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AUG 20 2015

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Director, Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555-0001

**SUSQUEHANNA STEAM ELECTRIC STATION
10 CFR 71.95 REPORT REGARDING
ENERGY SOLUTIONS 8-120B CASK CERTIFICATE
OF COMPLIANCE 9168
PLA-7374**

**Docket Nos. 50-387
and 50-388**

Talen Energy, Susquehanna Nuclear, LLC hereby submits the attached report in accordance with 10 CFR 71.95(a)(3). Licensees are required to submit a report regarding the instances in which the conditions of approval in the Certificate of Compliance for the 8-120B Cask (Certificate of Compliance #9168) were not observed when making a shipment. The circumstances regarding the need to submit this report are described in Energy Solutions Report, CD15-0149, dated June 24, 2015 (Enclosure 1).

Susquehanna Nuclear, LLC has made four (4) shipments with an affected cask (numbers 8-120B-1, 8-120B-2, 8-120B-6 and 8-120B-1S) during the affected 21-month period as described in the Energy Solutions report. Information regarding the four shipments made by Susquehanna Nuclear, LLC is included in Enclosure 2 to this letter.

If you have any questions regarding this letter, please contact Mr. Jeffery N. Grisewood, Manager, Nuclear Regulatory Affairs, at (570) 542-1330.

This letter contains no new regulatory commitments.


J. A. Franke

- Enclosure 1) Energy Solutions Report, CD15-0149, dated June 24, 2015
Enclosure 2) List of Susquehanna Nuclear, LLC Shipments Using the Affected Energy Solutions 8-120B Cask

Copy: Mr. J. E. Greives, NRC Sr. Resident Inspector
Mr. D. E. Jackson, NRC Region I
Mr. J. A. Whited, NRC Project Manager
Mr. M. Shields, PA DEP/BRP

Enclosure 1 to PLA-7374

**Energy Solutions Report CD15-0149,
dated June 24, 2015**



ENERGYSOLUTIONS

June 24, 2015

CD15-0149

Mark Lombard, Director
Division of Spent Fuel Management
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington DC 20555-0001

ATTN: Document Control Desk

Subject: 10 CFR 71.95 Report on the 8-120B Cask

Dear Mr. Lombard:

EnergySolutions hereby submits the attached report providing the information required by 10 CFR 71.95(a)(3) for instances in which the conditions of approval in the Certificate of Compliance for the 8-120B Cask (Certificate of Compliance #9168) may not have been observed in making certain shipments. The circumstances described in this report are applicable to approximately 235 shipments made by EnergySolutions as a licensee and user of the 8-120B cask over a 21 month period.

If you have any questions regarding this submittal, please contact me at 801-649-2109.

Daniel B. Shrum



Senior Vice President, Regulatory Affairs
EnergySolutions LLC

Dan Shrum
Jun 24 2015 2:58 PM

CSign

Attachment: Failure to Observe Certificate of Compliance Conditions for the 8-120B Vent Port Leak Pre-Shipment Leak Test

cc: Michele Sampson, Chief
Spent Fuel Licensing Branch

Pierre M. Saverot
Licensing Branch

**Failure to Observe Certificate of Compliance Conditions
for the 8-120B Vent Port Pre-Shipment Leak Test**

June 24, 2015

1) Abstract

During the vent port seal pre-shipment leak rate test, a neoprene gasket that was added under the test manifold may have reduced the test sensitivity below the required value. The test manifold and gasket are not licensed packaging components. The gasket was added to the test manifold on some or all shipments to more reliably seal the manifold, saving test time and reducing personnel exposures. The amount of reduction of the test sensitivity cannot be determined for any particular shipment due to several reasons as discussed below. The gasket may have been used on as many as 100 shipments by EnergySolutions as the licensee from September 2013 through June 2015. The condition was determined not to have significant safety consequence because the seals receive periodic helium leak testing as required by the SAR, the vent ports are only opened rarely, there is a margin of conservatism of approximately a factor of 9 on the prescribed vent port leak rate test, and there have been no observations of contamination around the vent port openings that would suggest leakage. There will be no further tests made using the gaskets since EnergySolutions has replaced all of the subject gaskets with a modified version that does not have the potential to reduce the test sensitivity.

It is uncertain whether, or by how much, the sensitivity of the vent port pre-shipment leak tests was reduced because: 1) Use of the gasket was optional- the gasket may, or may not have been in place for the tests, and 2) The force with which the gasket was compressed during testing is unknown, so it is uncertain if caused the gasket to constrict onto the head of the vent port cap screw.

