

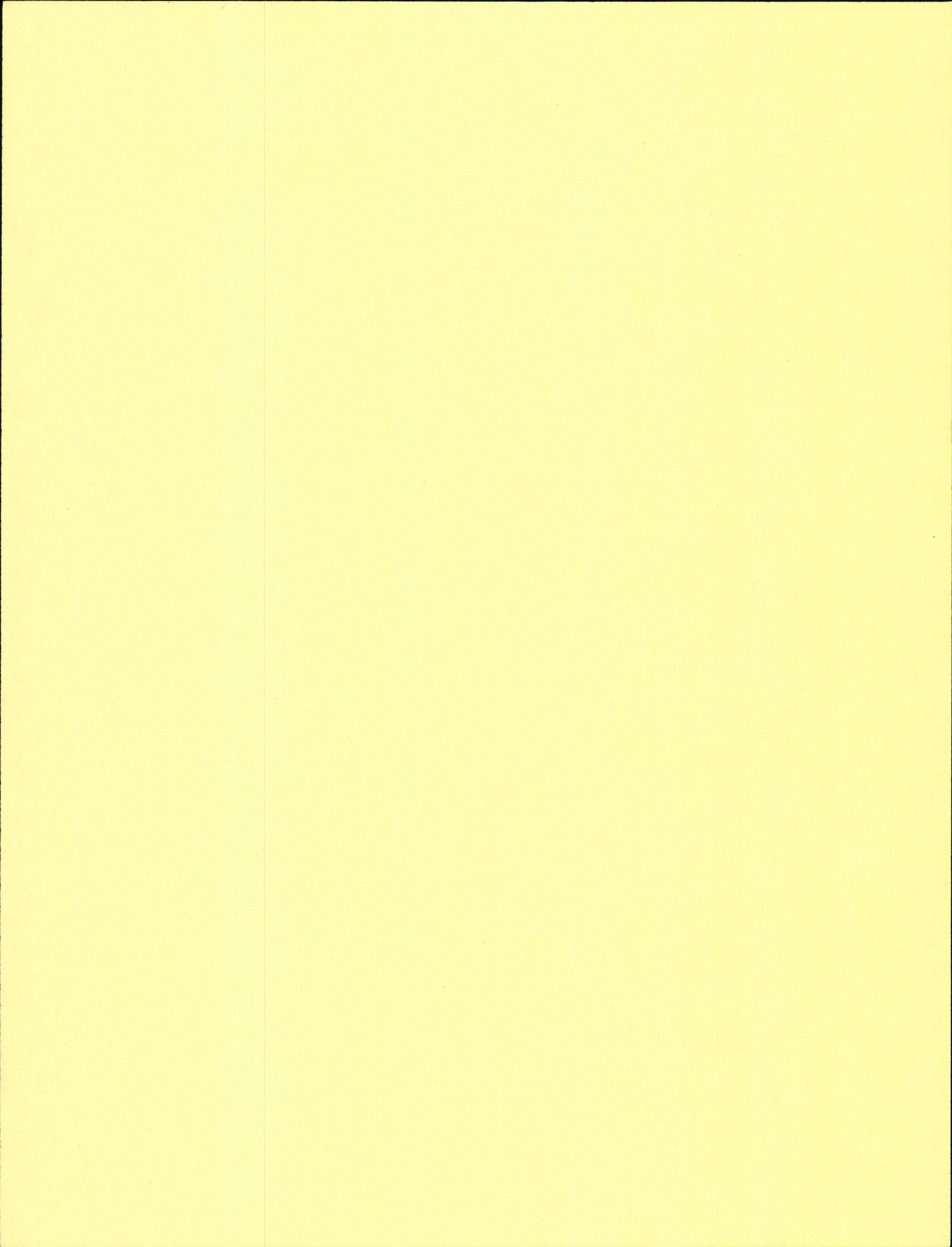
Public Participation Document

EnergySolutions, LLC

Radioactive Material License No. UT 2300478

Amendment 3

Attachment A	<i>EnergySolutions</i> Request
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Attachment A
EnergySolutions Request
October 19, 2020

October 19, 2020

CD-2020-157

Mr. Ty Howard
Director
Utah Division of Waste Management and Radiation Control
195 North 1950 West
Salt Lake City, Utah 84114-4880

Re: Radioactive Material License UT 2300478 -
Groundwater Quality Discharge Permit UGW450005; **Amendment and Modification
Request to Reduce Capacity and Disposal Footprint**

Dear Mr. Howard:

EnergySolutions hereby requests the Director of the Division of Waste Management and Radiation Control amend Radioactive Material License UT2300478 to authorize a reduced by-product disposal capacity and waste footprint. On November 30, 2017, the Director of the Utah Division of Waste Management and Radiation Control renewed Radioactive Material License UT2300478. Since then, EnergySolutions has recognized a dramatic reduction in the volume of 11e.(2) by-product material received for disposal. In support of this amendment request, EnergySolutions' hereby supports its amendment request with revision of sections of its 2015 License Renewal Application that are impacted by this requested reduction in footprint and byproduct waste capacity.

EnergySolutions also requests the Director modify Table 3 of Groundwater Quality Discharge Permit UGW450005 to reflect the following corner coordinates for the reduced disposal footprint.

- Northwest Corner
 - o Local Clive Coordinates - Northing 12,051.32, Easting 11,696.02
 - o Global Coordinates - Latitude(N) 40° 41' 12.159", Latitude(W) 113° 07' 06.565"
- Southwest Corner
 - o Local Clive Coordinates - Northing 10,277.00, Easting 11,646.73
 - o Global Coordinates - Latitude(N) 40° 40' 54.627", Latitude(W) 113° 07' 07.206"



Mr. Ty Howard
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- Southeast Corner
 - o Local Clive Coordinates - Northing 10,251.66, Easting 12,549.28
 - o Global Coordinates - Latitude(N) 40° 40' 54.845", Latitude(W) 113° 06' 55.564"

- Northeast Corner
 - o Local Clive Coordinates - Northing 12,025.96, Easting 12,599.10
 - o Global Coordinates - Latitude(N) 40° 41' 12.380", Latitude(W) 113° 06' 55.346"

Please contact me at (801) 649-2000 if you have any questions regarding this License Amendment and Permit Modification request.

Sincerely,

 Vern C. Rogers
Oct 19 2020 2:17 PM
cosign

Vern C. Rogers
Director of Regulatory Affairs

enclosures



**STATE OF UTAH 11e.(2) BYPRODUCT
RADIOACTIVE MATERIAL LICENSE
AMENDMENT REQUEST (UT2300478)**

October 19, 2020

By
EnergySolutions, LLC
299 South Main Street, Suite 1700
Salt Lake City, UT 84111

For
Utah Division of Waste Management and Radiation Control
Post Office Box 144850
195 North 1950 West
Salt Lake City, UT 84114-4880

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SECTION 1. PROPOSED ACTION

On November 30, 2017, the Director of the Utah Division of Waste Management and Radiation Control renewed Radioactive Material License UT2300478. The License's 2017 renewal authorized a byproduct disposal embankment with total by-product design capacity of 5,048,965 cubic yards and embankment waste footprint of 3,993,750 square feet (in response to EnergySolutions' renewal application; 2015). Since then, EnergySolutions has recognized a dramatic reduction in the volume of 11e.(2) by-product material received annually for disposal. As shown in Figure 1-1, the annual by-product receipt rate for disposal under License UT2300478 has significantly decreased in 2019 to less than 5% of that received in 2010. As a result of this analysis, EnergySolutions hereby requests the Director amend License UT2300478 to authorize a reduced by-product disposal capacity of 1,629,255 cubic yards and waste footprint of 1,603,136 square feet.

In support of this amendment request, EnergySolutions' hereby submits revision of those sections of its 2015 License Renewal Application (EnergySolutions, 2015) that served as the basis for the 2017 renewal of License UT2300478 that are impacted by the requested reduction in footprint and byproduct waste capacity (see Table 1-1). Proposed revisions to Radioactive Material License UT2300478 are provided in redline/strikeout format in Appendix C. The proposed changes to the 11e.(2) Radioactive Material License include the following:

1. Condition 8: Maximum quantity Licensee may possess at any one time 1,629,255 cubic yards
2. Condition 10.14(c): The total embankment capacity shall not exceed 1,245,655 m³ (1,629,255 yd³)

EnergySolutions similarly requests that the reduced disposal cell footprint also be reflected in Table 3 of Groundwater Discharge Permit UGW450005.

- Northwest Corner
 - Local Clive Coordinates - Northing 12,051.32, Easting 11,696.02
 - Global Coordinates - Latitude(N) 40° 41' 12.159", Latitude(W) 113° 07' 06.565"
- Southwest Corner
 - Local Clive Coordinates - Northing 10,277.00, Easting 11,646.73
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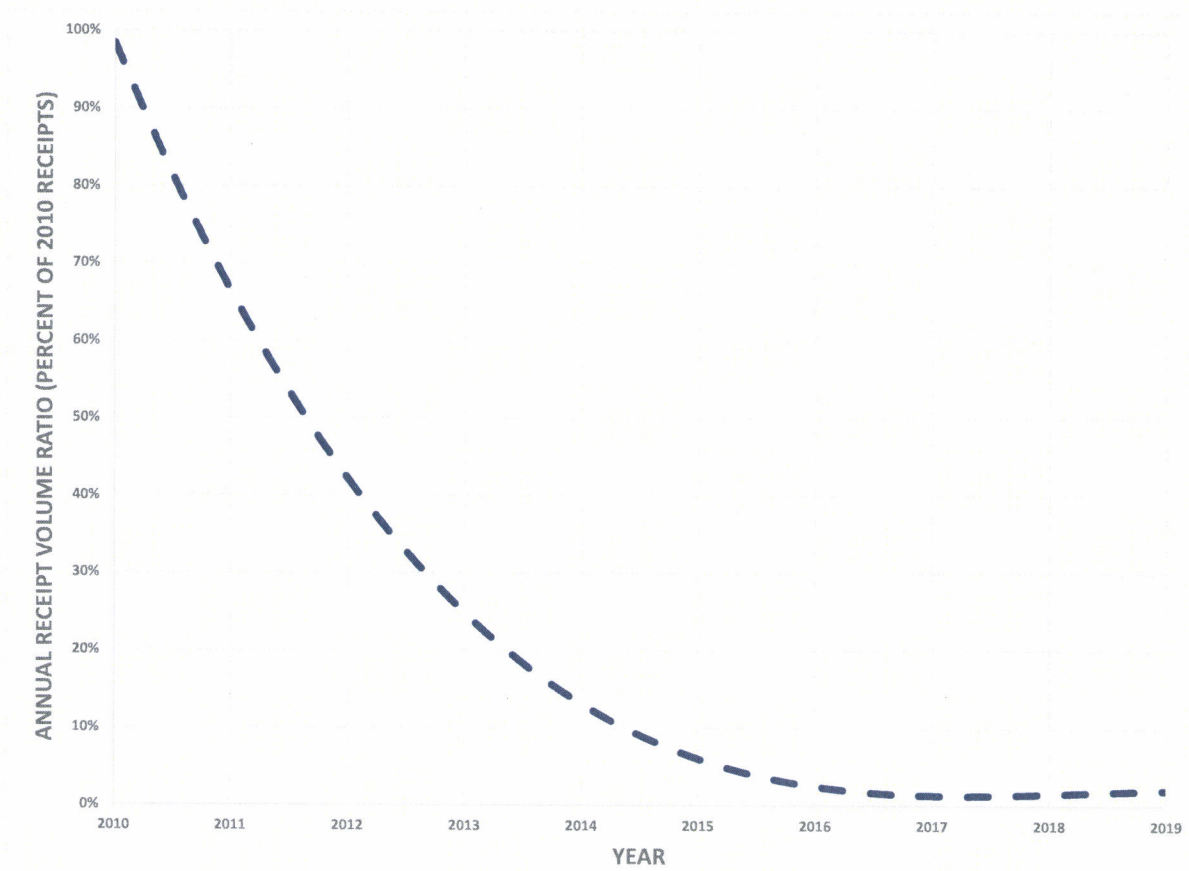


Figure 1-1 Annual By-Product Receipt Rate for Disposal Under License UT2300478

Table 1-1

Impacted Sections of the 2015 Renewal Application (EnergySolutions, 2015)

2015 - LICENSE RENEWAL APPLICATION SECTION		AMENDMENT IMPACT
SECTION 1. PROPOSED ACTION		The reduced footprint and disposal capacity are introduced.
SECTION 2. SITE CHARACTERIZATION		Unimpacted
SECTION 3. DESCRIPTION OF FACILITY		The smaller footprint is described.
3.1	EMBANKMENT	The smaller footprint is described.
3.1.1	<i>Storm-Water Design</i>	Runoff management of the smaller footprint is described.
3.1.2	<i>Waste Disposal Operations and Procedures</i>	Unimpacted
3.2	UNLOADING FACILITIES	Unimpacted
3.2.1	<i>Procedures For Receiving and Opening Shipments</i>	Unimpacted
3.3	DECONTAMINATION FACILITIES	Unimpacted
3.3.1	<i>Waste-Water Facilities</i>	Unimpacted
3.4	WASTE HANDLING FACILITIES	Unimpacted
3.4.1	<i>Procedures for Waste Handling</i>	Unimpacted
3.4.2	<i>Procedures for Waste Disposal</i>	Unimpacted
3.5	INSTRUMENTATION AND CONTROL	Unimpacted
SECTION 4. EFFLUENT CONTROL SYSTEMS		Unimpacted
4.1	GASEOUS AND AIRBORNE PARTICULATES	Unimpacted
4.2	LIQUIDS AND SOLIDS	Unimpacted
4.3	CONTAMINATED EQUIPMENT	Unimpacted
SECTION 5. OPERATIONS		Unimpacted
5.1	CORPORATE ORGANIZATION AND ADMINISTRATIVE PROCEDURES	Unimpacted
5.1.1	<i>Standard Operating Procedures</i>	Unimpacted
5.2	MANAGEMENT CONTROL PROGRAM	Unimpacted
5.3	MANAGEMENT AUDIT, INSPECTION, AND RECORDKEEPING PROGRAM	Unimpacted
5.3.1	<i>Management Audit, and Internal Inspection Program</i>	Unimpacted
5.3.2	<i>Recordkeeping and Record Retention</i>	Unimpacted
5.4	QUALIFICATIONS FOR PERSONNEL	Unimpacted
5.4.1	<i>Radiation Safety Officer</i>	Unimpacted
5.4.2	<i>Radiation Safety Staff</i>	Unimpacted
5.5	RADIATION SAFETY TRAINING	Unimpacted

2015 - LICENSE RENEWAL APPLICATION SECTION		AMENDMENT IMPACT
5.6	SECURITY	Unimpacted
5.6.1	<i>Access Control</i>	Unimpacted
5.6.2	<i>Signs and Postings</i>	Unimpacted
5.7	RADIATION SAFETY CONTROLS AND MONITORING	Unimpacted
5.7.1	<i>ALARA Program</i>	Unimpacted
5.7.2	<i>Radiation Protection Program</i>	Unimpacted
5.7.3	<i>Radiation Work Permits</i>	Unimpacted
5.7.4	<i>Respiratory Protection</i>	Unimpacted
5.7.5	<i>Radiological Surveys</i>	Unimpacted
5.7.6	<i>Effluent Control Techniques</i>	Unimpacted
5.7.7	<i>External Radiation Exposure Monitoring Program</i>	Unimpacted
5.7.8	<i>Airborne Radiation Monitoring Program</i>	Unimpacted
5.7.9	<i>Exposure Calculations</i>	Unimpacted
5.7.10	<i>Bioassay Program</i>	Unimpacted
5.7.11	<i>Contamination Control Program</i>	Unimpacted
5.7.12	<i>Airborne Effluent and Environmental Program</i>	Unimpacted
5.7.13	<i>Ground-Water and Surface-Water Monitoring Programs</i>	Unimpacted
5.7.14	<i>Quality Assurance</i>	Unimpacted
SECTION 6. GROUND-WATER QUALITY RESTORATION, SURFACE RECLAMATION, PLANT DECOMMISSIONING		Unimpacted
6.1	PLANS AND SCHEDULES FOR GROUND-WATER QUALITY RESTORATION	Unimpacted
6.2	PLANS AND SCHEDULES FOR RECLAIMING DISTURBED LANDS	Unimpacted
6.3	PROCEDURES FOR REMOVING AND DISPOSING OF STRUCTURES AND EQUIPMENT	Unimpacted
6.4	EMBANKMENT COVER	Cover design and material quantities affected by smaller embankment are presented.
6.4.1	<i>Cover Design and Construction</i>	Unimpacted
6.4.2	<i>Long Term Radiological Performance of Embankment Cover</i>	Unimpacted
6.4.3	<i>Post Closure Containment of Non-Radiological Hazards</i>	Unimpacted
6.4.4	<i>Decontamination and Decommissioning</i>	Unimpacted
6.5	PROCEDURES FOR CONDUCTING POST- RECLAMATION AND DECOMMISSIONING RADIOLOGICAL SURVEYS	Unimpacted

2015 - LICENSE RENEWAL APPLICATION SECTION		AMENDMENT IMPACT
6.6	FINANCIAL ASSESSMENT FOR GROUND-WATER RESTORATION, DECOMMISSIONING, RECLAMATION, WASTE DISPOSAL AND MONITORING	Impacts from premature closure of a smaller embankment are presented.
6.6.1	<i>Surety</i>	Unimpacted
SECTION 7. ENVIRONMENTAL EFFECTS		Unimpacted
7.1	SITE PREPARATION AND INITIAL CONSTRUCTION	Unimpacted
7.2	OPERATIONS	Unimpacted
7.2.1	<i>Radiological Releases During Normal Operation Conditions</i>	Unimpacted
7.2.2	<i>Potential Accident Radiological Releases During Operations</i>	Unimpacted
7.2.3	<i>Non-Radiological Effects</i>	Unimpacted
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7.3.1	<i>Transfer Mechanism - Groundwater</i>	Unimpacted
7.3.2	<i>Transfer Mechanism - Air</i>	Unimpacted
7.3.3	<i>Transfer Mechanism - Surface Water</i>	Unimpacted
7.3.4	<i>Other Transfer Mechanisms</i>	Unimpacted
7.4	ECONOMIC AND SOCIAL EFFECTS OF CONSTRUCTION AND OPERATION	Unimpacted
7.5	PUBLIC AND OCCUPATIONAL HEALTH	Unimpacted
SECTION 8. EMERGENCY RESPONSE PLAN		Unimpacted
8.1	NOTIFICATIONS	Unimpacted
8.2	LEAKING SHIPMENTS	Unimpacted
SECTION 9. ALTERNATIVES TO PROPOSED ACTION		Unimpacted
SECTION 10. COST BENEFIT ANALYSIS		Unimpacted
SECTION 11. ENVIRONMENTAL APPROVALS AND CONSULTATIONS		Unimpacted
SECTION 12. APPLICABLE REGULATIONS		Unimpacted
12.1	CONFORMANCE TO REGULATIONS AND REGULATORY GUIDES	Unimpacted
12.1.1	<i>Compliance with 10 CFR, Part 19</i>	Unimpacted
12.1.2	<i>Compliance with 10 CFR, Part 21</i>	Unimpacted
12.1.3	<i>Compliance with 10 CFR 61.80, 10 CFR 61.81, and 10 CFR 61.82</i>	Unimpacted
12.2	SUMMARY/STATUS OF FEDERAL, STATE, AND LOCAL PERMITS, LICENSES, APPROVALS, OTHER ENTITLEMENT AND REGIONAL AUTHORITIES	Unimpacted
12.2.1	<i>Utah Division of Waste Management and Radiation Control – Radioactive Material License</i>	Unimpacted

2015 - LICENSE RENEWAL APPLICATION SECTION		AMENDMENT IMPACT
12.2.2	<i>Ut Utah Division of Waste Management and Radiation Control – Radioactive Material License – Hazardous Waste Plan Approval (State-issued Part B Permit)</i>	Unimpacted
12.2.3	<i>Utah Division of Waste Management and Radiation Control – Radioactive Material License – Solid Waste Disposal Permit</i>	Unimpacted
12.2.4	<i>Bureau of Land Management – Right-of-Way or Temporary Use Permit</i>	Unimpacted
12.2.5	<i>Utah State Department of Environmental Quality, Division of Air Quality Approval Order</i>	Unimpacted
12.2.6	<i>Office of State Engineer, Utah Division of Water Rights – Approval of Well Plugging</i>	Unimpacted
12.2.8	<i>Tooele County Corporation, Development Services – Conditional Use Permit</i>	Unimpacted
12.2.8	<i>State of Utah Division of Water Quality – Ground Water Discharge Permit</i>	Unimpacted

SECTION 3. DESCRIPTION OF FACILITY

Areas utilized for disposal material receiving, unloading, hauling, handling, and placement in the 11e.(2) Embankment are considered a Restricted Area. Any person entering the Restricted Area must check in and out through access control, or through a truck/vehicle entrance gate. Additionally, radiation exposure to persons working within the Restricted Area is monitored using Thermo Luminescent Dosimeters (TLDs), or equivalent monitoring devices. The fences surrounding the areas are conspicuously posted with signs that read "*Caution – Radioactive Materials.*"

3.1 EMBANKMENT

As is illustrated in Engineering Drawing set 20001 (included in Appendix M), the capacity of the 11e.(2) Embankment is 1,629,255 cubic yards and occupies 1,603,136 square feet of land. EnergySolutions' 11e.(2) design is a shallow land burial embankment, constructed using materials native to the site or found in close proximity to the site. Engineered features of the Embankment are designed based upon State of Utah regulations, U.S. Nuclear Regulatory Commission (NRC) guidance, U.S. Environmental Protection Agency (EPA) guidance, and EnergySolutions' past experience at this location. In order to simplify the information presented in this license amendment request, the following presentation of design criteria, pertinent characteristics, and projected performance is limited to the those features impacted by the reduction in Embankment capacity.

Principle design features of the Embankment include: clay liner, waste placement, final cover, drainage systems, and a buffer zone. Auxiliary systems and facilities include utility systems, operational support facilities, fire protection systems, and water management systems. Of the principle design features and auxiliary systems, only performance of the drainage system is impacted by a reduction in Embankment footprint.

The general design requirements for the licensing of the shallow land burial 11e.(2) Embankment are set forth in Utah Administrative Code (UAC) R313-24 and 10 CFR 40, administered by the Director of the Utah Division of Waste Management and Radiation Control.

1. Site design features are directed toward long-term isolation and avoidance of the need for continuing active maintenance after closure;
2. The disposal site design and operation are compatible with the disposal site closure and stabilization plan and lead to disposal site closure that provides reasonable assurance that the performance objectives will be met;
3. The disposal site is designed to complement and improve, where appropriate, the ability of the disposal site's natural characteristics to assure that the performance objectives are met;
4. Covers are designed to minimize, to the extent practicable, water infiltration, to direct percolating or surface water away from the disposed waste, to resist degradation by surface geologic processes and biotic activity, and to limit the atmospheric release of radon;
5. Surface features direct surface water drainage away from disposal units at velocities and gradients which do not result in erosion that require ongoing active maintenance in the future; and
6. The disposal site is designed to minimize to the extent practicable the contact of standing water with waste during disposal, and the contact of percolating or standing water with wastes after disposal.

