

**SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
RADIOACTIVE MATERIAL LICENSE**

Pursuant to the Atomic Energy and Radiation Control Act, Section 13-7-40 et. seq. of S.C. Code of Laws of 1976 as amended and Supplements thereto, and the South Carolina Department of Health and Environmental Control Regulation 61-63 Radioactive Material (Title A), and in reliance on statements and representations heretofore made by the applicant, 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. The license is subject to all applicable rules of the South Carolina Department of Health and Environmental Control now or hereafter in effect and to any conditions specified below.

Amendment No. 49 amends

LICENSEE		3. License Number
1. Name	Chem-Nuclear Systems, LLC. Barnwell Waste Management Facility	097 in its entirety
2. Address	740 Osborn Road Barnwell, S.C. 29812	4. Expiration Date
		Five year term to be determined

5. Radioactive Material (Element and Mass Number)	6. Chemical and/or Physical Form	7. Maximum Radioactivity and/or quantity of material which licensee may possess at any one time.
A. Any Radioactive material excluding source material and special nuclear material.	A. Dry packaged radioactive waste except as authorized in this license.	A. 50,000 curies
B. Source material	B. Dry packaged radioactive waste except as authorized in this license.	B. 60,000 pounds
C. Special Nuclear Material	C. Dry packaged radioactive waste except as authorized in this license.	C. 350 grams total of ²³⁵ U or 200 grams ²³³ U or 200 grams of plutonium or any combination of these provided the sum of the ratios of the quantities does not exceed unity.

8. Authorized Use:

A., B. and C.

Radioactive material as low-level radioactive waste may be received, stored, and disposed of by enhanced shallow land burial in approved engineering barriers (vaults) unless otherwise specifically authorized by the Department. The licensee shall not receive an annual volume of more than the authorized limits of South Carolina Code of Laws of 1976, as amended.

Unless otherwise authorized by the Department, only radioactive waste consigned for burial shall be received at the location specified in Condition No. 9 of this license. The maximum radioactivity and/or quantity of radioactive material indicated in Item 7. A, B, and C applies to the above-ground activities.

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General Conditions

9. Unless otherwise specified, the authorized place of use is a site located approximately five miles northwest of Barnwell, South Carolina, in the Seven Pines School District, Red Oak Township, Barnwell County, South Carolina within the boundary of the land area described in Lease agreement dated April 6, 1976, as amended.
10. The licensee shall comply with the provisions of the South Carolina Department of Health and Environmental Control (SC DHEC) Regulation 61-63, Radioactive Material, (Title A), Part I - General Provisions; Part II - Licensing of Radioactive Materials; Part III - Standards for Protection Against Radiation; Part VI - Notices, Instructions, and Reports to Workers; Inspections, and Part VII - Licensing Requirements for Land Disposal of Radioactive Waste; Department Regulation 61-83, Transportation of Radioactive Waste Into or Within South Carolina.
11. Unless otherwise specified in this license, the licensee shall make no changes in the internal safety audits, Safety Review Board, ALARA Review Committee, Site Criteria, or procedures governing these specific activities without approval from the Department.
12. Operations authorized by this license shall be conducted in accordance with Chem-Nuclear Systems (CNS) procedures and subsequent revisions and additions approved by the Department. However, the licensee may upon notification to the Department but without Department approval, make minor changes to these procedures provided that:
- A. The change does not affect requirements of any other license condition in this license;
 - B. The change does not increase the potential for personnel exposure;
 - C. The change does not diminish operational safety;
 - D. The change does not increase the potential for release of radioactive material to unrestricted areas; and
 - E. The change does not reduce the licensee's record keeping and reporting system.
- The licensee shall maintain records of these changes including evaluations which provide the basis for the change.
13. The licensee shall ensure that all site personnel have satisfactorily completed the training program requirements as specified in the CNS Barnwell Site Training Program. Changes and additions to the program shall be submitted to the Department for review. Time intervals for personnel indoctrination, training, examinations, certification, retraining specified in CNS Procedure S20-AD-004, "Barnwell Radioactive Waste Burial Site Personnel Training", shall not be changed without Department approval.
14. Operations shall be conducted by or under the supervision of: William A. Veronee, (RSO), James W. Latham, Joseph J. Still, William B. House, Michael J. Benjamin, Wayne Inabinett, Edward F. Boyles, Jr. or other individuals designated by the licensee's Radiation Safety Officer upon successful completion of the licensee's training program and approval by the licensee's Safety Review Board.
15. The licensee shall to the extent necessary, continue the employment of all personnel involved in the operation of the Barnwell Waste Management Facility in accordance with all requirements in the license and applicable regulations and, in the event replacement of employees becomes necessary, only individuals of comparable qualifications and experience will be hired.

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16. A documented weekly inspection of site operations and the restricted area of the site for compliance with applicable conditions of this license shall be conducted by a named authorized user in Condition 14 or other individual approved by the Department.
17. The transportation of radioactive materials and radioactive waste within the State of South Carolina shall be in accordance with applicable regulations of the United States Department of Transportation (US DOT), the United States Nuclear Regulatory Commission (US NRC), Section RHA 2.22, Department Regulation 61-63, Radioactive Material (Title A), and Department Regulation 61-83, "Transportation of Radioactive Waste Into or Within South Carolina".
18. The licensee shall maintain all records and shipment manifest pertinent to the transportation, receipt, and disposal of radioactive material at the location specified in Condition 9 of this license until authorization is given by the Department for transfer or disposal of such records.
19. The licensee shall maintain records for each shipment of waste disposed of at the site. The records shall conform with the requirements of RHA 7.32, Department Regulation 61-63, Radioactive Material (Title A). The licensee shall maintain all records required in the Department Regulations 61-63 and 61-83, and 10 CFR Part 61 at the disposal facility in readable form to include electronic and microfilm, and stored in an environmentally-controlled facility to prevent damage.
20. A monthly site receipt and burial activities report shall be submitted no later than the 10th day following the month to the Assistant Director, Division of Waste Management, Bureau of Land & Waste Management, SC DHEC, 2600 Bull Street, Columbia, SC 29201.
21. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 5, 6, and 7 of this license and conduct site operations in accordance with statements, representations, operating procedures, and disposal criteria, heretofore made by the licensee or his authorized representative in application for and subsequent to issuance of SC Radioactive Material License No. 097, and amendments thereto.
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Receipt, Acceptance and Inspection Conditions

22. The licensee shall not accept radioactive waste for storage or disposal unless the shipper has completed the required information for the waste shipment on the US NRC Uniform Low-Level Radioactive Waste Manifest Forms 540 (Shipping Paper), 541 (Container and Waste Description), and 542 (Manifest Index and Regional Compact Tabulation) as applicable, or approved equivalent forms.
23. The licensee shall not accept radioactive waste for storage or disposal unless the generator of such waste has a valid, unsuspended Radioactive Waste Transport Permit issued by the SC DHEC.
24. The licensee shall not accept radioactive waste for storage or disposal unless the shipper has provided a properly executed Department Form, DHEC-803, Radioactive Waste Shipment Certification Form, Part I and II. Shipments consisting of more than 75 cubic feet or containing more than one (1) curie shall also be accompanied by a properly completed and executed Department Form, DHEC-802, Radioactive Waste Prior Notification and Manifest Form. Changes to the shipment identification number on the forms may be made by the licensee, provided that the Department is notified of the change no later than the last day of the month for which the shipment was originally scheduled. Forms shall not be carried over more than one month.

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25. The licensee shall only accept radioactive waste shipments for storage or disposal which have been inspected by a representative of the Department. The licensee shall assist the Department in inspection, sampling and analysis of the waste as deemed necessary by the Department to ensure compliance with the requirements of this license. The licensee shall perform radiological analysis of liquids found in waste packages and interstitial spaces of shipping casks as deemed necessary by the Department.
26. Notwithstanding other conditions of this license, the licensee shall not accept radioactive waste for storage or disposal unless he has received advanced written notification of any waste shipment containing unusual hazards or potential hazards including but not limited to, physical, gaseous, chemical, pyrophoric, or excessive removable contamination on the disposal containers shipped inside casks or excessive internally contaminated casks, and unexpected high radiation levels at the disposal container surfaces.
27. The licensee shall immediately notify the Department or the Department's on-site representative of any waste shipments where a violation of applicable regulations or license conditions has been found.
28. The licensee shall notify the shipper and the Department when any shipment of radioactive waste or part of a shipment has not arrived within 60 days after the advance copy of the shipment manifest or shipping papers was received by the licensee.
29. The licensee shall notify the shipper when it has been determined that a radioactive waste shipment or part of a shipment cannot be accepted for disposal by the licensee. The licensee shall notify the waste generator/shipper before the end of the next business day if a shipment has failed to arrive at the disposal facility within the 24-hour time frame indicated in the advance notification or manifest.
30. The licensee shall acknowledge receipt of the waste within 7 days of its acceptance for disposal by returning a signed copy of the shipment manifest or shipping papers to the shipper. The licensee shall indicate on the returned copy of the shipment manifest or shipping papers any discrepancy between the waste description listed on the manifest or papers and the waste materials received in the shipment.
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Waste Characteristics and Waste Form Conditions

31. The licensee shall not accept any radioactive waste for storage or disposal unless the shipper has marked each disposal container, as specified by the licensee, to identify its classification as either Class A, stable or unstable (S or U), Class B, or Class C waste, and certifies that the waste materials have been classified and prepared in accordance with the following waste classification table:
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Waste Classification Table

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RADIONUCLIDES

CONCENTRATION LIMITS IN
CURIES/CUBIC METER*

<u>Table I (long-lived)</u>	<u>Class A</u>	<u>Class B</u>	<u>Class C</u>
C-14	≤ 0.8	≤	8
C-14 in activated metal	≤ 8	≤	80
Ni-59 in activated metal	≤ 22	≤	220
Nb-94 in activated metal	≤ 0.02	≤	0.2
Tc-99	≤ 0.3	≤	3
I-129	≤ 0.008	≤	0.08

CONCENTRATION LIMITS IN
NANOCURIES/GRAM

Alpha emitting transuranics with half-life greater than 5 years	≤ 10	≤	100
Ra-226	≤ 10	≤	100
Pu-241	≤ 350	≤	3500
Cm-242	≤ 2000	≤	20000

CONCENTRATION LIMITS IN
CURIES/CUBIC METER*

<u>Table II (short-lived)</u>	<u>Class A</u>	<u>Class B</u>	<u>Class C</u>
Total of all with half-life less than 5 years	≤ 700	> 700	
H-3	≤ 40	> 40	
Co-60	≤ 700	> 700	
Ni-63	≤ 3.5	≤ 70	≤ 700
Ni-63 in activated metal	≤ 35	≤ 700	≤ 7000
Sr-90	≤ 0.04	≤ 150	≤ 7000
Cs-137	≤ 1	≤ 44	≤ 4600

* curies/cubic meter is equivalent to microcuries/cubic centimeter

- A. The concentration of a radionuclide or radionuclide mixture may be averaged over the volume of the waste and, if used, the solidification agent or matrix if the waste form is a homogenous mixture. The concentration of radionuclides in filters/sealed sources encapsulated with a solidification agent or matrix shall be averaged over the volume of the filter/sealed source not the solidification agent. The volume of packaging, containers, liners, or overpacks shall not be included in this calculation, nor shall the volume of the waste mixture be artificially increased with the addition of non-dispersible solids or objects even if considered as waste.

If expressed in units of nanocuries per gram, concentration may be averaged over the weight of the waste and, if used, the solidification agent if homogenous, except in the case of encapsulation of filters which shall be over the weight of the filter. The weight of packaging, containers, liners, or overpacks shall not be included in this calculation, nor shall the weight of the waste mixture be artificially increased by the addition of heavy, non-dispersible solids or objects even if considered as waste.

- B. The waste is Class A if none of the listed radionuclides are present.
- C. There are no upper limits in Class B waste for the first three radionuclides listed in Table II.

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- D. There are no Class B values for the first nine (9) radionuclides listed; their presence classifies the waste as either Class A or Class C according to their concentrations.
- E. The waste class for mixtures of radionuclides is determined by deriving for each radionuclide the ratio between its concentration in the mixture and its concentration limit in the table and adding the resulting ratio values for each radionuclide group. All limits used in the calculation must be for the same waste class. The sum of the ratios for each group must be less than or equal to 1.0 or the waste is of a higher classification than that used for the calculation.
- F. If Class C limits are used in the calculation and the sum of the ratios for either group is equal to or exceeds 1.0, the waste is not acceptable for disposal without prior written approval from the Department.
- G. If the concentration of any single radionuclide exceeds Class C values in the table, the waste is not acceptable for disposal without prior written approval from the Department.
- H. Concentrations for C-14, Ni-59, Ni-63, and Nb-94 in activated metal must be evaluated for any irradiated metal component, filters and filter material associated with spent fuel pools.
- I. Waste containing radium may be accepted only if the requirements of condition 44 of this license are met.
32. A. Unless otherwise specified in this license, the licensee shall not receive any liquid radioactive waste regardless of the chemical or physical form. Absorbent materials may be placed in packages of dry, solid waste to absorb unintentional and incidental amounts of liquids. Further, liquids in the interstitial spaces of transport casks and containers shall be removed to the extent practical.
- B. Solidified or dewatered radioactive waste shall have no detectable free standing liquids in excess of one-half percent (0.5%) by waste volume of non-corrosive liquids per container.
- C. In lieu of the requirements of paragraph B. above, solidified or dewatered waste containing non-corrosive liquids in excess of one-half percent (0.5%) by waste volume, and less than one percent (1%) non-corrosive liquids by waste volume, may be received and disposed of in high integrity containers approved by the Department.
33. A. Unless otherwise specified, the licensee shall only receive aqueous liquids and other applicable waste forms which have been solidified or otherwise stabilized with one of the following solidification media:
- a. Vinyl Ester Styrene
 - b. Cement
 - c. Bitumen (see Subparagraph E. below)
 - d. Vinyl Chloride
- B. Solidification media and processes used to stabilize Class A aqueous liquids and other Class A wastes containing isotopes with greater than five (5) year half-lives having a total specific activity if all these isotopes of 1 microcurie/cubic centimeter or greater, and all applicable Class B and C waste, shall meet and have been evaluated in accordance with the "Stability Guidance" requirements of the

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- US NRC Waste Management Division, Technical Position on Waste Form, (Revision 1), dated January 1991, or other evaluation criteria or methods specifically approved by the NRC or the Department.
- C. Solidified Class A aqueous liquids and other applicable waste forms with a specific activity of less than 1 microcurie/cubic centimeter, shall meet the requirements of the "Solidified Class A Waste Products" of the NRC Technical Position on Waste Form, (Revision 1) dated January 1991.
- D. Other solidification media and processes shall be acceptable for which a topical report has been prepared and received approval from the US NRC with concurrence from the Department or approval by the Department.
- E. The licensee shall only receive for disposal, full formula, oxidized bitumen (asphalt) solidified waste, which is a free standing monolith as received for disposal, and certified as such by the waste generator.
34. Except as specifically provided in this license, the licensee shall not accept liquid radioactive waste packaged in absorbent materials, or where absorbent materials have been used to absorb liquids rather than properly solidified with an approved media.
35. Regardless of the waste classification of Condition 31, and unless otherwise authorized by the Department, the licensee shall not receive evaporator bottoms or concentrates, residues, sludges, or other waste which may contain free standing liquids, unless they are solidified in accordance with Condition 33, and meet the requirements as specified in Condition 32. Evaporator bottoms or concentrates which contain no free standing water and are not free flowing are acceptable for disposal when processed by a method specifically approved by the Department.
36. The licensee may receive resins and filter media in a dewatered form provided that the free standing liquid requirements of Condition 32 and the requirements of Condition 38 are met.
37. The licensee shall not receive containers of ion exchange resins or filter media (dewatered or solidified) unless records of complete radiological analyses (quantitative and qualitative) are provided. The records must specify the specific activity of each radionuclide expressed in microcuries/cubic centimeter and transuranic radionuclides in nanocuries/gram.
38. Regardless of the waste classification of Condition 31, ion exchange resins and filter media containing isotopes with greater than five (5) year half-lives having a specific activity of all these isotopes of 1 microcurie/cubic centimeter or greater must be stabilized by solidification in accordance with Condition 33 and meet the free standing liquid requirements of Condition 32.B. However, in lieu of solidification, the Department will authorize disposal of these waste forms meeting the free standing liquid requirements of Condition 32.C. in approved high integrity containers or other approved methods of stabilization.
39. Unless specifically provided otherwise, the licensee shall dispose of all classes of wastes in concrete overpacks or vaults which are approved by the Department and provided by the site operator. Void spaces within the waste and between the waste and its packaging shall be reduced to the extent practicable, but in no case shall less than eighty-five percent (85%) of the capacity of the containers be filled for all waste classes unless placed in a High Integrity Container. The licensee may allow a variance from this condition in certain instances, but only after receiving a written justification from the waste generator prior to receiving the waste shipment. Variance justifications and approvals shall be maintained for review by the Department.
40. Radioactive waste containing transuranic radionuclides within the limits specified in Condition 31 are acceptable provided that the transuranic radionuclides are evenly distributed within a homogeneous waste form and are incidental to the total radioactivity. Incidental in this condition is defined as not more than one

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percent (1%) of the total activity. This license does not authorize the receipt of disposal of components or equipment primarily contaminated with transuranic radionuclides on vehicles, equipment, or components, with contamination limits in excess of those specified in Condition 55.

41. Household or industrial smoke or gas detectors containing Americium-241 foils which may exceed the transuranic radionuclide limit specified in Condition 31 of this license may be accepted for disposal provided the entire detector is received for disposal.
42. The licensee shall not receive or dispose of sealed sources or special form radioactive materials containing more than 5 curies of radioactive material with half-lives greater than 5 years except in a container which provides long term containment. Such containers are subject to approval by the Department. Irradiated metal components which have similar characteristics of special form radioactive materials are subject to Department review for disposal container requirements.

The licensee may accept the following sealed sources and maximum total activities provided that the sources are encapsulated with a minimum of four (4) inches of cement on all sides having a minimum compressive strength of 2,500 pounds per square inch.

Radionuclide	Maximum Total Activity (microcuries)
C-14	100
Ni-59	100
Nb-94	0.01
Tc-99	10
I-129	0.01
Radionuclides in Condition 31. Table II	10^7

43. The licensee shall not receive toluene, xylene, dioxane, scintillation liquids which exhibit hazardous properties or other organic liquids or solids with similar chemical properties except as specified below:
- A. Containers which have contained any of the liquids mentioned above are acceptable for disposal after treatment as specifically authorized by the Department.
- B. The ash and/or residue from the incineration of these wastes are acceptable in accordance with Condition 45 of this license.
44. Unless otherwise authorized by the Department the licensee shall not receive any radioactive waste containing Radium except for:
- A. Radium contained in solid homogeneous waste forms in which the Radium activity is incidental (incidental is defined as not more than one percent of the total activity) and the concentration of Radium has not been technologically enhanced or,
- B. Radium contained in the following devices: self-luminous dials, hands of dials, timepieces, compasses, and electron tubes provided that the entire device is received and buried, or
- C. Radium contained in biological research waste, or

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- D. Radium sources specifically approved by the Department.
45. The licensee shall not receive radioactive waste in the forms of incinerator ash or powder which may be dispersible unless solidified with a media specified in Condition 33 of this license, or packaged to prevent dispersion as specifically approved by the Department. In lieu of solidification, these waste forms may be received in high integrity containers approved by the Department, provided the waste is rendered nondispersible with a binding matrix.
46. Radioactive waste containing chelating agents between 0.1 percent and 8 percent by weight in the waste as received for disposal shall be in High Integrity Containers or shall be stabilized by solidification with a media specified in Condition 33 of this license or an alternative method specifically approved by the Department.
47. The licensee may only receive gaseous radioactive materials of Krypton 85, Xenon 133, and Tritium for burial provided they meet the following criteria:
- A. For Krypton 85 and Xenon 133:
- a. Burial containers must be US DOT specification cylinders or U.S. Nuclear Regulatory Commission approved sealed sources.
 - b. Internal pressure of containers may not exceed 1.5 atmospheres.
 - c. Total activity of containers shall not exceed 100 curies each.
- B. For Tritium:
- a. Only sources approved by the US NRC or an Agreement State may be received for disposal.
 - b. The source/device must be received intact.
 - c. The internal pressure of the source/device shall not exceed 1.5 atmospheres.
 - d. Sources/devices must be packaged to prevent breakage.
 - e. The maximum activity per disposal container shall not exceed 1000 curies.
 - f. Devices requiring stabilization based on waste classification (using the volume of the source/device only) must be placed in a high integrity container or encapsulated with an appropriate stabilization media.
48. A. Unless otherwise authorized, the licensee shall not receive for storage nor disposal any mixed low-level radioactive waste defined as waste that satisfies the definition of low-level radioactive waste specified in the Low-Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240), and contains waste that either (1) is listed as hazardous waste in Subpart D, 40 CFR 261, or (2) causes the waste to exhibit any of the hazardous waste characteristics identified in Subpart C, 40 CFR Part 261.
- B. The licensee may however receive waste that has been treated by acceptable methods to render it nonhazardous and therefore not subject to the jurisdiction of the Resource Conservation and Recovery Act (RCRA). Waste which may contain discrete quantities of hazardous or toxic materials may be evaluated for disposal by the licensee and such evaluations provided to the Department for consideration of approval.

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49. The licensee shall not receive radioactive waste that is readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperature, or of explosive or exothermic reaction with water.
50. The licensee shall not receive radioactive waste which contains or is capable of generating quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with Condition 47 of this license.
51. The licensee shall not receive or dispose of any pyrophoric material or flammable solids. These materials contained in waste shall be treated, prepared and packaged to be nonflammable and the final waste form rendered nonpyrophoric and nonflammable prior to transportation and receipt.
52. The licensee shall not receive or bury oil or petroleum based materials in any physical form. However, this does not prohibit the receipt and disposal of waste containing incidental or trace amounts of oil or petroleum based materials which have been absorbed, provided that the amount of absorbed oil and petroleum based materials does not exceed one percent (1%) by waste volume in a container.
53. The licensee shall not receive radioactive waste containing hazardous biological, pathogenic, or infectious material unless treated to reduce to maximum extent practicable the potential hazard from the materials. In addition, radioactive waste containing biological, pathogenic, or infectious material shall be doubly packaged in new or properly recertified containers which meet the general packaging requirements of DOT as follows:
- A. First, the inner container having a capacity of 55-gallon or less shall have a water tight liner at least 4 mils thick hermetically sealed after filling.
 - B. The biological material shall be thoroughly layered in the inner container in a ratio of thirty (30) parts biological material to at least one (1) part slaked lime and ten (10) parts absorbent, which shall be agricultural grade 4 vermiculite or medium grade diatomaceous earth, or other adsorbents that have received approval from the Department by volume. The addition of formaldehyde is strictly prohibited.
 - C. The closure on the inner container shall be a standard lid with securely attached ring and bolt. Lever locks are not acceptable.
 - D. Unless otherwise authorized by the Department, the outer container, which shall have a volume of at least 1.5 times the inner container shall be filled initially with at least 4 inches of absorbent material, specified in B., the inner container in an upright position, and the remaining volume filled with the absorbent material, then securely closed and properly sealed.
54. Unless otherwise authorized by the Department, the licensee shall receive Special Nuclear Material (SNM) as authorized in Conditions 5, 6, 7, and 8 of this license in 55 gallon or larger containers only. Any SNM shipment in which there is evidence that SNM is missing or that the waste packages have been tampered with in transport shall be received by the licensee and safely stored pending notification to the Department. The licensee shall not dispose of such packages unless authorized by the Department.
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Contamination Limit Conditions

55. For receipt at the Barnwell Site, all shipments shall comply with contamination control limits as prescribed in US DOT Regulations, 49 CFR 173.443.

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Enclosed radioactive material transport vehicles used solely for transporting radioactive materials and marked "For Radioactive Material Use Only" and accessible surface of transport casks and trailer shall not be released from the site if contamination limits exceed the following:

- A. Fixed contamination of 10 mR/hr on contact with the interior surface or 2 mR/hr at 1 meter from the interior surface.
- B. Removable contamination of 2200 dpm/100 sq. cm. Beta-gamma or 220 dpm/100 sq. cm. Alpha. This applied to interior and exterior surfaces.
- C. Fixed contamination of 0.5 mR/hr on contact with any exterior surface.

Internally contaminated (fixed or removable) shipping casks released from the site are subject to applicable shipping regulations of the US DOT. The licensee shall inform the recipient of such casks of the contaminated nature of the cask. Shipping documentation for the casks must be maintained by the licensee for review by the Department.

- 56. Vehicles used solely for transporting radioactive material and are not marked "For Radioactive Material Use Only" shall not be released from the site if the contamination limits exceed the following:
 - A. Fixed contamination of 0.5 mR/hr at any accessible surface.
 - B. Removable contamination of 2200 dpm/100 sq. cm. Beta-gamma, or 220 dpm/100 sq. cm. Alpha.
- 57. Vehicles or items for unrestricted use shall not be released from the site if the contamination limits exceed the following unless specifically authorized by the Department:
 - A. Fixed contamination of 0.1 mR/hr at any accessible surface.
 - B. Removable contamination of 220 dpm/100 sq. cm. Beta-gamma, or 22 dpm/100 sq. cm. Alpha.
- 58. The licensee shall perform decontamination on vehicles, equipment, or components, with contamination limits in excess of those specified in Condition 56 in a controlled environment.
- 59. The licensee shall not use its vehicle wash-down facility for any vehicles or equipment with removable contamination limits in excess of those specified in Condition 56 unless specifically approved by the Department.

General Packaging Conditions

- 60. All radioactive waste shall be packaged and loaded in accordance with applicable US DOT Regulations, US NRC Regulations 10 CFR Part 71, the requirements of this license, and the disposal site criteria.
- 61. Unless otherwise authorized, all radioactive waste shall be received and buried in closed containers. Containers which have been altered, and solidification or encapsulation media intended to serve as containers or container closures, are not acceptable unless approved by the Department. Loose radioactive waste and solidification residuals within shipping casks or other reusable containers are prohibited.
- 62. The licensee shall not receive any package to be used as the final burial container that is corroded to the point of degradation or damage. Any package used as the final burial container shall be of such material

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- construction that there will be no significant chemical, galvanic, or other reaction among the packaging components, or between the packaging components and the package contents.
63. The licensee shall, to the extent practicable, repair or repackage any damaged package used as the final burial container if such packages are approved for acceptance by the Department.
64. Prior to burial, the licensee shall, to the extent practicable, remove all liquids from waste packages found in excess of allowable limits if such packages are approved for acceptance by the Department.
65. The licensee shall not receive shipments of radioactive materials unless appropriate lifting devices of sufficient length has been provided and securely attached to containers and palletized shipments within a cask.
66. The licensee is not authorized to open any packages at its facility, except for the following:
- A. For purposes of repairing or repackaging damaged containers.
 - B. For purposes of inspecting to insure compliance with this license.
 - C. For purposes of returning outer shipping containers.
 - D. For purposes of confirming package contents.
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Site Design, Construction and Maintenance Conditions

67. Construction of waste burial trenches shall be in accordance with CNS Procedure S20-AD-008, "Trench Construction" and Department approved drawings and specifications. Any changes to these drawings, specifications, or procedures must have approval from the Department before implementation.
68. The licensee shall not begin construction of any trench prior to approval of the Department as to location, trench bottom elevation and intended use.
69. The licensee shall not initiate burial operations in newly excavated trenches until the Department has inspected and approved the trenches. Trench construction inspections shall be performed in accordance with CNS Procedure S20-AD-008, "Trench Construction" and any additional inspections deemed necessary by the Department.
70. Trench backfill and completion shall be performed in accordance with CNS Procedure S20-AD-008, "Trench Construction".
71. A. Completed trenches shall at no time be used for stockpiling large volumes of earth notwithstanding provisions for a final grading plan.
- B. The licensee shall design trench covers to minimize to the extent practicable water infiltration, to direct percolating or surface water away from the disposed waste, and to resist degradation by surface geologic processes and biotic activity.
72. Open trenches to include trenches under construction and partially filled trenches shall be protected to prevent runoff water from entering trenches. Radioactive waste shall not be placed into trench areas where water has

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- accumulated. Burial of radioactive waste into trenches with unusual amounts of water shall immediately cease until the origin of water has been determined and corrective action taken.
73. The licensee shall use proper surface water management techniques on the site to insure that:
- A. Erosion is minimized.
 - B. Surface runoff is directed away from the trenches.
 - C. Accumulation of standing water is minimized.
 - D. Standing water in the immediate disposal area is prevented.
74. All monitoring wells, sumps, shall be sufficiently capped or covered to prevent the introduction of extraneous material or infiltration of water. All well and sump pipes shall be protected from damage.
75. The licensee shall perform inspections of completed trenches and capped areas in accordance with CNS Procedure S20-OP-007, "Completed Trench Inspection Procedure", to ascertain any erosion, settling, cracking, subsidence, or loss of ground cover grasses and make corrections immediately. Documentation of the inspection findings and all repairs even if the repairs were performed as a routine maintenance function shall be made and incorporated into a permanent record and submitted with the stabilization plan for final site closure.
76. The licensee shall initiate closure and stabilization measures as each trench is filled and covered. Interim or final grades shall be established at no more than one year following final trench burial operations. Completed trenches shall be continuously and properly maintained to control erosion. Active waste disposal operations must not have an adverse effect on completed closure and stabilization measures.
77. The licensee shall use any reasonable means, including but not limited to fencing and security personnel, to prevent unauthorized entry into the restricted area of the site.
78. The boundaries and locations of each disposal trench shall be accurately located and mapped by means of a land survey. Temporary trench boundary markers and trench identification markers shall be erected upon completion of backfill operations until permanent markers are installed.
79. A series of markers, one at the end of each completed trench and on each corner, shall be installed upon completion of the seeding of trench covers. End monuments shall be constructed of granite. Trench corner markers shall be constructed in accordance with CNS Drawing No. B-215-C-0010. The following information shall be reported to the Assistant Director, Division of Waste Management, Bureau of Land & Waste Management, SC DHEC, 2600 Bull Street, Columbia, SC 29201:
- A. Total activity of radioactive material in curies total amount of source material in pounds, and total amount of special nuclear material in grams in the trench.
 - B. Date of completion of the burial operations; and
 - C. Volume of waste in the trench.
-

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Burial Operation Conditions

80. Unless specifically authorized by the Department, the licensee shall not exhum previously buried waste.
81. All waste shall be placed in vaults which will provide additional structural stability. Structural evaluations for large components may be submitted to the Department for review and with concurrence from the Department will not require disposal in a vault. The licensee shall construct the vaults in accordance with procedures, drawings, standards, and a quality assurance plan that have received approval from the Department.
82. The disposal trenches and vaults shall be designed and constructed to meet the following objectives:
- A. to minimize the migration of water onto the disposal trench.
 - B. to minimize the migration of waste or waste contaminated water out of the disposal units.
 - C. to detect water or other liquids in the trenches for assessment and potential remedial measures.
 - D. to facilitate remedial methods without disturbing other disposal trenches.
 - E. to provide reasonable assurance that the waste will be isolated for at least the institutional control period.
 - F. to prevent contact between the waste and the surrounding earth, except for earthen materials used for backfilling within the disposal unit.
83. Wastes designated as Class C pursuant to Condition 31 of this license, shall be disposed of so that the top of the waste is a minimum of 5 meters below the top surface of the cover or shall be disposed of with intruder barriers that are designed to protect against an inadvertent intrusion for at least 500 years. Such intruder barrier designs must be specifically approved by the Department.
84. The licensee shall handle and emplace packages of radioactive waste in disposal trenches in such a manner that maintains packaging integrity during handling, emplacing, and subsequent backfilling. Waste packages deposited in trenches shall be protected from any adverse operations which may cause damage to them.
85. The licensee shall emplace disposal vaults in such a manner to minimize voids between vaults and permit voids between vaults to be filled with earth to reduce future trench subsidence.
86. The licensee shall be a "Registered User" of all licensed casks delivered to the site containing radioactive waste for disposal.
87. At least one health physics technician shall be present during all waste handling, offloading, and disposal operations.
88. The licensee shall maintain radiation levels at the edge of the open trenches at or below 100 mR/hr.
89. Licensee personnel shall wear appropriate protective clothing, apparatus, and gloves at all times while handling or disposing of radioactive waste.
90. Vaults shall be covered within six (6) months of being filled with waste unless otherwise approved by the Department.

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91. The licensee shall bury containers of Krypton 85 and Xenon 133 gaseous radioactive materials in upright positions within concrete overpacks or vaults. Each gas container shall be disposed in different overpacks or vaults unless otherwise authorized by the Department.
92. Unless specifically authorized, the licensee shall not store any package containing radioactive waste for a period greater than six months from the date of receipt of the package prior to burial. Radioactive waste shall not be stored in the trench area or an open environment for a period greater than ten (10) days from receipt, and shall be protected from damage and inclement weather conditions.
-

Environmental Surveillance Conditions

93. The licensee shall conduct an on-site monitoring and environmental monitoring program capable of detecting the potential contribution of radioactive material and hazardous constituents from the site to the environment. The monitoring program shall be performed in accordance with CNS Procedures
94. Should any samples taken from the monitoring wells, or air samples reveal increases in the concentration of radioactive material which were determined prior to commencement of the burial operations, the licensee shall perform further surveys to determine whether or not the increase is due to the land burial operations. The licensee shall notify the Assistant Director, Division of Waste Management, Bureau of Land & Waste Management, SC DHEC, within 48 hours of any such increases.
95. The licensee shall submit results of all scheduled environmental sampling and analysis to the Department quarterly.
96. Monitoring wells shall be placed outside the trenches but in the trench area. Specific locations shall be determined through consultation. All wells shall be grouted, sealed and capped.
97. As radioactive material buried may not be transferred by abandonment or otherwise, unless specifically authorized by the Department, the expiration date of this license applies only to the above ground activities and to authority to bury radioactive material wastes at the site specified in Condition 9. The license continues in effect and the responsibility and authority for possession of buried radioactive material waste continues until the Department finds that the plan established for preparation of the Barnwell Site for transfer to another person has been satisfactorily implemented in a manner to reasonably assure protection of the public health and safety and the Department takes action to terminate the licensee's responsibility and authority under this license. All requirements for environmental monitoring, site inspection, maintenance and site security continue whether wastes are being buried or not.
98. The licensee shall develop a site closure and stabilization plan that addresses, as a minimum, the following performance objectives:
- A. Bury all waste in accordance with the requirements of the license.
 - B. Dismantle, decontaminate, as required, and dispose of all structures, equipment, and materials that are not to be transferred to the site custodian.
 - C. Document the arrangements and the status of the arrangements for orderly transfer of site control and for long term care by the government custodian. Also document the agreement, if any, of state or federal governments to participate in, or accomplish, any performance objective. Specific funding arrangements to assure the availability of funds to complete the site closure and stabilization plan must be made.