2) Narrative Description of the Event

a) Status of Components

All of the 8-120B packaging components are operating normally. The neoprene gaskets that caused the event have all be removed from service and replaced with a new manifold gasket, as discussed in (4) below.

b) Dates of Occurrences

From September 2013, when pre-shipment leak tests were first performed using the neoprene gasket, to present, approximately 100 shipments were made by EnergySolutions as the licensee. Most of these shipments used the neoprene gasket to perform the pre-shipment leak rate test of the vent port.

c) Cause of Error

New 8-120B lids went into service in September 2013. It was found that the manifold sometimes had problems sealing with the vent port on these new lids. EnergySolutions personnel found that adding an extra neoprene gasket helped to reduce the false test failures. Since the pre-shipment leak rate test is performed in a radiation environment, false failures are undesirable because they increase the personnel exposure. The personnel did not realize that the gaskets had the potential to reduce the test sensitivity.

Attachment 1 has a detailed description of the test configuration.

d) Failure Mode, Mechanism, and Effects

The neoprene gasket can constrict on the head of the vent port plug cap screw when it is compressed by the bottom end of the test manifold stinger, which could reduce the sensitivity of the pre-shipment leak test. Consequently, the vent port pre-shipment leak tests performed using the neoprene gasket may not have provided the required test sensitivity of 1×10^{-3} ref-cm³/sec.

e) Systems or Secondary Functions Affected

Not applicable.

f) Method of Discovery of the Error

On Monday June 1, 2015, an 8-120B cask user identified a concern that the neoprene gasket could potentially affect the integrity of the vent port seal pre-shipment leak test. Later that week EnergySolutions performed a bench test that confirmed that the neoprene gasket can constrict on the head of the vent port plug cap screw when it is compressed by the manifold, resulting in a reduction of the test sensitivity.

3) Assessment of Safety Consequences

Pre-shipment leak tests of all containment seals, including the vent port, were performed prior to every shipment in accordance with the requirements of Chapter 7 of the SAR. In addition, periodic and maintenance leak tests of the containment seals, using helium as the test gas, were performed after maintenance, repair, or replacement of the containment seals in accordance with the requirements of Chapter 8 of the SAR.

The 8-120B preshipment leak rate test criteria were sized for the large primary lid. Since the vent port has a much smaller test volume, the test specification is conservative. Calculations show that the test specified in the SAR is a factor of 9 more sensitive than the 1×10^{-3} ref-cm³/sec required by Chapter 8 of the SAR. However, due to the uncertainties in the effects of the gasket, and the behavior of seals in series, it is not possible to confirm whether the reduction in sensitivity is offset by the test criteria conservatism.

There has been no indication of any leakage from the vent port from any shipment, and therefore, no exposure of individuals to radiation or radioactive materials due to the gaskets. It is also noted that it is unusual for the vent port seal to be opened during cask operations, in which case the previous helium leak test of the vent port seal provides added assurance of seal integrity.

Therefore, it is concluded that there has been no safety consequence from performing vent port pre-shipment leak tests that may not have provided the required test sensitivity of 1×10^{-3} ref-cm³/sec.

4) Planned Corrective Actions

EnergySolutions has taken corrective actions to assure that use of the old neoprene gasket design for the vent port pre-shipment leak test is immediately discontinued.

- EnergySolutions notified all 8-120B cask users with upcoming shipments to require use of a new procedure, in conjunction with the new manifold gasket design, for pre-shipment leak testing of the vent port seal on all future shipments.
- EnergySolutions designed and tested new manifold gasket design that does not constrict onto the head of the vent port plus screw when compressed, and therefore it does not reduce the test sensitivity. The new gaskets have been distributed to all upcoming shipment users. The new manifold gasket design is shown in Attachment 1.

The EnergySolutions drawing for the 8-120B air drop manifold have been revised to include the new gasket seal, and the air pressure drop test procedure TR-TP-002 has been revised to incorporate the new pre-shipment leak test procedure for the vent port. Use of the new procedure and the new manifold gasket will assure that the pre-shipment leak test satisfies the required test sensitivity and that the manifold gasket is removed from the test port after completing the pre-shipment leak test.

5) Previous Similar Events Involving the 8-120B

No previous similar events have been identified.

