



Texas Commission on Environmental Quality

Radioactive Material License

Pursuant to the Texas Radiation Control Act, Texas Commission on Environmental Quality, (TCEQ or commission) and Title 30 of the Texas Administrative Code (30 TAC), and in reliance on statements and representations heretofore made by the Licensee, a license is hereby issued authorizing the Licensee to receive, possess, use, store, dispose and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Texas Commission on Environmental Quality now or hereafter in effect and to any conditions specified below.

Licensee Customer Number	Licensee Name	Licensee Address	License Number	License Expiration Date	This license is issued in response to an application received dated	Amendment Number 12
CN600616890	1. Waste Control Specialists LLC ATTN: Scott Kirk, CHP	2. P.O. Box 1129 Andrews, Texas 79714	3. R04100	3.A September 10, 2024	4. May 6, 2011; June 29, 3011, August 19, 2011, August 22, 2011(2), August 30, 2011, and October 14, 2011 Signed by: J. Scott Kirk, CHP	4.A: Issued on: March 6, 2012

Radioactive Material Authorized

5. Radioisotope	6. Form of Material	7. Maximum Volume and Total Radioactivity	8. Authorized Use
<p>A. Low-level radioactive waste as defined at Texas Health and Safety Code §401.004</p> <p>B. Low-level radioactive waste is limited to Compact Waste and Federal Facility Waste as defined at Texas Health and Safety Code §401.2005.</p> <p>C. Carbon-14 for the Compact Waste Disposal Facility not to exceed 600 curies total radioactivity for facility life.</p> <p>D. Carbon-14, technetium-99, and iodine-129 for the Federal Facility Waste Disposal Facility not to exceed 180, 35, 0.15 curies, respectively, total radioactivity for facility life.</p> <p>E. Above ground possession of source material not to exceed 30,000,000 grams.</p> <p>F. Above ground possession of special nuclear material not to exceed 350 grams total of uranium-235, 200 grams of uranium-233, or 200 grams of plutonium or any combination of these provided the sum of the ratios of the quantities does not exceed unity.</p>	<p>A. Dry packaged low-level radioactive waste, except as authorized in this license.</p>	<p>A. For the Compact Waste Disposal Facility: Total volume not to exceed 2,310,000 cubic feet or total radioactivity not to exceed 3,890,000 curies.</p> <p>B. For the Federal Facility Waste Disposal Facility: Total volume of federal facility waste limited to 26,000,000 cubic feet or total radioactivity not to exceed 5,600,000 curies of totals, not more than a total volume of 8,100,000 cubic feet (or 300,000 cubic yards) and total radioactivity of 5,500,000 curies of Class A Containerized, Class B, and Class C low-level radioactive waste, collectively.</p>	<p>A. Receipt of low-level radioactive waste from other persons for near-surface land disposal.</p> <p>B. Receipt is limited to Compact Waste and Federal Facility Waste as defined at Texas Health and Safety Code §401.2005.</p>

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General Requirements

9. This license authorizes the disposal of low-level radioactive waste, except Greater Than Class C low-level radioactive waste and waste of international origin. No other material shall be accepted under this license. The receipt and/or disposal of spent fuel, high-level radioactive waste, by-product material, as defined in 30 TAC §336.2(16)(B), naturally-occurring radioactive material, hazardous waste, industrial solid waste, municipal solid waste, liquid waste, explosive or pyrophoric materials are specifically prohibited. Low-level radioactive waste intended for disposal shall be received, possessed, and disposed only at:

Regulated Entity Number	Location
RN101702439	9998 West Highway 176, Andrews, Texas, 79714 One mile north of State Highway 176; 250 feet east of the Texas and New Mexico State Line (30 miles west of Andrews, Texas).

10. The Licensee shall comply with the provisions of Title 30 Texas Administrative Code (30 TAC) Chapter 37; Chapter 39, Subchapters A, H, and M; Chapter 50; Chapter 55, Subchapter G; Chapter 60; Chapter 281, Subchapter A; Chapter 305, Subchapters A, B, C, D, and F; and Chapter 336, Subchapters A, B, C, D, E, G, H, and J.
11. Words and terms used in this license are defined in 30 TAC Chapter 336. The following words and terms, when used in this license, shall have the following meaning:
- A. Buffer Zone – A portion of the disposal site that is controlled by the Licensee and that lies under the disposal units and between the disposal units and the boundary of the disposal site.
 - B. Bulk Waste – Material that is soil or soil-like in its physical form.
 - C. Canister – A rectangular or cylindrical reinforced concrete container as defined in Appendix 3.0-1 of the application.
 - D. Commencement of Major Construction – Any clearing of land, excavation, or other substantial action that would adversely affect the environment of a land disposal facility. The term does not mean disposal site exploration, necessary roads for disposal site exploration, borings to determine foundation conditions, or other preconstruction monitoring or testing to establish background information related to the suitability of the disposal site or the protection of environmental values.
 - E. Commission – The Commissioners of the Texas Commission on Environmental Quality acting in their official capacity.
 - F. Compact – The Texas Low-Level Radioactive Waste Disposal Compact established under Texas Health and Safety Code §403.006 and Texas Low-Level Radioactive Waste Disposal Compact Consent Act, Public Law Number 105-236 (1998) (Texas Compact).

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- G. Compact Waste Disposal Facility – The low-level radioactive waste land disposal facility licensed by the commission for the disposal of Compact Waste.
- H. Compact Waste – Low-level radioactive waste that is generated in Texas or a party state; or is not generated in Texas or a party state, but has been approved for importation to Texas by the Compact Commission under §3.05 of the Compact established under Texas Health and Safety Code §403.006.
- I. Containerized – To be emplaced within a canister.
- J. Disposal Site – That portion of a land disposal facility which is used for disposal of waste. It consists of disposal units and a buffer zone.
- K. Disposal Units – A discrete portion of the land disposal facility into which waste is placed for disposal. For near-surface disposal as authorized by this license, the disposal unit is a trench in which waste is emplaced.
- L. Excavation – Those subset of activities comprising construction that involve the removal of native materials (e.g., soils) at the site for the construction of the Land Disposal Facility features, such as, the disposal units, receiving pad, contact water storage pad, decontamination building, or any other structure.
- M. Executive Director – The executive director of the Texas Commission on Environmental Quality, or any authorized individual designated to act for the executive director in the administration of the license and the rules of the TCEQ (for example, reporting, inspection, emergency response).
- N. Federal Facility Waste – Low-level radioactive waste that is the responsibility of the federal government under the Low-Level Radioactive Waste Policy Act, as amended by the Low-Level Radioactive Waste Policy Amendments Act of 1985 (42 United States Code §2021b - 2021j). Excluded from this definition is low-level radioactive waste that is classified as greater than Class C as defined in 30 TAC §336.362.
- O. Federal Facility Waste Disposal Facility – The low-level radioactive waste land disposal facility for the disposal of Federal Facility Waste.
- P. Land Disposal Facility – All land, buildings and structures, and equipment which are intended to be used for the disposal of low-level radioactive wastes into the subsurface of the land. For the purposes of the license, the term shall mean both the Compact Waste Disposal Facility and Federal Facility Waste Disposal Facility.
- Q. Low-Level Radioactive Waste (LLRW) – Radioactive material that is discarded or unwanted and is not exempt by a Texas rule adopted under the Texas Health and Safety Code §401.106; is waste, as that term is defined by Title 10 Code of Federal Regulations (CFR) §61.2; and is subject to: concentration limits and disposal criteria established in 30 TAC Chapter 336. Low-level radioactive waste does not include: high-level radioactive waste defined by 10 CFR §60.2; spent nuclear fuel as defined by 10 CFR §72.3; transuranic waste as defined in 30 TAC §336.2(138); by-product material as defined in 30 TAC §336.2(16)(B); naturally-occurring radioactive material (NORM) waste as defined in 30 TAC §336.2(83); or oil and gas NORM waste.
- R. Operations – The receipt and transfer of low-level radioactive waste for disposal from other persons and/or the emplacement of low-level radioactive waste into a disposal unit and any other activities associated with the receipt and emplacement of low-level radioactive waste. A land disposal facility is in operation from the day that low-level radioactive waste is first received until the day final closure begins.

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- S. Restricted Area – An area, access to which is limited by the Licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. For the purpose of this license, the Land Disposal Facility is designated as the Restricted Area.
 - T. Site – The contiguous land area where the land disposal facility or disposal activity is physically located or conducted including adjacent land used in connection with the land disposal facility or disposal activity, and includes soils and groundwater contaminated by radioactive material. Activity includes the receipt, storage, processing, or handling of radioactive material for purposes of disposal at a land disposal facility
 - U. Waste – Has the same meaning as Low-Level Radioactive Waste
 - V. Waste of International Origin – Means Low-Level Radioactive Waste that originates outside of the United States or a territory of the United States, including subsequently stored or processed in the United States.
12. The following are related to the designated Radiation Safety Officer under this license:
- A. The individual designated as the Radiation Safety Officer (RSO) for activities covered by this license is Mr. Scott Kirk, CHP.
 - B. The RSO shall be the primary contact between the Licensee and the TCEQ for all matters relating to this license and radiation safety.
 - C. Any request for amendment of the license shall be submitted under the signature of the RSO.
 - D. The Licensee shall provide a resolution from its board of directors, attested by the secretary of the corporation that the Licensee has delegated to the radiation safety officer position the authority to act for and on behalf of the Licensee in all matters relating to radiation safety matters and this radioactive material license.
 - E. The Licensee shall revise an organizational chart and the description of the duties, responsibilities and authorities of the RSO submitted in the application to depict and specify that the designated RSO has a direct line of communication with the Licensee's President on all matters pertaining to radiation safety and compliance with the conditions of this license and the applicable rules.
 - F. The Licensee shall require and document the following minimum qualifications of any person to be designated to serve as the RSO for this license:
 - 1) A bachelor's degree in the physical or biological sciences, industrial hygiene, or engineering from an accredited college or university or an equivalent combination of education and relevant experience in uranium recovery, waste processing, or production facility radiation protection. Two (2) years of relevant experience is considered equivalent to one (1) year of academic study.
 - 2) At least one (1) year of work experience relevant to low-level radioactive waste management and disposal operations in applied health physics, radiation protection, industrial hygiene, or similar work. This experience should involve directly working with radiation detection and measurement equipment, not strictly administrative work. This experience should be in addition to any

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experience that is used to meet the educational requirement.

- 3) At least four (4) weeks of specialized classroom training in health physics specifically applicable to low-level radioactive waste management and disposal operations.
- 4) The RSO should attend refresher training on low-level radioactive waste management and disposal operations related to health physics every two (2) years.

G. The RSO shall ensure that the radiation safety program provides, as a minimum, the same qualifications and same training as is provided to radiation safety technicians for all other positions at the land disposal facility involved with the administration and/or execution of the radiation safety program.

13. Copies of all documents and records required by this license must be maintained for the executive director's review at 9998 West Highway 176, Andrews, Texas, 79714.
14. This license may be revoked, suspended, or modified, in whole or in part, for any material false statement in the application or any statement of fact required under provisions of the Texas Radiation Control Act (TRCA), or because of conditions revealed by any application or statement of fact or any report, record, or inspection or other means that would warrant the commission to refuse to grant a license on the original application, or for failure to operate the facility in accordance with the terms of the license, or for any violation of or failure to observe any of the terms and conditions of the TRCA or other applicable law or the license or of any rule or order of the commission.
15. The Licensee must restrict possession and disposal of low-level radioactive waste to the locations and purposes authorized in the license.
16. The Licensee shall maintain records of the types, forms, and quantities of low-level radioactive waste and hazardous waste disposed at the site. This information shall be used during decommissioning and to update the dose modeling prior to license termination. This information shall be retained throughout disposal facility operations and throughout the closure and post-closure periods. Upon license transfer, the records of the types, forms, and quantities of low-level radioactive waste and hazardous waste disposed at the site shall be transferred to the custodial agency.
17. The Licensee must notify the executive director within seven (7) days of receipt of a citation, petition, summons, warrant or other notice of a civil, administrative, or criminal proceeding by a city, county, state, or federal authority relating to the site, land disposal facility, activities, Licensee, managers, or employees at the site.
18. The Licensee must notify the executive director within four (4)-hours of any temporary or permanent closure of the facility or the occurrence of any event that causes the site to be closed beyond the regular schedule of operation.
19. The Licensee may not transfer the real property on which the Federal Facility Waste Disposal Facility is located except to the federal government. The Licensee may not use the

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property on which the land disposal facilities are located as security or collateral or otherwise subject the real property to foreclosure or possession by a person who is not the state or federal government or the Licensee.

20. Upon issuance of this license, the Licensee shall convey all right, title and interest in land and buildings for the Compact Waste Disposal Facility to the State of Texas together with requisite rights of access to the property.
21. The Licensee must cease any activity authorized under this license when directed to do so by the executive director or the resident inspector as necessary to protect the public health and safety and the environment.
22. The Licensee must submit an annual report to the executive director on the status of the land disposal facilities, including the facilities' projected future capacity.
23. The Licensee shall comply with all license conditions. Failure to comply with any license condition is a violation of the license and statutes under which the license is issued and is grounds for enforcement action, for license amendment, revocation, or suspension, or for denial of a license renewal application or an application for a license or permit for another facility.
24. For the purpose of coordination, communication, and efficiency of submitted document reviews, project-phased schedules shall be required to be submitted as follows:
 - A. A comprehensive Pre-Construction Schedule shall be submitted to the executive director no later than 60 days from the authorized date of the approved license. The Pre-Construction Schedule shall include, but is not limited to, the requirements in the following license conditions: 20, 22, 50, 51, 52, 53, 54, 55, 57, 58, 59, 60, 61, 62, 63, 154, 156, 159, 161, 162, 163, 164, 165, 167, 170, 171, and 183.
 - B. A comprehensive Construction and Operations Schedule shall be submitted to the executive director no later than 60 days from date of authorized construction. The Construction and Operations Schedule shall include, but is not limited to, the requirements in the following license conditions: 64, 68, 69, 70, 71, 76, 77, 81, 82, 86, 87, 92, 97, 99, 109, 114, 116, 117, 118, 122, 126, 128, 132, 134, 135, 143, 144, 156, 157, 158, 159, 162, 165, 166, 167, 170, 171, and 183.
 - C. One (1) year from the predicted date of site closure, a Closure Schedule shall be submitted to the executive director. The Closure Schedule shall include, but is not limited to, the requirements in the following license conditions: 156, 157, 158, 159, 162, 166, 167, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, and 183.
25. The Licensee shall note that it is not a defense in an enforcement action, that it would have been necessary to halt or reduce the licensed activity to maintain compliance with the license conditions.
26. The Licensee must take all reasonable steps to minimize or prevent any discharge, disposal, or other license violation which has a reasonable likelihood of adversely affecting human health or the environment.

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27. The Licensee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) installed or used by the Licensee to achieve compliance with the license conditions.
28. The Licensee must furnish to the executive director, upon request and within a reasonable time, any information to determine whether cause exists for amending, revoking, suspending, or terminating the license, and copies of records required to be kept by the license.
29. This provision is related to indemnification of TCEQ:
 - A. Upon license issuance, to the fullest extent permitted by law, the Licensee shall indemnify and hold harmless the TCEQ and its officers, employees, agents, principals and assigns from and against all fines, penalties, claims, damages, losses, demands, judgments, settlements, punitive damages, costs of suit, attorneys' fees and delays to other contractors, whether arising in tort or otherwise, whether arising under the Texas Tort Claims Act or otherwise, and whether or not the parties are individually or jointly responsible for any damages, that arise out of or result from:
 - 1) Work performed in connection with this license by the Licensee or any of its agents, employees, subcontractors, or suppliers or their agents or employees, whether or not such work is negligently or recklessly performed;
 - 2) Licensee's handling of a hazardous substance or performance of an inherently hazardous activity;
 - 3) The negligent, reckless, or intentional acts or omissions of Licensee or any of its agents, employees, subcontractors, or suppliers or their agents or employees;
 - 4) The Licensee's failure to comply with any license requirement, covenant, warranty, or representation;
 - 5) Any claim against the TCEQ relating to its issuing or not issuing this license, or regulatory enforcement or lack of enforcement of this license, or including or not including any terms, provisions, or requirements in this license;
 - 6) Personal injury or bodily injury (including death) to the Licensee's own employees, contractor's, or contractors' employees, subcontractors, or subcontractor's employees, suffered as a result of the Licensee's performance or lack of performance of any activities related to this license;
 - 7) The acts or omissions of negligence of commission or any of TCEQ's officers or employees;
 - 8) The acts or omissions of gross negligence of any TCEQ officer or employee arising out of or in connection with the Licensee's performance of any activities related to this license; or

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- 9) Any condition of tangible property on or related to the site, whether or not TCEQ owns or has control over the site or any of the conditions at the site.
- B. This indemnity obligation shall not be apportioned according to contribution, in negligence or otherwise, but shall apply to the entire such claim, damage, loss, demand, judgment, expense, or attorneys fees, regardless of whether it is caused in whole or in part by a party indemnified hereunder (including the negligent act or omission of the TCEQ or its employees.
- C. This indemnity obligation shall survive termination of the license. The Licensee must give notice to the executive director before physical alterations or additions to the licensed facility if such alterations or additions would require a license amendment or result in a violation of license requirements.
30. Authorization from the commission is required before beginning any change in the licensed facility or activity that would result in noncompliance with other license requirements.
31. Unless subject to a different reporting requirement in this license or under 30 TAC §336.335 (Reporting Requirements for Incidents), the Licensee must report any noncompliance to the executive director which may endanger human health or safety or the environment. Such information must be provided orally within 24-hours from the time the Licensee becomes aware of the noncompliance. A written submission must also be provided within five (5) days of the time the Licensee becomes aware of the noncompliance. The written submission must contain a description of the noncompliance and its cause; the potential danger to human health or safety, or the environment; the period of noncompliance, including exact dates and times; if the noncompliance has not been corrected, the time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance, and to mitigate its adverse effects.
32. Inspection and entry must be allowed under Texas Water Code, Chapters 26 - 28 and 32, Texas Health and Safety Code §§361.032, 361.033, 361.037, and 401.063, and 40 CFR §122.41(i). The statement in Texas Water Code §26.014, that executive director entry of a facility must occur in accordance with an establishment's rules and regulations concerning safety, internal security, and fire protection is not grounds for denial or restriction of entry to any part of the facility, but merely describes the executive director's duty to observe appropriate rules and regulations during an inspection.
33. The license may not be transferred except on approval of the commission.
34. All reports and other information requested by and submitted to the executive director must be signed by the person and in the manner required by 30 TAC §305.128. All information submitted to the executive director must comply with the applicable requirements of the Texas Engineering Practice Act, the Texas Geoscience Practice Act, and the Texas Professional Land Surveying Practices Act.
35. This license may be amended, suspended and reissued, or revoked for cause. The filing of a request by the Licensee for a license amendment, suspension and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not

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stay any license condition.

36. This license does not convey any property rights of any sort, or any exclusive privilege.
37. Monitoring results must be provided at the intervals specified in the license.
38. When the Licensee becomes aware that it failed to submit any relevant facts in a license application, or submitted incorrect information in an application, or in any report to the executive director, it must promptly submit such facts or information.
39. At any time before termination of the license, the Licensee must submit written statements under oath upon request of the commission or the executive director to enable the commission to determine whether or not the license should be modified, suspended, or revoked.
40. The license or portion thereof will be transferred to the custodial agency only on the full implementation of the final closure plan as approved by the commission, including post-closure observation and maintenance.
41. No waste may be received or disposed of until all information required to be submitted under this license is submitted and the executive director has inspected the facility and has found it to be in conformance with the description, design, and construction described in the application and as modified by this license. No waste may be received for disposal at the site until the executive director has approved financial assurance and disposal site ownership arrangements.
42. The commission may incorporate in this license at the time of issuance, or thereafter, by appropriate rule or order, additional requirements and conditions with respect to the Licensee's receipt, possession, and disposal of wastes as it deems appropriate or necessary in order to: (1) protect the health and safety of the public and the environment; or (2) require reports and recordkeeping and to provide for inspections of activities under the license that may be necessary or appropriate to effectuate the purposes of the Texas Radiation Control Act and the commission's rules.
43. Ninety (90) days prior to the receipt of federal facility waste, the Licensee must indemnify the commission, the state, and its officers and agents for any liability imposed on the commission or state under state or federal law for damages, removal, or remedial action with respect to the land, the facility, or the federal waste accepted, stored, or disposed of. The Licensee may not receive federal facility waste until the executive director approves the indemnification in writing.
44. Notice of Bankruptcy.
 - A. The Licensee must notify the executive director, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of Title 11 (Bankruptcy) of the United States Code (11 USC) by or against:
 - 1) The Licensee;

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- 2) An entity (as that term is defined in 11 USC §101(14)) controlling the Licensee or listing the license or Licensee as property of the estate;
- 3) An affiliate (as that term is defined in 11 USC §101(2)) of the Licensee; or
- 4) Valhi, Inc.

B. This notification must indicate:

- 1) The name of the Licensee;
- 2) The License number(s);
- 3) The bankruptcy court in which the petition for bankruptcy was filed; and
- 4) The date of filing of the petition.

45. Any leases, contracts, or other arrangements between the Licensee and the commission with respect to the ownership and use of the property on which the Compact Waste Disposal Facility is located are subject to the laws of the State of Texas and are independent of the regulatory and administrative processes applicable to low-level radioactive waste disposal. By granting this license, the commission does not waive any rights with respect to the ownership and use of the property on which the Compact Waste Disposal Facility is located.
46. The Licensee shall not receive or dispose of any waste with physical, chemical, and radiological characteristics not evaluated in the application.
 - A. The Licensee shall not receive or dispose uranium enrichment waste, uranium conversion waste, or uranium deconversion waste, including uranium hexafluoride, and large quantities of depleted uranium or similar material.
 - B. The Licensee shall not receive or dispose waste streams containing depleted uranium in concentrations greater than ten (10) nanocuries per gram. All depleted uranium or similar waste in concentrations less than ten (10) nanocuries per gram (<10nCi/g) shall be disposed consistent with the provisions specified in License Condition 102.
 - C. In order to accept any additional waste streams, information on complete waste profiles, radionuclide information, total radioactivity, radionuclide concentrations, chemical constituents, and analysis of any impacts to members of the public and the environment must be submitted as an application for amendment to this license.
47. The Licensee shall provide, on or near the required signs and labels, additional information, as appropriate, to make individuals aware of potential radiation exposures and ways to minimize the exposures.
48. The Licensee must use any reasonable means, including but not limited to, fencing and security personnel, to prevent unauthorized entry into the restricted area of the site. The Licensee is authorized to implement the security and fire protection system as modified in the administrative amendment application dated July 27, 2011, and in the associated

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amendment application revisions dated September 1, 2011, October 14, 2011, and November 4, 2011, subject to the following conditions:

- A. The Licensee shall ensure that an operational badge card reader system or an equivalent access control system is provided at all entry and exit points of the Compact Waste Disposal Facility and Federal Facility Waste Disposal Facility Decontamination and Waste Staging buildings.
 - B. The Licensee shall ensure that an adequate number of motion sensing Pan-Tilt-Zoom (PTZ) security cameras shall be installed inside the Compact Waste Disposal Facility and Federal Facility Waste Disposal Facility decontamination buildings. The Licensee may not store waste overnight in these buildings.
 - C. The Licensee shall ensure that there are no blind spots in the motion sensing alarm field of range of the PTZ cameras when the PTZ cameras are focused on the entry/exit doors of land disposal facility buildings.
 - D. The Licensee shall ensure adequate staffing is provided for round the clock continuous, dedicated visual monitoring and observation of security camera monitoring screens in the Low-Level Radioactive Waste Disposal Facility gatehouse and the main site guard house, accounting for distractions caused by other duties, fatigue, and/or scheduled breaks. The Licensee shall develop detailed operational procedures for the security camera monitoring operations. These procedures shall be submitted to TCEQ for review and approval within 60 days of approval for the commencement of disposal operations.
 - E. The Licensee shall develop and provide procedures that describe the precise protocols to be followed to download the recording data of the Network Video Recorder (NVR) when its capacity is approached or when a specific image is needed.
 - F. Only a Trustworthy and Reliable person with Unescorted Access (TRUA) can provide escort for any radioactive material quantity of concern (RAMQC), including during disposal and offloading of this waste. The Licensee shall modify its Procedure RMP-100 sections 6.1.4 and 6.1.5 to state that only a TRUA can provide the escort for the RAMQC during these activities.
 - G. The Licensee's security and surveillance system may be subject to review and inspection by TCEQ to evaluate the effectiveness of the system regarding areas illuminated by lamps and the areas covered by the cameras. This inspection may identify changes to the system that the Licensee will be required to address.
 - H. The Licensee must provide written notification to TCEQ no less than two (2) weeks before the planned receipt of waste containing quantities of concern at the land disposal facility. This notification shall include: plans for the increased surveillance and security for quantities of concern as required in U.S. NRC order EA-05-090; plans and procedures to ensure that the waste will be disposed the same day, and contingency storage plans that satisfy U.S. NRC order EA-05-090 if, due to unforeseen circumstances, the waste must be stored overnight; and acknowledgment that the submitted plans for the increased surveillance and security must receive approved by TCEQ before the waste can be received.
49. Upon submission of an application for license renewal and/or amendment, or upon the request of the executive director, the Licensee must furnish the executive director with an updated map and cross-referenced list of adjacent landowners.