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- D. Direct gamma radiation from buried wastes should be essentially background.
 - E. Demonstrate by measurement and/or model during operations and after site closure that concentrations of radioactive material which may be released to the general environment in ground water, surface water, air, soil, plants, or animals will not result in an annual dose exceeding an equivalent of 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public.
 - F. Render the site suitable for surface activities during custodial care. Planned custodial care may be limited to activities such as vegetation control, minor maintenance, and environmental monitoring. However, use of the site surface for activities such as parking lots may be planned. Final conditions at the site must be acceptable to the government custodian and compatible with its plan for the site.
 - G. Demonstrate that all trench elevations are above water table levels taking into account the complete history of seasonable fluctuations.
 - H. Eliminate the potential for loss of site or trench integrity due to factors such as erosion, surface water, wind, subsidence, and frost action. For example, an overall site surface water management system must be established for humid sites to drain rainwater and snowmelt away from the burial trenches. All slopes must be sufficiently gentle to prevent slumping or gullying. The surface must be stabilized with established short rooted grass, rock, riprap, or other measures. Trench caps must be stabilized to minimize erosion, settling, or slumping of caps.
 - I. Demonstrate that trench markers are in place, stable, and keyed to benchmarks. Identifying information must be clearly and permanently marked.
 - J. Compile and transfer to the Department complete records of site maintenance and stabilization activities, trench elevation and locations, trench inventories, and monitoring data for use during custodial care for unexpected corrective measures and date interpretation.
 - K. Establish a buffer zone surrounding the site sufficient to provide space to stabilize slopes, incorporate surface water management features, assure that future excavation on adjoining areas would not compromise trench or site integrity, and provide working space for unexpected mitigating measures in the future. The buffer zone must also be transferred to the custodial agency. The buffer zone may generally be less than 300 feet but not less than 100 feet.
 - L. Provide a secure passive site security system (e.g., a fence) that requires minimum maintenance.
 - M. Stabilize the site in a manner to minimize environmental monitoring requirements for the long-term custodial phase and develop a monitoring program based on the stabilization plan.
 - N. Investigate the causes of any statistical increases in environmental samples which have occurred during operation and stabilization. In particular, any evidence of unusual or unexpected rates or levels of radionuclide or hazardous constituent migration in or with the groundwater must be analyzed and corrective measures implemented.
 - O. Eliminate the need for active water management measures, such as sump or trench pumping and treatment of the water to assure that wastes are not leached by standing water in the trenches.
 - P. Evaluate present and zoned activities on adjoining areas to determine their impact on the long-term performance of the site and take reasonable action to minimize the effects.

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99. An interim site closure and stabilization plan, assessment of current operating practices, and the long term care plan for the site shall be submitted for review one year prior to the expiration date listed in Condition 4 of this license. The plan shall be consistent with Condition 98 of this license and shall include demonstration that funds are being set aside or other measures being taken are adequate to finance site closure and long term care. The plan shall also include preliminary estimates of costs, environmental impacts, data needs, personnel needs, material and equipment needs, planned documentation and quality assurance, and detailed plan for trench locations and elevations, expected capacities, planned surface contours, and buffer zones.
100. The licensee shall periodically assess the adequacy of the Decommissioning Trust accounts and any other financial mechanisms to assure that sufficient funds are available to complete the remaining activities required to close and stabilize the site in accordance with the latest revision of the site closure fund. The licensee shall provide an annual report of this assessment in accordance with RHA 7.30.3 to the Department by June 30.

Date of Issuance _____

For the South Carolina Department of Health and
Environmental Control

By: _____
Henry J. Porter, Assistant Director
Division of Waste Management
Bureau of Land and Waste Management



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License Number: WN-I019-2
Amendment No. 37

US ECOLOGY WASHINGTON, INC.
1777 Terminal Drive
Richland, Washington 99354

Attention: Mike Ault
Facility Manager

Radioactive Materials License Number WN- I019-2 is administratively amended as follows:

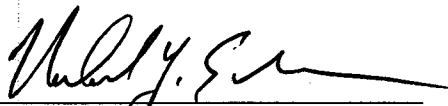
License Condition 84 is added:

84. The licensee must comply with the initial inventory reporting requirement in 10 CFR 20.2207(h) for nationally tracked sources by the dates imposed in that paragraph. The licensee must also comply with the reporting requirements for transactions involving nationally tracked sources in 10 CFR § 20.2207. This section includes the requirement to report any manufacture, transfer, receipt, disassembly, or disposal of a nationally tracked source, otherwise allowed by this license, by the close of the next business day after the transaction. A nationally tracked source, as defined in 10 CFR § 20.1003, refers to a sealed source containing a quantity equal to or greater than Category 1 or Category 2 levels of any radioactive material listed in Appendix E to 10 CFR Part 20 - "Nationally Tracked Source Thresholds."

FOR THE STATE OF WASHINGTON DEPARTMENT OF HEALTH

Date: January 26, 2009

By


Mikel J. Elsen, Supervisor
Waste Management Section

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License Number: WN- I019-2

Pursuant to the Nuclear Energy and Radiation Control Act, RCW 70.98, and the Radiation Control Regulations, chapters 246-220 through 246-255 WAC, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules and regulations promulgated by the State of Washington Department of Health.

1. Licensee Name: US ECOLOGY WASHINGTON, INC.	3. License Number: WN-I019-2 Amendment in Entirety Amendment 36
2. Address: 1777 TERMINAL DRIVE RICHLAND, WASHINGTON 99354 Attn: Mike Ault, Facility Manager	4. Expiration Date: 31 January 2011 5. Reference Number(s):

6. Radioactive Material
(element and mass number).

7. Chemical and/or Physical Form.

8. Maximum quantity licensee may possess at any one time.

6.A. Any radioactive material, excluding source material and special nuclear material.

7.A. Dry packaged radioactive waste except as authorized by this license.

8.A. 60,000 curies
(2.22×10^{15} Bequerels).

6.B. Source material.

7.B. Dry packaged radioactive waste except as authorized by this license.

8.B. 36,000 kilograms.

6.C. Special Nuclear Material.

7.C. Dry packaged radioactive waste except as authorized by this license.

8.C. 350 grams of U^{235} or 200 grams of U^{233} or 200 grams of plutonium or any combination of these, provided the sum of the ratios of the quantities does not exceed unity.

6.D. Any radioactive material.

7.D. Check and calibration sources in any form.

8.D. 0.1 Curie
(3.7×10^9 Bequerels).

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CONDITIONS

9. Authorized use.

A-C Radioactive waste may be received, transferred, stored, repackaged, and disposed at a low-level radioactive waste disposal facility. The maximum radioactivity and/or quantity of radioactive material indicated in items 8.A, 8.B, and 8.C apply only to above-ground activity.

D. For use as check and calibration sources.

10. A. The licensee shall not receive for disposal any waste containing Ra-226, H-3, I-129, Tc-99, U-238, C-14, U-234, and Pu-239 once the following source term limits have been reached:

<u>Radionuclide</u>	<u>Total Site Limit (Curies)</u>
Ra-226	464.60
I-129	5.98
Tc-99	55.10
U-238	1,547.7
C-14	5,090.00
U-234	335.4
Pu-239	4,510.00

B. Commencing January 1, 2006, the licensee shall not receive for disposal, any waste containing H-3 in an unstable waste form once the following yearly source term limit has been reached:

<u>Radionuclide</u>	<u>Yearly Limit (Curies)</u>
H-3 (unstable waste form)	100.0 Curies

11. The authorized place of use is a low-level waste burial facility located in the southeast corner of Section 9, Township 12 North, Range 26E W.M., Benton County, Washington, Route 4 - U.S. DOE Hanford Reservation, Richland, Washington 99352, within the boundary of the land area described in Sublease Agreement with the state of Washington, dated July 29, 1965, as amended. For the purposes of this license, the authorized place of use shall be referred to as the "facility."

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12. Reference to the "department" in this license shall mean the Department of Health or successor agency.
13. A. The licensee shall notify the department in writing within 30 days of the appointment of a new Facility Manager, Assistant Facility Manager, Radiation Protection Manager, or Assistant Radiation Protection Manager, describing how the appointee meets or exceeds the minimum qualifications specified in the Facility Standards Manual.
- B. The licensee shall notify the department in writing 30 days prior to any change in the licensee's corporate structure.
14. Upon receipt of a shipment, the licensee shall furnish to the department copies of all shipment manifests received. The licensee shall furnish to the department, within 30 days of a specific written request, special reports consisting of selected information contained on shipment manifests. By the tenth day of each month, the licensee shall submit a report totaling the volume and activity of the waste received during the previous month. In addition, a monthly facility receipt and burial activities report shall be submitted by the licensee, no later than the fifteenth day of the following month to the Department of Health, Supervisor, Waste Management Section. The report shall include the following information for each shipment:
- A. Name and address of the generator(s), broker (if any), and shipper.
- B. Radionuclides and activity of each radionuclide in millicuries (total and by generator).
- C. Grams of special nuclear material (total and by generator).
- D. Mass (in kilograms) of source material received (total and by generator).
- E. Class totals of volume and activity of Class A, B, and C waste entrenched (total and by generator).
- F. Volume of packages disposed with radiation readings at the surface of the disposal container of:

≤ 50 mR/hr
 > 50 mR/hr ≤ 200 mR/hr
 > 200 mR/hr ≤ 1 R/hr

> 1 R/hr ≤ 10 R/hr
 > 10 R/hr ≤ 100 R/hr
 > 100 R/hr

and to the extent practicable:

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- G. Type and physical form of the waste.
 - H. Chemical form of the waste and solidification/stabilization/sorption agent used.
 - I. If an Engineered Concrete Barrier (ECB), or High Integrity Container (HIC) was used (total and by generator).
 - J. Quantity and type of chelates in concentrations greater than 0.1 percent by weight (total and by generator).
 - K. Type of secondary containment used (if any).
 - L. Volume of diffuse Naturally Occurring or accelerator produced radioactive material received (total and by generator).
15. In addition to the record keeping requirements contained in WAC 246-250-600, the licensee shall maintain a record for each shipment of waste disposed at the facility. As a minimum, the record shall include:
- A. The date of disposal of the waste.
 - B. The location of the waste in the disposal site.
 - C. The condition of the waste packages as received.
 - D. Any discrepancies between materials listed on the manifest and those received.
 - E. Any evidence of leaking or damaged packages or radiation or contamination levels in excess of limits specified in United States Department of Transportation and state of Washington regulations.
 - F. A description of any repackaging operations of any of the waste packages in the shipment.
 - G. Type of secondary containment used (if any).

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GENERAL PACKAGING CONDITIONS

16. All radioactive waste shall be packaged, loaded, received, and transported in accordance with all applicable U.S. Department of Transportation regulations, U.S. Nuclear Regulatory Commission regulations, state regulations, and the requirements of this license. Nothing in this license shall in any way relieve the licensee from full compliance with all applicable state and federal laws and regulations, including but not limited to the Resource Conservation and Recovery Act of 1976, as amended, and the State Hazardous Waste Management Statutes of 1976, as amended, and subsequently enacted regulations.
17. Unless otherwise authorized, the licensee shall not receive for disposal any mixed low-level radioactive waste. Mixed waste is defined as any radioactive material which is no longer of use or value, and contains waste that either (A) is listed as dangerous waste in the state's Dangerous Waste Regulations, (B) causes the waste to exhibit any of the dangerous waste characteristics identified in the state's Dangerous Waste Regulations, (C) fulfills any of the "dangerous waste criteria" identified in the state's Dangerous Waste Regulations, (D) listed as hazardous waste in Subpart D, 40 CFR Part 261, or (E) causes the waste to exhibit any of the hazardous waste characteristics identified in Subpart C, 40 CFR Part 261.
18. Unless specifically authorized by the department, all radioactive waste shall be received and buried in closed containers. Cardboard, corrugated paper, wood, and fiberboard are prohibited burial containers.
19. All metal containers shall be secured by an intact heavy-duty closure device when presented for disposal. Closure devices of open-head metal drums having 55-gallons or greater capacity shall be secured by bolts having 5/8 inch or larger diameters. The shipper of any DOT 7A Type A container must maintain on file complete documentation of tests and an engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction comply with that specification.
20. Radioactive waste shall be packaged in such a manner that waste containers received at the facility do not show:
 - A. Significant deformation.
 - B. Loss or dispersal of contents.
 - C. An increase in the external radiation levels as recorded on the manifest, within instrument tolerances.

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- D. Degradation due to rust or other chemical action which results in a loss of container integrity.
21. Void spaces within the radioactive waste and between the waste and its package shall be reduced to the maximum extent practicable. Unless specifically approved by the department, void spaces within all waste packages shall be less than 15 percent of the total volume of the disposal package, provided the disposal package is not a high integrity container nor contains activated metals that are too large to put into high integrity containers. For Class B and Class C waste packages containing activated metals, voids shall be reduced to the extent practicable and shall be demonstrated to be structurally stable by any of the methods discussed in WAC 246-249-050(2)(a). This documentation shall be submitted to the department prior to disposal, and shall be kept on file by the licensee.
22. Waste shall not contain, or be capable of generating, toxic gases, vapors, or fumes during transportation, handling, or disposal.
23. No pyrophoric, hazardous, dangerous, or chemically explosive materials or materials which could react violently with water or moisture or when subject to agitation shall be accepted for disposal.
24. Waste or packaging shall not contain any liquid except as authorized by this license.
25. In order to keep doses as low as reasonably achievable (ALARA), the licensee shall not receive shipments of radioactive material unless appropriate lifting devices of sufficient length have been provided and securely attached to containers and palletized shipments within a cask.
26. The licensee shall not accept radioactive waste unless each waste package has been:
- A. Classified in accordance with Appendix A of this license and the most recent version of the "Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification," issued May 1983 by the U.S. Nuclear Regulatory Commission.
 - B. Marked as either Class A stable, Class A unstable, Class B, or Class C, as defined in Appendix A of this license and the most recent version of the "Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification," issued May 1983 by the U.S. Nuclear Regulatory Commission.

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- C. Marked with a unique package identification number, clearly visible on the package, that can be correlated with the manifest for that particular shipment.
- D. Stabilized, when required by this license, in accordance with criteria contained in the most recent version of the "Technical Position on Waste Forms," issued May 1983 by the U.S. Nuclear Regulatory Commission, and procedures that are described in approved vendor topical reports. Only those stabilization media approved by the department and listed in Appendix C to this license, or High Integrity Containers approved by the department and listed in Appendix D to this license may be used. Stability may also be achieved using engineered barriers in the disposal unit. Specific approval by the department is required prior to construction of any newly designed or redesigned engineered barrier. Only those engineered barriers listed in Appendix E of this license are approved for use at the facility.
27. The classification and package identification marking required by Condition 26 is in addition to any marking or labeling required by U.S. NRC or U.S. DOT, and shall consist of lettering 1/2 inch high or greater in a durable contrasting color to the background surrounding the lettering. The classification marking shall be visible on the same side as the radioactive marking or label and in close proximity (within six inches). Waste packages marked "Radioactive," "Limited Quantity," or "Radioactive LSA" need only one classification marking, whereas waste packages labeled White I, Yellow II, or Yellow III shall have classification markings in close proximity (within six inches) to each label. Waste materials shipped in casks shall have the classification markings visible on the outside of the cask.
28. The licensee may possess SNM that has not been disposed of at the facility, subject to the following restrictions and all other conditions of this license:
- A. No single package shall contain more than 100 grams of U-235, or 60 grams of U-233, or 60 grams of Pu, or any combination thereof, such that the sum of the ratios of the quantity of each SNM radionuclide to the quantities specified herein exceeds unity. Compliance with this requirement shall be determined by the following formula:
- $$\frac{\text{grams containing U-235}}{100} + \frac{\text{grams containing U-233}}{60} + \frac{\text{grams containing Pu}}{60} = <1$$
- B. No single package shall contain more than 15 grams of any combination of U-235, U-233, and Pu, per cubic foot of the total volume. To the extent practicable, the SNM will essentially be uniformly distributed throughout the waste package.

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SPECIFIC WASTE FORM REQUIREMENTS

29. Except as allowed under this license, untreated liquids and wet sludges are not allowed for disposal. Liquids shall be rendered non-corrosive ($4 \leq \text{pH} \leq 11$) prior to treatment. Acceptable treatments are stabilization or solidification, depending on waste class. Wet sludges and slurries, such as evaporator bottoms, shall be non-corrosive and shall be treated by stabilization or solidification. Ion exchange media shall not be treated by sorption.
30. Liquids, ion exchange resins, or filter media treated by stabilization shall be processed in accordance with a process control program using an approved stabilization medium (see Appendix C). The resulting waste form shall contain no detectable free-standing liquid and shall meet the stability requirements of Condition 26. "No detectable free-standing liquid" is defined to be as little free-standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1.0% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of waste processed to a stable form.
31. Liquids treated by solidification shall be processed in accordance with a process control program using an approved solidification medium (see Appendix B). The resulting waste form shall contain no detectable free-standing liquid. "No detectable free-standing liquid" is defined to be as little liquid as is reasonably achievable, but in no case shall it exceed more than 0.5 percent (by volume) of liquid per container.
32. Except as specifically provided in this license, the licensee shall not accept for disposal, any liquid radioactive waste packaged in sorbent material.
33. Incidental and unintentional liquids entrained in solid material may be received, provided that:
- A. (1) The dry material contains less than 0.1 volume percent of liquid within the package, or
 - (2) If a process control program (PCP) is used to verify the amount of liquids, the dry material must contain less than 0.5 volume percent of liquids within the package and;
 - B. Sufficient approved sorbent material (see Appendix F) is used and layered to absorb the incidental and unintentional liquids.

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34. Waste containing biological (excluding animal carcasses, which are considered in Condition 35), pathogenic, or infectious material or equipment (e.g., syringes, test tubes, capillary tubes) used to handle such material, shall be treated to reduce, to the maximum extent practicable, the potential hazard from the non-radiological materials. The inner waste container shall be a metal container meeting DOT 7A performance specifications (see Condition 19) and shall be lined with a minimum 4 mil plastic liner which shall be sealed. The inner waste container shall be placed in an outer metal container meeting DOT 7A performance specifications with a heavy duty closure device (see Condition 19) and shall have a capacity at least 40 percent greater than the inner container. The void between inner container and outer container shall be completely filled by approved sorbent material and the outer container must be sealed. Only sorbents approved by the department shall be allowed (see Appendix F).
35. Animal carcasses containing, or contained in, radioactive materials shall be packaged in accordance with the following requirements: the biological material shall be layered with absorbent and lime and placed in a metal container meeting DOT 7A performance specification, having a heavy duty closure device (see Condition 19). The inner container shall be closed and placed in a metal container meeting DOT 7A performance specification with a heavy duty closure device, having a capacity at least 40 percent greater than the inner container. The void between the inner container and the outer container shall be completely filled by approved sorbent material and the outer container must be sealed. Only sorbents approved by the department (except Perlites) shall be used (see Appendix F).
36. Waste in gaseous form must be packaged at a pressure that does not exceed 1.5 atmospheres at 20°C. Total activity shall not exceed 100 curies (3.7×10^{12} Bqs) per container. Class A gaseous waste shall be contained within U.S. DOT specification cylinders. Class A gaseous waste contained in hermetically sealed glass ampules, tubes, or sealed sources are exempt from the requirement for the specification cylinder provided that they are packaged in containers meeting DOT 7A specifications, having a heavy duty closure device (see Condition 19) and with sufficient sorbent material to prevent breakage and rupture of its contents. Specific approval of the department is required if the gaseous waste is Class B or C. Only sorbents approved by the department shall be used (see Appendix F).
37. Class A ion exchange and filter media containing radionuclides with half-lives greater than five years, the total package concentration of which is one microcurie (3.7×10^4 Bqs) per cubic centimeter or greater, except Cobalt 60 having a concentration of 50 microcuries per cubic centimeter or greater, shall:

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- A. Meet the stability requirements of Condition 26 and shall contain no detectable free-standing liquid. "No detectable free-standing liquid" is defined to mean as little liquid as reasonably achievable, but in no case shall the liquid exceed 1.0% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of waste processed to a stable form. Other Class A ion exchange and filter media which are classified as unstable shall contain no more liquid than 0.5% by volume of the waste.
- B. The calculations of concentrations of isotope activity will adhere to the "sum of fractions being equal to or less than unity rule" for ion exchange resins and filter media containing isotopes with half-lives greater than five years, with the exception of Cobalt 60.
38. Radioactive waste containing radium and/or transuranic radionuclides, as described in Appendix A, is acceptable, provided that the radium and transuranic radionuclides are essentially evenly distributed within an homogenous waste form. The receipt and disposal of waste in which the radium or transuranic radionuclides are not evenly distributed (components, or equipment primarily contaminated with radium or transuranic radionuclides), or radium or transuranic radionuclides in excess of Class A limits, requires the specific approval of the department. Radioactive waste packaged in accordance with License Condition 39 is exempt from this condition.
39. Radioactive consumer products, the use and disposal of which is exempt from licensing control (see WAC 246-232), may be received for disposal without regard to concentration limits of Appendix A, provided the entire unit is received and is packaged with sufficient sorbent material so as to preclude breakage and rupture of its contents. Only sorbents approved by the department shall be used (see Appendix F).
- This condition allows the disposal of such consumer products as intact household or industrial smoke detector units containing Americium-241 foils, and radium or other radioactive materials incorporated into self-luminous devices and electron tubes. Documentation that the consumer product was manufactured under a U.S. Nuclear Regulatory Commission exempt license shall accompany each shipment made under this condition. Waste packaged in accordance with this license condition shall be Class A unstable, and the words "Condition 39" shall be noted on the manifest or other documentation accompanying the waste package.
40. Incinerator ash which is classified as Class A waste according to Condition 26 shall be solidified, granular, or treated in such a manner as to be rendered nondispersible in air, exclusive of packaging.

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41. Wastes containing a concentration of oil in excess of ten percent by weight are not authorized for burial. Dilution by solidification or stabilization media shall not be allowed in determining the waste composition. "Oil" means an organic liquid which is immiscible in water, the disposal of which is not regulated under RCRA or the state hazardous waste regulations.
42. Until alternative waste management techniques such as incineration or recycling become generally available, waste liquids which have a pretreatment concentration of chelating agents in excess of 0.1 percent by weight shall be treated by either solidification or stabilization, and placed into an Engineering Concrete Barrier (ECB). Prior to receipt of any chelate waste in excess of 1.0 percent by weight, the generator must notify the licensee of the intent to ship such material for disposal. The notification shall consist of telephone and written notification to the Facility Manager prior to shipment. Dilution by solidification or stabilization media shall not be allowed in determining waste composition. "Chelating agent" means amine polycarboxylic acids (e.g., EDTA, DTPA), hydroxy-carboxylic acids and polycarboxylic acids (e.g., citric acid, carboic acid, and gluconic acid), the disposal of which is not regulated under RCRA or the state hazardous waste laws. Additionally, the licensee shall record the three-dimensional location of the ECBs containing these wastes
43. The licensee shall not accept for disposal any neutron source (e.g., polonium 210, americium 241, radium 226 in combination with beryllium or other target) unless the generator has notified the licensee of the intent to ship such source to the licensee's disposal facility. The notification shall consist of telephone and written notification to the Facility Manager prior to shipment. The notification shall indicate the isotope, activity, form of the source, a description of the packaging utilized, radiological data, and anticipated date of arrival. Additionally, a copy of the written notification must accompany the shipment made under this license condition.

RECEIPT, ACCEPTANCE, AND INSPECTION CONDITIONS

44. The licensee is exempt from the timely inspection requirements of WAC 246-221-160(2)(a) and (3)(a), provided the requirements of the Facility Standards Manual and Conditions 45 through 48 of this license are met.
45. Waste shipments shall not be accepted at the facility unless accompanied by the following (a single shipment shall consist of not more than one vehicle or one tractor with legal trailer(s) attached):
 - A. Shipment manifest approved by the department.

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- B. Washington State Patrol or Washington State Utilities and Transportation Commission vehicle inspection certificate, or a current visible Washington State 90-day vehicle inspection seal.
 - C. Current certification Form RHF-31, properly executed by a representative of the shipper/generator of the waste, in accordance with requirements of Washington State Rules and Regulations for Radiation Protection, WAC 246-249-030.
 - D. Copies of any specific approval or variance granted by the department for disposal.
 - E. Upon departmental request, other permits or documentation required under this license, or state or federal law or regulation.
46. Waste shipments shall not be accepted by the facility unless the accompanying Form RHF-31 is stamped as received, and initialed by an authorized representative of the department. (This individual may be the licensee, when designated by telephone notification and confirming letter from the department.)
47. Upon acceptance for disposal of each waste shipment, the licensee shall:
- A. Acknowledge receipt of the waste as soon as practicable, but no later than seven days following its acceptance for disposal, by returning a signed copy or equivalent documentation of the shipment manifest to the shipper. The shipper to be notified by the licensee is the one last possessing the waste and transferring it to the licensee.
 - B. Indicate on the returned copy of the shipment manifest, shipping papers, or equivalent documentation any discrepancy between noted waste descriptions listed on the manifest or papers and the waste materials received in the shipment.
 - C. Notify the shipper and the department when any shipment or part of a shipment has not arrived 60 days after the separate copy of the shipment manifest or shipping papers was received by the licensee.
 - D. Maintain copies of completed shipment manifests, including annotations of discrepancies found in accordance with Condition 47.B.
 - E. Maintain records in accordance with in WAC 246-250-600.

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48. Any shipment in which there is evidence that any radioactive material is missing, or that the waste packages have been tampered with or damaged in transit, shall be received by the licensee and safely stored pending notification to the department. The licensee shall not dispose of such packages unless authorized by the department.
49. The manifest for each package of waste received for disposal shall list all radionuclides greater than 3,700 kBq (100 microcuries).

BURIAL OPERATIONS CONDITIONS

50. Packages containing radioactive material shall not be stored above ground for a period greater than ninety days from the date of the department's release of the packages. Packages shall be stored in such a manner as to maintain radiation exposures as low as reasonably achievable. Retention of packaged waste above ground for not more than three working days does not constitute storage.
51. Unless otherwise specifically authorized by the department, the licensee is not authorized to open any package containing radioactive material at the facility, except for the following:
- A. For purposes of repairing, repackaging, or overpacking leaking containers or containers damaged in transport in the event the material is to be disposed, or returned to the generator if required for the protection of the health and safety of the employees or the environment.
 - B. For purposes of inspection and waste confirmation in the presence of a department inspector for compliance with Title 246 WAC, other applicable federal and state regulations, and conditions of this license.
 - C. For purposes of returning outer shipping containers.

The licensee shall use and maintain a facility, in accordance with the Facility Standards Manual, where the above operations can be safely conducted.

52. By June 1, 2006 the licensee shall dispose of all Class B, and C waste in a secondary containment system which has been reviewed and approved by the department. In addition, waste packages containing any of the following radionuclides, H-3, I-129, C-14, Tc-99, U-238, U-234, and Pu-239, shall be disposed in accordance with procedures approved by the department. Secondary containment shall be used for all packages that exceed the predetermined levels contained in these procedures, and the Facility

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Standards Manual. Levels shall be established such that at least 90% of the allowable future source term activity for each listed isotope is placed in secondary containment. The effectiveness of these procedures shall be evaluated annually and reported in the Facility Utilization Report required by License Condition 71:

53. Class B and C waste packages stabilized with bitumen shall be backfilled immediately after waste placement. Sufficient backfill material shall be placed around each container to cover all sides around the packages.
54. Accumulations of waste packages, with an SNM Mass ratio (SNM Mass/ Package Mass) that exceeds 0.0002 (1/5000), in quantities specified in this license, shall be disposed so that there is a minimum of eight inches of soil or a minimum of four feet of non-SNM-bearing waste in all directions from any other accumulation of packages containing SNM in quantities specified in this license, with an SNM Mass ratio that exceeds 0.0002.
55. Class B, and C waste packages must be disposed at a minimum depth of five meters (16.5 feet) below the natural grade of the trench, as defined in the Comprehensive Facility Utilization Plan.
56. All discrete radium 226 must be disposed in an engineered concrete barrier (ECB) at a minimum depth of 23 feet below the natural grade of the trench, as defined in the Comprehensive Facility Utilization Plan.

SITE DESIGN AND CONSTRUCTION CONDITIONS

57. All burial trenches or disposal units shall be in a controlled area surrounded by a chain link fence, eight feet high, and topped with barbed wire.
58. Thirty days prior to commencement of construction of any new disposal unit, the licensee shall submit to the department a detailed engineering plan for the trench in accordance with the provisions of the Facility Standards Manual, or a statement that the proposed trench will be designed and constructed in accordance with Condition 60 of this license.
59. By June 30, 2006, the licensee shall submit, for approval by the department an updated Comprehensive Facility Utilization and Engineering Plan which encompasses the proposed site conditions for the expected lifetime of the facility. The Plan shall discuss, at a minimum, the reasoning for the choice of design, and shall include detailed drawings and calculations sufficient to support the conclusions reached. Changes to the Plan must be submitted to the department for review and approval. The plan shall be updated and submitted for approval by the department every five years.

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60. Until an the updated Comprehensive Facility Utilization and Engineering Plan required by Condition 59 is approved by the department, the licensee shall construct new disposal units in accordance with the March 6, 1991 department-approved Comprehensive Facility Utilization Plan, Document 200-DOC-001, Rev. 3.
61. A. Upon completion of the construction of any new trench, submit to the department two copies of the trench construction report. The report shall include, at a minimum, as-built drawings, daily and final inspection reports, laboratory and field soil test results, and a description of any problems encountered during construction, in order to demonstrate that the construction of the disposal unit is in compliance with applicable plans and specifications contained in the approved Facility Utilization Plan.
- B. 30 days prior to use of any new trench, notify the department in writing of the intent to physically place waste in the trench.
62. The dimensions of burial trenches shall not exceed a width of 150 feet (46 meters), a depth of 50 feet (15.24 meters), or a length of 1000 feet (305 meters) without specific documented approval from the department. Measurements shall be referenced to natural grade as established in the March 6, 1991 department-approved Comprehensive Facility Utilization Plan.
63. Until an agreement is secured with agencies controlling adjacent lands, which meets the requirements of Condition 74 (K) of this license, disposal units constructed after the effective date of this license shall be placed at least 100 feet away from the North, South, and West subleasehold boundaries. The set-back distance for the East boundary shall be no less than 50 feet.

ENVIRONMENTAL MONITORING AND SURVEY CONDITIONS

64. The licensee shall perform an exposure pathway analysis of the site closure plan within 180 days of a department-approved closure plan. The licensee shall verify that the proposed closure actions remain within the acceptable parameters developed and established by the Environmental Impact Statement's (EIS) "Comprehensive Exposure Pathway Analysis". The verification shall include air, soil, ground water, vegetation, fauna, burrowing animals, and human impacts. Additionally, the analyses shall be reviewed and updated as necessary every four years subsequent to the approval of the pathway analyses. Upon completion of the review, the licensee shall submit a copy of the review to the department. This requirement is in addition to the requirements found in WAC 246-250-060(1). Within 120 days of completion of the pathway analysis report, the licensee

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shall submit to the department the licensee's evaluation and analysis of the report with respect to the environmental monitoring programs. The analyses shall clearly identify and differentiate between the roles performed by the natural disposal site characteristics and design features in isolating and segregating the wastes. The analyses shall clearly demonstrate that there is reasonable assurance that the exposure to humans from the release of radioactivity will not exceed the limits set forth in WAC 246-250-170.

65. The licensee shall conduct an environmental monitoring program capable of detecting the potential contribution of radioactive material from the site to the environment. The program shall include collection of samples and analyses at frequencies specified in the Facility Standards Manual (FSM). The licensee shall coordinate sampling schedules with the department to provide, when possible, duplicate samples on a prearranged frequency. A comprehensive annual report of all sample analyses, with statistical trend analyses and discussions of all anomalous results and actions taken, specification of the quantity of each of the principal contaminants released to unrestricted areas in liquid and in airborne effluents during the preceding year, wind rose for the facility, depth to water, and depth to bottom, Ph, as well as non-radiological contaminants specified in the FSM, for all groundwater wells, ventilation exhaust samples taken from the inspection facility, and comparisons of onsite groundwater wells and U.S. DOE groundwater wells in the vicinity of the facility shall be forwarded to the department by June 1 of each year. The report shall be submitted in general accordance with the department's document entitled "Recommended Content and Format for Annual Environmental Reports." Deviations in the reporting format must be approved by the department. In addition, the licensee shall report immediately any environmental monitoring results in excess of reporting levels specified in the Facility Standards Manual.
66. The licensee shall conduct an experimental monitoring program designed to determine the extent and modes of migration of disposed waste into the unsaturated zone, in accordance with procedures specifically approved by the department. Annual reports shall be made to the department by June 1 of each year. The results of the program shall be discussed in the annual Environmental Monitoring Report required by license Condition 65.

TRENCH AND SITE CLOSURE CONDITIONS

67. The licensee shall, within 90 days of filling each disposal unit, closed after the effective date of this license, erect interim disposal unit monuments upon which the following information shall be displayed in a legible manner:

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- A. Total activity of radioactive material, in curies, excluding source and special nuclear materials, total amount of source materials in kilograms, and total amount of special nuclear material in grams.
- B. Trench number or disposal unit designation.
- C. Date of opening and closing of the disposal unit.
- D. Volume of waste contained in the disposal unit.
- E. Coordinates of the disposal unit.

The erection of interim monuments may be omitted if permanent monuments, required by Condition 73, are scheduled to be erected within six months of completion of the disposal unit.

- 68. The licensee shall initiate closure and stabilization measures as each trench is filled and covered in accordance with the schedule and performance criteria defined in the Final Environmental Impact Statement for the Commercial Low-Level Radioactive Waste Disposal Site, Richland Washington, dated May 28, 2004.
- 69. The licensee shall conduct closure and stabilization operations in accordance with the most recent department-approved Comprehensive Facility Utilization Plan and the Facility Closure and Stabilization Plan required by Condition 74 as each trench is filled and covered.
- 70. In addition to the requirements of Condition 69, the licensee shall design and construct interim disposal unit caps in accordance with the specifications contained in the Facility Standards Manual. Interim disposal unit caps shall be established within 3 months of completion of a disposal unit, or as described in the Comprehensive Facility Utilization Plan approved by the department.
- 71. The licensee shall submit a facility utilization report to the department by June 30 of each year. The report shall provide:
 - A. Identification of each disposal unit and description of all waste emplaced during the previous calendar year. A three-dimensional identification to describe the disposal location of each Class B, and C package of waste including the location of engineered barriers used to provide structural stability, and the disposal location of those wastes containing oils or chelates shall also be provided. The location of Class A waste shall be tracked three-dimensionally within 50 feet horizontally and within 10 feet in the vertical plane.