Long-term stabilization of the site is accomplished through erosion control and flood protection. The controlled areas of the site are fenced both during construction and after operation to prevent public access. Additionally, site custodial maintenance and surveillance are performed to assure continued long-term compliance with applicable regulatory standards. The construction sequence is as follows:

1. Existing terrain is excavated to a depth of approximately eight feet.
2. After the overburden is removed, a two foot clay liner is constructed under all areas where waste material is placed. The clay liner consists of a two foot low permeability clay barrier compacted to 95% of a standard proctor. This clay liner provides a seepage liner/retardant on the bottom of the Embankment.
3. The material for disposal is placed on the liner and compacted in place to a waste column height of approximately 34 feet at the embankment shoulder. At the embankment's highest point, the waste column will be approximately 50 feet thick.
4. When the Embankment is filled to the maximum height, a three and one-half foot thick layer of clay is placed on the side slopes and a four-foot thick layer of clay is placed on top and compacted to form a radon barrier.
5. A twelve-inch filter zone of small diameter rock provides a drainage layer under the rock erosion barrier.
6. An erosion barrier of specification-sized rock covers the surface of the embankment.

In order to evaluate and document stability of the 11e.(2) Embankment, the LLRW and 11e.(2) CQA/QC Manual, work elements "*Temporary Cover Placement and Monitoring*" and "*Settlement Monitoring*" require the placement of settlement monitoring monuments. Within work element "*Temporary Cover Placement and Monitoring*," specification "*Transition to Final Cover*" provides a process for evaluating settlement data to demonstrate stability of the waste column before final cover construction begins. The CQA/QC Manual contains work elements that include construction specifications, including lift bonding, keying-in of segments, prevention of liner drying, and spring start-up. Meeting the CQA/QC Manual's specifications demonstrates that the embankment will meet the regulatory performance requirements.

The Director of the Division of Waste Management and Radiation Control has adopted performance based Best Available Technology (BAT) standards for EnergySolutions' disposal facility, requiring that groundwater protection standards will not be exceeded at compliance wells within 200 years for non-radioactive hazardous constituents and within 500 years for radioactive constituents. Where design criteria set forth specific criteria, the 11e.(2) Embankment has been designed to meet that requirement, such as required water quality protection levels. However, the general criteria that the facility design must "*achieve long-term stability... to eliminate, to the extent practicable, the need for ongoing active maintenance of the disposal site after closure*," requires a determination of the meaning of "long-term." EPA and NRC, in setting design criteria for disposal facilities for 11e.(2), have addressed the issue of long-term stability. Both agencies have adopted a standard that requires that the facility be designed for 1,000 years, whenever reasonably achievable, but in any case for a minimum of 200 years. EnergySolutions' shallow land burial 11e.(2) Embankment design meets the requirement for 1,000 year containment, and follows the direction outlined in "*Guidance for Disposal of Uranium Mill Tailings: Long-Term Stabilization of Earthen Cover Materials*."

Structural stability has been evaluated in terms of slope stability within the layers that comprise the embankment contents. The Embankment meets global stability requirements for a Sliding Safety factor of 1.5 under static conditions and 1.2 under dynamic (i.e., earthquake) conditions. These minimum factors of safety for static and seismic conditions are found in UAC R655-11-6. These minimum recommended factors of safety are based on reviewing case histories of embankment dams founded on non-liquefiable clay

foundations or bedrock, which demonstrated adequate performance under seismic conditions (AMEC, 2011 and AMEC, 2012). This amendment request to license less capacity than is currently licensed does not impact the Director's prior determination that the 11e.(2) Embankment satisfies the structural stability performance objective.

As the basis for License UT2300478, EnergySolutions demonstrated that the 11e.(2) Embankment performed as required under normal and abnormal conditions and static conditions. The evaluations compared the calculated safety factor inherent to the Embankment design against the expected peak ground acceleration due to an earthquake that might affect the site. Detailed seismic stability and deformation analyses of the Embankment projected a minimum static factor of safety of 2.1 under saturated conditions and 2.3 under unsaturated condition (AMEC, 2011 and AMEC, 2012), both exceeding the design static factor of safety of 1.5. Abnormal condition evaluated the seismic loading of the Embankment due to a maximum credible earthquake. The calculated minimum seismic factor of safety is 1.3 (AMEC, 2011 and AMEC, 2012). This factor of safety exceeds the minimum design criteria (seismic factor of safety < 1.2). The minimum static factor of safety is 2.1 under saturated conditions and 2.3 under unsaturated conditions; the minimum seismic factor of safety is 1.3. These values exceed the design criteria of static factor of safety < 1.5 and seismic factor of safety < 1.2. The referenced evaluations were performed for the larger and taller Class A West embankment, providing a bounding analysis for a reduction in 11e.(2) Embankment capacity.

3.1.1 Storm-Water Design

During active operations, the 11e.(2) Embankment is surrounded by run-on and run-off berms. Run-on berms prevent stormwater run-on, from ambient precipitation in the vicinity of the facility, into the emplaced waste before final cover is built. Run-on berm design criteria is not impacted by a reduction in 11e.(2) Embankment capacity. The disposal area is surrounded by a perimeter berm that is at least 3 feet above the natural ground. This run-on control berm is designed to protect the disposal operations against the Probable Maximum Flood. The design calculations for the site perimeter berms are located in Appendix E of EnergySolutions, (2013). Calculations for the Probable Maximum Precipitation and Probable Maximum Flood are also located in Appendix G of EnergySolutions, (2013). The final drainage design is shown on Engineering Drawing 20001-C03.

Run-off berms ensure that precipitation that falls on emplaced waste is collected and does not carry contamination off of the site. Because run-off berm locations necessarily move as new portions of the 11e.(2) Embankment are opened for waste placement, these operational features are not depicted on facility design drawings. The 11e.(2) Embankment drainage systems provide drainage and ensure structural stability, in managing stormwater. In contrast to the embankment, which is designed for a 1,000-year lifetime, the stormwater drainage ditch system is only operational during the active life of the facility. This yields a design life of approximately 25 years for the drainage ditch system. All 11e.(2) Embankment surfaces are contoured to avoid areas of concentrated surface runoff or abrupt or sharp changes in slope gradient. EnergySolutions has also designed a drainage ditch to channel flow that originates on the Embankment away from the Embankment. The drainage ditch is designed with rock erosion barrier to limit erosion (as shown on Engineering Drawing 20001-C03). Following completion of the cover for sections of the Embankment, permanent drainage ditches are constructed. Drainage ditches are constructed of filter zone and erosion barrier materials meeting the specifications described in the CQA/QC Manual (Work Element – *Drainage Ditches*). These surface water controls have been successfully utilized at the Clive facility for over 30 years.

3.1.1.1 Facilitate Flow of Precipitation Away from the Embankment

Site drainage is considered in terms of two complementary aspects: (1) facilitating flow of precipitation away from the embankment, and (2) minimizing deep infiltration under flood conditions. As is demonstrated in Appendix L, storm water remains within the 11e.(2) drainage ditch system to a depth of 1.29 feet (2.71 feet of freeboard) under the normal precipitation event and 1.35 feet (2.65 feet of freeboard) under the abnormal precipitation event. This criterion promotes the collection of precipitation as well as promotes flow away from a reduction in 11e.(2) Embankment footprint, thus minimizing standing water adjacent to the Embankment; thereby minimizing potential infiltration into the waste.

During the maximum normal precipitation event, the greatest volume retained in storage within the 11e.(2) Landfill Embankment drainage ditch system occurs approximately 15 minutes into the event and decreases rapidly over the next hour. This volume is well within the four-foot perimeter ditch height specifications. Therefore the 11e.(2) ditch design adequately contains the maximum normal and worst case precipitation events.

Safety factors have been calculated for critical design case of the downstream ditch system. Consideration of the ditch system provides a maximum projected drainage runoff. For the normal condition, the safety factor is calculated as the ratio of projected freeboard to the design criteria for freeboard. The calculated freeboard adjacent to the Embankment during the normal event is 2.71 feet and the design criteria freeboard (from Table 6-1) is 0.5 feet; therefore, the safety factor is $2.71 / 0.5 = 5.42$. For the abnormal event, the design criterion is that the ditch be able to contain the flow; no freeboard is necessary. The safety factor during the abnormal event in the drainage system is calculated as the ratio of design ditch depth to calculated flow depth: $4.00 / 2.71 = 2.96$.

3.1.1.3 Ensure Ditch Integrity

Ditch Integrity is evaluated in terms of the drainage ditch's ability to prevent internal erosion of the compacted soils beneath the filter rock layer. Runoff water velocity shall not exceed three feet per second on the surface of the compacted soil. NUREG/CR-4620, "Methodologies for Evaluating Long-Term Stabilization Designs of Uranium Mill Tailings Impoundments" provides tables of permissible velocities over different surfaces. The permissible velocity criterion is a velocity that will not erode the underlying material. The erosion potential of the material is determined based on the material properties as well as the degree of compaction that the material has undergone. Table 4.9 of NUREG/CR-4620 provides limiting velocities in cohesive materials. The permissible velocities presented in this table range from 1.05 ft/sec for an uncompacted lean clayey soil to 5.90 ft/sec for "very compact" sandy clay. The drainage ditch sub-grade is comparable to "compact clay" within this table. The permissible velocity for this type of clay is 3.94 ft/sec. Therefore, the specified design criterion of a velocity ≤ 3 ft/sec is conservative.

The normal design condition evaluates performance under the 100-year, 24-hour storm event of 2.4 inches of precipitation. The abnormal condition evaluates impacts of the Probable Maximum Precipitation (one-hour storm of 6.1 inches) as the worst-case extreme erosion event. The one-hour event was selected to maximize velocity of precipitation and, accordingly, flow through the cover drainage system.

The drainage ditch is constructed of compacted natural ground or borrow material covered with Type A filter rock and Type A riprap for erosion control. Drainage ditch slopes range from 0.000474 ft/ft and 0.000484 ft/ft (see Appendix L). Maximum interstitial water velocities in the ditches are calculated in Appendix L at 9.58×10^{-4} ft/sec. This velocity is the maximum possible velocity at the interface and is not dependent on the

11e.(2) License Amendment Request

amount of water flow. This velocity is an order of magnitude below the design criteria velocity at which erosion may occur (3 ft/sec). Therefore, significant erosion of the ditch clay surface will not occur.

Abnormal conditions are not applicable for the internal water velocity calculations because the calculated interstitial velocity at the clay/rock interface is a maximum velocity. Any further water will flow in areas above the interface and will not affect erosion of the clay layer. No appropriate accident conditions exist for this design criterion.

The safety factor of the internal water velocity over the compacted soil surface of the ditch is the ratio of the calculated interstitial velocity to the design criteria (minimal erosion) velocity. Use of the top slope interstitial velocity is conservative, since the material is the same but the slope is less for the drainage ditches. Accordingly, the safety factor is approximately $3 / 0.000958 = 3,131$.

SECTION 6. GROUND-WATER QUALITY RESTORATION, SURFACE RECLAMATION, PLANT DECOMMISSIONING

11e.(2) Embankment closure and stabilization includes decontamination and decommissioning. However, removal of facilities that have also been used in support of Class A Low-Level Radioactive Waste Management, including roads, rail spurs, railcar rotary, storage pads, wash pads, and administrative buildings is considered as part of Radioactive Material License #UT 2300249 (EnergySolutions, 2019b). Any material contaminated solely with 11e.(2) isotopes that do not meet the standards for unrestricted release are placed into the 11e.(2) Embankment. Remediation will then be performed on the decontaminated and decommissioned areas.

Groundwater quality restoration and surface reclamation are discussed further in the 11e.(2) Environmental Assessment (Appendix G of EnergySolutions; 2015). Because groundwater mounding caused by infiltration of non-contact surface water can cause localized areas where the vertical gradient is downward. EnergySolutions measured the vertical hydraulic conductivity in core samples and determined the vertical conductivity, on average, is three orders of magnitude less than the horizontal hydraulic conductivity of the shallow water-bearing unit (EnergySolutions, 2019a). Given this hydraulic conductivity information, low infiltration rates through the embankment, and the location of shallow water-bearing zone monitoring wells approximately 90 feet from the edge of the embankment. Localized areas of downward gradient will not impact the long-term performance of the embankment. General decommissioning of Section 32 of EnergySolutions' facility will be performed to meet site closure requirements of License #UT2300249 and License #UT2300478.

6.4 EMBANKMENT COVER

As shown in Engineering Drawing 20001-C06, the cover design cross section of the 11e.(2) Embankment is unchanged by this capacity reduction amendment request. The cover of the 11e.(2) Embankment is being constructed as follows:

1. When the Embankment is filled to the maximum height, a minimum 3.5-foot thick layer of clay is placed on the top of the side slopes and a 4-foot thick layer of clay is placed on top and compacted to form a radon barrier.
2. 12-inch thick filter zone layer is placed.
3. An erosion barrier consisting of one foot to one and one-half foot thick specification-sized rock is placed. The filter zones and erosion barrier placement and thickness are specified in Engineering Drawing 20001-C06.

EnergySolutions is constructing the 11e.(2) Embankment cover in accordance with the cover design and construction procedures and specifications found in the CQA/QC Manual. As they are impacted by precipitation runoff from a reduced the 11e.(2) Embankment, the revised drainage ditch features are summarized in Tables 6-1 through 6-3.

Table 6-1

Design Criteria of the Principle Cover Design Features Impacted by a Reduced 11e.(2) Embankment Capacity

Principal Design Feature	Required Function	Complementary Aspects	Design Criteria	Design Criteria Justification	Conditions	
					normal	abnormal/accident
Drainage Systems	Provide Site Drainage	Facilitate flow away from the embankment	Depth of water < depth of ditch. Promote free flowing conditions. Freeboard ≥ 0.5 foot under normal conditions.	Minimize potential infiltration into the waste.	normal	25 yr. 24 hr. storm
					abnormal	100 yr. 24 hr. storm
					accident	Downstream Blockage
	Minimize Infiltration under flood conditions	Flood water shall dissipate faster than water travels through the cover system.	Ponded flood water promotes infiltration. So long as flood water drains or evaporates faster than the travel time through the cover, increased infiltration will be minimized.	normal	100 year flood (1,300 cfs)	
				abnormal	PMF (29,800 cfs)	
				accident	Downstream Blockage	
	Ensure Ditch Integrity	Prevent Internal Erosion	Water velocity over compacted soil ≤ 3 ft/sec	NUREG/CR-4620 NUREG-1623	normal	25 yr. 24 hr. storm
					abnormal	100 yr. 24 hr. storm
					accident	Not Required

Table 6-2

Pertinent Characteristics of the Principle Cover Design Features Impacted by a Reduced 11e.(2) Embankment Capacity

Principal Design Feature	Principal Design Element	Pertinent Characteristics	References
Drainage Systems	Drainage Ditches	4 feet deep "Irregular quadrilateral" with a 2% bottom slope and 5:1 (H:V) sides slopes Borrow Material = CL or ML soils Natural Ground or Imported Borrow Material Compacted to 95% of a Standard proctor 6 inches of Type A filter material 18 inches of Type A riprap material	Engineering Drawings 20001-C03 and 20001-C05 Borrow Material in CQA/QC Manual, Attachment II-A, Work Element - Drainage Ditch Imported Borrow, Material specification

Table 6-3

Projected Performance of the Principle Cover Design Features Impacted by a Reduced 11e.(2) Embankment Capacity

Principal Design Feature	Required Function	Complementary Aspects	Design Criteria	Projected Performance	Performance Reference	Safety Factor
Drainage System	Provide Site Drainage	Facilitate flow of precipitation away from the embankment	Depth of water < depth of ditch. Freeboard \geq 0.5 foot under normal conditions.	Design ditch height = 4 feet. Max height of water during normal event = 1.29 feet. Max height of water during abnormal event = 1.35 feet. Downstream blockage improves post-closure performance	Appendix L	Downstream: Normal SF = 5.42 Abnormal SF = 2.96
	Ensure Ditch Integrity	Prevent Internal Erosion	Water velocity over compacted soil \leq 3 ft/sec	Maximum interstitial water velocities in the ditches = 9.58×10^{-4} ft/sec.	Appendix L	SF = 3,131

6.6 FINANCIAL ASSESSMENT FOR GROUND-WATER RESTORATION, DECOMMISSIONING, RECLAMATION, WASTE DISPOSAL AND MONITORING

Custodial maintenance, such as repair of a damaged perimeter fence, is required at the site. Extreme natural events, intentional intrusion, or other events may occur at a site that may require contingency repair to ensure that the tailings facility continues to function as intended.

The 11e.(2) Embankment is being constructed in a manner that minimizes the need for long-term maintenance. The containment structure is made completely of natural materials. The only item at the facility that is man-made is the chain link fence that surrounds the site. The major items of construction include:

- a) a 2-foot clay liner beneath the waste material;
- b) the waste material itself;
- c) a three and one-half to four foot clay layer over the waste;
- d) a filter layer;
- e) a rock erosion barrier;
- f) a rock-lined perimeter ditch;
- g) a twelve foot inspection road; and,
- h) a six foot chain link fence.

With the exception of the chain link fence all of the materials incorporated in the final Embankment have been designed to remain intact for 1,000 years. The Embankment is resistant to water erosion, wind erosion, and slope failure for the 1,000 year design life of the facility. There will be no active maintenance required on the Embankment after closure.

EnergySolutions' long-term surveillance plan is based on "Guidance for UMTRA Project Surveillance and Maintenance, January 1986" (DOE, 1986). EnergySolutions will use that document as a guide during post-closure activities. A summary of the surveillance and maintenance plan is provided in this section.

Prior to completion of remedial action at the Energy Solutions site, the final site conditions, including airborne particulate monitoring, will be defined and characterized as the first step in the surveillance and maintenance process. After completion of the remedial action, information will be assembled into a site file that will be reviewed by the Director of the Division of Waste Management and Radiation Control prior to surveillance activities.

This section explains the procedures used by EnergySolutions to determine when maintenance or contingency repairs are required at the facility. The EnergySolutions site will not require scheduled maintenance. Examples of site conditions that may require maintenance are listed in Table 6-5. Conditions that may trigger contingency repair action are listed in Table 6-6.

When compared with contingency repair, maintenance is generally less costly, smaller in scale, and more frequent in occurrence. In contrast, contingency repairs are unlikely; however, repair costs may be substantial due to the size of the work force and technical skills required for repairs. The inspection report and monitoring results will be reviewed and site conditions compared from year to year so that trends of changing conditions can be identified. Extrapolation of identifiable trends will provide a means of predicting when maintenance or repair is required at the disposal site.

11e.(2) License Amendment Request

After a decision has been made to initiate maintenance or contingency repair, a statement of work will be prepared for the work performed. The maintenance or repair actions required to correct site problems will be dependent upon the nature of the problem or hazard. Although the details of maintenance or repair actions required cannot be reliably predicted in advance, a range of possible actions are outlined in Table 6-7. A remote possibility exists for failure of a site to adequately contain the waste material. For the Clive site, the only feasible scenario will be release of waste material from a site following a major earthquake, major flood, or other severe natural phenomena.

EnergySolutions will identify site failure in at least three ways:

1. Results of Phase I, Phase II, or contingency site inspections.
2. Reports from local government authorities or local residents.
3. Reports from National Oceanic & Atmospheric Administration (NOAA), the Earthquake Early Warning Service, or other agencies.

On the basis of the site contingency plan, appropriate action will be taken to notify individuals who may be affected and advise them of precautions that are necessary. Local law enforcement officials, news media, responsible agency representatives, and/or state representatives may be utilized in contacting affected parties.

After completion of maintenance or contingency repair actions, the responsible agency will certify that all work was completed in accordance with specifications. Copies of the certification statement will be attached to the 11e.(2) License, the site inspection report, and will become part of the site file.

Table 6-5

**Examples of Site Conditions That May
Require Custodial Maintenance**

1. Damage to site boundary fence, signs, or monuments,
 2. Damage or obstruction to primary site access road (e.g., road washout).
or new construction adjacent to the site that obstructs the access road).
 3. Growth of deep rooted shrubs on the site cover.
 4. Development of animal burrows on the site cover.
-

Table 6-6

**Examples of Site Conditions That May
Require Contingency Repair**

1. Development of rills or gullies, deeper than six inches with near vertical walls, and no vegetative cover.
 2. Surface rupture where the dimensions of the cracks are larger than one inch wide by ten feet long by one foot deep that would indicate severe shrinkage of cover materials or differential settlement of site materials.
 3. Instability of slopes to the point where mass wasting or liquifaction has occurred due to earthquakes, differential settlement, or other causes.
 4. Encroachment of stream channels onto the disposal site.
 5. Flood damage to the disposal site in the form of new channels, or debris deposits.
 6. Intrusion by man whereby cover materials have been removed from the site.
-
-

Table 6-7

**Custodial Maintenance or Repair Action Which
Could be Needed at Sites**

1. Repair of fences.
 2. Replacement of warning signs.
 3. Reestablishment of survey control monuments.
 4. Removal of deep-rooted shrubs from the embankment cover.
 5. Control or eradication of burrowing animals.
 6. Placement of fill in gullies or rills.
 7. Replacement of erosion barrier rock cover materials.
 8. Placement of inclinometers or tilt meters to measure movement on unstable slopes.
 9. Reconstruction of embankment slope segments where slumping, mass wasting, liquefaction, or other severe events have occurred.
 10. Reconstruction of site cover or other features because of extreme seismic events, extreme flooding, or other events.
-

AMENDMENT REFERENCES

AMEC, (2012). "Response to Interrogatory CAW R313-25-8(4)-16/3: Seismic Hazard Evaluation/Seismic Stability Analysis Update, EnergySolutions Clive Facility – Class A West Embankment, Clive, Tooele County, Utah." (Job No. 10-817-05290) AMEC Environmental & Infrastructure, Inc., 6 April 2012.

AMEC, (2011). "Geotechnical Update Report, EnergySolutions Clive Facility, Class A West Embankment" AMEC Environmental & Infrastructure, Inc. February 15, 2011.

DOE, (1989). Technical Approach Document, Revision II, UMTRA-DOE/AI 050425.0002, 1989.

DOE, (1986). "Guidance for UMTRA Project Surveillance and Maintenance, January 1986" (UMTRA-DOE/AL-350124.0000). January 1986.

EnergySolutions, (2019a). "GWQDP UGW450005 – Revised Hydrogeologic Report." EnergySolutions Report (submitted via CD19-0008), January 15, 2019.

EnergySolutions, (2019b). "Ground Water Quality Discharge Permit Condition I.H.6 – 2019 Annual As-Built Reports", (CD19-0235), November 27, 2019.

EnergySolutions, (2015). "Revision 7 of the 11e.(2) Renewal Application for UT2300478; Response to Round 2 Interrogatories." EnergySolutions Report (submitted via CD15-0283), December 11, 2015.

EnergySolutions, (2013). "Radioactive Material License UT 2300249: Response to 2012 License Renewal Application Completeness Review (L-2012-178)." Letter (CD13-0066) from Vern Rogers of EnergySolutions to Rusty Lundberg, Utah Division of Radiation Control, 15 March 2013.

NRC, (2002). "NUREG-1623: Design of Erosion Protection for Long-Term Stabilization. Final Report." September, 2002.

NRC, (1986). "NUREG/CR-4620: Methodologies for Evaluating Long-Term Stabilization Designs of Uranium Mill Tailings Impoundments," June 1986.

