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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
 DIVISION OF RADIOLOGICAL HEALTH
 William R. Snodgrass TN Tower 312 Rosa L. Parks Avenue, 15th Floor Nashville, TN 37243
 615-532-0364

RADIOACTIVE MATERIAL LICENSE

Amendment 139

Pursuant to Tennessee Department of Environment and Conservation Regulations, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules and regulations of the Tennessee Department of Environment and Conservation and orders of the Division of Radiological Health, now or hereafter in effect and to any conditions specified below.

1. Name EnergySolutions Services, Inc. 2. Address 1560 Bear Creek Road Oak Ridge, TN 37830		3. License number R-73006-L24	
		4. Expiration date December 31, 2024	
		5. File no. R-73006	
6. Radioactive Material (Element and Mass Number)	8. Chemical and/or physical form	9. Maximum Radioactivity and/or quantity of material which licensee may possess at any one time.	
SEE SUPPLEMENTARY SHEETS			

10. Authorized Use

SEE SUPPLEMENTARY SHEETS

CONDITIONS

11. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

For the Commissioner
 Tennessee Department of Environment and Conservation

Date of Issuance: September 12, 2017

By: _____

Division of Radiological Health
 Ronald J. Parsons, Environmental Consultant



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6. Radioactive Material (Element and <u>Mass Number</u>)	8. Chemical and/or <u>Physical Form</u>	9. Maximum Radioactivity and/or Quantity of Material Which Licensee May <u>Possess at Any One Time</u>
A. Mixed activation and fission products with atomic numbers 3-83 inclusive (not Carbon 14 or Iron 55)	A. Any form suitable for transport under U.S. DOT Regulations	A. 500 Curies
B. Hydrogen 3	B. Same as 8.A.	B. 500 Curies
C. Carbon 14.	C. Same as 8.A.	C. 100 Curies
D. Iron 55	D. Same as 8.A.	D. 500 Curies
E. Polonium 210	E. Same as 8.A.	E. 20 Curies
F. Radium 226	F. Same as 8.A.	F. 20 Curies
G. Thorium 232	G. Same as 8.A.	G. 20 Curies
H. Uranium-depleted and Natural	H. Same as 8.A.	H. 100 Curies
I. Uranium (not Uranium 233, Uranium 235, or Uranium 238)	I. Same as 8.A.	I. 2.5 Curies
J. Uranium 233	J. Same as 8.A.	J. 200 grams *
K. Uranium-enriched in Uranium 235	K. Same as 8.A.	K. 350 grams * of contained U-235
L. Plutonium	L. Same as 8.A.	L. 200 grams *
M. Americium 241	M. Same as 8.A.	M. 100 Curies



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N.	Transuranics (not Plutonium or Americium 241)	N.	Same as 8.A.	N.	2.5 Curies
O.	Radioactive materials with atomic numbers 84-91, inclusive (not Polonium 210, Radium 226, or Thorium 232)	O.	Same as 8.A.	O.	2.5 Curies
P.	Any radioactive material (except special nuclear)	P.	Sealed sources (Model numbers listed in NRC registry of Sealed Sources and Devices), surface-deposited disc and plane sources, and volumetric reference sources)	P.	No single source to exceed 5 millicuries. Total not to exceed 10 millicuries.

Note:

- * For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified here for the same kind of special nuclear material. The sums of such ratios for all kinds of special nuclear material in combination shall not exceed "1" (i.e., unity).

10. Authorized Use

10.A.through O. Receipt, possession, storage, unpacking, processing, decontamination, release for unrestricted use, repacking, and transfer of radioactive waste when packaged in accordance with U.S. Department of Transportation requirements for interstate commerce in accordance with statements, representations, and procedures contained in documents referenced in conditions of this license.

P. Instrumentation standardization and/or calibration sources.

Conditions (continued)



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12. The licensee shall comply with applicable provisions of 0400-20-04, 0400-20-05, 0400-20-10, and 0400-20-13 of "State Regulations for Protection Against Radiation."

13. Radioactive material authorized by this license shall be used and stored at EnergySolutions Services, Inc., 628 Gallaher Road, Kingston, TN 37763.