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Preconstruction Requirements

50. Prior to commencement of major construction, the Licensee shall perform and submit to the executive director for review:
- A. A Site-specific Data Assessment and Management Plan (S-DAMP). The S-DAMP shall describe the collection and refinement of existing and new data related to the characteristics at the site and the schedule for submitting new data to the executive director. Parameters in the S-DAMP requiring refinement include, but are not limited to, water levels, matric potential, geophysical resistivities, erosion, hydraulic conductivities, porosities, and k_d distribution coefficients. The S-DAMP must include a method for well purging and well sampling to assure that well samples are taken from groundwater in the formation, particularly for low-flowing systems and not from condensation in the well and that the samples are representative of the water in the zone that is sampled. The S-DAMP must include a method for determining the source of water found below the well screen. The S-DAMP must include age-dating techniques for the development and validation of the site hydrogeologic conceptual model, including the use of age-dating for characterization of connectivity, history and flow paths of groundwater within the Ogallala-Antlers-Gatuña materials at the site and in the vicinity of the land disposal facility. The S-DAMP must specify the frequency, methods, and all well locations that will be used for age-dating. Discussion and refinement of any other parameters anticipated for use in models or codes must also be included in this plan. Prior to any investigation, sample locations and a schedule of activities are required to be submitted as a precursor to S-DAMP for review by the executive director. The licensee must provide all previously collected sampling data for surface water, soil, air, plant and animal samples to the executive director in an electronic format within 30 days of the final approval of the license. Sampling data submitted must include the latitude and longitude location for each sample taken, identification number of the sampled well or other monitoring device, screen depths of sampled wells, water levels of sampled wells, and elevation of the casing of a sampled well. Positional data submitted to the executive director must comply with OPP 8.11.01 Geographic Information Systems Positional Data, as amended, and OPP 8.12.01 Global Positioning System, as amended. The licensee must submit the data in an electronic format specified by the executive director. These requirements apply to all data required by the S-DAMP.
 - B. A Performance Assessment Maintenance Plan. The plan shall incorporate the conditions of this license, including the most current waste characterization data, and demonstrate compliance with the performance objectives of 30 TAC §336.723. The plan shall include, but not be limited to, an explanation of how data will be used for demonstrating compliance, how the data was collected, development of a conceptual model consistent with validated characterization data, defining scenarios and pathways, selection of appropriate mathematical models and codes, calibration methods of the models/codes and the data output from execution of the codes, methods for sensitivity and uncertainty analyses, and approaches for determination of site characterization in meeting the performance objectives.
 - C. A Fracture Analysis Plan. The plan must adhere to the following requirements:
 - 1) Within 60 days following license issuance, a fracture analysis plan and schedule is required to be submitted to the executive director. Proposed boring and well locations must be submitted prior to conducting an investigation. Possible fracture and faults must be investigated within and down-gradient of land disposal

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facility using techniques that may range from simple extrapolation of surface observations to geophysics methods, such as seismic and electromagnetic soundings, and single-bore or borehole-to-borehole analysis. Wells must be installed where possible faults, fractures or lineaments have been located, and if possible, where the maximum number of these features intersects.

- 2) Installation of new borings and monitoring wells must be used initially for the sole purpose of completing pressurized tests capable of measuring the hydraulic conductivities in those Dockum materials of greatest relevance to the performance assessment. No water sampling may be performed during these tests. All wells must have transducers during the entire length of the hydraulic conductivity test, especially during the critical first half of the test.
- 3) During installation of the wells, core samples shall be collected from all zones in the wells and utilized for grain size analysis, determining porosity values, and in site specific determination of distribution coefficients (k_d) for a suite of radionuclides. Batch contact tests, rather than column tests, must be used to estimate the sorption isotherm over an appropriate range of concentrations. Samples must also be collected from the 225-zone and utilized for laboratory analysis of hydraulic conductivity from all boring.
- 4) Arrays of wells with packers must be installed to identify possible hydraulic connectivity of the fracture system using pressurized air. An array must be located in the footprint of the Federal Facility Waste Disposal Facility to evaluate fracture connectivity in the zone from between the Ogallala-Antlers-Gatuña contact with the Dockum Group and the bottom of the proposed disposal unit. Additional arrays must be located immediately adjacent to the footprint of the Federal Facility Waste Disposal Facility to evaluate fracture connectivity in the zone from between the 125-foot zone and the 180-foot zone and between the 180-foot zone and the 225-foot zone.

D. A Hydrogeologic Properties Report. A site hydrogeologic properties report and study must also conduct statistical analyses of spatial distribution of measured hydraulic conductivities and porosities. These analyses must include, but are not limited to, hydraulic conductivity contour maps, block estimating, correlation arguments for conductivities upgradient of the disposal units, hypothesis tests for log-normality, and textural comparisons between the 125-, 180-, and the 225-foot layers. The results of the age-dating and confirmation of the new model are to be reported within this document.

51. Prior to commencement of major construction, the Licensee shall submit to the executive director for review the following studies or plans:

- A. Installation and sampling of eight (8) additional borings inside the perimeter of the Compact Waste Disposal Facility, to verify unsaturated conditions immediately outside the disposal unit. These borings must be located as follows: one (1) at each corner of the Compact Waste Disposal Facility, and one (1) additional boring evenly spaced along each side of the disposal site, and to a depth of at least the upper one (1) foot of the Dockum formation.

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The measurement methods selected should provide for verification of unsaturated conditions prior to construction, and for annual verification, thereafter. Should any of these measurements indicate saturated conditions, operations must cease to accommodate additional sampling, verification, or testing.

- B. Installation and sampling of eight (8) additional borings inside the perimeter of the Compact Waste Disposal Facility, to verify unsaturated conditions immediately outside the disposal unit. These borings must be located as follows: one (1) at each corner of the Compact Waste Disposal Facility, and one (1) additional boring evenly spaced along each side of the disposal site, and to a depth of at least within one (1) foot of the bottom of the disposal unit as provided in this license.

The measurement methods selected should provide for verification of unsaturated conditions prior to construction, and for annual verification, thereafter. If any of these measurements indicate saturated conditions, then operations must cease to accommodate additional sampling, verification, or testing.

- C. Installation and sampling of 12 additional borings inside the perimeter of the Federal Facility Waste Disposal Facility, to verify unsaturated conditions immediately outside the disposal unit. These borings must be located as follows: one (1) at each corner of the Federal Facility Waste Disposal Facility, and two (2) additional borings evenly spaced along each side of the disposal site, and to a depth of at least the upper one (1) foot of the Dockum formation.

The measurement methods selected should provide for verification of unsaturated conditions prior to construction, and for annual verification, thereafter. If any of these measurements indicate saturated conditions, then operations must cease to accommodate additional sampling, verification, or testing.

- D. Installation and sampling of 12 additional borings inside the perimeter of the Federal Facility Waste Disposal Facility, to verify unsaturated conditions immediately outside the disposal unit. These borings must be located as follows: one (1) at each corner of the Federal Facility Waste Disposal Facility, and two (2) additional borings evenly spaced along each side of the disposal site, and to a depth of at least within one (1) foot of the bottom of the disposal unit as provided in this license.

The measurement methods selected should provide for verification of unsaturated conditions prior to construction, and for annual verification, thereafter. If any of these measurements indicate saturated conditions, then operations must cease to accommodate additional sampling, verification, or testing.

- E. Verification of the previous resistivity study including a new resistivity survey to re-establish as closely as possible the original study, and extend to the south beyond the planned location of the land disposal facility. Borings must be installed and logged to calibrate the resistivity survey. The resistivity study should address further definition of the Dockum surface in the surveyed area. If the survey indicates that saturation in the Ogallala-Antlers-Gatuña formation is located over the proposed facility, additional sampling, verification or testing must be proposed.

- F. Verification by engineering reports to the executive director within 270 days of the issuance of this license, and no later than 60 days prior to the start of waste disposal operations in the Federal Facility Waste Disposal Facility Non-Containerized Disposal Unit. Reports must include an evaluation of the expected effectiveness of water spraying, with and without chemical additives, in controlling particulate air emissions

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from the exposed waste face in the Federal Facility Waste Disposal Facility Non-Containerized Disposal Unit. The report must address the emissions control effectiveness during both average seasonal wind velocity and high wind velocity events taken from National Weather Service recorded data from the past 25 years for Midland/Odessa, Texas. The report must include an evaluation of the ability to apply water sprays in winds exceeding 25 miles per hour, given the tendency for wind erosion of the waste surfaces, and droplet entrainment at higher wind speeds. The evaluation must be based upon new testing, or documented performance testing under similar conditions from prior studies, which may include spraying systems manufacturers' performance data.

- G. A particulate air emissions study for the Federal Facility Waste Disposal Facility Non-Containerized Disposal Unit which is to include wind erosion of the exposed waste face as a mass air emissions rate factor in the air dispersion modeling. High wind velocity events are to be taken from National Weather Service data for Midland/Odessa Texas from the past 25 years, and are to be used in computing wind erosion mass air emissions for one (1)-hour, 24-hour, seven (7)-day, 30-day, and annual averaging periods. Maximum wind gusting velocities, as well as average sustained wind velocities must be considered in the analysis. Any credit taken for emissions control due to the sheltering effect of subsurface disposal must be validated by modeling, or by documented performance testing under similar conditions from prior studies. Any credit taken for emissions control by water spraying of the exposed-waste face must be consistent with the evaluation of this method provided in the license. The study must include an estimate of the total annual mass loss of Class A bulk low-level radioactive waste from the Federal Facility Waste Disposal Facility Non-Containerized Disposal Unit, due to particulate air emissions, under anticipated average, and high wind operating conditions.
- H. Installation of spill control (containment features such as vaults, double walled tanks, sumps, etc.) and monitoring measures (monitoring wells for groundwater and soil stations for soil) from the surface to the top of the caliche caprock around surface structures where a spill or leak could possibly occur, to facilitate remediation of possible spills. Surface structures include the decontamination building and the water storage and disposal structures, fuel tanks, storage facilities, processing structures, re-packaging areas, etc. Incorporate a plan for these controls and measures into the Radiological Environmental Monitoring Program and re-submit to the executive director for review prior to construction.
- I. Tracer studies to determine the proper location and installation of monitor wells in the Ogallala-Antlers-Gatuña formation (above and below the cap rock). Tracer studies must be utilized to further delineate contaminant migration in the shallow groundwater and allow for better placement of monitoring stations. Groundwater pathways to springs and playas should be determined using tracers in order to protect and monitor these features from spills and releases. Both the work plans and the subsequent results for the tracer studies must be submitted to the executive director.
- J. Verification that salt dissolution will not impact the land disposal facility by placing one (1) boring and collecting core samples near the proposed land disposal facility from the lower part of Dockum Group and into the salt-bearing section of the Salado Formation.
- K. Verification and evaluation of the location of faulting nearest to the land disposal facility.

52. Prior to commencement of major construction, the Licensee shall:

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- A. Verify the elevations of the top of the Dockum Group within the site area with sufficient spatial resolution to support any modeling relying upon these elevations.
 - B. Evaluate the condition of the central industrial well, including the necessary geophysical logs to evaluate the condition of cement behind pipe on the well, condition of the well casing, and the screened interval(s). Based on the condition of the well, the executive director may require appropriate remedial action including plugging and abandonment. The Licensee shall also monitor and report to the executive director any operating changes or change of use for active oil and gas wells adjacent to the facility.
 - C. Demonstrate that the possibility for water to flow from the Ogallala-Antlers-Gatuña formation to the lateral drainage layer of the final constructed cover will not affect the performance of the Compact Waste Disposal Facility and Federal Facility Waste Disposal Facility.
 - D. Verify and provide to the executive director data demonstrating the geotextile fabric materials ability to function as a filter. The ability of the geotextile fabric located between the sand filter material and the bio-barrier layer to retain its integrity during installation must be confirmed.
 - E. Measure matric potential of the subsurface Dockum formation at the land disposal facility to locate the top of the zone of saturation. The Licensee must allow for observation by the executive director of any verification measurements or testing, and provide data and interpretation of the results in a report to the executive director.
 - F. Reconcile the differences in the descriptions of site drainage and site soils between the surficial geology report and the floodplain report provided in the license application. The reconciliation must be submitted for review by the executive director.
 - G. Identify and report any changes to the 100-year, the 500-year, and the Probable Maximum Precipitation (PMP) floodplains anticipated as a result of future climatic conditions described in the license application. The reports must be submitted for review by the executive director.
 - H. Verify and modify according to design changes in this license, the geographical coordinates of the area centroid and each of the four (4) corners of each proposed disposal unit using global positioning system (GPS) with sub-meter accuracy.
 - I. Verify the depictions of all existing and planned improvements on the site and revise the topographic maps relied upon accordingly.
 - J. Verify the adequacy of the leachate collection system, including but not limited to rise in hydraulic head of the drainage pipe at the center of the disposal unit in relation to the mounding equation used. Any design modification of the leachate collection system necessitated by the verification process, must use the 100-year, 24-hour precipitation event as the design basis for the leachate collection system in accordance with the application. The revised analysis and design must be submitted for review by the executive director.
53. Prior to commencement of major construction, the Licensee must submit modeling to:
- A. Demonstrate that the buffer zones established for the land disposal facility will be unsaturated at all times. The representative current and future climatic parameters in the license application must be incorporated into the modeling.

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- B. Predict hydrological conditions to assure that unsaturated conditions remain in the buffer zone at all times. The modeling shall incorporate sensitivity studies and uncertainty analyses of the locations of the Ogallala-Antlers-Gatuña formation “dry line” and the Dockum Group water table.
 - C. Provide input parameters for native materials, including but not limited to, the lower boundary condition of the infiltration computer models, Hydrologic Evaluation of Landfill Performance (HELP) and Variable Saturated Two-Dimensional Infiltration (VS2DI). Sensitivity analysis must be included in any simulations incorporating all relevant parameters. Any revised sensitivity analysis must be submitted for review by the executive director.
 - D. Include soil samples in a refined sampling grid to provide a better assessment of the regional erosion patterns. The erosion modeling must include sensitivity analysis. The modeling must be submitted for review by the executive director.
54. Prior to commencement of major construction, the Licensee must develop site-specific erosion rates. The Licensee must install, maintain, and monitor erosion pin arrays on the north side of the Federal Facility Waste Disposal Facility as close to the disposal site as possible.
- A. Quarterly measurements of erosion made at the pins shall be taken and reported to the executive director.
 - B. If this data indicates erosion is greater than the expected erosion as provided in the application over the operational life of the facility, the Licensee must submit a license amendment to establish the final cover design and closure plans to address the observed erosion rate.
 - C. The Licensee shall install a weather/climate station in the immediate proximity of the erosion monitoring in Ranch House Draw and in any other location of additional erosion pin arrays.
55. Prior to commencement of major construction, the Licensee shall:
- A. Complete seismic analyses demonstrating the structural stability of bulk and containerized waste during the operational phase of waste disposal, when the disposal units are open.
 - B. Complete equivalency demonstration under 30 TAC §336.730(b), regarding the containment structure. This demonstration must include:
 - 1) An analysis of the chemical resistance of the proposed shotcrete liner;
 - 2) The development of the long-term strength of the shotcrete;
 - 3) An analysis of whether an elastomer coating should be applied to the shotcrete;
 - 4) An analysis accounting for degradation and creep in the shotcrete; and
 - 5) An analysis of the shotcrete liner using Structural Analysis Program (SAP).
56. Prior to commencement of major construction, the Licensee shall ensure that all applicable

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information submitted to the executive director is in compliance with the Texas Engineering Practice Act, the Texas Geoscience Practice Act, and the Texas Professional Land Surveying Practices Act.

57. Prior to commencement of major construction, the Licensee must provide calculations originally contained in Appendix 3.0-3.14 of the application and implement this design, in order to reduce the possibility of localized erosion. The calculations must use a design basis of the Probable Maximum Precipitation (PMP).
58. Prior to commencement of major construction, the Licensee must:
 - A. Design a diversion ditch for “Area 1” and the seven (7) acre area that drains to the Compact Waste Disposal Facility in Volume 21, Appendix 3.0-3.1 of the application.
 - B. Re-design the other surface water diversion ditches to include run-off from “Area 1” and Compact Waste Disposal Facility. All ditches must be designed to insure at least one (1) foot of freeboard and use riprap gravel to provide sufficient protection from scour.
 - C. Design ledge ditches on all sides of the disposal unit sized to account for the 100-year, 24-hour precipitation event.
 - D. The revised designs must be submitted for review by the executive director.
59. Prior to commencement of major construction, the Licensee shall ensure stormwater from the Federal Facility Waste Disposal Facility does not commingle with stormwater from the Compact Waste Disposal Facility. The Licensee’s stormwater management plan should include drainage to a sedimentation pond sized to retain the 100-year storm event and an estimated volume of sediment produced by erosion over a ten (10) year period. The revised analysis and design of the various stormwater conveyances must be submitted for review by the executive director.
60. Prior to commencement of major construction, the Licensee must submit a fully compliant respiratory protection program to the executive director for review. The program shall include the following procedures:
 - A. Air monitoring;
 - B. Personnel breathing zone monitoring;
 - C. Medical surveillance;
 - D. Respiratory protection program audits;
 - E. Maintaining breathing quality;
 - F. Training on the use of respirators;
 - G. Fit-testing;
 - H. Respirator selection;
 - I. Inventory and control;

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- J. Storage and issuance;
- K. Maintenance, repair, testing, and quality assurance;
- L. Record keeping; and
- M. Periods of respirator use and relief from respirator use.

61. The Licensee must cure all title defects for the Section 25, Block A-49, Public School Land Survey, Andrews County, Texas mineral estate prior to commencement of major construction.
62. The Licensee must provide an abstract of title for the Section 25, Block A-49, Public School Land Survey, Andrews County, Texas mineral estate prior to commencement of major construction.
63. The Licensee shall submit final construction documents to the executive director no later than 60 days prior to the planned commencement of facility construction. Construction may not commence without the prior written approval of the executive director. Construction documents shall include, but are not limited to, all final design plans, elevations, and detail drawings; all final written design specifications and supporting calculations; all equipment vendor data sheets and drawings; all materials specifications and data sheets; construction schedules; construction quality assurance plans; engineering reports addressing compliance with applicable design codes and standards; and any other documents related to the construction of the facility.

Construction documents shall address, but are not limited to, the following aspects of the facility:

- A. Design and configuration of the Compact Waste Disposal Facility disposal units and Federal Facility Waste Disposal Facility disposal units;
- B. Design of interim and final covers, including vegetative layers, for the Compact Waste Disposal Facility disposal units and Federal Facility Waste Facility disposal units;
- C. Disposal facility site grading plan, including topographic maps, surface water diversion structure, and stormwater control features;
- D. Engineering evaluation of rainwater capture under anticipated 24-hour, 100-year precipitation event and expected accumulation rates as static liquid head over the primary liners, based upon the design of the leachate collection, detection, and removal systems, as applicable for the Compact Waste Disposal Facility disposal units and Federal Facility Waste Disposal Facility disposal units; and
- E. Design and re-location of any waste staging building, including all equipment and facilities to be installed within the building.

Site Design and Construction Requirements

64. The base of the disposal units within the Federal Facility Waste Disposal Facility must have a final elevation of no lower than 3,370 feet mean sea level. The base of the disposal units is the lowest point at which waste will be disposed. The northernmost edge of the Federal Facility Waste Disposal Facility will be relocated to be at least 50 feet further from the

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Ogallala-Antlers-Gatuña formation “dry line” presented in the application. A revised design must be submitted for review by the executive director.

65. The Licensee shall maintain an individual buffer zone for both the Compact Waste Disposal Facility and the Federal Facility Waste Disposal Facility in a lateral perimeter of at least 100 feet around all disposed waste to allow monitoring for early detection of releases and to allow for remediation, if necessary. In the event that saturated conditions are detected in the buffer zone, the Licensee shall cease all waste disposal operations and notify the executive director immediately.
66. The Licensee shall maintain an individual buffer zone for both the Compact Waste Disposal Facility and the Federal Facility Waste Disposal Facility under the lowest point of disposed waste of adequate size to allow monitoring for early detection of releases and to allow for remediation, if necessary. In the event that saturated conditions are detected in the buffer zone, the Licensee shall cease all waste disposal operations and notify the executive director immediately.
67. The Compact Waste Disposal Facility and Federal Facility Waste Disposal Facility design and construction shall be in accordance with the application and specifications as modified by this license, and any applicable conditions of this license.
68. During excavation and construction of the disposal site, the Licensee shall provide weekly written reports and photographs to accommodate the executive director’s inspection and observation of all excavation and construction activities and include a discussion of future construction activities. Particular attention must be directed to fractures, faults, any evidence of collapse features or groundwater flow, or unanticipated geologic features encountered. The Licensee shall cease excavation and construction when directed to do so by the executive director in order to sample, verify, or test. The following shall be conducted during excavation and construction:
 - A. Topographic surveys of the elevations of the top of Dockum Group shall be conducted on a five (5)-foot grid during excavation and shall include elevation measurements of that surface on all exposed vertical faces. An elevation map of the top of Dockum Group surface shall be created from these measurements and submitted for review by the executive director no later than 30 days prior to clay liner installation. This elevation map shall be compared to the elevation maps submitted under the title “Geostatistical Analysis of the Top of the Dockum Red Beds at the Waste Control Specialists Site, Andrews County, Texas” dated May 14, 2009. The excavation-based elevation map shall cover the same areal extent as the map used in the previous study.
 - B. Topographic data shall be included with the weekly reports in electronic and written format. This information is required to verify the elevations of the top of the Dockum Group consistent with License Condition 52.A.
 - C. Within 24 hours of excavation of the vertical surfaces of both the Compact Waste Disposal Facility and Federal Facility Waste Disposal Facility, contiguous geologic mapping of fractures and other structural features shall be performed in approximately ten (10)-foot depth intervals.
 - D. Provide water level elevation measurements, consistent with License Condition 70, for the six (6) upper Dockum Group wells used to confirm monitoring at areas of

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potentially higher hydraulic conductivity. This information is required to augment the resistivity studies required in License Condition 51.E.

- E. Conduct air hydraulic conductivities testing utilizing an array of vertical borings and an array of angled borings, or horizontal borings at depth if determined appropriate, as required in License Condition 50.C. Results of testing must be submitted to the executive director for review within 150 days of the commencement of major construction.
 - F. The investigation of the leaks into the installed neutron access tubes should proceed as indicated in Licensee's December 1, 2010 response letter to this license, with the following exception: the cement bond log of the impacted neutron access tubes should begin immediately.
69. During excavation and construction of the disposal site, the Licensee shall perform geotechnical studies, sampling, and laboratory analysis, and allow for observation by the executive director, to verify original geotechnical conditions by continuously monitoring parameters and features including, but not limited, to: soil moisture, bearing capacity, slope stability, and permeable soil stringers as construction progresses. The Licensee shall report verification results to the executive director and provide certification of geotechnical studies by a qualified geotechnical professional. The Licensee shall cease excavation and construction when directed by the executive director in order to sample, verify, or test.
70. The Licensee must conduct water level elevation measurements monthly, including during excavation and construction, on all wells within the site boundary completed in the Ogallala-Antlers-Gatuña formation, and report, in writing, these elevations to the executive director within ten (10) days, to monitor movement in the Ogallala-Antlers-Gatuña formation "dry line" as presented in the application. If the water level elevations are at or higher than the top of the Dockum Group at the facility, excavation shall cease in order to sample, verify, or test. For the purpose of observing seasonal variations in water levels, water tables and potentiometric surfaces, continuous data recordings for the water levels shall be required and transducers shall be installed in a justified percentage of the wells being monitored for each layer. Geostatistical support for the spatial location of each transducer/well location used for each formation shall be provided.
- A. Demonstrate that the buffer zones established for the land disposal facility will remain unsaturated at all times during construction. Any free-standing groundwater encountered during excavation will be managed in accordance with the Encountered Groundwater Management Plan submitted on October 28, 2010, with the following exceptions. Justification for the quantities of "free-flowing groundwater" stated in the plan should be provided and may be adjusted by TCEQ accordingly. The TCEQ shall be notified whenever the procedure has been initiated. Water level measurements of the following well clusters should be recorded weekly: FWF-10, FWF-14, FWF-16, FWF-17, FWF-119, CWF-110, CWF-11, and CWF-12.
 - B. Within one day of encountering saturation during excavation, resulting in observed free-standing groundwater, notification will be provided to the executive director.
 - C. The observation and measurements related to the presence of groundwater must be incorporated into the performance assessment modeling as required by License Condition 87.

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71. The Licensee shall verify input parameters during excavation of materials and construction of disposal unit liners and covers of the infiltration computer models, HELP and VS2DI. Any revised analysis must be reviewed by the executive director. In addition, the following information is required:
- A. Submit a field sampling investigation and classification of the soils at the site. The results should indicate which of the descriptions given in the application match these soils. The Licensee shall also provide an investigation on whether the Ranch House Draw is integrated with Monument Draw, as indicated in the floodplain report, or not integrated, as indicated in the Surficial Geology Report. Results from these investigations should be incorporated into updated Floodplain and Surficial Geology reports.
 - B. Submit an updated floodplain report showing changes to the 100-yr, 500-yr, and Probable Maximum Precipitation (PMP) anticipated as a result of future climatic conditions described in the license application. In developing the precipitation events, the licensee shall utilize precipitation records from areas similar to those forecasted for in the license application and as required by License Condition 52.G.
 - C. To minimize the potential for the introduction of water into the Ogallala-Antlers-Gatuña formation from the bench of the disposal unit, the Licensee must take precautions to minimize precipitation or runoff from the bench entering any active disposal unit. Exposed portions of the Ogallala-Antlers-Gatuña formation or Dockum sandstone/siltstone located within the drainage channel created by the bench of the disposal unit shall be temporarily sealed by material equivalent or superior to the specifications as applied to the disposal facility liner. Catch basins on the bench of the disposal unit shall be temporarily sealed by a geomembrane, concrete liner, or technologically equivalent material. These temporary liners shall remain fully functional until the final cover is applied, at which time the Ogallala-Antlers-Gatuña and permeable layer of the cover are to be hydraulically connected. All red bed bench liner construction shall be completed before the beginning of waste emplacement.
 - D. Submit a quantitative Surface Water Management Plan within 100 days of the commencement of major construction.
72. Disposal units under construction and partially filled units must be bermed to prevent water from entering the disposal unit. Low-level radioactive waste may not be placed into disposal units with standing water.
73. All changes to the Compact Waste Disposal Facility and Federal Facility Waste Disposal Facility design must be authorized by the executive director. The executive director will review all the requests submitted by the Licensee for changes to the operations and facilities. The commission may approve the changes by amending the license, as necessary.
74. The Licensee must obtain written authorization from the executive director prior to changing, adding, or deleting the codes and standards used for the design and construction of the facility as listed in the license application.
75. The Licensee must use American Water Works Association (AWWA) D102-06 for the inside coating and cathodic protection of all the leachate tanks serving the Compact Waste Disposal Facility and the Federal Facility Waste Disposal Facility.