Appendix C
Proposed 11e.(2) Material License



UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WASTE MANAGEMENT AND RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE

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

LICENSEE) 3. License Number: UT 2300478
) Amendment #32
1. Name EnergySolutions, LLC) *****
) 4. Expiration Date
2. Address 299 S. Main St., Suite 1700) November 13, 2027
Salt Lake City, UT 84111) *****
) 5. License Category 2-c

6. Radioactive material 7. Chemical and/or 8. Maximum quantity
(element and mass physical form Licensee may possess at
number) any one time
11e.(2) Byproduct Packaged or Bulk 1,629,255 Cubic Yards
Material Radioactive Waste 5,048,965

SECTION 9.0. ADMINISTRATIVE CONDITIONS

- 9.1 All notices to the Division of Waste Management and Radiation Control required under this license shall be addressed to the Director of the Division of Waste Management and Radiation Control (Director), Department of Environmental Quality, 195 North 1950 West, P.O. Box 144880, Salt Lake City, UT 84114-4880.
9.2 Authorized place for use shall be the Licensee's facility located in Section 32 of Township 1 S, Range 11 W, Tooele County, Utah, near Clive.
9.3 Authorized use is for the receipt, storage and disposal of 11e.(2) byproduct material in accordance with statements, descriptions, and representations contained in the Licensee's application, including appendices.
9.4 In order to ensure that no disturbance of cultural resources occurs, the Licensee shall cease any work resulting in the discovery of previously unknown cultural or historical artifacts and report the

discovery, in writing, to the Director and the State Historic Preservation Office (SHPO). The artifacts shall be inventoried and evaluated in accordance with UCA 9-8-404, and no disturbance shall occur until the Licensee has received written authorization from the Director and SHPO to proceed.

- 9.5 The Licensee shall:
- a) Establish, implement and comply with standard operating procedures (SOPs) for all operational activities involving the handling, storing or disposal of radioactive materials. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. In addition, SOPs shall be established and implemented for non-operational activities to include environmental monitoring, bioassay analysis and instrument calibration. An up-to-date copy of each written SOP, as controlled under the quality assurance (QA) procedures, shall be kept in each area where it is used.
 - b) Design, implement and comply with an effective air sampling program in the workplace based on Revision 1 to Nuclear Regulatory Commission (NRC) Regulatory Guide 8.25 (June 1992), "Air Sampling in the Workplace" or an equivalent program.
- 9.6 The Licensee shall have all written SOPs reviewed and approved by the Radiation Safety Officer (RSO), or designee, qualified by way of specialized radiation protection training equivalent to that required for the RSO as defined in License Condition 9.8, before being implemented and whenever a change in a procedure is proposed. All existing facility SOPs related to operational and non-operational activities shall be reviewed and documented by the RSO on an annual basis in the 11e.(2) Annual Report, to be submitted to the Director by April 30.
- 9.7 Any change to the Licensee's corporate organizational structure, as presented in the license application, affecting the assignment or reporting responsibility of the radiation staff shall conform to the NRC's Regulatory Guide 8.31, "Information Relevant to Ensuring That Occupational Radiation Exposures at Uranium Mills Will Be As Low As Is Reasonably Achievable" as amended.
- 9.8 The Licensee's staff shall meet the qualifications as described in the currently approved Organization Layout of Condition 32.A of Radioactive Material License UT 2300249. In addition to the responsibilities and qualifications specified in the Licensee's application, the RSO or designee shall be qualified as specified in Sections 1.2 and 2.4 of the NRC Regulatory Guide 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills will be As Low As Reasonably Achievable," as amended. In addition, the RSO shall also receive 40 hours of related health and safety refresher training every two years.
- 9.9 For the purposes of this License Condition, reference to "uranium mill" or "milling" in the NRC Regulatory Guide 8.31, as amended, shall mean the Licensee's facility and authorized activities.
- 9.10 The Licensee shall conduct:
- a) Annual training for its facility inspectors that covers all areas included in the daily inspections of the 11e.(2) byproduct material and the disposal area.

- b) Annual operational training that covers all aspects of operational safety and emergency procedures for all employees. The SOPs shall be used to conduct operations training to assure consistency and thoroughness.
- 9.11 The Licensee shall, at all times, maintain a Surety that satisfies the requirements of R313-24-4 (10 CFR 40, Appendix A, Criterion 9 and 10 incorporated by reference), as defined by License Condition 9.13 (a) or 9.13 (b) (or more frequent, at the Licensee’s sole discretion) and shall include closure and post-closure costs in all areas subject to the portions of the facility herein licensed.
- 9.12 Annually, by March 1, the Licensee shall submit proposed closure and post-closure costs in a Surety Report, upon which financial assurance amounts are based, including costs of potential remediation at the licensed facility, as if accomplished by a third party contractor, for completion of a Director-approved reclamation/decommissioning plan of the Licensee’s licensed grounds, equipment and facilities including above-ground decommissioning and decontamination, soil and water sample analyses and groundwater restoration associated with the site, as warranted.
- 9.13 At its election, the Licensee’s annual proposed closure and post-closure costs shall be based on either:
 - a) a proposed annual cost estimate using unit rates from the current edition of RS Means Facilities Construction Cost Data and other site-specific processes, indirect costs based on the sum of applicable direct costs in accordance with the indirect cost multipliers in Table 9.13A or others mutually agreed to by the Licensee and the Director; or

TABLE 9.13A

Description	Percentage
Working Conditions	5.5%
Mobilization / Demobilization	4.0%
Contingency	11.0%
Engineering and Redesign	2.25%
Overhead and Profit	19.0%
Management Fee and Legal Expenses	4.0%
DEQ Oversight	4.0%

- b) an initial financial assurance determination and for each financial assurance determination every five years thereafter, a proposed competitive site-specific estimate for closure and post-closure care of the licensed facility shall be used; and for each year between this financial assurance determination, a proposed financial assurance estimate that accounts for current site conditions and that includes an annual inflation adjustment to the financial assurance determination using the Gross Domestic Product Implicit Price Deflator of the

Bureau of Economic Analysis, United States Department of Commerce, calculated by dividing the latest annual deflator by the deflator for the previous year shall be used.

- 9.14 The annual Surety Report shall be prepared under the direct supervision of and be certified by a professional with at least five years of construction cost estimation experience, who bears the seal of either a Professional Engineer or Professional Geologist currently licensed by the State of Utah. The Licensee shall provide the Surety Report in both paper and electronic formats. Within 60 days of the Director's approval of the Surety Report, the Licensee shall submit written evidence that the surety instruments have been adequately funded. The currently-approved Surety Report and instrument(s) shall be maintained as a Surety Appendix to the License.
- 9.15 The combined annual surety is \$80,149,535.08 with the 11e.(2) subtotal of \$10,870.016.43 as approved in the Director's letter dated October 11, 2019.
- 9.16 The Licensee shall require a radiation work permit (RWP) for work where the potential for significant exposure to radioactive materials exists and for which no SOP exists. Each RWP shall contain the information specified in Regulatory Guide 8.31, as amended.
- 9.17 The RSO, or designee, qualified by way of special radiation protection training equivalent to that required for the RSO as defined in License Condition 9.8, shall indicate by signature, the review and approval of each RWP, prior to the initiation of the work.
- 9.18 The Licensee shall provide SOPs for controlling internal contamination of workers from dust inhalation, which shall include the use of dust suppressants (e.g., magnesium chloride or water) on all operational roads, as necessary.
- 9.19 The Licensee shall have qualified individuals, designated by the RSO and Manager, Health and Safety, perform quantitative respirator fit tests on all employees required to wear respirators prior to the initial use of a respirator and annually thereafter. During the annual fit test, the qualified individual performing the test shall ensure that the employee is correctly performing negative pressure fit checks and shall instruct the employee that the fit test is to be performed each time a respirator is donned and prior to entering an area where respirators are required. The Licensee shall follow the guidance provided in the NRC Regulatory Guide 8.15 "Acceptable Programs for Respiratory Protection" as amended.
- 9.20 The Licensee shall complete "as built drawings" of the facility on an annual basis. The as built drawings shall be certified by a professional engineer.
- 9.21 The Licensee shall provide for an independent internal audit of facility operations to ensure compliance with applicable regulations and license conditions. The independent internal audit shall be conducted annually by a qualified health physicist knowledgeable of operations concerning radiation protection programs at milling/waste disposal facilities. The contractor report shall be submitted to the Director as part of the 11e.(2) Annual Report.

- 9.22 The operational environmental monitoring program shall be conducted in accordance with the current Environmental Monitoring Plan approved by the Director.

SECTION 10.0. OPERATIONAL CONTROLS, LIMITS AND RESTRICTIONS

- 10.1 The Licensee shall restrict eating and drinking to the administrative offices and enclosed lunch areas that are separated from the disposal areas. With the exception of drinking from closeable containers, there shall be no eating, drinking, smoking, defecating or urinating in the restricted areas at any time.
- 10.2 The Licensee shall analyze and adequately characterize all incoming waste to identify any new hazardous constituents not listed in the Waste Characterization Plan referenced in Condition 58 of Radioactive Material License UT 2300249. The Licensee shall develop, implement and comply with methodologies and procedures for systematic characterization and analysis of the incoming waste so that any new hazardous constituents are identified. The Licensee shall assume that the baseline background concentrations for any new constituents are at their detection levels, unless the Licensee demonstrates to the Director's satisfaction that the constituents will not reach the water table in one year and proceeds to establish background based on direct monitoring of these constituents in the Point of Compliance (POC) wells for one full year.
- 10.3 The following key radon attenuation model parameter values shall be used during placement to verify that the values used in the Licensee's model (see Licensee's correspondence to the NRC dated August 30, 2000 and to the DRC dated October 31, 2007) have been achieved: (1) dry density and (2) moisture content (percent by dry weight) of the placed compacted radon barrier material and the upper ten feet of 11e.(2) byproduct material. Average values for each parameter by lift, for the upper ten feet of the 11e.(2) embankment only, per year shall be calculated and submitted to the Director in the 11e.(2) Annual Report.
- 10.4 The distribution of the Ra-226 and Th-230 concentrations in the 11e.(2) byproduct material in the upper 3.3 meters (10 feet) of the contaminated material shall be used to verify that the concentration in any lift does not exceed the values used in the radon attenuation model. The Licensee shall measure the Ra-226 and Th-230 concentrations using standard analytical procedures for every 2500 cubic yards of material placed for compaction and at least once per lift for lifts smaller than 2500 cubic yards. This sampling may be performed from the waste container/conveyance at receipt or on the lift during waste placement. In the case where sampling will be performed from the waste container/conveyance, proper tracking shall be performed to accurately identify disposal location (or lift number). In the case where sampling will be performed at the disposal lift, each sample shall be a composite sample consisting of ten aliquots from random locations on the lift. The data shall include the elevation (or lift number) of the sample location. The results shall be presented as average values for each lift and submitted to the Director in the 11e.(2) Annual Report.
- 10.5 The Licensee shall assume full responsibility for remediation of any groundwater contamination caused by hazardous constituents originating from the 11e.(2) disposal facility that have been detected at the Point of Compliance (POC) wells in concentrations exceeding the limits specified in

Tables 1-C and 1-D of the Groundwater Discharge Quality Permit UGW450005. It shall be assumed that the 11e.(2) disposal facility is the source of all of the hazardous constituents detected in the POC wells, unless it can be demonstrated to the Director's satisfaction that the 11e.(2) facility is not the source of those constituents.

- 10.6 The Licensee shall undertake corrective action to clean up groundwater contamination if and when required, but no later than 18 months from the date when exceedance of a standard has first been discovered and without taking credit for any delays caused by disagreements as to the source of contamination. The Licensee shall consider and evaluate existing and new groundwater clean-up technologies before selecting and implementing an appropriate clean-up program.
- 10.7 The Licensee shall continue groundwater and land surface monitoring at all POC locations throughout the post closure period until the disposal facility is transferred to long-term government custody.
- 10.8 The Licensee shall implement the quality assurance plan as provided in the license application.
- 10.9 The Licensee shall, prior to managing waste for disposal, determine the presence of free liquids as described in Section IV of the Waste Characterization Plan referenced in Condition 58 of Radioactive Material License UT2300249. Solid waste received for disposal shall contain as little free standing and non-corrosive liquid as reasonably achievable, but shall contain no more free liquids than one percent of the volume of the waste.
- 10.10 The Licensee shall not accept any waste containing free liquid for disposal. Solid waste received and containing unexpected aqueous free liquids in excess of 1% by volume shall have the liquid removed and placed in the evaporation ponds or the liquids shall be solidified prior to its management.
- 10.11 Unexpected non-aqueous free liquids less than 1% of the volume of the waste within the container shall be solidified prior to disposal.
- 10.12 Should shipments arrive with greater than 1% unexpected free liquids (total of aqueous and non-aqueous), the Licensee shall notify the Director within 24 hours that the shipments failed the requirements for acceptance and shall be managed in accordance with the Waste Characterization Plan as referenced in Condition 58 of Radioactive Materials License UT2300249.
- 10.13 The Licensee shall, upon arrival of waste, perform external exposure rate measurements of the waste conveyances. Any shipment with exposure rates greater than five mrem per hour at a distance of 30 cm from any surface and which cannot be disposed of within 24 hours, shall be posted as a Radiation Area in compliance with R313-15-901, R313-15-902 and R313-15-903 [10 CFR 20.1902(a) incorporated by reference] until disposed.
- 10.14 The Licensee shall operate the facility in compliance with the following specifications:
 - a) The maximum bulk mass of waste disposed of annually shall not exceed 4.536×10^5 tonnes (5×10^5 tons) or $(3.82 \times 10^5 \text{ m}^3)$ or $(4.00 \times 10^5 \text{ yd}^3)$.

- b) The open cell area shall not exceed 78,038.55 m², 93,333.33 yd², 840,000 ft² or 19.28 acres.
 - c) The total embankment capacity shall not exceed 1,245,655 m³ (1,629,255 yd³).
 - d) The maximum volume of waste that may be stored as in-cell bulk storage on site prior to disposal shall not exceed 10,000 yd³ or (7,645.55 m³) at any one time.
 - e) Waste with an average concentration above 4,000 pCi/g for natural uranium or for any radio nuclide in the radium-226 series; or above 60,000 pCi/g for thorium-230; or above 6,000 pCi/g for any radionuclide in the thorium series in any truckload or railcar shall not be accepted.
- 10.15 The Licensee shall maintain the detailed documents demonstrating compliance with the specifications in License Condition 10.16 on-site and shall summarize the data in Condition 10.17 and Condition 10.18. This information shall be submitted to the Director in the 11e.(2) Annual Report.
- 10.16 The minimum compacted radon barrier thickness placed in accordance with the specifications authorized in the LLRW and 11e.(2) Construction Quality Assurance / Quality Control Manual, as revised (CQA/QC Manual) shall be 4.0 ft. on the top and 3.5 ft. on the side of the disposal cell. CLSM shall not be used in the upper ten feet of the 11e.(2) embankment.
- 10.17 At the end of every calendar year, the Licensee shall ensure that the cumulative average activity concentration of waste placed within the upper three feet of disposed waste does not exceed 300 pCi/g of Ra 226 or 900 pCi/g of Th 230, and within the next seven feet does not exceed 500 pCi/g Ra 226 or 1500 pCi/g of Th 230. When both radionuclides are present, the unity rule defined below shall apply to ensure that the Ra-226 limit is not exceeded within 1000 years.
- Activity of Th 230 (pCi/g)/X + Activity of Ra 226 (pCi)/Y < or = 1
- Where:
- X = 900 pCi/g in the upper three feet and 1500 pCi/g in the next seven feet of waste, and
- Y = 300 pCi/g in the upper three feet and 500 pCi/gm in the next seven feet of waste
- 10.18 The cumulative average densities of the waste in the upper ten feet of the 11e(2) embankment and of the compacted radon barrier placed shall not be less than 1.5 g/cm³ for either.

SECTION 11. INSPECTION, MONITORING AND RECORDING REQUIREMENTS

- 11.1 The Licensee shall fulfill and comply with all conditions and all compliance schedules stipulated in the Ground Water Discharge Permit, number UGW 450005, issued by the Director, as amended.

- 11.2 The Licensee shall require that the RSO and the Engineering Director or designee perform and document joint inspections of all work areas at least quarterly. The Licensee shall correct any deficiency noted during the inspection within seven working days. The results of the inspections and any necessary corrective actions shall be submitted to the Director in the 11e.(2) Annual Report.
- 11.3 The Licensee is granted an exemption from R313-15-201(4) and R313-15-302(2) and is authorized to use Annual Limit on Intake (ALI) and Derived Air Concentration (DAC) values based on dose coefficients adopted by the International Commission on Radiological Protection (ICRP) and published in ICRP publication No. 68 and adult dose factors published in ICRP publication No. 72, as required to demonstrate compliance with the requirements of Subpart C and Subpart D of 10 CFR 20 (UAC R313-15).
- 11.4 The Licensee shall conduct an analysis to assess the need to characterize the basal aquifer.

SECTION 12. REPORTING REQUIREMENTS

- 12.1 The Licensee shall perform an annual ALARA audit of the radiation safety program which shall be led by the RSO or designee, qualified by way of specialized radiation protection training equivalent to that required for the RSO as defined in License Condition 9.8, in accordance with Section 2.3.3 of NRC Regulatory Guide 8.31, as amended. A report of this audit shall be submitted to the Director in the 11e.(2) Annual Report. The report shall include detailed summaries of the analytical results of the radiological surveys. In order to evaluate the ALARA objective, the Licensee shall, at a minimum, review the following records:
 - a) Bioassay results including any actions taken when the results exceed established action levels as referenced in the NRC Regulatory Guide 8.9, "Acceptable Concepts, Models, Equations, and Assumptions For A Bioassay Program" as amended.
 - b) Records of external and internal exposure.
 - c) Safety meeting minutes, attendance records, and training program records.
 - d) Daily inspection log entries and summary reports of the annual review.
 - e) Radiological survey and monitoring data, as well as environmental radiological effluent and monitoring data.
 - f) Surveys required by radiation work permits.
 - g) Reports on overexposure submitted to the Director and previously submitted to the NRC.
 - h) Reviews of operating and monitoring procedures completed during the period.

- 12.2 The ALARA audit shall also address any statistically significant trends in personnel exposures for identifiable categories of workers and types of activities, any trends in radiological effluent data and the performance of exposure and effluent control equipment as well as its utilization, maintenance and inspection history. Any recommendations to further reduce personnel exposures or environmental releases of uranium or radon and radon progeny shall be included in the report.
- 12.3 The Licensee shall conduct an annual land use survey for a five km radius around the site. The purpose is to assess population growth or industry growth in the immediate vicinity of the Clive facility and provide an inventory of domestic and agricultural wells within the survey area. The Licensee shall document this survey in the 11e.(2) Annual Report submitted to the Director.
- 12.4 The Licensee shall orally notify the Director within 24 hours and by submitting a letter within seven days of any waste shipment where a violation of applicable regulations or license conditions occurs. For example:
- a) Free liquids and leaking shipment discrepancy notifications made in accordance with applicable provisions of the Waste Characterization Plan as referenced in Condition 58 of Radioactive Materials License UT2300249.
- 12.5 Shipment discrepancies not addressed by the Waste Characterization Plan shall be noted on the manifest and the manifest retained on site for Division review.
- 12.6 The Licensee shall, unless otherwise specified, include in 11e.(2) the Annual Report submitted to the Director:
- a) The annual reporting requirements as specified in the license conditions;
 - b) The results of calibration of equipment;
 - c) Reports on audits and inspections completed during the year;
 - d) The results of all meetings and training courses required by this license; and
 - e) Any other significant subsequent information, reviews, investigations and corrective actions. Unless otherwise specified by rule, all such documentation shall be maintained at the site and corporate headquarters for a period of at least five years.
- 12.7 The Licensee shall, at least three months prior to license termination, submit to the Director a report which demonstrates the site has met all applicable provisions for license termination and transfer of the facility to the government for long-term custody in accordance with R313-24-4 (10 CFR Part 40, Appendix A, Criterion 11 incorporated by reference). Specifically, the Licensee shall document that:

11e.(2) License Amendment Request

- a) The concentrations of all of the listed hazardous constituents at the POC are within their designated concentration limits (standards);
- b) If a corrective action program was implemented, that the hazardous constituents contaminating the groundwater were returned to their designated limits; and
- c) The facility has been properly decontaminated and decommissioned in accordance with the decontamination and decommissioning plan proposed by the applicant in the license application and approved by the Director. The license termination shall not occur until the Licensee has demonstrated that these actions have been completed.

12.8 The Licensee shall immediately report to the Director:

- a) Any failure of the 11e.(2) byproduct material disposal cell that results in a release of waste into unrestricted areas; or
- b) Any unusual conditions that, if not corrected, could indicate the potential or lead to the failure of the system and result in a release of waste into an unrestricted area.

DIVISION OF WASTE MANAGEMENT AND RADIATION CONTROL

Ty L. Howard, Director

Date

Appendix L
Revised Drainage Ditch Calculations

PERIMETER DITCH CALCULATIONS FOR THE 11e.(2) EMBANKMENT

The following calculations are performed to justify the perimeter ditch design proposed in drawing set 20001; specific design information is provided in Engineering Drawings 20001-C03 and 20001-C05.

1.0 Perimeter Ditch Flow Capacity Evaluation

The drainage area contained by the 11e.(2) embankment perimeter drainage ditch includes the landfill embankment, the ditch itself, and the perimeter inspection road surrounding the facility. Engineering Drawing 20001-C03 provides centerline drainage ditch locations and elevations around the 11e.(2) landfill embankment. From Engineering Drawing 20001-C03, the following ditch centerline distances may be estimated:

North Side = South Side = 971 feet
East Side = West Side = 1,860 feet

From these dimensions, an estimate of the total drainage area is calculated:

$$\text{Drainage Area} = (971 \text{ ft})(1,860 \text{ ft}) = 1,806,060 \text{ ft}^2$$

From the ditch lengths and centerline elevations in Drawing 20001-C03, the following ditch slopes are determined:

North Side = 971 feet in length with an elevation change of 0.46 feet; this yields a slope of $(0.46 \text{ ft} / 971 \text{ ft}) = 4.74 \times 10^{-4} \text{ ft/ft}$

South Side = 970 feet in length with an elevation change of 0.46 feet; this yields a slope of $(0.46 \text{ ft} / 970 \text{ ft}) = 4.74 \times 10^{-4} \text{ ft/ft}$

East Side = 1,859 feet in length with an elevation change of 0.9 feet; this yields a slope of $(0.9 \text{ ft} / 1,859 \text{ ft}) = 4.84 \times 10^{-4} \text{ ft/ft}$

West Side = 1,859 feet in length with an elevation change of 0.9 feet; this yields a slope of $(0.9 \text{ ft} / 1,859 \text{ ft}) = 4.84 \times 10^{-4} \text{ ft/ft}$

As marked, the south side slope present the least amount of slope and are therefore the limiting slopes for the analysis.

Based on the ditch slopes and factoring in a triangular geometry for the ditch shape, Manning's Formula can be used to determine the maximum flow rate for each side of the cell. The ditch depth is 4 feet with a total ditch width of 40 feet, a ditch side-slope ratio of 1V:5H is produced.