14.A. Radioactive material authorized by this license shall be used by, or under the supervision of, the following Authorized Users as specified:
Site Operations

1. An Operations Authorized User shall be on-site during all licensed operations as specified per Section VI, items B, C, D, and F of application dated May 29, 2014, with attachments.
2. A Radiation Safety Technician (RST) shall be present on-site during all licensed operations as specified per Section VI, items B, C, D, and F of application dated May 29, 2014, with attachments.
3. Operations Authorized Users

Phillip Booher, Brian Crabtree, Jeff Dickinson, Clint Evans, Leona Gillam, Eddie James, Keith Schillings, Donna Webb, Brian Parsons, Roger Jones, Josh Cox, Chris Thurman, or Jack Clark

Site Logistics

1. A Logistics Authorized User shall be on-site during all licensed operations involving the movement and transshipment of radioactive material.
2. A Radiation Safety Technician (RST) shall be present on-site during all licensed operations as specified per Section VI, items A and E of application dated May 29, 2014, with attachments.

Site Logistics Authorized Users

Nick Arden, Brian Mayes, Brad Melton, Fred Schulz, Jason Stafford, Brett Grizzard, Don McCullough, David Phillips, Tracy Shelton, Ronald Hamilton, Mike Phillips, Dwayne Wilkey, Jeffery Saffell, or Allen Duncan

B. The Radiation Safety Officer for this license is Duane R. Quayle.



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15. A. The licensee shall develop and maintain a written radiation protection manual that ensures the implementation of the radiation protection program in accordance with "State Regulations for Protection Against Radiation" (SRPAR), ALARA, and documents referenced in conditions of this license. Changes to this manual require prior written approval from the Department.
- B. In addition, the licensee shall develop and implement written standard operating procedures to ensure all activities involving the handling and/or use of radioactive materials authorized by this license are carried out in a manner consistent with SRPAR, ALARA, the licensee's radiation protection manual, and the documents referenced in conditions of this license.
- C. These procedures may be modified without prior approval of the Department when deemed appropriate and documented by the Radiation Safety Officer. However, adherence to the current procedures as written shall be considered a condition of this license. The written procedures required by this condition shall be available for inspection by the Department. A copy of the current procedures shall be forwarded to the Department upon request.
16. Bulk Survey for Release (BSFR)
- A. The licensee is authorized to conduct the Bulk Waste Assay Program (BWAP) which includes Green is Clean (GIC) processing, Safe Check gamma processing, Safe Check non-gamma processing, and Decay Check. The BWAP shall be conducted in accordance with statements, representations, and procedures contained in documents referenced in conditions of this license. The Radium 226 disposal limit for Carter Valley Landfill, North Shelby Landfill, and South Shelby Landfill will be 5 pCi per gram.
- B. The licensee is authorized to implement BWAP release limits for Carter Valley Landfill, North Shelby Landfill, and South Shelby Landfill disposal of Safe Check and Decay Check program licensed material in accordance with statements, representations, and procedures contained in application dated May 29, 2014, with attachments, letter dated April 15, 2015, with attachments, letter dated January 29, 2016, with attachments, including "Technical Basis for Safe Check and Decay Check Conditional Release Limits," Revision 6., and letters dated November 15, 2016, with attachments, August 3, 2017, with attachments, and the most current BSFR concentration limits established by the Division of Radiological Health for Carter Valley Landfill, North Shelby Landfill, and South Shelby Landfill.



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- C. Records of all disposals made under this condition shall be submitted quarterly to the Division of Radiological Health, William R. Snodgrass Tennessee Tower, 15th Floor, 312 Rosa L. Parks Avenue, Nashville, Tennessee 37243. Monitoring of materials for contamination for release as authorized by this condition is only to be conducted at the licensee's facilities specified in Condition 13 of this license, and not at customer or other job sites.
- D. The licensee shall meet the requirements of the March 2017 "Licensing Requirements for Evaluation and Acceptance of Licensee Requests for the Disposal of Materials with Extremely Low Levels of Contamination in Class 1 (Subtitle D) Landfills."
- E. For calendar year 2017 the licensee is approved to dispose of 2102 tons of material in the Carter Valley Landfill. This is a combined disposal limit with EnergySolutions R-73016-G25. For calendar year 2017 the licensee is authorized to dispose of 871 tons of material in the North Shelby Landfill. For calendar year 2017 the licensee is authorized to dispose of 1279 tons of material in the South Shelby Landfill.
- 17. A. The Box Assay System shall be operated in accordance with the requirements and specifications found in the "Technical Basis for Design and Calibration of the EnergySolutions Box Assay System," Revision 2. Additionally, the waste density shall not exceed 3.0 g/cc, the volume of waste assayed in any single container shall have multiple counts to ensure each four-foot by six-foot cross section (or less) of the container or item is assayed by the system.
- B. The Gardian Assay System shall be operated in accordance with the requirements and specifications found in the "Technical Basis for Design, Calibration, and Operation of the Gardian Mobile Assay System," Revision 0.
- 18. The licensee is authorized to release asphalt/concrete from areas previously used for radioactive material storage in accordance with statements, representations, and procedures contained in the EnergySolutions Radiation Safety Guide (RSG-1). Asphalt/concrete released in accordance with this condition shall not be reintroduced to the general public for use as fill or recycling. Excavated material containing no detectable radioactivity when assayed in accordance with the current BWAP program requirements may be used as clean fill at the licensee's nearby Bear Creek site.
- 19. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste (radioactive material that has no further use that is dispositioned for disposal) may be possessed under this license (to also include waste generated under the authority of this license), from the time of receipt until its transfer from the facility, for a period of time greater than three hundred sixty five (365) days. The