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76. The Licensee must provide additional thickness to the native conditioned layer in the evapotranspiration cover in order to support vegetation and store water as well as provide long term stability and protection from erosion. The revised cover design must be submitted for review by executive director prior to construction.
77. A minimum density of 85 percent (%) of the standard Proctor maximum dry density is specified for the native fine material layer in the evapotranspiration cover. The Licensee must specify a maximum density to ensure that the layer is not too dense to inhibit plant growth, including deeper rooted plants.
78. Any precipitation falling on the land disposal facility must be managed and monitored under all applicable state and federal requirements, including 30 TAC §336.359, Appendix B, Table II. Discharges leaving the land disposal facility may not exceed the values in Table II, 30 TAC §336.359, Appendix B.
79. The Licensee must measure hydraulic conductivities of the performance cover by taking at least one (1) measurement performed per 100 cubic yards of fill material. The Licensee must also measure standard density of the performance cover by taking at least one (1) measurement performed per 200 cubic yards of fill material.
80. The Licensee must adhere to the design bases listed for all applicable design features and structures.
81. Sixty (60) days prior to the receipt of waste for disposal in the applicable disposal unit, the Licensee shall provide a final geotechnical report and “as-built” construction drawings for review by the executive director. A Registered Professional Engineer licensed to practice in Texas shall certify that the applicable disposal unit has been constructed in accordance with the license application and the conditions of this license, or as amended. Any deviation in the as-built drawings from the design and construction proposed in the license application must be explained and submitted for review by the executive director. Deviations may require an amendment of this license.
82. The Licensee must install moisture content and pressure head monitors in and below the Compact Waste Disposal Facility and the Federal Facility Waste Disposal Facility liners and the covers. The monitoring systems must be automated and capable of continuously transferring data. The monitoring systems must be maintained and not be abandoned, so that the systems may be used for long-term monitoring. Selection and placement of these monitors must be submitted for review by the executive director. The monitoring systems under the disposal units are to accomplish the following:
 - A. The monitoring systems under the liners at the bottoms of the landfills are to provide early warning of leaking from the liners. To accomplish this, these systems must have the sensitivity to detect increases in moisture content and the explicitness to determine the origin of the water.
 - B. The monitoring systems at the Ogallala-Antlers-Gatuña (OAG) contact with the Dockum red bed must be capable of showing whether water has penetrated the cover to the depth of the cover drainage layer, which drains to the OAG-Dockum contact. To accomplish this, these systems must have the sensitivity to detect increases in

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moisture content and the explicitness to determine the origin of the water under gravity flow.

- C. The monitoring systems along the sides of the landfills are to provide early warning of groundwater encroachment from the native material toward the landfills. To accomplish this, these systems must have the sensitivity to detect increases in moisture content and the explicitness to determine the origin of the water.
- D. The Licensee must submit a draft report for review by the executive director 30 days after the installation of the detection system. The final report must be submitted at least 60 days before acceptance of waste. The report must include documentation that demonstrates effectiveness of the system to detect and measure moisture in the subsurface soils and describe the radius of measurement influence of the specific system components. The Licensee must conduct an evaluation of the information obtained through monitoring the system on an annual basis and submit a report for review by the executive director. The Licensee shall include in the initial and all subsequent reports an evaluation of the effectiveness of the monitoring system and an evaluation of whether moisture content has increased in the soils underneath and adjacent to the Compact Waste Disposal Facility and the Federal Facility Waste Disposal Facility, based on data from the system.

- 83. If a water level is found to exist in any well(s) on the site considered previously dry from the last measurement event, the executive director must be notified in writing within ten (10) days of the first occurrence of this condition, otherwise the reporting period must be quarterly.
- 84. Except as specifically provided for in this license, the Licensee is prohibited from further modifying surface water characteristics of the watershed including but not limited to placement of materials in the large playa to the north of the Federal Facility Waste Disposal Facility. Any modifications or alterations of site characteristics or natural drainage conditions as depicted in the application and as modified by this license must be approved by license amendment.
- 85. The Licensee shall design and construct the Compact Waste Disposal Facility to minimize groundwater infiltration and mitigate impact from the remaining portion of the small playa located on the eastern edge of the Compact Waste Disposal Facility.
- 86. The Licensee must verify that the hydraulic conductivity used in technical specifications is representative of the native fine material layer. Specifications must be verified by measurement during construction.

Receipt, Acceptance, and Inspection Requirements

- 87. Prior to accepting waste and by March 31 of each year thereafter, the Licensee shall conduct an updated performance assessment, consistent with the Performance Assessment Maintenance Plan, and provide the updated performance assessment to the executive director for review to demonstrate that performance objectives of 30 TAC Chapter 336 Subchapter H will be met. The updated performance assessment shall incorporate the conditions of this license, include the most current waste characterization data, and demonstrate compliance with the performance objectives of 30 TAC §336.723:

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- A. In demonstrating compliance with the performance objectives, the updated performance assessment shall provide for the use of a more realistic and flexible dose modeling code, such as GoldSim, and site-specific estimates of the magnitudes and the variability in the models or codes to provide a greater level of confidence in the results. The use of models or codes should be consistent with the site conceptual model and be capable of addressing the inherent complexity at the site. Any subsequent data collected at the site shall be utilized in the code as well as any other parameters required by the code that were not previously submitted.
 - B. The updated performance assessment shall address all plausible release and accident scenarios as they relate to the performance objectives including, but not limited to, protection of individuals from releases after closure, protection of workers and the public during normal operations and from accidents, protection of individuals from inadvertent intrusion, and long-term stability of the disposal site after closure. The accident scenarios must be submitted for review by the executive director prior to initiating revision of the performance assessment.
 - C. The updated performance assessment must evaluate the impacts or activities of nearby facilities, including any off-site surface impoundments or water management retention/detention ponds required by this license, to ensure that the performance objectives of 30 TAC §336.723 will continue to be met after closure.
 - D. The updated performance assessment must evaluate the impact on the performance assessment of saturating the drainage layer in the cover in the event of future water level increases in the Ogallala-Antlers-Gatuña formation. The Licensee must provide, for review and approval, a two-dimensional infiltration model capable of simulating saturated conditions within the drainage layer of the cover. This simulation should consider future predicted conditions of a wetter climate and a degraded (i.e., more conductive) performance layer. Sensitivity analyses should be performed and submitted for review and approval.
 - E. The annual performance assessment report must be prepared in accordance with the approved Performance Assessment Maintenance Plan. The annual updates must be based on changes of conditions, assumptions, received source term, or any information needed to benchmark against the original performance assessment, the collection and refinement of existing and new data, refinement of assumptions or the refinement or replacement of models in order to minimize uncertainty in the dose modeling results.
88. The Licensee shall not commingle compact waste and federal facility waste. The Compact Waste Disposal Facility and Federal Facility Waste Disposal Facility must have separate receipt, acceptance, and disposal units. Compact waste may only be received, accepted, and disposed in the Compact Waste Disposal Facility. Federal facility waste may only be received, accepted, and disposed in the Federal Facility Waste Disposal Facility.
 89. Prior to accepting federal facility waste, the Licensee must provide an agreement signed by the Secretary of the United States Department of Energy, and acceptable to the executive director, that the federal government will assume all right, title, and interest in land and buildings for the disposal of federal facility waste.
 90. The Licensee shall not accept waste at the Federal Facility Waste Disposal Facility until the Licensee has begun accepting waste in compliance with this license at the Compact Waste Disposal Facility.

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91. No shipment may be accepted for disposal unless it has been inspected by the executive director's resident inspector or other qualified TCEQ staff. For waste intended for disposal at the Compact Waste Disposal Facility, waste acceptance is triggered by the final approval of the specific waste shipment by the executive director's resident inspector.
92. Prior to accepting waste, the Licensee must provide updated, detailed procedures for receipt, inspection, and tracking of onsite waste; for acceptance of large package waste shipments; rejection and return of unacceptable packages; and verification of waste packages and bulk waste at the Compact Waste Disposal Facility or the Federal Facility Waste Disposal Facility. The procedures must specify a minimum frequency of testing to verify package contents. The procedures must be submitted for review by the executive director before waste shipments are accepted. Prior to acceptance of waste, the Licensee shall submit detailed procedures for rejection and return of unaccepted waste.
93. Prior to accepting any waste at the Compact Waste Disposal Facility, the waste must meet requirements found in Attachment C of this license, *Compact Waste Disposal Facility Waste Acceptance Criteria*. Prior to accepting any waste at the Federal Facility Waste Disposal Facility, the waste must meet waste acceptance criteria provided in this license as approved by the executive director.
94. The Licensee, during the operational period, shall maintain records of the types, forms, and quantities of radioactive waste and hazardous waste disposed at the land disposal facility, including waste profiles, waste manifests, and any additional waste shipment information. This information shall be used during decommissioning and to update the dose modeling. This information must be retained on-site throughout the operating life of the land disposal facility and upon license transfer, transferred to the custodial agency. The Licensee shall provide monthly reports of waste receipts no later than the seventh (7th) day of the following month to the executive director compiled by waste stream, type, form, quantity, and radioactivity.
95. The Licensee shall not accept any waste by rail that is intended for disposal at the Compact Waste Disposal Facility or the Federal Facility Waste Disposal Facility. In order for waste to be shipped by rail, the Licensee must submit an application for amendment of this license that includes an evaluation and procedures for the receipt, handling, off-loading, and acceptance of waste into the land disposal facility.
96. The Licensee may not accept low-level radioactive waste for storage or disposal unless the shipper of low-level radioactive waste has given the Licensee written notice of the shipment at least five (5) days before shipment to the Compact Waste Disposal Facility or the Federal Facility Waste Disposal Facility. The Licensee shall notify the executive director upon receiving written notification of any waste shipment, including the scheduling of any waste shipment for acceptance and disposal.
97. Sixty (60) days prior to accepting waste for disposal, the Licensee shall provide an inventory of any waste being stored at adjacent facilities that is intended for disposal in the Compact Waste Disposal Facility or the Federal Facility Waste Disposal Facility. During operations, the Licensee is prohibited from using any area outside of the land disposal

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facility for staging or managing waste intended for disposal. If an inventory of any stored waste intended for disposal in the Compact Waste Disposal Facility or the Federal Facility Waste Disposal Facility persists once the facilities become operational, the Licensee shall provide updated stored inventory to the executive director each calendar quarter including an explanation of the planned disposal.

98. The Licensee must follow all applicable Facility Operating Procedures, Radiation Safety Procedures, ALARA (as low as reasonably achievable) Program, Quality Assurance Plan, and Waste Acceptance Procedures and Plans as provided in the application. The Licensee may not revise these programs, plans, and procedures without amendment to this license.
99. The Federal Facility Waste Disposal Facility may only accept mixed low-level radioactive waste, as defined in 30 TAC Chapter 336, in compliance with 40 CFR Part 268 (Land Disposal Restrictions). This license does not authorize the processing, treatment, storage, or disposal of hazardous waste.
 - A. Prior to accepting waste for disposal in the Federal Facility Waste Disposal Facility, the Licensee shall submit a plan that demonstrates how the requirements of 30 TAC Chapter 335 (Industrial Solid Waste and Municipal Hazardous Waste) will be met.
 - B. The Licensee may not store, process, or dispose of mixed low-level radioactive waste defined in 30 TAC §336.2(80) unless authorized by a TCEQ hazardous waste permit in accordance with 30 TAC Chapter 335.
100. The Federal Facility Waste Disposal Facility Non-Containerized Disposal Unit may only accept Class A low-level radioactive waste that meets the waste acceptance criteria in this license and the Licensee's Waste Acceptance Plan except as provided by this license. The Licensee is prohibited from disposal of bulk waste in the Non-Containerized Disposal Unit consisting of radionuclides with half-lives of greater than 35 years, including depleted uranium and waste consisting of transuranic radionuclides in concentrations less than ten (10) nanocuries per gram (<10nCi/g), unless specifically authorized by the executive director.
101. The Licensee is authorized to accept low-level radioactive waste for disposal at the Federal Facility Waste Disposal Facility Non-Containerized Disposal Unit that meets all the following criteria.
 - A. Soil and soil-like Class A low-level radioactive waste as defined by 30 TAC §336.362(a)(2). Soil and soil-like waste must meet the classification as a Group A-1-A through A-4 soil in accordance with American Society for Testing and Materials (ASTM) D-3282;
 - B. The average, in-place organic content does not exceed five percent (5%) and the average, as received organic content of any individual waste shipment does not exceed ten percent (10%) by using ASTM D-2974;
 - C. No debris is present in any waste shipment other than incidental items (no more than one percent (1%)) that conform with the limitations applicable to bulk debris;
 - D. Dose rates are less than 100 millirem per hour at 30 centimeters;

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- E. No free liquids are present; and
 - F. Soil and soil-like mixed waste must comply with 40 CFR Part 268.
102. All rubble and debris federal facility waste may only be disposed in the Federal Facility Waste Disposal Facility Containerized Disposal Unit and must be in concrete canisters.
103. Disposal of soil and soil-like waste in the Federal Facility Waste Disposal Facility Non-Containerized Disposal Unit must meet the following requirements so that long-term volumetric stability is achieved:
- A. Soil and soil-like waste will be placed in lifts no thicker than 12 inches and lift lots of no greater area than 10,000 square feet;
 - B. Except for Group A-1-a materials, soil-like waste will be compacted to 90 percent (%) of Modified Proctor maximum density with moisture between plus or minus two percent ($\pm 2\%$) of optimum per American Society for Testing and Materials (ASTM) D1557;
 - C. Density actually achieved will be determined with nuclear density gauge measurements per ASTM D-2922 at the rate of one (1) nuclear density gauge measurements per 1,000 square feet placed and compacted within a given lift but not less than one (1) such measurement per lift;
 - D. Sand cone test will be performed according to ASTM D1556 at the rate of one (1) sand cone density test for every five (5) nuclear density gauge measurements;
 - E. For the use of nuclear density gauge measurements and sand cone testing, the Licensee will conduct the following additional testing:
 - 1) Modified proctor tests per ASTM D1557 to determine the actual moisture/density relationship at the specific location where density is an issue;
 - 2) Nuclear density gauge measurements per ASTM D2922 and sand cone test per ASTM D1556 repeated at the location; and
 - 3) Rework the deficient waste disposal lift and repeat verification testing until satisfactory results are achieved.
 - F. The Licensee must submit a quarterly report to the executive director verifying soil and soil-like disposal requirements.
104. Compaction of bulk waste using hand-operated tools or equipment is prohibited.
105. The following provisions are related to potential weather conditions:
- A. The placement of lifts of soil-like waste is prohibited if the temperature of the lift is less than 32 degrees Fahrenheit;
 - B. Once weather conditions return that allow current placement operations to resume, supplemental nuclear density gauge measurements will be performed on lift areas already placed before further placement of waste is undertaken; and

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- C. Emplaced bulk waste will be re-compacted, should supplemental nuclear density gauge measurements indicate unacceptable compaction after freezing conditions cease.

Radiation Safety Requirements

- 106. Void spaces within the bulk waste must be reduced to the extent practicable through all the following actions:
 - A. Voids are either exposed so they can be backfilled or are eliminated;
 - B. Waste is placed loose in lifts no thicker than one (1) foot;
 - C. Voids are backfilled with granular soils or soil-like waste; and
 - D. Each lift, including backfill, is compacted to at least 90 percent (%) of maximum density.
- 107. Any changes to the Radiation Safety Program must be approved by amendment to this license.
- 108. The Radiation Safety Officer (RSO) will designate radiation staff authorized to handle radioactive material. All radiation staff must successfully complete a radiation safety course that has been submitted for review by the executive director. Documentation verifying successful completion of the training for authorized staff will be maintained by the licensee for inspection by the executive director.
- 109. Written procedures incorporating operating instructions and appropriate safety precautions for licensed activities must be maintained and available for inspection at the licensed facility. The written procedures established must include the activities of the radiation safety program, the employees training program, operational procedures, analytical procedures and instrument calibrations. At least annually, the Licensee must review all procedures to determine their continued applicability and report conclusions and recommendations of the procedures review to the executive director.
- 110. Unless otherwise specified in the license, the Licensee may not change internal safety audit processes, ALARA procedures, waste acceptance criteria, or health and safety procedures provided in the application or required by this license without amendment to this license.
- 111. The RSO, or his or her designee, must conduct and document weekly inspections of site operations and the restricted areas of the site for compliance with applicable conditions of this license.
- 112. The Licensee will document and maintain records of all accidental or unplanned releases of low-level radioactive waste during operations at the facility. Documentation of the events must be maintained for inspection until the site is transferred to the custodial agency.
- 113. In the event of an accidental or unplanned release of low-level radioactive waste, the Licensee must implement the emergency plan in the application and provide immediate notification to the executive director.

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114. Records produced by the Quality Assurance and Quality Control programs must be reviewed by the Quality Assurance Manager at least annually. Deficiencies in the Quality Assurance and Quality Control program must be identified, documented, and corrected promptly. Records related to deficiencies must be available to the executive director upon request.
115. The Licensee may not use nuclear density gauge equipment for soil compaction testing without an appropriate license. Only authorized Licensees may perform the required compaction testing needed for compliance to the rules for surface compaction and moisture measurements. This license does not provide regulatory authorization for use and possession of nuclear density gauge equipment.
116. The Licensee must provide an orientation and safety program for visitors and contractors and issue dosimeters before allowing entrance into the land disposal facility. The Licensee must submit to the executive director the orientation and safety program prior to beginning operations. The Licensee shall maintain and document compliance with the orientation and safety program for visitors and contractors.
117. The Licensee must conduct an updated bioassay program for all employees to conform to license conditions. Prior to allowing employees into the restricted area, a whole body count and bioassay must be conducted on all employees. Thereafter, bioassays must be conducted monthly for occupationally exposed workers and quarterly for administrative staff, managers and site contractors. Annual whole body counts, in addition to monthly urinalysis and fecal analysis will be employed for occupationally exposed workers. All radioisotopes authorized for disposal in the land disposal facility must be evaluated in these bioassays.
118. The Licensee must submit an annual report summarizing bioassay results for all employees. If any bioassay result exceeds ten percent (10%) of the occupational dose limit provided in 30 TAC Chapter 336, the Licensee shall notify the executive director within 30 days of receiving the results.
119. The Licensee must comply with the following regarding training and operations:
 - A. Visitors to Compact Waste Disposal Facility or Federal Facility Waste Disposal Facility shall be escorted by personnel trained in the facility's safety procedures. A maximum of five (5) visitors may be escorted by a single trained person.
 - B. All clerical and office support staff shall be given safety training which may be an abridged version of that given to operations personnel. If anyone (1) of these employees transfers to other duties, the employee shall be given appropriate radiation safety training for his or her new assignments.
 - C. All female employees shall be given instruction concerning prenatal radiation exposure.
 - D. The Licensee shall make a record of the training provided to all of the above. The record shall indicate the name of the individual receiving the training or instructions, the date the training or instruction is provided, the results of examinations for course material retention, and the name of the training course provider or instructor.

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120. The Licensee must comply with the following regarding personnel dosimetry:
- A. The Licensee must provide personnel dosimetry to all employees and contractors who enter the land disposal facility. Thermoluminescent dosimeters (TLDs) or optically-stimulated luminescence dosimeters (OSLs) must be worn by all employees. A second badge will be issued to workers undergoing medical diagnostic or therapeutic procedures. This badge will be worn in addition to the individual's usual badge during the period of elevated body radiation levels.
 - B. The Licensee shall revise the procedures to include an instruction to the users of personnel dosimetry that personnel dosimetry must be worn at all times in the land disposal facility.
 - C. The Licensee shall comply with the following regarding the storage of dosimeters issued to employees when the dosimeters are not in use:
 - 1) The Licensee shall provide a place for storage of dosimeters issued to personnel when personnel exit the restricted area;
 - 2) The place for storage of issued dosimeters (when not in use) shall be in an area determined to be of natural-background radiation;
 - 3) A control dosimeter shall be located in the issued dosimeter storage area; and
 - 4) The control dosimeter for the issued dosimeter storage area shall be exchanged and processed at the same frequency as the dosimeters issued to personnel.
121. The laboratory conducting the bioassays must be National Environmental Laboratory Accreditation Conference (NELAC) certified. The laboratory's quality assurance program must be submitted for review in writing by the executive director.
122. The Licensee must conduct a respiratory protection program that has been submitted for review by the executive director. Employees working with non-containerized low-level radioactive waste must wear breathing zone monitors and appropriate respiratory protection.
123. Respirators made available for re-issuance or reuse must show no removable contamination in excess of 100 disintegrations per minute (dpm) per 100 square centimeters (cm²) alpha, or in excess of 1,000 dpm per 100 cm² beta-gamma (as determined by standard swipe or smear techniques), and no fixed beta-gamma contamination in excess of 0.2 milliRoentgen per hour (mR/hr) above background on contact.
124. Eating, drinking, or smoking shall not be allowed within the restricted area or in any area where radioactive material is handled, transferred, or processed.
125. The Licensee shall designate any area where the total airborne alpha radioactivity, as determined by air sampling, exceeds 5×10^{-13} microcuries per milliliter total radioactivity as an airborne radioactivity area.

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126. The Licensee must conduct monthly surveys for fixed and removable alpha, beta, or gamma contamination, by standard swipe or smear technique, in all eating areas, shower and change areas, administrative offices, control rooms, and laboratories in accordance with Table 1 below. Any positive results in swipes taken in these areas must elicit an immediate investigation as to cause. Surfaces which have removable contamination greater than the limits stated in 30 TAC §336.364, Appendix G must be decontaminated.

Table 1: Contamination Surveys

Radiation Detection Methods	Location	Frequency
A. Gamma Radiation Levels	Laboratory	Weekly
Gamma Radiation Levels	Office Area(s)	Weekly
Gamma Radiation Levels	Lunch/Change Area(s)	Weekly
Gamma Radiation Levels	Transport Vehicles	Upon vehicle arrival at site and before departure
Gamma Radiation Levels	Low-Level Radioactive Waste Holding Area(s)	Weekly
B. Contamination Swipes	Decontamination Facilities	Weekly
Contamination Swipes	Laboratory	Weekly
Contamination Swipes	Office Area(s)	Weekly
Contamination Swipes	Lunch/Change Area(s)	Weekly
Contamination Swipes	Transport Vehicles	Once before release
Contamination Swipes	Decontamination Facilities	Weekly
Contamination Swipes	Low-Level Radioactive Waste Holding Area(s)	Weekly
C. Employee and Personnel Survey	Skin and Personal Clothing	Prior to exiting restricted area
D. Gamma Survey	Administrative Building(s)	Quarterly

127. Step-off pads shall be located outside of the restricted area and must be surveyed every four (4) hours during operating hours. Surface levels more than twice background beta-gamma or removable contamination greater than the limits stated in 30 TAC §336.364, Appendix G must be considered contaminated and replaced.
128. Gamma surveys must be conducted quarterly at all work stations and areas that contain or have contained low-level radioactive waste.
129. Each employee (including temporary and contract workers) who works in areas where contact with low-level radioactive waste is possible must be surveyed before leaving the work site. Removable contamination greater than the limits stated in 30 TAC §336.364, Appendix G must be decontaminated.
130. All radiation workers must receive at least 40 hours of classroom training following the Technical Topics listed in the application.
131. The outer surfaces of each shipping container must be swipe-tested for removable contamination upon receipt. Each shipping container must also be surveyed individually to assess the external radiation fields present and a record made of the readings.

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132. Radiation Safety Meetings must be held monthly with all employees. Unannounced RSO employee reviews will be conducted monthly. The RSO shall conduct audits of the radiation safety program in accordance with the following.
- A. At intervals not to exceed 12 months;
 - B. Include all of the items listed in the procedures provided in the application as activities conducted to evaluate specific components of an audit; and
 - C. Include observation of the performance of radiation safety procedures as a part of an audit of the radiation safety program.
133. Any material to be released for unrestricted use from the land disposal facility must be surveyed for contamination. Contamination may not exceed the limits specified by the 30 TAC §336.364 and §336.356.
134. The RSO must review the following areas of the Radiation Safety Program at least quarterly:
- A. Health physics authority and responsibility;
 - B. Operating procedures (involving the receipt, handling, and disposal activities);
 - C. Audits, inspections, and surveys conducted by the facility RSO (for timeliness and the resolution of any problems);
 - D. Radiation protection including employee exposure records; bioassay procedures and results; quarterly, semiannual, and annual surveys and inspections; radiological survey, and sampling data; and any changes in operating procedures;
 - E. Radiation safety training;
 - F. Respiratory protection program;
 - G. Facility and equipment design including ventilation rates within various portions of the facility, and fire control;
 - H. Control of airborne low-level radioactive wastes;
 - I. Compliance with applicable federal and state regulations and the conditions of this license; and
 - J. Audit of receipt procedures.
135. The RSO must prepare an annual report summarizing the reviews and audit. The report must be submitted for review by the executive director within 30 days after completion of the audit.
136. Along with complying with all confined space entry requirements and before any work, including maintenance, repair, cleaning, dismantling or other such activities, is performed within closed tanks on the land disposal facilities which may contain or have contained radioactive materials, radiation work permits (or their equivalent) shall be submitted to the RSO. The RSO or his or her designee shall survey all tank interiors using radiological

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measuring and detection instruments and swipe methods to determine if contamination is present prior to any work being performed. If contamination exceeding 220,000 dpm per 100 cm² is found or if the RSO does not perform such a survey, then protective clothing and respiratory protection shall be worn by employees during the performance of operations.