6) Contact for Additional Information

Dan Shrum

EnergySolutions

Senior Vice President, Regulatory Affairs

(801) 649-2109

7) Extent of Exposure of Individuals to Radiation or Radioactive Materials

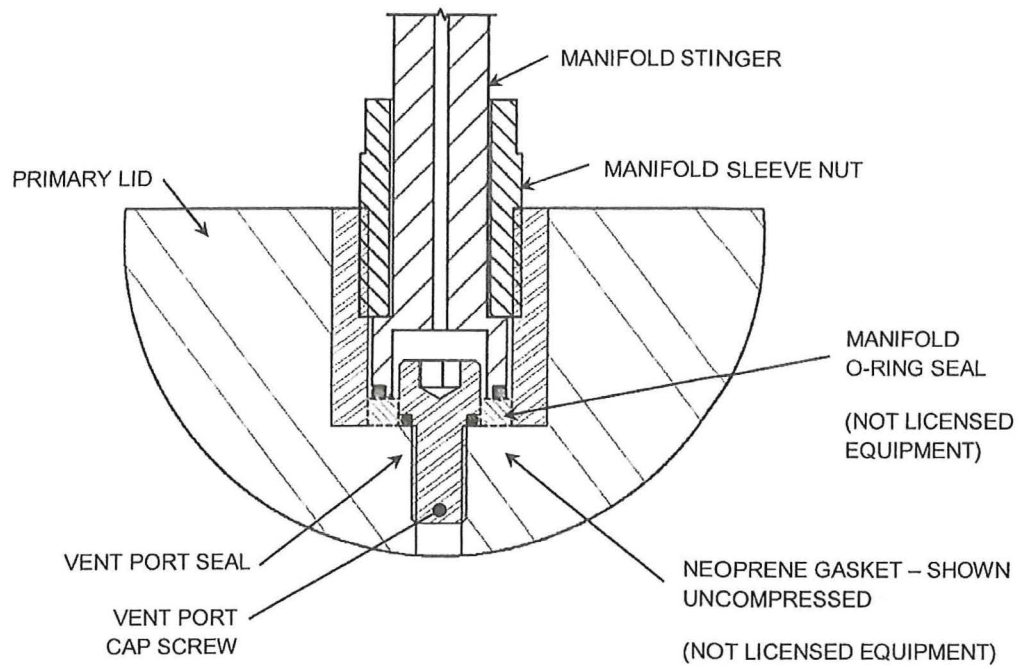
None.

Attachment 1

Details of the 8-120B Vent Port Leak Rate Test Setup

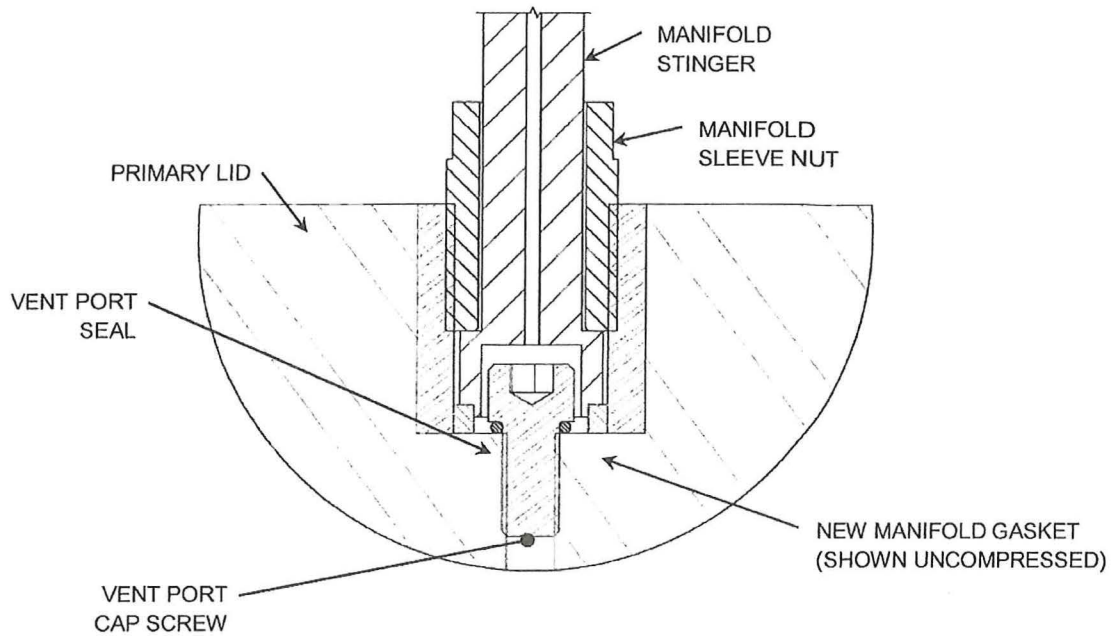
The 8-120B CoC requires the package to be prepared for shipment and operated in accordance with Chapter 7 of the SAR, and tested and maintained in accordance with Chapter 8 of the SAR. Step 7.1.14 of the SAR requires a pre-shipment leak test of the primary lid, secondary lid, and vent port seals to be performed in accordance with Section 8.3.2.2 prior to every shipment to assure that the containment system is properly assembled. Per Table 8-2 of the SAR, the pre-shipment leak test of the vent port is performed by connecting a test manifold to the vent port, pressurizing the seal and head of the vent port cap screw to 18 psig with dry air or nitrogen, and monitoring the pressure for at least 15 minutes to assure that it does not drop by more than 0.1 psig.