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exceptions to this constraint are with respect to equipment, specifically licensed or otherwise authorized, and stored on-site for future use: (1) at a location authorized

by an EnergySolutions Services, Inc. Tennessee Radioactive Material License or (2) at a location where such equipment is authorized by the agency having jurisdiction.

- B. No radioactive material or radioactive waste may be stored so as to exceed the following stacking limits:

<u>Container Type</u>	<u>Stacking Limit</u>
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	2 high
5. Any other strong tight container	10 feet nominal

20. Radioactive material, contaminated equipment, and empty radioactive material containers may be stored in accordance with statements representations, and procedures contained in documents referenced in this license, provided that radiation levels for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in Title 49 Code of Federal Regulations (CFR), Part 171.8 or DOT approved strong tight containers. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored:

- Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions.
- Radiation levels from stored empty containers shall not exceed an average of 0.5 mR/hr, and hot spot activity shall not exceed 2 mR/hr.
- Outside storage of containers with radioactive waste and/or DOT Empty containers is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.
- Soil samples must be collected and analyzed at least quarterly along the edges of outside asphalt or concrete pads where radioactive materials are stored and along the perimeter fence to ensure that there is no buildup of radioactive contamination. Data from these samples must be maintained for inspection by the Department.



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5. Each designated outside storage area shall be equipped with identifiable markers (sign postings) at each corner to clearly identify the boundary of the bonded storage area. In addition, the space between these markers can be painted or otherwise marked to identify the storage area.
6. EnergySolutions Empty containers are permitted to be stored on any surface (e.g. paved, grass, dirt, or gravel) within any area of the facility that is routinely monitored by the environmental sampling program for radioactivity per the RSG-1.
7. Green is Clean Empty containers may be stored in any location within the facility.

The combined authorizations for storage granted by this license shall not exceed a total of 75, 928.4 square feet.

21. The licensee shall maintain complete and accurate records of the receipt and disposal of radioactive material. The licensee shall, for radioactive material no longer useful for any purpose and for any equipment or supplies contaminated with such material for which further use and decontamination are not planned, define those materials as radioactive waste and treat them as such in accordance with the following provisions:
 - A. Radioactive waste material shall not be stored with non-radioactive waste.
 - B. A written record of all radioactive waste material shall be maintained until it has been determined by a suitable survey or radioassay that it has decayed to background levels or until it has been shipped to an authorized recipient in accordance with applicable regulations. Accountability of radioactive waste material prepared for shipment but not yet shipped from the licensee's premises shall be maintained by the licensee by an internal record system such that the licensee is constantly aware of the material's location and the proposed time of shipment. Individuals who are involved in the shipping of such material and/or the storage of such material prior to shipment, shall be trained in the precautions necessary for such handling and storage.
 - C. For material which has decayed to background levels as determined by radioassay or external level as measured with appropriately calibrated instruments, records shall indicate that the material was determined to be no longer radioactive and will indicate the methods and results of the survey or analysis.



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- D. Shipment records of radioactive waste material shall be maintained and the licensee shall require written confirmation from the authorized recipient of such material that this material has been received.
- E. Transfer of radioactive waste to a land disposal facility or a licensed waste handler shall be done in accordance with 0400-20-05-.125 of "State Regulations for Protection Against Radiation."
- F. All records and written confirmations required by this condition shall be maintained for inspection by the Department.