General Packaging

137. All waste intended for disposal at the land disposal facility must be packaged and shipped in accordance with waste acceptance criteria authorized by this license. Waste intended for the Compact Waste Disposal Facility must meet requirements found in Attachment C of this license, *Compact Waste Disposal Facility Waste Acceptance Criteria*.
138. Sealed sources and special form radioactive material are prohibited, in any form, for disposal in the Federal Facility Waste Disposal Facility Non-Containerized Disposal Unit. All sealed sources or special form radioactive material disposed of in the Federal Facility Waste Disposal Facility Canister Disposal Unit or the Compact Waste Disposal Facility shall be doubly-packaged and encased in concrete or similar inert material within the outer package. For waste classification purposes, the activity in a waste package may be averaged over the entire package in accordance with the United States Nuclear Regulatory Commission "Final Branch Technical Position on Concentration Averaging and Encapsulation Revision in Part to Waste Classification Technical Position, January 17, 1995."

Waste Characteristics and Waste Forms

139. In accordance with 30 TAC §336.229, no person may reduce the concentration of radioactive constituents by dilution to meet exemption levels established under the Texas Health and Safety Code §401.106, or change the waste's classification or disposal requirements. Low-level radioactive waste that has been diluted as a result of processing, stabilization, mixing, or treatment, including, but not limited to, 40 CFR Part 268, or for any other reason, must be subject to the disposal regulations it would have been subject to prior to dilution.
140. The Licensee may not dispose unstable waste in the Compact Waste Disposal Facility or the Federal Facility Waste Disposal Facility Containerized Disposal Unit that does not meet the requirements of 30 TAC §336.362(b)(2). Unstable soil or soil-like Class A low-level radioactive waste, excluding waste containing radionuclides with half-lives greater than 35 years or transuranics in concentrations less than ten (10) nanocuries per gram, may only be disposed in the Federal Facility Waste Disposal Facility Non-Containerized Disposal Unit.
141. The Licensee may not accept low-level radioactive waste that contains hazardous listed chemicals or exhibits hazardous characteristics as defined by 40 CFR Part 261 (Identification and Listing of Hazardous Waste) for disposal at the Compact Waste Disposal Facility. Unless otherwise authorized by executive director, the Licensee is authorized to accept only the following waste streams in Table 2 below, and as described in the license application, at the Compact Waste Disposal Facility:

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Table 2: Authorized Waste Streams

Waste Source	Waste Stream Description	Waste Group	Classification
Utility	Condensate Filter Sludge	CONDFSL	A and B
Utility and Non-utility	Compactable Trash	COTRASH	A
Utility	Decontamination Resins	DECONRS	A
Utility	Floor Drain Filter Sludge	FLDRFSL	A
Utility	Fuel Pool Skimmer Filter Sludge	FPPFILSL	A and C
Utility	Non-Compactable Trash	NCTRASH	A
Utility	Non-Fuel Reactor Components	NFRCOMP	C
Utility	Process Filters	PROCFIL	C
Utility	Reactor Water Cleanup Resins	RWCUPRS	B
Utility	Reactor Water Demineralization Resins	RWDMRES	A and B
Utility	Secondary System Resins	SSYSRES	A
Non-utility	Absorbed Liquids	ABSLIQD	A
Non-utility	Biological Wastes	BIOWAST	A
Non-utility	High Radioactivity Waste	HIGHACT	A
Non-utility	Low Radioactivity Waste	LOWASTE	A
Non-utility	Non-Compactable Trash	NCTRASH	A and B
Non-utility	Sealed Sources	SOURCES	A, B, and C
Reactor Decommissioning	Decommission Waste	D&D	A, B, and C

Disposal Operations

142. The Licensee must manage all stormwater and wastewaters that come in contact with waste or other radioactive constituents during operations in accordance with this license and TCEQ Wastewater Permit No. WQ00049480000.
143. A monthly site receipt and disposal activities report must be submitted no later than the seventh (7th) day of month for the previous month's activities to the executive director.
144. The Licensee may not exhume previously buried waste unless specifically authorized by the executive director.
145. The top of the all disposed Containerized Class A, Class B, and Class C low-level radioactive waste must be a minimum of five (5) meters below the top surface of the cover or must be disposed of with intruder barriers that are designed to protect against an inadvertent intrusion for at least 500 years in accordance with 30 TAC §336.730(b)(3).
146. The Licensee may only accept Class A, Class B, and Class C low-level radioactive compact waste for disposal in reinforced modular concrete canisters and inside an additional reinforced concrete barrier in the Compact Waste Disposal Facility. Large components (e.g., steam generators, reactor vessels, reactor primary system components) that will not fit into the reinforced modular concrete canisters as provided in the application must be evaluated by the executive director on a case-by-case basis prior to disposal. Large components must be backfilled with sand, or grout, if necessary, to ensure the voids are filled.
147. The Licensee may only dispose of debris, rubble, Containerized Class A, Class B, and Class C low-level radioactive federal facility waste in the Federal Facility Waste Disposal Facility

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Containerized Disposal Unit by placement in reinforced modular concrete canisters and inside an additional reinforced concrete barrier. Large components that will not fit into the reinforced modular concrete canisters as provided in the application must be evaluated by the executive director on a case-by-case basis prior to disposal. Large components must be backfilled with sand, or grout, if necessary, to ensure the voids are filled.

148. The Licensee must implement measures to reduce the potential for desiccation and cracking of the performance cover during operation and closure, with special emphasis on areas not overlain by a geomembrane. The Licensee must conduct periodic surveillance to verify that the measures are effective.
149. During operations and closure, the Licensee shall measure the geotechnical properties of the cover system materials to verify the initial design values. The Licensee shall report any deviations and propose any necessary design modifications that may affect cover system performance to the executive director.
150. The Licensee shall minimize the introduction of water into the disposal units. The Licensee must manage all stormwater on the land disposal facility. This management of stormwater must include, but is not limited to, the collection and conveyance of all stormwater and wastewater, and be subjected to the radionuclide effluent concentration limits, as specified in 30 TAC §336.359, Appendix B, Table II.
151. The Licensee must sample and perform radionuclide analyses on all precipitation and stormwater planned for re-use. Possible re-use of on-site water can be considered only as authorized by this license and TCEQ Permit No. WQ00049480000. Precipitation and stormwater with radionuclide concentrations greater than those listed 30 TAC §336.359, Appendix B, Table II must treated and disposed as low-level radioactive waste and may not be used for dust suppression or any other activity that increases the risk to human health or the environment.
152. The Licensee must initiate an investigation as to the nature, extent, and cause of any leachate collected from the leachate collection system, in which the radionuclide concentrations are 50 percent (%) of the effluent concentration limits specified in 30 TAC §336.359, Appendix B, Table II and take appropriate corrective action. The Licensee will notify the executive director within ten (10) days of any such occurrence.
153. The Licensee shall not handle, store, or dispose of waste, or engage in any waste-related activities in any buffer zone. The Licensee shall only conduct environmental monitoring and routine maintenance in the buffer zone; any other activity in any buffer zone shall require written approval of the executive director.
154. For the Compact Waste Disposal Facility and the Federal Facility Waste Disposal Facility Containerized Disposal Unit, the Licensee shall:
 - A. Pre-position concrete canisters in the disposal unit for emplacement of waste packages. After waste packages have been placed in the concrete canister, grout shall be placed around the packages to reduce voids. Packages shall be emplaced to permit voids between packages to be filled with grout. Temporary lids shall be placed on

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canisters until they are filled and the permanent canister lid has been cast in place. Once canisters are filled, grouted and the canister lids are constructed, native backfill consisting of dry, free-flowing, cohesionless natural material shall be placed around the canisters.

- B. Apply an elastomer coating (described in technical specification, 07 14 16, of the application) to all concrete disposal canisters. The complete specification for this coating, including the design life of the coating shall be submitted to the executive director for review prior to the commencement of major construction.

- 155. The Licensee shall handle and emplace waste in the disposal units in a manner that maintains disposal package integrity. Waste packages and concrete canisters shall be protected from any land disposal facility operations which may cause damage or otherwise impact the integrity of packages and canisters.

Environmental Surveillance

- 156. The Licensee must conduct environmental surveillance of the facilities as follows:

- A. General Provisions. The Licensee must conduct the radiological and non-radiological environmental monitoring specified in this license. The Data Quality Objective (DQO) Process, established by the United States Environmental Protection Agency (US EPA), must be used to establish performance or acceptance criteria, which serve as the basis for designing any of the monitoring plans for the facility for collecting data of sufficient quality and quantity to support the goals of each plan (pre-operational, operational, and post-operational). The Licensee must use the DQO Process, which consists of seven (7) iterative steps in development of a data collection design that specifies the type, number, location, and physical quantity of samples and data, as well as the quality assurance and quality control activities that will ensure that sampling design and measurement errors are managed sufficiently to meet the performance or acceptance criteria specified in the DQOs. The Licensee must submit a Quality Assurance Project Plan (QAPP) that follows the Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP) process, and which will include details of the DQO, the method quality objective, and the method of uncertainty analysis for each radio-analyte per media and for each method. The QAPP must be submitted to the executive director for review prior to any sampling performed for the Modified Natural Radiation Monitoring Program and the Pre-Operation, Construction, and Operational Environmental Monitoring Program for this license.
- B. Sampling and analysis plans for the Radiological Environmental Monitoring Program (REMP) sampling events described in Attachment A and B shall be submitted under the Site-specific Data Assessment and Management Plan (S-DAMP) and to the executive director for review. For Attachment A, the plan shall be submitted no less than 60 days after the authorized date of the license. For Attachment B, the plan shall be submitted 60 days after the authorized date to construct.
- C. Environmental samples shall be analyzed by a National Environmental Laboratory Accreditation Conference (NELAC) certified laboratory. Prior to analysis, Licensee must provide a list of methods that are not NELAC certified that they plan to use and a list of methods that were NELAC certified but have been modified. This information must be included in the QAPP. As part of radiological sample analysis, all analytical batches must include laboratory control blanks, method blanks, matrix spikes, and laboratory duplicates and only include WCS samples. An analytical batch must be defined in the QAPP. In addition, the laboratory must provide the method of

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uncertainty calculation.

- D. Duplicate samples. The Licensee must provide the executive director an opportunity to obtain duplicate split samples concurrently with the Licensee's data collection schedule.
- E. Monitoring Records. The Licensee must maintain records of all monitoring activities.
- F. Monitoring Well Installation. All monitoring wells must be constructed and maintained in accordance with the requirements of the Texas Occupations Code, Chapter 1901 and in accordance with American Society for Testing and Materials (ASTM) D5092-04e1 (2004) "Standard Practice for Design and Installation of Ground Water Monitoring Wells." Monitor well clusters will consist of one (1) well screened in the Ogallala-Antlers-Gatuña formation, one (1) well screened at the top of the 225-foot layer, one (1) well screened at the bottom of the 225-foot layer, and one (1) well screened at the bottom in the 125-foot layer. Any well alterations must be authorized by TCEQ. The Licensee shall notify executive director when it performs an inspection of any altered wells, and shall report the results of the inspection within 30 days of completion.
- G. Evaluation of Data. The Licensee must evaluate monitoring data using a two (2)-tiered environmental monitoring response system. Investigation levels and action levels will be specified as described in the license application. The results of the evaluations must be included in the annual environmental monitoring report to the executive director conducted during each calendar year.
- H. The following procedures must be used when monitoring all groundwater zones and be described in the Site-specific Data Assessment and Management Plan (S-DAMP) and the Quality Assurance Project Plan (QAPP):
 - 1) For the collection of representative groundwater samples, the Licensee shall allow for parameter stabilization during the purging process prior to sample collection. The Licensee shall monitor water quality parameters (conductivity, pH, and temperature) according to ASTM D 4448-01 Standard Guide for Sampling Ground-Water Monitoring Wells (2007). Prior to sampling, wells must be pumped down to the point at which the conductivity equilibrates. Samples must then be acquired from the well by a pump or lowering and filling a sample bailer with well water and then transferring the water to a sample container. All parameter readings must be recorded during purging and collected at regular intervals. Stabilization is achieved when at least three consecutive readings are taken at three-(3) to five-(5) minute intervals and are within tolerances stated in ASTM D 4448-01. When sufficient recharge of water exists, wells will be purged before a sample is collected. If documented insufficient recharge of water exists or other factors make purging and/or sampling impractical, the conditions and reasons must be documented and available for review by the executive director.
 - 2) For well-specific conditions (i.e., rate of recharge, water quantity, etc.) where low-flow sampling techniques are appropriate, sampling method ASTM D 6771-02 Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations must be used for sampling methodologies for any wells listed in Attachments A and B. Parameter readings will be recorded as specified in ASTM D 6771-02 for determining stabilization.

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- 3) In addition, water levels must also be measured prior to sample collection.
 - 4) The S-DAMP must include a method or methods for well purging and well sampling, including wells in low flow conditions, to assure that well samples are representative of the groundwater in the zone that is sampled.
 - 5) For the purpose of observing seasonal variations in water levels, water tables and potentiometric surfaces, the Licensee must establish a network of wells as required in license condition 70 that is representative of each water-bearing zone and monitor using continuous transducers where possible.
 - 6) Water must be sampled whenever the water is at or above the screen in a well as described above. The S-DAMP must include a method for well sampling to assure that well samples are taken from groundwater in the formation and not from condensation in the well.
 - 7) For all radiochemical analysis, water samples will not be filtered in the field and will not be acidified in the field prior to shipping to the laboratory, unless filtering and acidification is required by a specified analytical method. Filtering will be performed by the laboratory when the sample contains sediment. Certain radionuclides of interest can partition to the sediment; in which case, both the water and the sediment will be analyzed. Container type and size will also be determined by the analytical method.
 - 8) For all chemical analysis, water samples will not be filtered in the field and will be preserved according to the analytical method requirements. Filtering will be performed, by the laboratory, when the sample contains sediment. Certain chemical analytes of interest can partition to the sediment; in which case, both the water and the sediment will be analyzed. Container type and size will be determined by the analytical method.
 - 9) The Licensee shall provide a semi-annual environmental monitoring report to the executive director to be submitted before March 31 and September 30 of the preceding six (6) months. The semi-annual report shall include the results of all environmental media samples for all facilities at the Waste Control Specialists LLC, Andrews County, site. The Annual Meteorological Report should be submitted prior to or included in the March 31 semi-annual environmental monitoring report. The Licensee shall follow the requirements of 30 TAC Chapter 25 (Environmental Testing Laboratory Accreditation and Certification,) and provide the executive director with acceptable analytical data provided by an accredited environmental testing laboratory unless extenuating conditions exist as specified under 30 TAC §25.6 (Conditions Under Which the Commission May Accept Analytical Data).
 - 10) All of the above information must be reported in the semi-annual environmental monitoring report.
- I. In the event the 125-foot zone becomes saturated, the Licensee shall notify the

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executive director with ten (10) days. Within 60 days of the event, the Licensee shall submit a plan for the installation of monitoring wells in the 180-foot zone and monitoring of the 180-foot zone in accordance with Attachment B.

157. The Licensee must provide a report on site topography including maps and all supporting data to the executive director every five (5) years.
158. The Licensee must provide to the executive director every five (5) years written documentation from the Texas Parks and Wildlife Department and the United States Fish and Wildlife Service regarding the presence of threatened or endangered species occurring near the site.
159. The Licensee must recognize Baker Spring as a perennial water body and conduct appropriate aquatic surveys to establish baseline conditions and to identify the supported species, including aquatic and benthic invertebrates. In addition, routine sampling of Baker Spring must be incorporated into the Ecological Monitoring Plan for determination of potential site impacts to species and for evaluation of surface water and sediment quality.
160. Before the Licensee takes any action regarding site playas, the Licensee shall obtain and provide to the executive director a site-specific "no jurisdiction" determination from the United States Army Corps of Engineers.
161. Regarding the Ecological Monitoring Plan, the Licensee must use the most recent update of the TCEQ ecological risk assessment guidance that contains the screening levels for non-radiological constituents in surface water, sediment, and soil.
162. The Licensee shall implement the following radiological environmental monitoring programs:
 - A. At a minimum, conduct the Modified Natural Radiation Monitoring Program, specified in Attachment A of this license. The Modified Natural Radiation Monitoring Program may be run concurrently with the Pre-Operational Monitoring Program, specified in Attachment B of this license. These programs must be conducted for a minimum of 12 consecutive months. No low-level radioactive waste may be received at the Compact Waste Disposal Facility or the Federal Facility Waste Disposal Facility until these programs are concluded, and the evaluation of the program reviewed by the executive director.
 - B. Previous monitoring performed at the site, in addition to the proposed modified natural radiation monitoring program and the pre-operational environmental monitoring program as defined in license conditions, will be used to establish a modified baseline. This monitoring must also be used to detect any significant masking that may occur due to nearby or adjacent facilities or activities.
 - C. Chemical constituents listed in HW-50358 Permit Application, Attachment VI, Appendix 6.62, Table 1, as amended, must also be evaluated on all soil, vegetation, surface water, and monitor well samples for a 12-month consecutive period before low-level radioactive waste can be received at the site for disposal. Thereafter, all sampling will be conducted annually, except the monitor well chemical constituents will be sampled quarterly or other monitoring frequency specifically required by this

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license.

- D. The Licensee must conduct a Pre-Operational, Construction, and Operational Environmental Monitoring Program specified in Attachment B of this license. Concentrations of the radionuclides listed in the application will be evaluated. The Pre-Operational Monitoring Program will continue at least 12 consecutive months.
- E. The Licensee must submit a report presenting and analyzing all data collected in the Modified Natural Radiation Monitoring Program and the Pre-Operational Monitoring Program within 60 days after the completion of the programs.
- F. The Licensee shall conduct quarterly subsurface monitoring for the presence of water in the Ogallala-Antlers-Gatuña around the following on-site structures:
 - 1) Compact Waste Disposal Facility (CWF) Waste Staging Building
 - 2) CWF Vehicle Decontamination Building
 - 3) Federal Facility Waste Disposal Facility (FWF) Bulk Container Staging Building
 - 4) FWF Waste Staging Building
 - 5) FWF Vehicle Decontamination Building
 - 6) FWF Contact Water Tanks, and
 - 7) FWF Laboratory

Where unsaturated conditions exist underneath these structures, lysimeters must be installed around these features in accordance with ASTM D4696-92 (2008) to monitor for possible spills and leaks. Where saturated conditions exist underneath these structures, monitoring wells must be installed to allow for detection of potential releases. These lysimeters and wells must be installed prior to waste receipt, added to Attachment A and B, sampled quarterly as a grab sample and analyzed for a minimum of gross alpha, gross beta, alpha isotopic, and liquid scintillation when the quantity of water is sufficient for analysis. Isotopic analyses will be performed on those samples that exceed, after correction for background, 5 picocuries per liter alpha or 50 picocuries per liter beta/gamma.

- 163. Prior to beginning the Modified Natural Radiation Monitoring Program, the Licensee must submit the revised figures to the executive director for review to add new upgradient and down-gradient Ogallala-Antlers-Gatuña formation wells. The new wells must be spaced no more than 150 feet apart.
- 164. The Licensee must sample and analyze parameters in the Modified Natural Background Environmental Monitoring Program as described in Attachment A of this license.
- 165. The Licensee must conduct a Pre-Operational, Construction, and Operational Environmental Monitoring Program as described in Attachment B of this license.

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166. The Licensee must ensure that State of Texas Well Reports are provided to the Texas Department of Licensing and Regulation for all new piezometers, monitoring wells, and other water wells installed at the site pursuant to this License. Copies will also be provided to the executive director within 60 days of well completion.
167. The Licensee must continue erosion monitoring and report annually to the executive director after the commencement of major construction. Prior to the commencement of major construction, quarterly measurements of erosion shall be taken and reported to the executive director. The Licensee must also install a weather/climate station in the immediate proximity of erosion monitoring in Ranch House Draw and the location of additional erosion pin arrays.
168. The Licensee must include the use of high-volume air samplers in air monitoring.
169. The Licensee must provide for a transitional environmental monitoring period whenever program components, including sampling locations, equipment, techniques, or laboratories, are changed. This transitional period must include parallel monitoring with both the old and new conditions for at least one (1) sampling period or as directed by the executive director.
170. Using the data quality objective process, the Licensee must develop control charts or nonparametric prediction limits which will be used to determine investigation levels and action levels for each environmental medium. For whichever statistical method is used, it will require one (1) year of data for each parameter under review as approved by the executive director. The specific methods and sample analyses for each baseline measurement must be incorporated into the charts. The final control charts must be submitted to the executive director prior to accepting waste.
 - A. Evaluation of Data. The Licensee shall evaluate monitoring data using a two-tiered environmental monitoring response system (i.e., investigation and action levels) as described in Volume 18, Appendix 2-10.1-2 (REMP) and Volume 30, Appendix 7.3.2 (Early Warning and Corrective Action Plan) of the Licensee's application. Investigation Levels (ILs) and Action Levels (ALs) shall be determined for all media, radionuclides of interest, and sampling locations. The results of the evaluation must be included in the annual environmental monitoring report to the executive director. As part of the initial annual environmental monitoring report (preoperational phase) to the executive director, the Licensee shall revise the REMP to include a new section on reporting exceedances of ILs and ALs.
 - B. All ILs and ALs shall be based on appropriate prediction intervals for intra-location comparisons. Independence of intra-location samples should be verified, and, if this statistical independence is not confirmed, then the intra-location prediction intervals should be adjusted in accordance with statistical theory. The expression used to compute the prediction intervals shall be based on sample size and number of future comparisons. The ILs and ALs shall provide sufficient warning of a release and consider health effects as a secondary factor in the detection of the limits. Documentation on the computations, bases, and assumptions should be provided for review by the executive director.
 - C. The Licensee shall provide details, algorithms, and assumptions used by the statistical software in estimating the Type I and Type II error rates claimed for the stated

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decision rules. The Licensee should specify the scenarios and conditions under how the Type II error rates were obtained. Assumptions on whether the normality of the data is applied throughout the range of contaminant levels of interest shall be validated in the software along with whether the standard deviation can be modeled as a function of the mean contaminant level.

- D. The Licensee shall state whether the Method Detection Limit (MDL) used in analytic measurements is understood as a critical limit or a detection limit. Quantification limits of analytic results should inform whether the AL and IL are achieved in order for the analytic measurements to be used as proxies for the true constituent concentration levels.

- 171. The Licensee shall operate an on-site monitoring station to collect the following meteorological data on a 15-minute averaging period with 90 percent (%) minimum data retrieval: two (2)-meter data collection of precipitation, barometric pressure, solar radiation, scalar wind speed, vector wind direction, temperature, and relative humidity; and ten (10) meter data collection of scalar wind speed, vector wind direction, and relative humidity. The Licensee must submit to the executive director annual meteorological reports updated to include data from the previous year. The report must be submitted no later than March 31 of the following year.

Closure Requirements

- 172. Prior to closure and license termination, the Licensee shall:

- A. Re-evaluate the impacts or activities of nearby facilities in order to ensure that the performance objectives of 30 TAC §336.723 will continue to be met after closure; and
- B. Evaluate the impacts to workers in the disposal unit area during the closure of a facility. An analysis of worker doses shall be submitted to the executive director prior to initiating closure.

- 173. General requirements for closure of the facilities are listed as follows:

- A. During closure of the Federal Facility Waste Disposal Facility, the Licensee may not store, process, or dispose of mixed wastes defined in 30 TAC §336.2(80) unless authorized by a TCEQ hazardous waste permit in accordance with 30 TAC Chapter 335.
- B. During closure of the Federal Facility Waste Disposal Facility, in addition to the compliance with the decommissioning standards in 30 TAC Chapter 336, Subchapter G, the Licensee must comply with the closure requirements of a TCEQ hazardous waste permit in accordance with 30 TAC Chapter 335.
- C. Changes made to the Decommissioning and Site Closure Plan included in the license application may only be made through a license amendment authorized by the commission.
- D. After completion of the final cover for each disposal unit(s), the Licensee must submit certification of proper construction of the final cover, signed, sealed, and dated by a Texas licensed professional engineer. Each final cover certification must be accompanied by a certification report which contains the results of all tests performed to verify proper construction. The Licensee must conduct whatever tests, inspections,

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or measurements are necessary in the judgment of the professional engineer to certify that the final cover has been constructed in conformance with the design and construction specifications of this license and associated license application. The certification report must, at a minimum, contain the following engineering plans and test results:

- 1) Scaled plan-view and east-west and north-south cross-sections which accurately depict the area boundaries and dimensions of the cover; surrounding natural ground surface elevations; minimum, maximum, and representative elevations of the base on which the interim cover was placed; minimum, maximum, and representative elevations of the upper surface of the interim and final covers; thickness, extent, and materials of component parts of the cover system; and
 - 2) All observations, tests, and analyses required to ensure that the installation has been completed with the terms of this license and the incorporated design plans waste migration and interaction with emplacement media, or any other tests, experiments, or analyses pertinent to the long-term containment of emplaced waste within the land disposal facility;
- E. One (1) year before final closure of the disposal site, or as otherwise directed by the executive director, the Licensee must submit an application to amend the license for closure. The amended closure application must include a final revision and specific details of the disposal site closure plan and decommissioning plan included as part of the license application submitted under 30 TAC §336.708(a) that includes each of the following in accordance with 30 TAC §336.719(a):
- 1) Any additional geological, geochemical, hydrological, or other site data obtained during the operational period pertinent to the long-term containment of emplaced wastes;
 - 2) The results of tests, experiments, or any other analyses relating to backfill of excavated areas, closure and sealing;
 - 3) Any proposed revision of plans for decontamination or dismantlement;
 - 4) Decontamination and dismantlement of surface facilities;
 - 5) Backfilling of excavated areas;
 - 6) Stabilization of the land disposal facility for post-closure care; and
 - 7) Any significant new information regarding the environmental impact of closure activities and long-term performance of the land disposal facility.
- F. Upon review and consideration of an application to amend the license for closure submitted in accordance with subsection 30 TAC §336.719(a), the commission may issue an amendment authorizing closure if there is reasonable assurance that the long-term performance objectives of 30 TAC §336.723 will be met.
- G. The Licensee shall address the impact of ongoing disposal activities on closed disposal

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unit stability. An analysis of the stability of the disposal unit on disposal activities shall be submitted to the executive director for review.