The pre-shipment leak test of the vent port is a pressure drop test performed using a dedicated test manifold. The test manifold is not a part of the licensed package. It includes a stinger (shown below), an O-ring seal that contacts the stinger and the bottom of the vent port hole, and a sleeve nut to compress the O-ring seal. The test manifold was designed so that it surrounds the vent port cap screw, leaving a small gap between itself and the vent port cap screw. The 8-120B cask fleet began to ship with a new lid design in September 2013, and operations staff noted more frequent difficulty getting the manifold to seal. It became desirable to find a better way to seal the bottom of the manifold in order to minimize operator exposure. They found that adding a neoprene gasket (also not part of the licensed package) under the base of the stinger as shown below helped reduce testing time and exposure.



Corrective Action – Modified Test Seal

The new manifold gasket design, shown below, replaces the manifold O-ring seal and neoprene gasket previously used with a neoprene gasket that fits within the notch at the base of the manifold stinger.



Enclosure 2 to PLA-7374

**List of Susquehanna Nuclear, LLC
Shipments Using the Affected Energy
Solutions 8-120B Cask**

**List of Susquehanna Nuclear, LLC Shipments Using the
Affected Energy Solutions 8-120B Cask**

Shipment Date	User Shipment ID	Cask CoC	User Manifest ID
3/30/2015	15-026	8-120B-2	15-026
4/09/2015	15-027	8-120B-6	S150077
6/02/2015	15-032	8-120B-1S	S150106
6/16/2015	15-033	8-120B-1	15-033

Shipment 15-026

FORM 540 (6-97) ENERGYSOLUTIONS BARNWELL PROCESSING FACILITY UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER		5. SHIPPER -NAME AND FACILITY PPL Susquehanna, LLC Susquehanna SES (KJM) 769 Salem Blvd Berwick, PA 18603		SHIPPER I.D. NUMBER N/A		7. FORM 540 AND 540A PAGE 1 OF <u>1</u> PAGE(S) FORM 541 AND 541A <u>1</u> PAGE(S) FORM 542 AND 542A <u> </u> PAGE(S) ADDITIONAL INFORMATION <u> </u> PAGE(S)		8. MANIFEST NUMBER (Use this number on all continuation pages) 15-026	
		S.C. TRANSPORT PERMIT NUMBER: <u>0162-37-15-X</u>		SHIPMENT NUMBER 15-026		GENERATOR TYPE (Specify) NP		9. CONSIGNEE - Name and Facility Address <u>RS</u> Barnwell Processing Facility Duratec Consolidation and Services Facility 18043 Dunbarton Boulevard Barnwell, SC 29812	
		CONTACT Kimberly Murchison		TELEPHONE NUMBER (Include Area Code) (570)542-3169		CONTACT Roger Betow		TELEPHONE NUMBER (Include Area Code) (800)607-6199	
1. EMERGENCY TELEPHONE NUMBER (Include Area Code) <u>(570)542-3907</u>		ORGANIZATION Shift Manager		2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST =====> <u>1</u>		6. CARRIER - Name and Address Hittman Transport Services (C) 740 Osborn Road Barnwell, SC 29812	
4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If "Yes," provide Manifest Number =====>		EPA MANIFEST NUMBER N/A		CONTACT Roger Betow		EPA ID NUMBER N/A		SHIPPING DATE 03/30/2015	
11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including UN ID number, proper shipping name, hazard class, and any additional information)		12. DOT LABEL "RADIOACTIVE" YELLOW III		13. TRANSPORT INDEX 4.0		14. PHYSICAL AND CHEMICAL FORM Solid/ Metal Oxides		15. INDIVIDUAL RADIONUCLIDES H-3 Mn-54 Co-58 Ni-63 Sr-89 Nb-95 (I-129-LLD)	
UN2916, Radioactive material, Type B(U) package, 7 RQ - Radionuclides 1 Metal Cask Dewatered Reactor Water Clean-up Resin								16. TOTAL PACKAGE ACTIVITY MBq mCi 5.76E+06 (1.56E+05)	
								17. LSA/SCO CLASS N/A	
								18. TOTAL WEIGHT AND OR VOLUME (Use appropriate units) 29756.2 Kg 65600.0 Lbs	
								19. IDENTIFICATION NUMBER OF PACKAGE USA9168(B)(U)-95 8-1208-2	
20. "Certification is hereby made to the South Carolina Department of Health and Environmental Control that this shipment of low-level radioactive waste has been inspected in accordance with the requirements of South Carolina Radioactive Material License 287-04 as amended, and the effective consolidation facility acceptance criteria, within 48 hours prior to shipment, and further certification is made that the inspection revealed no items of non-compliance with all applicable laws, rules and regulations."									
Date <u>3/30/15</u> Signature <u>K. Smith</u> Title and Organization <u>RPShipper</u> Telephone No. <u>(800)573-9703</u>									