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- B. Percent of utilization for each operating stable and unstable trench or disposal unit filled during the previous calendar year.
 - C. Annual aerial photograph of the leasehold.
 - D. Summary, by waste class, of activities and quantities of radionuclides disposed.
 - E. A summary of disposal unit maintenance activities.
 - F. Any instances in which observed site characteristics were significantly different from those described in the application for the license.
 - G. The remaining capacity of the disposal facility and each open disposal unit.
 - H. A summary of each disposed radionuclide and its activity.
 - I. An updated source term for the facility that covers all waste disposed during the previous year.
 - J. A summary of waste packages that have been placed in secondary containment.
 - K. The volume of diffuse Naturally Occurring and Accelerator produced Radioactive Material (NARM) disposed.
 - L. An evaluation of waste disposed in secondary containment during the previous year.
 - M. Any other information the department may require.
72. As radioactive material buried may not be transferred by abandonment or otherwise, unless specifically authorized by the department, the expiration date of this license applies only to the above-ground activities and to the authority to bury radioactive material wastes at the location specified in Condition 11. The license continues in effect, and the responsibility and authority for possession of buried radioactive material wastes continues until the department finds that the plan established for preparation of the facility for transfer to another person or custodial agency has been satisfactorily implemented in a manner to reasonably assure protection of the public health and safety and the environment, and the department takes action to terminate the licensee's responsibility and authority under this license. All requirements for environmental monitoring, site inspection, maintenance, and site security continue whether wastes are being buried or not.

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73. All trenches or disposal units shall be conspicuously marked with permanent, stable monuments at each end, consistent with the approved site closure plan required by Condition 74. Permanent monuments shall be designed to stand erect, well above the grade of the final trench cover, and in a manner which will not allow them to be covered or obscured by drifting sand during the institutional control period. Inscriptions shall be made so as to endure and remain legible well beyond the institutional control period. The permanent monuments shall be inscribed with the following information:
- A. Total activity of radioactive material, in curies, excluding source and special nuclear materials, total amount of source material in kilograms, and total amount of special nuclear material, in grams, in the trench.
 - B. Trench number or other means of identifying the disposal unit.
 - C. Date of opening and closing the disposal unit.
 - D. Volume of waste in the disposal unit.
 - E. Coordinates of the stable and unstable disposal units, including disposal unit depth and depth of cover at closure.

This same information shall be reported to the Department of Health and the Department of Ecology within 30 days of closure of each trench or disposal unit.

74. Upon approval of the Trench Cap Design required by License Condition 68, the licensee shall review and update the July 1996 Facility Closure and Stabilization Plan within one year, and shall review and update the plan as necessary every four years thereafter. A copy of this review shall be submitted to the department upon completion of the review. The facility closure and stabilization plan shall address how the licensee meets or plans to meet the following requirements:
- A. Bury all waste in accordance with the requirements of the license.
 - B. Dismantle, decontaminate (as required), and dispose of all structures, equipment, and materials that are not to be transferred to the site custodian.
 - C. Document the arrangements and the status of the arrangements for orderly transfer of site control and for long-term care by the government custodian. Also document the agreement, if any, of state or federal governments to participate in, or accomplish, performance objectives. Specific arrangements to assure availability of funds to complete the site closure and stabilization plan shall be documented.

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- D. Direct gamma radiation levels from buried wastes shall be essentially background at any accessible above-ground location, as determined by evaluation of environmental data from the licensee, the U.S. Department of Energy, and its contractors.
- E. Demonstrate by measurement and model during operations and after site closure that concentrations of radioactive material which may be released to the general environment in ground water, surface water, air, soil, plants, or animals will not result in any member of the public receiving an annual dose exceeding an equivalent to 25 millirems (0.25 mSv) to the whole body, 75 millirems (0.75 mSv) to the thyroid, and 25 millirems (0.25 mSv) to any other organ.
- F. Render the site suitable for surface activities without resort to custodial care exceeding vegetation control, minor maintenance, and environmental monitoring. No active ongoing maintenance shall be necessary. Final conditions at the site must be acceptable to the government custodian and compatible with its plan for the site.
- G. Demonstrate that all trench elevations are above water table levels, taking into account the complete history of seasonable fluctuations.
- H. Eliminate the potential for erosion or loss of site or trench integrity due to factors such as ground water, surface water, wind, subsidence, and frost action. All slopes shall be sufficiently gentle to prevent slumping or gullyng. The surface shall be stabilized to minimize erosion, settling, or slumping of caps.
- I. Demonstrate that permanent trench markers are in place, stable, and keyed to benchmarks. Identifying information shall be clearly and permanently marked as required by Condition 67 of this license.
- J. Compile and transfer to the department complete records of site maintenance and stabilization activities, trench elevation and locations, trench inventories, and monitoring data for use during custodial care for unexpected corrective measures and data interpretation.
- K. Maintain a buffer zone to provide space to stabilize slopes, incorporate offsite surface water management features, assure that any future excavation on adjoining areas shall be evaluated for the potential to compromise trench or site integrity, and provide working space for unexpected mitigating measures, if needed, in the future. The buffer zone may be within the subleasehold or on adjacent land, provided written agreements are secured with persons owning or controlling adjacent lands, which shall allow the licensee or custodial agency the required access and actions.

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- L. Provide a secure passive site security system (e.g., a fence) that requires minimum maintenance.
 - M. Stabilize the site in a manner to minimize environmental monitoring requirements for the long-term custodial phase, and develop a monitoring program based on the stabilization plan.
 - N. Investigate the causes of any statistically significant levels of radioactive or hazardous materials in environmental samples taken during operation and stabilization. In particular, any evidence of unusual or unexpected rates or levels of radionuclide migration in or with the ground water shall be analyzed, and corrective measures implemented.
 - O. Eliminate the need for active water management measures, such as a sump or trench pumping and treatment of water to assure that wastes are not leached by standing water in the trenches.
 - P. Evaluate present and proposed activities on adjoining areas to determine their impact on the long-term performances of the site, and take reasonable action to identify and minimize the effects.
75. Upon completion of Phase II of Trench Cap construction, the licensee shall develop specific procedures, and implement a program, approved by the department, which is designed to study (A) erosion of soils onto and off of the facility, (B) methods of revegetation of closed trenches, and (C) subsidence of trenches, in accordance with criteria established by the department. Once approved, the licensee shall submit annual reports to the department by October 31 which discusses the results of the program.
76. Upon closure of each disposal unit, the licensee shall submit to the department a summary of:
- A. All radionuclides and associated activities disposed in that trench.
 - B. Waste class totals by volume and activities.
 - C. Disposal locations and volume of chelates disposed.
 - D. A summary, to the extent practical, of the physical and chemical forms disposed.

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77. Notwithstanding other requirements of this license or the sublease, one year prior to the anticipated transfer of the licensee's facility and buried radioactive waste to another person (including an agency of the state or federal government), the licensee shall submit a final version of the facility closure plan, including a schedule for implementation of all remaining plan elements prior to transfer, and a description of the mechanics of orderly transfer in coordination with the transferee.

FINANCIAL ASSURANCES

78. By June 30 of each year, the licensee shall submit the following financial documentation to the department:
- A. A copy of its financial report or a certified financial statement and Security and Exchange Commission (SEC) Form 10K.
 - B. A copy of its financial or surety arrangements for closure and stabilization of the disposal facility.
 - C. A copy of personnel and nuclear liability insurance held for the facility.
79. The licensee shall submit to the department a copy of site surveillance fees paid, within 45 days after the end of each calendar quarter.
80. The licensee shall conduct a quality assurance/quality control program in accordance with US Ecology Quality Assurance Manual, and Quality Assurance Procedures Manual QA-MA-2. Changes to these documents shall be submitted to the department within 30 days of the change.
81. The licensee shall comply with the requirements set forth in Order dated November 29, 2005, signed by Gary Robertson, Director, Office of Radiation Protection, and made a part hereof by this reference. The licensee shall comply with any new requirements issued subsequent to date of original Order.
82. **Effective 4 April 2008:**
The licensee shall comply with the requirements described in the Administrative Amendment to this license and the document (NRC ORDER EA-07-305, with attachments, dated 5 December 2007) entitled "Fingerprinting and Criminal History Records Check Requirements for Unescorted Access to Certain Radioactive Material". Those requirements listed in the U.S. Nuclear Regulatory Commission Order (implemented in accordance with the due dates given in the "Timeline Attachment" to the 5 March 2008 Administrative Amendment cover letter), shall be instituted as required as part of the licensee's Trustworthiness and Reliability component of the Increased Controls requirements.

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By 3 July 2008, the licensee shall provide under oath or affirmation, to the state of Washington Department of Health and to the Nuclear Regulatory Commission, a certification that the Trustworthiness and Reliability Official is deemed trustworthy and reliable by the licensee as required in paragraph B.2 of the U.S. Nuclear Regulatory Commission (NRC) Order EA-07-305, published in the Federal Register on December 13, 2007 [72 FR 70901].

All fingerprints obtained by the licensee pursuant to this requirement must be submitted to the NRC for transmission to the U.S. Federal Bureau of Investigation (FBI). Additionally, the licensee's submission of fingerprints shall also be accompanied by a certification, under oath and affirmation, of the trustworthiness and reliability of the licensee's Trustworthiness and Reliability Official as required by paragraph B.2 of NRC Order EA-07-305.

The licensee shall complete implementation of the fingerprinting requirements by 1 October 2008. The licensee shall notify the state of Washington Department of Health and the U.S. Nuclear Regulatory Commission when they have achieved full compliance with the requirements described in the NRC Order. The notification shall be made within twenty-five (25) days after full compliance has been achieved.

The licensee shall notify the state of Washington Department of Health and the U.S. Nuclear Regulatory Commission within 24 hours if the results from a criminal history records check indicate that an individual is identified on the FBI's Terrorist Screening Data Base.

83. Except as specifically provided by this license, the licensee shall possess and use radioactive material described in Conditions 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in the documents listed below. The department's "Rules and Regulations for Radiation Protection," Title 246 WAC, shall govern the licensee's statements in applications or letters, unless statements are more restrictive than the regulations. Any change to the documents listed below shall require departmental approval in the form of an amendment to this license.
- A. Application and cover letter dated January 7, 1997.
 - B. Facility Standards Manual, dated February 2003; Superseded by License Condition 83.D.
 - C. Administrative amendment incorporating increased controls, dated November 30, 2005.

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- D. US Ecology Washington, Inc. Facility Standards Manual dated September 2006; Superseded by License Condition 83.F.
- E. Letter and attachments dated March 29, 2007 RE: request to revise disposal limits for SNM and addition of requirement to dispose of Radium 226 sources in ECBs.
- F. Letter and attachments dated December 20, 2007 RE: request to: eliminate experimental monitoring of vadose tritium and radon, solar still tritium, and radon in air; suspend vadose vapor sampling and groundwater sampling of hazardous constituent until after completion of the MTCA investigation; change gamma composite of air filters from monthly to quarterly; change tritium in air sampling from continuous to continuous for 30 days each quarter; change soil sampling from quarterly to once every 3 quarters; change vegetation sampling from quarterly to annually; change groundwater sampling from quarterly to once every 3 quarters; change all environmental TLDs to quarterly; change personal dosimetry exchange form quarterly to semi-annually; reduce vendor audits from every three years to every five years.
- G. US Ecology Washington, Inc. Facility Standards Manual dated December 2007.
- H. **Administrative amendment; RE: adding new IC requirements for fingerprinting and criminal history checks.**

FOR THE STATE OF WASHINGTON DEPARTMENT OF HEALTH

Date: March 5, 2008

By Mikel J. Elsen
Mikel J. Elsen, Supervisor
Waste Management Section

APPENDIX A

WASTE CLASSIFICATION TABLE

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RADIONUCLIDES CONCENTRATION LIMITS IN CURIES/CUBIC METER**

<u>Table 1 (long-lived)</u>	<u>Class A</u>	<u>Class C</u>
C-14	≤ 0.8	≤ 8
C-14 in activated metal	≤ 8	≤ 80
Ni-59 in activated metal	≤ 22	≤ 220
Nb-94 in activated metal	≤ 0.02	≤ 0.2
Tc-99	≤ 0.3	≤ 3
I-129	≤ 0.008	≤ 0.08

CONCENTRATION LIMITS IN NANOCURIES/GRAM

Alpha emitting Transuranic radionuclides with half-lives greater than five years	≤ 10	≤ 100 with specific departmental approval
Radium 226	≤ 10	≤ 100 with specific departmental approval
Curium 242	$\leq 2,000$	$\leq 20,000$ with specific departmental approval
Plutonium 241	≤ 350	$\leq 3,500$

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RADIONUCLIDES	CONCENTRATION LIMITS IN CURIES/CUBIC METER**		
<u>Table 2 (short-lived)</u>	<u>Class A</u>	<u>Class B</u>	<u>Class C</u>
Total of all with half-life less than 5 years	≤ 700	♦	
H-3	≤ 40	♦ with specific departmental approval	
Co-60	≤ 700	♦	
Ni-63	≤ 3.5	≤ 70	≤ 700
Ni-63 in activated metal	≤ 35	≤ 700	≤ 7000
Sr-90	≤ 0.04	≤ 150	≤ 7000
Cs-137	≤ 1	≤ 44	≤ 4600

** Curies/cubic meter is equivalent to microcuries/cubic centimeter

♦ There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other nuclides in Table 2 determine the Waste to be Class C independent of these nuclides.

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- Note 1. Unless specifically restricted elsewhere in the license, the concentration of a radionuclide or radionuclide mixture may be averaged over the volume (or mass) of the waste and, if used, the solidification agent or matrix. The concentration of radionuclides in filters encapsulated with a solidification agent or matrix shall be averaged over the volume of the filter, not the solidification agent. The volume (mass) of packaging containers, liners or overpacks shall not be included in this calculation, nor shall the volume (mass) of the waste mixture be artificially increased by the addition of heavy, nondispersible solids or objects even if considered as waste. Further guidance is provided in "Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification," May 1983, or successor documents issued by the U.S. Nuclear Regulatory Commission.
- Note 2. The waste is Class A if none of the listed radionuclides is present. Waste packaged in accordance with Condition 39 of this license shall be Class A unstable and the words "Condition 39" shall be noted on the manifest or other documentation accompanying the waste package.
- Note 3. There are no Class B values for Table 1 radionuclides; their presence classifies the waste as either Class A or Class C according to their concentrations.
- Note 4. The waste class for mixtures of the listed radionuclides is determined by deriving for each radionuclide the ratio between its concentration in the mixture and its concentration limit in the table of this license and adding the resulting ratio values for each radionuclide group. All limits used in the calculations must be for the same waste class. The sum of the ratios for each radionuclide group must be equal to or less than 1.0, or the waste is the next higher classification than that used for the calculation.

If Class C limits are used in the calculation and the sum of ratios for either group exceeds 1.0, the waste is not acceptable for near-surface disposal without prior written approval from the department.

APPENDIX A

WASTE CLASSIFICATION TABLE

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- Note 5. If radioactive waste contains a mixture of radionuclides, some of which are listed on Table 1, and some of which are listed on Table 2, classification shall be determined as follows:
- A. If the concentration of a nuclide listed in Table 1 does not exceed the Class A limit, the class shall be that determined by the concentration of nuclides listed in Table 2.
 - B. If the concentration of a nuclide listed in Table 1 exceeds the Class A limit, but does not exceed the Class C limit, the waste shall be Class C, provided the concentration of nuclides listed in Table 2 does not exceed the Class C value.
- Note 6. If concentrations for any single radionuclide exceed the Class C values in the table, the waste is not acceptable for near-surface disposal under this license.

APPENDIX B

APPROVED SOLIDIFICATION MEDIA

Page 1 of 1

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Only approved solidification media can be used. Approved solidification media are:

- | | |
|--|--|
| 1. Atcor Cement | 11. Pacific Nuclear Portland Cement |
| 2. Aquaset I and II | 12. Petroset I and II |
| 3. Aztech (General Electric) | 13. Safe T Set |
| 4. Bitumen* (Waste Chem and ATI) | 14. SEG (Westinghouse - Hittman) Cement |
| 5. Chem-Nuclear Cement | 15. Petroset -H |
| 6. Concrete (Structural) | 16. Aquaset -H |
| 7. Delaware Custom Media | 17. EMC Cement |
| 8. Dow Media | 18. Other solidification media and processes which have been approved by U.S. NRC and/or the department. |
| 9. Envirostone | |
| 10. LN Technologies Portland Cement Formula for Oils | |

*Note: For waste types that require solidification, both oxidized bitumen and straight distilled are acceptable.

"Solidification" means a resultant waste form which is a free-standing solid and primarily relies upon a chemical reaction or encapsulation to contain the liquid. Approved stabilization media may also be used as solidification agents without conducting tests necessary to verify stability, provided the resulting waste form is a free-standing solid.

It is the responsibility of the person processing the waste into a solid form to adhere to a quality control program to verify the waste form is appropriate. If a material can also be used as a sorbent, the restrictions noted for its use in Appendix F shall apply to its use as a solidification agent.

APPENDIX C

APPROVED STABILIZATION MEDIA

Page 1 of 1

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Only approved stabilization media may be used. Approved stabilization media are:

1. Aztech (General Electric)
2. Bitumen* (Waste Chem)
3. Concrete**
4. Dow Media (Vinyl Ester Styrene)
5. Veri Solidification Process
6. Other stabilization media and processes which have been reviewed and approved by U.S. NRC and the department as meeting waste form stability criteria.

*Note: Oxidized Bitumen only.

**Concrete, when used as an encapsulation medium around a small volume of radioactive material; e.g., a sealed source centered in a 55-gallon drum containing concrete, shall have a formulated compressive strength greater than or equal to 2500 psi.

APPENDIX D

CERTIFICATES OF COMPLIANCE FOR
HIGH INTEGRITY CONTAINERS

Page 1 of 2

License Number: WN-I019-2

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Only those High Integrity Containers which have been approved by the department and used in accordance with the Certificate of Compliance (C of C) may be used. Approved High Integrity Containers are:

<u>C of C Number</u>	<u>Manufacturer</u>	<u>Package Identification Number</u>
WN-HIC-01	Pacific Nuclear	DSHS-HIC-TMI-01
WN-HIC-02	Nuclear Packaging	DSHS-HIC-EA-50
WN-HIC-03	Chichibu Cement	DSHS-HIC-SFPIC 200L
WN-HIC-04	Chichibu Cement	DSHS-HIC-SFPIC 400L
WN-HIC-05	Nuclear Packaging	DSHS-HIC-EA 142-A
WN-HIC-06	Nuclear Packaging	DSHS-HIC-EA 50-A
WN-HIC-07	Nuclear Packaging	DSHS-HIC-EA 140-A
WN-HIC-08	Nuclear Packaging	DSHS-HIC-EA 190-A
WN-HIC-09	Nuclear Packaging	DSHS-HIC-EA 210-A
WN-HIC-10	Nuclear Packaging	DSHS-HIC-EA 50-C
WN-HIC-11	Nuclear Packaging	DSHS-HIC-EA 140-C
WN-HIC-12	Nuclear Packaging	DSHS-HIC-EA 142-C
WN-HIC-13	Nuclear Packaging	DSS-HIC-EA 190-C

APPENDIX D

CERTIFICATES OF COMPLIANCE FOR
HIGH INTEGRITY CONTAINERS

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<u>C of C Number</u>	<u>Manufacturer</u>	<u>Package Identification Number</u>
WN-HIC-14	Nuclear Packaging	DSHS-HIC-EA 210-C
WN-HIC-15	(SEG) LN Technologies	DSHS-HIC-LN 179-H
WN-HIC-16	(SEG) LN Technologies	DSHS-HIC-LN 131-H
WN-HIC-17	(SEG) LN Technologies	DSHS-HIC-LN 118-H
WN-HIC-18	(SEG) LN Technologies	DSHS-HIC-LN 96-H

Other High-Integrity Containers which have been specifically approved by the department.

APPENDIX E

CERTIFICATES OF COMPLIANCE FOR
ENGINEERED BARRIERS

Page 1 of 1

License Number: WN-I019-2

Amendment 36

Only those Engineered Barriers approved by the department and/or NRC and used in accordance with the Certificate of Compliance (C of C) may be used. Approved Engineered Barriers are:

C of C NumberIssued To

WN-EB-01

US Ecology Washington, Inc.

WN-EB-02

US Ecology Washington, Inc.

Other Engineered Barriers which have been specifically approved by the department.

APPENDIX F

APPROVED SORBENTS

Page 1 of 1

License Number: WN-I019-2

Amendment 36



Only those absorbents listed below have been approved by the state of Washington, Department of Health, Division of Radiation Protection, (department) for use in packaging and/or processing of incidental or unintentional radioactive liquids in accordance with License Condition 33.

Absorbency efficiencies and quantity of absorbent required vary. In all cases, it is the responsibility of the waste generator and/or packager to determine the efficiency and proper proportions of absorbent for incidental or unintentional liquids being absorbed. Note: Enough absorbent materials must be provided to absorb at least twice the volume of radioactive liquid contents.

Media

A. Clay Materials

1. Speedi Dri
2. Hi Dri
3. Florco
4. Florco X
5. Instant Dri
6. Safe T Sorb
7. Opalex
8. Moltan Plus

B. Diatomaceous Earths

1. Superfine
2. Floor Dry
3. Celetom
4. Safe N Dri
5. Solid-A-Sorb
6. Xtrasorb- 248

C. Perlite *

1. Chemsil 30
2. Chemsil 50
3. Chemsil 3030
4. Dicaperl HP200
5. Dicaperl HP500

D. Others

1. Dicalite Dicasorb
2. Petroset
3. Petroset II
4. Aquaset
5. Aquaset II
6. Safe T Set
7. SP-100
8. SP-400
9. Large Grain Superabsorbent crystals

* Note: Perlite products shall not be used for packaging animal carcasses.

LICENSE AMENDMENT**UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE**

Pursuant to Utah Code Annotated, Title 19, Chapter 3 and the Radiation Control Rules, Utah Administrative Code (UAC) R313, and in reliance on statements and representations heretofore made by the Licensee designated below, a license is hereby issued authorizing the Licensee to transfer, receive, possess, and use the radioactive material designated below; and to use radioactive material for the purpose(s) and at the place(s) designated below. The license is subject to all applicable rules, and orders now or hereafter in effect and to all conditions specified below.

LICENSEE

) 3. License Number UT 2300249
) Amendment # 7

1. Name EnergySolutions, LLC (EnergySolutions)

)
)*****

2. Address 423 West 300 South
Suite 200
Salt Lake City, UT 84101

) 4. Expiration Date
) January 25, 2013
)*****
) 5. License Category 4-a

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6. Radioactive Material

6. Radioactive Material (element and mass number)		7. Chemical and/or physical form		8. Maximum Radioactivity and/or quantity of material the Licensee may possess at any one time.
A.	Any Radioactive Material including Special Nuclear Material specified in License Condition 13 A through J.	A. and B. Notwithstanding Conditions 9 (Authorized Use), 16 (Prohibitions and Waste Requirements), and 56 (containerized waste), typically large volume, bulky or containerized, soil or debris. Debris can include both decommissioning (cleanup) and routinely generated operational waste including but not limited to radiologically contaminated paper, piping, rocks, glass, metal, concrete, wood, bricks, resins, sludge, tailings, slag, residues, personal protective equipment (PPE) that conforms to the size limitations in currently approved QA/QC Manual.	A.	20,000 Curies***
B.	Special Nuclear Material		B.	As specified in License Condition 13.A through J.
C.	Cesium-137	Sealed Source(s) registered pursuant to R313-22-210 or an equivalent U.S. Nuclear Regulatory Commission or Agreement State regulation	C.	Not to exceed 11 millicuries per source
D.	Americium-241	Sealed Neutron Source(s) registered pursuant to R313-22-210 or an equivalent U.S. Nuclear Regulatory Commission or Agreement State regulation	D.	Not to exceed 51 millicuries per source

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6. Radioactive Material (element and mass number)		7. Chemical and/or physical form		8. Maximum Radioactivity and/or quantity of material the Licensee may possess at any one time.
E.	Americium-241 Americium-243 Neptunium-237 Plutonium-239 Plutonium-242 Thorium-229 Thorium-230 Uranium-232 Uranium-238	Liquid	E.	Not to exceed 5 microcuries total activity per source
F.	Strontium-90/Yttrium-90	Liquid	F.	Not to exceed 5 microcuries total activity
G.	Americium-241	Sealed Source(s) registered pursuant to R313-22-210 or an equivalent U.S. Nuclear Regulatory Commission or Agreement State regulation	G.	Not to exceed 5 microcuries total activity
H.	Thorium-230	Sealed Source(s) registered pursuant to R313-22-210 or an equivalent U.S. Nuclear Regulatory Commission or Agreement State regulation	H.	Not to exceed 48.6 microcuries total activity
I.	Plutonium-239	Sealed Source(s) registered pursuant to R313-22-210 or an equivalent U.S. Nuclear Regulatory Commission or Agreement State regulation	I.	Not to exceed 21.9 microcuries total activity
J.	Strontium-90/Yttrium-90 and Americium-241	Sealed Source(s) registered pursuant to R313-22-210 or an equivalent U.S. Nuclear Regulatory Commission or Agreement State regulation	J.	Not to exceed 8.1 millicuries per source
K.	Am-241, Cd-109, Co-57, Te-123m, Cr-51, Sn-113, Sr-85m, Cs-137, Co-60, and Y-88	Calibration or Referenced Combined Source(s)	K.	Not to exceed 5 microcuries per source
L.	Uranium-234, Uranium-235, Uranium-238, Americium-241, and Plutonium-239	Calibration or Reference Combined Source(s)	L.	Not to exceed 5 nanocuries per source

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6. Radioactive Material (element and mass number)		7. Chemical and/or physical form		8. Maximum Radioactivity and/or quantity of material the Licensee may possess at any one time.
M.	Cobalt-60 and Cesium-137	Calibration or Reference Combined Source(s)	M.	Not to exceed 0.4 microcuries per source
N.	Reserved	Reserved	N.	Reserved
O.	Americium-241 and Europium-152	Calibration or Reference Combined Sources	O.	Not to exceed 2 microcuries per source
P.	Cesium-137	Sealed Source(s) registered pursuant to R313-22-210 or an equivalent U.S. Nuclear Regulatory Commission or Agreement State regulation	P.	Not to exceed 12 millicuries per source

***Applies to undisposed maximum quantity at the Class A disposal cell and the Mixed Waste landfill cell.

9. AUTHORIZED USE

- A. Licensee may receive, store, and dispose by land burial, radioactive material as naturally occurring and accelerator produced material (NARM) and low-level radioactive waste. Prior to receiving an initial, low-level radioactive waste shipment for disposal from a generator, the Licensee shall obtain documentation which demonstrates that the low-level radioactive wastes have been approved for export to the Licensee. Approval is required from the low-level radioactive waste compact of origin (including the Northwest Compact), or for states unaffiliated with a low-level radioactive waste compact, the state of origin, to the extent a state can exercise such approval.
- B. In accordance with Utah Code Annotated 19-3-105, the Licensee may not receive Class B or Class C low-level radioactive waste without first receiving approval from the Executive Secretary of the Utah Radiation Control Board and also receiving approval from the Governor and the Legislature.
- C. The Licensee shall fulfill and maintain compliance with all conditions and shall meet all compliance schedules stipulated in the Ground Water Quality Discharge Permit, number UGW 450005 (hereafter GWQ Permit), issued by the Executive Secretary of the Utah Water Quality Board.
- D. The Licensee may receive and store up to twenty (20) empty radioactive waste transportation casks under the following conditions:
 - The casks are dedicated to the transportation of low level radioactive wastes.

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- Storage of the casks is confined to the Restricted Area within the area specified in License Condition 10, except when staged for return to commerce within 7 days.
 - Internal contamination is kept minimal as practical but will not exceed the contamination limits specified for Department of Transportation, Class 7 Hazardous Material, Radioactive Material, Excepted Package-Empty Packaging, UN2908.
 - During storage, casks are to be secured in accordance with their Department of Transportation or Nuclear Regulatory Commission approved design specifications.
- E. The Licensee may dispose of Class A Low-Level Radioactive Waste (LLRW) and NARM in both the Class A and Class A North disposal cell described in License Condition 40, and in the Mixed Waste Landfill Cell. Class A waste is defined in Utah Radiation Control Rule R313-15-1008 and NARM at R313-12-3.
- F. Effective January 1, 2002, the Licensee shall not accept, possess, store or dispose of any radioactive waste delivered to the disposal site by any conveyance, unless the associated Shipping Documents have a valid Generator Site Access Permit number, issued by the Utah Division of Radiation Control, affixed.
- G. The Licensee may receive and treat radioactively contaminated aqueous liquids and liquid mercury as characterized in the waste profile at the mixed waste facilities only, the waste must be Class A LLRW at receipt. Treated aqueous liquids may be disposed at the Mixed Waste Facility or the LLRW Facility, in accordance with Exhibit 3 of the Waste Characterization Plan. Treated (amalgamated) liquid mercury shall be disposed at the Mixed Waste Facility only.
- H. Reserved
- I. Licensed material in Items 6.C and 6.D, Sealed source(s) contained in compatible portable gauging devices (registered pursuant to R313-22-210 or an equivalent U.S. Nuclear Regulatory Commission or Agreement State regulation) for measuring properties of materials.
- J. Licensed material in Items 6.E through 6.L, for operational checks and efficiency determinations of radiation detection instrumentation.
- K. Licensed material in Items 6.M through 6.O, calibration or reference combined source(s) for use in conjunction with the Licensee's whole body counter.
- L. Licensed material in Item 6.P, sealed source(s) contained in MGP Instruments, Inc. Model IRD-2000 dosimeter calibrators/irradiators for tests and source checks of electronic dosimeters.

SITE LOCATION

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10. A. The Licensee may receive, store and dispose of licensed material at the Licensee's facility located in Section 32 of Township 1 South and Range 11 West, Tooele County, Utah.
- B. Section 32, Township 1 South and Range 11 West, Tooele County, Utah, is defined by the following points of reference:
- | | |
|---------------------------|---|
| Southwest Section Corner: | Latitude 40° 40' 51.890" N |
| Elevation | Longitude 113° 7' 28.580" W
4269.76 feet above mean sea level (amsl) |
| Southeast Section Corner | Latitude 40° 40' 51.879" N |
| Elevation | Longitude 113° 6' 20.011" W
4277.27 feet-amsl |
| Northwest Section Corner | Latitude 40° 41' 44.098" N |
| Elevation | Longitude 113° 7' 28.654" W
4273.06 feet-amsl |
| Northeast Section Corner | Latitude 40° 41' 44.086" N |
| Elevation | Longitude 113° 6' 20.109" W
4280.83 feet-amsl |
- C. The Southwest Section Corner marker of Section 32 shall be the Point of Beginning (POB).
- D. The Licensee shall cause a survey to be conducted by a Utah licensed land surveyor to identify the section corners of Section 32, Township 1 South, and Range 11 West, Tooele County, Utah (as defined in Condition 10.B). Licensee shall place monuments with brass caps at the identified section corner locations. Monuments shall be permanent and constructed in a manner that will protect them from being disturbed.
- E. Licensed material in Items 6.C through 6.P shall be used only at the Licensee's facilities referenced in Condition 10.B.
11. The open cell area within the Class A and Class A North disposal embankments where waste disposal/placement has or may occur, but the cover system has not been completed shall be limited to 3,650,000 square feet. Uncovered radioactive waste shall be limited to a surface area of 1,020,000 square feet.
12. Pursuant to UAC R313-12-55(1), the Licensee is granted an exemption to UAC R313-25-9, as it relates to land ownership and assumption of ownership.

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SPECIAL NUCLEAR MATERIAL

13. In accordance with the Order issued by the U.S. Nuclear Regulatory Commission dated January 14, 2003, Docket No. 040-8989, License No. SMC-1559, EnergySolutions may possess Special Nuclear Material (SNM) within the restricted area of the EnergySolutions facility as described in Condition 10 provided that:
- A. Concentrations of SNM in individual waste containers must not exceed the values listed in Table 13-A at time of receipt:

Table 13-A

<u>Column 1</u> Radionuclide	<u>Column 2</u> Maximum Concentration (pCi/g)	<u>Column 3</u> Measurement Uncertainty (pCi/g)
U-235 ^a	1,900	285
U-235 ^b	1,190	179
U-235 ^c	26	10
U-235 ^d	680	102
U-233	75,000	11,250
Pu-236	500	75
Pu-238	10,000	1,500
Pu-239	10,000	1,500
Pu-240	10,000	1,500
Pu-241	350,000	50,000
Pu-242	10,000	1,500
Pu-243	500	75
Pu-244	500	75

- a - for uranium below 10 percent enrichment and a maximum of 20 percent of the weight of the waste of materials listed in License Condition 13.B
- b - for uranium at or above 10 percent enrichment and a maximum of 20 percent of the weight of the waste of materials listed in License Condition 13.B
- c - for uranium at any enrichment with unlimited quantities of materials listed in License Condition 13.B and License Condition 13.C

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- d - for uranium at any enrichment with sum of materials listed in License Condition 13.B and License Condition 13.C not exceeding 45 percent of the weight of the waste

*The measurement uncertainty values in Column 3 above represent the maximum one-sigma uncertainty associated with the measurement of the concentration of the particular radionuclide.

The SNM must be homogeneously distributed throughout the waste. If the SNM is not homogeneously distributed, then the limiting concentrations must not be exceeded on average in any contiguous mass of 600 kilograms.

- B. Except as allowed by notes a, b, c, and d in Condition 13.A, waste must not contain “pure forms” of chemicals containing carbon, fluorine, magnesium, or bismuth in bulk quantities (e.g., a pallet of drums, a B-25 box). By “pure forms,” it is meant that mixtures of the above elements such as magnesium oxide, magnesium carbonate, magnesium fluoride, bismuth oxide, etc. do not contain other elements. These chemicals would be added to the waste stream during processing, such as at fuel facilities or treatment such as at mixed waste treatment facilities. The presence of the above materials will be determined by the generator, based on process knowledge or testing.
- C. Except as allowed by notes c and d in Condition 13.A, waste accepted must not contain total quantities of beryllium, hydrogenous material enriched in deuterium, or graphite above one percent of the total weight of the waste. The presence of the above materials will be determined by the generator, based on process knowledge, physical observations, or testing.
- D. Waste packages must not contain highly water soluble forms of uranium greater than 350 grams of uranium-235 or 200 grams of uranium-233. The sum of the fractions rule will apply for mixtures of U-233 and U-235. Highly soluble forms of uranium include, but are not limited to: uranium sulfate, uranyl acetate, uranyl chloride, uranyl formate, uranyl fluoride, uranyl nitrate, uranyl potassium carbonate, and uranyl sulfate. The presence of the above materials will be determined by the generator, based on process knowledge or testing.
- E. Mixed waste processing of waste containing SNM will be limited to stabilization (mixing waste with reagents), micro-encapsulation, macro-encapsulation using low-density and high density polyethylene, macroencapsulation using cementitious mix (Macro Mix), and thermal desorption.