174. Temporary disposal unit boundary markers and disposal unit identification markers shall be erected upon completion of backfill operations until permanent markers are installed.
175. Permanent monuments shall be installed within 120 days of the disposal unit closure and completion of the disposal unit cover. The information below shall be inscribed on each monument:
 - A. Total radioactivity in curies, excluding source material;
 - B. Total amount of source material in pounds;
 - C. Total amount of special nuclear material in grams;
 - D. Disposal unit number or other means of identification;
 - E. Date of opening and closing the disposal unit;
 - F. Volume and class of waste in the disposal unit; and
 - G. Dimensions of the disposal unit.
176. General requirements for post-closure are as follows:
 - A. The Licensee must perform post-closure care for the Compact Waste Disposal Facility in accordance with the license application and 30 TAC §336.720(a).
 - B. The Licensee must perform post-closure care for the Federal Facility Waste Disposal Facility in accordance with the license application and 30 TAC §336.720(a) and §335.174.
 - C. In addition to compliance with license conditions for environmental surveillance specified in Attachments A and B to this license, the Licensee must comply with the following conditions:
 - 1) Maintain all storm water conveyance structures in good functional condition.
 - 2) Maintain the cover on the Compact Waste Disposal Facility and Federal Facility Waste Disposal Facility such that the cover promotes drainage, prevents ponding, minimizes surface water infiltration, and minimizes erosion of the cover. Any desiccation cracks, settlement, erosion, gully, or other damage must be repaired upon observance.
 - 3) Maintain the cover to promote natural growth of native vegetation.
 - 4) Maintain all benchmarks at the land disposal facility.
 - 5) Maintain the land disposal facility perimeter fence, manned or locked gates, and warning signs in good functional condition.

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- 6) Ensure that all entrances to the land disposal facility have manned or locked gates.
 - 7) Ensure that the executive director has access to the land disposal facility.
 - 8) Perform all post-operational radiological and non-radiological monitoring in accordance with the license application's Radiological Environmental Monitoring Plan and Non-Radiological Environmental Monitoring Plan, respectively, with the following exceptions:
 - a. In addition to monitoring wells shown in the license application, the Licensee must install additional wells as provided in Attachment B to this license.
 - b. Annual fauna samples must be collected.
 - 9) Collect and remove pumpable liquids in the leak detection and leachate collection system sumps to minimize the head on the bottom of the liner.
 - 10) Manage all liquids removed from the leachate collection and leak detection systems in accordance with this license and 30 TAC Chapters 335 and 336.
 - 11) Maintain a record of the amount of liquids removed from each leak detection system sump at least monthly during the post-closure period, except that the Licensee may record the amount of liquids removed from the each leak detection system sump quarterly during the post-closure period, after the final cover is installed, provided that the liquid level in the sump stays below the pump operating level for two (2) consecutive months.
 - 12) If at any time during the post-closure period the pump operating level is exceeded at units on quarterly recording schedules, the Licensee must return to monthly recording of amounts of liquids removed from each leak detection system sump until the liquid level again stays below the pump operating level for two (2) consecutive months.
 - 13) The Licensee must install moisture content and pressure head monitors in the Compact Waste Disposal Facility and the Federal Facility Waste Disposal Facility liners and the covers. The monitoring system must be automated and capable of continuously transferring data. The monitoring system must be maintained and not be abandoned, as to be used for long term monitoring after closure. Selection and placement of these monitors must be submitted for review by the executive director prior to construction.
 - 14) The Licensee shall conduct walkover surveys during the institutional control period on a semiannual basis.
 - 15) Visual inspections must be performed quarterly during operations and closure, and annually thereafter.
- D. The following requirements apply to disposal units receiving mixed waste as defined 30 TAC §336.2(80):

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- 1) The Licensee must establish an Action Leakage Rate (ALR) pursuant to 40 CFR §264.302. The Licensee must determine if the ALR, given in gallons per acre per day, for each sump has been exceeded by converting the weekly or monthly flow rate from the monitoring data obtained to an average daily flow rate in gallons per acre per day for each sump. The Licensee must calculate the average daily flow rate for each landfill sump on a weekly basis during the active life and closure period.
- 2) Prior to receipt of waste, the Licensee must have in place an approved Response Action Plan (RAP) which meets the requirements of 40 CFR §264.304. The RAP must set forth the actions to be taken if the ALR is exceeded.
- 3) The Licensee must determine if the ALR, established in accordance with license, has been exceeded by converting the monthly flow rate from the monitoring data obtained under the license, to an average daily flow rate in gallons per acre per day for each sump. The Licensee must calculate the average daily flow rate for each sump on a monthly basis during the post-closure care period.
- 4) If the ALR is exceeded at any time during the post-closure period, the Licensee must perform the following activities.
 - a. Notify the executive director in writing of the exceedance within seven (7) days of the determination;
 - b. Submit a preliminary written assessment to the executive director within 14 days of the determination, as to the amount of liquids, likely sources of liquids, possible location, size, and cause of any leaks, and short-term actions taken and planned;
 - c. Determine to the extent practicable the location, size, and cause of any leak;
 - d. Determine whether any waste should be removed from the unit for inspection, repairs, or controls;
 - e. Determine any other short-term and longer-term actions to be taken to mitigate or stop any leaks; and
 - f. Within 30 days after the notification that the ALR has been exceeded, submit to the executive director the results of the evaluations specified in the license, the results of actions taken, and actions planned. Monthly thereafter, as long as the flow rate in the leak detection system exceeds the action leakage rate, the Licensee must submit to the executive director a report summarizing the results of any remedial actions taken and actions planned.
- 5) To make the leak or remediation determinations in the license, the Licensee must:
 - a. Assess the source of liquids and amounts of liquids by source;
 - b. Conduct a fingerprint, hazardous constituent, or other analyses of the liquids in the leak detection system to identify the source of liquids and possible location of any leaks, and the hazard and mobility of the liquid; and
 - c. Assess the seriousness of any leaks in terms of potential for escaping into the environment; or
 - d. Document why such assessments are not needed.

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177. Prior to closure and license transfer, the Licensee, as part of decommissioning, must decontaminate all ancillary facilities, surfaces, and equipment in accordance with 30 TAC §336.364 (Acceptable Surface Contamination Limits). The results of all surveys and decontamination activities must be included in the decommissioning plan.
- A. Prior to license transfer, the licensee must dispose of any facilities, surfaces, or equipment that has not been decontaminated, at a licensed low-level radioactive waste disposal facility.
 - B. The decommissioning plan must include the revised source term in the dose modeling reflecting any onsite disposal of facilities, surfaces, or equipment.
178. The Licensee shall complete and submit the following:
- A. A Decommissioning and Site Closure Plan prior to construction that includes updated cost estimates;
 - B. An updated Decommissioning and Site Closure Plan prior to commencement of closure of each disposal unit. The Licensee shall conduct a review and revise, if necessary, the decommissioning and site closure plan following closure of each disposal unit and submit any revisions to the executive director at that time, or annually, whichever occurs first; and
 - C. A license amendment for any periodic or final revisions made to the decommissioning and site closure plan.
179. The Licensee must apply for an amendment to transfer the license to the commission upon fulfillment of all applicable requirements under laws for closure and for post-closure observation and maintenance.
180. The Licensee is exempted from the requirements of 30 TAC §336.734(a) for disposal of federal facility waste at the Federal Facility Waste Disposal Facility as authorized by this license. Except for mineral interests transferred to the State of Texas by condemnation prior to issuance of this license, the Licensee must own the land and minerals in fee for the Federal Facility Waste Disposal Facility until transferred to the federal government. Upon completion of all decommissioning requirements and before the transfer of the license can occur, the Licensee shall convey to the federal government all of Licensee's right, title and interest in land and buildings of the Federal Facility Waste Disposal Facility and convey all right, title and interest in federal facility waste to the federal government.
181. Upon application to transfer the license, the Licensee shall acknowledge the conveyance to the State of Texas of all right, title and interest in compact waste located in the Compact Waste Disposal Facility.

Financial Assurance and Qualifications

182. The Licensee must provide all cost estimates and supporting analysis when requesting any changes to financial assurance.
183. Sixty (60) days prior to accepting waste, the Licensee shall provide financial assurance in an amount described below and in a form acceptable to the executive director. Financial

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assurance acceptable to the executive director in amount and form shall be maintained until license termination has been approved by the commission and the United States Nuclear Regulatory Commission, except for the financial assurance for corrective action and for institutional control.

- A. Financial assurance in the amount of \$79,912,000 in 2008 dollars for decommissioning and closure, \$10,256,000 in 2008 dollars for post-operational surveillance, and \$21,000,000 in 2008 dollars for institutional control must be provided initially by the Licensee to the executive director. These amounts must be converted to current dollars, by use of the methodology cross-referenced in 30 TAC Chapter 37, Subchapter T (Financial Assurance for Near-Surface Land Disposal of Radioactive Waste) prior to receipt of low-level radioactive waste and posting of financial assurance with the executive director. Upon demonstration by the Licensee and approval by the executive director, the amount of financial assurance for closure and decommissioning may be reduced to reflect the cost estimates for on-site discharge of leachate that include decommissioning costs of an authorized on-site wastewater treatment facility, costs for disposal of treatment residuals and contaminated treatment media, and costs that would be incurred if an independent contractor were hired to operate and decommission the on-site wastewater treatment facility. An additional technical demonstration would be required to be submitted with cost estimates to evaluate a plan for on-site discharge of leachate. The amount of financial assurance for post-operational surveillance and institutional control should be updated annually based on received waste volumes and/or the schedule of costs listed in Tables A-3, A-4, and A-6 of Appendix 12.1.4-3 of the license application.
- B. The financial assurance amount of \$25,300,000 in 2008 dollars for corrective action must be provided initially by the Licensee to the executive director as an amount sufficient to address unplanned events that pose a risk to public health, safety and the environment that may occur after the decommissioning and closure of the land disposal facility. The amount must be converted to current dollars, by use of the methodology cross-referenced in 30 TAC Chapter 37, Subchapter T, prior to receipt of low-level radioactive waste and posting of financial assurance with the executive director. At least 60 days prior to the anniversary date of the first establishment of the financial assurance mechanism, this amount shall be increased as acceptable to the executive director to account for the cumulative waste received at the land disposal facility each successive year. This annual additional amount shall not be less than \$3,350,000.
- C. The Licensee shall annually increase the cost estimates for inflation as described in 30 TAC Chapter 37, Subchapter B (Financial Assurance Requirements for Closure, Post Closure, and Corrective Action). In addition, the Licensee shall submit a revision to the cost estimates along with supporting documentation for the land disposal facility to the commission for approval on the anniversary date of the financial assurance mechanism each year, and upon amendment to the license. Commission approval may be demonstrated by either amendment of this license or by order of the commission to specify the current dollar amount. Within 60 days of the commission's approval of the amount for license condition 183. A. and B., the Licensee shall change the level of funding of the financial assurance and submit the revised financial assurance mechanism for approval.
- D. The Licensee shall provide financial assurance for bodily injury and property damage to third parties caused by sudden and non-sudden accidental occurrences arising from operations of the Compact Waste Disposal Facility and the Federal Facility Waste Disposal Facility in a manner that meets the requirements of 30 TAC Chapter 37,

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Subchapter T. If the Licensee utilizes an insurance mechanism for such third party liability coverage as set out in this provision, the Licensee shall forward an acceptable and updated replacement insurance instrument to the executive director at least annually. The insurance mechanism submitted must include an original signature of the insurer.

Additional Requirements

184. Except as specifically provided otherwise by this license, the Licensee must possess and dispose of low-level radioactive waste authorized by the license in accordance with statements, representations, and procedures contained in the following:
- Original application dated August 3, 2004, and subsequent revisions.
 - Application for administrative amendment dated November 17, 2009 requesting authorization to change the RSO.
 - Application for administrative amendment dated March 5, 2010 requesting authorization for revised Quality Assurance Plan and Quality Assurance Procedures.
 - Application for minor amendment requesting authorization to document impacts of installation of rail loop, document disposal facility reconfiguration and constructions changes, and modification of environmental monitoring details, dated January 12, 2010.
 - Application for administrative amendment dated February 22, 2011 and the revised application dated April 15, 2011 requesting authorization to alter select monitoring wells and another administrative application dated April 6, 2011 to extend time to complete air hydraulic conductivities testing.
 - Application for administrative amendment dated April 8, 2011 requesting authorization to handhole to manhole changes, WCS Change Request (CR)-034, drawing LC.2.27 note callout, WCS CR-039, and change of elevation of the non-contact stormwater piping discharge into Compact Waste Disposal Facility sedimentation pond, WCS CR-038. This authorization excludes the pad configuration request portion of the WCS CR-038.
 - Application for administrative amendment to Radioactive Material License No. R04100 requesting authorization to implement improvements to vadose zone monitoring system neutron logging access tubes and below-liner sensor system access tubes dated April 26 2011 and the letter supplementing the administrative amendment application dated May 31, 2011.
 - Application for administrative amendment dated May 9, 2011 requesting authorization for design changes to provide additional common area drainage information (LL-010), modify routing of administration building sanitary sewer line (LL-028), and modify shape of contact water storage tank secondary containment drainage waterway (LL-031).
 - Application for administrative amendment dated May 24, 2011 requesting authorization for design changes to sanitary septic system.
 - Application for administrative amendment dated July 11, 2011 requesting authorization for design changes to the north utility corridor north of Federal Facility Waste Disposal Facility, (LL-032).
 - Application for administrative amendment dated June 24, 2011 requesting authorization for design changes to allow penetrations of the foundation footing for the CWF

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decontamination building only. Only changes the drawing S1.2 as provided in revision 1, dated June 11, 2011 are approved. The proposed changes shown in the draft revision 1, dated June 14, 2011, to the drawing G.11 of record (previously approved revision 0, dated June 1, 2009) are not approved. Therefore, this conditional authorization is applicable only to CWF decontamination building and does not apply to the other buildings at the LLRW facility.

- Application for minor amendment dated May 3, 2011 requesting authorization for design changes to the Compact Waste Disposal Facility (CWF) Contact Water Secondary Containment Structure, and the response to the First Technical Notice of Deficiency dated June 14, 2011.
- Application for minor amendment dated June 6, 2011 requesting authorization for design changes to implement surface stormwater conveyance and sedimentation pond inlet structure improvements and in the September 29, 2011 revision to the application.
- Application for minor amendment dated July 14, 2011 to authorize design changes to the stormwater drainage diversion, and in the September 29, 2011 and October 14, 2011 revisions to the application.
- Application for minor amendment dated July 22, 2011 requesting authorization for design changes to the CWF access ramps and red bed bench ditch drainage system and in the September 29, 2011 and October 17, 2011 revisions to the application.
- Application for administrative amendment dated July 27, 2011, and revisions to the amendment application dated September 1, 2011, October 14, 2011, and November 4, 2011 requesting authorization for design and associated procedural changes to the security and fire protection system.
- Application for administrative amendment dated May 6, 2011 and associated amendment revisions dated August 11, 2011, September 1, 2011, September 29, 2011, and November 4, 2011 requesting authorization for design changes to the FWF contact water storage system piping and truck pad relocation as a result of not installing the two 500,000 gallon tanks to support the FWF Non-Containerized Disposal Unit (NCDU).
- Application for administrative amendment dated June 29, 2011 and associated amendment revisions dated October 11, 2011 requesting authorization for design modifications to the Laboratory, Administration and TCEQ Resident Inspector buildings at the land disposal facility.
- Application for minor amendment dated August 19, 2011 and revisions dated November 23, 2011 to authorize certain design modifications to the potable water distribution system in land disposal facility.
- Application for administrative amendment dated August 22, 2011 and associated amendment revisions dated October 12, 2011 requesting authorization for design changes to construct underground electrical distribution instead of overhead electrical distribution system and revisions to exterior lighting.
- Application for minor amendment dated August 22, 2011 and associated amendment revisions dated on October 27, 2011 requesting authorization for design changes to emergency shower and eyewash stations in land disposal facility buildings.
- Application for administrative amendment dated August 30, 2011 requesting authorization for the use of new and revised procedures. The authorization for use of new and revised procedures excludes all the environmental procedures.

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- Application for administrative amendment dated October 14, 2011 requesting authorization for the use of new and revised procedures including the Waste Acceptance Plan. The authorization revises procedures submitted to conform to the requirements in Attachment C of this license, and excludes the submitted Radiological Environmental Monitoring Program. Waste acceptance conditions have been relocated and consolidated by removal from the Receipt, Acceptance, and Inspection Requirements section of the license for incorporation into revised Attachment C to this license. Revised Attachment C specifically details regulatory requirements on limitations and prohibited wastes, waste types and waste streams allowed, WCS' waste generator audit and certification program, waste classification, waste characterization, waste tracking, waste treatment, waste stabilization, waste minimization, waste form and waste packaging criteria, waste container weight categories, transportation references, and waste acceptance by TCEQ resident inspectors.
- Specific construction requirements are deleted based on information in a Licensee's letter report submitted on December 1, 2011 that documents how the construction requirements have been addressed, with the exception of construction conditions related to asphalt paving. These pending asphalt paving conditions are placed in Attachment D of this license. Conditions regarding elevation adjustments to environmental monitoring wells are removed, based on a December 2, 2011 letter report submitted by Licensee that documents the final groundwater monitoring well adjustments.

185. All written submissions to the executive director as required by this license shall be made to the following:

A. For submissions by U. S. Postal Service:

Attn: Lorrie Council, P.G., Section Manager

Radioactive Materials Division

Texas Commission on Environmental Quality

P. O. Box 13087

Mail Code – 233

Austin, Texas 78711-3087

B. For Submissions by facsimile transmission, the transmission should be addressed to the attention of the Radioactive Material Licensing Section, Radioactive Materials Division and sent to the following number:

(512) 239-6464

C. For submission of portable document file (pdf) documents by electronic mail, address to the following: lorrie.council@tceq.texas.gov

If there is a conflict between a condition of this license, statements contained in the application materials, and/or applicable provisions of Title 30 of the Texas Administrative Code, the most stringent provision shall prevail.

Date: March 6, 2012


For The Commission

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Attachment A
Modified Natural Radiation Monitoring Program

Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Air - Particulate	6 - Northwest Land Disposal Facility (LDF) fence line 27 - Southeast of LDF 31 - West of LDF	High-volume Sampler	Continuous sampling with weekly or more frequent changes as required due to dust loading with analyses of composite samples by location each month	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ⁷ , Radionuclide of concern ⁵
Air - Tritiated water vapor	6 - Northwest LDF fence line 27 - Southeast of LDF 31 - West of LDF		Continuous with monthly changes	Tritium (hydrogen-3)
Air – Other vapor, gases	6 - Northwest LDF fence line 27 - Southeast of LDF 31 - West of LDF	Cartridge	Continuous with weekly changes	Carbon-14 ³ , Iodine-129 ⁴ , Krypton-85 ²
Precipitation (radiological)	Ranch house draw weather station	Grab	Monthly when quantity is sufficient for analysis	Gamma spectroscopy ²
Precipitation (meteorological)	Ranch house draw weather station		Continuous	As per license
Radon	6 - Northwest LDF fence line 27 - Southeast of LDF 31 - West of LDF	Track-etch detector	Quarterly	Radon
Ambient radiation/Direct radiation	6 - Northwest LDF fence line 27 - Southeast of LDF 31 - West of LDF	TLD and survey readings	Quarterly	Ambient and direct gamma radiation measurements taken at each location

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Soil (radiological)	6 - Northwest LDF fence line 27 - Southeast of LDF 31 - West of LDF	Grab at 0-6 inches, at 6-12 inches	Quarterly	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ⁷ , Radionuclide of concern ⁵
Soil (chemical)	6 - Northwest LDF fence line 27 - Southeast of LDF 31 - West of LDF	Grab at 0-6 inches	Quarterly	Chemical analysis (per HW-50358 application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005)
Vegetation (radiological)	6 - Northwest LDF fence line 27 - Southeast of LDF 31 - West of LDF	Grab	Semi-annually when quantity is sufficient for analysis	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ⁷ , Radionuclide of concern ⁵
Vegetation (chemical)	6 - Northwest LDF fence line 27 - Southeast of LDF 31 - West of LDF	Grab	Semi-annually when quantity is sufficient for analysis	Chemical analysis (per HW-50358 application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005)

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Surface Water (radiological)	Baker Spring	Grab	Quarterly when quantity is sufficient for analysis	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ⁷ , Radionuclide of concern ⁵ .
Surface Water (chemical)	Baker Spring	Grab	Quarterly when quantity is sufficient for analysis	Chemical analysis (per HW-50358 application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005
Sediment	Baker Spring	Grab	Quarterly	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ⁷ , Radionuclide of concern ⁵
Fauna	General Site Area	Grab	Annually	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ⁷ , Radionuclide of concern ⁵

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Soil (radiological)	17 off-site locations surrounding the site as per application Revision 12c, Appendix 2.10.1-2, Addendum 1, Revision 2, Table 11A	Grab at 0-6 inches, 6-12 inches	Quarterly for twelve consecutive months	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ⁷
Soil (chemical)	50-meter grid of Land Disposal Facility (LDF)	Grab 0-6"	One (1) time	Chemical analysis as per HW-50358 application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005
Monitor well clusters (radiological) Ogallala-Antlers-Gatuña (OAG) wells, 225-foot zone top 225-foot zone bottom 125-foot zone bottom	The following OAG wells: FWF-1A, FWF-6A, FWF-8A, FWF-10A, FWF 14A, FWF-16A, FWF-17A, FWF-19A (TP-33), OAG-44 (FWF-20A), FWF-21A, FWF-22A, FWF23-A, FWF-24A, FWF-25A, FWF-26A, FWF-27A, FWF-119A, OAG-12, OAG-13, OAG-14, OAG-15, OAG-46 (TP-164), CWF-1A, CWF-4A, CWF-7A, CWF-8A, CWF-9A (TP-38), OAG-33 (CWF-10A), CWF-11A, CWF-12A, CWF-110A, OAG-25, OAG-30 (TP-155), OAG-31 (TP-130), OAG-32 (TP-29), A-16, PM-07, GW-4 (TP-14), TP-18, TP-19, TP-20, GW-2 (TP-31), TP-46, GW-1A, GW-3 (PZ-68), GW-5, GW-6 (TP-117), TMW-D, TMW-E, TMW-K, TP-12, TP-13, TP-16, TP-37, TP-42, TP-43, TP-44, TP-47, TP-49, TP-62, TP-64, TP-65, TP-67, TP-68,	Grab	Quarterly ^{4,6} when quantity sufficient for analysis is present	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ⁷ , Radionuclide of concern ⁵

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
	TP-71, TP-76, TP-77, TP-79, TP-80, TP-83, TP-85, TP-87, TP-99, TP-104, TP-111, TP-112, TP-118, TP-126, TP-134, TP-139, TP-141, TP-143, TP-144, TP-162, TP-163, TP-167, TP-170, TP-171, PW-1, PW-7, PZ-1, PZ-10, PZ-32, PZ-44, and PZ-52. PM-01 (OAG)/PM-02 (125-Zone)/PM-03 (225-Zone) – East of LDF. One (1) upgradient well cluster at north fence line Federal Facility Waste Disposal Facility (well cluster FWF-21) and one down-gradient well cluster at south fence line (well cluster FWF-10)			
Monitor well clusters (chemical) Ogallala-Antlers-Gatuña (OAG) wells, 225-foot zone top 225-foot zone bottom 125-foot zone bottom	The following OAG wells: FWF-1A, FWF-6A, FWF-8A, FWF-10A, FWF 14A, FWF-16A, FWF-17A, FWF-19A (TP-33), OAG-44 (FWF-20A), FWF-21A, FWF-22A, FWF23-A, FWF-24A, FWF-25A, FWF-26A, FWF-27A, FWF-119A, OAG-12, OAG-13, OAG-14, OAG-15, OAG-46 (TP-164), CWF-1A, CWF-4A, CWF-7A, CWF-8A, CWF-9A (TP-38), OAG-33 (CWF-10A), CWF-11A, CWF-12A, CWF-110A, OAG-25, OAG-30 (TP-155), OAG-31 (TP-130), OAG-32 (TP-29), A-16, PM-07, GW-4 (TP-14), TP-18, TP-19, TP-20, GW-2 (TP-31), TP-46, GW-1A, GW-3 (PZ-68), GW-5, GW-6 (TP-117), TMW-D,	Grab	Quarterly ^{4,6} when quantity sufficient for analysis is present	Chemical analysis as per HW-50358 application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
	TMW-E, TMW-K, TP-12, TP-13, TP-16, TP-37, TP-42, TP-43, TP-44, TP-47, TP-49, TP-62, TP-64, TP-65, TP-67, TP-68, TP-71, TP-76, TP-77, TP-79, TP-80, TP-83, TP-85, TP-87, TP-99, TP-104, TP-111, TP-112, TP-118, TP-126, TP-134, TP-139, TP-141, TP-143, TP-144, TP-162, TP-163, TP-167, TP-170, TP-171, PW-1, PW-7, PZ-1, PZ-10, PZ-32, PZ-44, and PZ-52.PM-01(OAG)/PM-02(125-Zone)/PM-03(225-Zone) – East of LDF. One (1) upgradient well cluster at north fence line (well cluster FWF-21) and one (1) down-gradient well cluster at south fence line (well cluster FWF-10)			

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Attachment A: Footnotes

Modified Natural Radiation Monitoring Program

1. Alpha isotopic analyses must include, but not be limited to, radium-226, thorium-230, thorium-232, plutonium-238, plutonium-239/240, uranium-238, uranium- 235/236, and uranium-233/234.
2. Gamma spectroscopy analyses must include, but not be limited to, cesium-137 and krypton-85.
3. Liquid scintillation analyses must include, but not be limited to, hydrogen-3, technetium-99, carbon-14 and plutonium-241.
4. Sampling and analysis procedures to be submitted for review by the executive director. This information must be included in the Site-specific Data Assessment and Management Plan (S-DAMP) and the Quality Assurance Project Plan (QAPP). The QAPP must follow the Multi-Agency Radiological laboratory Analytical Protocols Manual (MARLAP) process, and should include details of the data quality objectives (DQO), the method quality objective (MQO), and the Method of Uncertainty Analysis for each radio-analyte per media and for each method.
5. Actinium-228, alpha (gross), americium-241, antimony-124, antimony-125, barium-133, beta (gross), beryllium-7, bismuth-212, bismuth-214, carbon-14, cerium-141, cesium-134, cesium-136, cesium-137, Chromium-51, cobalt-56, cobalt-57, cobalt-58, cobalt-60, curium-242, curium-243, europium-152, europium-154, europium-155, hydrogen-3, iodine-129, iridium-192, iron-59, krypton-85, lead-210, lead-212, lead-214, manganese-54, mercury-203, neodymium-147, neptunium-237, neptunium-239, nickel-59, nickel-63, niobium-95, plutonium-238, plutonium-239, plutonium-242, potassium-40, promethium-146, radium-226, radium-228, radon-222, ruthenium-106, silver-110m, sodium-22, strontium-90, technetium-99, thallium-208, thorium-228, thorium-230, thorium-232, thorium-234, uranium-233, uranium-234, uranium-235, uranium-236, uranium-238, yttrium-88, zinc-65, zirconium-95.
6. If insufficient groundwater is present for radiological analyses, the analyses will be prioritized in the following manner: (1) gross alpha and beta; (2) gamma spectroscopy; (3) alpha spectroscopy/radon emanation (radium-226); and (4) liquid scintillation/gas flow proportional counting (radionuclide specific). Chemical analyses will be prioritized in the following order: (1) volatile organics, (2) semi-volatile organics, (3) metals, (4) cyanide, and (5) general water quality parameters.
7. Other approved analytical methods may be used to analyze for lead-210, strontium-90, iodine-129, nickel-59, radium-226, and radium-228. Lead-210 and strontium-90 may be determined using Gas Flow Proportional Counting (GFPC). Iodine-129 and nickel-59 may be determined using low-energy gamma spectroscopy (LEGS). Radium-226 may be determined using radon emanation techniques. Alternatively, radium-226 may be determined using gamma spectroscopy when there is sufficient sample volume to yield minimum detectable activities (MDAs) consistent with the data quality objectives established in accordance with License Condition 156.A. Radium-228 may be determined using gamma spectroscopy when there is sufficient sample volume to yield MDAs consistent with the data quality objectives established in accordance with License Condition 156.A.