FORM 541 (10-96)										ENERGYSOLUTIONS BARNWELL PROCESSING FACILITY										1. MANIFEST TOTALS										2. MANIFEST NUMBER		
UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST										NUMBER OF PACKAGES/ DISPOSAL CONTAINERS		NET WASTE VOLUME		NET WASTE WEIGHT		SPECIAL NUCLEAR MATERIAL (grams)						15-026										
CONTAINER AND WASTE DESCRIPTION										1		m3 2.832		kg 2507.0		U-233		U-235		Pu		TOTAL		3.								
										t3 100.00		lb 5527.0		N P		N P		N P		N P		PAGE 1 PAGE OF 1 PAGE(S)										
										Activity(MBq/mCi)										SOURCE		4. SHIPPER NAME										
										ALL NUCLIDES		TRITIUM		C-14		Tc-99		I-129		PPL Susquehanna, LLC												
Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste										MBq		5.78E+06		6.19E+02		2.20E+03		(6.10E+00)		(9.37E-01)		kg NP		SHIPMENT ID NUMBER								
										mCi		1.56E+05		2.21E+01		5.93E+01		(2.19E-01)		(2.53E-02)		lb NP		N/A								
DISPOSAL CONTAINER DESCRIPTION										WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER																						
5. CONTAINER IDENTIFICATION NUMBER/ S.C. TRANSPORT PERMIT NUMBER		6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)		7. VOLUME		8. WASTE AND CONTAINER WEIGHT		9. SURFACE RADIATION LEVEL		10. SURFACE CONTAMINATION		11. PHYSICAL DESCRIPTION			14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION				16. WASTE CLASSIFICATION											
				m3 ft3		kg lb		mSv/hr mrem/hr		MBq/100 cm2 dpm/100 cm2		11. WASTE DESCRIPTOR (See Note 2 & Note 2A)			12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER		13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)		CHEMICAL FORM / CHELATING AGENT		WEIGHT % CHELATING AGENT IF > 0.1 %		INDIVIDUAL RADIONUCLIDES AND ACTIVITY AND CONTAINER TOTAL: OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT				AS - Class A S - Stable AU - Class A U - Unstable B - Class B C - Class C					
										ALPHA BETA-GAMMA					m3 ft3								RADIONUCLIDES (SNM Grams/Source Kilograms)				MBq		mCi			
L10-09 (original survey)		13-A		3.407		2903.0 Kg		920.000		< 3.33E-07 < 1.67E-05		26 G H I			2.832		100		Metal Oxides		N P		H-3				8.19E+02		2.21E+01		AS	
				120.30		6400.0 Lbs		92000.0		< 20 < 1000					100.00				N P				C-14				2.20E+03		5.93E+01			
		PO-006727-1 EnergySolutions, LLC CNS PL8-120 DHEC-HIC-PL-001																					Mn-54				6.64E+03		1.79E+02			
																							Fe-55				2.88E+06		7.79E+04			
																							Co-58				6.24E-04		1.89E-05			
																							Co-60				2.60E+06		7.03E+04			
																							Ni-63				2.49E+05		6.72E+03			
																							Zn-65				5.80E+03		1.57E+02			
																							Sr-89				5.39E-09		1.46E-13			
																							Sr-90				1.34E+02		3.62E+00			
																							Nb-95				2.08E-14		5.62E-16			
																							Cs-137				1.70E+04		4.59E+02			
																							Tc-99				(8.10E+00)		(2.19E-01)			
																							I-129				(9.37E-01)		(2.53E-02)			
																							TOTALS:				5.76E+06		1.56E+05			
Shipment Total:				3.407		2903.0																										
				120.30		6400.0																					5.70E+06		1.56E+05			

NOTE 1: Container Description Codes. For containers/waste requiring disposal in approved structural overpacks, the numerical code must be followed by "-OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner

9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other. Describe in item 6, or additional page

NOTE 1A: Barnwell Specific Container Description Codes (Choose one code as may be applicable.)

A High Integrity Container - Poly
B High Integrity Container - Poly with Steel Shell
C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

NOTE 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous

29. Demolition Rubble
30. Cation Ion-Exchange Media
31. Anion Ion-Exchange Media
32. Mixed Bed Ion-Exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating

38. Evaporator Bottoms/Sludges/Concentrates
39. Compatible Trash
40. Noncompatible Trash
41. Animal Carcass
42. Biological Material (except animal carcass)
43. Activated Material
59. Other. Describe in item 11, or additional page

NOTE 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes.)