The requirements of this condition are in addition to any other requirements for the handling and/or disposal of radioactive material contained in this license and "State Regulations for Protection Against Radiation."

- 22. The licensee shall not accept either radioactive waste and/or items contaminated or potentially contaminated with licensable quantities of radioactive material or radioactive materials or items from licensable activities for repackaging, processing, refurbishing, storage pending disposal or disposal unless the shipper of such waste possesses a valid license for delivery issued pursuant to 0400-20-10-.32 of "State Regulations for Protection Against Radiation."
- 23. Written assurances must be furnished by the facility shipping the radioactive material indicating that the facility may accept return of the material processed or unprocessed. In addition, for states outside the Southeast Compact the state or appropriate Compact must be a signatory to the Interregional Access Agreement for Waste Management or assurances shall be obtained from the appropriate state governor's office, the state radiation control program, and the appropriate Compact official, if any.
- 24. The licensee shall establish in every contractual obligation relating to radioactive materials the ability to return radioactive materials, processed or unprocessed, to the prior licensed or exempt possessor.
- 25. A. Beta and/or gamma sealed sources containing more than 100 microcuries, and alpha sealed sources containing more than 10 microcuries, authorized by this license shall be tested for leakage and/or contamination at intervals not to exceed six (6) months. In the absence of a certificate from a transferor indicating that a test has been made within six (6) months prior to transfer, the sealed source shall not be put into use until tested.



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- B. The licensee is authorized to perform leak testing of sealed sources and analytical services for Energy Solutions facilities in accordance with statements, representations, and procedures contained in Tennessee Radioactive Material License Number R-73008.
 - C. The tests shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample, or in the case of radium, the escape of radon at the rate of 0.001 microcurie per 24 hours. The test sample shall be taken from the sealed source or from the surface of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak tests shall be kept in units of microcuries and maintained for inspection by the Department.
 - D. If the test reveals the presence of 0.005 microcurie or more of removable contamination, or in the case of radium, the escape of radon at the rate of 0.001 microcurie or more per 24 hours, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Department regulations. A report shall be filed within five (5) days of the test with the Division of Radiological Health, Tennessee Department of Environment and Conservation, William R. Snodgrass Tennessee Tower, 15th Floor, 312 Rosa L. Parks Avenue, Nashville, Tennessee, 37243, describing the equipment involved, the test results, and the corrective action taken.
26. The licensee shall not open or remove sealed sources containing radioactive material from their respective source holders.
27. The licensee is authorized to receive, possess, and use any radioactive material distributed under a general license, issued by the U. S. Nuclear Regulatory Commission, or another Agreement State, without being specifically referenced in Items 6, 8, 9 and 10 of this license. Notwithstanding any other conditions of this license, the general licensee may possess and use radioactive material received under the provisions of 0400-20-10 of "State Regulations for Protection Against Radiation" in accordance with the requirements provided at the time of the transfer of the radioactive material under the terms of the general license.
28. The following evaluations shall be performed for all process ventilation systems:
- 1) Air balance within the RCA at least semi-annually, and following any ventilation system or process changes which could potentially alter the effectiveness of the system,



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- 2) Particulate removal efficiency of the main filtration system HEPA filters by DOP or comparable testing in accordance with pertinent ANSI standards immediately following installation of new HEPA filters or at least semi-annually.

29. In addition to other requirements of this license or of Chapter 0400-20-50-.60 of "State Regulations for Protection Against Radiation," the licensee shall conduct operations so that radiation levels in unrestricted areas would not cause an individual, assuming an occupancy of one (1), to receive a total effective dose equivalent in excess of 500 millirems in one calendar year. These radiation levels shall be appropriately monitored by the licensee, and records of such monitoring shall be maintained for inspection by the Department. For calculational purposes of this condition, the licensee shall base its anticipated exposure to a member of the public upon the sum of the maximally exposed TLD and the highest air concentration derived using the latest available pertinent data.

30. No provision of this license relieves the licensee from compliance with other Federal, State, and local laws, ordinances, and regulations applicable to the licensee's activities.

31. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in the following:
 - Application dated May 29, 2014, with attachments
 - Letters dated June 30, 2014, December 1, 2014, March 3, 2015, with attachments, and March 3, 2015, with attached EnergySolutions Tennessee Radiation Safety Guide (RSG-1), Revision 10, April 15, 2015, with attachments, January 29, 2016, with attachments, November 15, 2016, with attachments, and August 3, 2017, with attachments.