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Attachment B
Pre-Operational, Construction, and Operational Environmental Monitoring

Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Air - Particulate	61 - Northwest corner Federal Facility Waste Disposal Facility (FWF) 60 - Northwest FWF 59 - North-center FWF 58 - Northeast corner FWF 63 - Southeast FWF 62 - Southwest FWF 11 - West FWF 65 - East FWF/West Compact Waste Disposal Facility (CWF) 55 - Northwest CWF 54 - Northeast CWF 50 - South CWF 1 - East of guard house 4 - Southwest corner of FWF 6 - Northwest of Land Disposal Facility (LDF) fence line 7 - North fence line center of Resource Conservation and Recovery Act (RCRA) permit area 9 - Control station 26 - East of LDF fence line 27 - Southeast of LDF 31 - West of the LDF	High-volume sampler	Continuous sampling with weekly or more frequent changes as required due to dust loading with analyses of composite samples by location each month	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ^{5,11}

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Air - Tritiated water vapor	61 - Northwest corner FWF 60 - Northwest FWF 59 - North-center FWF 58 - Northeast corner FWF 63 - Southeast FWF 62 - Southwest FWF 11 - West FWF 65 - East FWF/West CWF 55 - Northwest CWF 54 - Northeast CWF 50 - South CWF 1 - East of guard house 4 - Southwest corner of FWF 6 - Northwest of LDF fence line 7 - North fence line center of RCRA permit area 9 - Control station 26 - East of LDF fence line 27 - Southeast of LDF 31 - West of the LDF		Continuous with monthly changes	tritium (hydrogen-3)

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Air – Other vapor, gases	61 - Northwest corner FWF 60 - Northwest FWF 59 - North-center FWF 58 - Northeast corner FWF 63 - Southeast FWF 62 - Southwest FWF 11 - West FWF 65 - East FWF/West CWF 55 - Northwest CWF 54 - Northeast CWF 50 - South CWF 1 - East of guard house 4 - Southwest corner of FWF 6 - Northwest of LDF fence line 7 - North fence line center of RCRA permit area 9 - Control station 26 - East of LDF fence line 27 - Southeast of LDF 31 - West of LDF	Cartridge	Continuous with weekly changes	Carbon-14 ^{3,4} Iodine-129 ⁸ Krypton-85 ²
Precipitation (radiological)	Ranch house draw weather station	Grab	Monthly when quantity sufficient for analysis is collected	Gamma spectroscopy ²
Precipitation (meteorological)	Ranch house draw weather station		Continuous	As per license
Radon	Stations as listed in the REMP, with any changes approved by executive director	Track-etch detector	Quarterly	Radon

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Direct Radiation/Ambient Radiation	61 – Northwest corner FWF 60 – Northwest FWF 59 – North center FWF 58 – Northeast corner FWF 64 – Southeast FWF 62 – Southwest FWF 11 – West FWF 65 – East FWF/West CWF 55 – Northwest CWF 54 – Northeast CWF 50 – South CWF 1 – East of guard house 4 – Southwest corner of FWF 6 – Northwest of facility fence line 7 – North fence line center of RCRA permit area 9 – control station 26 – East of facility fence line 27 – Southeast of facility 31 – West of facility	TLD, Survey reading	Quarterly	Ambient and direct gamma radiation measurements taken at each location
Soil (radiological)	Air monitoring station locations	Grab at 0-6 inches and Grab 6-12 inches (pre-operational only)	Quarterly at air monitoring stations	Gross alpha, Gross beta, Alpha isotropic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ^{5, 11}
Soil (chemical)	Air monitoring station locations	Grab at 0-6 inches	Semi-annually at air monitoring stations	Chemical analysis as per HW-50358 application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Vegetation (radiological)	Air monitoring station locations GW-1 -Stock pond GW-2 -Baker Spring GW-3- Playa west of by-product material facility GW-4- Playa north of FWF GW-5 - Playa northeast of CWF GW-6 - Playa east of CWF	Grab	Semi-annually when quantity sufficient for analysis is present	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ^{5,11}
Vegetation (chemical)	Air monitoring station locations GW-1 -Stock pond GW-2 -Baker Spring GW-3- Playa west of by-product material facility GW-4- Playa north of FWF GW-5 - Playa northeast of CWF GW-6 - Playa east of CWF	Grab	Semi-annually when quantity sufficient for analysis is present	Chemical analysis as per HW-50358 application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005
Surface Water (radiological)	GW-1 -Stock pond GW-2 -Baker Spring GW-3- Playa west of by-product material facility GW-4- Playa north of FWF GW-5 - Playa northeast of CWF GW-6 - Playa east of CWF Sedimentation pond as per license	Grab	Quarterly when quantity sufficient for analysis is present ^{5,6}	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ^{5,11}

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Surface Water (chemical)	GW-1 -Stock pond GW-2 -Baker Spring GW-3- Playa west of by-product material facility GW-4- Playa north of FWF GW-5 - Playa northeast of CWF GW-6 - Playa east of CWF Sedimentation pond as per license	Grab	Annually when quantity sufficient for analysis is present ^{5,6}	Chemical analysis as per HW-50358 application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005
Aquatic Eco-receptor	GW-1 -Stock pond GW-2 -Baker Spring GW-3 -Playa west of by-product material facility GW-4 -Playa north of FWF GW-5 -Playa northeast of CWF GW-6 -Playa east of CWF	Grab	Annually, if present	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ^{5,11}
Sediment	GW-1 -Stock pond GW-2 -Baker Spring GW-3 -Playa west of by-product material facility GW-4 -Playa north of FWF GW-5 -Playa northeast of CWF GW-6 -Playa east of CWF Sedimentation pond as per license	Grab	Quarterly	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ^{5,11}
Fauna	General site area	Grab	Annually	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ^{5,11}

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
Septic, process water	All buildings at Land Disposal Facility	Grab, solids and liquids	Quarterly and prior to disposal off-site	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ^{5,11}
Perimeter monitor well clusters ⁷ (radiological) Ogallala-Antlers-Gatuña (OAG) wells 225-foot zone top 225-foot zone bottom 125-foot zone bottom	Federal Facility Waste Disposal Facility (FWF) FWF-1, FWF-2, FWF-3, FWF-4, FWF-5, FWF-6, FWF-7, FWF-8, FWF-9, FWF-10, FWF-11, FWF-12, FWF-13, and FWF-14. These stations shall be placed at approximately 150 feet intervals along the southern perimeter of the FWF from southwest corner to southeast corner FWF-15 - Southern end of FWF east perimeter FWF-16, FWF-17, and FWF-18 - Center portion of the FWF eastern perimeter FWF-19/FWF-119 – Northeast angled perimeter of the FWF FWF-20- Eastern end of northern FWF perimeter FWF-21 and FWF-22 - North center of FWF perimeter FWF-23 - Western portion of the FWF northern perimeter FWF – 24 – Northwest of FWF FWF-25 – Northwest	Grab	Quarterly gauging and sample collection when water quantity is sufficient for sampling ¹¹	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved methods ^{5,11}

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
	corner of the FWF 26 and FWF-27 - Center portion of the FWF western perimeter FWF-28 - Southern end of the FWF west perimeter Compact Waste Disposal Facility (CWF) CWF-1, CWF-2, CWF-3, CWF-4, CWF-5, CWF-6, and CWF-7 - Along southern perimeter of CWF, from the southwest corner to southeast corner at an approximate spacing of 150 feet CWF-8 – Northern end of the eastern perimeter corner of the CWF CWF – 9 – Northeast of CWF CWF-10/CWF-110 - Center of the north angled perimeter of the CWF CWF-11 - Northwest corner of the CWF CWF-12 West center of the CWF perimeter CWF-13 Southern end of the CWF site west perimeter All RCRA monitor wells			
Ogallala-Antlers-Gatuña (OAG) monitor wells ^{7,8} (radiological)	OAG-1, OAG-2, OAG-3 and OAG-4 Center portion of the FWF eastern perimeter OAG-5 - Northern end of the FWF east	Grab	Quarterly ^{8,9} (when quantity sufficient for analysis is present) ¹¹	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , Liquid scintillation ³ , Other approved

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
	perimeter OAG-7, OAG-8 and TP-102 - Eastern end of the northern FWF perimeter OAG-9 , OAG 10, and OAG-11 - North center zone of the FWF perimeter OAG-12, OAG 13, and OAG-14 - Western end of the northern FWF perimeter OAG-15 - Northern end of the FWF west perimeter OAG-16, OAG-17, and OAG-18 - Center portion of FWF site western perimeter OAG-19 - Southern end of the FWF west perimeter OAG-20 and OAG-21 - Southern end of the CWF east perimeter OAG-22 and OAG-23 - Northern end of the CWF east perimeter OAG-24 and OAG-25 - Eastern end of the CWF north perimeter OAG-26 and OAG-27 - Western end of the CWF north perimeter OAG-30 – Southern end Northeast corner of the CWF west perimeter GW-1A - Stock pond GW-2/TP-31 - Baker Spring GW-3/PZ-68 - Playa west of by-product material facility GW-4/TP-14 - Playa north of the FWF			methods ^{5,11}

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
	GW-5 - Playa northeast of the CWF GW-6/TP-117 - Playa east of the CWF All RCRA monitor wells			
Perimeter monitor well clusters ⁷ (chemical). Ogallala-Antlers-Gatuña (OAG) wells 225-foot zone top 225-foot zone bottom 125-foot zone bottom	Federal Facility Waste Disposal Facility (FWF) FWF-1, FWF-2, FWF-3, FWF-4, FWF-5, FWF-6, FWF-7, FWF-8, FWF-9, FWF-10, FWF-11, FWF-12, FWF-13, and FWF-14. These stations shall be placed at approximately 150 feet intervals along the southern perimeter of the FWF from southwest corner to southeast corner FWF-15 - Southern end of FWF east perimeter FWF-16, FWF-17, and FWF-18 - Center portion of the FWF eastern perimeter FWF-19/FWF-119 – Northeast angled perimeter of the FWF FWF-20- Eastern end of northern FWF perimeter FWF-21 and FWF-22 - North center of FWF perimeter FWF-23 - Western portion of the FWF northern perimeter FWF-24 – Northwest of FWF FWF-25 – Northwest corner of the FWF	Grab	Quarterly gauging and sample collection when water quantity is sufficient for sampling ¹¹	Chemical analysis as per HW-50358 application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
	FWF 26 and FWF-27 - Center portion of the FWF western perimeter FWF-28 - Southern end of the FWF west perimeter Compact Waste Disposal Facility (CWF) CWF-1, CWF-2, CWF-3, CWF-4, CWF-5, CWF-6, and CWF-7 - Along southern perimeter of CWF, from the southwest corner to southeast corner at an approximate spacing of 150 feet CWF-8 – Northern end of the eastern perimeter corner of the CWF CWF-9 – Northeast of CWF CWF-10/CWF-110 - Center of the north angled perimeter of the CWF CWF-11 - Northwest corner of the CWF CWF-12 - West center of the CWF perimeter CWF-13 Southern end of the CWF site west perimeter All RCRA monitor wells			
Ogallala-Antlers-Gatuña (OAG) monitor wells ^{7,8} (chemical)	OAG-1, OAG-2, OAG-3 and OAG-4 - Center portion of the FWF eastern perimeter OAG-5 - Northern end of the FWF east perimeter OAG-7, OAG-8 and	Grab	Quarterly ^{8,9} (when quantity sufficient for analysis is present) ¹¹	Chemical Analysis as per HW-50358 Application Attachment VI, Appendix 6.6-2, Table 1, Revision 6, January 20, 2005

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
	TP-102 - Eastern end of the northern FWF perimeter OAG-9 , OAG 10, and OAG-11 - North center zone of the FWF perimeter OAG-12, OAG 13, and OAG-14 - Western end of the northern FWF perimeter OAG-15 - Northern end of the FWF west perimeter OAG-16, OAG-17, and OAG-18 - Center portion of FWF site western perimeter OAG-19 - Southern end of the FWF west perimeter OAG-20 and OAG-21 - Southern end of the CWF east perimeter OAG-22 and OAG-23 - Northern end of the CWF east perimeter OAG-24 and OAG-25 - Eastern end of the CWF north perimeter OAG-26 and OAG-27 - Western end of the CWF north perimeter OAG-30 – Southern end Northeast corner of the CWF west perimeter GW-1A - Stock pond GW-2/TP-31 - Baker Spring GW-3/PZ-68 - Playa west of by-product material facility GW-4/TP-14 - Playa north of FWF site GW-5 - Playa northeast of the			

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
	Compact Waste Disposal Facility (CWF) GW-6/TP-117 - Playa east of the CWF. All RCRA monitor wells			
Combined facilities background wells	A-16 - OAG well located southeast of CWF ⁹ PM-01 - OAG well located in northeast portion of RCRA permit area ⁹ PM-07 - OAG well located in eastern portion of RCRA permit area, northwest of old ranch house ⁹ TP-14 - OAG well located northeast of Federal FWF ⁹ TP-18 - OAG well located just outside the northeast corner of FWF ⁹ TP-19 - OAG well located north of the CWF ⁹ TP-20 - OAG well just north of RCRA permit area, between stations 7 and 16 ⁹ TP-31 - OAG well located at Baker Spring ⁹ TP-46 - OAG well located south of the FWF ^{9, 10} A-22 - Well in the 225-foot zone located southeast of the CWF and A-16 ⁹ A-24 - Well in the 225-foot zone located	Grab	Quarterly ⁹ (when quantity sufficient for analysis is present) ¹¹	Gross alpha, Gross beta, Alpha isotopic ¹ , Gamma spectroscopy ² , ⁹ Liquid scintillation ³ , Other approved methods ^{5,11}

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Sample	Station/Location Reference	Method	Frequency	Required Analyte/Type of Analysis
	<p>south-east of the CWF and east of A-22⁹</p> <p>MW-3A - Well in the 225-foot zone located north of the by-product material facility⁹</p> <p>MW-11B - Well in the 225-foot zone located south of the by-product material facility⁹</p> <p>MW-5EA - Well in the 225-foot zone located south of the FWF^{9, 10}</p> <p>DW-35A - Well in the 225-foot zone located south of the RCRA landfill⁹</p> <p>PM-03 - Well in the 225-foot zone located in northeast portion of RCRA permit area⁹</p> <p>PM-06 - Well in the 225-foot zone located northeast of CWF⁹</p> <p>TP-69 – Well in the 225-foot zone located north of the CWF and FWF^{9,12}</p>			

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Attachment B: Footnotes

Pre-Operational, Construction, and Operational Environmental Monitoring

1. Alpha isotopic analyses during the pre-operational monitoring period must include, but not be limited to, radium-226, americium-241, neptunium-237, plutonium-238, plutonium-239, plutonium-242, curium-242, and curium-243; and thorium and uranium radionuclides (such as thorium-232, uranium-234, uranium-235, uranium-238). Alpha isotopic analyses during the construction and operational period is performed only if confirmed gross alpha (initial result and re-analysis) exceeds investigation limit (IL) and will include the same radionuclides.
2. Gamma isotopic analysis must include, but not be limited to, short-lived, long-lived and primordial isotopes (beryllium-7, sodium-22, potassium-40, chromium-51, manganese-54, cobalt-56, cobalt-57, cobalt-58, iron-59, cobalt-60, zinc-65, krypton-85, yttrium-88, niobium-94, niobium-95, zirconium-95, ruthenium-106, silver-110m, antimony-124, antimony-125, iodine-129, barium-133, barium-140, cerium-141, cesium-134, cesium-136, cesium-137, promethium-144, promethium-146, europium-152, europium-154, europium-155, cerium-144, neodymium-147, iridium-192, mercury-203, thallium-208, bismuth-212, lead-212, bismuth-214, lead-214, thorium-234, uranium-235, uranium-238, neptunium-239, americium-241, americium-243, and curium-243).
3. Liquid scintillation analysis during the pre-operational monitoring period must include, but not be limited to, hydrogen-3, carbon-14, nickel-63, technetium-99 and plutonium-241.
4. Liquid scintillation analysis during the operational monitoring period must include, but not be limited to, hydrogen-3, carbon-14 and technetium-99; analysis for nickel-63 will also be performed if gross beta exceeds IL. Liquid scintillation analysis for plutonium-241 will be performed during the operational monitoring period if americium-241, americium-243, or curium-243 is detected via gamma spectroscopy.
5. Other approved analytical methods may be used to analyze for lead-210, strontium-90, iodine-129, nickel-59, radium-226, and radium-228. Lead-210 and strontium-90 may be determined using Gas Flow Proportional Counting (GFPC). Iodine-129 and nickel-59 may be determined using low-energy gamma spectroscopy (LEGS). Radium-226 may be determined using radon emanation techniques. Alternatively, radium-226 may be determined using gamma spectroscopy when there is sufficient sample volume to yield minimum detectable activities (MDAs) consistent with the data quality objectives established in accordance with license condition 156A. Radium-228 may be determined using gamma spectroscopy when there is sufficient sample volume to yield MDAs consistent with the data quality objectives established in accordance with license condition 156A.
6. Ephemeral playa locations will be recorded using Global Positioning System (GPS) coordinates. Sampling locations are dependent on weather conditions and may vary from monitoring event to monitoring event.
7. Perimeter monitoring well clusters will be installed as the disposal units are developed. Initial construction of perimeter monitoring well clusters for pre-operational monitoring will consist of the following well clusters: FWF-1, FWF-6, FWF-10, FWF-14, FWF-16, FWF-17, FWF-19/FWF-119, FWF-21, FWF-23, FWF-24, FWF-26, FWF-27, CWF-1, CWF-4, CWF-7, CWF-8, CWF-9, CWF-10/CWF-110, CWF-11, and CWF-12. Well clusters to be installed prior to waste receipt consist of: FWF-2, FWF-3, FWF-4, FWF-5, FWF-9, FWF-11, FWF-12, FWF-13, FWF-15, FWF-18, FWF-20, FWF-22, FWF-28, CWF-2, CWF-3, CWF-5, CWF-6, and CWF-13.
8. The perimeter OAG wells (those that are not part of a well cluster) will be installed prior to waste receipt.
9. Sampling and analysis procedures to be submitted for review by the executive director. This information must be included in the Site-specific Data Assessment and Management Plan (S-DAMP) and the Quality Assurance Project Plan (QAPP). The QAPP must follow the Multi-Agency Radiological laboratory

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Analytical Protocols Manual (MARLAP) process, and which will include details of the data quality objectives (DQO), the method quality objective (MQO), and the Method of Uncertainty Analysis for each radio-analyte per medium and for each method.

10. These wells will be monitored under this license for the duration of their lifetime. As the RCRA landfill is advanced, these wells will require decommissioning and possible replacement, as they are within the area that will be disturbed by RCRA landfill construction.
11. If insufficient groundwater is present for radiological analyses the analyses will be prioritized in the following manner: (1) gross alpha and beta; (2) gamma spectroscopy; (3) alpha spectroscopy/radon emanation (radium-226); and (4) liquid scintillation/gas flow proportional counting (radionuclide-specific). Chemical analyses will be prioritized in the following order: (1) volatile organics, (2) semi volatile organics, (3) metals, (4) cyanide and (5) general water quality parameters.
12. Monitoring at well TP-69 will begin during the first quarterly groundwater monitoring event initiated after issuance of Amendment Number 03 of this license. Monitoring will continue on a quarterly basis thereafter in accordance with this license. Four quarters of pre-operational monitoring under this license will not be required at this location.

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Attachment C

Compact Waste Disposal Facility Waste Acceptance Criteria

1.0 General Acceptance Information

The Compact Waste Disposal Facility (CWF) Waste Acceptance Criteria (WAC) is incorporated into this license to provide specific criteria for acceptance of low-level radioactive waste at the CWF in accordance with Title 30, Texas Administrative Code (TAC), Chapter 336 and this license. This WAC only applies to waste acceptance at the CWF. In the event of a conflict between this WAC and any waste acceptance plan or other procedures for receipt, inspection, tracking, verification, or acceptance of waste shipments, this WAC shall govern. Any variances from this WAC may require an application for amendment to Radioactive Material License No. R04100. Variances, revisions, or changes from this WAC will be evaluated by the Texas Commission on Environmental Quality (TCEQ) on a case-by-case basis for making license amendment determination. The executive director may accept, on a case-by-case basis, revisions to WAC provisions which do not affect human health and the environment, provided written notification to the executive director is made by the Licensee as soon as practicable. All other changes to the WAC are subject to review under 30 TAC Chapter 305.

The TCEQ, on behalf of the State of Texas, is the owner and is the regulator of the CWF. Title of commercial waste received and accepted at the CWF shall be transferred to the State of Texas at the time the waste is accepted. The State of Texas and TCEQ are indemnified under the terms of this license. Transfer of title of commercial waste to the State of Texas does not relieve generators or potentially responsible parties from the requirements under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The accurate and timely reporting of waste manifest and associated information to TCEQ are the responsibility of waste generators and the Licensee. A TCEQ *Waste Generator Disposal Guide* provides steps to waste disposal for waste generators and links to required TCEQ forms (see <http://www.tceq.texas.gov/permitting/radmat/licensing/generator-site-access>).

In accordance with Texas Health and Safety Code (THSC) §401.215, the CWF shall accept for disposal all Compact waste that is presented to it and that is properly processed and packaged. Disposal charges for party state compact low-level radioactive waste shall be based on: (i) the Party State Compact Disposal Fees or Interim Party State Compact Waste Disposal Fees that are set by TCEQ under THSC §§401.245-401.2455, whichever is in effect at the time of waste acceptance, or (ii) a mutually agreed upon contract between a generator and the Licensee, provided that such contract has been approved by TCEQ under 30 TAC §336.1317.

No shipment may be accepted for disposal unless it has been inspected by the executive director's Resident Inspector and advanced reporting of manifest information has been received by TCEQ. Other qualified TCEQ staff may perform the duties of the executive director's Resident Inspector, as necessary. For waste intended for disposal at the CWF, waste acceptance is triggered by the final approval of the specific waste shipment by the TCEQ Resident Inspector or other qualified TCEQ staff. Waste accepted for disposal shall not be removed from the land disposal facility except as authorized in writing by the TCEQ for the purposes of repackaging or

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reprocessing or as provided in 30 TAC Chapter 336.