When waste is processed using the thermal desorption process, EnergySolutions shall confirm the SNM concentration following processing and prior to returning the waste to temporary storage.

Liquid waste may be stabilized provided the SNM concentration does not exceed the SNM concentration limits in License Condition 13.A. For containers of liquid waste with more than 600 kilograms of waste, the total activity (pCi) of SNM shall not exceed the SNM concentration in License Condition 13.A times 600 kilograms of waste. Waste containing free

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liquids and the solids shall be mixed prior to treatment. Any solids shall be maintained in a suspended state during transfer and treatment.

- F. EnergySolutions shall require generators to provide the following information for each waste stream:

Before Receipt

1. Waste Description. The description must detail how the waste was generated, list the physical forms in the waste, and identify uranium chemical composition.
2. Waste Characterization Summary. The data must include a general description of how the waste was characterized (including the volumetric extent of the waste, and the number, location, type, and results of any analytical testing), the range of SNM concentration ranges, and the analytical results with error values used to develop the concentration ranges.
3. Uniformity Description. A description of the process by which the waste was generated showing that the spatial distribution of SNM must be uniform, or other information supporting spatial distribution.
4. Manifest Concentration. The generator must describe the methods to be used to determine the concentrations on the manifests. These methods could include direct measurement and the use of scaling factors. The generator must describe the uncertainty associated with sampling and testing used to obtain the manifest concentrations.

EnergySolutions shall review the above information and, if adequate, approve in writing this pre-shipment waste characterization and assurance plan before permitting the shipment of a waste stream. This will include statements that EnergySolutions has a written copy of all the information required above, that the characterization information is adequate and consistent with the waste description, and that the information is sufficient to demonstrate compliance with Conditions 13.F.1 through 13.F.4. Where generator process knowledge is used to demonstrate compliance with Conditions 13.A, 13.B, 13.C, or 13.D, EnergySolutions shall review this information and determine when testing is required to provide additional information in assuring compliance with the conditions. EnergySolutions shall retain this information as required by the State of Utah to permit independent review.

At Receipt

EnergySolutions shall require generators of SNM waste to provide a written certification with each waste manifest that states the SNM concentrations reported on the manifest do not exceed the limits in Condition 13.A, that the measurement uncertainty does not exceed the uncertainty value in Condition 13.A, and that the waste meets Conditions 13.B through 13.D.

- G. Sampling and radiological testing of waste containing SNM must be performed in accordance with the following: One sample for each of the first ten shipments of a waste stream; or one sample for each of the first 100 cubic yards of waste up to 1,000 cubic yards of a waste stream;

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and one sample for each additional 500 cubic yards of waste following the first ten shipments or following the first 1,000 cubic yards of a waste stream. Sampling and radiological testing of debris waste containing SNM can be waived if the SNM concentration is lower than one tenth of the applicable limit in License Condition 13.A.

- H. EnergySolutions shall notify the NRC, Region IV office within 24 hours if any of the above conditions are violated, including if a batch during a treatment process exceeds the SNM concentration in License Condition 13.A. A written notification of the event must be provided within 7 days.
- I. EnergySolutions shall obtain NRC approval prior to changing any activities associated with the above conditions.
- J. Notwithstanding License Condition 13.A through 13.I, for the Containerized Waste Facility described in License Condition 10.F, the following limits for possession of SNM apply to the total combined quantities of SNM at the Containerized Waste Facility:

Consistent with the definition of special nuclear material given in UAC R313-12-3, the maximum quantity of special nuclear material which the EnergySolutions may possess at any one time, shall not exceed: 350 grams of U-235, 200 grams of U-233, and 200 grams Pu, or any combination of them in accordance with the following formula:

$$\frac{(\text{Grams U-235})}{350} + \frac{(\text{Grams U-233})}{200} + \frac{(\text{Grams Pu})}{200} \leq 1$$

“Possession” and “Disposal” are defined in License Conditions 63 and 64 respectively.

MIXED WASTE

14. A. The Licensee may receive for treatment, storage, and disposal any radioactive waste as authorized by this license that is also determined to be hazardous (commonly referred to as mixed waste) as permitted by the “Hazardous Waste Plan Approvals” issued and modified by the Executive Secretary, Utah Solid and Hazardous Waste Control Board and “HSWA Permit” issued by the U.S. Environmental Protection Agency.
- B. The Licensee may dispose of treated mixed waste in the Class A North or the Class A disposal cells if it meets the criteria described in Exhibit 3 of the Waste Characterization Plan.
- C. All other mixed wastes shall be disposed in the Mixed Waste Landfill Cell only.

WASTE TREATMENT AND PROCESSING

15. A. Prior to receipt of any low level radioactive or mixed wastes requiring treatment before disposal, the Licensee shall, based on knowledge of the technology to be used for treatment/processing of each particular radioactive or mixed waste, calculate and document

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that the resultant processed waste is neither Class B nor Class C waste.

- B Reserved
- C. Following treatment at the Mixed Waste facility the Licensee shall classify the resultant processed waste in accordance with UAC R313-15-1008.
- D. The Licensee shall manifest treated waste from the Mixed Waste facility for disposal in accordance with UAC R313-15-1006.

PROHIBITIONS AND WASTE ACCEPTANCE REQUIREMENTS

- 16. A. Sealed sources as defined in Utah Administrative Code (UAC) R313-12 shall not be accepted for disposal.
- B. In accordance with UAC R313-15-1008(2)(a)(v), waste shall not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.
- C. In accordance with UAC R313-15-1008(2)(a)(vi), waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste.
- D. In accordance with UAC R313-15-1008(2)(a)(vii), waste shall not be pyrophoric.
- E. Waste containing untreated biological, pathogenic, or infectious material including radiologically contaminated laboratory research animals is prohibited
- F. Liquid Waste Restrictions
 - i. Except for liquid mercury and minimal quantities as described in Condition 17 and in the Waste Characterization Plan, receipt of non-aqueous liquid waste is prohibited unless specifically approved by the Executive Secretary.
 - ii. Treated liquid radioactive waste shall be disposed at the Mixed Waste Facility or the LLRW Facilities in accordance with Exhibit 3 of the Waste Characterization Plan.
 - iii. Only Utah Division of Radiation Control approved solidification or absorption agents as listed in the State-issued Part B Permit are authorized for liquid waste treatment.
 - iv. Liquid radioactive waste shall be solidified or absorbed in a manner such that no liquid component is disposed.
 - v. Only containers authorized by the U. S. Department of Transportation as specified in the regulations (49 CFR parts 100 thru 180) for transporting liquid radioactive materials shall be accepted for all liquid radioactive wastes, regardless of radioactivity concentrations.

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- G. In accordance with UAC R313-15-1008(2)(a)(viii), gaseous waste received for disposal in the Containerized Waste Facility shall be packaged at an absolute pressure that does not exceed 1.5 atmospheres at a temperature of 20 degrees Celsius and the total activity of any container shall not exceed 100 curies (3.7×10^{12} Bequerels).
- H. In accordance with UAC R313-15-1008(2)(a)(ii), waste received for disposal in the Containerized Waste Facility shall not be packaged in cardboard or fiberboard containers.
- I. The Licensee shall not accept for disposal any neutron source (e.g., polonium-210, americium-241, radium-226 in combination with beryllium or other target).
- J. Incinerator ash shall be treated, in preparation for disposal, in a manner that renders it non-dispersible in air.
- K. Radioactive waste containing chelating agents greater than 0.1 percent by weight shall be disposed of in the Mixed Waste Landfill Cell.
- L. The Licensee shall not accept containerized radioactive waste unless each waste package has been:
 - i. Classified in accordance with R313-15-1008, "Classification and Characteristics of Low-Level Radioactive Waste." In addition, the Licensee shall require that all radioactive waste received for disposal meet the requirements specified in the Nuclear Regulatory Commission, "Branch Technical Position on Concentration Averaging and Encapsulation", as amended.
 - ii. Marked as either Class A Stable or Class A Unstable as defined in the most recent version of the "Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification." originally issued May, 1983 by the U.S. Nuclear Regulatory Commission.
 - iii. Marked with a unique package identification number, clearly visible on the package, that can be correlated with the manifest for the waste shipment in which the package arrives at the facility.
- M. The Licensee may accept containerized Class A LLRW in the following waste packages for disposal in the Containerized Waste Facility of the Class A or Class A North disposal cell:
 - i. DOT "strong, tight" containers in accordance with 49 CFR 173 and meeting the following void space criteria: void spaces within the waste and between the waste and its packaging shall be reduced to the extent practicable, but in no case shall less than 85 percent of the capacity of the container be filled
 - ii. High-Integrity Containers (HICs) exceeding the void space criteria provided in License Condition 16.M.i, shall be approved by the Executive Secretary.

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- iii. DOT “strong, tight” containers in accordance with 49 CFR 173 exceeding the void space criteria provided in License Condition 16.M.i and large components shall be placed as approved by the Executive Secretary.
- iv. Oversized DOT containers (larger than 215 cubic feet) meeting the void space criteria provided in License Condition 16.M.i shall be placed in accordance with the currently approved LLRW Construction QA/QC Manual.

MANAGEMENT OF FREE LIQUIDS

- 17. A. In accordance with UAC R313-15-1008(2)(a)(iv), solid waste received for disposal shall contain as little free standing and non-corrosive liquid as reasonably achievable, but shall contain no more free liquids than one percent of the volume of the waste.
- B. Solid waste received and containing unexpected aqueous free liquid in excess of 1% by volume shall have the liquid removed and placed in the evaporation ponds or the liquid solidified prior to management.
- C. Unexpected non-aqueous free liquids less than 1% of the volume of the waste within the container shall be solidified prior to disposal.
- D. Should shipment(s) arrive with greater than 1% unexpected free liquids (total of aqueous and non-aqueous), the Licensee shall notify the Division of Radiation Control within 24 hours that the shipment(s) failed the requirements for acceptance and manage in accordance with the Waste Characterization Plan.

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RADIATION SAFETY

18. The Licensee shall comply with the provisions of UAC R313-18, “Notices, Instructions and Reports to Workers by Licensees or Registrants--Inspections”; and UAC R313-15, “Standards for Protection Against Radiation.”
19. The Licensee may transport licensed material or deliver licensed material to a carrier for transport in accordance with the provisions of UAC R313-19-100, Transportation.”
20. Written procedures incorporating operating instructions and appropriate safety precautions for licensed activities shall be maintained and available at the location specified in License Condition 10.A. The written procedures established shall include the activities of the radiation safety and environmental monitoring programs, the employee training program, operational procedures, analytical procedures, and instrument calibration. At least annually, the Licensee shall review all procedures to determine their continued applicability.
21. The Licensee’s Director of Health Physics shall review and approve written procedures as stated in License Condition 20 and subsequent changes to the procedures related to waste disposal operations.

ROUTINE MONITORING AND CONTAMINATION SURVEYS

22. The Licensee shall conduct contamination surveys in accordance with Table 22-A:

TABLE 22-A

Type	Location	Frequency
A. Gamma Radiation Levels	1. Perimeter of Restricted Area(s)	1. Weekly
	2. Office Area (s)	2. Weekly
	3. Lunch/Change Area(s)	3. Weekly
	4. Transport Vehicles	4. Upon vehicle arrival at site and before departure.
	5. Mixed Waste Facility	5. Weekly
	6. Decontamination facilities	6. Weekly
B. Contamination Wipes	1. Eating Area(s)	1. Weekly
	2. Change Area(s)	2. Weekly
	3. Office Areas(s)	3. Weekly
	4. Railcar rollover and control shack	4. Weekly
	5. Equipment/Vehicles	5. Once before release
	6. Decontamination facilities	6. Weekly
	7. Mixed Waste Facility	7. Weekly
	8. Shredder Facility and control room	8. Weekly

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Type	Location	Frequency
	9. Rotary Dump and control room	9. Weekly
C. Employee/Personnel	1. Skin & Personal clothing	1. Prior to exiting restricted area
D. Gamma Exposure	1. Administration Bldg.(s)	1. Quarterly
E. Radon Concentration	1. Administration Bldg.(s)	1. Quarterly

23. The Licensee shall determine internal exposure of employees under its bioassay program, in accordance with UAC R313-15-204.
24. The Licensee shall implement a respiratory protection program that is in accordance with UAC R313-15-703.
25. The Licensee shall calibrate air sampling equipment at intervals not to exceed six months.
26. The operational environmental monitoring program shall be conducted in accordance with the Environmental Monitoring Plan (Rev 0. dated: November 24, 2008)
27. Vehicles, containers, facilities, materials, equipment or other items for unrestricted use shall not be released from the Licensee's control if contamination exceeds the limits found in Table 27-A. Except as provided in 49 CFR 173.443(d), conveyances used for commercial transport of radioactive waste or materials, may not be returned to service until the radiation dose rate at each accessible surface is 0.005 mSv per hour (0.5mrem per hour) or less, and there is no surface removable (non-fixed) radioactive surface contamination as specified in paragraph (a) of 49 CFR 173.443.

TABLE 27-A

Nuclide ^a	Column 1 Average ^{b,c,f}	Column 2 Maximum ^{b,d,f}	Column 3 Removable ^{b,e,f}
U-nat, U-235, U-238, and associated decay products	5,000 dpm alpha/ 100cm ²	15,000 dpm alpha/ 100cm ²	1,000 dpm alpha/ 100cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100cm ²	300 dpm/100cm ²	20 dpm/100cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100cm ²	3,000 dpm/100cm ²	200 dpm/100cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emissions or spontaneous fission) except Sr-90 and other noted above.	5,000 dpm beta, gamma/100cm ²	15,000 dpm beta- gamma/100cm ²	1,000 dpm beta- gamma/100cm ²

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- a. Where surface contamination on both alpha-and beta-gamma emitting nuclides exists, the limits established for alpha-and beta-gamma emitting nuclides should apply independently.
 - b. As used in this table, dpm (disintegration's per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
 - c. Measurements of average contamination should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each such object.
 - d. The maximum contamination level applies to an area of not more than 100 cm².
 - e. The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping the area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.
 - f. The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters shall not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.
28. The Licensee shall submit the following to the Executive Secretary for review and approval pending resolution of all issues as judged by the Executive Secretary:
- A. The Licensee shall submit a corrective action plan for the Cover Test Cell for Executive Secretary approval by no later than July 23, 2008. The corrective action plan shall identify all means necessary to collect valid data to verify actual performance of the cover system. Said plan shall include Cover Test Cell design, construction, instrumentation, monitoring, reporting, and comparison of actual performance to projected performance. The Cover Test Cell corrective action plan shall include:
 - i. Performance goals to meet the objective of verifying modeled cover system performance.
 - ii. Methodologies and plans that provide quantitative and qualitative results capable of satisfying the objective.
 - iii. Design, construction, and operational plans to implement the methodologies and plans.
 - iv. Quality control and quality assurance requirements of work to be performed. Quality control and quality assurance specifications and procedures shall state specific actions and processes the Licensee will use to ensure compliance with designs and specifications, monitoring, reporting, ensure data validity, timely detect data deficiencies, enhance accuracy of data interpretation, and ensure correctness of results prior to being submitted to the Division.
 - v. In the event that the plan results in new instrumentation or construction, the Licensee shall complete all such activities within 30-days of Executive Secretary approval.

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Within 30-days of completion of said construction, the Licensee shall submit an As-Built report for Executive Secretary approval.

- B. The Licensee shall submit an annual report for Executive Secretary approval by March 1 of each calendar year. This annual report shall detail the Licensee's progress in implementing the corrective action plan, provide the data collected in the past year, analyze the data, and interpret the meaning of the data relative to the overall objective of the corrective action plan.

REPORTING

29. The Licensee shall submit the following reports to the Executive Secretary:

- A. Quarterly results from the Environmental Monitoring Program (Env. Monitoring Plan, as amended). The report(s) shall be submitted within 90 days after the expiration of each calendar quarter. Calendar Quarter shall mean:

First Quarter	January, February, and March
Second Quarter	April, May, and June
Third Quarter	July, August, and September
Fourth Quarter	October, November, and December

- B. A quarterly summary report detailing the radioisotopes, activities, weighted average concentrations, volume, and tonnage for waste disposed of during the calendar quarter. The report of volume (cubic feet and cubic yards) and tonnage (tons) shall be partitioned according to waste type: Low Level Radioactive Waste (LLRW), LLRW with PCBs, Mixed Waste (MW), MW with PCBs, MW Treatment, NORM, Containerized Class A, uranium/thorium mill tailings (i.e. 11e.(2) wastes), and waste generated prior to congress passing the Uranium Mill Tailings Radiation Control Act in 1978. The report(s) shall be submitted within 30 days after the expiration of each calendar quarter. Calendar Quarter shall mean:

First Quarter	January, February, and March
Second Quarter	April, May, and June
Third Quarter	July, August, and September
Fourth Quarter	October, November, and December

- C. Reserved
- D. For the Mixed Waste Landfill Cell, the Licensee shall ensure that the maximum acceptable activities, used as source terms in the groundwater performance modeling are not exceeded after facility closure. Therefore, the Licensee shall notify the Executive Secretary, at the earliest knowledge, that the following nuclides are scheduled for disposal: berkelium-247 and chlorine-36.
- E. For the Class A and Class A North disposal cells, the Licensee shall ensure that the maximum

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acceptable activities used as source terms in the groundwater performance modeling are not exceeded after facility closure. Therefore, the Licensee shall notify the Executive Secretary, at the earliest knowledge, that the following nuclides are scheduled for disposal: aluminum-26, berkelium-247, calcium-41, californium 250, chlorine-36, rhenium-187, terbium-157, and terbium-158.

- F. An annual report shall be submitted by March 31st and shall report the cumulative void space (expressed as a percent of waste volume) disposed of in the Containerized Waste Facility for the previous year.
30. Except as provided by this condition, the Licensee shall maintain the results of sampling, analyses, surveys, and instrument calibration, reports on inspections, and audits, employee training records as well as any related review, investigations and corrective actions, for five (5) years. The Licensee shall maintain personnel exposure records in accordance with UAC R313-15-201.

STAFFING/QUALIFICATIONS

31. Radiation Safety operations for bulk, containerized and mixed waste, portable gauging device(s), radioactive source(s), and dosimeter calibrator(s)/irradiator(s) shall be conducted by or under the supervision of Rick Chalk, Director of Health Physics.
32. A. The Licensee's staff shall meet the qualifications as described in Appendix I (February 9, 2009, rev 21).
- B. Licensed material in License Conditions 6.C and 6.D. shall be used by, or under the supervision and in the physical presence of, the Director of Health Physics or individuals who have been trained in the Licensee's standard operating and emergency procedures and have satisfactorily completed at least one of the following:
- i. The device manufacturer's training course for safe use and handling of portable gauging devices containing licensed material; or
 - ii. A portable gauge training program conducted in accordance with the provisions of a specific license issued by the Executive Secretary, an Agreement State or the U.S. Nuclear Regulatory Commission.
- C. Licensed material in License Conditions 6.E through 6.P shall be used by, or under the supervision of, the Director of Health Physics, or individuals designated in writing by the Director of Health Physics.
- D. The Licensee shall maintain the organizational independence of the programs that monitor and enforce employee safety, environmental protection, and public safety from programs responsible for production and profitability and other influences or priorities that might compromise quality and radiation safety.

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- E. The Licensee shall establish a method for any employee or contractor to anonymously submit questions, concerns, ideas, or other comments regarding employee safety, environmental protection, and public safety to the Director of Health Physics. The method shall include documentation of all comments submitted, the Applicant's response to each comment, and a method for communicating the Licensee's response to employees and contractors.

CONSTRUCTION ACTIVITIES

33. The Licensee shall obtain prior written approval from the Executive Secretary prior to construction of significant facilities. Significant facilities shall include, but are not limited to waste, stormwater, and wastewater related handling, storage, and transfer projects.
34. The Licensee shall address and resolve all concerns the Division has identified regarding clay mining activities in areas adjacent to Section 32, as provided in a February 16, 2007 Division letter to the Licensee, including a February 9, 2007 Round 1 Interrogatory by the URS Corporation (URS 39400018.3090). The Licensee shall deliver detailed analyses, explanations, descriptions, and appropriate justification to the Division no later than July 1, 2008. If the Executive Secretary determines that unacceptable adverse conditions exist or might develop or evolve, the Licensee shall submit for approval a remedial action plan within 30 days of written notice of the determination by the Executive Secretary. The remedial action plan will address, among other topics, description of proposed activities, justification that the proposed activities will be adequate to protect the facilities in Section 32 from possible impacts of clay mining, and engineering design, specifications, and construction of proposed remedial actions.
35. A. The Licensee shall place all wastes with depleted uranium concentrations greater than 5 percent (by weight) a minimum of 10 feet below the top of the cover. This license condition shall be removed following the completion of the Nuclear Regulatory Commission's rulemaking on Depleted Uranium and subsequent approval by the Division of the site specific performance assessment for the Clive facility.
- B. Performance assessment: A performance assessment, in general conformance with the approach used by the Nuclear Regulatory Commission (NRC) in SECY-08-0147, shall be submitted for Executive Secretary review and approval no later than December 31, 2010. The performance assessment shall be revised as needed to reflect ongoing guidance and rulemaking from NRC. For purposes of this performance assessment, the compliance period will be a minimum of 10,000 years. Additional simulations will be performed for a minimum 1,000,000-year time frame for qualitative analysis.
- C. Revised disposal embankment design: If the performance assessment specified in paragraph 35 B indicates that changes to disposal operations and cover design are necessary to ensure compliance with the requirements of 10 CFR Part 61 or Utah Administrative Code R313,

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EnergySolutions will provide a revised design that does meet those requirements, for all wastes that have been and are reasonably anticipated to be disposed of at the facility within 180 days of Executive Secretary approval of the performance assessment.

- D. Remediation: If following the completion of DRC's review of the performance assessment described in paragraph 35 B, the disposal of DU as performed after the date of this license condition would not have met the requirements of the performance assessment, the facility will undertake remediation to ensure that the performance standards are met, or if that is not possible, shall remove the DU and transport it off-site to a licensed facility.
- E. Surety: The Licensee shall fund the surety for the remediation, in License Condition 35 D. Within 30-days of the effective date of this license condition, the licensee shall submit for Executive Secretary review and approval, the surety cost estimates for remediation of existing Savannah River DU waste disposal and planned, similar large quantity DU waste disposal.
36. A. The West Rail Spur and Unloading facility shall be operated as a transfer station for Surface Contaminated Objects (SCO) and large components, (waste storage is prohibited). These objects may be set on the gravel pad for 24 hours to facilitate unloading and transferring to the Class A disposal cell.
- B. The West Rail Spur and Unloading facility shall be operated as a transfer station for conveyances to be unloaded at the Containerized Waste Facility (unloading of waste packages is prohibited).
37. All ion exchange resins shall be disposed of as follows:
- A. Solidified using solidification agents approved by the Executive Secretary and disposed of in the Containerized Waste Facility; or
- B. Packaged in High-Integrity Containers (HIC) approved by the Executive Secretary, carbon-steel liners, unapproved HICs, or poly HICs meeting the void space criteria described in License Condition 16.M.i and disposed of in the Containerized Waste Facility; or
- C. Packaged in High-Integrity Containers (HIC) approved by the Executive Secretary, carbon-steel liners, unapproved HICs, or poly HICs not meeting the void space criteria described in License Condition 16.M.i and disposed of as approved by the Division under License Condition 16.M.ii or 16.M.iii in the Containerized Waste Facility; or
- D. Disposed of in accordance with the requirements of the Construction Quality Assurance/Quality Control Manual.
38. The Licensee shall construct the Class A disposal Cell identified in the Ground Water Quality Discharge Permit No. UGW450005 and in accordance with approved engineering design drawings "Series 9821".

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- 39 Waste placement and backfilling within the Containerized Waste Facility shall be conducted in accordance with the following:
- A. The Containerized Waste Facility shall conform to the characteristics defined, analyzed, and described in the Engineering Justification Report "Class A Disposal Cell Containerized Waste Facility" (dated April 12, 2001); Engineering Justification Report, Addendum "Fifteen Percent Void Space Criteria" (Revision 1 dated October 10, 2001); and the AMEC letter to Envirocare of Utah, Inc. "Placement of Drums and B-25 Containers with 15 Percent Voids; Envirocare Class A - Containerized Waste Facility Near Clive, Utah" (dated October 2, 2001). Waste containers that have void space in excess of 15 percent shall be filled to the top of the container opening using Controlled Low Strength Material (CLSM) in accordance with the Construction QA/QC manual. The Licensee is exempt from the CLSM cold weather requirements and the 48 hour notification for void remediation only at the CWF Facility.
 - B. Waste container placement configurations and associated waste placement procedures, backfill materials and procedures, and backfill cover materials shall be those approved by the Executive Secretary following testing according to Work Element: Containerized Waste Facility-Waste Placement Test Pad of the currently approved LLRW Construction Quality Assurance/Quality Control Manual.
 - C. Waste delivered in a shielded transportation cask shall remain in the cask until the waste is approved for disposal and the disposal location is prepared for the shipment. Waste received for disposal in the Containerized Waste Facility shall not be handled, stored or transferred within the contaminated portion of the Restricted Area without the approval of the Director of Health Physics.
 - D. The Containerized Waste Facility shall be operated as a contamination-free portion of the Restricted Area until containerized waste disposal operations are completed. Bulk waste may then be used to complete the filling of the cell.
 - E. Interim storage is applicable only to the Containerized Waste Facility. Packages containing radioactive material shall not be stored for a period of longer than 30 days from the date of receipt. Retention of waste materials above ground pending disposal up to 3 working days does not constitute storage. All packages in storage shall be shielded so that the package or shielding shall not exceed 40 mR/hour at one meter from the surface.
 - F. Disposal of non-containerized decomposable or compressible waste at the Containerized Waste Facility is prohibited. Such waste shall be disposed of as debris in bulk waste portions of the Class A or Class A North disposal embankments, in accordance with debris placement requirements of the currently approved LLRW and 11e.(2) CQA/QC Manual.

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40. The LLRW and Class A Disposal Cells, shall be defined by the areas enclosed by the points of reference in the Ground Water Quality Discharge Permit No. UGW450005. The Containerized Waste Facility within the Class A disposal cell shall be separated from the non-containerized area by a 6-foot chain link fence on the berm around the Containerized Waste Facility perimeter area.
41. Reserved.
42. Reserved.
43. The Licensee shall construct the Class A North disposal cell identified in the Ground Water Quality Discharge Permit No. UGW450005 and in accordance with approved engineering design drawings "Series 04080".
44. The Licensee shall fulfill all requirements and maintain compliance with all conditions in the LLRW CQA/QC Manual and engineering drawings currently approved by the Executive Secretary.
45. All engineering related soil tests conducted by the Licensee to demonstrate compliance with Condition 44 shall be performed by a laboratory certified and accredited by the AASHTO Materials Reference Laboratory (AMRL). Said certification / accreditation shall apply to clay liner, clay radon barrier, soil filter layers, sacrificial soils, and riprap materials, or other soil or man-made materials as directed by the Executive Secretary. Said certification shall include all engineering test methods required by License Condition 44, or as directed by the Executive Secretary. Certification is not required for the DRC approved sealed single ring infiltrometer permeability test contained in Appendix B to the LLRW and 11e(2) CQA/QC Manual.
46. Reserved
47. The Licensee shall not initiate disposal operations in newly excavated areas until the Division has inspected and the Executive Secretary has approved the cell/embankment liner.

CONSTRUCTION DRAWINGS.

48. A. The Licensee shall provide a comprehensive set of drawings for the entire Clive site. The drawings shall correctly: (1) locate all structures, utilities, fences, ponds, drainage features railroad tracks, roads, storage facilities, loading and off-loading facilities, disposal embankments, all environmental monitoring locations including instruments/devices, and any other appurtenances related to the operation, maintenance and closure of the disposal facility; and (2) provide survey control including elevations in sufficient detail to fully describe the site. The drawings shall be developed in accordance with the standards of professional care. A drawing index shall be included that identifies drawings by discrete number. Each drawing shall include a revision block that documents the latest changes or modifications by date and includes the initials of the responsible reviewer for QA/QC tracking purposes.

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- B. Drawings showing approved future designs shall be marked as “Final Drawings.” Final drawings or drawings developed for construction shall be sealed by a Utah registered professional engineer. The drawings shall be developed in accordance with the standards of professional care.
- C. Within 30 days of completion of any project that requires approval by the Executive Secretary, a set of “As-Built” drawings shall be submitted for review. The drawings shall indicate as-built conditions as they existed no earlier than 30 days prior to the submittal. Drawings of finished construction shall be marked as “As-Built” in the final entry in the revision block.

SITE OPERATING PROCEDURES

- 49. Shipments containing free liquid in excess of 1% shall be absorbed, evaporated, or the liquids removed only at facilities with approved secondary containment or the rail rollover facility.
- 50.
 - A. On-site generated waste shall be managed according to its radiological, physical and chemical characteristics. Solid phase material shall be disposed in either the Class A Cell, Class A North Cell, Mixed Waste Cell, or the 11e.(2) Cell. Waste water from decontamination facilities will be put in the evaporation ponds or sprayed on disposal cells for purposes of dust and engineering controls.
 - B. Site equipment that has reached the end of its useful life, is not operational and does not meet the removable contamination limits of License Condition 27, Table 27-A, shall be disposed in the LLRW Class A Cell or Class A North Cell within 90 days as debris in accordance with requirements of the LLRW Construction Quality Assurance/Quality Control Manual or stored on approved facilities for storage, transfer, and sampling of bulk waste.
 - C. Facility vehicles transferring or unloading waste shall not be left unattended.
- 51. The following shall be implemented for LLRW and 11e.(2) Waste segregation purposes:
 - A. LLRW and 11e.(2) waste shall not be managed simultaneously at the Rail rollover facility, Shredder Facility, Rotary Dump Facility, or Rail Digging facility;
 - B. Any vehicle or facility used to manage waste for disposal within the 11e.(2) disposal embankment, must be clearly labeled to designate 11e.(2) management. The labels shall be visible from both sides of a vehicle/facility designated for 11e.(2) waste management.
 - C. Equipment, vehicles and facilities, which are used for management of LLRW will be cleaned of any material before being used for 11e.(2) waste management activities. Equipment, vehicles and facilities shall be cleaned of all waste material to a limit of 500 grams per square foot prior to being used for other waste types.

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52. Waste shipments or transportation packages received shall meet the following contamination control requirements for removable contamination
- *Less than 220 dpm/100cm² alpha
 - *Less than 2200 dpm/100cm² Beta-gamma

If a shipment or transportation package does not meet the above contamination requirements, the Licensee shall take actions to reduce the risk for spread of contamination.

53. A. Quarterly, the Licensee shall clean the facility roads, or more frequently when needed. The material collected from cleaning the roads shall be disposed within an approved disposal embankment for Class A waste.
- B. On a biweekly basis (once every two weeks) between the first day of May and the last day of September, the Licensee shall spray a polymer solution on all exposed contaminated cell areas and areas of waste within the Class A Cell and Class A North Cell which have been disturbed in the previous two weeks. The Licensee will apply a polymer-based stabilizer in accordance with the manufacturer's instructions.
- C. The Licensee shall minimize the dust created during the process of placing and moving waste, through the use of water. Water or other engineering controls shall be placed on roads and in areas which work is being performed.
- D. The Licensee shall cease loading, hauling, and dumping of un-containerized waste whenever the 5-minute average wind velocities exceed 35 miles per hour. When both the 5-minute average and 5-minute maximum wind velocities are less than 35 mph as observed on the meteorological station, management of un-containerized waste may resume.
54. The Licensee shall fulfill and maintain compliance with all conditions and requirements in the Site Radiological Security Plan (Revision 3, May 5, 2008).
55. A. For the Class A and Class A North disposal cells, the Licensee shall ensure that the actual cumulative activity of chlorine-36 does not exceed 0.2828 picocuries per gram in accordance with the following formula:

$$\frac{\text{Total Activity of chlorine-36 Received (picocuries)}}{\text{Total Mass of Active Cell (grams) + Completed Cell (grams)}} \leq 0.2828 \text{ picocuries per gram}$$

- B. For the Class A and Class A North disposal cells, the Licensee shall ensure that the actual cumulative activity of berkelium-247 does not exceed 0.0001 picocuries per gram in accordance with the following formula:

$$\frac{\text{Total Activity of berkelium-247 Received (picocuries)}}{\text{Total Mass of Active Cell (grams) + Completed Cell (grams)}} \leq 0.0001 \text{ picocuries per gram}$$

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- C. For the Mixed Waste disposal cell, the Licensee shall ensure that the actual cumulative activity of chlorine-36 does not exceed 8.75 picocuries per gram in accordance with the following formula:

$$\frac{\text{Total Activity of chlorine-36 Received (picocuries)}}{\text{Total Mass of Active Cell (grams) + Completed Cell (grams)}} \leq 8.75 \text{ picocuries per gram}$$

- D. For the Mixed Waste disposal cell, the Licensee shall ensure that the actual cumulative activity of berkelium-247 does not exceed 0.00314 picocuries per gram in accordance with the following formula:

$$\frac{\text{Total Activity of berkelium-247 Received (picocuries)}}{\text{Total Mass of Active Cell (grams) + Completed Cell (grams)}} \leq 0.00314 \text{ picocuries per gram}$$

56. Containerized Class A waste shall be certified by the generator to meet the Waste Acceptance Criteria in accordance with the Waste Characterization Plan described in License Condition 58.
57. A. The Licensee shall move rail shipments into the Restricted Area within seven (7) days of arrival. The shipments may be returned to the carrier when management of the waste is not possible within the seven (7) day period, unless additional time is approved by the Executive Secretary of the Utah Radiation Control Board.
- B. Empty outbound railcars shall be picked up by the local rail service within seven (7) days of release from the Restricted Area, unless additional time is approved by the Executive Secretary of the Utah Radiation Control Board.
- C. Railcars that have been decontaminated and surveyed both internally and externally and found to meet criteria of non-fixed radioactive surface contamination less than 220 dpm/100 cm² Alpha, 2,200 dpm/100 cm² Beta and a dose rate less than 0.5 mrem/hr or that meet the limits found in Table 27-A do not have to be picked up by local rail service within seven (7) days.
- D. The Licensee may perform the following activities on incoming shipments on rail lines outside of Section 32, not including the main line adjacent to Section 32:
1. Visual Inspection
 2. Radiation level surveys
 3. Affix labels
58. The Licensee shall fulfill and maintain compliance with all conditions and requirements in the LLRW Waste Characterization Plan (dated October 8, 2009).
59. Reserved.