Manning's Formula is:

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2}. \quad (1)$$

where,

Q = Flow in ft³/sec;

A = Cross sectional area of flow in ft²;

R = The hydraulic radius, the area of flow divided by the wetted perimeter, in feet; and,

S = Slope in ft/ft.

n = Manning's coefficient of roughness, calculated as:

$$n = 0.0456(D_{50}S)^{0.159}. \quad (2)$$

D₅₀ is equal to 4.5 inches for the rock in the ditch.

n_(east) = 0.017208;

n_(west) = 0.017208;

n_(north) = 0.017150;

n_(south) = 0.017152;

The cross sectional area of the ditch is determined by multiplying the height of the ditch squared by 5, and the wetted perimeter is determined by multiplying two times the height of the water in the ditch by the square root of one plus five squared; or:

$$WP = 2h\sqrt{1+5^2}. \quad (3)$$

The Manning calculations for flow around the embankment perimeter yields the following tables:

Table 1 - East Side Ditch (S = 0.000484 ft/ft)

Height of Water in Ditch (feet)	Flow Cross-Section Area in Ditch (ft ²)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Flow Rate (ft ³ /sec)	Flow Rate (ft ³ /min)
0.5	1.25	5.1	0.25	0.93	55.82
1.0	5.00	10.2	0.49	5.91	354.41
1.5	11.25	15.3	0.74	17.42	1,044.91
2.0	20.00	20.4	0.98	37.51	2,250.34
2.5	31.25	25.5	1.23	68.00	4,080.13
3.0	45.00	30.6	1.47	110.58	6,634.75
3.5	61.25	35.7	1.72	166.80	10,008.04
4.0	80.00	40.8	1.96	238.15	14,288.75

Table 2 - West Side Ditch (S = 0.000484 ft/ft)

Height of Water in Ditch (feet)	Flow Cross-Section Area in Ditch (ft ²)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Flow Rate (ft ³ /sec)	Flow Rate (ft ³ /min)
0.5	1.25	5.1	0.25	0.93	55.82
1.0	5.00	10.2	0.49	5.91	354.41
1.5	11.25	15.3	0.74	17.42	1,044.90
2.0	20.00	20.4	0.98	37.51	2,250.33
2.5	31.25	25.5	1.23	68.00	4,080.12
3.0	45.00	30.6	1.47	110.58	6,634.73
3.5	61.25	35.7	1.72	166.80	10,008.02
4.0	80.00	40.8	1.96	238.15	14,288.72

Table 3 - North Side Ditch (S = 0.000474 ft/ft)

Height of Water in Ditch (feet)	Flow Cross-Section Area in Ditch (ft ²)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Flow Rate (ft ³ /sec)	Flow Rate (ft ³ /min)
0.5	1.25	5.1	0.25	0.92	55.42
1.0	5.00	10.2	0.49	5.86	351.87
1.5	11.25	15.3	0.74	17.29	1,037.42
2.0	20.00	20.4	0.98	37.24	2,234.22
2.5	31.25	25.5	1.23	67.52	4,050.91
3.0	45.00	30.6	1.47	109.79	6,587.22
3.5	61.25	35.7	1.72	165.61	9,936.35
4.0	80.00	40.8	1.96	236.44	14,186.40

Table 4 - South Side Ditch (S = 0.000474 ft/ft)

Height of Water in Ditch (feet)	Flow Cross-Section Area in Ditch (ft ²)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Flow Rate (ft ³ /sec)	Flow Rate (ft ³ /min)
0.5	1.25	5.1	0.25	0.92	55.43
1.0	5.00	10.2	0.49	5.87	351.93
1.5	11.25	15.3	0.74	17.29	1,037.62
2.0	20.00	20.4	0.98	37.24	2,234.63
2.5	31.25	25.5	1.23	67.53	4,051.66
3.0	45.00	30.6	1.47	109.81	6,588.45
3.5	61.25	35.7	1.72	165.64	9,938.20
4.0	80.00	40.8	1.96	236.48	14,189.04

The calculations in Tables 1 through 4 show the amount of runoff that can be successfully collected in each section of the 11e.(2) embankment perimeter drainage ditch system.

2.0 Erosion Evaluation

The geotechnical literature (NUREG/CR-4620, "Methodologies for Evaluating Long-Term Stabilization Designs of Uranium Mill Tailings Impoundments") indicates that an acceptable velocity of water traveling over a compacted clay surface without significant erosion is no greater than 3 ft/sec. Water velocity may be calculated using the simple equation:

$$v = \frac{Q}{A} \quad (4)$$

In order to calculate the interstitial velocities associated with the ditch flow, the dimensions of the rock inside the ditch is required. Engineering Drawing 20001-C03 notes that the perimeter ditch is lined with Type A rock which has a D_{15} of 2 to 4 inches. A conservative value of 4 inches (yielding the fastest water velocity) is selected for the following equation to calculate the interstitial velocity:

$$v_f = \frac{1.4Ki}{n} \quad (5)$$

where,

K is the coefficient of permeability = $0.35(D_{15})^2 = 5.6 \text{ in/sec} = 0.467 \text{ ft/sec}$

i is the slope

n is the porosity = 0.33

tortuosity factor = 1.4.

The tortuosity factor describes the extra length that a flow must travel to eventually reach the outflow area. This is calculated as the length of actual flow (L_c) to the total length of the porous media (L). Typical ranges for this factor can be calculated from ranges provided by Bear ("Dynamics of Fluids in Porous Media," Dover Publications, Inc., 1972) for a similar tortuosity factor. The typical range provided by Bear converts to a range of 1.12 – 1.34 for the tortuosity factor used in this equation. Therefore, a tortuosity factor of 1.4 is conservatively selected.

Water velocities and interstitial velocities are calculated for a conservative maximum potential centerline height of 4 feet of water in each drainage ditch. The calculated velocities are presented in Table 5, which demonstrate all velocities are well below 3 ft/sec.

Table 5 - Water Velocities

Location	Area (ft²)	Flow Rate (ft³/sec)	Water Velocity (ft/sec)	Interstitial Velocity (ft/sec)
North	80	236.44	2.96	9.38 x 10 ⁻⁴
South	80	236.48	2.96	9.39 x 10 ⁻⁴
East	80	238.15	2.98	9.58 x 10 ⁻⁴
West	80	238.15	2.98	9.58 x 10 ⁻⁴

3.0 Storm Events

The performance of the drainage ditches to contain runoff is only important for the active life of the facility (estimated as 25 years). Upon closure, the drainage ditches will be removed or eventually become silted in to allow sheet flow across the site over the natural grade of the area. Therefore, a reasonable maximum storm event over the active life of the facility is the 25-year, 24-hour storm event (1.9 inches). A reasonable potential worst-case event during the active life of the facility is the 100-year, 24-hour storm event (2.4 inches). Both of these storm events are depicted in the isopluvial maps of the National Oceanic and Atmospheric Administration (NOAA) Atlas 2, Volume VI (1973).

The rainfall amount at one hour during the 100 and 25-year events is calculated using the equations provided in NOAA, Atlas 2. For the Clive region, the equation is:

$$1-hr = 0.322 + 0.789 \left[(6-hour) \left(\frac{6-hour}{24-hour} \right) \right] \quad (6)$$

Where the (6-hr) and (24-hr) are the precipitation amounts displayed on the isopluvial maps.

Empirical equations are developed for the 15-min, 30-min, 2-hour and 3-hour events, based upon the 1-hour and 6-hour events:

$$15\text{-min} = 0.57 \times (1\text{-hr}). \quad (7)$$

$$30\text{-min} = 0.79 \times (1\text{-hr}). \quad (8)$$

$$2\text{-hr} = 0.299 \times (6\text{-hour}) + 0.701 \times (1\text{-hr}). \quad (9)$$

$$3\text{-hr} = 0.526 \times (6\text{-hour}) + 0.474 \times (1\text{-hr}). \quad (10)$$

As is described in the NOAA text, the 12-hour distribution is estimated using graphical methods, based upon the 6-hour and 24-hour events. Using the equations and methods described above, the following storm distributions is estimated for the design storm events.

Table 6 - Storm Distributions

Time (min)	Maximum Normal Event (inches)	Potential Worst Case Event (inches)
15	0.65	0.73
30	0.9	1.00
60	1.14	1.27
120	1.21	1.40
180	1.27	1.50
360	1.4	1.70
720	1.65	2.05
1,440	1.9	2.40

Over the short active life span of the drainage ditches, it is unreasonable to assume larger storm events such as the Probable Maximum Precipitation (PMP). These larger storm events are more appropriately utilized in the longer life elements of the embankment design such as the rock cover over the embankment.

4.0 Drainage Calculations

Drainage calculations for the 11e.(2) embankment ditch system are determined from a mass balance over the system itself, where

$$(\text{flow in}) - (\text{flow out}) = \text{Accumulated water (required storage space)}$$

The total accumulated flow into the system is calculated by multiplying the accumulated rainfall by the weighted total drainage area. The calculated drainage area is equal to 1,806,060 ft². The run-off coefficient is equal to 0.5 (for earth with stone surface). Therefore, the total weighted drainage area is equal to (1,806,060 ft²)(0.5) = 903,030 ft².

Flow out of the system is calculated by multiplying the flow rate at specific depths (as presented in Tables 1 through 4) by the elapsed time of rainfall. The volume of the ditch at a specific depth is calculated by multiplying the cross-sectional flow area in the ditch at a given depth by the length of the ditch. The volume associated with a given depth is compared to the required storage volume calculated by subtracting the available discharge from the accumulated flow into the system. The volume associated with a given depth is equated the required storage volume by iterating over the depth of water in the ditch to estimate a maximum flow within the ditch for a particular storm event.

The total length of the drainage ditch, calculated from the ditch centerline coordinates provided in Engineering Drawing 20001-C03 is approximately 5,662 ft. The cross-sectional flow areas of the ditch varies with depth (as shown in Tables 1 through 4). Conservatively assuming that the discharge rate from the perimeter berm is dependent on the least sloped ditch (south side ditch = 4.74×10^{-4} ft/ft). Using the maximum normal storm event described in Table 6, an iterative method is used to equate the required storage with the available storage volume at a specific water depth. Using the lowest ditch slope (4.74×10^{-4} ft/ft), the discharge flow rate and volume of required ditch storage is calculated.

Table 7 - Drainage Flows and Storage for the Maximum Normal Storm Event

Rainfall Duration (min)	Rainfall Depth (in)	Flow Into Ditch System (ft ³)	Flow Out of Ditch System (ft ³)	Required Storage (ft ³)
15	0.65	48,914	10,377	38,537
30	0.9	67,727	20,754	46,974
60	1.14	85,788	41,507	44,281
120	1.21	91,056	83,015	8,041
180	1.27	95,571	124,522	0
360	1.4	105,354	249,044	0
720	1.65	124,167	498,088	0
1440	1.9	142,980	996,175	0

5.0 Conclusions

During the maximum normal precipitation event, the greatest volume retained in storage within the 11e.(2) Landfill Embankment drainage ditch system is approximately 46,974 ft³. This occurs approximately 30 minutes into the event and decreases over the next couple of hours. This volume equates to a depth of water within the ditch of approximately 1.29 feet, which is well within the four-foot perimeter ditch height specifications. Therefore the 11e.(2) ditch design adequately contains the maximum normal precipitation event. Similarly, Table 8 reports the discharge and water perimeter elevations for the worst-case storm event.

Table 8 - Drainage Flows and Storage for the Worst Case Storm Event

Rainfall Duration (min)	Rainfall Depth (in)	Flow Into Ditch System (ft³)	Flow Out of Ditch System (ft³)	Required Storage (ft³)
15	0.73	54,934	11,786	43,148
30	1.0	75,253	23,572	51,681
60	1.27	95,571	47,144	48,427
120	1.4	105,354	95,571	11,066
180	1.5	112,879	141,431	0
360	1.7	127,929	282,862	0
720	2.05	154,268	565,725	0
1440	2.4	180,606	1,131,449	0

During the potential worst-case scenario, the maximum volume retained in storage within the 11e.(2) ditch system is approximately 51,681 ft³, occurring roughly 30 minutes into the event and decreasing over the couple of next hours. This volume equates to a water height within the ditch slightly higher than 1.35 feet (well within the four-foot design height of the ditches). It is therefore concluded that the 11e.(2) embankment is capable of adequately containing the worst-case storm precipitation event.

6.0 Peak Run-Off Rate for Small Watersheds

The maximum length for the travel of water to the discharge point is down the sloped corner of the 11e.(2) embankment, from the crest to the northeast corner of the drainage ditch, then west down the northern drainage ditch and finally south toward the discharge point in the southwest corner. Engineering Drawing 20001-C03 illustrates this travel distance at approximately distance down the corner slope from the crest to the shoulder at roughly 784 feet with a slope of $16.71 / 784 = 0.021$ ft/ft. From that point, the distance down the corner slope from the shoulder to the northeast corner is approximately 272 feet with a slope of $25.5 / 272 = 0.094$ ft/ft. Flow across the northern drainage ditch is approximately 971 feet with a slope of 0.000474 ft/ft. Flow across the western drainage ditch is approximately 1,860 feet with a slope of 0.000484 ft/ft.

Rainfall intensity (i) is estimated by determining the time of concentration, T_c , or time required for water to travel from the most distant location in the watershed to the watershed discharge point. The formula for determining T_c is:

$$T_c = 0.00013L^{0.77}S^{-0.385} \quad (11)$$

The cumulative T_c over the path length of water travel, yields the following:

Table 9 - Travel Time

Path Length (ft)	Slope (ft/ft)	T_c (hr)
784	0.021	0.097
272	0.094	0.024
971	0.000474	0.494
1860	0.000484	0.809
Cummulative		1.424

Therefore, the total time required for water to travel the farthest distance within the watershed is roughly one hour and twenty-five minutes.

As it is a boundary condition, only the estimate of peak runoff flow rates during the potential worst-case condition is necessary. If the flow rates for the worst-case scenario are within tolerance, then the normal conditions will also be within tolerance. From Table 6, the most applicable storm intensity data for the above abnormal event is 1.27 inches over a one-hour time period. This equates to a rainfall intensity (i) of 1.76×10^{-3} feet/minute. Using this intensity, the drainage area and runoff coefficient values herein described, the estimated peak runoff during the abnormal event is:

$$Q = CiA = (0.5)(1.76 \times 10^{-3} \text{ ft/min})(1,806,060 \text{ ft}^2) = 1,589.3 \text{ ft}^3/\text{min} \quad (12)$$

This value is less than the lowest design flow rates for the 2.5-foot deep ditch described in Tables 1 through 4 (ranging between 4,051 ft^3/min and 4,080 ft^3/min).

Using the calculations of Tables 1 through 4 as maximum flow, this calculated flow results in depths of approximately 1.76 feet in all of the ditches (all allowing a freeboard of more than 2 feet). Therefore, the 11e.(2) Embankment ditches are sufficiently designed to contain the peak runoff flow from the potential worst case (and subsequently normal) storm events.

Calculations were performed by Vern C. Rogers and reviewed by Timothy L. Orton, P.E.

Reviewed by:

Timothy L. Orton, P.E.
Environmental Engineer and Manager

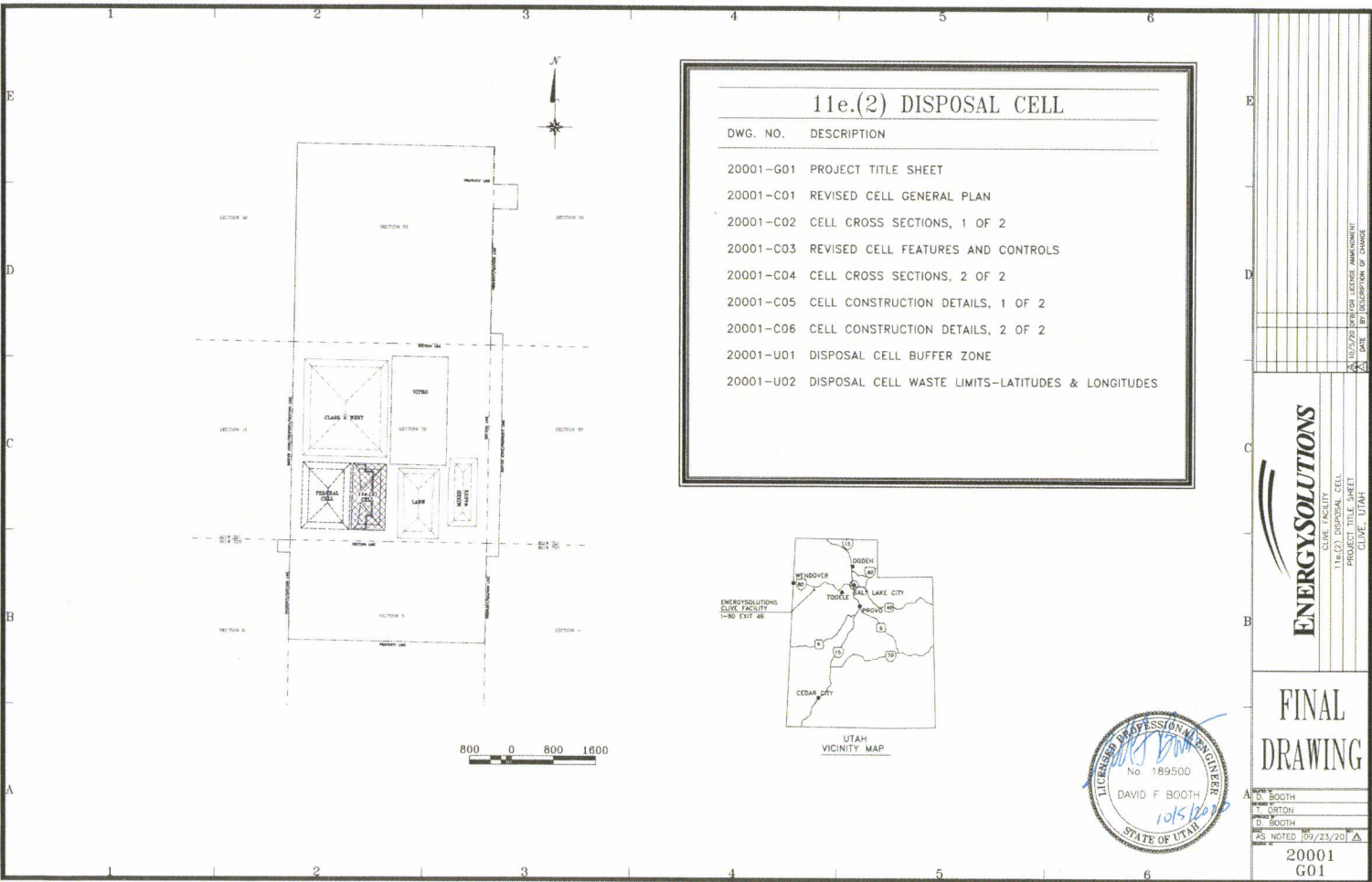
References

Bear, J. (1972). *Dynamics of Fluids in Porous Media*, Dover Publications, Inc., 1972

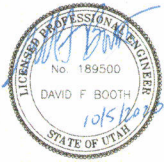
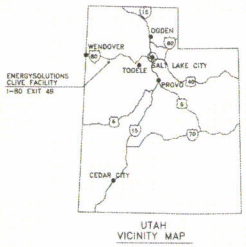
NOAA, (2012). "NOAA Atlas 2 Precipitation Frequency Estimates in GIS Compatible Formats." Accessed at <http://www.nws.noaa.gov/oh/hdsc/noaaatlas2.htm> on 20 October 2012.

NRC, (1986). "NUREG/CR-4620: Methodologies for Evaluating Long-Term Stabilization Designs of Uranium Mill Tailings Impoundments," June 1986.

Appendix M
Revised Engineering Drawing Set



11e.(2) DISPOSAL CELL	
DWG. NO.	DESCRIPTION
20001-G01	PROJECT TITLE SHEET
20001-C01	REVISED CELL GENERAL PLAN
20001-C02	CELL CROSS SECTIONS, 1 OF 2
20001-C03	REVISED CELL FEATURES AND CONTROLS
20001-C04	CELL CROSS SECTIONS, 2 OF 2
20001-C05	CELL CONSTRUCTION DETAILS, 1 OF 2
20001-C06	CELL CONSTRUCTION DETAILS, 2 OF 2
20001-U01	DISPOSAL CELL BUFFER ZONE
20001-U02	DISPOSAL CELL WASTE LIMITS-LATITUDES & LONGITUDES



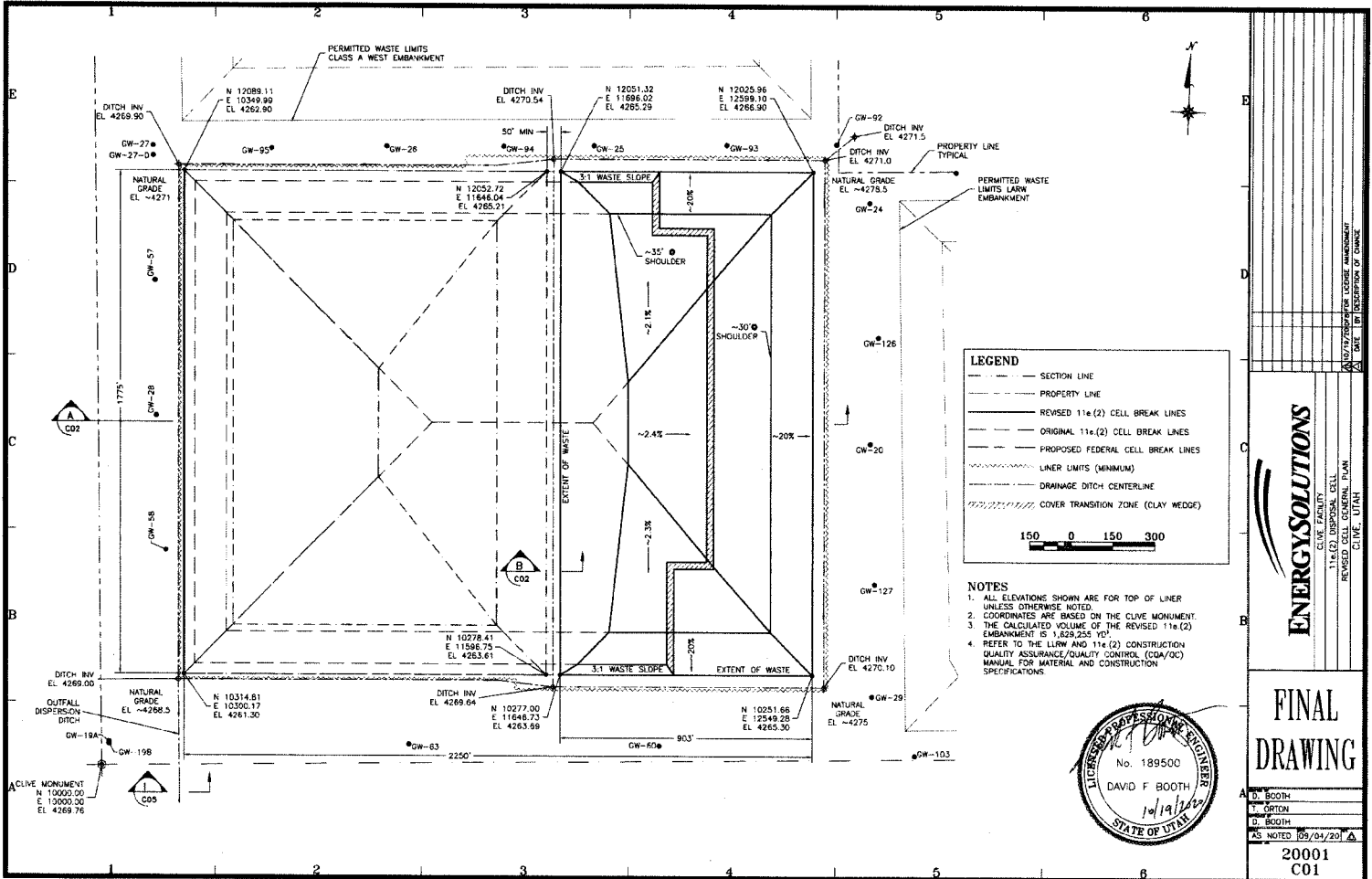
ENERGY SOLUTIONS
 CLIVE FACILITY
 11e.(2) DISPOSAL CELL
 PROJECT TITLE SHEET
 CLIVE, UTAH