The WAC applies to any generator shipping radioactive waste to the CWF. This WAC provides criteria on:

- Limitations and prohibited wastes;
- Waste types;
- Waste classification;
- Waste characterization;
- Waste tracking;
- Treatment, stabilization, and waste minimization;
- Waste form and packaging requirements;
- Weight requirements;
- Transportation; and
- TCEQ Resident Inspector.

2.0 Limitations and Prohibited Wastes

The Licensee is authorized by this license to receive commercial low-level radioactive waste for disposal in the CWF with certain limitations and prohibitions. The limitations and prohibitions restrict certain types and quantities of wastes for the purpose of meeting performance objectives, meeting regulatory requirements, or because there has been no demonstration that a proposed waste type will meet performance objectives. Currently, this license does not allow for the disposal of nonparty compact waste or certain types, forms, or waste streams of Compact waste. Successful license amendment of this license will be required to receive and dispose of imported nonparty compact waste and certain types, forms, or waste streams of Compact waste.

2.1 Limitations

- 2.1.1 Commercial low-level radioactive waste volume not to exceed 2, 310,000 cubic feet with a total quantity of radioactivity not to exceed 3,890,000 curies.
- 2.1.2 The CWF quantity of radioactivity for carbon-14 shall not exceed a total of 600 curies.
- 2.1.3 Waste streams that have not been projected; specifically characterized in physical, chemical and radiological terms; and demonstrated to meet the performance objectives and license requirements.
- 2.1.4 Complete waste pedigree (origin – last entity and location that put radioactive material into practical use, that is, use in the production or operation of something useful, tracking to final disposition, and any claimed attribution) must be documented prior to shipment - Original waste type and waste generator identified and other waste processing or management must be tracked through the final packaging for disposal.

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2.1.5 Waste must be shipped for disposal in a disposal container (includes drums, B-12 and B-25 boxes, HICs, liners, etc.) unless the waste package has received prior approval for an alternative configuration.

2.2 Waste types currently prohibited from disposal in the CWF

- Waste streams not specifically authorized by the license, which is any waste stream not included in License Condition (LC) 141, Table 2.
- Waste of international origin
- Any waste with physical, chemical, and radiological characteristics not evaluated in the license application
- Waste that contains or is commingled with Federal Facility Waste during processing
- Greater than Class C waste (GTCC)
- Naturally-occurring radioactive material (NORM) waste
- By-product material waste (11.e(2))
- High-level radioactive waste
- Waste shipped by rail
- Oil or petroleum products, other than incidental
- Depleted uranium (DU) from uranium enrichment, uranium conversion/deconversion, large quantities of DU, DU exempt radioactive materials (i.e., counterweights), and waste containing greater than 10 nanocuries per gram DU
- Hazardous waste
- Mixed waste
- Soil, debris, or other loose items as bulk waste unless the waste will not be disposed in the container in which it is shipped
- Waste in a cardboard, fiberboard, or wood disposal container

3.0 Waste Types or Streams

The Licensee is authorized by this license to receive commercial low-level radioactive waste for disposal from Texas Compact party state waste generators. Authorized waste streams and their associated waste classification generated from nuclear utilities and non-utility generators in this license as listed in License Condition (LC) 141, Table 2. Note: For the purposes of this WAC “waste types” and “waste streams” have the same meaning.

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Acceptable waste generation activities include academic research, use of radionuclides in medicine, production of nuclear energy, industrial applications, and decommissioning waste from both utility and non-utility nuclear facilities. All waste and packages received for disposal in the CWF are intended for disposal and shall be received and disposed without requiring treatment or processing within 24 hours of receipt. If contingencies require that the Licensee implement emergency storage, notice to the executive director must occur within 24 hours and consistent with LC 48 of this license. Waste requiring verification sampling may be stored in the waste staging building for up to 30 days while awaiting sampling analytical data. Certain types of waste will require special treatment, packaging, or processing prior to shipment for disposal.

3.1 Waste Containing Quantities of Concern - Written notification must be submitted to the Licensee no less than three (3) weeks before the planned receipt of waste containing quantities of concern at the land disposal facility. The Licensee will develop plans for the increased surveillance and security for shipment containing quantities of concern as required in U.S. NRC order EA-05-090; plans and procedures to ensure that the waste will be disposed the same day, and contingency storage plans that satisfy U.S. NRC order EA-05-090 if, due to unforeseen circumstances, the waste must be stored overnight.

3.2 Sealed Sources – All sealed sources (i.e., source material deposited in a plastic medium or ANSI designed special form sources) or special form radioactive material, with the exception of check sources, disposed of in the CWF shall be doubly-packaged and encased in concrete or similar inert material within the outer package. For waste classification purposes, the activity in a waste package may be averaged over the entire package in accordance with the United States Nuclear Regulatory Commission (U.S. NRC) “Final Branch Technical Position on Concentration Averaging and Encapsulation, Revision in Part to Waste Classification Technical Position, January 17, 1995.”

3.2.1 Encapsulation media shall be in the form of structural grade cement or material technologically equivalent or superior to structural grade cement as demonstrated through technical specifications and testing.

3.2.2 The encapsulation method for sealed sources shall be geometrically centered within a minimum of four (4) inches of encapsulation media distributed uniformly around the source(s). Sealed sources may be placed in high integrity containers for disposal. More than one source may be placed in a single container as long as the requirements of this WAC, this license, and 30 TAC Chapter 336 rules are met.

3.2.3 The maximum concentration of any radionuclide(s) in one or more sources encapsulated in a single container must not exceed the concentration limits specified in 30 TAC §336.362(a)(2) for Class C low-level radioactive waste. Combinations of radionuclides in a single container shall not exceed unity.

3.2.4 The maximum amount of cesium-137/barium-137 gamma-emitting radioactivity in a source(s) that may be encapsulated in a single container is 30 curies (Ci). Other gamma emitters shall not exceed Class C limits or have a dose rate that exceeds U.S. Department of Transportation (U.S. DOT) shipping requirements.

3.2.5 The maximum amount of radioactivity in a source(s) from transuranics,

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other than plutonium-241 and curium-242 that may be encapsulated in a single container, is 30 millicuries (mCi).

- 3.2.6 The maximum amount of carbon-14 radioactivity in a source(s) that may be encapsulated in a single container shall not exceed one (1) Ci.
- 3.2.7 The maximum amount of radium-226 radioactivity in a source(s) that may be encapsulated in a single container shall not exceed 30 mCi.
- 3.2.8 The CWF 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 specifically notified the Licensee and TCEQ of the intent to ship such a source. The notification shall consist of telephone and written notification prior to the initial written request for shipment. The notification shall indicate the isotope, activity, form of the source, a description of the packaging utilized, radiological data, and requested date of arrival. Additionally, a copy of the advance written notification must accompany the shipment. If the source is a nationally-tracked source, see the requirements below in Sections 3.2.9-3.2.12
- 3.2.9 A nationally-tracked source, as defined in 10 CFR §20.1003, refers to a sealed source containing a quantity equal to or greater than Category 1 or Category 2 levels of any radioactive material listed in Appendix E to Part 20 – “Nationally Tracked Source Thresholds.”
- 3.2.10 Prior to shipping, the generator shall provide the Licensee and the TCEQ the following information specifically identifying these sources for review and approval.
 - 3.2.10.1 Generators name, shipping address, radioactive material License number, and name of individual preparing the reported information.
 - 3.2.10.2 The manufacturer, model, and serial number of the source or, if not available, other information to uniquely identify the source.
 - 3.2.10.3 The radioactive material in the source and current activity in becquerels and curies. The activity reported must be the same as the activity that will be listed on the shipment manifest.
 - 3.2.10.4 The date the source strength is reported.
 - 3.2.10.5 The requested shipping date and estimated arrival date.
 - 3.2.10.6 The waste manifest number and the waste disposal container number.
- 3.2.11 Upon waste source shipment arrival, the Licensee will complete U.S. NRC Form 748, National Source Tracking Transaction Report as required by the close of the next business day. The form may be submitted electronically and is located at: <http://www.nrc.gov/security/byproduct/nsts/report-nsts/nrc748d-dispose-source.pdf>
- 3.2.12 Upon disposal of the sources, the Licensee will complete U.S.-NRC Form 748, National Source Tracking Transaction Report as required by the close

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of the next business day.

- 3.3 Biological/Pathogenic Wastes – Waste containing biological, pathogenic, or infectious material shall be treated by the generator or processor to reduce to the maximum extent practicable the potential hazard from the non-radiological materials.
- 3.3.1 Incineration is the preferred method of treatment for wastes containing biological, pathogenic, or infectious material. See Section 8.0 for details on limits of attribution from treating and processing waste. Incinerator ash waste shall be solidified or treated in such a manner as to be rendered non-dispersible in air, exclusive of packaging.
- 3.3.2 Biological waste treated by incineration can be considered “treated biological waste” or “routine” upon acceptance at the site.
- 3.3.3 Biological waste not undergoing incineration or thermal treatment has specific packaging requirements and will be considered “untreated biological waste” upon acceptance at the disposal facility site.
- 3.3.4 For the standard over-pack method for untreated biological waste using absorbent and lime. Standard over-packs may be placed into high integrity containers (HICs).
- 3.3.4.1 Waste containing hazardous, biological, pathogenic, or infectious material must be packaged to reduce to the maximum extent practicable the potential hazard from the non-radiological materials. In addition, waste containing biological, pathogenic, or infectious material that is not incinerated shall be doubly packaged in drums composed of steel, polyethylene, or equivalent material as follows:
- The inner container with the capacity of 55-gallon or less, shall have a water-tight liner at least four (4) mils thick and be hermetically sealed after filling;
 - The biological material shall be thoroughly layered in the inner container in a ratio of 30 parts biological material to at least one (1) part slaked lime and ten (10) parts absorbent, which shall be agricultural grade four (4) vermiculite or medium grade diatomaceous earth, or other absorbents that have received approval by the executive director by volume. The addition of formaldehyde is prohibited.
 - The closure on the inner container shall be a standard lid with securely attached ring and bolt. Lever locks are prohibited.
 - Unless otherwise authorized by the executive director, the outer container, which must have a volume of at least one and one-half (1.5) times the inner container, must be filled initially with at least four inches (4”) of absorbent material, the inner container placed in an upright position, and the remaining volume filled with the absorbent material, then securely closed and properly sealed.

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- 3.4 Source Material and Special Nuclear Material –This license, by LC 5.E and LC 5.F, authorizes receipt of source material and special nuclear material in the following quantities and with limitations:
- 3.4.1 Source Material - Above ground possession of source material not to exceed 30,000,000 grams.
- 3.4.2 Special Nuclear Material – Above ground possession of waste that contains special nuclear material (SNM), as defined in 30 TAC §336.2(127), is limited to quantities not sufficient to form a critical mass - uranium enriched in the radioisotope 235 in quantities not exceeding 350 grams of contained uranium-235; uranium-233 in quantities not exceeding 200 grams; plutonium in quantities not exceeding 200 grams; or any combination of these in accordance with the following formula. For each kind of SNM, determine the ratio between the quantity of that SNM and the quantity specified above for the same kind of SNM. The sum of such ratios for all of the kinds of SNM in combination may not exceed one (1). Upon receipt and acceptance by the Licensee and the TCEQ, SNM falls under the possession limitations of this license, as also stated above.
- 3.5 Hazardous Waste –No mixtures of radioactive waste and hazardous waste as defined by Title 40 Code of Federal Regulations (CFR) Part 261 and TCEQ rules 30 TAC Chapter 351 will be accepted at the CWF.
- 3.5.1 Waste containing hazardous listed chemicals or that exhibits hazardous characteristics is prohibited from acceptance and disposal at the CWF at all times. A mixture of radioactive waste and waste which was classified a hazardous solely because it exhibited one or more of the hazardous characteristics defined in 40 CFR Part 261, Subpart C, but has been treated in manner such that it no longer exhibits any of the characteristics, will be reviewed for acceptance on a case-by-case basis. As required by 40 CFR §261.24, the Toxicity Characteristic Leaching Procedure shall be used.
- 3.5.2 A description of the treatment process and results of the analytical tests of the final waste shall be submitted to the Licensee for evaluation prior to shipment.
- 3.6 Lead - Only lead used for radiation shielding purposes may be acceptable for disposal in the CWF. Requests for disposal of non-contaminated lead used for shielding purposes must be evaluated by the Licensee prior to request for shipment to the CWF. Generators shall provide the following information for shipments containing lead:
- Type of lead used (sheet, block, pig, etc)
 - Amount of lead used (in pounds) and a depiction of its location and configuration within the package
 - Container type and size
 - Description of the waste requiring shielding including waste classification
 - Approximate external dose rate prior to shielding

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- External dose rate after shielding

4.0 Waste Generator Audit/Certification

- 4.1 Condition 92 of this license requires operator procedures to address verification of waste packages shipped to the CWF. The Licensee has submitted a plan for implementation of the Quality Assurance (QA) Generator Certification Program for generators planning to ship waste to the CWF for disposal. The generator for Licensee certification purposes is the individual or company that is listed as the generator on the waste profile submitted to the Licensee. The operator generator certification packet is described below and in the Licensee's Waste Acceptance Plan (WAP), Section 5.1.1.

The generator should submit waste information as early in the process as possible. Each generator certification packet may be accompanied by multiple waste profiles, one for each waste stream that the generator proposes to ship to the CWF. The generator certification is based on the waste stream information the generator provided at the time of certification. The generator should provide information on all planned waste streams. The Licensee will conduct on-site audits as described in Section 4.7 below.

- 4.2 Once certified, generators will receive a generator certification identification number valid for a 12-month period. The Licensee will contact the certified generators approximately 60 days in advance of expiration to start the recertification process. The generator certification identification number is required on all documentation or correspondence to the Licensee regarding waste disposal at the CWF. Second or third party programs that are used in the classification, characterization, or processing of a waste to may be reviewed during the generator certification process. For example, if a generator of waste hires an outside shipper to develop shipping documentation for their waste shipment to the CWF, then the shipper's process and procedures will be reviewed during the generator's certification process.
- 4.3 Any discrepancies in waste shipments sent to the CWF by a shipper will be the responsibility of the generator. The generator identification number may be suspended if any waste shipment from a generator is received and a major discrepancy, as defined in the Licensee's approved WAP, is confirmed by the Licensee and the TCEQ. Generators with suspended identification numbers must apply for recertification by resubmission of the generator certification packet. The resubmitted packet should include measures taken to prevent the reoccurrence of the violation that resulted in the non-compliance. Non-compliant generators are also required to undergo the site audit process to qualify for re-certification, regardless of the waste receipt categories associated with the generator's wastes.
- 4.4 A waste broker may be the generator for purposes of the waste profile and require their own certification number, or part of the generator certification process of the original generator of the waste depending on whether the broker or the original generator is going to be listed on the waste profile. The broker may act as an authorized agent under the original generator's certification program as long as the original generator has designated the broker in writing as its agent. Small generators may ship through a waste broker using the broker's waste profile and may not have to complete the waste generator audit/certification program as

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determined on a case-by-case basis. Waste shipped using a broker's profile will list the original generator on the manifest. If a treatment or processing facility were to combine wastes from more than one Texas Compact party states' generator and perform comprehensive analyses of the waste blend such that information developed by the original waste generators was not used for classification or characterization of the final waste blend, then the treatment or processing facility would typically be considered to be the generator for certification purposes only.

- 4.5 The generator certification packet submitted to the Licensee for waste shipments intended for disposal at the CWF should contain documentation of the following programs, as applicable:
- The waste classification/characterization program, including sampling and analytical procedures and frequencies, quality assurance/quality control procedures, procedures for documenting free liquids and void space, and procedures for verification that waste is not hazardous;
 - Documentation on the presence or absence of chelating agents, and, where chelating agents are present or potentially present, the methodologies for establishing a conservative upper bound for the typical concentration of chelating agents in each waste, and the basis upon which the methodologies provide a conservative upper bound of chelating agent concentrations;
 - The process control program establishing the procedures and systems in place to maintain consistency in the generating process and resultant wastes (required only when process knowledge is used in characterizing a waste);
 - The waste packaging and shipping program(s); and
 - The personnel training program applicable to persons responsible for all component steps in performing waste classification, characterization, packaging, and shipping.

In addition, the generator certification packet should include proof of the generator's radioactive material license, as applicable. This could include a copy of the license, the cover page, results of regulatory inspections and compliance audits, and resolution of any alleged noncompliant conditions or practices that would impact the generator's waste program. Because the generator certification requirements are based on the types of waste that the generator is going to send to the CWF, the Licensee suggests submitting waste profiles with the waste certification packet. The Licensee process includes approval of waste profiles after the generator is certified through the generator certification process.

- 4.6 For planned waste profiles that require an outer cask for shipment, oversized large component, or that have a high dose rate potential, referred to a High Container Dose Rate (HCD) waste section in the Licensee's approved WAP, the Licensee will perform an onsite audit except as provided in Section 4.7. This audit will encompass the generator's waste classification/characterization process, chelating agent determination, packaging/shipping program, and other associated programs, practices, and records as part of the certification process for that generator. The Licensee may also perform an on-site audit for cause, based upon review of the generator certification packet. If the original generator certification

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did not include a site audit, and a new waste stream is submitted that triggers an audit for certification, then a site audit will be planned by the Licensee. The Licensee will develop an audit plan for each generator that requires an audit. The plan will include audit procedures and/or checklists that reflect specific elements of the programs submitted in the generator certification packet to determine compliance with the approved WAP. The following activities, at a minimum, will be conducted by an auditor as part of the generator site audit:

- Observe or verify on-site waste handling procedures, including transfer, storage, processing, packaging, and shipment preparation procedures;
 - Interview personnel with direct and supervisory responsibility for waste classification/characterization and waste handling;
 - Observe or verify the actions taken to ensure that wastes shipped to the LLRW facilities meet each waste acceptance criterion (e.g., absence or quantity of free liquids, void space in containers, nonhazardous waste determinations for LLRW);
 - Observe or verify the performance of measurements, analyses, calculations, or other methods used to classify and characterize radioactive waste;
 - Review records documenting use of chelating agents and the basis for the generator's waste profile information regarding chelating agents; and
 - Review records documenting radioactive waste classification and characterization procedures including, as applicable, process knowledge documentation.
- 4.7 Nuclear utility generators whose facilities are inspected by the U.S.-NRC will not be subject to the Licensee's on-site audit process except "for cause." Nuclear utility facilities should submit the latest U.S. NRC inspection report covering the area of radioactive material processing and transportation to the CWF along with the generator certification packet. In the event the U.S. NRC inspection report brings into question the utility facility's ability to compliantly deliver waste to the CWF, a "for cause" site audit will be performed.
- 4.8 The waste profile and supporting documentation should demonstrate that the waste stream is compliant with this license and applicable regulatory requirements. The completed profile form provides an overview of the waste stream and its physical, chemical, and radiological characteristics. Below are some general guidelines for filling out the waste profile and guidance on supporting documentation.
- A separate profile must be completed for each waste stream;
 - Any field not applicable on the form should be marked as "NA";
 - A Licensee contact, waste profile number, and revision that are on the profile form will be assigned by the Licensee.

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- The following radionuclides are required to be placed on a waste profile, if applicable:
 - Radionuclides that are required to be listed in accordance with 49 CFR Part 173.203(d);
 - Radionuclides used for low-level radioactive waste classification (30 TAC §336.362). Class determination under this regulation takes into consideration an additional isotope (radium-226) beyond those considered in the federal 10 CFR Part 61 analyses;
 - Enriched uranium-235, uranium-233, plutonium-239, and plutonium-241.
 - Uranium and/or thorium considered source material.
 - Hydrogen-3 (tritium), technetium-99, iodine-129, carbon-14.
 - Radionuclides that affect the dose rate of a package or shipment.
- Multiple waste classes can be included on the same waste profile but class determination of containers will need to be provided at the time of individual shipment request;
- A copy of the Material Safety Data Sheet (MSDS) for any absorbent used is required to be attached to the waste profile;
- Waste profile information should be submitted at least on an annual basis, or when the process generating a waste, or the characteristics of a waste change from the information presented in the current waste profile; and
- If a revision to a waste profile is necessary, a revised waste profile should be submitted to the Licensee prior to the generator scheduling additional shipments of the waste.

5.0 Waste Classification

All waste classification shall be conducted by the generator in accordance with the waste classification tables in 30 TAC §336.362, Appendix E. Waste class verification shall be performed by the Licensee through the approved WAP and generator audit/waste approval process both prior to shipping and upon receipt. Waste class verification may also be performed by the TCEQ prior to acceptance.

The classes of waste authorized for disposal at the CWF are Class A, B, C and Containerized Class A low-level radioactive waste. Containerized Class A is “Class A low-level radioactive waste which presents a hazard because of high radiation levels. High radiation levels are radiation levels from an unshielded container that could result in an individual receiving a dose equivalent in excess of 0.1 rem (1 millisievert) in one hour at 30 centimeters from any surface of the container that the radiation penetrates.”

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Additional documentation will be required by TCEQ from the generator on waste classification. See Section 7.0 below.

6.0 Waste Characterization

Waste characteristics shall be identified by the generators and verified by the Licensee through the approved WAP and the generator audit/waste approval process. Waste generators seeking authorization to ship waste to the CWF shall follow the generator certification process provided in the Licensee's approved WAP. Only waste streams that have been evaluated and approved for acceptance under LC 141, Table 2 are authorized for disposal. Waste characterization verification may also be performed by the TCEQ. Minimum waste characteristic requirements shall be consistent with 30 TAC §336.362(b)(1) and this license, including but not limited to:

- 6.1 Liquid waste shall be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid (See Section 8).
- 6.2 Solid waste containing liquid shall contain as little free-standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1.0% of the volume.
- 6.3 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.
- 6.4 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. This does not apply to radioactive gaseous waste packaged in accordance with requirement below.
- 6.5 Waste must not be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be nonflammable.
- 6.6 Waste in a gaseous form shall be packaged at an absolute pressure that does not exceed 1.5 atmospheres at 20 degrees Celsius. Total activity shall not exceed 100 curies (3.7 terabecquerels) per container.
- 6.7 The maximum weight percent of chelating agents is eight percent (8%) for all waste streams. Chelating agents shall be made immobile to the maximum extent possible, to minimize intrusion into the surrounding environment and migration into unaffected areas.
- 6.8 If waste received is not properly characterized, classified, or packaged by the generator it will not be accepted for disposal at the CWF. Upon inspection by the Licensee and the TCEQ and discovery of the non-compliance, the Licensee shall immediately notify the generator to correct any discrepancies. The TCEQ shall be notified within 24 hours of any non-compliant waste shipment.
- 6.9 The Licensee may not open any package or shipping container except for the following purposes:
 - 6.9.1 Inspecting to insure compliance with this license and/or confirming package contents.
 - 6.9.2 Repairing or repackaging damaged containers.

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6.9.3 Returning outer shielding or shipping containers.

6.9.4 Waste shipment verification will be conducted according to the following table.

	Containerized Soil	Containerized Debris	High Dose Rate	Cask Waste
Pre-shipment Sample	Required	See note 2	See note 3	See note 3
Intrusive Visual Inspection	10% of containers from each profiled waste stream per shipment	10% of containers from each profiled waste stream per shipment	See note 3	See note 3
Intrusive Sampling/Analysis	10% of containers from each profiled waste stream per shipment	See note 2	See note 3	See note 3
External Radiologic Analysis	See note 1	10% of containers from each profiled waste stream per shipment	10% of containers from each profiled waste stream per shipment	100%

Note 1: External radiologic analysis not performed due to sampling and analysis requirement

Note 2: Sampling and analysis not performed due to physical nature of the waste

Note 3: Intrusive inspection and sampling deferred due to ALARA considerations

7.0 Waste Tracking

Waste tracking from generation or point of origin to disposal ensures control and consistency in maintaining the pedigree of the waste and for the purposes of accurate waste classification. The CWF inventory must be tracked closely by the Licensee Waste inventory will be incorporated into the Performance Assessment Maintenance Plan (PAMP) and evaluated to ensure that the performance objectives will continue to be met during land disposal facility operations. The Licensee must maintain records for each shipment of waste disposed of at the land disposal facility. The records must conform to the requirement of 30 TAC §336.740(a). All records and reports required by the license, rules, or orders must be complete and accurate.

Every waste shipment that is eligible for acceptance and transfer of title to the State of Texas will require additional documentation to be completed by the waste generator and submitted to TCEQ for verification and tracking purposes. A TCEQ *Waste Generator Disposal Guide* provides

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steps to waste disposal for waste generators and links to required TCEQ forms (see <http://www.tceq.texas.gov/permitting/radmat/licensing/generator-site-access>). Each generator or generator's agent is required to use TCEQ Form 20225, *Texas Compact Waste Shipment Verification* which can be found on TCEQ's external web page by clicking on the "Forms" link located on the left portion of the page. The form must be completed and submitted via electronic mail to RADMAT@TCEQ.texas.gov or by facsimile at 512-239-6464 prior to any planned waste shipment to the CWF. Generators must also submit the waste manifest for each shipment by attaching it to the Waste Shipment Verification Form. The required key information includes, but is not limited to, the following:

- 7.1 Generator – Name and address of the company, organization, institution, etc., that is the original generator of the waste to be disposed of. Original generator means the last person who puts radioactive material to practical use. A broker may not list itself as the original generator of its client's radioactive material or waste, nor sign on behalf of the generator. A broker may assist the generator in completing the Waste Shipment Verification Form. However, the generator must sign the completed form.
- 7.2 Generator Type – The waste was generated from what type of activity (i.e., research/academic, medical, nuclear utility, etc.), including pedigree from original waste type
- 7.3 Type of Processing or Treatment – processing or treatment the waste has undergone (i.e., encapsulation, solidification, compaction, incineration, etc)
- 7.4 Waste Description – A description of the type of waste (e.g., sealed source, dry activated waste (DAW), resins, filter media, activated metals, etc.)
- 7.5 Waste Classification - Classification of waste (i.e., Containerized Class A, Class B, or Class C low-level radioactive waste)
- 7.6 Waste Classification Method – How the waste was classified (i.e., U.S. NRC "Final Branch Technical Position on Concentration Averaging and Encapsulation, Revision in Part to Waste Classification Technical Position, January 17, 1995.", etc.)
- 7.7 Type, Weight, and Volume of Container – B-12, B-25, drum, HIC, etc., weight in lbs, and volume in m³
- 7.8 Curie Content – Total millicuries per radionuclide in each package
- 7.9 Radionuclide Concentrations – The concentration of radionuclides in each package in activity per cubic meter or activity per gram.
- 7.10 Radiation Levels – External dose rates at contact, 30 centimeters, and one meter taking into account ALARA considerations. High dose rate packages may be excepted.