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60. All wind dispersed litter located outside of the disposal cell/embankments, shall be retrieved by the Licensee and returned to the Licensee's control within 24 hours.
61. Truck, railcar, and other equipment washdown (decontamination) facilities, including evaporation ponds, shall be controlled with fences or other approved barriers to prevent intrusion.
62. All burial embankments and waste storage areas, including immediately adjacent drainage structures, shall be controlled areas, surrounded by a six-foot chain link fence. Upon site closure, all permanent fences shall be six-feet high chain link topped with three strand barbed wire, tip tension wire, and twisted selvedge.
63. Radioactive and mixed wastes within Section 32 and all rail spurs controlled by the Licensee around the Licensee's Disposal Facility are possessed by the Licensee. Waste conveyed to the facility by truck is in transport as long as the commercial carrier driver and vehicle remain at the Clive disposal facility. The Licensee does not possess such waste for purposes of determining compliance with surety requirements and SNM quantity limits, except that the Licensee does, however, possess any waste containing SNM that is not disposed of on the day it is delivered to the facility.
64. "Disposal" is the locating of radioactive waste into a lift of the disposal embankment. Disposal does not include the storage of waste in containers on a lift when the container will ultimately be emptied, the staging of containerized waste in the disposal embankment; or waste as "In Cell Bulk Disposal".

MANIFEST/SHIPPING REQUIREMENTS

65. The Licensee shall comply with UAC R313-15-1006 and UAC R313-25-33(8), Requirements for Low-Level Waste Transfer for Disposal at Land Disposal Facilities and Manifests.
66. The Licensee shall not accept radioactive waste for storage and disposal unless the Licensee has received from the shipper a completed manifest that complies with UAC R313-15-1006 and UAC R313-25-33(8).
67. The Licensee shall maintain copies of complete manifests or equivalent documentation required under Conditions 65 and 66 until the Executive Secretary authorizes their disposition.
68. The Licensee shall immediately notify the Executive Secretary or the Division's on-site representative of any waste shipment where there may be a possible violation of applicable rules or license conditions.
69. The Licensee shall require anyone who transfers radioactive waste to the facility to comply with the requirements in UAC R313-15-1006.
70. The Licensee shall acknowledge receipt of the waste within one (1) week of waste receipt by returning a signed copy of the manifest or equivalent document to the shipper. The shipper to be notified is the Licensee who last possessed the waste and transferred the waste to the Licensee. The returned copy of the manifest or equivalent documentation shall indicate any discrepancies between materials listed on the manifest and materials received.

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71. The Licensee shall notify the shipper (e.g., the generator, the collector, or processor) and the Division when any shipment or part of a shipment has not arrived within 60 days after receiving the advance manifest.
72. The Licensee shall maintain a record for each shipment of waste disposed of at the site. At a minimum, the record shall include:
- A. The date of disposal of the waste;
 - B. The location of the waste in the disposal site;
 - C. The condition of the waste packages received;
 - D. Any discrepancy between the waste listed on the shipment manifest or shipping papers and the waste received in the shipment;
 - E. A description of any evidence of leaking or damaged packages or radiation or contamination in excess of applicable regulatory limits; and
 - F. A description of any repackaging of wastes in any shipment.

FINANCIAL ASSURANCE/CLOSURE

73. The Licensee shall at all times maintain a Surety that satisfies the requirements of UAC R313-25-31 in an amount adequate to fund the decommissioning and reclamation of Licensees' grounds, equipment and facilities by an independent contractor. The Licensee shall annually review the amount and basis of the surety and submit a written report of its findings by December 1 each year for Executive Secretary approval. At a minimum, this annual report shall meet the following requirements:
- A. Summary of Changes – the annual report shall include a written summary of any change in the cost estimate previously approved by the Executive Secretary, including, but not limited to:
 - i. A description of any modification, addition, or deletion of any direct cost or post-closure monitoring and maintenance (PCMM) cost line item, including supporting justification, calculations and basis;
 - ii. Any change to the unique reference number (cost line item) assigned approved by the Executive Secretary for any direct or PCMM cost line item.
 - B. Indirect Costs shall be based on the sum of all direct costs in accordance with the following values:

Surety Reference No.	Description	Percentage
300	Working Conditions	5.5%
301	Mobilization / Demobilization	4.0%

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Surety Reference No.	Description	Percentage
302	Contingency	11.0%
303	Engineering and Redesign	2.25%
304	Overhead and Profit	19.0%
305	Management Fee and Legal Expenses	4.0%
306	DEQ Oversight	4.0%

- C. RS Means Guide estimates of direct construction costs provided in the annual report shall be derived from or based on the most recent edition of the RS Means Guide for Construction.
- D. Report Certification – the annual report shall be prepared under the direct supervision of and certified by a Professional Engineer or Professional Geologist currently licensed by the State of Utah with at least five (5) years of construction cost estimation experience. The annual report shall be developed in accordance with the standards of professional care.
- E. Electronic Format – the Licensee shall provide the report in both paper and electronic formats, as directed by the Executive Secretary.
- F. Within 60-days of Executive Secretary approval of said annual report, the Licensee shall submit written evidence that the surety has been adequately funded.
- G. The Licensee shall prepare and maintain current a gravel resource evaluation report on-site that quantifies the gravel reserves remaining in the Grayback Hills Gravel Pit located in Section 24 of T. 1 N., R. 12 W (SLBM). Such report shall be prepared and certified on or before August 31 of each year by a professional engineer or professional geologist currently registered in the State of Utah.
74. One (1) year prior to the anticipated closure of the site, the Licensee shall submit for review and approval by the Executive Secretary a site decontamination and decommissioning plan. As part of this plan, the Licensee shall demonstrate by measurements and/or modeling that concentrations of radioactive materials which may be released to the general environment, after site closure, will not result in an annual dose exceeding 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public.
75. In accordance with UAC R313-25-33(6), the Licensee shall submit a financial statement annually by March 31st of each year for the previous year.
76. Reserved.

SPECIAL HANDLING

77. Except while waste packages are being handled in the active areas of the Containerized Waste

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Facility, external gamma radiation levels shall not exceed 40 mR/hr at one meter from the surface of any emplaced waste package or from shielding placed around disposed waste containers.

78. The Licensee shall observe the following controls on waste handling at the Containerized Waste Facility:
- A. Before unloading any waste container whose external gamma radiation at the surface exceeds 10 R/hr, an ALARA review shall be performed and documented and a pre-job briefing shall be conducted.
 - B. As part of the ALARA review, the Licensee shall determine and record (1) estimates of the radiation dose rates for the waste container, disposal unit working face, and any other potentially significant radiation sources; (2) expected durations of exposures to and distances from each radiation source; and (3) expected doses to each person involved in the actual disposal operation.
 - C. Before unloading any waste container whose external gamma radiation at the surface exceeds 200 R/hr, a practice run shall be conducted. The practice run shall involve shielding, container(s) filled with non-radioactive material, and handling equipment that are similar to those involved with the actual shipment. Similarity includes similar rigging and physical characteristics (e.g., weight, dimensions, and attachments). Those personnel who will participate in receiving, processing, handling, and disposing of the actual waste will participate in the practice run, using actual procedures. The Licensee shall notify the Division 24 hours in advance of conducting the practice runs.
 - D. On a case-by-case basis, the Executive Secretary may exempt the Licensee from conducting the required practice run, considering the results of earlier practice runs and actual experience handling waste containers with high radiation levels.
79. Reserved.
80. The Licensee shall notify in writing the Executive Secretary at the earliest possible date, but no later than 10 days before scheduled receipt of each shipment with contact radiation levels in excess of 200 R/hr. The notification shall include the anticipated dates of receipt and plan for disposal in the Containerized Waste Facility.
81. The Director of Health Physics or other qualified person designated by the Director of Health Physics shall be present for and shall observe the receipt, processing, handling, and disposal of each waste package with contact radiation levels in excess of 200 R/hr.
82. The Licensee shall dispose of only closed containers in the Containerized Waste Facility. The Licensee shall not dispose of any breached waste container in the Containerized Waste Facility without first repairing the breached container or overpacking it in an undamaged container. The Licensee is authorized to open packages at its facility only to:
- A. Repair or repackaged breached containers.
 - B. Inspect for compliance with conditions of this license.

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- C. Confirm package contents and fill voids in packages/containers that have greater than 15% void space.
 - D. Accomplish other purposes as approved by the Executive Secretary.
83. The Licensee shall handle and emplace LLRW packages in the Containerized Waste Facility such that packaging integrity is maintained during handling, emplacement, and subsequent backfilling. Waste packages deposited in the Containerized Waste Facility shall be protected from any adverse effects of operations which may damage them.

SEALED SOURCES AND/OR DEVICES

84. A.
- i. Sealed sources shall be tested for leakage and/or contamination at intervals not to exceed the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or by equivalent regulations of an Agreement State.
 - ii. In the absence of a certificate from a transferor indicating that a leak test has been made within the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or by equivalent regulations of an Agreement State prior to the transfer, a sealed source received from another person shall not be put into use until tested.
 - iii. Sealed sources need not be tested if they are in storage and are not being used. However, when they are removed from storage for use or transferred to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source shall be stored for a period of more than 3 years without being tested for leakage and/or contamination.
 - iv. The leak test shall be capable of detecting the presence of 185 becquerels (0.005 μCi) of radioactive material on the test sample. If the test reveals the presence of 185 becquerels (0.005 μCi) or more of removable contamination, a report shall be filed with the Executive Secretary in accordance with R313-15-1208, and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Utah Radiation Control Rules. The report shall be filed within 5 days of the date the leak test result is known with the Division of Radiation Control, P.O. Box 144850, Salt Lake City, Utah 84114-4850. The report shall specify the source involved, the test results, and corrective action taken.
 - v.
 - (a) The Licensee is authorized to collect leak test samples in accordance with Condition 85.D of this license, the Licensee's renewal application (dated March 1, 2001), and the Licensee's Memo (dated March 11, 2002).
 - (b) The analysis of leak test samples shall only be performed by individuals who meet the qualifications of a Health Physics Technician I or II, as defined by this license. The analysis of leak test samples shall be performed in accordance with the Licensee's renewal application (dated March 1, 2001), and the Licensee's

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Memo (dated March 11, 2002). Alternatively, tests for leakage and/or contamination, including sample collection and analysis, may be performed by other persons specifically licensed by the Executive Secretary, the U.S. Nuclear Regulatory Commission, or an Agreement State to perform such services.

- vi. Records of leak test results shall be kept in units of Becquerels or microcuries and shall be maintained for inspection by representatives of the Executive Secretary.
- B. Sealed sources or source rods, containing licensed material shall not be opened or sources removed from source holders, devices, or detached from source rods by the Licensee, except as specifically licensed by the Executive Secretary, an Agreement State, or the U.S. Nuclear Regulatory Commission to perform such services.
- C. The Licensee shall conduct a physical inventory every six months to account for all sealed sources and/or devices received and possessed under this license. The records of inventories shall be maintained for three years from the date of the inventory for inspection by the Division, and shall include the quantities and kinds of radioactive material, manufacturer's name and model numbers, location of the sources and/or devices, and the date of the inventory.

PORTABLE GAUGING DEVICES:

- 85. A. Each portable gauging device shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The gauge or its container must be locked when in transport, storage or when not under the direct surveillance of an authorized user.
- B. Each portable gauging device shall be kept under the constant surveillance (direct surveillance) of individuals trained in accordance with Condition 32.B of this license, when the device is not in secured storage, as required by Condition C of this license condition.
- C. When a portable gauging device is not in transit or under constant surveillance (direct surveillance) as required by Condition B of this license condition:
 - i. The Licensee shall secure the device in accordance with R313-15-801(1) and (2).
 - ii. The Licensee shall not:
 - (a) leave the device unattended or unsecured;
 - (b) chain the device to a post, chain the device in the back of an open bed truck; or secure the device in any similar manner.
- D. Any cleaning and/or maintenance of portable gauging device(s) or the collection of leak test samples, performed by the Licensee, shall only be performed with the radioactive source/source rod in the safe shielded position.
- E. All cleaning and/or maintenance of portable gauging device(s), performed by the Licensee shall only be performed in accordance with Condition D of this license condition, and the manufacturer's instructions and recommendations.

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- F. Any cleaning, maintenance, or repair of portable gauging device(s) that requires removal of the sources/source rod shall be performed only by the manufacturer or by other persons specifically licensed by the Executive Secretary, an Agreement State, or the U.S. Nuclear Regulatory Commission to perform such services.

DOSIMETER CALIBRATOR(S)/IRRADIATOR(S):

86. A. The LDM-2000 reader shall only be connected to a maximum of two IRD-2000 irradiator modules.
- B. Devices(s) shall only be:
- i. installed in areas where device(s) can be secured and limited to individuals authorized to use device(s) pursuant to Condition A of this license condition and Condition 32.C of this license.
 - ii. used by individuals who meet the qualifications of a Health Physics Technician I or II, as defined by this license.
 - iii. used in accordance with the manufacturer's operating manual and certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or by equivalent regulations of an Agreement State. The Licensee shall follow the manufacturer's recommendations for preventative maintenance and operational testing.
- C. Maintenance and servicing of device(s) shall only be performed by the manufacturer or persons specifically licensed by the Executive Secretary, the U.S. Nuclear Regulatory Commission, or an Agreement State to perform such services.
- D. The Licensee shall not perform calibration(s) for non-MGP Instrument dosimeters.

INCREASED CONTROL CONDITIONS

87. The Licensee shall comply with the requirements described in the Division's letter dated November 14, 2005 and attached document to the Division's letter entitled "Increased Controls for Licensees that Possess Sources Containing Radioactive Material Quantities of Concern." The Licensee shall complete implementation of said requirements before May 15, 2006 or the first day that radionuclides in quantities of concern are possessed at or above the limits specified in Table 1, provided as an attachment to the Division's letter dated November 14, 2005, whichever is later. Within 25 days after the implementation of the requirements of this License Condition, the Licensee shall notify the Executive Secretary in writing that it has completed the requirements of this License Condition.
88. The licensee shall comply with requirements described in the Executive Secretary's letter dated May 16, 2008, Attachment 1, "Fingerprinting and Criminal History Records Check Requirements for Unescorted Access to Certain Radioactive Material" and Attachment 2, "Specific Requirements Pertaining to Fingerprinting and Criminal History Records Checks." The requirements of this license condition shall be implemented as part of the trustworthiness and reliability program of the Increased Controls requirements.

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- A. On or before August 14, 2008, the licensee shall provide under oath or affirmation, a certification that the Trustworthiness and Reliability Official is deemed trustworthy and reliable by the licensee as required in paragraph 2.B of Attachment 1, "Fingerprinting and Criminal History Records Check Requirements for Unescorted Access to Certain Radioactive Material."
- B. All fingerprints obtained by the licensee pursuant to this requirement must be submitted to the U.S. Nuclear Regulatory Commission for transmission to the U.S. Federal Bureau of Investigation (FBI). Additionally, the licensee's submission of fingerprints shall also be accompanied by a certification, under oath and affirmation, of the trustworthiness and reliability of the Trustworthiness and Reliability Official as required by paragraph 2.B of Attachment 1, "Fingerprinting and Criminal History Records Check Requirements for Unescorted Access to Certain Radioactive Material."
- C. The licensee shall complete implementation of the fingerprinting requirements on or before November 12, 2008. The licensee shall notify the Executive Secretary when full compliance with the requirements described in the Executive Secretary's letter dated May 16, 2008, Attachment 1, "Fingerprinting and Criminal History Records Check Requirements for Unescorted Access to Certain Radioactive Material" and Attachment 2, "Specific Requirements Pertaining to Fingerprinting and Criminal History Records Checks" have been achieved. Notification to the Executive Secretary shall be made within twenty-five (25) days after full compliance has been achieved.
- D. The licensee shall notify both the Executive Secretary and the U.S. Nuclear Regulatory Commission within 24 hours if the results from a criminal history records check indicate that an individual is identified on the FBI's Terrorist Screening Data Base.

CLOSEOUT CONDITIONS

- 89. Except as specifically provided otherwise in this license, the Licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Utah Radiation Control Rules, Utah Administrative Code R313 shall govern unless the statements, representations, and procedures in the Licensee's application and correspondence are more restrictive than the rules.
 - A. License renewal application, Revision 2, dated June 20, 2005.
 - B. The following documents refer to revisions made in Amendment 22:
 - (1) Letter CD04-0481, dated October 27, 2004, Amendment and Modification Request – Class A North Embankment.
 - (2) Letter CD04-0548, dated December 23, 2004, Revised Class A North Disposal Embankment License Amendment Request.
 - (3) URS Review of Revised Class A North Embankment Amendment Request, dated December 29, 2004.
 - (4) Letter CD05-0024, dated January 17, 2005, Class A North Disposal Embankment

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- (5) Letter CD05-0265, dated May 20, 2005, Revision of Appendix R, Environmental Monitoring and Surveillance Plan.
 - (6) Letter CD05-0266, dated May 25, 2005, Surety Calculations for the Class A North Disposal Cell.
 - (7) Memo: Treesa Parker to John Hultquist, dated May 25, 2005, Proposed revisions to RML for Amendment 22
 - (8) Email: Treesa Parker to Christine Hiaring, dated June 1, 2005, License Amendment 22 Minor Changes for Consistency.
- C. The following documents refer to revisions made in Amendment 22A:
- (1) Division letter dated November 14, 2005.
- D. The following documents refer to revisions made in Amendment 22B:
- (1) Letter CD05-0333, dated June 30, 2005, RML no. UT 2300249 Request for approval of revisions to Appendix I, Organization, and amendment of License Condition 32 A.
 - (2) Memorandum dated August 2, 2005, Subject; Review of Appendix I
 - (3) Letter CD05-0398, dated August 16, 2005, Request for approval of revisions to Appendix I, Organization and amendment of license condition 31.A,B,C, and 32A.
 - (4) Letter CD05-0507, October 26, 2005, Additional information regarding proposed revisions to Appendix I, Organization and amendment of license condition 31.A,B,C, and 32A.
 - (5) Letter CD05-0453, dated September 19, 2005 Request for amendment of License Condition 9.10 RML UT2300478; Organization.
 - (6) Letter dated November 22, 2005, Request for information regarding request to revise Appendix I of the 11e(2) License Application and Amendment of L.C. 9.10.
 - (7) Letter dated October 11, 2005, Re: Request for Information: Revision to Appendix I and amendment 31A. B. C. and 32A. dated August 16, 2005 (CD05-0398).
 - (8) Memorandum, dated October 3, 2005, Subject; Appendix I, revisions to RML UT2300249 conditions 31 A, B, C, and 32 A.
 - (9) Letter CD05-0411, dated August 23, 2005, Payment of administrative cost for Appendix I amendment request dated August 16, 2005.
 - (10) Letter CD05-0472, dated September 30, 2005, License condition 39.E amendment
 - (11) Email dated August 10, 2005, Subject: Draft amendment for LC 39.E and attached august 10, 2005, License Condition 39 E. amendment "draft".
 - (12) Email dated September 16, 2005, Subject: RE: FW: Draft amendment for LC 39.E.
 - (13) Letter CD05-0285, dated June 1, 2005, Envirocare containerized waste facility concrete overpacks corrective action plan.
 - (14) Letter dated June 2, 2005, filling waste package voids at the containerized waste facility using controlled low strength material (CLSM)
 - (15) Letter CD05-0326, dated June 27, 2005, Re: Letter to Mr. Dane Finerfrock, dated April 13, 2005, CD05-0181.

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- (16) Letter CD05-0366, dated July 26, 2005, Re: Letter to Dane Finerfrock, dated June 27, 2005, CD05-0326.
 - (17) Letter CD06-0011, dated January 12, 2006, Request to amend License Condition No. 2, Address.
 - (18) Letter CD06-0043, dated February 3, 2006, Request to amend License Condition No. 1, Company Name.
 - (19) Letter dated February 6, 2006, evidence of name change with the Utah Department of Commerce.
 - (20) Email dated October 6, 2005, Subject: License condition 39.E.
 - (21) Memorandum from Woodrow W. Campbell through Loren Morton and Dane Finerfrock to Envirocare File, dated January 13, 2006 regarding AMRL Soils Lab Certification for the Envirocare Soils Lab.
 - (22) Email dated February 15, 2006 from Loren Morton to Dan Shrum, Subject: License Amendment for Condition 73.
 - (23) Email dated December 23, 2005 from Loren Morton to Dane Finerfrock, Subject: Proposed Changes to License Condition 73 - Annual Surety Evaluation Report.
 - (24) Letter dated February 22, 2006, Subject: Revise void remediation procedure OPC-6.0.
- E. The following documents refer to revisions made in Amendment 22C:
- (1) Letter CD05-0435, dated September 8, 2005, Request to amend RML UT 2300249: Condition 58, Waste Characterization Plan.
 - (2) Letter CD05-0557, dated December 5, 2005, RML UT 2300249; Condition 58 Waste Characterization Plan –Revised License Amendment Request.
 - (3) Letter CD06-0072, dated February 27, 2006, Radioactive Material License UT 2300249: Condition 58 Waste Characterization Plan – Revised License Amendment Request.
 - (4) Email dated February 24, 2006 from Boyd Imai to Sean McCandless Re: Waste Characterization Plan.
 - (5) Letter CD06-0059, dated February 15, 2006, Radioactive Material License UT 2300249 –Self Identified Noncompliance.
 - (6) Letter dated March 17, 2006, from the DRC regarding the February 15, 2006 letter of noncompliance.
 - (7) Letter CD06-0055) dated February 9, 2006, Request to Amend RML UT 2300249 to show addition of Liquid Radioactive Sources to License Condition 6.E.
 - (8) Letter (CD06-0092) dated March 8, 2006, RML UT 2300249; Request for administrative amendment. Conditions 21A and B and Condition 81.
- F. The following documents refer to revisions made in Amendment 22E:
- (1) CD06-0389, “Request to amend Radioactive Materials License No. UT 23000249 and 11e.(2) Radioactive Materials License No. UT 23000478 – Request for approval revised Appendix I, *Organization*,” October 6, 2006.

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- (2) Shredder Facility
- a. CD05-0448, "Radioactive Materials License No. UT 2300249 (RML) and Groundwater Quality Discharge Permit UGW450005 (GWQDP). Request to Construct Shredding Facility," September 15, 2005.
 - b. CD05-0532, "Request to Construct Shredding Facility – Revised Design and Interrogatory Response," November 14, 2005.
 - c. CD05-0556, "Request to Construct Shredding Facility – Additional Information," December 2, 2005.
 - d. CD06-0036, "Request to Construct Shredding Facility – Response to Round 2 Interrogatories", February 1, 2006.
 - e. CD06-0098, "Request to Construct Shredding Facility – Response to Round 3 Interrogatory," March 10, 2006.
 - f. ASTM F-1417, "ASTM Method F 1417-92," March 29, 2006.
 - g. CD06-0188, "Request to Construct Shredder Facility – Response to Round 4 Interrogatory," May 9, 2006.
 - h. CD06-0211, "Request to Construct Shredder Facility – Response to Round 4B Interrogatory," May 25, 2006.
 - i. CD06-0234, "Requests to Construct Shredder and Rotary Dump Facilities – Revised Wastewater Management Process," June 19, 2006.
 - j. "EnergySolutions LLC Low-Level Radioactive Waste Closure & Post-Closure Trust License UT 2300249 Trust #16673400," June 29, 2006.
 - k. CD-0346, "Interim Wastewater Management Plan for the Shredder Facility – Response to August 18, 2006 Request for Additional Information," August 31, 2006.
 - l. CD06-0388, "Radioactive Material License UT 2300429 and Groundwater Quality Discharge Permit (GWDP) No UGW450005 Shredder Facility – Request to Operate," October 5, 2006.
 - m. CD06-0407, "Comment on Proposed Amendment of Radioactive Material License UT 2300249 and Groundwater Quality Discharge Permit (GWDP) No UGW450005, October 18, 2006.
 - n. CD06-0414, "Radioactive Material License UT 2300249 and Groundwater Quality Discharge Permit No UGW450005 Shredder Facility – Submittal of Revised Drawings" October 25, 2006.
 - o. CD06-0425, "Groundwater Quality Discharge Permit No UGW450005 (GWQDP) Submittal of Revised Appendix J and K," November 7, 2006.
- (3) Rotary Dump Facility
- a. CD05-0564, "Request to Construct – Rotary Dump," December 12, 2005.
 - b. CD05-0570, "Request to Construct Rotary Dump 00 Submittal of Dose Assessment," December 16, 2005.
 - c. CD06-0086, "Request to Construct Rotary Dump Facility – Response to Round 1 Interrogatory", March 2, 2006.
 - d. ASTM F-1417, "ASTM Method F 1417-92," March 29, 2006.

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- e. CD06-0147, "Request to Construct Rotary Dump Facility – Revised Drawings," April 10, 2006.
 - f. CD06-0210, "Request to Construct Rotary Dump Facility – Response to Round 2 Interrogatory," May 25, 2006.
 - g. CD06-0211, "Request to Construct Rotary Dump Facility – Response to Round 4B Interrogatory," May 25, 2006.
 - h. CD06-0226, "Request to Construct Rotary Dump Facility – Response to Round 2B Interrogatories," June 8, 2006.
 - i. CD06-0234, "Requests to Construct Shredder and Rotary Dump Facilities – Revised Wastewater Management Process," June 19, 2006.
- (4) Intermodal Container Wash Building
- a. CD05-0291a, "Radioactive Materials License No. UT 2300249 (RML) and Groundwater Quality Discharge Permit UGW450005 (GWQDP). Request to Construct Intermodal Container Wash Building and Access Control Building," June 9, 2005.
 - b. CD05-0388, "Request to Construct Intermodal Container Wash Building – Revised Design and Supplemental Information," August 8, 2005.
 - c. CD05-0432, "Request to Construct Intermodal Container Wash Building – Revised Design and Interrogatory Response," September 1, 2005.
 - d. CD06-0110, "MARSSIM Release for New Intermodal Container Wash Facility," March 22, 2006.
 - e. CD06-0206, "Radioactive Material License UT 2300249 and Groundwater Quality Discharge Permit No UGW450005 Intermodal Container Wash Building – Request to Operate," May 22, 2006.
 - f. "EnergySolutions LLC Low-Level Radioactive Waste Closure & Post-Closure Trust License UT 2300249 Trust #16673400," June 29, 2006.
 - g. CD06-0259, "Groundwater Quality Discharge Permit (GWDP) No UGW450005 Intermodal Container Wash Building – Revised Appendix J and K," July 10, 2006.
- (5) Decontamination Access Control Building
- a. CD05-0291b, "Radioactive Materials License No. UT 2300249 (RML) and Groundwater Quality Discharge Permit UGW450005 (GWQDP). Request to Construct Intermodal Container Wash Building and Access Control Building," June 9, 2005.
 - b. CD05-0367, "MARSSIM Release of New Boxwash Access Control", July 26, 2005.
 - c. CD06-0139, "Radioactive Material License UT 2300249 and Groundwater Discharge Quality Permit (GWDP) No UGW450005 Decontamination Access Control Building – Request to Operate", April 6, 2006.
 - d. "EnergySolutions LLC Low-Level Radioactive Waste Closure & Post-Closure Trust License UT 2300249 Trust #16673400," June 29, 2006.

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- e. CD06-0245, "Groundwater Discharge Quality Permit (GWDP) No UGW450005 Decontamination Access Control Building – Revised Appendix J and K and Drawing No 05015-S100," June 30, 2006.
- (6) East Side Drainage Project
 - a. CD06-0175, "Request to Construct East Side Drainage and Gray Water System Modifications," May 1, 2005.
 - b. CD06-0244, "East Side Drainage and Gray Water System Modifications – Response to DRC Review," June 30, 2006.
 - c. CD06-0293, "Groundwater Discharge Quality Permit No UGW450005 East Side Drainage and Gray Water System – Revised Design and BAT Plans," August 4, 2006.
 - d. CD06-0327, "Groundwater Discharge Quality Permit No UGW450005 East Side Drainage and Gray Water System – Revised Appendix J BAT Performance Monitoring Plan and Appendix K BAT Contingency Plan," August 23, 2006.
 - e. CD06-0328, "Groundwater Discharge Quality Permit No UGW450005 East Side Drainage and Gray Water System – Revised Drawings," August 24, 2006.
- G. The following documents refer to revisions made in Revision 0 of the License Renewal Application:
 - (1) AGRA Earth & Environmental, Inc. 1999. Summary Seismic Stability and Deformation Analysis: Envirocare LARW Disposal Facility, Clive, Tooele County, Utah. September 1, 1999. (1998 LRA Appendix J)
 - (2) AGRA Earth & Environmental, Inc. 2000a. Evaluation of Settlement of Compressible Debris Lifts: LARW Embankments, Clive, Tooele County, Utah. June 1, 2000.
 - (3) AGRA Earth & Environmental, Inc. 2000b. Evaluation of Settlement of Incompressible Debris Lifts: LARW Embankments, Clive, Tooele County, Utah. June 1, 2000.
 - (4) AMEC Earth & Environmental, Inc. 2000a. Letter Report: Allowable Differential Settlement and Distortion of Liner and Cover Materials. October 4, 2000.
 - (5) AMEC Earth & Environmental, Inc. 2000b. Letter Report Stability Considerations: Proposed LLRW Embankment. October 25, 2000.
 - (6) AMEC Earth & Environmental, Inc. 2000c. Letter Report Stability Considerations - Addendum: Proposed LLRW Embankment. November 8, 2000.
 - (7) AMEC Earth & Environmental, Inc. 2001. Response to Interrogatory Number 2: Placement of HICs in Caissons. October 1, 2001.
 - (8) AMEC Earth & Environmental, Inc. 2002. Placement of Large Liners in Caissons. June 19, 2002.
 - (9) Bingham Environmental. 1996. Project Memorandum HEC-1 and HEC-2 Analysis, LARW Application for License Renewal, Envirocare Disposal Facility, Clive Utah. November 26, 1996. (1998 LRA Appendix KK)

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- (10) EnergySolutions (Rebecca McCloud) to Utah Division of Radiation Control (Dane Finerfrock). 2006. Correspondence concerning corporate ownership and name changes. February 6, 2006.
- (11) EnergySolutions (Tye Rogers) to Utah Division of Radiation Control (Dane Finerfrock). 2006. Correspondence concerning corporate ownership and name changes. February 3, 2006.
- (12) EnergySolutions LLC. 2007. "2006 Annual 083106 Rev 052107.xls" [annual surety review], Revision 22, May 21, 2007
- (13) EnergySolutions to Utah Division of Radiation Control. 2006. Letter number CD06-0348, Radioactive Materials License No. UT2300249 – Revision to License Condition 26, Appendix R request submitted to DRC on March 17, 2006. September 1, 2006.
- (14) Envirocare of Utah, Inc. to URS Corporation. 2005. Personal communication via electronic mail (Sean McCandless and Robert D. Baird, PE). January 27, 2005.
- (15) Envirocare of Utah, Inc. to Utah Division of Radiation Control. 2004. Letter number CD04-0287, Updated Specific Gravity Report and Request for Eliminating Specific Gravity Monitoring. June 9, 2004.
- (16) Envirocare of Utah, Inc. to Utah Division of Radiation Control. 2005. Letter number CD05-0487, Cover Test Cell Evaporative Zone Depth (EZD) Report. October 13, 2005
June 9, 2004.
- (17) Envirocare of Utah, Inc. 2000a. Pre-Licensing Plan Approval Application for a License Amendment Allowing Disposal of Class B & C Low-Level Radioactive Waste. (revision of January 5, 2000 plan) March 15, 2000.
- (18) Envirocare of Utah, Inc. 2000b. Rock Cover Design. July 26, 2000.
- (19) Envirocare of Utah, Inc. 2001. "Clive Facility Total Ditch Flow Calculations." October 30, 2001.
- (20) Envirocare of Utah, Inc. 2003c. Application for Renewal: Radioactive License Materials License Number UT-2300249. July 2, 2003.
- (21) Envirocare of Utah, Inc. 2005d. Application for Renewal: Radioactive License Materials License Number UT-2300249, Revision 2 (including all Appendices). June 20, 2005.
- (22) Montgomery-Watson (John Pellicer and Patrick Corser) to Envirocare of Utah, Inc. (Tim Orton). 2000. Letter Report LLRW Cover Frost Penetration. March 1, 2000.
- (23) Rogers and Associates Engineering for the Utah Division of Radiation Control. 2000. Siting Evaluation Report for Proposed Disposal Under URCR R-313-25-3 of Class B & C Low Level Radioactive Waste. May 2, 2000.
- (24) Shrum, Dan to Robert D. Baird, PE, CCE (URS Corporation). 2005. Via electronic mail. February 28, 2005.
- (25) SWCA Environmental Consultants, Inc. 2000. Assessment of Vegetative Impacts on LLRW.
- (26) Tooele County Recorder. 1993. Entry No. 5489, Book 348, Page 104. March 16, 1993.

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- (27) Utah Bureau of Radiation Control (Larry F. Anderson) letter to Envirocare of Utah, Inc. (Khosrow B. Semnani, President). 1987. "Radioactive Material License No. UT 2300249." November 18, 1991.
- (28) Utah Department of Environmental Quality (Diane R. Nielson, Executive Director) and Envirocare of Utah, Inc. (Khosrow B. Semnani, President). 1993. "Agreement Establishing Covenants and Restrictions." March 16, 1993.
- (29) Utah Division of Radiation Control (Dane Finerfrock) to Envirocare of Utah, Inc. (Daniel Shrum). 2007. "EnergySolutions 2006 Annual Surety Submittal, May 21, 2007 Update." June 1, 2007.
- (30) Utah Division of Radiation Control (Dane Finerfrock) to Envirocare of Utah, Inc. (Tye Rogers). 2004. "Restoration of Site Drainage." November 12, 2004.
- (31) Utah Division of Radiation Control (Dane Finerfrock) to Envirocare of Utah, Inc. (Tye Rogers). 2005a. "Response to December 4, 2004 Report - Restoration of Site Drainage: Request for Additional Information." February 23, 2005.
- (32) Utah Division of Radiation Control (Dane Finerfrock) to Envirocare of Utah, Inc. (Tye Rogers). 2005b. "Response to March 25, 2005 Envirocare Response to the February 27, 2005 DRC Request for Information - Restoration of Site Drainage." April 22, 2005.
- (33) Utah Division of Radiation Control (Dane Finerfrock) to Envirocare of Utah, Inc. (Tye Rogers). 2007. "Restoration of Grade - Round 1 Interrogatories: Notice of Upcoming Requirements and Request for Schedule." February 16, 2007.
- (34) Utah Division of Radiation Control (Loren Morton) to EnergySolutions (Tye Rogers) . 2006. Correspondence regarding "DRC Response to Eight Submittals by EnergySolutions Regarding Proposed Class A Combined (CAC) Disposal Cell: Request for Additional Information, Round 3 Interrogatory." March 3, 2006.
- (35) Utah Division of Radiation Control to EnergySolutions, LLC. 2006. Letter of approval of Revision 20 of the CQA/QC Manual. September 21, 2006.
- (36) Utah Division of Radiation Control (William Sinclair) to Envirocare of Utah, Inc. 2000. Correspondence concerning expectations in addressing the land ownership issue. March 6, 2000.
- (37) Utah Division of Radiation Control. 2006a. Memorandum: Analysis of the December 20, 2005 Envirocare Submittal of Settlement Monitoring Plan Update. February 2, 2006. (Johnathan P. Cook to Loren Morton)
- (38) Whetstone Associates, Inc. memorandum to Envirocare of Utah, Inc. 2000. Technical Memorandum 41010 Infiltration Through Lower Radon Barrier, Class A, B, & C Cell Cover. November 7, 2000.
- (39) Whetstone Associates, Inc. 2000a. Revised Envirocare of Utah Western LARW [Class A] Cell Infiltration and Transport Modeling. July 19, 2000.
- (40) Whetstone Associates, Inc. 2001a. "Travel Time Through Class A Cell Cover." June 22, 2001.
- (41) Whetstone Associates, Inc. 2003b. Memorandum to Dan Shrum, Envirocare of Utah, "Open Cell Modeling Results for Years 7 – 12," Technical Memorandum 4101T, August 28, 2003.