G Dewatered
H Solid
J Combustible
K Air Filtration Filters
L Asbestos

NOTE 3: Solidification and Stabilization Media Codes. For media meeting disposal site structural stability requirements, the numerical code must be followed by "-S". For all solidification media, the vendor and brand name must also be identified in item 13, Code 100 = None Required.

Solidification
90. Cement
91. Concrete (Encapsulation)
92. Silumen
93. Vinyl Chloride

94. Vinyl Ester Stryane
99. Other. Describe in item 13 or additional page
100. None Required

NOTE 3A: Barnwell Specific Solidification and Stabilization Media Codes. (Choose this code if applicable.)

M Wax Binder

Shipment 15-027

FORM 540 (6-97) R&W 8.2.1

FORM 541 (10-95)										ENERGYSOLUTIONS BARNWELL PROCESSING FACILITY										1. MANIFEST TOTALS										2. MANIFEST NUMBER	
UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST										NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME		NET WASTE WEIGHT		SPECIAL NUCLEAR MATERIAL (grams)				SOURCE		3.										
															U-233	U-235	Pu	TOTAL													
											1	m3	1.982	kg	1599.8	N P	N P	N P	N P	4. SHIPPER NAME											
											ft3	70.00	lb	3527.0	Activity(MBq/mCi)				SHIPMENT ID NUMBER												
		ALL NUCLIDES		TRITIUM		C-14		Tc-99		I-129				N/A																	
MBq		3.58E+06		5.09E+02		1.37E+03		(5.17E+00)		(5.98E-01)		kg NP																			
mCi		9.67E+04		1.38E+01		3.69E+01		(1.40E-01)		(1.62E-02)		lb NP																			
DISPOSAL CONTAINER DESCRIPTION										WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER										16.											
5.	6.	7.	8.	9.	10.		11.			12.	13.	14.		15.		16.															
CONTAINER IDENTIFICATION NUMBER/ S.C. TRANSPORT PERMIT NUMBER	CONTAINER DESCRIPTION (See Note 1 & Note 1A)	VOLUME m3 ft3	WASTE AND CONTAINER WEIGHT kg lb	SURFACE RADIATION LEVEL mSv/hr mrem/hr	SURFACE CONTAMINATION MBq/100 cm2 dpm/100 cm2		WASTE DESCRIPTOR (See Note 2 & Note 2A)	APPROXIMATE WASTE VOLUME(S) IN CONTAINER m3 ft3	SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)	CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1 %	INDIVIDUAL RADIONUCLIDES AND ACTIVITY AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT		RADIONUCLIDES [SNN Grams/Source Kilograms]			MBq	mCi													
L10-10(original Surv ey)	13-A	3.407	1995.8 Kg	823.000	< 3.33E-07	< 1.67E-05	32 G H	1.982	100	Metal Oxides	N P	H-3	5.09E+02	1.38E+01	A S																
		120.30	4400.0 Lbs	82300.0	< 20	< 1000		70.00		N P		C-14	1.37E+03	3.69E+01																	
	PO-006727-2 EnergySolutions, LLC CNS FLB-120 DHEC-HIC-PL-001											Mn-54	4.10E+03	1.11E+02																	
												Fe-55	1.79E+06	4.83E+04																	
												Co-58	3.77E-04	1.02E-05																	
												Co-60	1.62E+06	4.37E+04																	
												Ni-63	1.55E+05	4.18E+03																	
												Zn-65	3.56E+03	9.67E+01																	
												Sr-89	3.22E-06	8.69E-11																	
												Sr-90	8.33E+01	2.25E+00																	
												Nb-95	1.22E-14	3.26E-16																	
												Cs-137	1.06E+04	2.85E+02																	
												Tc-99	(5.17E+00)	(1.40E-01)																	
												I-129	(5.98E-01)	(1.62E-02)																	
												TOTALS:	3.58E+06	9.67E+04																	
Shipment Total:		3.407	1995.8																												
		120.30	4400.0										3.58E+06	9.67E+04																	

NOTE 1: Container Description Codes. For containers/waste requiring disposal in approved structural overpacks, the numerical code must be followed by "OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner

9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
15. Other. Describe in item 6, or additional page

NOTE 1A: Barnwell Specific Container Description Codes (Choose one code as may be applicable.)

A High Integrity Container - Poly
B High Integrity Container - Poly with Steel Shell
C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

Note 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous

29. Demolition Rubble
30. Cation Ion-Exchange Media
31. Anion Ion-Exchange Media
32. Mixed Bed Ion-Exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating

38. Evaporator Bottoms/Sludges/Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (except animal carcasses)
43. Activated Material
59. Other. Describe in item 11, or additional page

Note 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes)

G Dewatered
H Solid
I Combustible
J Non-Combustible
K Air Filtration Filters
L Asbestos

NOTE 3: Solidification and Stabilization Media Codes. For media meeting disposal site structural stability requirements, the numerical code must be followed by "S". For all solidification media, the vendor and brand name must also be identified in item 13. Code 100 = None Required.