DATE: 10/5/09
 BY: [Signature]
 DESCRIPTION OF CHANGE:

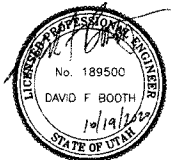
FINAL DRAWING

DESIGNED BY:	D. BOOTH
CHECKED BY:	T. GATON
DATE NOTED:	09/23/2010

20001
 G01

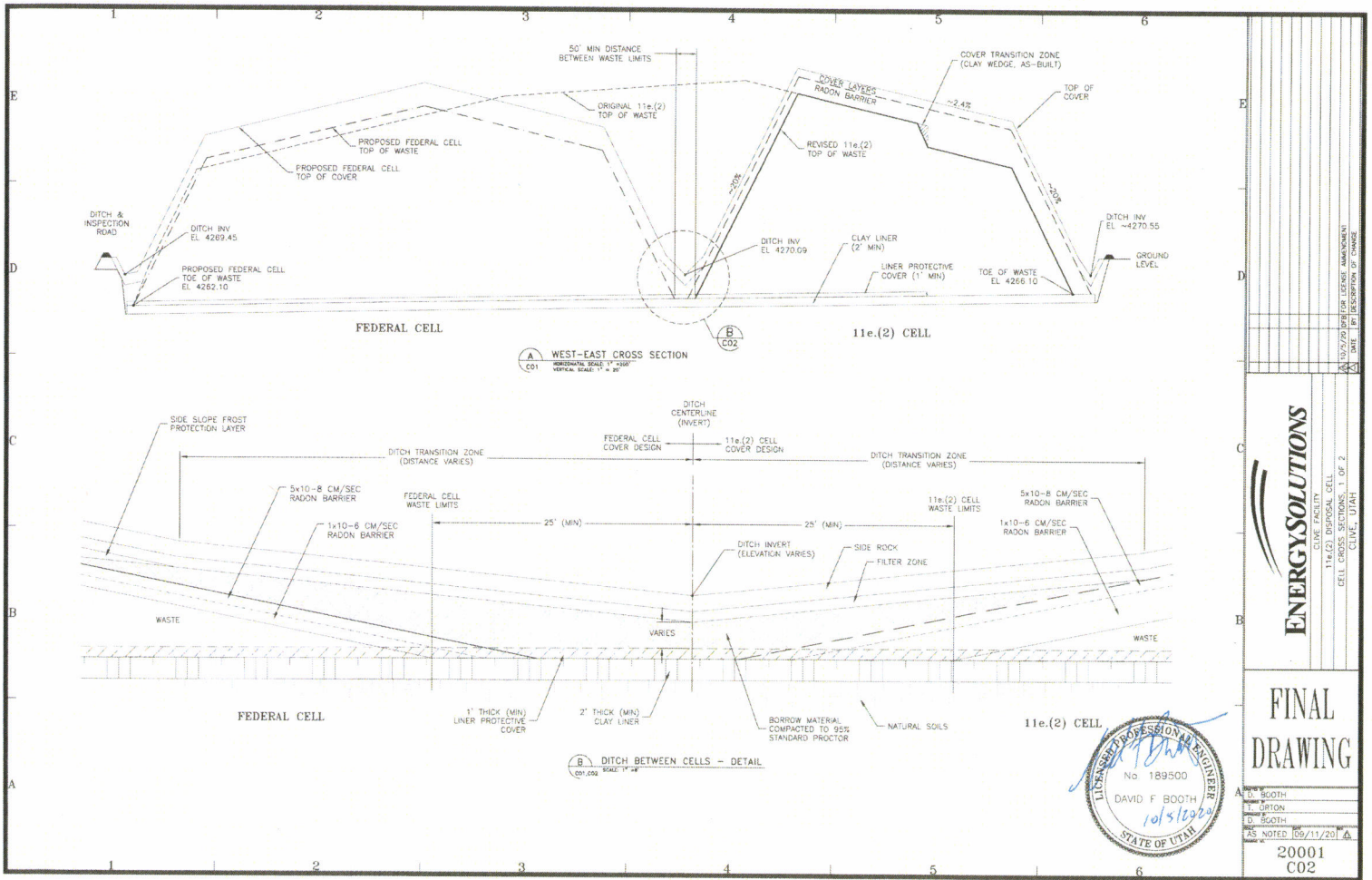


ENERGYSOLUTIONS
CLIVE FACILITY
 11a(2) DISPOSAL CELL
 REVISED CELL GENERAL PLAN
 CLIVE, UTAH



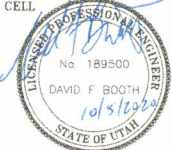
FINAL DRAWING

A. D. BOOTH
 T. CRTON
 D. BOOTH
 AS NOTED 09/04/2019
20001 C01

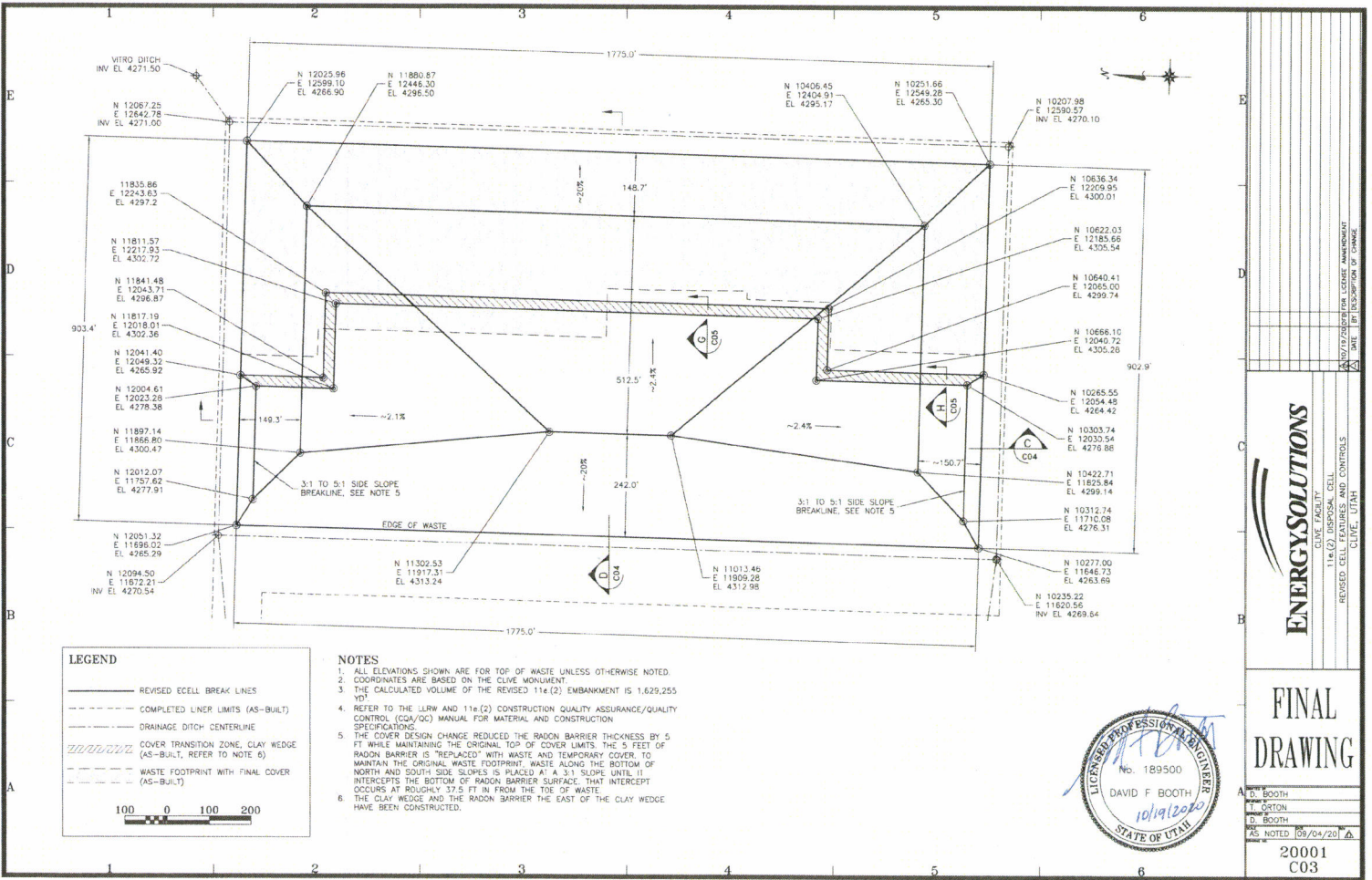


ENERGYSOLUTIONS
 CLIVE FACILITY
 11e.(2) DISPOSAL CELL
 CELL CROSS SECTIONS, 1 OF 2
 CLIVE, UTAH

FINAL DRAWING



E. BOOTH
 T. GORTON
 C. BOOTH
 AS NOTED 09/11/2010
20001 C02

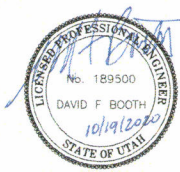


LEGEND

- REVISED E'CELL BREAK LINES
- COMPLETED LINER LIMITS (AS-BUILT)
- DRAINAGE DITCH CENTERLINE
- COVER TRANSITION ZONE, CLAY WEDGE (AS-BUILT, REFER TO NOTE 6)
- WASTE FOOTPRINT WITH FINAL COVER (AS-BUILT)

100 0 100 200

- NOTES**
1. ALL ELEVATIONS SHOWN ARE FOR TOP OF WASTE UNLESS OTHERWISE NOTED.
 2. COORDINATES ARE BASED ON THE CLIVE MONUMENT.
 3. THE CALCULATED VOLUME OF THE REVISED 11e(2) EMBANKMENT IS 1,629,255 YD³.
 4. REFER TO THE LLRW AND 11e(2) CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL (CQA/QC) MANUAL FOR MATERIAL AND CONSTRUCTION SPECIFICATIONS.
 5. THE COVER DESIGN CHANGE REDUCED THE RADON BARRIER THICKNESS BY 5 FT WHILE MAINTAINING THE ORIGINAL TOP OF COVER LIMITS. THE 5 FEET OF RADON BARRIER IS "REPLACED" WITH WASTE AND TEMPORARY COVER. TO MAINTAIN THE ORIGINAL WASTE FOOTPRINT, WASTE ALONG THE BOTTOM OF NORTH AND SOUTH SLOPE SLOPES IS PLACED AT A 3:1 SLOPE UNTIL IT INTERCEPTS THE BOTTOM OF RADON BARRIER SURFACE, THAT INTERCEPT OCCURS AT ROUGHLY 37.5 FT IN FROM THE TOE OF WASTE.
 6. THE CLAY WEDGE AND THE RADON BARRIER THE EAST OF THE CLAY WEDGE HAVE BEEN CONSTRUCTED.

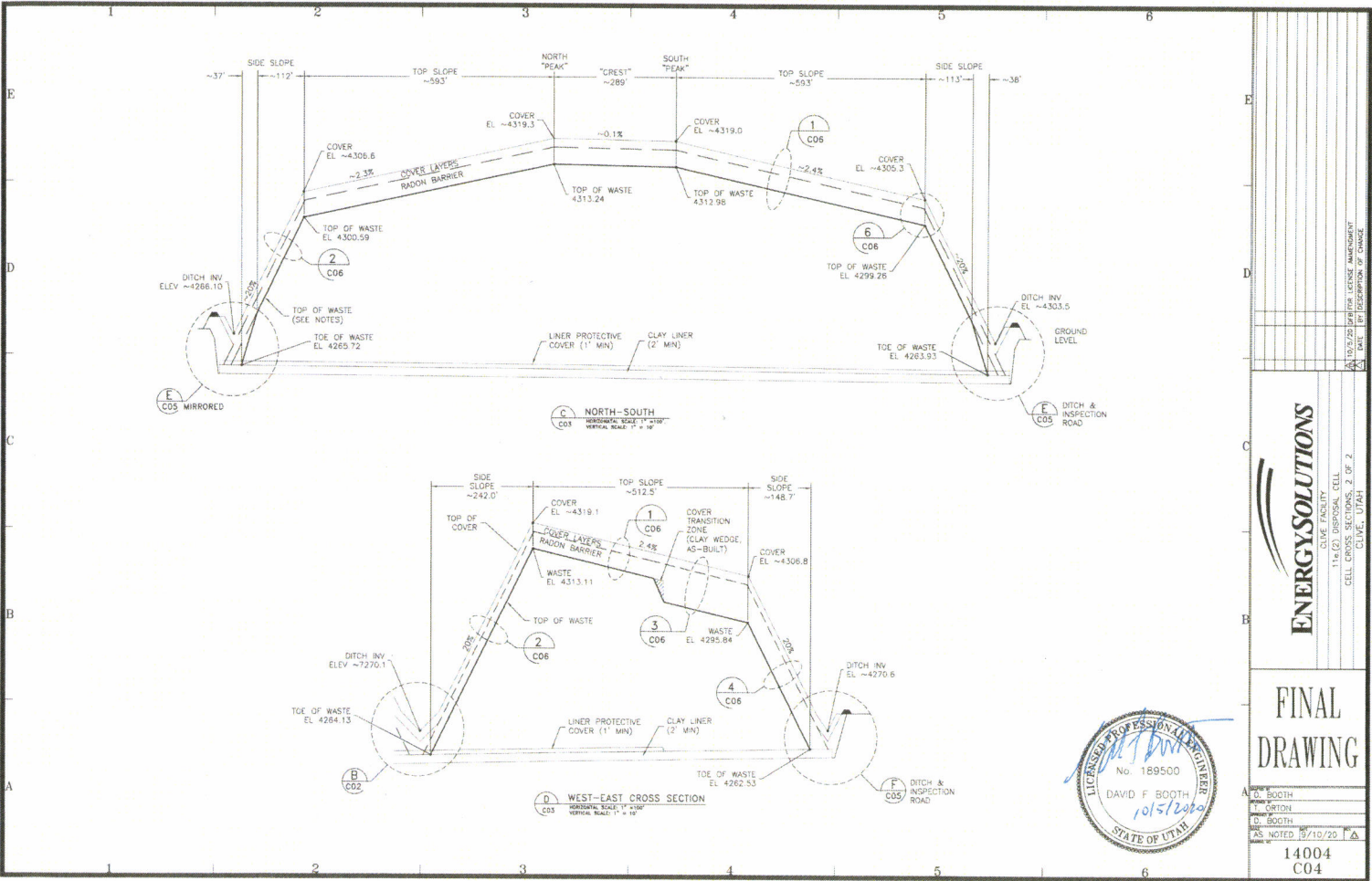


11e(2) DISPOSAL CELL
 REVISED CELL FEATURES AND CONTROLS
 CLIVE, UTAH
 DATE: 10/19/2020
 SHEET: 11 OF 12 (DISPOSITION OF CHANGE)

ENERGYSOLUTIONS
 CLIVE FACILITY

FINAL DRAWING

BY: D. BOOTH
CD: T. ORTON
DATE: 10/19/2020
AS NOTED 09/04/20
2001
C03



1	2	3	4	5	6
E					
D					
C					
B					
A					

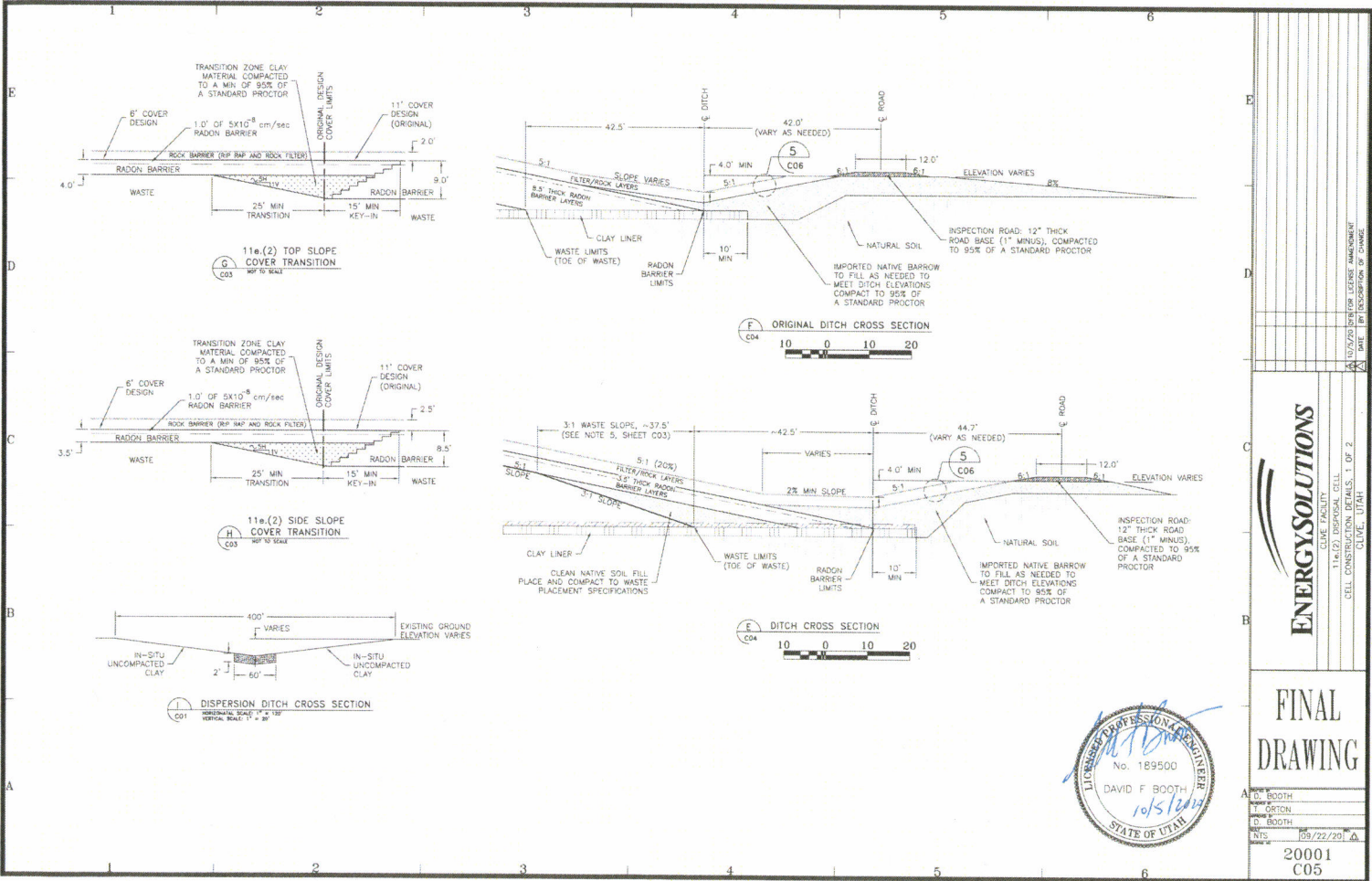
ENERGYSOLUTIONS

11.5 (C) PERSONAL CELL
 CELL CROSS SECTIONS, 2 OF 2
 DATE: BY: DESCRIPTION OF CHANGE:

FINAL DRAWING

DAVID F. BOOTH
 No. 189500
 10/5/2020
 STATE OF UTAH

14004
 C04



ENERGYSOLUTIONS

11e.(2) DITCH CROSS SECTION
 CELL CONSTRUCTION DETAILS: 1 OF 2
 CLIVE, UTAH
 DATE: 09/22/2011
 BY: INCORPORATION OF CHANGE

LICENSURE PROFESSIONAL ENGINEER
 No. 189500
 DAVID F BOOTH
 10/5/2011
 STATE OF UTAH

FINAL DRAWING

A: B. BOOTH
 T. ORTON
 D. BOOTH
 NTS: 09/22/2011
 20001 C05

11e.(2) CELL COVER DESIGNS

ROCK
12" THICK TOP ROCK
12" THICK FILTER ZONE
12" OF 5 X 10" CM/SEC RADON BARRIER

CLAY
3" OF 1 X 10" CM/SEC RADON BARRIER

1 11e.(2) TOP SLOPES
C04

ROCK
12" THICK TOP ROCK
12" THICK FILTER ZONE
12" OF 5 X 10" CM/SEC RADON BARRIER

CLAY
6" OF 1 X 10" CM/SEC RADON BARRIER

3 11e.(2) TOP SLOPES
ORIGINAL DESIGN
C04

ROCK
18" THICK SIDE ROCK
12" THICK FILTER ZONE
NATURAL GROUND OR IMPORTED NATIVE BARROW MATERIAL

5 PERIMETER DITCH
SUBMIT SIDE VIEW
C05

ROCK
18" THICK SIDE ROCK
12" THICK FILTER ZONE
12" OF 5 X 10" CM/SEC RADON BARRIER

CLAY
2.5" OF 1 X 10" CM/SEC RADON BARRIER

2 11e.(2) SIDE SLOPES
C04

ROCK
18" THICK SIDE ROCK
12" THICK FILTER ZONE
12" OF 5 X 10" CM/SEC RADON BARRIER

CLAY
7.5" OF 1 X 10" CM/SEC RADON BARRIER

4 11e.(2) SIDE SLOPES
ORIGINAL DESIGN
C04

ROCK
12" THICK TOP ROCK
12" THICK FILTER ZONE
12" OF 5 X 10" CM/SEC RADON BARRIER

CLAY
5" OF 1 X 10" CM/SEC RADON BARRIER
2.5" OF 1 X 10" CM/SEC RADON BARRIER

6 TOP SLOPE/SIDE SLOPE BREAKOVER
C05

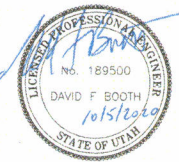
GRADATIONS -- ASTM C-136

TOP ROCK
D₁₀₀ 2-1/2 TO 4-1/2 INCHES
D₆₀ 1-1/8 TO 3 INCHES
D₃₀ 3/4 TO 1-1/2 INCHES

SIDE ROCK
D₁₀₀ 12 TO 16 INCHES
D₆₀ 8 TO 12 INCHES
D₃₀ 4-1/2 TO 6 INCHES
D₁₅ 2 TO 4 INCHES

FILTER ZONE
D₁₀₀ = 1.5 TO 3.0 INCHES
D₆₀ = 1.0 TO 2.5 INCHES
D₃₀ = 0.75 TO 2.0 INCHES
D₁₅ = 0.3, 0.25 TO 0.825 INCHES
D₁₀ >= #10 SIEVE (2.0 mm)
D₅ >= #200 SIEVE (0.074 mm)

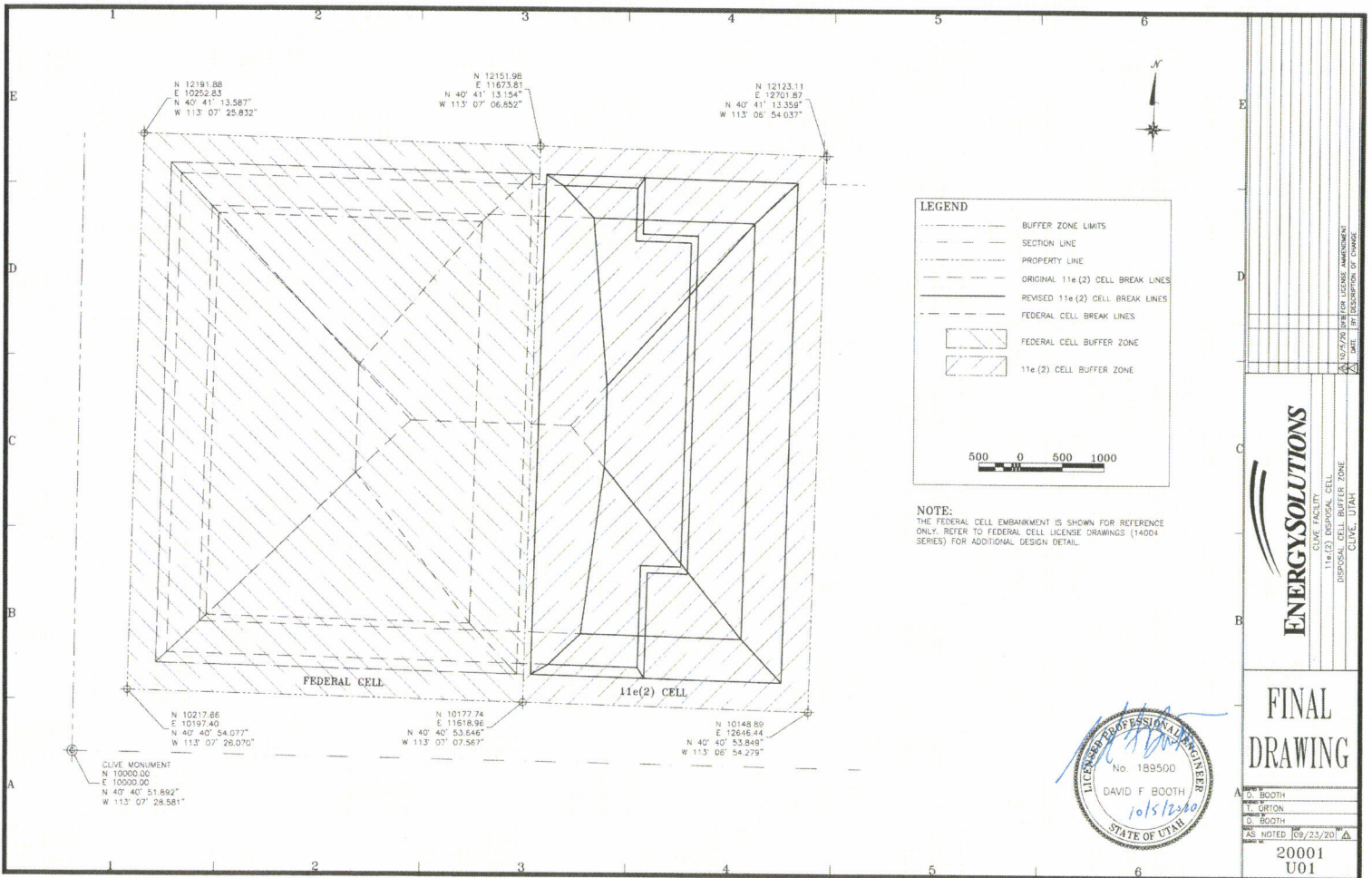
REFER TO THE LLRW AND 11e.(2) CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL (CQA/QCC) MANUAL FOR MATERIAL AND CONSTRUCTION SPECIFICATIONS.