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- (42) Whetstone Associates, Inc. 2004. Revised Western LARW Cell Infiltration and Transport Modeling. July 19, 2004.
- (43) Zion's Bank and Energy Solutions, LLC, 2007. Surety Details. March 27, 2007.
- (44) "Envirocare's Cover Test Cell Evaporative Zone Depth (EZD) Report", Daniel B. Shrum of Envirocare of Utah, LLC to Dane L. Finerfrock of Utah Division of Radiation Control, CD05-0487, October 13, 2005.
- (45) "Cover Test Cell Data Report Addendum: Justification to Change EZD from 18-inches to 24-inches", Envirocare of Utah, LLC, October 5, 2005.
- (46) "October 13, 2005 Envirocare Submittal Regarding Cover Test Cell Evaporative Zone Depth (EZD) Report: CAC Cell Round 2 Interrogatory", Loren B. Morton of Utah Division of Radiation Control to Daniel B. Shrum of Envirocare of Utah, LLC, November 1, 2005.
- (47) "Class A Combined Embankment Interrogatories: Clarification of Envirocare October 13, 2005 Evaporative Zone Depth Report", Daniel B. Shrum of Envirocare of Utah, LLC to Dane L. Finerfrock of Utah Division of Radiation Control, CD05-0518, November 2, 2005.
- (48) "Response to DRC Letter dated November 1, 2005 in Regards to Envirocare's October 13, 2005 Evaporative Zone Depth Report", Daniel B. Shrum of Envirocare of Utah, LLC to Dane L. Finerfrock of Utah Division of Radiation Control, CD05-0520, November 3, 2005.
- (49) "Cover Test Cell As-Built Report", Envirocare of Utah, LLC, January 24, 2002.
- (50) Appendix N, "Cover Test Cell Monitoring Report" dated June 20, 2003, Envirocare of Utah, LLC, License Renewal Application, Revision 2, dated June 20, 2005
- (51) Appendix G, "Drawings" variously dated, Envirocare of Utah, LLC, License Renewal Application, Revision 2, dated June 20, 2005.
- (52) "Attachment 4: EZD Cover Test Cell Data" CD-ROM attached to "Radioactive Material License #UT2300249 and Groundwater Quality discharge Permit No. UGW450005. Class A Combined Disposal Embankment – Response to September 19, 2005 Interrogatories", Tye Rogers of Envirocare of Utah, LLC to Dane L. Finerfrock of Utah Division of Radiation Control, CD05-0574, December 16, 2005.
- (53) "HDU Data", Mike LeBaron of Envirocare of Utah, LLC to Loren Morton of Utah Division of Radiation Control and Robert Baird of URS Corporation, e-mail dated December 19, 2005.
- (54) "Cover Test Cell WCR Data", Mike LeBaron of Envirocare of Utah, LLC to Loren Morton of Utah Division of Radiation Control and Robert Baird of URS Corporation, e-mail dated December 20, 2005.
- (55) "Matric Potential Conversion Factor", Mike LeBaron of Envirocare of Utah, LLC to Loren Morton of Utah Division of Radiation Control and Robert Baird of URS Corporation, e-mail dated December 21, 2005.
- (56) "RE: Evaporative Pan Data (39400085.10300 OUT)", Mike LeBaron of Envirocare of Utah, LLC to Loren Morton of Utah Division of Radiation Control and Robert Baird of URS Corporation, e-mail dated December 22, 2005.

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- (57) "Report Combined Embankment Study: Envirocare", AMEC Earth and Environmental, Inc., December 13, 2005.
- (58) "Geotechnical Study Increase in Height and Footprint: Envirocare LARW Facility Near Clive, Utah", AMEC Earth and Environmental, Inc., May 27, 2005.
- (59) "Class A Disposal Cell: Containerized Waste Facility: Engineering Justification Report", Envirocare of Utah, April 12, 2001.
- (60) "Class A Disposal Cell: Containerized Waste Facility: Engineering Justification Report: Addendum 15 Percent Void Space Criteria", Envirocare of Utah, October 2, 2001.
- (61) "Mixed Waste Embankment Engineering Justification Report" Revision 2, Envirocare of Utah, October 20, 2001
- (62) "Minimum Temperature Return Rates", personal communication from Jim Ashby, November 1, 2000.
- (63) "Review of Cover Design for LARW Cell", TerraMatrix/Montgomery Watson to Envirocare of Utah, February 5, 1998.
- (64) "Cover Test Cell As-Built Report", Envirocare of Utah, January 24, 2002.
- (65) Letter CD02-0097, "Revised CQA/QC Manual - Containerized Waste Facility: Placement of Large Liners/HICs", Envirocare of Utah to Utah Division of Radiation Control, March 18, 2002.
- (66) Letter CD02-0269, "Revised CQA/QC Manual - Containerized Waste Facility: Placement of Large Liners/HICs - Response to Interrogatories", Envirocare of Utah to Utah Division of Radiation Control, July 3, 2002.
- (67) Letter CD02-0315, "Revised CQA/QC Manual - Containerized Waste Facility: Placement of Large Liners/HICs - Revised Settlement Analysis and CQA/QC Language", Envirocare of Utah to Utah Division of Radiation Control, August 7, 2002.
- (68) Letter CD02-0339, "Revised CQA/QC Manual - Containerized Waste Facility: Placement of Large Liners/HICs - Proposed Revision 15 of the LLRW CQA/QC Manual", Envirocare of Utah to Utah Division of Radiation Control, August 26, 2002.
- (69) Letter CD01-0212, "Engineering Justification Report - Waste Placement with CLSM", Envirocare of Utah to Utah Division of Radiation Control, May 16, 2001.
- (70) Letter CD01-0296, "Containerized Waste Facility - Placement of Class A Ion-Exchange Resins in Polyethylene HICs and Steel Liners", Envirocare of Utah to Utah Division of Radiation Control, July 5, 2001.

H. The following documents refer to revisions made in Amendment 1:

- (1) Letter CD07-0420, "RML UT2300249, Condition 58 –Request for Amendment to the Waste Characterization Plan, dated July 23, 2007.
- (2) Letter CD08-0078, "RML UT2300249, Condition 58 –Request for Amendment to the Waste Characterization Plan."
- (3) Letter CD08-0004, "RML UT2300249 Amendment for Calibration Sources" dated January 2, 2008.
- (4) Letter CD08-0066, "RML UT2300249; Request to amend License Condition 32" dated February 28, 2008.

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- (5) Email dated February 29, 2008 from Boyd Imai to Mark Ledoux Re: Amendment Request (CD08-004).
 - (6) Email dated November 23, 2007 from John Hultquist to Sean McCandless, Request for Information regarding WCP:
 - (7) Letter dated March 7, 2008, Utah Division of Radiation Control (Dane Finerfrock) to EnergySolutions, LLC. (Sean McCandless). "Appendix I Organization dated February 28, 2008".
 - (8) Memorandum from John Hultquist to File; dated March 11, 2008 Review of WCP revised November 9, 2007 and March 10, 2008.
- I. The following documents refer to revisions made in Amendment 2:
- (1) Executive Secretary's letter dated May 16, 2008 [LA# 116-2008]
- J. The following documents refer to revisions made in Amendment 3:
- (1) Letter CD08-0218, "Clive Transportation Hub" dated July 9, 2008.
 - (2) Email dated July 28, 2008 from Mark Ledoux to Boyd Imai, "Clive cask hub."
 - (3) Letter CD08-0339, Request to Amend License Conditions 10, 38, 43, and Table 40.A., dated October 21, 2008.
 - (4) Letter CD08-0137, Request for Amendment to Condition 54, Site Radiological Security Plan, dated May 5, 2008.
 - (5) Email dated May 6, 2008 from Mark Ledoux to John Hultquist, License condition 57 proposed changes.
 - (6) Letter CD08-0111, RML UT2300249 License Condition 26, and RML UT2300478 License Condition 13.1.D. Environmental Monitoring Plan, dated April 4, 2008
 - (7) Letter CD08-0115, RML UT2300249 License Condition 26, and RML UT2300478 License Condition 13.1.D. Environmental Monitoring Plan, dated April 9, 2008
 - (8) Email dated November 13, 2008 from John Hultquist to Sean McCandless, Summary of meeting regarding the Env. Monitoring Plan.
 - (9) Email dated December 11, 2008, from Sean McCandless to John Hultquist, Procedure CL-RS PR-120 Rev 2. Access Control Points, DRC Comment Rev.
 - (10) Letter CD08-0376, RML UT2300249 License Condition 26, and RML UT2300478 License Condition 13.1.D. Environmental Monitoring Plan, dated November 24, 2008
 - (11) Email dated December 15, 2008 from Sean McCandless to John Hultquist, Procedure CL-RS PR-120 Rev 2. Access Control Points, Form update.
- K. The following documents refer to revisions made in Amendment 4:
- (1) Letter dated January 26, 2009 (CD09-0020) from Daniel Shrum to Dane Finerfrock; Radioactive Material License No: UT230029 and UT2300478; Revision of Appendix I, *Organization*.
 - (2) Letter dated January 28, 2009 John Hultquist to Dan Shrum, Request for Information, Revision to Appendix I *Organization* submitted January 26, 2009.

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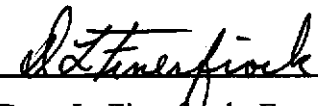
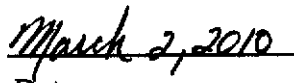
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- (3) Letter dated February 9, 2009 (CD09-0038) from Dan Shrum to Dane Finerfrock, Revision to Appendix I *Organization*. Response to Request for Information.
- L. The following documents refer to revisions made in Amendment 5:
- (1) Letter dated July 27, 2009 (CD09-0188) from Daniel Shrum to Dane Finerfrock; Radioactive Material License Number UT 2300249 - Request for Amendment.
 - (2) Letter dated May 6, 2009 (CD09-0116) from Sean McCandless to Dane Finerfrock, Radioactive Material License #UT 2300249 – Request for Amendment and Response to April 15, 2009 Request for Information.
 - (3) Letter dated May 28, 2009 Dane Finerfrock to Sean McCandless, 2009 Module 14 Engineering Inspection – Soil Lab and Testing Methods with accreditation for License Condition 45, Radioactive Materials License UT 2300249 Closeout Letter.
 - (4) Letter dated April 7, 2009 (CD09-0091) from Sean McCandless to Dane Finerfrock Radioactive Material License #UT 2300249 and Ground Water Quality Discharge Permit No. UGW450005 - Response to DRC Request for Information
 - (5) Memorandum from Dave Esser to File, dated May 21, 2009 Proposed correction to the Ground Water Quality Discharge Permit UGW45005 and Radioactive Material License UT2300249 – Amendment Review regarding section, disposal cell, and buffer zone Latitude and Longitude coordinates.
- M. The following documents refer to revisions made in Amendment 6:
- (1) Letter dated October 22, 2007 (CD07-0340) from Sean McCandless to Dane Finerfrock; Radioactive Material License Number UT 2300249 - Request for Amendment to Conditions 14.B and 16.F.ii.
 - (2) Letter dated November 20, 2007 from John Hultquist to Sean McCandless, Formerly Characteristic Hazardous Waste meeting, request to Amendment, Radioactive Material License #UT 2300249.
 - (3) URS Memorandum dated December 10, 2007 Gary Merrell to Dane Finerfrock Review of Whetstone Technical Memorandum, “Formerly Characteristic Waste Modeling of Class A and Class A North Cells, from Susan Wyman to Dan Shrum, September 25, 2007
 - (4) Letter dated January 21, 2009 (CD09-0015) from Sean McCandless to Dane Finerfrock Formerly Characteristic Waste – Response to Letter dated November 20, 2007
 - (5) Letter dated January 21, 2009 (CD09-0014) Timothy Orton to Dennis Downs, Div. of Solid and Hazardous Waste, Class 2 Modification – Management of Wastes at the Mixed Waste Facility that will be disposed at the LLRW Facility.
 - (6) Memorandum dated February 18, 2009, from Boyd Imai to John Hultquist, EnergySolutions Amendment Request (CD07-0340).
 - (7) Memorandum dated September 21, 2009, from Boyd Imai to John Hultquist, Review; Formerly Characteristic Waste – License Amendment Request.
 - (8) Letter dated August 31, 2009, Sean McCandless to Dane Finerfrock, Radioactive Material License No. UT2300249 – Revised request for Amendment – Formerly

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- Characteristic (LLRW Destined) Waste.
- (9) Email dated October 15, 2009 Sean McCandless to John Hultquist, Formerly Characteristic, Attachments Revised RML 10/8/09 and WCP Revised 10/8/09.
 - (10) Memorandum dated October 19, 2009, from Boyd Imai to John Hultquist, Formerly Characteristic Wastes – Transfer to LLRW.
- N. The following documents refer to revisions made in Amendment 7:
- (1) Letter dated September 21, 2009 (CD09-0241) from Val J. Christensen to Amanda Smith; RML No. UT2300249 – Commitments Relating to Depleted Uranium Disposal.
 - (2) Letter dated October 1, 2009 (CD09-0258) from Val J. Christensen to Dane Finerfrock; RML No. UT2300249 – Commitments Relating to Depleted Uranium Disposal
 - (3) Notice of Agency Action to Consider Proposed License Condition No. 35 dated October 21, 2009.
 - (4) Email dated February 22, 2010, from Laura Lockhart to Dane Finerfrock and John Hultquist, License Condition documents –comment response document.

UTAH RADIATION CONTROL BOARD


Dane L. Finerfrock, Executive Secretary
Date

**Atlantic Compact Regional Waste
Alternative Rate Schedule for Fiscal Year 2011
Effective July 1, 2010**

Option A Pricing (applicable to Generators who do not elect Option B Access Fee Pricing)

Use Maximum Uniform Rate Schedule

Option B Access Fee (at Generator's election)

An individual nuclear power reactor, or any non-reactor waste generator with a South Carolina permit to ship waste to the Barnwell site is eligible to be an Option B Participant.

Option B Participants may elect Option B Access Fee pricing by committing to an annual access fee to be paid in quarterly installments and paying the first quarter's access fee by July 1, 2010; and by providing the disposal site operator a volume projection and shipping schedule for Fiscal Year 2011, and updating the projection and shipping schedule throughout the year, as necessary.

QUARTERLY ACCESS FEE

Option B Participants shall pay a quarterly access fee in lieu of disposal charges for individual shipments.

The access fee for all four quarters must be paid, even if the Option B Participant does not plan to ship waste during any specific quarter. Access fee payments are due not later than:

- July 10, 2010
- October 1, 2010
- January 1, 2011
- April 1, 2011

Pursuant to Proviso 90.15 of H.4657 of 2010 an interim revenue requirement in the amount of \$4,561,000 shall be used as the basis for a quarterly access fee for each Option B Participant. The quarterly access fee shall be determined by dividing the interim revenue requirement for operating costs (less the amount of payments projected to be received from Option A disposal rate customers), evenly among all Option B Participants, and dividing the result by four quarters. The differential between this interim revenue requirement and the projected interim revenue requirement of \$4,913,308 for FY 2010-11 shall be remitted in four payments, made quarterly, pursuant to Proviso 90.15 of H.4657 of 2010 on the same schedule as the access fees due from Option B participants.

In the event that annual revenue collections at the end of the fiscal year have exceeded the actual operating costs incurred by the disposal site operator for the fiscal year, the disposal site operator shall first refund all amounts remitted pursuant to Proviso 90.15 of H.4657 of 2010, and if an excess still exists shall return an even share of the over collected amount (as adjusted for any authorized carry-over funds) to each Option B Participant not later than July 30, 2011. In the event that an operating shortfall occurs, as determined by calculating the difference between the allowable operating costs plus adjustments as approved by the Public Service Commission, and the access fees paid by the Atlantic Compact generators, the amount necessary to maintain access fees at the FY 2010 level shall be transferred pursuant to Proviso 90.15 of H.4657 of 2010.

VOLUME ALLOCATIONS

Volume Allocations. Each Option B Participant shall be allocated an equal share of 7,000 cubic feet of disposal capacity (volume allocation), which may be disposed at no further charge. Volume allocations for Option B Participants may be pooled within a company upon written notification to Chem-Nuclear from the applicable Participants prior to August 1, 2010. An Option B Participant may transfer unused allocation to another Option B Participant by providing Chem-Nuclear a signed statement executing the transfer.

VARIABLE COST SURCHARGE

For each cubic foot of waste received that is in excess of an Option B Participant's volume allocation (or pooled allocation), the Participant shall be assessed an additional \$133 per cubic foot to cover variable costs and margin related to acceptance of the waste. (The variable cost surcharge does not apply to any waste volume resulting from the transfer of excess volume allocation from one Option B Participant to another.)

RATE RECONCILIATION

Final approval by the PSC of allowable operating costs for Fiscal Year 2011 is expected no later than June 30, 2012. In the event that the total of operating costs approved by the PSC, plus margin, for FY2011 is less than the amounts paid through Option B Access Fees and variable cost surcharges, plus payments received for any Option A disposal charges, first all amounts remitted pursuant to Proviso 90.15 of H.4657 of 2010 will be refunded, then if funds still remain each Option B Participant will receive a pro-rata refund within 30 days of the end of the Fiscal Year. If the margin plus the PSC approved allowable costs exceed the interim revenue requirement, then the South Carolina Budget and Control Board shall be invoiced the difference to be paid from the Barnwell Operational Shortfall Account, pursuant to Proviso 90.15 of H.4657 of 2010. If the Barnwell Operational Shortfall Account has no remaining funds available for this purpose each Option B Participant will be invoiced for an equal share of the difference, unless Chem-Nuclear voluntarily waives its right under South Carolina law to seek or accept such revenues.

VOLUME PROJECTIONS

Each Option B Participant shall provide the disposal site operator a projection of its expected waste volumes for the fiscal year not later than July 1, 2010, and will update the projection on a quarterly basis, or as conditions warrant. Option B Participants recognize that shipment of waste to the disposal site at a relatively even pace throughout the fiscal year helps minimize operating costs.

IRRADIATED HARDWARE (See Note D)

Irradiated Hardware is not included in Volume Allocations and is not considered as waste in excess of volume allocations. Pricing will be calculated on a case-by-case basis in an amount sufficient to cover all allowable operating costs incurred by the site operator to dispose of the waste.

STEAM GENERATORS AND OTHER LARGE COMPONENTS (See Note E)

Large Components are not included in Volume Allocations and are not considered as waste in excess of volume allocations. Pricing will be calculated on a case-by-case basis in an amount sufficient to cover all allowable operating costs incurred by the site operator to dispose of the waste.

NOTES:

- A. Due to staffing limitations, Chem-Nuclear is authorized to limit total waste volumes received during the fiscal year to 11,500 cubic feet (excluding large components and irradiated hardware).
- B. Surcharges for the extended care fund and decommissioning trust fund are included in the disposal rates.
- C. Sealed sources: Requests for disposal are reviewed by South Carolina Department of Health and Environmental Control to ensure that the waste was generated within the Atlantic Compact region.
- D. Irradiated hardware and high dose shipments: As a general rule, case-by-case billing as irradiated hardware pertains to shipments of exceptionally high activity that require clearing of the site and special off-loading into a slit trench. These generally include TN-RAM and other horizontally offloaded cask shipments. In addition to items of irradiated hardware, if a shipment requires substantial special handling, due to exceptionally high package surface doses, additional surcharges may be authorized by Board staff in an amount that will reimburse the site operator for costs that have not been budgeted.
- E. Large components: Pricing will be calculated on a case-by-case basis in an amount sufficient to cover all allowable operating costs incurred by the site operator, and associated margin, as a result of the request for disposal and disposal of the waste. Large components include steam generators, reactor pressure vessels, reactor coolant pumps, or items that require construction of special-sized disposal vaults. Large components also include items that may fit into the standard sized vault, but fit so inefficiently due to their shape and geometry that it is less costly to build a specially sized vault.
- F. Because the disposal of large components is rare and is not considered as a factor in planning and budgeting for site operations, a supplemental service fee sufficient to cover all additional costs and margin may be authorized by Board staff to cover the disposal site operator's costs for planning, consultation, feasibility studies, cost estimating, regulatory consultation, and other necessary costs that have not been budgeted and accounted for as operating costs for the fiscal year. This supplemental service fee is applicable whether or not the generator ultimately commits to disposal of the large component(s), and whether or not the waste is eventually disposed at the Barnwell site.
- G. Because the operating costs for disposal of large components may be significantly affected by the number of such components and the schedule for delivery, generators are strongly encouraged to coordinate their plans for shipment of large components to Barnwell in order to reduce unit costs through better economies of scale. Early in project planning, shippers are encouraged to consult with the disposal site operator on designs and configurations that may reduce handling and offloading costs at the disposal site.
- H. Transport vehicles with additional shielding features may be subject to an additional handling fee which will be provided upon request.
- I. In certain circumstances, the disposal site operator may assess additional charges for necessary services that are not part of and are additional to disposal rates established by the State of South Carolina. These include decontamination services and special services as described in the Barnwell Site Disposal Criteria.
- J. The disposal site operator has established the following policies and procedures which are provided herein for informational purposes:
 - i. Terms of payment are net 30 days upon presentation of invoices. A per-month service charge of one and one-half percent (1½%) shall be levied on accounts not paid within thirty (30) days.
 - ii. Company purchase orders or a written letter of authorization and substance acceptable to CNS shall be received before receipt of radioactive waste material at the Barnwell Site and shall refer to CNS Radioactive Material License, the Barnwell Site Disposal Criteria and subsequent changes thereto.
 - iii. All shipments shall receive a CNS shipment identification number and conform to the Prior Notification Plan.

Reporting the content of radionuclides in radwaste may be inferred for "difficult to measure" radionuclides by establishing ratios to the activity for radionuclides that can be easily measured. Nuclides used for scaling factors should meet the following criteria: (1) there should be a constant ratio in the rate of formation and release of both nuclides; (2) both nuclides should possess similar chemical and physical transport properties; (3) the nuclide on which the correlation is based should be readily measurable by gamma-ray spectrometry.

Most scaling factor correlations are based on Co-60 or Cs-137. There is considerable disparity between the actual and ideal correlation pair. Differences in orders of magnitude have been observed. Variations in correlations occur from three major areas: (1) change in defective fuel conditions result in different release rates between nuclides; (2) changes in primary system materials from which most of the activated corrosion products originate (such as effort to reduce sources of Co-60 in BWRs); (3) a change in source inputs to the radwaste system.

Difficult to measure radionuclides include:

H-3 (Tritium): produced in coolant by neutron capture in the $^2\text{H}(n,\gamma)^3\text{H}$ reaction. It is also produced by high energy neutron reactions with lithium isotopes $^6\text{Li}(n,\alpha)^3\text{H}$, and $^7\text{Li}(n,\alpha)^3\text{H}$ and with boron isotopes $^{10}\text{B}(n,2\alpha)^3\text{H}$; $^{10}\text{B}(n,\alpha)^7\text{Li}(n,\alpha)^3\text{H}$. The boron and lithium reactions are the predominant sources of tritium in a PWR. Tritium is also produced by ternary fission of U-235, but only a small fraction (about 1%) of the total H-3 produced in the fuel is believed to diffuse through the cladding into the coolant. Tritium does not relate to any other nuclide in the waste but can be estimated from the coolant content of the radwaste.

C-14 is produced by neutron capture from the $^{17}\text{O}(n,\alpha)^{14}\text{C}$ reaction. C-14 is released from PWRs in the gaseous radwaste system as organic species, predominantly methane. In BWRs, it is released in the condenser offgas system as CO_2 . A small fraction of C-14 is retained in the reactor water cleanup system. No suitable correlation can be found in the radwaste.

Fe-55 and Ni-63 are produced by neutron activation of Fe-54 and Ni-62. These two nuclides and Co-60 result from the activation of reactor material corrosion and/or erosion (wear) products. All three species have similar chemical properties, although cobalt and nickel are probably more soluble than iron in the reactor coolant. The major activation process involves the deposition of corrosion products on fuel surfaces followed by their activation and subsequent release and transport to the radwaste system. The ratios of Fe-55/Co-60 and Ni-63/Co-60 are expected to be different between BWRs and PWRs because of differences in material sources and coolant chemistry.

Ni-59 is produced by the $^{58}\text{Ni}(n,\gamma)^{59}\text{Ni}$ reaction. The ratio of Ni-58 and Ni-62 in natural nickel is constant, and the product of Ni-59 is similar to that of Ni-63, so the ratio of Ni-59 to Ni-63 should be constant. The Ni-59/Ni-63 activity ratio has been calculated to be approximately 0.01 irrespective of the flux or core location. Since the Ni-63/Co-60 correlation factor can be measured and established for a specific waste stream, the Ni-59/Co-60 can also be estimated.

Sr-90 is a fission product which decays by beta emission to Y-90 which is also a beta emitter. Y-90 is practically in equilibrium with Sr-90, but unlike Sr-90, Y-90 is normally in insoluble forms. Since Sr-90 and Cs-137 are generally found in soluble cationic forms, the activity ratio may be easier to

establish as long as the fuel conditions do not change significantly.

Tc-99 is mainly produced by fission. The valence state may vary from -1 to +7. In BWR coolant, shorter-lived activities (Tc-99m, Tc-101, Tc-104) are normally found in the anionic forms, most likely TcO_4^- , but they would behave totally differently in the PWR coolant. It is difficult to find a good correlation partner. Although Cs-137 has been suggested, there are not only differences in chemical properties, but the release mechanisms from fuel are significantly different. Tc-99 is also produced by activation of Mo-98.

I-129 (half-life of 1.6×10^7 years, 150 KeV gamma and 39 KeV beta) is produced as a fission product and as a decay product of Te-129. (The long half-life of I-129 makes it a long term waste disposal problem). Iodine activities are always found in BWRs and PWR coolant as anion species. In BWRs, iodine activities are also volatile and a large fraction released from failed fuel can be transported with steam into the condensate. Like Tc-99, a gamma-emitting correlation partner for I-129 may not exist.

Transuranic isotopes (TRU) are produced by the activation of uranium and its products. The activity buildup is rapid during fuel burnup. The predominant activity is due to Cm-242 (90 to 95%), because of its shorter half-life (163 days). Most TRU alpha activities are found in insoluble form in reactor coolant, and can be correlated with Zr-95, Ru-103, and Ce-144. The determination of TRU in low-level waste is difficult because of the low intensities and short half-lives of these species.

Scaling factors for difficult-to-measure nuclides are difficult to determine accurately and consistently. Plant and stream specific factors can only be determined for short operating duration because the correlation may vary depending upon many different factors.

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APPENDIX E TO PART 20—NATIONALLY
TRACKED SOURCE THRESHOLDS

The Terabecquerel (TBq) values are the regulatory standard. The curie (Ci) values

specified are obtained by converting from the TBq value. The curie values are provided for practical usefulness only and are rounded after conversion.

Radioactive material	Category 1 (TBq)	Category 1 (Ci)	Category 2 (TBq)	Category 2 (Ci)
Actinium-227	20	540	0.2	5.4
Americium-241	60	1,600	0.6	16
Americium-241/Be	60	1,600	0.6	16
Californium-252	20	540	0.2	5.4
Cobalt-60	30	810	0.3	8.1
Curium-244	50	1,400	0.5	14
Cesium-137	100	2,700	1	27
Gadolinium-153	1,000	27,000	10	270
Iridium-192	80	2,200	0.8	22
Plutonium-238	60	1,600	0.6	16
Plutonium-239/Be	60	1,600	0.6	16
Polonium-210	60	1,600	0.6	16
Promethium-147	40,000	1,100,000	400	11,000
Radium-226	40	1,100	0.4	11
Selenium-75	200	5,400	2	54
Strontium-90	1,000	27,000	10	270
Thorium-228	20	540	0.2	5.4
Thorium-229	20	540	0.2	5.4
Thulium-170	20,000	540,000	200	5,400
Ytterbium-169	300	8,100	3	81

[71 FR 65708, Nov. 8, 2006]

APPENDIX F TO PART 20 [RESERVED]

APPENDIX G TO PART 20—REQUIREMENTS
FOR TRANSFERS OF LOW-LEVEL RA-
DIOACTIVE WASTE INTENDED FOR
DISPOSAL AT LICENSED LAND DIS-
POSAL FACILITIES AND MANIFESTS

I. MANIFEST

A waste generator, collector, or processor who transports, or offers for transportation, low-level radioactive waste intended for ultimate disposal at a licensed low-level radioactive waste land disposal facility must prepare a Manifest (OMB Control Numbers 3150-0164, -0165, and -0166) reflecting information requested on applicable NRC Forms 540 (Uniform Low-Level Radioactive Waste Manifest (Shipping Paper)) and 541 (Uniform Low-Level Radioactive Waste Manifest (Container and Waste Description)) and, if necessary, on an applicable NRC Form 542 (Uniform Low-Level Radioactive Waste Manifest (Manifest Index and Regional Compact Tabulation)). NRC Forms 540 and 540A must be completed and must physically accompany the pertinent low-level waste shipment. Upon agreement between shipper and consignee, NRC Forms 541 and 541A and 542 and 542A may be completed, transmitted, and stored in electronic media with the capability for producing legible, accurate, and complete records on the respective forms. Licensees are not required by NRC to comply

with the manifesting requirements of this part when they ship:

(a) LLW for processing and expect its return (i.e., for storage under their license) prior to disposal at a licensed land disposal facility;

(b) LLW that is being returned to the licensee who is the “waste generator” or “generator,” as defined in this part; or

(c) Radioactively contaminated material to a “waste processor” that becomes the processor’s “residual waste.”

For guidance in completing these forms, refer to the instructions that accompany the forms. Copies of manifests required by this appendix may be legible carbon copies, photocopies, or computer printouts that reproduce the data in the format of the uniform manifest.

NRC Forms 540, 540A, 541, 541A, 542 and 542A, and the accompanying instructions, in hard copy, may be obtained by writing or calling the Office of Information Services, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, telephone (301) 415-7232, or by visiting the NRC’s Web site at <http://www.nrc.gov> and selecting forms from the index found on the home page.

This appendix includes information requirements of the Department of Transportation, as codified in 49 CFR part 172. Information on hazardous, medical, or other waste, required to meet Environmental Protection Agency regulations, as codified in 40 CFR parts 259, 261 or elsewhere, is not addressed in this section, and must be provided

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on the required EPA forms. However, the required EPA forms must accompany the Uniform Low-Level Radioactive Waste Manifest required by this chapter.

As used in this appendix, the following definitions apply:

Chelating agent has the same meaning as that given in §61.2 of this chapter.

Chemical description means a description of the principal chemical characteristics of a low-level radioactive waste.

Computer-readable medium means that the regulatory agency's computer can transfer the information from the medium into its memory.

Consignee means the designated receiver of the shipment of low-level radioactive waste.

Decontamination facility means a facility operating under a Commission or Agreement State license whose principal purpose is decontamination of equipment or materials to accomplish recycle, reuse, or other waste management objectives, and, for purposes of this part, is not considered to be a consignee for LLW shipments.

Disposal container means a container principally used to confine low-level radioactive waste during disposal operations at a land disposal facility (also see "high integrity container"). Note that for some shipments, the disposal container may be the transport package.

EPA identification number means the number received by a transporter following application to the Administrator of EPA as required by 40 CFR part 263.

Generator means a licensee operating under a Commission or Agreement State license who (1) is a waste generator as defined in this part, or (2) is the licensee to whom waste can be attributed within the context of the Low-Level Radioactive Waste Policy Amendments Act of 1985 (e.g., waste generated as a result of decontamination or recycle activities).

High integrity container (HIC) means a container commonly designed to meet the structural stability requirements of §61.56 of this chapter, and to meet Department of Transportation requirements for a Type A package.

Land disposal facility has the same meaning as that given in §61.2 of this chapter.

NRC Forms 540, 540A, 541, 541A, 542, and 542A are official NRC Forms referenced in this appendix. Licensees need not use originals of these NRC Forms as long as any substitute forms are equivalent to the original documentation in respect to content, clarity, size, and location of information. Upon agreement between the shipper and consignee, NRC Forms 541 (and 541A) and NRC Forms 542 (and 542A) may be completed, transmitted, and stored in electronic media. The electronic media must have the capability for producing legible, accurate, and

complete records in the format of the uniform manifest.

Package means the assembly of components necessary to ensure compliance with the packaging requirements of DOT regulations, together with its radioactive contents, as presented for transport.

Physical description means the items called for on NRC Form 541 to describe a low-level radioactive waste.

Residual waste means low-level radioactive waste resulting from processing or decontamination activities that cannot be easily separated into distinct batches attributable to specific waste generators. This waste is attributable to the processor or decontamination facility, as applicable.

Shipper means the licensed entity (i.e., the waste generator, waste collector, or waste processor) who offers low-level radioactive waste for transportation, typically consigning this type of waste to a licensed waste collector, waste processor, or land disposal facility operator.

Shipping paper means NRC Form 540 and, if required, NRC Form 540A which includes the information required by DOT in 49 CFR part 172.

Source material has the same meaning as that given in §40.4 of this chapter.

Special nuclear material has the same meaning as that given in §70.4 of this chapter.

Uniform Low-Level Radioactive Waste Manifest or uniform manifest means the combination of NRC Forms 540, 541, and, if necessary, 542, and their respective continuation sheets as needed, or equivalent.

Waste collector means an entity, operating under a Commission or Agreement State license, whose principal purpose is to collect and consolidate waste generated by others, and to transfer this waste, without processing or repackaging the collected waste, to another licensed waste collector, licensed waste processor, or licensed land disposal facility.