90. Cement
91. Concrete
(Encapsulation)
92. Bitumen
93. Vinyl Chloride

94. Vinyl Ester Styrene
99. Other. Describe in item 13 or additional page
100. None Required

NOTE 3A: Barnwell Specific Solidification and Stabilization Media Codes (Choose one code if applicable)

M Wax Binder

Shipment 15-032

[illegible]

FORM 541 (10-96)				ENERGYSOLUTIONS BARNWELL PROCESSING FACILITY										1. MANIFEST TOTALS							2. MANIFEST NUMBER	
UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST CONTAINER AND WASTE DESCRIPTION Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste				NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME	NET WASTE WEIGHT	SPECIAL NUCLEAR MATERIAL (grams)				SOURCE		SHIPMENT ID NUMBER									
							U-233	U-235	Pu	TOTAL												
				1	m3	2.832	kg	1781.3	N P	N P	N P	N P										
					ft3	100.00	lb	3927.0														
				Activity(MBq/mCi)																		
				ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129														
				MBq	1.35E+07	(4.20E+02)	(1.73E+02)	(1.44E+02)	(4.95E+00)	kg	N P											
				mCi	3.65E+05	(1.14E+01)	(4.67E+00)	(3.88E+00)	(1.34E-01)	lb	N P											
DISPOSAL CONTAINER DESCRIPTION						WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER										16. WASTE CLASSIFICATION AS - Class A Stable AU-Class A Unstable B-Class B C-Class C						
5. CONTAINER IDENTIFICATION NUMBER/ S.C. TRANSPORT PERMIT NUMBER	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME m3 ft3	8. WASTE AND CONTAINER WEIGHT kg lb	9. SURFACE RADIATION LEVEL mSv/hr mrem/hr	10. SURFACE CONTAMINATION MBq/100 cm2 dpm/100 cm2		11. WASTE DESCRIPTION (See Note 2 & Note 2A)		12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER m3 ft3	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)	14. CHEMICAL DESCRIPTION CHEMICAL FORM / CHELATING AGENT		15. RADIOLOGICAL DESCRIPTION INDIVIDUAL RADIONUCLIDES AND ACTIVITY AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT									
					ALPHA	BETA-GAMMA																
L15-01	13-A	3.407	2177.3 Kg	1500.000	< 3.33E-07	< 1.67E-05	32	2.832	100	Metal Oxides	N P	Mn-54	3.30E+05	8.92E+03	A U							
		120.30	4800.0 Lbs	150000.0	< 20	< 1000		100.00		N P		Fe-55	4.76E+06	1.29E+05								
	PO620467-9 EnergySolutions, LLC CNS PLB-120 DHEC-HIC-PL-001											Co-57	1.63E+03	4.40E+01								
												Co-58	7.57E+02	2.05E+01								
												Co-60	8.05E+06	2.18E+05								
												Ni-63	2.35E+05	6.35E+03								
												Zn-65	1.27E+05	3.42E+03								
												Sr-89	3.82E-01	1.03E-02								
												Sr-90	3.58E+01	9.68E-01								
												Nb-95	1.07E-01	2.89E-03								
												Cs-137	7.68E+03	2.08E+02								
												H-3	(4.20E+02)	(1.14E+01)								
												C-14	(1.73E+02)	(4.67E+00)								
												Tc-99	(1.44E+02)	(3.88E+00)								
												I-129	(4.95E+00)	(1.34E-01)								
Shipment Total :		3.407	2177.3									TOTALS:	1.35E+07	3.65E+05								
		120.30	4800.0										1.35E+07	3.65E+05								

NOTE 1: Container Description Codes. For containers/waste requiring disposal in approved structural overpacks, the numerical code must be followed by "OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner

9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other. Describe in item 6, or additional page

NOTE 1A: Barnwell Specific Container Description Codes (Choose one code as may be applicable.)

A High Integrity Container - Poly
B High Integrity Container - Poly with Steel Shell
C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

Note 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous

29. Demolition Rubble
30. Cation Ion-Exchange Media
31. Anion Ion-Exchange Media
32. Mixed Bed Ion-Exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating

38. Evaporator Bottoms/Sludges/Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (except animal carcass)
43. Activated Material
59. Other. Describe in item 11, or additional page

Note 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes.)

G Dehydrated
H Solid
I Combustible
J Non-Combustible
K Air Filtration Filters
L Asbestos

NOTE 3: Solidification and Stabilization Media Codes. For media meeting disposal site structural stability requirements, the numerical code must be followed by "S". For all solidification media, the vendor and brand name must also be identified in item 13. Code 100 = None Required.