ENERGYSOLUTIONS
CLIVE FACILITY
11e.(2) CELL COVER DESIGN
CELL CONSTRUCTION DETAILS, 2 OF 2
CLIVE, UTAH

FINAL DRAWING

DAVID F. BOOTH
09/22/2010
2001
C06



N 12191.88
 E 10252.83
 N 40° 41' 13.587"
 W 113° 07' 25.832"

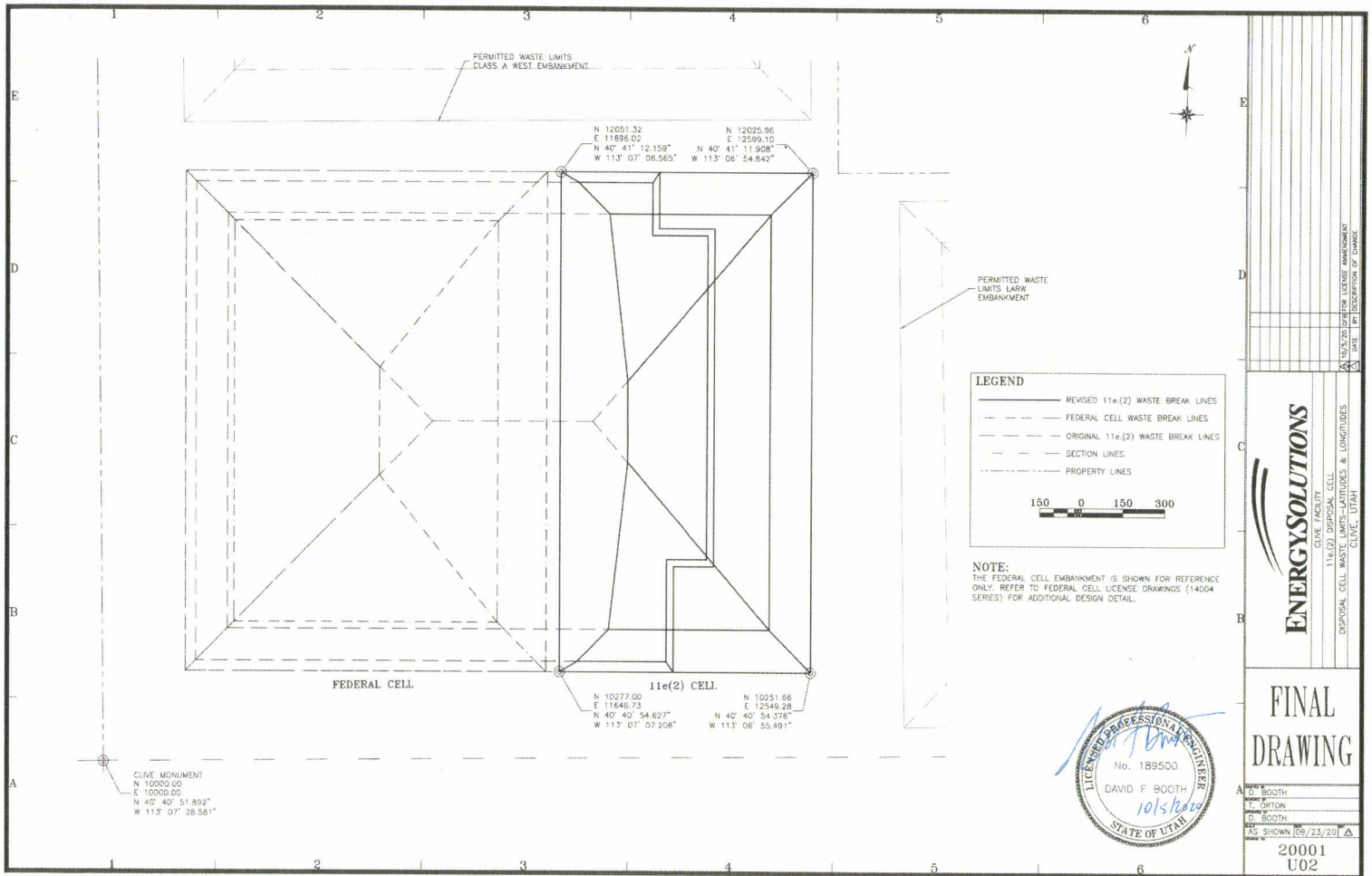
N 12151.98
 E 11673.81
 N 40° 41' 13.154"
 W 113° 07' 06.852"

N 12123.11
 E 12701.87
 N 40° 41' 13.359"
 W 113° 06' 54.037"

N 10217.86
 E 10197.40
 N 40° 40' 54.073"
 W 113° 07' 26.070"

N 10177.74
 E 11818.96
 N 40° 40' 53.846"
 W 113° 07' 07.567"

N 10148.89
 E 12646.44
 N 40° 40' 53.849"
 W 113° 06' 54.279"



Attachment B
EnergySolutions, LLC
Revised Request
March 1, 2021

MAR 01 2021


ENERGYSOLUTIONS

DRC-2021-003475

February 26, 2021

CD-2021-030

Mr. Ty Howard
Director
Utah Division of Waste Management and Radiation Control
195 North 1950 West
Salt Lake City, Utah 84114-4880

Re: Radioactive Material License UT 2300478 -
Groundwater Quality Discharge Permit UGW450005; **Revised Amendment and
Modification Request to Reduce Capacity and Disposal Footprint**

Dear Mr. Howard:

In a letter dated October 19, 2020 (CD-2020-157) *EnergySolutions* requested the Director of the Division of Waste Management and Radiation Control amend Radioactive Material License UT 2300478 to authorize a reduced by-product disposal capacity and waste footprint. In response to concerns raised by Division staff during subsequent 2021 meetings regarding the waste setback between the 11e.(2) embankment and a proposed Federal Cell Facility (under separate license consideration), *EnergySolutions* hereby submits revised Engineering Drawings to replace those in Appendix M of its October 19, 2020 License Amendment request. These drawings reflect an increased setback between the 11e.(2) embankment and any future embankment constructed to the west. No other information in the October 19, 2020 License Amendment request require replacement. Similarly, the replacement Engineering Drawings do not affect *EnergySolutions*' October 19, 2020 request to modify Table 3 of Groundwater Quality Discharge Permit UGW450005 to reflect the corner coordinates for the reduced disposal footprint.

Please contact me at (801) 649-2000 if you have any questions regarding this revised License Amendment request.

Sincerely,

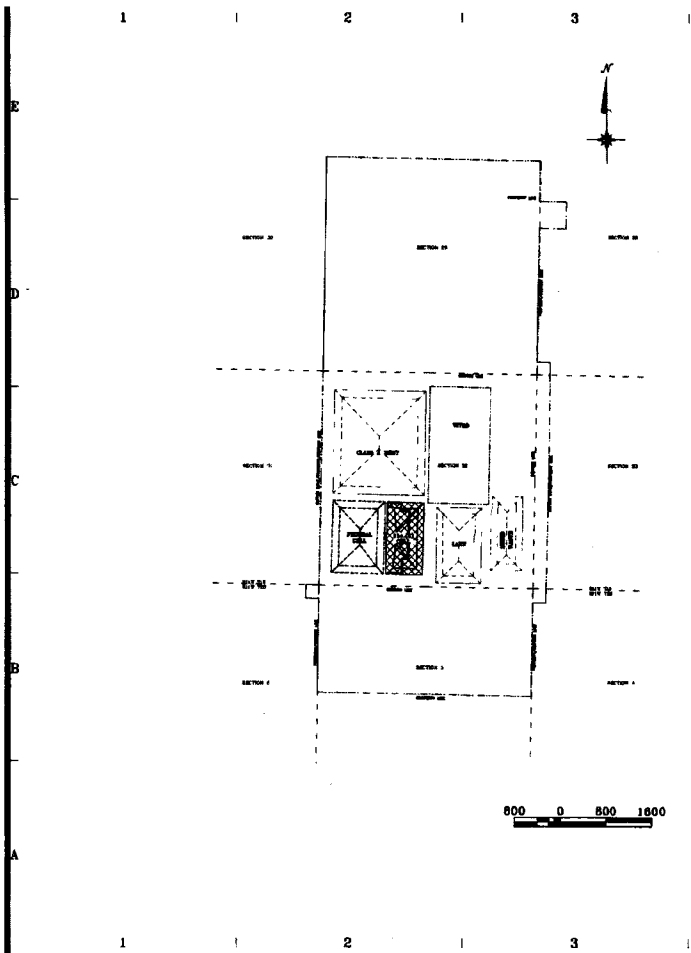


Vern C. Rogers
Feb 26 2021 9:08 AM

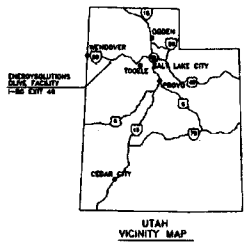
cosign

Vern C. Rogers
Director of Regulatory Affairs

enclosures



11e.(2) DISPOSAL CELL	
DWG. NO.	DESCRIPTION
20001-G01	PROJECT TITLE SHEET
20001-C01	REVISED CELL GENERAL PLAN
20001-C02	CELL CROSS SECTIONS, 1 OF 2
20001-C03	REVISED CELL FEATURES AND CONTROLS
20001-C04	CELL CROSS SECTIONS, 2 OF 2
20001-C05	CELL CONSTRUCTION DETAILS, 1 OF 2
20001-C06	CELL CONSTRUCTION DETAILS, 2 OF 2
20001-U01	DISPOSAL CELL BUFFER ZONE
20001-U02	DISPOSAL CELL WASTE LIMITS-LATITUDES & LONGITUDES



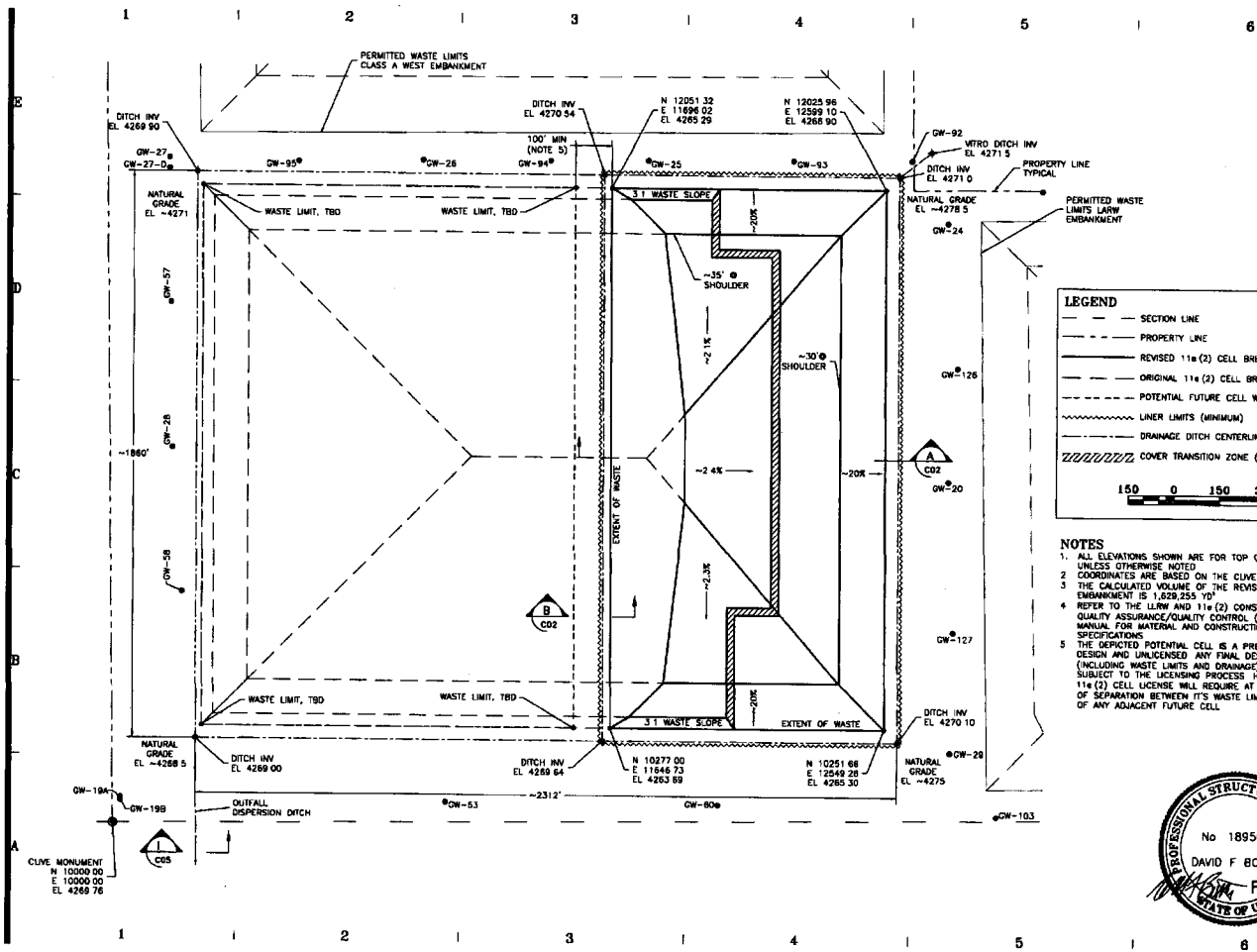
ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED
 ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE NOTED

ENERGYSOLUTIONS
 OGDEN FACILITY
 11e.(2) DISPOSAL CELL
 PROJECT TITLE SHEET
 OGDEN, UTAH

FINAL DRAWING

DESIGNED BY	D. BOOTH
CHECKED BY	T. ORTON
DATE	10/5/2001
AS NOTED	10/23/2001

20001
G01



LEGEND

- SECTION LINE
- PROPERTY LINE
- - - - - REVISED 11a(2) CELL BREAK LINES
- - - - - ORIGINAL 11a(2) CELL BREAK LINES
- - - - - POTENTIAL FUTURE CELL WASTE LIMITS
- - - - - LINER LIMITS (MINIMUM)
- - - - - DRAINAGE DITCH CENTERLINE
- ||||| COVER TRANSITION ZONE (CLAY WEDGE)

150 0 150 300

- NOTES**
1. ALL ELEVATIONS SHOWN ARE FOR TOP OF LINER UNLESS OTHERWISE NOTED
 2. COORDINATES ARE BASED ON THE CLIVE MONUMENT.
 3. THE CALCULATED VOLUME OF THE REVISED 11a(2) EMBANKMENT IS 1,029,255 YD³
 4. REFER TO THE LLRW AND 11a(2) CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL (CQA/QC) MANUAL FOR MATERIAL AND CONSTRUCTION SPECIFICATIONS
 5. THE SPECIFIED POTENTIAL CELL IS A PRELIMINARY DESIGN AND UNLICENSED ANY FINAL DESIGN (INCLUDING WASTE LIMITS AND DRAINAGE) WILL BE SUBJECT TO THE LICENSING PROCESS HOWEVER, THE 11a(2) CELL LICENSE WILL REQUIRE AT LEAST 100 FT OF SEPARATION BETWEEN ITS WASTE LIMITS AND THAT OF ANY ADJACENT FUTURE CELL



ENERGYSOLUTIONS

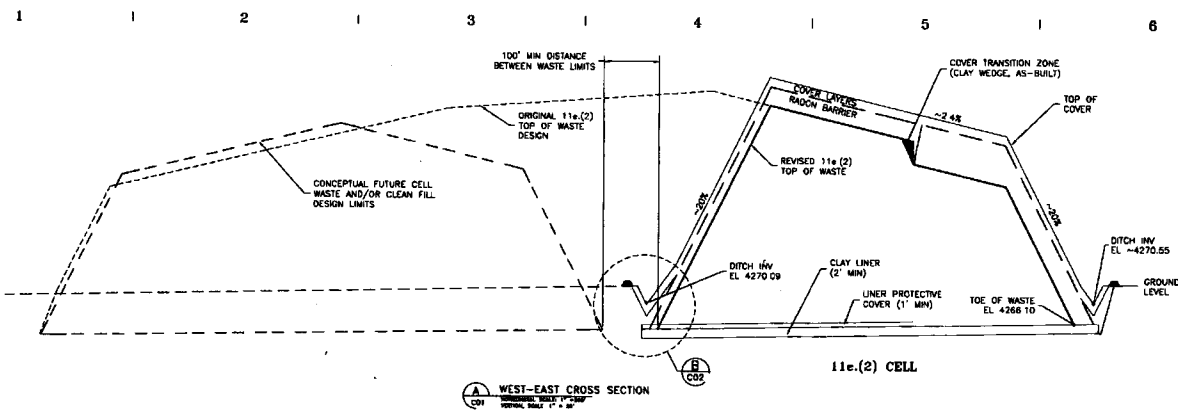
CLIVE FACILITY
 11a(2) DISPOSAL CELL
 REVISED CELL ORIGINAL PLAN
 CLIVE, UTAH

FINAL DRAWING

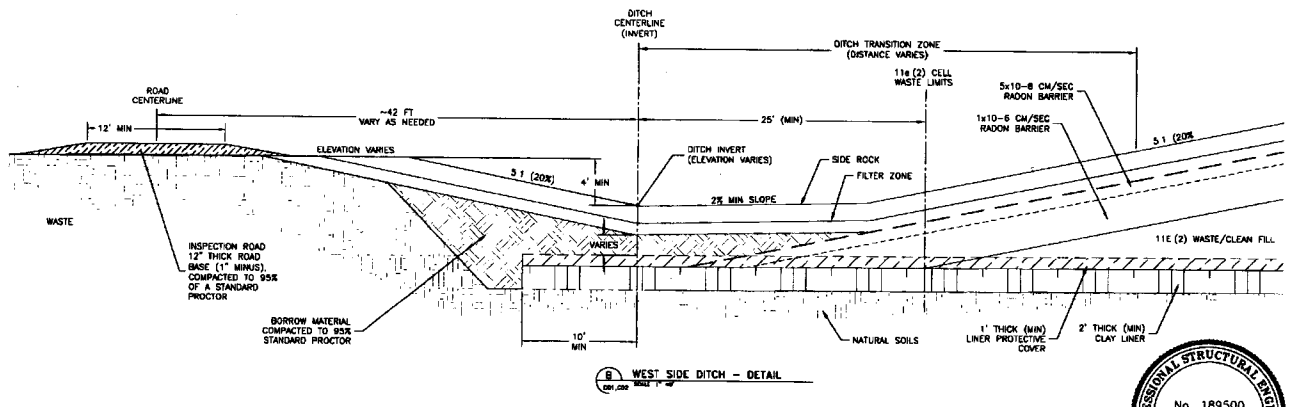
A: BOOTH
 T: ORTON
 D: BOOTH

AS NOTED 09/04/20

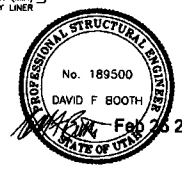
20001
 C01



A WEST-EAST CROSS SECTION
SCALE: HORIZ. 1" = 20' VERT. 1" = 4'



B WEST SIDE DITCH - DETAIL
SCALE: HORIZ. 1" = 20' VERT. 1" = 4'