Waste description means the physical, chemical and radiological description of a low-level radioactive waste as called for on NRC Form 541.

Waste generator means an entity, operating under a Commission or Agreement State license, who (1) possesses any material or component that contains radioactivity or is radioactively contaminated for which the licensee foresees no further use, and (2) transfers this material or component to a licensed land disposal facility or to a licensed waste collector or processor for handling or treatment prior to disposal. A licensee performing processing or decontamination services may be a "waste generator" if the transfer of low-level radioactive waste from its facility is defined as "residual waste."

Waste processor means an entity, operating under a Commission or Agreement State license, whose principal purpose is to process,

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repackage, or otherwise treat low-level radioactive material or waste generated by others prior to eventual transfer of waste to a licensed low-level radioactive waste land disposal facility.

Waste type means a waste within a disposal container having a unique physical description (i.e., a specific waste descriptor code or description; or a waste sorbed on or solidified in a specifically defined media).

*Information Requirements***A. General Information**

The shipper of the radioactive waste, shall provide the following information on the uniform manifest:

1. The name, facility address, and telephone number of the licensee shipping the waste;
2. An explicit declaration indicating whether the shipper is acting as a waste generator, collector, processor, or a combination of these identifiers for purposes of the manifested shipment; and
3. The name, address, and telephone number, or the name and EPA identification number for the carrier transporting the waste.

B. Shipment Information

The shipper of the radioactive waste shall provide the following information regarding the waste shipment on the uniform manifest:

1. The date of the waste shipment;
2. The total number of packages/disposal containers;
3. The total disposal volume and disposal weight in the shipment;
4. The total radionuclide activity in the shipment;
5. The activity of each of the radionuclides H-3, C-14, Tc-99, and I-129 contained in the shipment; and
6. The total masses of U-233, U-235, and plutonium in special nuclear material, and the total mass of uranium and thorium in source material.

C. Disposal Container and Waste Information

The shipper of the radioactive waste shall provide the following information on the uniform manifest regarding the waste and each disposal container of waste in the shipment:

1. An alphabetic or numeric identification that uniquely identifies each disposal container in the shipment;
2. A physical description of the disposal container, including the manufacturer and model of any high integrity container;
3. The volume displaced by the disposal container;
4. The gross weight of the disposal container, including the waste;

5. For waste consigned to a disposal facility, the maximum radiation level at the surface of each disposal container;

6. A physical and chemical description of the waste;

7. The total weight percentage of chelating agent for any waste containing more than 0.1% chelating agent by weight, plus the identity of the principal chelating agent;

8. The approximate volume of waste within a container;

9. The sorbing or solidification media, if any, and the identity of the solidification media vendor and brand name;

10. The identities and activities of individual radionuclides contained in each container, the masses of U-233, U-235, and plutonium in special nuclear material, and the masses of uranium and thorium in source material. For discrete waste types (i.e., activated materials, contaminated equipment, mechanical filters, sealed source/devices, and wastes in solidification/stabilization media), the identities and activities of individual radionuclides associated with or contained on these waste types within a disposal container shall be reported;

11. The total radioactivity within each container; and

12. For wastes consigned to a disposal facility, the classification of the waste pursuant to §61.55 of this chapter. Waste not meeting the structural stability requirements of §61.56(b) of this chapter must be identified.

D. Uncontainerized Waste Information

The shipper of the radioactive waste shall provide the following information on the uniform manifest regarding a waste shipment delivered without a disposal container:

1. The approximate volume and weight of the waste;
2. A physical and chemical description of the waste;
3. The total weight percentage of chelating agent if the chelating agent exceeds 0.1% by weight, plus the identity of the principal chelating agent;
4. For waste consigned to a disposal facility, the classification of the waste pursuant to §61.55 of this chapter. Waste not meeting the structural stability requirements of §61.56(b) of this chapter must be identified;
5. The identities and activities of individual radionuclides contained in the waste, the masses of U-233, U-235, and plutonium in special nuclear material, and the masses of uranium and thorium in source material; and
6. For wastes consigned to a disposal facility, the maximum radiation levels at the surface of the waste.

Pt. 20, App. G**10 CFR Ch. I (1-1-09 Edition)****E. Multi-Generator Disposal Container Information**

This section applies to disposal containers enclosing mixtures of waste originating from different generators. (Note: The origin of the LLW resulting from a processor's activities may be attributable to one or more "generators" (including "waste generators") as defined in this part). It also applies to mixtures of wastes shipped in an uncontainerized form, for which portions of the mixture within the shipment originate from different generators.

1. For homogeneous mixtures of waste, such as incinerator ash, provide the waste description applicable to the mixture and the volume of the waste attributed to each generator.

2. For heterogeneous mixtures of waste, such as the combined products from a large compactor, identify each generator contributing waste to the disposal container, and, for discrete waste types (i.e., activated materials, contaminated equipment, mechanical filters, sealed source/devices, and wastes in solidification/stabilization media), the identities and activities of individual radionuclides contained on these waste types within the disposal container. For each generator, provide the following:

(a) The volume of waste within the disposal container;

(b) A physical and chemical description of the waste, including the solidification agent, if any;

(c) The total weight percentage of chelating agents for any disposal container containing more than 0.1% chelating agent by weight, plus the identity of the principal chelating agent;

(d) The sorbing or solidification media, if any, and the identity of the solidification media vendor and brand name if the media is claimed to meet stability requirements in 10 CFR 61.56(b); and

(e) Radionuclide identities and activities contained in the waste, the masses of U-233, U-235, and plutonium in special nuclear material, and the masses of uranium and thorium in source material if contained in the waste.

II. CERTIFICATION

An authorized representative of the waste generator, processor, or collector shall certify by signing and dating the shipment manifest that the transported materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the Commission. A collector in signing the certification is certifying that nothing has been done to the collected waste which would invalidate the waste generator's certification.

III. CONTROL AND TRACKING

A. Any licensee who transfers radioactive waste to a land disposal facility or a licensed waste collector shall comply with the requirements in paragraphs A.1 through 9 of this section. Any licensee who transfers waste to a licensed waste processor for waste treatment or repackaging shall comply with the requirements of paragraphs A.4 through 9 of this section. A licensee shall:

1. Prepare all wastes so that the waste is classified according to §§61.55 and meets the waste characteristics requirements in §61.56 of this chapter;

2. Label each disposal container (or transport package if potential radiation hazards preclude labeling of the individual disposal container) of waste to identify whether it is Class A waste, Class B waste, Class C waste, or greater than Class C waste, in accordance with §61.55 of this chapter;

3. Conduct a quality assurance program to assure compliance with §§61.55 and 61.56 of this chapter (the program must include management evaluation of audits);

4. Prepare the NRC Uniform Low-Level Radioactive Waste Manifest as required by this appendix;

5. Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that either (i) receipt of the manifest precedes the LLW shipment or (ii) the manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee. Using both (i) and (ii) is also acceptable;

6. Include NRC Form 540 (and NRC Form 540A, if required) with the shipment regardless of the option chosen in paragraph A.5 of this section;

7. Receive acknowledgement of the receipt of the shipment in the form of a signed copy of NRC Form 540;

8. Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgement of receipt as the record of transfer of licensed material as required by 10 CFR parts 30, 40, and 70 of this chapter; and

9. For any shipments or any part of a shipment for which acknowledgement of receipt has not been received within the times set forth in this appendix, conduct an investigation in accordance with paragraph E of this appendix.

B. Any waste collector licensee who handles only prepackaged waste shall:

1. Acknowledge receipt of the waste from the shipper within one week of receipt by returning a signed copy of NRC Form 540;

2. Prepare a new manifest to reflect consolidated shipments that meet the requirements of this appendix. The waste collector shall ensure that, for each container of waste

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in the shipment, the manifest identifies the generator of that container of waste;

3. Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that either: (i) Receipt of the manifest precedes the LLW shipment or (ii) the manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee. Using both (i) and (ii) is also acceptable;

4. Include NRC Form 540 (and NRC Form 540A, if required) with the shipment regardless of the option chosen in paragraph B.3 of this section;

5. Receive acknowledgement of the receipt of the shipment in the form of a signed copy of NRC Form 540;

6. Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgement of receipt as the record of transfer of licensed material as required by 10 CFR parts 30, 40, and 70 of this chapter;

7. For any shipments or any part of a shipment for which acknowledgement of receipt has not been received within the times set forth in this appendix, conduct an investigation in accordance with paragraph E of this appendix; and

8. Notify the shipper and the Administrator of the nearest Commission Regional Office listed in appendix D of this part when any shipment, or part of a shipment, has not arrived within 60 days after receipt of an advance manifest, unless notified by the shipper that the shipment has been cancelled.

C. Any licensed waste processor who treats or repackages waste shall:

1. Acknowledge receipt of the waste from the shipper within one week of receipt by returning a signed copy of NRC Form 540;

2. Prepare a new manifest that meets the requirements of this appendix. Preparation of the new manifest reflects that the processor is responsible for meeting these requirements. For each container of waste in the shipment, the manifest shall identify the waste generators, the preprocessed waste volume, and the other information as required in paragraph I.E. of this appendix;

3. Prepare all wastes so that the waste is classified according to §61.55 of this chapter and meets the waste characteristics requirements in §61.56 of this chapter;

4. Label each package of waste to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with §§61.55 and 61.57 of this chapter;

5. Conduct a quality assurance program to assure compliance with §§61.55 and 61.56 of this chapter (the program shall include management evaluation of audits);

6. Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that either: (i) Receipt of the manifest pre-

cedes the LLW shipment or (ii) the manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee. Using both (i) and (ii) is also acceptable;

7. Include NRC Form 540 (and NRC Form 540A, if required) with the shipment regardless of the option chosen in paragraph C.6 of this section;

8. Receive acknowledgement of the receipt of the shipment in the form of a signed copy of NRC Form 540;

9. Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgement of receipt as the record of transfer of licensed material as required by 10 CFR parts 30, 40, and 70 of this chapter;

10. For any shipment or any part of a shipment for which acknowledgement of receipt has not been received within the times set forth in this appendix, conduct an investigation in accordance with paragraph E of this appendix; and

11. Notify the shipper and the Administrator of the nearest Commission Regional Office listed in appendix D of this part when any shipment, or part of a shipment, has not arrived within 60 days after receipt of an advance manifest, unless notified by the shipper that the shipment has been cancelled.

D. The land disposal facility operator shall:

1. Acknowledge receipt of the waste within one week of receipt by returning, as a minimum, a signed copy of NRC Form 540 to the shipper. The shipper to be notified is the licensee who last possessed the waste and transferred the waste to the operator. If any discrepancy exists between materials listed on the Uniform Low-Level Radioactive Waste Manifest and materials received, copies or electronic transfer of the affected forms must be returned indicating the discrepancy;

2. Maintain copies of all completed manifests and electronically store the information required by 10 CFR 61.80(l) until the Commission terminates the license; and

3. Notify the shipper and the Administrator of the nearest Commission Regional Office listed in appendix D of this part when any shipment, or part of a shipment, has not arrived within 60 days after receipt of an advance manifest, unless notified by the shipper that the shipment has been cancelled.

E. Any shipment or part of a shipment for which acknowledgement is not received within the times set forth in this section must:

1. Be investigated by the shipper if the shipper has not received notification or receipt within 20 days after transfer; and

2. Be traced and reported. The investigation shall include tracing the shipment and filing a report with the nearest Commission Regional Office listed in appendix D to this

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part. Each licensee who conducts a trace investigation shall file a written report with the appropriate NRC Regional Office within 2 weeks of completion of the investigation.

[60 FR 15664, Mar. 27, 1995, as amended at 60 FR 25983, May 16, 1995; 68 FR 58802, Oct. 10, 2003; 73 FR 30457, May 28, 2008]

PART 21—REPORTING OF DEFECTS AND NONCOMPLIANCE

GENERAL PROVISIONS

Sec.

- 21.1 Purpose.
- 21.2 Scope.
- 21.3 Definitions.
- 21.4 Interpretations.
- 21.5 Communications.
- 21.6 Posting requirements.
- 21.7 Exemptions.
- 21.8 Information collection requirements: OMB approval.

NOTIFICATION

- 21.21 Notification of failure to comply or existence of a defect and its evaluation.

PROCUREMENT DOCUMENTS

- 21.31 Procurement documents.

INSPECTIONS, RECORDS

- 21.41 Inspections.
- 21.51 Maintenance and inspection of records.

ENFORCEMENT

- 21.61 Failure to notify.
- 21.62 Criminal penalties.

AUTHORITY: Sec. 161, 68 Stat. 948, as amended, sec. 234, 83 Stat. 444, as amended, sec. 1701, 106 Stat. 2951, 2953 (42 U.S.C. 2201, 2282, 2297f); secs. 201, as amended, 206, 88 Stat. 1242, as amended, 1246 (42 U.S.C. 5841, 5846); sec. 1704, 112 Stat. 2750 (44 U.S.C. 3504 note).

Section 21.2 also issued under secs. 135, 141, Pub. L. 97–425, 96 Stat. 2232, 2241 (42 U.S.C. 10155, 10161).

SOURCE: 42 FR 28893, June 6, 1977, unless otherwise noted.

GENERAL PROVISIONS

§ 21.1 Purpose.

The regulations in this part establish procedures and requirements for implementation of section 206 of the Energy Reorganization Act of 1974. That section requires any individual director or responsible officer of a firm constructing, owning, operating or supplying the components of any facility

or activity which is licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended, or the Energy Reorganization Act of 1974, who obtains information reasonably indicating: (a) That the facility, activity or basic component supplied to such facility or activity fails to comply with the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order, or license of the Commission relating to substantial safety hazards or (b) that the facility, activity, or basic component supplied to such facility or activity contains defects, which could create a substantial safety hazard, to immediately notify the Commission of such failure to comply or such defect, unless he has actual knowledge that the Commission has been adequately informed of such defect or failure to comply.

§ 21.2 Scope.

(a) The regulations in this part apply, except as specifically provided otherwise in parts 31, 34, 35, 39, 40, 60, 61, 63, 70, or part 72 of this chapter, to:

(1) Each individual, partnership, corporation, or other entity applying for or holding a license or permit under the regulations in this chapter to possess, use, or transfer within the United States source material, byproduct material, special nuclear material, and/or spent fuel and high-level radioactive waste, or to construct, manufacture, possess, own, operate, or transfer within the United States, any production or utilization facility or independent spent fuel storage installation (ISFSI) or monitored retrievable storage installation (MRS); and each director and responsible officer of such a licensee;

(2) Each individual, corporation, partnership, or other entity doing business within the United States, and each director and responsible officer of such an organization, that constructs a production or utilization facility licensed for manufacture, construction, or operation under parts 50 or 52 of this chapter, an ISFSI for the storage of spent fuel licensed under part 72 of this chapter, an MRS for the storage of spent fuel or high-level radioactive waste under part 72 of this chapter, or a geologic repository for the disposal of high-level radioactive waste under part

Appendix D

PUBLIC RADIATION SAFETY SIGNIFICANCE DETERMINATION PROCESS

The significance determination process (SDP) in this Appendix is designed to provide a means by which NRC inspectors and management can assess the significance of inspection findings related to public health and safety from exposure to radiation from licensed or unlicensed radioactive materials during routine operations of civilian nuclear power reactors. This process is used in conjunction with Inspection Procedure 71122, "Public Radiation Safety," to determine the risk significance of a finding. A single issue may be evaluated using all applicable branches of the SDP and the significance determined by the most restrictive outcome. IP 71122 has three inspection areas:

Attachment 71122.01 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems

Attachment 71122.02 Radioactive Material Processing and Transportation

Attachment 71122.03 Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program

I. RADIOACTIVE EFFLUENT RELEASE PROGRAM

A. Objective

This **Radioactive Effluent Release** branch of the logic diagram focuses on the licensee's routine (i.e., non-accident) radioactive effluent release program. **This branch addresses performance deficiencies associated with radioactive effluents, leaks and spills and direct radiation from the facility.** It assesses the licensee's ability to monitor and maintain radioactive effluents ALARA (i.e., the design dose objectives contained in Appendix I to 10 CFR Part 50 and 10 CFR 20.1301(e)). Being able to assess dose from radioactive effluents and maintain radiation doses to a member of the public within Appendix I design objectives is the success **criteria**.

B. Basis

The regulatory basis for requiring radiological effluent monitoring programs is given in General Design Criterion 60, "Control of releases of radioactive materials to the environment," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities." Criterion 60 requires a licensee to provide for a means to control the release of radioactive materials in gaseous and liquid effluents during normal reactor operation, including anticipated operational occurrences. An additional requirement is in Section IV.B.1 of Appendix I to 10 CFR Part 50. This section requires a licensee to provide data on the quantities of radioactive material released in liquid and gaseous effluents to assure that such releases are within the

ALARA design objectives. This data, pursuant to 10 CFR 50.36a, is reported to the NRC annually. There is also a requirement in 10 CFR 20.1301(e) that requires power reactors to comply with the U.S. Environmental Protection Agency's environmental radiation standards in 40 CFR Part 190. Performance deficiencies related to direct radiation measurements and evaluations of the dose to a member of the public will be evaluated in this branch of the SDP.

C. SDP Determination Process

Is there a finding in the licensee's radiological effluent monitoring program that is contrary to NRC regulations or the licensee's Technical Specifications (TS), Offsite Dose Calculation Manual (ODCM), or procedures? Is there an indication of a spill or release of radioactive material on the licensee's site or to the offsite environs? If yes, was the licensee able to assess the dose to members of the public from the release of radioactive effluent and what is the dose impact (as calculated by the licensee) for the event? If the dose impact to a member of the public from the radiological release, spill or leak is less than the dose values in Appendix I to 10 CFR Part 50 and/or 10 CFR 20.1301(e), then there is minimal "risk" and the SDP classifies it as GREEN. The licensee is responsible to resolve the finding. The NRC will periodically inspect the effectiveness of the licensee's corrective action program.

If the licensee has a substantial failure to implement the radioactive effluent release program, then the finding would be WHITE. Failure to identify a release event, assess the dose consequences and the impact to the environment in a timely manner, consistent with ODCM requirements, could be considered a substantial failure to implement the radioactive effluent release program.

Examples of a substantial failure to implement the radioactive effluent release program are:

- Significant deficiency in implementing the effluent release program as defined in the plant's technical specifications, resulting in the gross inability or gross inaccuracy in characterizing an effluent release.
- Significant deficiency in evaluating an effluent release (either planned or unplanned) where the resulting dose has been grossly underestimated.
- Significant deficiency in calibrating effluent monitors used to assess effluent releases, resulting in a gross inability or gross inaccuracy in characterizing an effluent release.
- Failure to have any data by which to assess the dose to a member of the public from an effluent release (i.e., no monitor data, no independent sample data, no actual release sample data, etc.)

Usually the licensee has enough plant data (e.g., from tank volumes and periodic sample analysis of the radioactive material in the tank) to reconstruct a source term and calculate a bounding dose from the unmonitored release. A failure to properly calibrate an instrument or adequately train an individual on effluent monitor calibration or usage would usually not result in the White finding.

If the event resulted in an effluent release of radioactive material that, based on the methodology in the licensee's ODCM, exceeded the dose values in Appendix I to 10 CFR Part 50 and/or 10 CFR 20.1301(e) but is less than 0.1 rem, the SDP classifies the event as WHITE.

If the event resulted in effluent release of radioactive material that, based on the methodology in the licensee's ODCM, exceeded the annual public dose limit in 10 CFR Part 20 of 0.1 rem but is less than 0.5 rem, the SDP classifies the event as YELLOW.

If the event resulted in effluent release of radioactive material that, based on the methodology in the licensee's ODCM, exceeded 0.5 rem, the SDP classifies the event as RED.

II. RADIOACTIVE ENVIRONMENTAL MONITORING PROGRAM

A. Objective

This branch of the logic diagram focuses on the licensee's ability to operate an effective radioactive environmental monitoring program.

B. Basis

The regulatory basis for requiring radiological environmental monitoring programs is given in General Design Criterion 64, "Monitoring Radioactivity Releases," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities." Criterion 64 requires a licensee to provide for a means for monitoring the plant environs for radioactivity that may be released during normal operations, including anticipated operational occurrences, and from postulated accidents. In addition, Section IV.B.3 of Appendix I to 10 CFR Part 50 requires that the monitoring program identify changes in the use of unrestricted areas (e.g., for agricultural purposes) to permit modifications in the monitoring program for evaluating doses to individuals from principal pathways of exposure.

Radiological environmental monitoring is important both for normal operations, as well as in the event of an accident. During normal operations, environmental monitoring verifies the effectiveness of the plant systems used for controlling the release of radioactive effluents and direct radiation. It also is used to confirm that the levels of radioactive material in the environment and direct radiation exposures to members of the public do not exceed the projected values used to license the plant. For an accident, the program provides an additional means to estimate the dose to members of the public. For accident assessment issues concerning an area of the radioactive environmental monitoring program, the Emergency Preparedness SDP is to be used.

C. SDP Determination Process

Is there a finding in the licensee's radiological environmental monitoring program that is contrary to NRC regulations or the licensee's Technical Specifications (TS), Offsite Dose Calculation Manual (ODCM), or procedures? If yes, a Green risk significance finding is appropriate.

If the REMP identifies unexpected radiological conditions in the environment, then performance deficiencies should be assessed under the Radioactive Effluent Program branch of the SDP.

III. RADIOACTIVE MATERIAL CONTROL PROGRAM

A. Objective

This branch of the logic diagram focuses on the licensee's radioactive material control program. It assesses the licensee's ability to prevent the inadvertent release and/or loss of control of licensed radioactive material to an unrestricted area that can cause an actual or credible radiation dose to members of the public.

B. Basis

10 CFR Part 20 contains the requirements for the control and disposal of licensed radioactive material. At a licensee's facility, any equipment or material that came into contact with licensed radioactive material or that had the potential to be contaminated with radioactive material of plant origin and are to be removed from the facility must be surveyed for the presence of licensed radioactive material. This is because NRC regulations, with one exception in 10 CFR 20.2005, provide no minimum level of licensed radioactive material that can be disposed of in a manner other than as radioactive waste or transferred to a licensed recipient.

C. SDP Determination Process

Is there a finding in the licensee's radiological material control program that is contrary to NRC regulations and licensee's procedures? If yes, what is the dose impact to a member of the public in the restricted area, controlled area or the unrestricted area (as calculated by the licensee)? If the dose impact was less than or equal to 0.005 rem total effective dose equivalent (TEDE), then the SDP classification is Green. If the dose impact was greater than 0.005 rem TEDE, then the SDP classification is WHITE. If the dose impact is greater than 0.1 rem TEDE (exceeds 10 CFR Part 20 public dose limit), the SDP classification is YELLOW. If the dose impact was greater than 0.5 rem TEDE, the SDP classification is RED.

Individuals who have not been classified as occupation workers are sometimes permitted access to a licensee's Restricted Area for job-related or public information purposes. Such individuals are either physically escorted or are granted limited unescorted access following the successful completion of appropriate orientation training and security screening.

Exposure received by such individuals associated with a radioactive material control finding involving licensed radioactive material will be evaluated using the dose-based criteria in this SDP (e.g., less than 0.005 rem TEDE – Green; greater than 0.005 TEDE – White; greater than 0.1 rem TEDE – Yellow; or greater than 0.5 rem TEDE, Red).

It should be noted that discrete radioactive particles (also known as hot particles or fuel fleas) are not applicable to this program if the dose from the discrete radioactive particle does not result in a TEDE dose as defined in 10 CFR Part 20. Generally, the dose from the particle is to a very small localized area of the skin and is not equivalent to the risk of a TEDE dose. However, if the discrete radioactive particle is of such a magnitude that a TEDE dose (i.e., equal to or greater than 1 mrem) is received, then the finding should be evaluated in the SDP.

VII. TRANSPORTATION

A. Objective

This branch of the logic diagram focuses on the licensee's radioactive material packaging and transportation program. It assesses the licensee's ability to safely transport radioactive material on public roadways in accordance with regulations.

The SDP described below is intended to be used only for those radioactive material shipments classified as Schedule 5 (LSA-1) through 11 (Fissile Material), as described in NUREG-1660, U.S. Specific Schedules of Requirements for Transport of Specified Types of Radioactive Material Consignments. If a shipment is incorrectly classified as Schedule 1 (Limited Quantities) to Schedule 4 (Empty Packages) but was actually a Schedule 5 through Schedule 11 shipment, then this branch of the SDP is used.

B. Basis

The regulatory basis for the transportation program is contained in 10 CFR Parts 20, 61, and 71, and Department of Transportation regulations contained in 49 CFR Parts 170-189.

C. SDP Determination Process

a. Radiation Limits Exceeded

The radiation limits of a package offered for transport are found in 49 CFR 173. These include both limits for external radiation and removable surface contamination. The external radiation limits vary as a function of shipment type (non-exclusive and exclusive-use). Specific limits also exist as a function of distance from the package, such as the transport index (TI), and for the area occupied by the driver. These external radiation limits are found in 49 CFR 173.441 and are duplicated in 10 CFR Part 71.47 (as related to Type B radioactive material shipments).

The limits for removable (non-fixed) surface contamination on a package are found in 49 CFR 173.443 (Table 11) and vary as a function of shipment **type** (non-exclusive and exclusive use), and vary relative to the type of nuclides (alpha, and beta/gamma emitters).

The external radiation level branch provides for a graded approach for assessing the level of significance of findings. Exceeding the limit and then with increasing multiplies of the limits provides for GREEN, WHITE, YELLOW and RED findings.

To assess the significance of a finding, consideration is given to the accessibility of the package. An accessible area is defined **in the SDP** as **an area** that can reasonably be occupied by a major portion of an individual's whole body. **The definition of whole** body is in 10 CFR 20.1003. For example, consider a shipment that consists of a package loaded directly on a flat bed trailer, and is secured in place. An example of an inaccessible surface is the underside of the package, which is sitting directly on the trailer. It is highly improbable that any member of the public could gain access to that location, assuming normal conditions of transport. Examples of accessible areas include the **topside**, underside, **and outside** of the trailer, the unlocked cab, **accessible** surfaces of the package, and at two meters from the loaded package. Accessibility is not a factor that is considered if the dose rate on the external surface of the package is greater than two times the regulatory limit.

The removable surface contamination level branch provides for a graded approach for assessing the level of significance of findings. Exceeding the limit and then with increasing multiplies of the limits provide for GREEN, WHITE, YELLOW and RED findings. Note that to have a RED finding, the surface contamination levels must not only exceed 100 times the limit, but the unrestricted area must have been contaminated as well.

b. Breach of Package During Transit

DOT and NRC shipping regulations relative to packaging requirements are diverse. Generally, these requirements become more stringent as a function of several factors. As the quantity, type, **and** form (i.e., readily dispersible) of radioactive material varies (increases), then the potential impact on the public (dose) increases as a result of a package breach during transit. For purposes of risk **significance** determinations, a package breach means a loss of containment. The actual or potential impact on the public from a package breach then is a function of the package contents. For Type A packages normal conditions of transport are assumed; this includes rough handling tests as specified in the DOT regulations (i.e., drop, water, puncture and crush tests). Thus, during normal conditions of transport Type A packages are designed to prevent the loss or dispersal of radioactive material contents, and maintain radiation levels below limits. If a breach occurs under conditions more adverse than the rough handling tests, then a breach finding would not be appropriate unless it can be shown that licensee negligence contributed to the loss of containment. If a **package** breach occurs during transit with equal to or less than the normal conditions of transport and the licensee failed to meet transportation requirements (resulting in the breach), then a breach finding is appropriate.

Type B packages must meet the performance and packaging requirements of Type A, as well as beyond normal conditions of transport. They are designed to withstand hypothetical

serious accident conditions with no loss of containment (no breach), as measured by leak-rate testing. These design considerations and criteria are contained in 10 CFR Part 71.73, and include free fall, crush, puncture, fire, and water immersion. Given these rigorous design requirements, any breach of a Type B package in transit (in less than hypothetical accident conditions) is a candidate for a YELLOW or RED finding. If the licensee failed to meet the transportation requirements, and this failure contributed to the breach, then a breach finding is appropriate. The risk **significance** determination after a design basis accident will be determined on a case-by-case basis.

The less-than-or-equal-to Type A shipment branch provides for a graded approach for assessing the level of significance of findings. If a breach in a Type A container occurs as a result of the failure to meet transportation requirements, but no loss of control of the contents is evident, then the finding is GREEN. An example could be a solidified radwaste liner, inside a Type A package where the closure lid was loose (not tightened down). In this case, given the form of the radioactive contents, loss of control of the material is very unlikely. However, on a similar shipment, failure to properly torque the closure lid bolts (35 ft-lbs. versus required 45 ft-lbs.) is not a breach, assuming the licensee analysis demonstrates that package integrity would be maintained during the normal conditions of transport.

While power reactor shipping history has demonstrated that serious mishaps are highly unlikely, if a transportation incident occurs with a package breach, then public dose consequences could result. The next two blocks in the Type A branch (assuming a breach) focus on public and occupational doses that occur as a result of the loss of control of package contents. These are actual doses to real individuals, and depending on the level, would lead to either YELLOW or RED findings. Note that for a member of the public, the dose would in almost all cases be an estimate. Designated on-scene trained responders (e.g., local county Hazmat emergency team) would be designated occupational workers, subject the occupation dose limits.

The greater-than-Type A branch provides for a YELLOW finding, assuming no loss of control of package contents. A RED finding would result if package contents control was lost. An example of a YELLOW finding is where a receiving facility finds the incoming shipment (irradiated components) package's drain valve on the package open -- a direct pathway to environment, but no potential for loss of control of materials (assuming normal conditions of transport). A RED finding is appropriate for the same "open valve" scenario if the package contents were spent fuel -- fission product gases released continuously to the environs during the shipment, assuming normal conditions of transport. However, in the event of a transportation accident that led to loss of fuel integrity, public dose consequences could exceed acceptable levels before adequate protective measures could be implemented.

c. Part 61 Finding

If a licensee ships Class C or greater waste and it is determined that the waste was under-classified, contrary to the requirements of 10 CFR 61.55 (e.g., waste classified as Class A or Class B, but later found to be Class C or greater), then the finding is WHITE. In addition, if a licensee ships Class A or Class B waste and it is determined that the waste was under-

classified, contrary to the requirements of 10 CFR Part 61.55 (e.g., waste classified as Class A, but later found to be Class B), and resulted in the improper disposal of the waste, contrary to the requirements of 10 CFR 61.56, then the finding is WHITE. If the under-classification of Class A or Class B waste did not result in the improper disposal of the waste (i.e., not resulting in an actual increase in risk), then the finding is GREEN.

Determination of the acceptability of the waste for disposal is made by the applicable regulatory agency for the waste disposal facility; either NRC or the Agreement State. Agreement States have the authority under the Atomic Energy Act to promulgate regulations that are compatible with NRC's disposal regulations in 10 CFR Part 61. They also have the authority and responsibility to issue disposal facility licenses under their Part 61 compatible regulations, and to disposition a non-compliance by a licensee.

d. Failure to Make Notifications or Provide Emergency Information

This branch of the logic diagram focuses on vital communication and information, and notification requirements that must be provided by the licensee. Shippers of hazardous materials are required to provide emergency response information. Failure to provide these required notifications could seriously hamper or prevent the ability of the federal, state and local agencies to adequately respond as needed to transportation events and accidents. By hampering or preventing this regulatory response, the public health and safety could be negatively impacted

These requirements (in 49 CFR Part 172, Subpart G, Section 172.600) apply to any shipment which is required to have shipping papers. Shipments of excepted radioactive material packages (limited quantities, "empty" packages, etc) are not subject to the emergency response information.

NRC regulations (10 CFR 71.97) require advance notification to state governors for shipments of irradiated reactor fuel and nuclear waste under certain conditions. These notifications include quantity and form, and type of shipping container required. Notifications must be made in a timely manner to all the states hosting the radioactive material shipment. Additionally, 10 CFR 20.1906 requires receivers of certain packages of radioactive materials to perform timely external and surface contamination radiation monitoring upon receipt of the packages. If applicable radiation limits are exceeded, the receiving licensee must then report the event to the appropriate NRC Regional Office.

For Block N1 (10 CFR 71.97 non-compliance), if the licensee fails to make the required notifications before the shipment entered the State's boundary (crossed the State line) for interstate shipments, the finding would be WHITE. For intrastate shipments, if the shipment was put on public roads/rails before the Governor received the required notification, then a finding would be WHITE. Note that any other timeliness non-compliance (e.g., notification not postmarked at least 7 days before the 7 day shipment period), these findings would be GREEN.

For Block N2 (49 CFR 172.602 non-compliance), if the licensee fails to provide the required emergency response information to the shipment carrier (the shipment leaves the licensee's facility and control without the required information), the finding is WHITE. If the

carrier misplaces or loses the information (beyond the licensee's control), the finding is GREEN.

For Block N3 (49 CFR 172.604 non-compliance), if during an actual emergency the licensee does not respond in a timely manner in accordance with the requirements (or had not provided the 24-hour telephone number), the finding is WHITE. For an incorrect or missing emergency response telephone number as required by 49 CFR 172.604, if there were no actual accidents or situations where the emergency contact information was needed, then the risk significance would be minimal and the finding is determined to be Green.

For Block N4 (10 CFR 20. 1906), if the licensee's receipt surveys show 1) the package's external radiation levels in excess of five times the Part 71 limits, or 2) the surface radioactive contamination level in excess of five times the Part 71 (49 CFR 173) limits, and the licensee facility fails to make an immediate report, then the finding is WHITE. Other non-compliances are GREEN.

e. Certificates of Compliance

Pursuant to 10 CFR 71.3, a licensee may not deliver or transport licensed material without a general or specific license. The general license for the use of an NRC-approved package is discussed in 10 CFR 71.12. Section 71.12 grants a general license to a licensee to transport or deliver to a carrier for transport, licensed material in a package for which a license, certificate of compliance (CoC), or other approval has been issued by the NRC. Additionally, Section 71.5 requires the licensee to comply with the applicable DOT regulations in 49 CFR. Physical damage or structural failure of a transport package is processed through the package breach flow chart.

Usually, the form of approval issued by the NRC is a CoC. For purposes of readability, consider the CoC as discussed here to mean any NRC issued approval for a package. The CoC approves a specific package design, including a detailed allowable contents description consistent with the use of the general license of Section 71.12. The CoC also lists the requirements or "conditions" for the use and maintenance of the package in block 4 of the CoC. Frequently, these conditions include references to the package's Safety Analysis Report (SAR) or procedures supplied by the CoC holder to the package owner or user. The user of the package must comply with the requirements of 10 CFR Part 71, the applicable regulations of 49 CFR, the CoC and their own transportation program instructions, including quality assurance requirements, to ship material.