90. Cement
91. Concrete
92. Bitumen
93. Vinyl Ester Styrene
94. Other. Describe in item 13 or additional page
99. None Required
100. None Required
55. Vinyl Chloride

NOTE 3A: Barnwell Specific Solidification and Stabilization Media Codes. (Choose this code if applicable)

M Wax Binder

Shipment 15-033

[illegible]

FORM 541 (10-96)		ENERGYSOLUTIONS BARNWELL PROCESSING FACILITY										1. MANIFEST TOTALS							2. MANIFEST NUMBER			
UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST CONTAINER AND WASTE DESCRIPTION Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste												NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME		NET WASTE WEIGHT		SPECIAL NUCLEAR MATERIAL (grams)				TOTAL	15-033
													1	m3	2.832	kg	1781.3	U-233	U-235	Pu		
												ft3		100.00	lb	3927.0	N P	N P	N P	N P	SOURCE	4. SHIPPER NAME PPL Susquehanna, LLC
												Activity(MBq/mCi)		ALL NUCLIDES		TRITIUM		C-14	Tc-99	I-129		
MBq		1.04E+07		(4.20E+02)		(1.73E+02)	(1.44E+02)	(4.95E+00)	kg	NP												
mCi		2.81E+05		(1.14E+01)		(4.67E+00)	(3.88E+00)	(1.34E-01)	lb	NP												
DISPOSAL CONTAINER DESCRIPTION										WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER										16. WASTE CLASSIFICATION AS - Class A Stable AU-Class A Unstable B-Class B C-Class C		
5. CONTAINER IDENTIFICATION NUMBER/ S.C. TRANSPORT PERMIT NUMBER	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	10. SURFACE CONTAMINATION		11. PHYSICAL DESCRIPTION			14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION										
		m3 ft3	kg lb	mSv/hr mrem/hr	ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER m3 ft3	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)	CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1 %	INDIVIDUAL RADIONUCLIDES AND ACTIVITY AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT										
L15-02/ 0162-37-15-X	13-A	3.407	2177.3 Kg	1000.000	< 3.33E-07	< 1.67E-05	32 G	2.832	100	Metal Oxides	N P	Mn-54	2.64E+05	7.13E+03	A U							
		120.30	4800.0 Lbs	100000.0	< 20	< 1000		100.00		N P		Fe-55	3.67E+06	9.93E+04								
	PO644380-8 EnergySolutions, LLC CNS PL8-120 DHEC-HIC-PL-001											Co-57	1.31E+03	3.55E+01								
												Co-58	7.26E+02	1.96E+01								
												Co-60	6.16E+06	1.66E+05								
												Ni-63	1.78E+05	4.82E+03								
												Zn-65	1.03E+05	2.77E+03								
												Sr-89	4.03E-01	1.09E-02								
												Sr-90	2.72E+01	7.35E-01								
												Nb-95	1.30E-01	3.53E-03								
												Cs-137	5.83E+03	1.58E+02								
												H-3	(4.20E+02)	(1.14E+01)								
												C-14	(1.73E+02)	(4.67E+00)								
												Tc-99	(1.44E+02)	(3.88E+00)								
												I-129	(4.95E+00)	(1.34E-01)								
Shipment Total :		3.407	2177.3									TOTALS:	1.04E+07	2.81E+05								
		120.30	4800.0										1.04E+07	2.81E+05								

NOTE 1: Container Description Codes. For containers/waste requiring disposal in approved structural overpacks, the numerical code must be followed by "OP."

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6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner

9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other. Describe in item 6, or additional page

NOTE 1A: Barnwell Specific Container Description Codes (Choose one code as may be applicable.)

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C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

Note 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous

29. Demolition Rubble
30. Cation Ion-Exchange Media
31. Anion Ion-Exchange Media
32. Mixed Bed Ion-Exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating

38. Evaporator Bottoms/Sludges/Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (except animal carcasses)
43. Activated Material
59. Other. Describe in item 11, or additional page

Note 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes.)

G Dewatered
H Solid
I Combustible
J Non-Combustible
K Air Filtration Filters
L Asbestos

NOTE 3: Solidification and Stabilization Media Codes. For media meeting disposal site structural stability requirements, the numerical code must be followed by "S". For all solidification media, the vendor and brand name must also be identified in item 13. Code 100 = None Required.

90. Cement
91. Concrete
92. Bitumen
93. Vinyl Chloride

94. Vinyl Ester Styrene
99. Other. Describe in item 13 or additional page
100. None Required

NOTE 3A: Barnwell Specific Solidification and Stabilization Media Codes. (Choose this code if applicable)

M Wax Binder