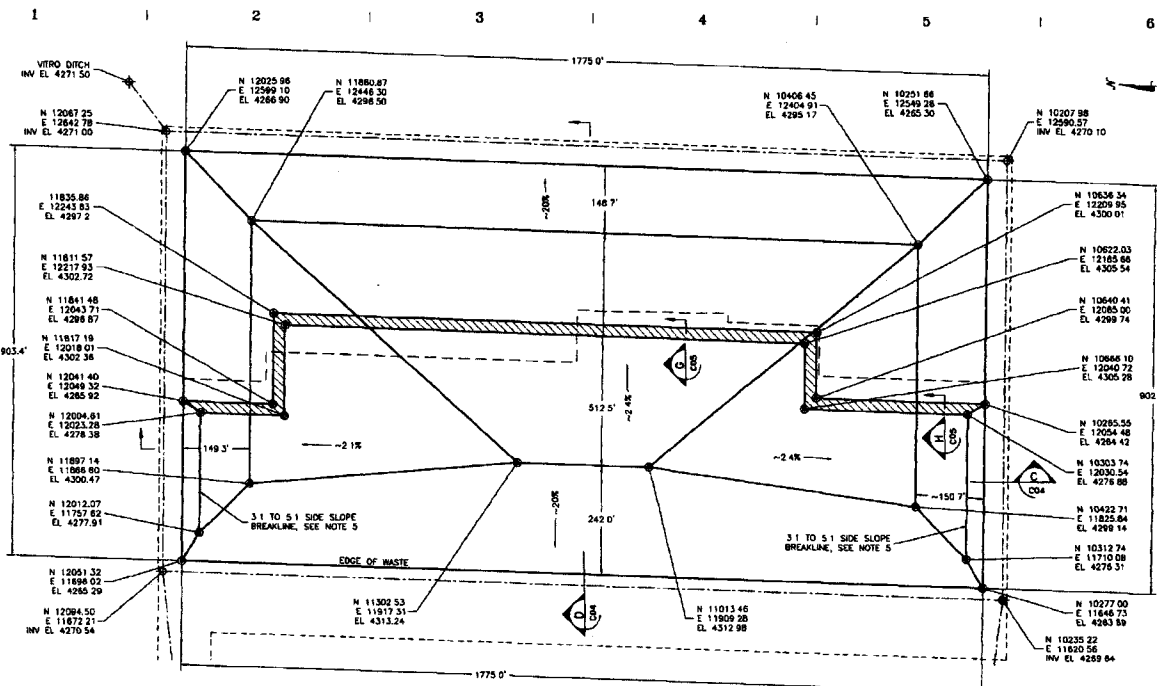
ENERGY SOLUTIONS
 1116 (2) DISPOSAL CELL
 CELL CROSS SECTIONS, 1 OF 2
 CLIVE, UTAH

DATE: BY: CHECKED: APPROVED: REVISION AND: REVISION CELL
 11/20/2019 11/20/2019 11/20/2019 11/20/2019 11/20/2019 11/20/2019
 DATE: BY: CHECKED: APPROVED: REVISION AND: REVISION CELL

FINAL DRAWING

A	D BOOTH
T	ORTON
D	BOOTH
AS NOTED 05/11/2019	

20001
 C02



LEGEND

- REVISED ECCELL BREAK LINES
- COMPLETED LINER LIMITS (AS-BUILT)
- DRAINAGE DITCH CENTERLINE
- COVER TRANSITION ZONE, CLAY WEDGE (AS-BUILT, REFER TO NOTE 6)
- WASTE FOOTPRINT WITH FINAL COVER (AS-BUILT)

100 0 100 200

- NOTES**
- 1 ALL ELEVATIONS SHOWN ARE FOR TOP OF WASTE UNLESS OTHERWISE NOTED.
 - 2 COORDINATES ARE BASED ON THE CLIVE MONUMENT
 - 3 THE CALCULATED VOLUME OF THE REVISED 11a(2) EMBANKMENT IS 1,629,255 YD³
 - 4 REFER TO THE LLW AND 11a(2) CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL (CQA/QCC) MANUAL FOR MATERIAL AND CONSTRUCTION SPECIFICATIONS
 - 5 THE COVER DESIGN CHANGE REDUCED THE RADON BARRIER THICKNESS BY 5 FT WHILE MAINTAINING THE ORIGINAL TOP OF COVER LIMITS. THE 5 FEET OF RADON BARRIER IS "REPLACED" WITH WASTE AND TEMPORARY COVER. TO MAINTAIN THE ORIGINAL WASTE FOOTPRINT, WASTE ALONG THE BOTTOM OF NORTH AND SOUTH SIDE SLOPES IS PLACED AT A 3:1 SLOPE UNTIL IT INTERCEPTS THE BOTTOM OF RADON BARRIER SURFACE. THAT INTERCEPT OCCURS AT ROUGHLY 37.5 FT IN FROM THE TOE OF WASTE.
 - 6 THE CLAY WEDGE AND THE RADON BARRIER THE EAST OF THE CLAY WEDGE HAVE BEEN CONSTRUCTED.

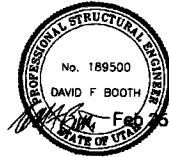
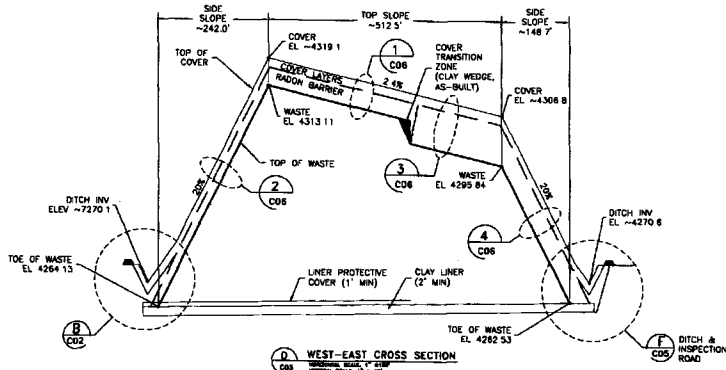
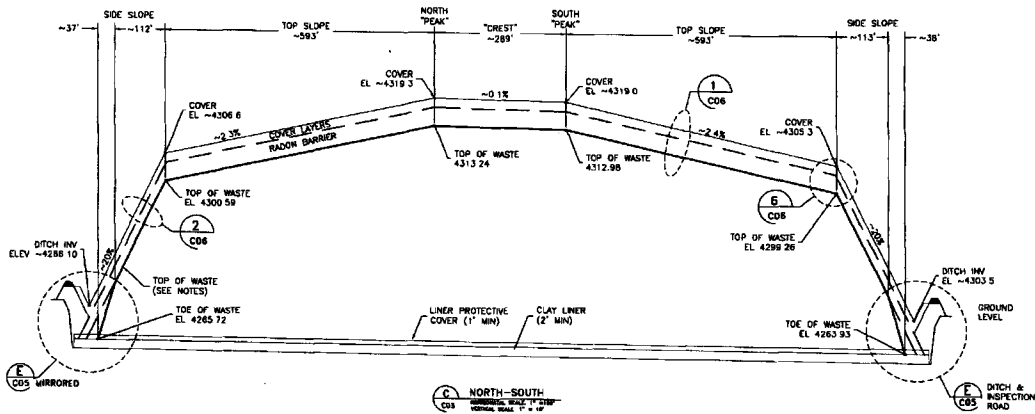


ENERGY SOLUTIONS
 CLIVE FACILITY
 11a(2) DISPOSAL CELL
 REVISED CELL PLAN AND CONTROLS
 CLIVE, UTAH

FINAL DRAWING

A: BOOTH
 T: ORTON
 D: BOOTH
 AS NOTED 09/04/2001 A

2001
 C03



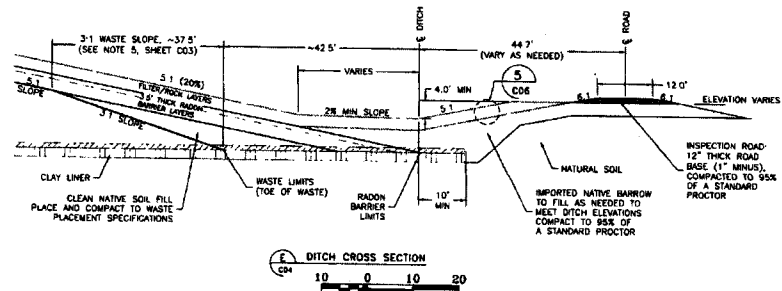
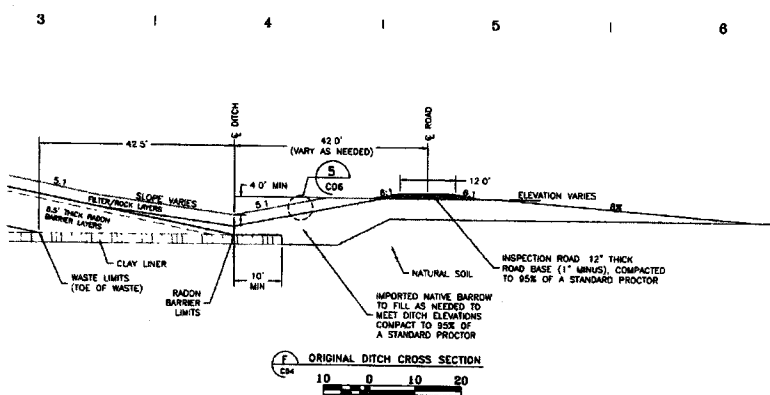
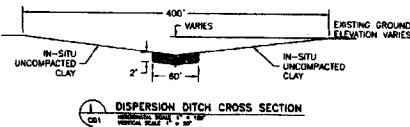
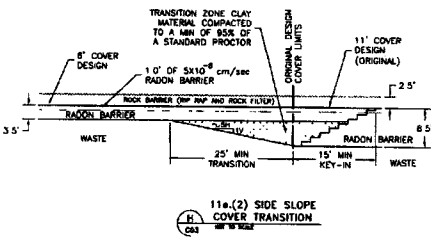
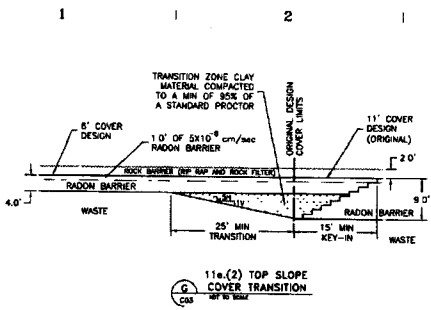
ENERGYSOLUTIONS

CLIVE FACILITY
116 (2) DISPOSAL CELL
CELL CROSS SECTIONS, 2 OF 2
DATE: 02/26/2021
BY: [Signature]
CHK: [Signature]

FINAL DRAWING

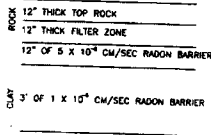
A	BOOTH
T	BOOTH
D	BOOTH
AS NOTED	8/10/20

14004
C04

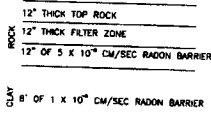


ENERGYSOLUTIONS
 CLIVE FACILITY
 11a.(2) DISPOSAL CELL
 CELL CONSTRUCTION DETAILS: 1 OF 2
 CELL CONSTRUCTION DETAILS: 1 OF 2
 DATE: 09/22/2010
FINAL DRAWING
 A: BOOTH
 T: GIBSON
 D: BOOTH
 MTS
 20001
 C05

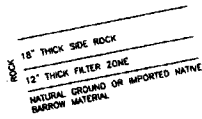
11e.(2) CELL COVER DESIGNS



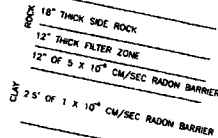
1 11e.(2) TOP SLOPES
C04



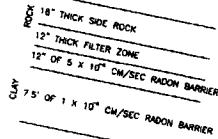
3 11e.(2) TOP SLOPES
C04



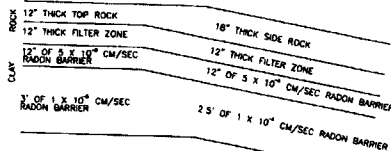
5 PERIMETER DITCH
C05



2 11e.(2) SIDE SLOPES
C04



4 11e.(2) SIDE SLOPES
C04



6 TOP SLOPE/SIDE SLOPE BREAKOVER
C05

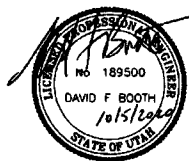
GRADATIONS - ASTM C-136

TOP ROCK
D₁₀₀ 2-1/2 TO 4-1/2 INCHES
D₇₅ 1-1/8 TO 3 INCHES
D₃₀ 3/4 TO 1-1/2 INCHES

SIDE ROCK
D₁₀₀ 12 TO 18 INCHES
D₇₅ 8 TO 12 INCHES
D₃₀ 4-1/2 TO 8 INCHES
D₁₅ 2 TO 4 INCHES

FILTER ZONE
D₁₀₀ = 1.5 TO 3.0 INCHES
D₇₅ = 1.0 TO 2.5 INCHES
D₃₀ = 0.75 TO 2.0 INCHES
D₁₅ = 0.3125 TO 0.625 INCHES
D_{7.5} = #10 SIEVE (2.0 mm)
D_{4.75} = #200 SIEVE (0.075 mm)

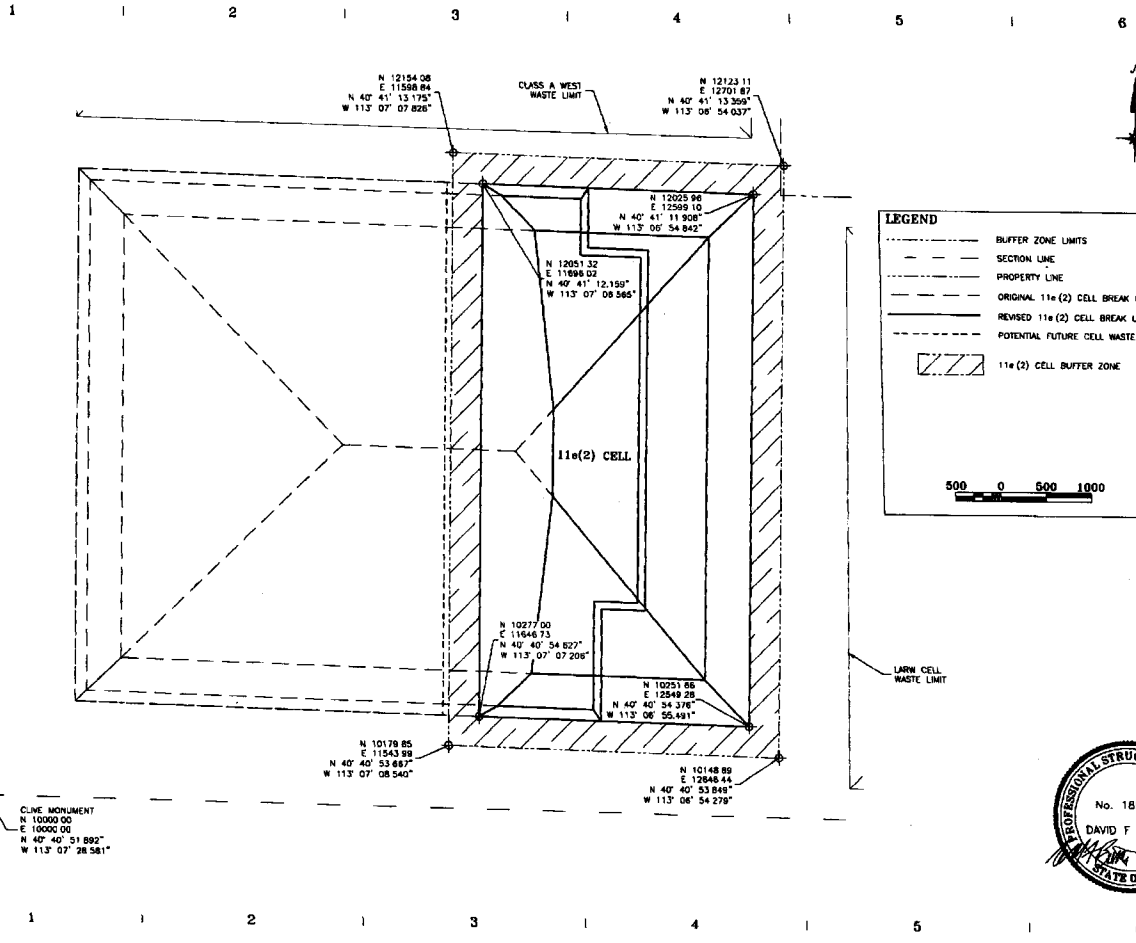
REFER TO THE LLRW AND 11e.(2) CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL (CQA/QC) MANUAL FOR MATERIAL AND CONSTRUCTION SPECIFICATIONS



ENERGYSOLUTIONS
CLAY FACILITY
11e.(2) DISPOSAL CELL
CELL CONSTRUCTION DETAILS 2 OF 2
DATE: 10/15/2004
DRAWN BY: [Name]

FINAL DRAWING

DATE: 09/22/2004
20001 C06



LEGEND

- BUFFER ZONE LIMITS
- - - SECTION LINE
- PROPERTY LINE
- ORIGINAL 11e(2) CELL BREAK LINES
- - - REVISED 11e(2) CELL BREAK LINES
- POTENTIAL FUTURE CELL WASTE LIMITS

11e(2) CELL BUFFER ZONE

500 0 500 1000



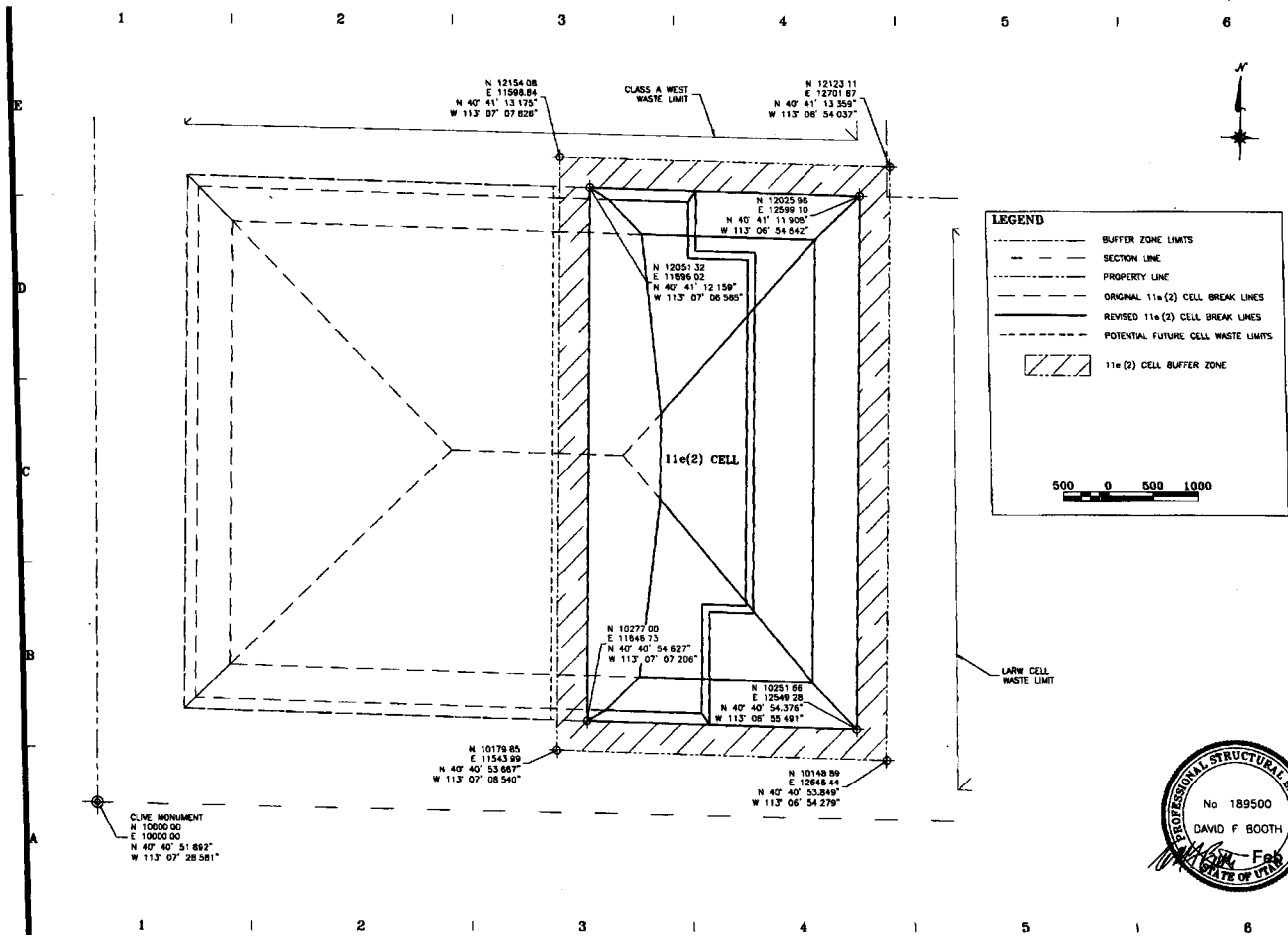
ENERGYSOLUTIONS

CLIVE FACILITY
 11e(2) DISPOSAL CELL
 DISPOSAL CELL BUFFER ZONE
 CLIVE, UTAH

FINAL DRAWING

AS NOTED 06/23/20 A

20001
 U01



ENERGYSOLUTIONS
 A DIVISION OF
 11e(2) DISPOSAL CELL
 DISPOSAL CELL BUFFER ZONE
 C.L.M. UTM

FINAL DRAWING

DAVID F. BOOTH
 PROFESSIONAL STRUCTURAL ENGINEER
 No. 189500
 STATE OF UTAH

AS NOTED 05/23/2021

20001
 U01



Peter Martinez <pmartinez@utah.gov>

Fwd: Revised Amendment and Modification Request to Reduce Capacity and Disposal Footprint (CD-2021-030)

1 message

LLRW DWMRC <llrw@utah.gov>
To: Peter Martinez <pmartinez@utah.gov>

Mon, Mar 1, 2021 at 7:53 AM

drc

----- Forwarded message -----

From: **Vern C. Rogers** <vcrogers@energysolutions.com>
Date: Fri, Feb 26, 2021 at 9:10 AM
Subject: Revised Amendment and Modification Request to Reduce Capacity and Disposal Footprint (CD-2021-030)
To: Llrw@utah.gov <Llrw@utah.gov>
Cc: Kristina M. Garcia <kmgarcia@energysolutions.com>, Treasa Parker <tparker@energysolutions.com>, Steve D. Gurr <sdgurr@energysolutions.com>

Mr. Howard

In a letter dated October 19, 2020 (CD-2020-157) EnergySolutions requested the Director of the Division of Waste Management and Radiation Control amend Radioactive Material License UT 2300478 to authorize a reduced by-product disposal capacity and waste footprint. In response to concerns raised by Division staff during subsequent 2021 meetings regarding the waste setback between the 11e.(2) embankment and a proposed Federal Cell Facility (under separate license consideration), EnergySolutions hereby submits revised Engineering Drawings to replace those in Appendix M of its October 19, 2020 License Amendment request. These drawings reflect an increased setback between the 11e.(2) embankment and any future embankment constructed to the west. No other information in the October 19, 2020 License Amendment request require replacement. Similarly, the replacement Engineering Drawings do not affect EnergySolutions' October 19, 2020 request to modify Table 3 of Groundwater Quality Discharge Permit UGW450005 to reflect the corner coordinates for the reduced disposal footprint.

Please contact me at (801) 649-2000 if you have any questions regarding this revised License Amendment request.