8.0 Treatment, Stabilization, and Waste Minimization

Treatment and processing for the purposes of stabilization and waste minimization are acceptable for waste disposed at the CWF. Treatment and processing for the purposes of dilution

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or changing waste classification are prohibited in accordance with 30 TAC §336.229. Acceptable forms of treatment for stabilization and waste minimization include, but are not limited to:

- Compaction and super-compaction;
- Encapsulation;
- Incineration for Dry Active Waste (DAW) and preferred for biological waste; and
- De-watering

Note: Any package that has undergone de-watering to meet free liquid requirements will be considered acceptable for disposal as long as documented de-watering was performed within 180 days or less prior to shipment.

- Solidification

Approved solidification agents include:

- Vinyl Ester Styrene
- Cement
- Bitumen
- Aquaset II-H
- Petroset H
- MetalPlex III
- Advanced Polymer (Diversified Technologies)
- Energy Solutions Stable Cement
- WMG Cement (concrete)
- Glass (Impact Geomelt)
- Other solidification media which has been reviewed and approved by the TCEQ, U.S. NRC, or Conference of Radiation Control Program Directors (CRCPD) to have passed U. S. NRC 1983 Branch Technical Position Paper on Waste Form tests.

- Sorting and segregation; and
- Rendering biological, pathogenic, or infectious waste void of the non-radiological hazard.

The generator or processor must demonstrate that any waste that is treated or processed shall restrict commingling of waste with nonparty Compact sources to no more than five percent (5%) of total radioactivity. If a generator sends a waste stream to a processor for incineration, either the generator or processor have to demonstrate that the processed waste contains no more than five percent (5%) total radioactivity contribution from previous nonparty Compact waste or differently defined waste types, including Naturally-Occurring Radioactive Material (NORM), remaining in the process or treatment equipment. This license does not authorize disposal of imported, nonparty Compact waste at the CWF.

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9.0 Waste Form and Packaging Requirements

This section provides preparatory measures for waste generators, waste brokers, and shipment transporters to facilitate waste acceptance by the State of Texas. Waste form, packaging requirements and surface contamination limits are intended to be met not only at the point of waste origin during preparation and packing of the disposal container, but also at the point of waste acceptance for disposal. This section on waste form and packaging provides waste generators, the Licensee, and the State of Texas assurance that shipment rejection, repackaging, and decontamination of packages and vehicles can be avoided, except under infrequent circumstances. A TCEQ *Waste Generator Disposal Guide* provides steps to waste disposal for waste generators and links to required TCEQ forms (see <http://www.tceq.texas.gov/permitting/radmat/licensing/generator-site-access>)

Low-level radioactive waste must be packaged in such a manner that waste containers received at the land disposal facility are not deformed to the extent that, there is a loss or dispersal of contents, there is an increase in the external radiation levels as recorded on the manifest (within instrument tolerances), or there is degradation due to chemical, physical or radiological reaction which could result in a loss of container integrity. Where the license conditions for the disposal site are more restrictive than the provisions of §336.362(b)(1), the license shall govern.

- 9.1 Waste shall not be packaged for disposal in cardboard or fiberboard boxes.
- 9.2 All commercial waste shall be placed in reinforced concrete canisters at the point of emplacement into the CWF – the Licensee’s modular concrete canisters (MCCs). Large reactor components that will not fit into a MCC will be evaluated case-by-case for canister equivalency determination (See section 9.5 below).
 - 9.2.1 MCCs are intended to accommodate a variety of standard industry disposal packages (55-gallon drum, 85-gallon drum, HIC, B-25 metal box) in certain configurations. Disposal packages must be emplaced in approved MCCs consisting of two designs, rectangular and cylindrical, with the following dimensions:
 - 9.2.1.1 Rectangular MCC Dimensions:
 - external height 10’4”
 - internal height 9’2”
 - length 10’10”
 - width 9’0”
 - internal cross-sectional area 9’6” x 7’8”
 - 9.2.1.2 Cylindrical MCC Dimensions:
 - internal height 9’2”

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- external height 10'4"
 - inside diameter 6'8"
 - external diameter 7'8"
- 9.3 Packaging requirements for various container types must conform to industry standards and meet Texas Department of State Health Services (DSHS) and U.S. DOT testing specifications, i.e. B-12 and B-25 boxes, High Integrity Containers (HICs), casks, etc.
- 9.4 Bulk-waste disposal is prohibited. All commercial bulk materials, including soil and debris, are required to be shipped in a disposal package or container and then emplaced on-site in an approved concrete canister (MCC) for disposal.
- 9.5 Large Components
- 9.5.1 Large components not placed in MCCs shall meet waste form and stability requirements consistent with 30 TAC §336.362(b)(2)(A) and 30 TAC §336.730(b), and shall meet a canister equivalency determination. Stable waste is waste that is inherently stable due to its form, rendered stable by placement into a high integrity container, or rendered stable by processing with an approved solidification media. Wastes designated as containerized Class A, Class B, or Class C under 30 TAC §336.362(a) and 30 TAC §336.702(5) (relating to Definitions) shall be disposed of within a reinforced concrete container and within a reinforced concrete barrier, or within containment structures made of materials technologically equivalent or superior to reinforced concrete. Exceptions may be made for Class B and C large components, on a case-by-case basis.
- 9.5.2 A 120-day pre-notification plan shall be submitted to the TCEQ for all large components and items of MCC non-conformance that require special handling or emplacement in order to allow for engineering and ALARA reviews. The plan shall include, but not be limited to the following:
- Drawings, photographs, and dimension specifications;
 - Description of voids and how they will be filled;
 - Packaging configuration and how it meets stability requirements;
 - Rigging, loading, and emplacement plan;
 - Transportation mode and meeting DSHS and DOT regulations;
 - Radiological characterization and surveys; and
 - ALARA and safety plan

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9.6 High Integrity Containers (HICs)

A HIC container commonly designed to meet the structural stability requirements of 30 TAC §336.362(b)(2) and to meet DOT requirements for a Type A package. All waste containers shall be filled to the maximum extent practical.

9.6.1 All HIC and liner specifications (i.e., volume, weight, material properties, attenuation capability, special features, etc.) shall be submitted to TCEQ for approval prior to acceptance of the container for disposal. Previous certifications from other state regulatory programs may be acceptable as determined by the TCEQ. Examples of other state regulatory approved manufacturers include:

- Pacific Nuclear
- Nuclear Packaging
- Chichibu Cement
- (SEG) LN Technologies
- Chem-Nuclear
- Energy Solutions

9.6.2 All ion exchange resins, liquid filters and/or liquid filter media and sludges shall contain as little free standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid contained be in excess of 1% of the waste volume. This shall be accomplished by de-watering or by using appropriate solidification agents (See de-watering note in Section 8 of this WAC).

9.6.3 MCCs qualify as meeting the stability requirements in 30 TAC §336.362(b)(2)(A). Liquid cartridge filters, which are encapsulated, grouted, and classified by concentration averaging, are acceptable for disposal in MCCs. Activity limits in this WAC for encapsulated sources do not apply to packages of encapsulated or grouted filters.

9.6.4 Resins can only be disposed in HICs, liners, or other approved packages. HICs shall be processed or handled as a liner if the package is not intended to provide structural stability. Resins can only be used as fill material in HICs or liners.

9.7 Waste Package/Container Lifting Devices

All disposal packages (boxes, liners or HICs) shall have appropriate lifting devices to facilitate ease of handling and for ALARA purposes.

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- 9.7.1 Disposal containers shall have adequate lifting devices secured on the container or pallet.
- 9.7.2 Lifting slings and cables shall be of sufficient length (e.g., overlap when lying on the top of the container) so cask-operating personnel can reach the lifting device with a remote operating tool from one side of the cask without direct exposure to the waste package(s).
- 9.7.3 When multiple containers are loaded inside a shipment cask, the containers shall be tied or secured together at the top to prevent shifts in weight and/or falling during transit and offloading.
- 9.7.4 Lifting slings or metal pallets attached to disposal containers are considered sacrificial.

9.8 Contamination Limits for Packages and Vehicles

Surface contamination of disposal packages shall be reduced to the maximum extent practicable. Reasonable means, considering ALARA, shall be used to minimize surface contamination on packages and transport vehicles during preparation of waste for shipment. Contamination limits for the package, the barrier and the vehicle shall comply with 49 CFR §173.428, 49 CFR §173.443(c), and 25 TAC §289.257.

- 9.8.1 All packages, with the exception of casks, received at the CWF shall not have surface contamination in excess of 2,220 dpm/100 cm² beta-gamma and 220 dpm/100 cm² alpha.
- 9.8.2 Enclosed vehicles used solely for the transport of radioactive materials (Exclusive Use) shall not have removable contamination in excess of 2,220 dpm/100 cm² beta-gamma and 220 dpm/100 cm² alpha.
- 9.8.3 For shipment casks, removable contamination shall not exceed 2,220 dpm/100 cm² beta-gamma and 220 dpm/100 cm² alpha.
- 9.8.4 For shipment casks, internal contamination shall not exceed 220,000 dpm/100 cm² beta-gamma and 22,000 dpm/100 cm² alpha.

9.9 Void Spaces In Waste Packages

Void spaces within the waste and between the waste and its package must be reduced to the extent practicable in accordance with 30 TAC §336.362(b)(2)(C). Void spaces between the modular concrete containers must be reduced to the maximum extent practicable. Voids within the package shall be reduced to maximum extent practicable and can have no more than 15% void space or head space for disposal in the CWF unless approved prior to shipment. Exceptions to the following requirements may be requested and will be evaluated by TCEQ on a case-by-case basis.

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- 9.9.1 Resins can only be disposed in HICs, liners, or other approved packages and can have no more than 15% void space or head space.
- 9.9.2 Interstitial space for rigid items, such as liquid cartridge filters, will be evaluated on a case-by-case basis.
- 9.9.3 Irradiated hardware and other similarly structurally stable components that fit into MCC's will be placed to fill void spaces to the maximum extent practicable.

10.0 Container Weight

The waste container or waste packages planned for disposal in the CWF shall meet all requirements and specifications in Sections 9 and 11 and will usually be conveyed in the form of drums, B-25 boxes, liners, HICs, and large components. Each package must be weighed upon receipt and documented unless there are limitations based on high dose rates. In determining the amount of disposal charges and surcharges, the shipping container weight on the manifest must be subtracted from the package weight to obtain the true waste container weight if the waste is transported in a shielded cask or over-pack containers.

- 10.1 Any waste or waste package container or package received for disposal at the CWF that has a net weight of less than 10,000 lbs. will have no additional surcharges applied to the disposal cost.
- 10.2 Any waste or waste package container or package received for disposal at the CWF that has a net weight of greater than 10,000 lbs. but less than 50,000 lbs. will be imposed an additional surcharge to the disposal cost.
- 10.3 Any waste or waste package container or package received for disposal at the CWF that has a net weight of greater than 50,000 lbs. will be imposed an additional surcharge to the disposal cost greater than the surcharge imposed for packages weighing between 10,000 and 50,000 lbs.

11.0 Transportation

Each shipment of low-level radioactive waste destined for the CWF shall meet all regulatory requirements for transportation in DSHS regulations (25 TAC §289.257) U.S. DOT regulations (49 CFR Parts 171-180), U.S. NRC regulations, United States Environmental Protection Agency (U.S. EPA), and the requirements of this license. All waste shippers and transporters wishing to transport low-level radioactive waste to the CWF will be required to submit a fee, emergency plans, quality assurance programs for packaging, and proof of financial responsibility to DSHS, Radiation Safety Licensing Branch for approval prior to shipment of waste. The DSHS has developed guidance in assisting transporters that describes the process for submission of documentation as well as fee payment entitled *Regulatory Guide 2.19 – Guide for Submission of Documents and Fees by Low-Level Radioactive Waste Shippers and Transporters*.

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All low-level radioactive waste intended for disposal at the CWF shall be manifested in accordance with this WAC and TCEQ requirements, 30 TAC §336.363, 25 TAC §289.257(d)(d), 10 CFR §61.80, 10 CFR §20.2006, and all applicable U.S. DOT regulations. The licensee must maintain all records and shipment manifests pertinent to the transportation, receipt, and disposal of low level radioactive waste of each shipment, including waste profiles, waste manifests, and any additional waste shipment information, until authorization is given by TCEQ for transfer or disposal of such records. In addition to meeting transportation requirements under both DSHS regulations and DOT regulations all waste shipments sent to the CWF shall meet requirements listed below in Section 11.1 – Section 11.13 of the WAC. Exceptions to the following requirements may be requested and will be evaluated by TCEQ on a case-by-case basis.

- 11.1 Waste must be shipped in packages or containment structures that will prevent releases during transit and minimize impacts from accidents.
- 11.2 Waste must be packaged in such a manner that the waste will not be exposed to the environment anytime during transit.
- 11.3 Waste must be packaged in such a manner as to prevent water, including rain, ice, or snow, from contacting the waste during transit.
- 11.4 Five (5) days advanced notification is required for every requested waste shipment. A waste manifest must be included with advanced notification to WCS and TCEQ. Advanced reporting of manifest and related information to TCEQ will be in a manner prescribed to facilitate tracking of waste shipments by the State of Texas.
- 11.5 Approval for waste shipments, including day and time for scheduled arrival, will be provided by the Licensee to waste generators within three (3) business days of the request, with the exception of large components. Waste shipments should not be put in transit until and unless approval has been received and TCEQ has been notified.
- 11.6 The Licensee shall notify the shipper/generator, TCEQ, and DSHS when any shipment of radioactive waste has not arrived within 24 hours after the scheduled delivery time of the waste shipment.
- 11.7 The Licensee shall acknowledge receipt of the waste within seven (7) days of its acceptance for disposal by returning a signed copy of the shipping manifest to the shipper. Any discrepancies from the shipping manifest will be listed on the returned manifest.
- 11.8 Upon leaving public roadways under the jurisdiction of U.S. DOT, the waste shipment shall be temporarily staged, if applicable and authorized, in a secured area directly under the control of the Licensee.
- 11.9 Vehicles and shipping containers exiting the CWF shall be surveyed and decontaminated, if necessary, to release limits described in 49 CFR §173.428, 49 CFR §173.443(c), and 25 TAC §289.257.
- 11.10 Van Shipments

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Shipments arriving at the CWF must be properly blocked, braced, and/or secured. Exceptions to the following requirements may be requested and will be evaluated by TCEQ on a case-by-case basis.

- 11.10.1 Drums exceeding 1,000 pounds shall be palletized or equipped with appropriate lifting devices, which have been approved by the Licensee and notification made to TCEQ before shipment.
- 11.10.2 Drums of different sizes shall be segregated within the same shipment.
- 11.10.3 Drums shall not be placed on their sides.
- 11.10.4 Drum rings and bolts shall be properly secured and be structurally strong enough to support the weight of the drum while off-loading.
- 11.10.5 Drums with lever-lock closure devices shall have prior approval from the Licensee prior to shipment departure.
- 11.10.6 Bulging lids shall not exceed height of closure ring; bulging bottoms shall not extend below bottom ring of drums.
- 11.10.7 Drums may be double stacked with proper bracing and U.S. DOT approval, provided the heavier drums are on the bottom.
- 11.10.8 Packages and drums shall have a minimum clearance of three inches from the van walls.
- 11.10.9 Packages weighing less than 8,000 lbs. shall be elevated with skids from the van floor and accessible to a forklift.
- 11.10.10 Packages and drums shall each have a top clearance of at least twelve inches in a closed van.
- 11.10.11 No stacking of drums on boxes or boxes on drums.
- 11.10.12 Packages shall be provided with properly attached lifting devices. Lifting devices shall be secured to the top of packages and be readily available for easy access (See Section 9.7).
- 11.10.13 Shipments with packages weighing more than 8,000 lbs. shall be segregated from drums.

11.11 Flatbed Trailer Shipments

Shipments arriving at the CWF must be properly blocked, braced, and/or secured. Exceptions to the following requirements may be requested and will be evaluated by TCEQ on a case-by-case basis.

- 11.11.1 Packages with attached lifting devices are not required to have bottom clearance (See Section 9.7 of the WAC).
- 11.11.2 Boxes less than 8,000 pounds and/or drums shipped on flatbed trailers must be loaded in such a manner that they may be off-loaded from the side using a forklift.

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11.12 Shielding Cask Shipments

Exceptions to the following requirements may be requested and will be evaluated by TCEQ on a case-by-case basis.

- 11.12.1 Cask documents (Certificates of Compliance, handling and maintenance procedures, and drawings) shall be made available to WCS and TCEQ prior to shipment of the cask to the CWF.
- 11.12.2 All shipments shall strictly comply with the applicable Certificate of Compliance and/or the cask handling procedures for the cask in use (lid torquing, sealing gaskets, weight restriction, shoring requirements, etc.)
- 11.12.3 Drums with dose rates greater than 1 R/hr shall be shipped in a cask on metal pallets and will be disposed with the metal pallet.
- 11.12.4 Palletized drums inside a cask shall be loaded to prevent movement in such a manner that any shifted position of drums on the pallet will not increase radiation levels measured outside the cask.
- 11.12.5 A cask shipment consisting of individual disposal packages/containers not on pallets shall have attached to each container a lifting device that will allow off-loading by a single lift.
- 11.12.6 Customers using an U.S. NRC licensed cask not owned by the Licensee shall ensure that the Licensee is a "Registered User" of the licensed cask prior to shipment to the CWF. This applies to all shipments requiring licensed packages.

11.13 Shipping Container Damage

If a shipping container is dented, damaged or defective when received, the Licensee shall, if necessary, repair or repackage the shipping container and shall contact the generator to get direction on required remedial action. Shipping containers that fail to comply with U.S. DOT and DSHS transportation regulations are prohibited from being released for shipment prior to waste acceptance at the land disposal facility.

12.0 **TCEQ Resident Inspector**

The TCEQ Resident Inspector may inspect every waste shipment and manifest received at the CWF for proper classification and characterization prior to waste acceptance. Acceptance occurs when all waste acceptance criteria specified in this license have been satisfied as determined by the TCEQ. The waste acceptance determination of the TCEQ shall be final. No shipment may be accepted for disposal unless advance notification has been provided and the waste shipment has been inspected by the TCEQ. For waste intended for disposal at the Compact Waste Disposal Facility, waste acceptance is triggered by the final approval of the specific waste shipment by the executive director's Resident Inspector or other qualified TCEQ staff. Texas will take title for all low-level radioactive waste upon final approval by TCEQ and acceptance for disposal into the CWF.

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The Licensee shall notify the TCEQ within 24 hours of any shipments that do not comply with applicable law or this license. As part of the TCEQ inspection process, the TCEQ reserves the right to inspect manifests, waste shipments, and conduct visual inspections and external exposure rate surveys, as well as any other inspection and analysis deemed necessary by the TCEQ. Waste shipment packaging may be inspected for damage or compromised container integrity by the TCEQ. The Licensee must notify the generator/shipper and the TCEQ when it has been determined that a low-level radioactive waste shipment or part of a shipment cannot be accepted for disposal and the shipment has been returned to an authorized facility. The Licensee must notify the waste generator/shipper, TCEQ, and DSHS before the end of the next business day if a shipment has failed to arrive at the land disposal facility within the 24-hour time frame indicated in the advance notification or manifest. The Licensee should properly process and package any non-compliant waste shipment for disposal, with the generators consent. Waste received, but prior to waste acceptance into the CWF, shall not be returned to the generator unless specifically authorized by the generator.

13.0 References

All generators shipping low-level radioactive waste to the CWF shall comply with the following applicable documents:

- 13.1 Title 25 Texas Administrative Code, Chapter 289, *Radiation Control*, effective November 1996.
- 13.2 Title 30 Texas Administrative Code, Chapter 336, *Radioactive Substance Rules*, effective September 1998.
- 13.3 Texas Health and Safety Code, Chapter 401, *Radioactive Materials and Other Sources of Radiation*, enacted 1989.
- 13.4 U.S. Nuclear Regulatory Commission, *Final Branch Technical Position on Concentration Averaging and Encapsulation*, Revision in Part to Waste Classification Technical Position, January 17, 1995.
- 13.5 U.S. Nuclear Regulatory Commission, *Technical Position Paper on Waste Form*, 1983.
- 13.6 Waste Control Specialists LLC, *Application for Administrative Amendment to Radioactive Material License No. R04100 to Authorize Use of New and Revised Procedures*, October 2011.
- 13.7 Texas Commission on Environmental Quality, *Texas Compact Waste Shipment Verification Form*, March 2011.
- 13.8 U.S. Department of Transportation, Title 49 Code of Federal Regulations, *Transportation*, Parts 171-180
- 13.9 U.S. Nuclear Regulatory Commission, Title 10 Code of Federal Regulations, Part 20, *Standards for Protection Against Radiation*.

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- 13.10 U.S. Nuclear Regulatory Commission, Title 10 Code of Federal Regulations, Part 61, *Licensing Requirements for Land Disposal of Radioactive Waste*.
- 13.11 Waste Control Specialists LLC, *Application for License to Authorize Near-Surface Land Disposal of Low-Level Radioactive Waste*, August 2004.
- 13.12 Radioactive Material License No. R04100, issued September, 2009, and subsequent amendments.
- 13.13 Additional Security Measures (ASM) on the Transportation of Radioactive Material Quantities of Concern issued by the U.S. Nuclear Regulatory Commission (EA-05-007), July 2005 and associated updates.
- 13.14 Texas Department of State Health Services, *Regulatory Guide 2.19 – Guide for Submission of Documents and Fees by Low-Level Radioactive Waste Shippers and Transporters*.

14.0 Site Contact Information

Address: Waste Control Specialists LLC
9998 W. Hwy 176
Andrews, TX 79714

Phone Numbers:

Customer Service: (432)-525-8500
Toll Free: (888)-789-2783

15.0 TCEQ Contact Information

Address: 12015 Park 35 Circle
Austin, TX 78753
MC-233

Phone Number:

Radioactive Materials Division: (512)-239-6466

Electronic Mail: RADMAT@tceq.texas.gov

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Attachment D

Requirements Pertain to the Pavement Design

1. The calculation of the equivalent 18,000 pound (18-kip) single axle load is incorrect in the design. For example, the design calculation for the access road at the entrance shows that each application of a HS 20-44 vehicle would result in an 18-kip equivalency factor of 0.61. This is inconsistent with common engineering practice. A HS 20-44 design vehicle has 1 single axle of 8-kip and 2 tandem axles of 32-kip each. Furthermore, the 18-kip traffic equivalency factors for the aforementioned single and tandem axles are 0.036 and 0.843, individually using 1993 AASHTO guide. As a result, the 18-kip equivalency factor of one (1) application of a HS 20-44 truck is equal to 1.72 ($= 1 \times 0.036 + 2 \times 0.843$). The existing thickness design underestimates damages caused by HS 20-44 trucks. Therefore, the Licensee shall verify the design thickness and re-design if necessary.
2. The Licensee shall verify that the design is appropriate for the daily traffic (i.e. the anticipated daily applications of HS 20-44 trucks).
3. The Licensee shall verify the design section of asphalt concrete pavement (i.e., four (4) inches asphalt concrete plus 12 inches crushed stone base course) using the 1993 AASHTO guide for design of pavement structures. The submitted calculations show that an older AASHTO Interim Guide (1972) was used in the design.
4. The Licensee shall provide calculations for the thickness design of gravel roads. The design thickness is based on an assumed design input (i.e., a structure number). The design procedures of aggregated-surfaced roads are covered in the 1993 AASHTO guide. It is recommended to use the section of low-volume road design to confirm that the proposed thickness (i.e., 12 inches crushed stone) of gravel road is properly designed.
5. Regarding specification 31 80 00 (page 4), no requirements of sodium sulfate soundness loss, flat and elongated particles, and Los Angeles abrasion etc. are specified. Aggregates of suitable angularities and durability must be used in the base course. The Licensee shall provide these requirements in the specification.
6. Regarding specification 32 12 00 (page 2), the Licensee shall take a minimum of three (3) samples for acceptance tests of density and thickness.
7. Regarding specification 32 12 00 (page 6), it is unclear to state that “don’t overheat the material or cause thermal damage.” The Licensee shall specify the temperature limits of hot asphalt mix (HMA) directly in the specification.
8. Regarding specification 32 12 00 (page 8), the maximum lift thickness of HMA for compaction is not specified. The Licensee shall provide a maximum of four (4) inch lift thickness in the specification, if the revised design thickness of asphalt concrete is over four (4) inches.
9. For the common site layout (drawing #C0.01), the roadway width shown is inconsistent with the width indicated on the typical section (drawing #C0.06). The Licensee shall revise the typical section.
10. For the Compact Waste Disposal Facility site layout (drawing #C1.01), the roadway width shown is inconsistent with the width indicated on the typical section (drawing #C1.02). The Licensee shall revise the typical section.