The following discussion provides a step-by-step description of the decision steps which make up the Certificate of Compliance (COC) portion of the Significance Determination Process (SDP) flowchart for Transportation & Part 61. It is anticipated that the inspector will have properly followed the Transportation and Part 61 SDP flowchart through the Radiation Limit Exceeded and Breach of Package decision points to the decision point where this COC branch begins. It is also expected that the inspector follows previous guidance concerning multiple findings on a single incident. That is, a finding with a package breach which resulted in a YELLOW determination and a CoC deficiency which resulted in a GREEN determination would be considered to be a YELLOW finding. This is

because the YELLOW signifies a more serious problem with the package breach aspect of the finding, than the CoC deficiency aspect of the finding.

This branch of the logic diagram resolves an NRC, or licensee, identified finding that deals with package preparation, use and maintenance. It includes a noncompliance with a CoC specification(s) or condition(s) for a transportation package/cask. The following is a list of all the decision blocks contained in the COC SDP flowchart for Transportation & Part 61.

1. Design Documentation Deficiency (1st decision block)

Any documentation deficiency related to maintenance or use of an NRC-approved package. This does not include deliberate misconduct related to documentation. The deficiencies covered here are expected to be purely documentation non-compliances and not the failure to perform a required action. These non-compliances would not be considered safety significant (i.e., GREEN) because the required action was performed and, often, the required documentation can be re-created with appropriate measures to show its creation after the actual performance of the activity.

Examples of documentation deficiencies include, but are not limited to, the failure to properly document compliance with:

- 49 CFR requirements such as shipping papers
- Section 71.87, Routine determinations (failure to document performance of the loading checklist)
- Section 71.89, Opening instructions (failing to document providing them when necessary)
- Section 71.91, Records (shipment records and evidence of package quality)
- Section 71.95, Reports
- CoC conditions such as the loading/unloading requirements of Section 7 of the Package SAR or CoC holder supplied procedures (including failure to use latest revision)
- CoC conditions such as the maintenance requirements of Section 8 of the Package SAR or CoC holder supplied procedures (including failure to use latest revision)

It is assumed that a documentation problem will be documented in the licensee's corrective action program and appropriate actions will be taken to correct the problem and preclude repetition in the future. Thus, the finding would be GREEN.

2. Maintenance/Use Performance Deficiency (2nd decision block)

This section is intended to cover physical problems with the package or the failure to verify the physical condition of the package. It includes the failure to perform required actions, or the improper performance of required actions. It does not include the physical failure of a package or the results from a physical failure, such as excessive exposures, personnel injury or property damage. These non-compliances would not be considered safety significant because a single occurrence of failure to perform one of these

individual actions will not usually result in a significant event. Any consequences of the noncompliance would be considered elsewhere in the SDP (radiation exposure, breach of package, etc.)

Examples of performance deficiencies include, but are not limited to, the failure to properly perform:

- Section 71.87, Routine determinations (failure to perform the loading checklist, verify package is in unimpaired physical condition)
- Section 71.89, Opening instructions (failure to provide then when necessary)
- Package is found to not meet the basic design criteria of the CoC (wall thickness is too thin empty weight is incorrect, package is rusted/corroded beyond tolerances)
- CoC conditions such as the loading/unloading requirements of Section 7 of the Package SAR or CoC holder supplied procedures
- CoC conditions such as the maintenance requirements of Section 8 of the Package SAR or CoC holder supplied procedures as evidenced by the wrong closure bolts, wrong gaskets (no gasket), or weld problems
- Section 71.85, Preliminary determinations or Section 8 of the SAR (failure to verify that the container is in accordance with the CoC)

It is assumed that the discovered problem would also be documented in the corrective action program. The deficiency would be corrected and a root cause evaluation would be conducted to preclude repetition. This finding would be GREEN.

3. Minor Contents Deficiency (3rd decision block)

Where the NRC or licensee found that a specification regarding cask contents with minor safety significance included in the CoC was not met (e.g. not a temperature, pressure, geometry, weight, burn-up, enrichment, or moderator specification nonconformance), this finding would be considered GREEN. This type of deficiency would have low risk significance relative to causing a radioactive release to the public or public or occupational exposure. If a radiation limit was exceeded or an overexposure resulted due to this deficiency, that finding would be handled through a different SDP branch. This type of deficiency would also be addressed by the licensee's corrective action program.

Examples are:

- Minor structural component left out or improperly configured (those not required to maintain content arrangement)
- Non-load bearing and not shielding related)
- Non-fissile material curie content exceeds the specification in the CoC
- A non-fissile isotope other than what is allowed by the CoC is loaded
- Residual water in a non-fissile package
- Inclusion of non-radioactive material not intended to be in the package

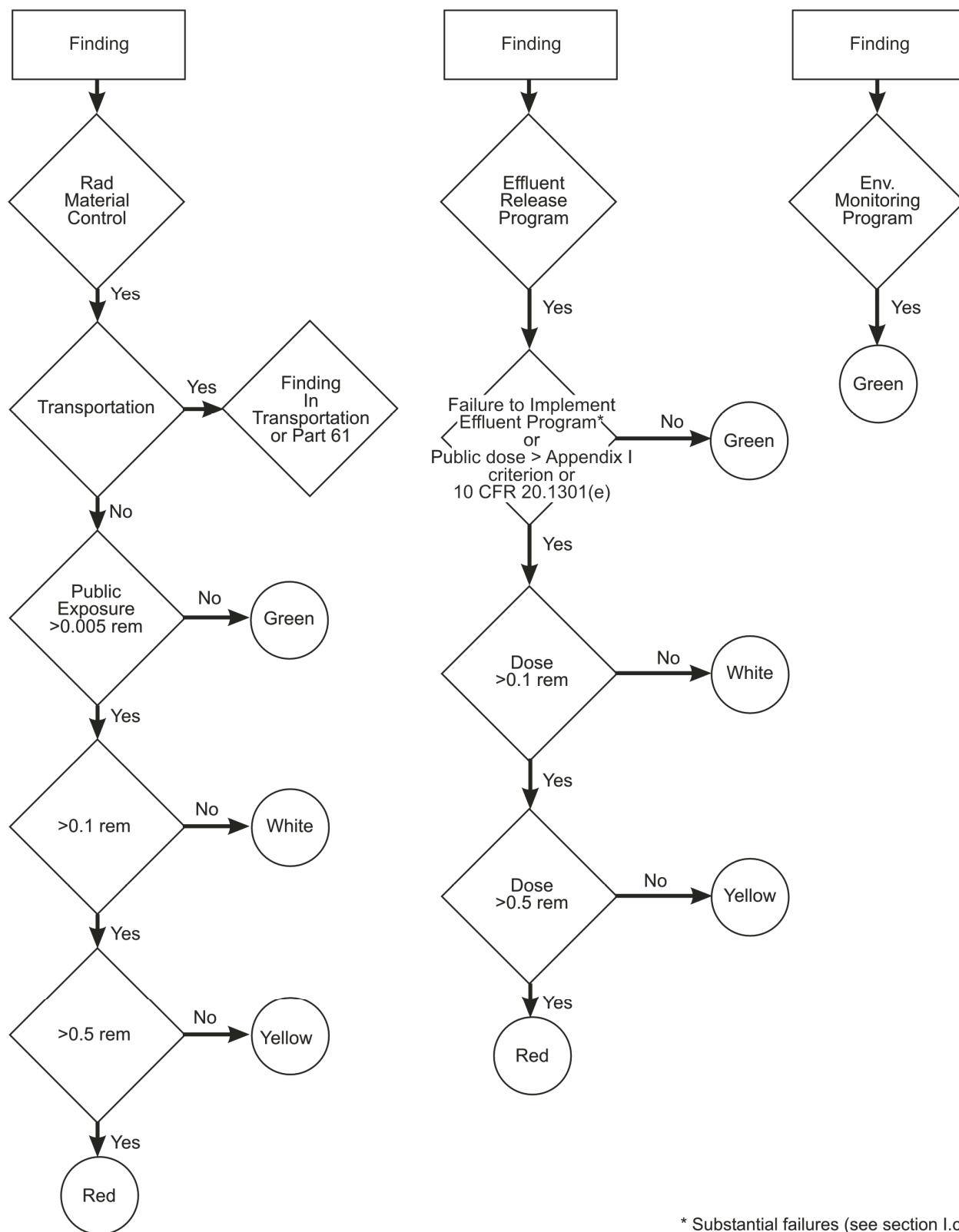
4. >1 Major Contents Deficiencies (4th decision block)

If it is determined that the package contained material such that a critical parameter was outside of the limits of the CoC, or that the closure/containment system was deficient, then the significance would be determined here. Deficiencies such as these would be risk significant in that they are more likely to lead to a criticality event, a breach of package, a radioactive release, the failure to exercise adequate controls, or a public or occupational dose exceeding NRC limits. If one critical deficiency was identified by the NRC or licensee, then the finding would be WHITE. If more than one critical deficiency was identified, then the finding would be YELLOW.

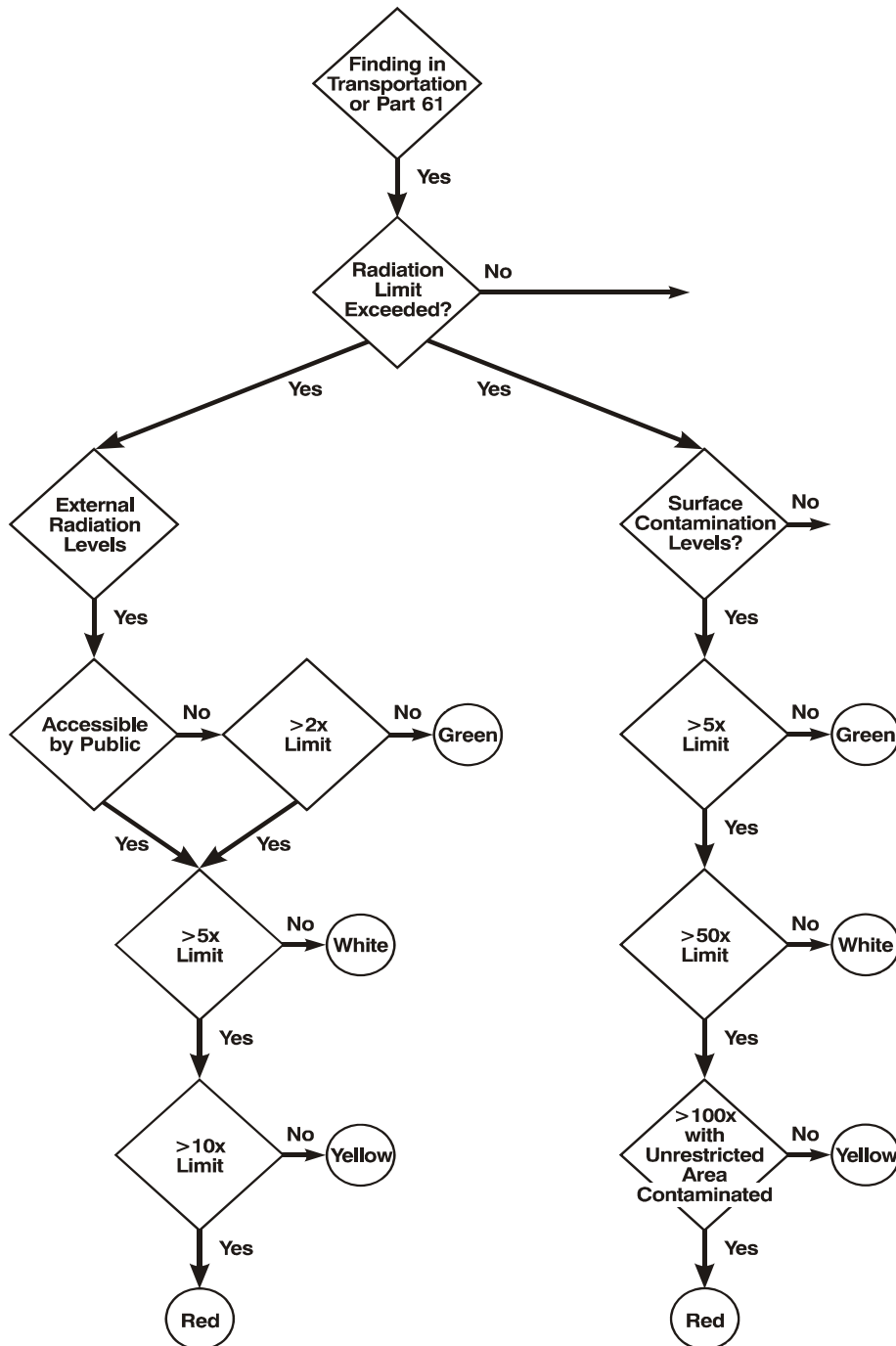
Examples are:

- Temperature
- Pressure
- Geometry/configuration
- Weight
- Burn-up
- Enrichment
- Moderator presence when not allowed/moderator exclusion when required
- Neutron absorber not present when required
- Fissile material curie content or quantity exceeds the specification in the CoC
- Major structural item left out (internal brace, basket, shoring, foam, shielding etc.) or structural deficiency/failure.

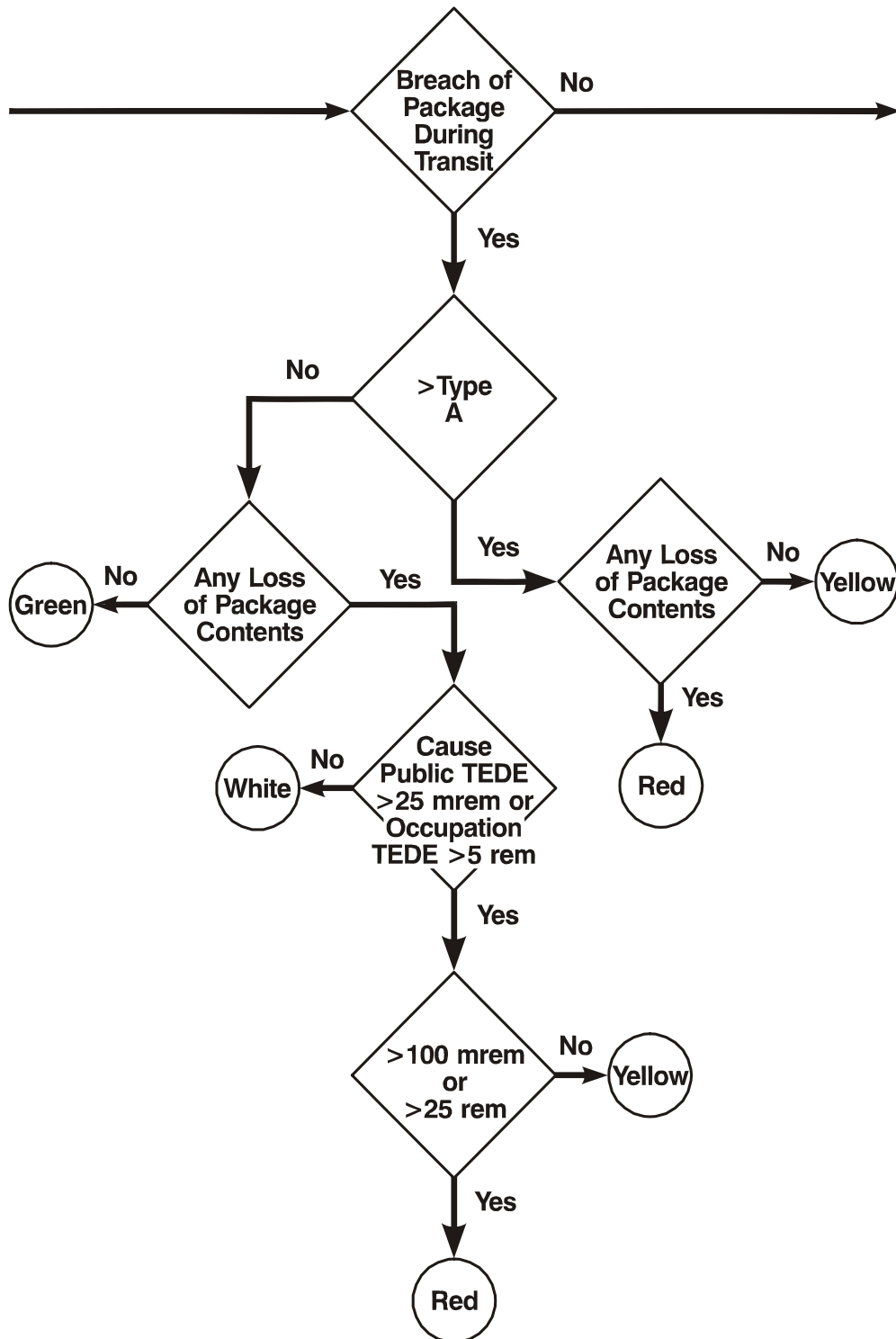
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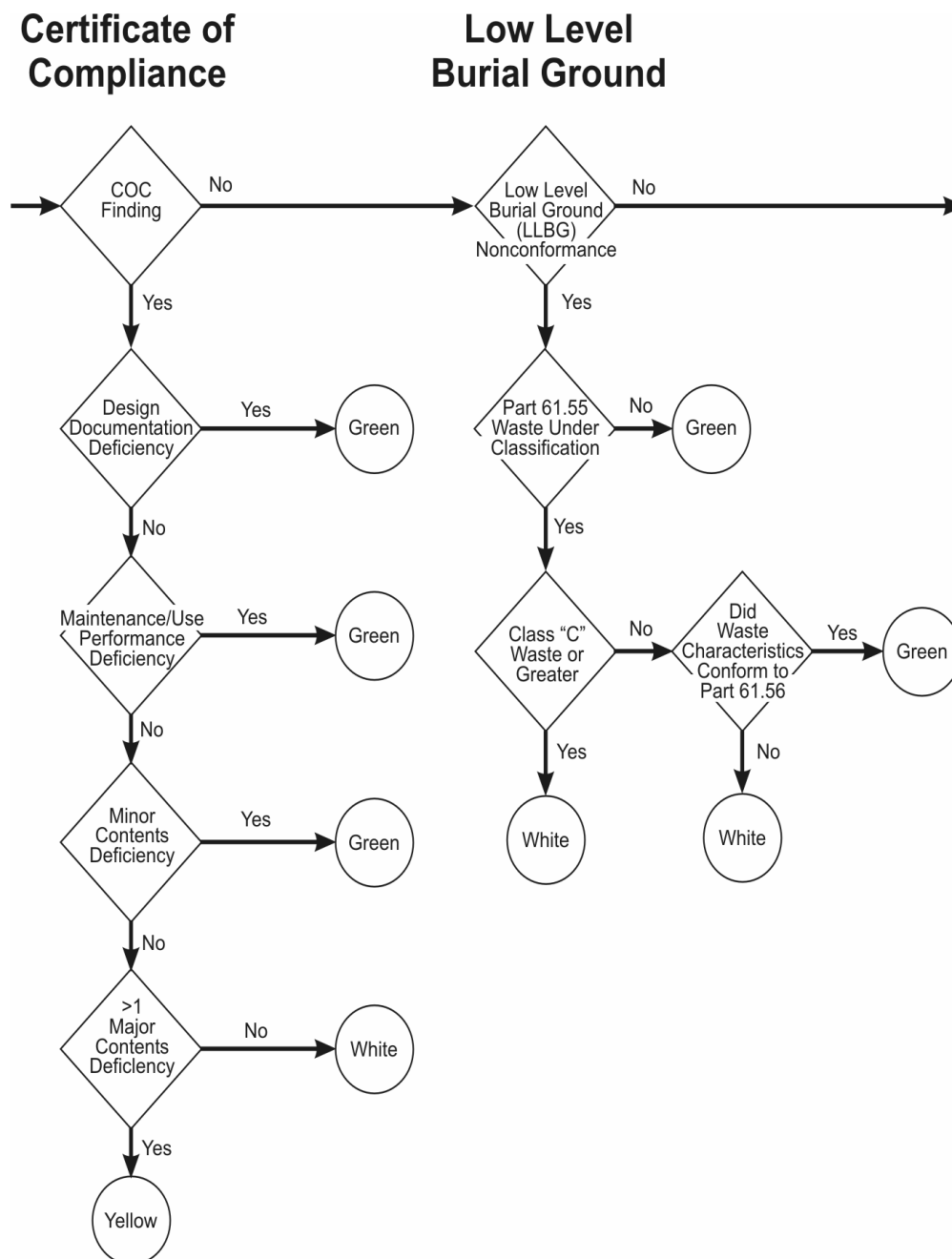
PUBLIC RADIATION SAFETY

Radiation Limits

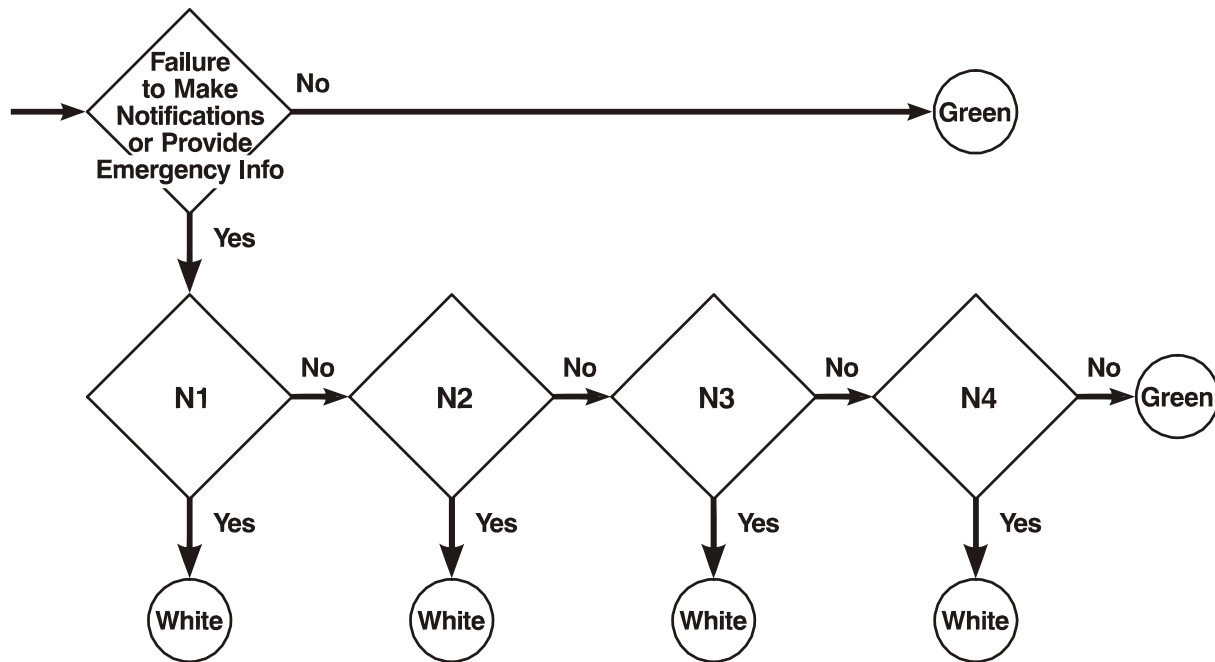


Package Breach





Notification & Emergency Information



N1 - Failure to comply with 10 CFR 71.97 - Made a shipment w/o notifying state governor prior to shipment entering state

N2 - Failure to provide emergency response info required by 49 CFR 172.602

N3 - Failure to respond during actual request IAW 49 CFR 172.604

N4 - Failure to make notification of 5x limits exceeded as required by 10 CFR 20.1906

ATTACHMENT 1

Revision History for IMC 0609, Appendix D

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	10/16/06 CN 06-027	This IMC has been revised to incorporate comments from the Commission in which the term public confidence has been change to openness	None	N/A	N/A
N/A	02/12/08 CN 08-007	This IMC has been revised to incorporate changes approved by the Commission in SECY-07-0112, including eliminating the White finding in the Environmental Monitoring branch. Other changes include removing the Yellow finding from the Low Level Burial Ground branch and eliminating the aggregation of findings in the Radioactive Materials Control Branch.	None	N/A	ML080220247

An Alternate Source of Quality High Integrity Containers

NUHIC™ High Integrity Containers

RWE NUKEM Corporation's NUHIC™ High Integrity Containers are designed and constructed for maximum flexibility in managing low-level radioactive waste. Each NUHIC™ provides the client an efficient, cost-effective alternative for waste disposal and storage. NUHIC™ containers have been used in government, commercial, and international applications since 1983.

The NUHIC™ advantage includes:

- Universally compatible with most media dewatering and drying systems
- Stackable to conserve valuable storage space
- Grappable for remote handling
- Available in a full range of waste-efficient sizes
- Compatible with virtually all waste processing systems and licensed transport casks

Compliant with Industry Standards

NUHICs™ are backed by an approved quality assurance plan and are accepted as high integrity containers at both the Barnwell, SC, and Hanford, WA, commercial radioactive waste disposal sites, as well as at many US Department of Energy facilities. The NUHIC™ Certificate of Compliance allows the safe disposal of:

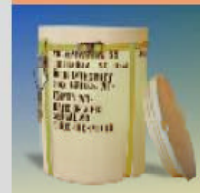
- Bead and powdered resins
- Filters and filter media
- Sludge
- Scrap

With RWE NUKEM's complete selection of waste processing internals and container configurations, you can process, store, and dispose of all commonly generated waste forms.

Efficient and Cost Effective

NUHIC™ waste capacities are greater compared to other available high integrity containers. This contributes to more packaging efficiency and cost savings when used with either new or existing waste processing systems.

RWE NUKEM offers six different, efficient NUHIC™ container sizes from the NUHIC™ 55 to the largest, NUHIC™ 205. Each container can be shipped in nearly all licensed transport cask sizes providing the greatest flexibility in cost-effective waste management.



RWE NUKEM Corporation provides safe, compliant, and cost-effective solutions to radioactive waste management problems through the innovative application of proven technologies.

Summary of NUHIC™

High Integrity Containers

NUHIC Designator	Burial Volume (ft ³)	Gross Weight (lbs)	Height (inches)	Diameter (inches)	Internal Configuration	Empty Weight (lbs)	Usable Volume (ft ³)	Waste Payload (lbs)
NUHIC-55	18.8	1,800	43.63	31.5	(Overpack)	150	14.8	1,650
NUHIC-80B	73.2	6,600	53.25	55	MT ¹	350	66.7	6,250
					DBR-C ²	375	66.4	6,225
					DBR-RD ³	381	66.0	6,219
					DBS ⁴	352	66.3	6,248
					D-C/RD ⁵	385	65.0	6,215
NUHIC-120	122.5	11,865	73.0	60	MT	746	105.8	11,119
					DBR-C	765	105.5	11,100
					DBR-RD ³	778	105.0	11,087
					DBS	755	105.4	11,110
					D-C/RD	805	103.8	11,060
NUHIC-136	133.5	8,500	69.5	65	MT	600	125.3	7,900
					DBR-C	625	124.7	7,875
					DBR-RD	780	124.1	7,720
					DBS	610	124.5	7,890
					D-C/RD	810	124.0	7,690
NUHIC-158	155.9	8,500	70.5	69.75	MT	600	138.3	7,900
					DBR-C	630	137.8	7,870
					DBR-RD	652	137.4	7,848
					DBS	610	137.8	7,890
					D-C/RD	810	136.0	7,690
NUHIC-205	204.8	20,000	78.0	75.25	MT	985	181	19,015
					DBR-C	1,035	180.4	18,965
					DBR-RD	1,041	180.0	18,959
					DBS	990	180.5	19,010
					D-C/RD	1,235	178.3	18,765

¹MT: Empty without internals

²DBR-C: Dewatering internals for bead resin - conventional dewatering

³DBR-RD: Dewatering internals for bead resin - rapid dewatering

⁴DBS: Dewatering internals for bead resin - sheet filter

⁵D-C/RD: Dewatering internals for powder resin - conventional and rapid dewatering

Waste Classification Exercise #1

Using the tables and guidance found in 10 CFR 61.55 (attached), classify the following into waste class A, B, C, or greater than C.

1. C-14 0.5 $\mu\text{Ci/cc}$ _____

2. H-3 60 $\mu\text{Ci/cc}$ _____

3. Co-60 340 $\mu\text{Ci/cc}$ _____

4. U-238 45 nCi/cc _____

5. Mixture of:

Cs-137 25 $\mu\text{Ci/cc}$ _____

Sr-90 80 $\mu\text{Ci/cc}$

6. Mixture of:

C-14 0.4 $\mu\text{Ci/cc}$ _____

Tc-99 0.2 $\mu\text{Ci/cc}$

Ni-63 45 $\mu\text{Ci/cc}$

Cs-137 10 $\mu\text{Ci/cc}$

7. Mixture of:

Pu-241 190 nCi/g _____

I-129 0.004 $\mu\text{Ci/cc}$

Answers: 1-A, 2-B, 3-A, 4-A, 5-C, 6-C, 7-C

Waste Classification Exercise #2

A licensee is shipping a HIC containing dewatered bead resin. The resin contains several isotopes found in the licensee's RCS waste stream. Below are the specifications for the waste package and the isotopic analysis that was performed on the waste. It would take considerable time to hand calculate the waste classification for this package due to the number of isotopes involved. This exercise shows why software is used to perform these calculations and to fill out the required waste manifest forms. If you were to perform a calculation using the data below, you would find that this package of resin is Waste Class B (see the Uniform Low-Level Radioactive Waste Manifest on the following pages).

Liner volume = 178.9 cubic feet

Waste volume = 4.033 cubic meters

Gross weight = 7633 pounds

Net waste weight = 2822.8 kg

<u>Isotope</u>	<u>Activity (mCi)</u>
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Cr-51	9.87E-1
Mn-54	5.74E+2
Fe-55	1.28E+3
Co-57	3.88E+0
Co-60	4.67E+3
Ni-59	5.59E-1
Ni-63	7.93E+1
Zn-65	6.72E+1
Ag-110m	4.76E+1
H-3	7.88E+1
Sr-90	2.07E+0
Cs-134	1.14E+2
Cs-137	6.92E+3
Ce-144	3.50E+1
Sr-89	4.33E+0
Pu-238	1.26E-1
Pu-239	7.08E-2
Pu-241	1.24E+1
Am-241	3.65E-1
Cm-243	2.80E-1

Unit Conversions

1 inch = 2.54 centimeters

1 pound = 453.59 grams

1 furlong = 220 yards

1 peck = 0.25 bushels

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EXPIRES: 07/31/2010

Estimated burden per response to comply with this information collection request: 3.3 hours. This uniform manifest is required by NRC to meet reporting requirements of Federal and State Agencies for the safe transportation and disposal of low-level waste. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (1-5 F52) U.S. Nuclear Regulatory Commission, Washington, DC 20585-0001, or by internet e-mail to infocollecta@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOS-10202, (3150-0166), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

U.S. NUCLEAR REGULATORY COMMISSION										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 (m ³)	NET WASTE WEIGHT (kg)	SPECIAL NUCLEAR MATERIAL (grams)							
										1	4.033	2822.8	U-233	U-235	Pu	TOTAL				
													NP	NP	1.27E-3	1.27E-3				
										ACTIVITY (MBq)				SOURCE (kg)						
ALL NUCLIDES										TRITIUM	C-14	Tc-99	I-129	NP						
5.14E+5										2.92E+3										
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/ GENERATOR ID NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 1)	7. VOLUME (m ³)	8. WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL <input type="checkbox"/> (μSv/hr) <input type="checkbox"/> (mSv/hr)	10. SURFACE CONTAMINATION MBq/100cm ² ALPHA BETA-GAMMA		11. WASTE DESCRIPTION (See Note 2)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER	13. SORBENT SOLIDIFICATION, STABILIZATION, MEDIA (See Note 3)	14. CHEMICAL DESCRIPTION CHEMICAL FORM/ CHELATING AGENT		WEIGHT % CHELATING AGENT IF > 0.1%	15. RADIOLOGICAL DESCRIPTION INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT							
XXX	13	5.066	3462.3				32		100	METAL OXIDES/ NONE		NP	Cr-51 Mn-54 Fe-55	3.66E+1 2.12E+4 4.74E+4	B					
													Co-57 Co-58 Co-60	1.44E+2 4.59E+2 1.73E+5						
													Ni-63 Ni-59 Zn-65	2.83E+3 2.07E+1 2.49E+3						
													Ag-110m H-3 Sr-90	1.76E+3 2.92E+3 7.66E+1						
													Cs-134 Cs-137 Ce-144	4.22E+3 2.56E+5 1.30E+3						
													Sr-89 Pu-238 Pu-239	1.60E+2 4.66E+0 2.62E+0						

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 | 9. Demineralizer |
| 2. Metal Box | 10. Gas Cylinder |
| 3. Plastic Drum or Pail | 11. Bulk Unpackaged Waste |
| 4. Metal Drum or Pail | 12. Unpackaged Components |
| 5. Metal Tank or Liner | 13. High Integrity Container |
| 6. Concrete Tank or Liner | 19. Other. Describe in item 6, or additional page |
| 7. Polyethylene Tank or Liner | |
| 8. Fiberglass Tank or Liner | |

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

- | | | |
|----------------------------|----------------------------------|--|
| 20. Charcoal | 29. Demolition Rubble | 38. Evaporator Bottoms/Sludges/Concentrates |
| 21. Incinerator Ash | 30. Cation Ion-exchange Media | 39. Compactible Trash |
| 22. Soil | 31. Anion Ion-exchange Media | 40. Noncompactible Trash |
| 23. Gas | 32. Mixed Bed Ion-exchange Media | 41. Animal Carcass |
| 24. Oil | 33. Contaminated Equipment | 42. Biological Material (except animal carcass) |
| 25. Aqueous Liquid | 34. Organic Liquid (except oil) | 43. Activated Material |
| 26. Filter Media | 35. Glassware or Labware | 59. Other. Describe in item 11, or additional page |
| 27. Mechanical Filter | 36. Sealed Source/Device | |
| 28. EPA or State Hazardous | 37. Paint or Plating | |

NOTE 3: For solidification media that meet disposal site structural stability requirements, the numerical code must be followed by "S." For all solidification media, the vendor (manufacturer) and brand name must also be identified in item 13. Code 100-NONE REQUIRED.

- | Solidification | | | |
|--------------------------|------------------|--------------------|--|
| 60. Speedi Dri | 64. Safe T Sorb | 69. Chemsil 30 | 74. Petroset 30 |
| 61. Celatom | 65. Safe N Dri | 70. Chemsil 50 | 75. Petroset II |
| 62. Floor Dry/ Superfine | 66. Florco | 71. Chemsil 3030 | 76. Aquaset |
| 63. Hi Dri | 67. Florco X | 72. Dicapert HP200 | 77. Aquaset II |
| | 68. Solid A Sorb | 73. Dicapert HP500 | |
| | | | 89. Other. Describe in item 13, or additional page |
| | | | 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 |

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CONTAINER AND WASTE DESCRIPTION (CONTINUATION)[illegible]