Vern C. Rogers | ENERGYSOLUTIONS

299 South Main Street, Suite 1700

Salt Lake City, UT 84111

PHONE: 801.649.2000

DIRECT: 801.649.2253

MOBILE: 801.557.9840

FACSIMILE 801.880.2879

EMAIL vcrogers@energysolutions.com

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 **02262021 - reduced footprint amendment transmittal.pdf**

6164K

Attachment C

EnergySolutions, LLC

Pages 40 and 41 of Federal Cell Application



vcrogers@energysolutions.com

Compose

Mail

Inbox

Starred

Snoozed

Important

Sent

Drafts

Categories

Social

Updates 13

Forums 4

Promotions 1

24- Hour Notice

Amy Esser

Board meeting

Bret Randall

Cabinet

EnergySolutions

Chat



Charles, Lawrence, Otis
Amendment 3

Spaces



Meet

Transmittal for Federal Cell License that in

Vern C. Rogers <vcrogers@energysolutions.com>
to me, owilloughby

See pages 40 and 41 for groundwater wells that need to be reflected in

Vern C. Rogers | **ENERGYSOLUTIONS**

299 South Main Street, Suite 1700
Salt Lake City, UT 84111

PHONE: 801.649.2000
DIRECT: 801.649.2253
MOBILE: 801.557.9840
FACSIMILE: 801.880.2879
EMAIL: vcrogers@energysolutions.com

CONFIDENTIALITY NOTICE: This electronic message transmission contains informati
intended recipient, be aware that any disclosure, copying, distribution or use of the cont
the message above is intended to create a contractual relationship.



April 9, 2021
Mr. Vern C. Rogers
Utah Division of Waste Management and Radiation Control
100 South 1400 West
Salt Lake City, Utah 84114-4000
Subject: Federal Cell Facility Radioactive Material License Application
Groundwater Quality Monitoring Permit 130-00000 Modification Request
Mr. Howard
In response to your electronic request from the LLRW Section Manager of the Division of
Waste Management and Radiation Control of the State of Utah.

PDF 04092021 - TRANS.



Otis Willoughby lii <owilloughby@utah.gov>
to Vern, me

Thank you Vern. Don't forget to send submittals though the LLRW addr

Otis H. Willoughby | Manager | Low Level Radioactive Waste Sect

Phone: [801-536-0220](tel:801-536-0220)

- e. **Comment 5:** *The calculated cost of item 450, Highly Unlikely Catastrophic Events, (i.e., \$2,383,386) does not include any of the Appendix A, Table 35 direct labor multipliers, shown in Table 3. When the Table 35 multipliers have been included, the cost increases to \$3,664,456.*

EnergySolutions' Response: Following a legal review of the statutory requirements in Utah Code 19-3-104 regarding closure and post-closure sureties and the perpetual care requirements of Utah Code 19-3-106.2, EnergySolutions has determined that perpetual care funds is not required from licensees of federal depleted uranium disposal facilities. See the response to Comment 1 of Appendix G.

EnergySolutions' Radioactive Material License UT2300478 authorizes management and disposal of 11e.(2) byproduct on the same footprint herein being considered for the Federal Cell Facility. In preparation for this Federal Cell Facility Radioactive Material License Application, EnergySolutions previously requested Radioactive Material License UT2300478 be amended license a smaller footprint.⁵

To support this Federal Cell Facility Radioactive Material License Application, EnergySolutions requests Table 3 of the Discharge Permit be amended to reflect the corner coordinates for the proposed Federal Cell Facility (as found in Condition 10.B of the suggested License language in Appendix A). Similarly, EnergySolutions requests a 10,000-year performance period for the Federal Cell Facility be included in the Table in Discharge Permit I.D.1. EnergySolutions also requests Table 2D be added to the Discharge Permit with references to the Engineering Drawings included in Appendix H of this Application. Finally, several groundwater wells were constructed along the original byproduct license footprint (several of which are no longer located at the small footprint of the byproduct perimeter). Therefore, EnergySolutions requests that Discharge Permit Part I.F.1.2 by modified and Part I.F.1.4 be added, as herein illustrated.


⁵ Rogers, V.C. "Radioactive Material License UT 2300478 - Groundwater Quality Discharge Permit UGW450005; Revised Amendment and Modification Request to Reduce Capacity and Disposal Footprint." (CD-2021-030) Letter from EnergySolutions to Ty Howard of the Utah Division of Waste Management and Radiation Control. February 26, 2021.

- 2) 11e.(2) Cell – existing wells ~~GW-19A, GW-20, GW-24, GW-25, GW-26, GW-27, GW-28, GW-29, GW-36, GW-37*, GW-38R*,~~ GW-57, GW-58, GW-60, GW-63, GW-126, GW-127 and piezometer PZ-1*. *Wells GW-37, GW-38R, and piezometer PZ-1 shall be monitored only for ground water elevations.
- 4) Federal Cell Facility– existing wells GW-19A, GW-25, GW-26, GW-27, GW-28, GW-29, GW-57, GW-58, GW-63.

EnergySolutions also requests authority to abandon groundwater wells GW-36, GW-37 and GW-38R. As groundwater beneath the proposed Federal Cell Facility generally flows toward the north-north east, existing groundwater wells surrounding the combined future Federal stewardship footprint (11e.(2) and Federal Cell Facility) will be adequate for early detection of any unlikely leakage beneath the two adjacent cells (11e.(2) and Federal Cell Facility). Supporting this claim is the recognition that regulatory oversight for both the 11e.(2) byproduct cell and the proposed Federal Cell Facility will be transferred to a single regulatory agency (the U.S. Department of Energy-Legacy Management) following their closure.

Please contact me at (801) 649-2000 if you have further questions regarding this License Application.

Sincerely,

 Vern C. Rogers
Apr 9 2021 4:27 PM
cosign

Vern C. Rogers
Director of Regulatory Affairs

Digital exhibits by SERVU ftp

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Attachment D

Public Notice



State of Utah

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality

Kimberly D. Shelley
Executive Director

DIVISION OF WASTE MANAGEMENT
AND RADIATION CONTROL

Douglas J. Hansen
Director

July 21, 2021

The Deseret News
Legal Advertising Department

EMAIL: legals@deseretnews.com

RE: Account #9001350993

To Whom It May Concern:

This email constitutes authorization to publish the NOTICE below in the Deseret News on July 23, 2021.

Please send invoice and affidavit of publication to:

Douglas J. Hansen, Director
Division of Waste Management and Radiation Control
P.O. Box 144880
Salt Lake City, UT 84114-4880

Enclosure: Public Notice

c: Jeff Coombs, EHS, Health Officer, Tooele County Health Department
Bryan Slade, Environmental Health Director, Tooele County Health Department
EnergySolutions General Correspondence (Email)
LLRW General Correspondence (Email)
Ashley Sumner (Email), Kaci McNeill (Email), Tom Ball (Email), and Larene Wyss (Email)
Facility File, Public Participation File, Alisa Westenskow



State of Utah

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality

Kimberly D. Shelley
Executive Director

DIVISION OF WASTE MANAGEMENT
AND RADIATION CONTROL

Douglas J. Hansen
Director

July 21, 2021

The Salt Lake Tribune
Legal Advertising Department

EMAIL: legals@sltrib.com

RE: Account #SLT0010250

To Whom It May Concern:

This email constitutes authorization to publish the NOTICE below in the Salt Lake Tribune on July 25, 2021.

Please send invoice and affidavit of publication to:

Douglas J. Hansen, Director
Division of Waste Management and Radiation Control
P.O. Box 144880
Salt Lake City, UT 84114-4880

Enclosure: Public Notice

c: Jeff Coombs, EHS, Health Officer, Tooele County Health Department
Bryan Slade, Environmental Health Director, Tooele County Health Department
EnergySolutions General Correspondence (Email)
LLRW General Correspondence (Email)
Ashley Sumner (Email), Kaci McNeill (Email), Tom Ball (Email), and Larene Wyss (Email)
Facility File, Public Participation File, Alisa Westenskow



State of Utah

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality

Kimberly D. Shelley
Executive Director

DIVISION OF WASTE MANAGEMENT
AND RADIATION CONTROL

Douglas J. Hansen
Director

July 21, 2021

Tooele Transcript Bulletin
57 North Main Street
Tooele, UT 84074

Email: tbp@tooeletranscript.com

To Whom It May Concern:

This email constitutes authorization to publish the NOTICE below in the Tooele Transcript Bulletin on July 27, 2021.

Please send invoice and affidavit of publication to:

Douglas J. Hansen, Director
Division of Waste Management and Radiation Control
P.O. Box 144880
Salt Lake City, UT 84114-4880

Enclosure: Public Notice

c: Jeff Coombs, EHS, Health Officer, Tooele County Health Department
Bryan Slade, Environmental Health Director, Tooele County Health Department
EnergySolutions General Correspondence (Email)
LLRW General Correspondence (Email)
Ashley Sumner (Email), Kaci McNeill (Email), Tom Ball (Email), Larene Wyss (Email)
Facility File, Public Participation File, Alisa Westenskow

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WASTE MANAGEMENT AND RADIATION CONTROL
NOTICE OF PUBLIC COMMENT ON

Amendment 3 of 11e.(2) License UT2300478
EnergySolutions, Clive Utah

The Director of the Division of Waste Management and Radiation Control (DWMRC) is requesting public comment on a proposed Licensing Amendment to the 11e.(2) Byproduct Radioactive Material License (UT2300478). This amendment proposes to reduce the embankment footprint of the 11e.(2) embankment at the EnergySolutions site near Clive, in Tooele County, Utah.

Licensee Information:

NAME: EnergySolutions, LLC
MAILING ADDRESS: 299 South Main Street, Suite 1700
Salt Lake City, UT 84111
TELEPHONE NUMBER: (801) 649-2000
FACILITY LOCATION: Interstate 80 Exit 49, Grantsville, UT 84029

EnergySolutions made an application to amend the Radioactive Material License (RML) No. UT2300478 for the 11e.(2) facility in a cover letter dated October 19, 2020. A Final draft License along with a Technical Review and Environmental Assessment application by EnergySolutions are available for review and/or copying between 8:00 a.m. and 5:00 p.m., Monday through Friday, at the address listed below. In addition, the draft License and Technical Review and Environmental Assessment Report are available on the DWMRC website listed below.

A forty-five day public comment period for the proposed Licensing Action will commence on July 28, 2021 and end on September 10, 2021. All comments received within the comment period will be considered for inclusion in the final Licensing Action.

Written comments will be accepted if received by 5:00 p.m. on September 10, 2021. Written comments must be directed to the following address:

Douglas J. Hansen, Director
Division of Waste Management and Radiation Control
Utah Department of Environmental Quality
P.O. Box 144880
Salt Lake City, UT 84114-4880

Comments can also be sent by electronic mail to: dwmrcpublic@utah.gov. Comments submitted by email must be identified using the following in the subject line: "Public comment on Amendment 3 of 11e.(2) License UT2300478 ". All documents included in comments must be submitted in pdf format or as ASCII (text) files.

A public hearing will be scheduled, if requested, by any citizen, by August 20, 2021. The hearing, if requested, will be on Wednesday, September 1, 2021, from 5:00 p.m. to 6:00 p.m. The purpose of the public hearing is to take comments from the public and to answer questions relating to the proposed revisions to EnergySolutions RML UT2300478. A Hearing Officer will manage the hearing, and the hearing will be recorded and transcribed. The public hearing will be held in the DEQ Board Room,

Room 1015, at the Utah Department of Environmental Quality, 195 North 1950 West, Salt Lake City Utah.

Interested persons must submit their questions to the Director by August 20, 2021. If a question that an interested person would like to ask relies on information that is not in the record, that information should also be provided with the question. Those who submitted questions will be allowed to follow up with additional questions based on the response provided. All questions submitted will be considered part of the record.

For the public's convenience, unofficial copies of the following documents are available on the Internet at EZ Records Search <http://eqedocs.utah.gov/>

EZ Search Numbers: Document Title:

- | | |
|-----------------|-----------------------------------------------------------------------------------------------------------------------|
| DRC-2020-017343 | October 19, 2020 (CD-2020-157) Amendment and Modification Request to reduce Capacity and Disposal Footprint. |
| DRC-2021-003475 | February 26, 2021 (CD-2021-030) Revised Amendment and Modification Request to reduce Capacity and Disposal Footprint. |
| DRC-2021-006424 | April 9, 2021 (CD-2021-052) Federal Cell Facility Amendment and Modification Request, page 41 |
| DRC-2021-006539 | May 10, 2021 Statement of Basis (SOB) for Amendment 3 11e.(2) Radioactive Material License No. UT 2300478. |

Under Utah Code Section 19-1-301.5 a person who wishes to challenge a Permit Order may only raise an issue or argument during an adjudicatory proceeding that was raised during the public comment period and was supported with sufficient information or documentation to enable the Director to fully consider the substance and significance of the issue.

In compliance with the Americans with Disabilities Act, individuals with special needs (including auxiliary communicative aids and services) should contact Larene Wyss, Office of Human Resources at (801) 536-4284, Telecommunications Relay Service 711, or by email at "lwyss@utah.gov".

If further information or assistance regarding this notice is required, contact David Esser at (801) 536-0079.

Attachment E
USDOE Comment



Otis Willoughby Iii <owilloughby@utah.gov>
Div of Waste Management
and Radiation Control

DRC-2021-014441

11e2 posting

AUG 25 2021

Tonkay, Douglas <douglas.tonkay@em.doe.gov>

Wed, Aug 25, 2021 at 7:27 AM

To: Otis Willoughby Iii <owilloughby@utah.gov>

Cc: "Miller, Steven (GC)" <steven.miller@hq.doe.gov>, "Kang, Jonathan S." <jonathan.kang@em.doe.gov>, "Kerl, Paul (LM)" <paul.kerl@lm.doe.gov>, "Sokolovich, Bud (LM)" <bud.sokolovich@lm.doe.gov>

Hi Otis,

Thanks again for bringing to our attention the 11e2 license mod that is pending. The team took a look and we don't have any comments to make. Thanks for the coordination. Let me know if you need anything else from us.

Doug

Attachment F

Division of Waste Management of Radiation Control

Statement of Basis

STATEMENT OF BASIS

for

AMENDMENT 3

Low Level Radioactive Waste Disposal Facility

EnergySolutions, LLC
299 South Main Street, Suite 1700
Salt Lake City, UT 84111

March 9, 2021

Purpose

This statement of basis establishes the foundation on which Radioactive Material License No. UT 2300478 (RML) was recommended for amendment. The revised License is designated as Amendment 3. The proposed revisions were submitted by EnergySolutions, LLC (ES) in two separate requests. The revisions reviewed by staff for Amendment 3 are listed chronologically below with several brief details:

On October 19, 2020 (CD-2020-157), ES submitted a request as a Amendment and Modification Request to Reduce Capacity and Disposal Footprint and update surety condition 9.15 (Amendment 3) to the Director of the Division of Waste Management and Radiation Control (Director) to amend the capacity **Condition 8**, Design footprint Coordinates and Drawings update **Table 3 and Appendix M Ground Water Permit UGW450005**, and **Condition 9.15** surety update.

On February 26, 2021(CD-2021-030), ES submitted at the request to division staff Engineering drawings to replace the drawings submitted on October 19, 2020, updating, and replacing drawings **20001-G01, 20001-C01, 20001-C02, 20001-C03, 20001-C04, 20001-C05, 20001-C06, 20001-U01, and 20001-C02 of Appendix M Ground Water Permit UGW450005.**

The Director has reviewed the submitted information and other than a proposed revision to License amendment each revision proposed for Amendment 3 was deemed appropriate. The changes requested are considered major but will reduce public health concerns with reduce waste in the 11.e(2) disposal embankment. However, the Director has determined that in accordance with UAC R313-17-2, a public comment period is required for these major requests to get comment from all stake holders' including the Department of Energy.

This License Amendment is solely related to the footprint reduction of the 11e.(2) cell and does not allow or approve any other license activities on the portion of Section 32 vacated by this amendment or any other potential licensed activities at the site.

Additionally, minor administrative changes were made to clarify and improve the License text. Throughout the document several terms, some phraseology, and punctuation was revised or corrected. The following are examples of revised terms and phrases.

The changes considered below succeed the previous License and will be incorporated into Amendment 3 of the License.

License Change Summary

License Condition	Minor/Major Change	Description of Changes and Basis for Changes
3	Minor	Amendment #2 to Amendment #3
8	Major	Change the Maximum quantity License may possess at any one time 5,048,965 Cubic Yards changed to 1,629,255 Cubic Yards.
9.15	Major	The Combined annual surety is \$80,149,535.08 with the 11e. (2) subtotal of \$10,870,016.43 changed to The Combined annual surety is \$82,460,030.51 with the 11e. (2) subtotal of \$6,943,999.48.
10.14(c)	Major	The total embankment capacity shall not exceed 1,629,255 Cubic Yards.
Table 3 Permit UGW450005	Major	Change footprint coordinates from larger footprint to a reduced footprint.
Appendix M	Major	Replacement drawings revision to Engineering drawings 20001-G01, 20001-C01, 20001-C02, 20001-C03, 20001-C04, 20001-C05, 20001-C05, 20001-C06, 20001-UT01, and 20001-UT02.

Statement of Basis to Amend License

License Conditions 3 through 10.14 (c), and Appendix M, Table 3.

The Division as part of this Statement of Basis has reviewed two submittals (October 19, 2020 and February 26, 2021) attached. The Division makes this submittals part and accept as part of the statement of basis EnergySolutions analysis and Statement of basis in data and regulatory guide for Basis. Please see the attached EnergySolutions Amendment and Modification request to reduce capacity and disposal footprint letters CD-2020-157 (DRC-2020-017343) and CD-2021-130 (DRC-2021-003475) as part of the Statement of Basis and Amendment request.

The two submittals include an updated license in redline strike. Storm water and drainage design and ditch design. The basis for reducing the footprint due to waste volume reduction over time show in Figure 1-1 in the October 19, 2020 request. The updated coordinates from the updated engineering drawings from old footprint to the new footprint. The updated engineering drawings

showing embankment, buffer zone, waste set back, all requirements in regulation and design between the 11e.(2) embankment and future embankment.

License Condition 9.15 – Surety Update

Statement of Basis to Amend License Condition 9.15

License Condition 9.15 of the 11e.(2) Radioactive Material License (UT 2300478) lists the approved combined annual surety amount for the Clive site and the individual surety amount for the 11e.(2) Facility. Changes to the combined surety and individual facility amounts are updated annually based on physical changes at the facility and inflation calculations. Occasionally intermediate revisions may be approved by the Director.

The Director has approved the 2019 Annual Surety update revision with an approval letter dated June 22, 2020. These 2019 Annual Surety values are being incorporated into this License as Amendment 2.

Based on a Division review of the annual update submission, Condition 9.15 of the 11e.(2) Radioactive Material License shall be revised as indicated in the following paragraphs:

The current License Condition is as follows:

9.15. The combined annual surety is \$80,149,535.08 with the 11e.(2) subtotal of \$10,870.016.43 as approved in the Director's letter dated October 11, 2019.

The amended License Condition 9.15 is as follows:

9.15 The combined annual surety is \$82,460,030.51 with the 11e.(2) subtotal of \$6,943,999.48 as approved in the Director's letter dated June 22, 2020.

References

EnergySolutions, LLC. 2019. Radioactive Material License UT2300249, Radioactive Material License UT2300478, EPA ID Number UTD982598898, 2018 Combined Surety Annual

Review, Class 1 Permit Modification, and LLRW, and 11e.(2) License Amendment Requests. CD19-0075. March 29, 2019. DRC-2019-002923.

Utah Department of Environmental Quality, Division of Waste Management and Radiation Control (UDEQ-DWMRC), 2019, 2018 Combined Surety Review, dated October 11, 2019. DSHW-2019-012382.

Attachment G

HEAL Utah

Comment Period Extension Request



Request for public hearing on Amendment 3 of 11e.(2) License UT2300478

From: **Scott Williams** <scott@healutah.org>
Date: Fri, Aug 20, 2021, 9:39 AM
Subject: Request for public hearing on Amendment 3 of 11e.(2) License UT2300478
To: Doug Hansen <djhansen@utah.gov>
Cc: <kshelley@utah.gov>, Ty Howard <tyhoward@utah.gov>, Noah Miterko <noah@healutah.org>

Dear Mr. Hansen, On behalf of the members of the Healthy Environment Alliance of Utah, I am requesting that a public hearing be held to take comments from the public and to answer questions relating to the proposed revisions to EnergySolutions RML UT2300478.

I am also requesting that the date of this hearing be changed from Wednesday, September 1, 2021 to Wednesday, September 8, 2021 or an alternate date after Labor Day since none of the members of HEAL's staff will be in town the week of August 30-September 3.

I am also requesting that arrangements be made so that this hearing can be attended either in person or remotely.

Thank you for your consideration of these requests,

Scott Williams *he/him/his*
Executive Director

Healthy Environment Alliance of Utah (HEAL Utah)

(801) 355-5055/ (435) 268-2424

Scott@healutah.org

www.Healutah.org

LETTER

Attachment H

Email from Doug Hansen (DWMRC) to Scott Williams (HEAL Utah)



State of Utah

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality

Kimberly D. Shelley
Executive Director

DIVISION OF WASTE MANAGEMENT
AND RADIATION CONTROL

Douglas J. Hansen
Director

August 23, 2021

Scott Williams, Executive Director
Healthy Environment Alliance of Utah
824 South 400 West, Suite B111
Salt Lake City, UT 84101

RE: Request for Hearing for the proposed EnergySolutions Amendment 3 of 11e.(2)
Radioactive Material License UT 2300478

Dear Mr. Williams:

I am responding to your e-mail request (dated August 20, 2021, copy attached) on behalf of Healthy Environment Alliance of Utah (HEAL Utah) to adjust the date of the hearing for the proposed Amendment 3 of 11e.(2) for Radioactive Material License UT2300478. Since HEAL Utah was the only person to request a hearing, your request to change the hearing date to September 8, 2021, is granted. The rescheduled hearing will be held in a physical/virtual hybrid format from 5:00 pm to 6:00 pm, with the anchor location being the UDEQ Board Room #1015 in the Multi-Agency State Office Building as described in the formal public notice. There is no change to the public comment period, which will end on September 10, 2021, as provided in the formal public notice.

Typically, in accordance with Utah Admin. Code R313-17-4, questions must be submitted in writing 15 days in advance of the public hearing. With the change in schedule, the Division will accept written questions from HEAL Utah until 5:00 pm on August 27, 2021. All questions must be submitted in writing in advance. The hearing format will be for the Division to provide answers to the written questions, followed by an opportunity, time permitting, for the public to provide oral comments, which will become part of the record and will be addressed in the same way as written comments. Under the procedures, new questions at the hearing are not allowed.

If you have any questions, please call Otis Willoughby at (801) 536-0220.

Sincerely,

Douglas J. Hansen, Director
Division of Waste Management and Radiation Control

(Over)

DRC-2021-011722

195 North 1950 West • Salt Lake City, UT
Mailing Address: P.O. Box 144880 • Salt Lake City, UT 84114-4880
Telephone (801) 536-0200 • Fax (801) 536-0222 • T.D.D. (801) 536-4284
www.deq.utah.gov

Printed on 100% recycled paper

DJH/JMK/al

Enclosure(s): Scott Williams Email request dated 8/20/21 (9:39 am) (DRC-2021-011763)

c: Scott Williams, Executive Director, HEAL Utah (Email)
Bret Randall, Assistant Attorney General, Office of the Utah Attorney General (Email)
Craig W. Anderson, Env. and Health Division Director, Office of the Utah Attorney General (Email)
Jeff Coombs, Health Officer, Tooele County Health Department
Bryan Slade, Environmental Health Director, Tooele County Health Department
LLRW General Correspondence Email

From: **Scott Williams** <scott@healutah.org>

DRC-2021-011763

Date: Fri, Aug 20, 2021, 9:39 AM

Subject: Request for public hearing on Amendment 3 of 11e.(2) License UT2300478

To: Doug Hansen <djhansen@utah.gov>

Cc: <kshelley@utah.gov>, Ty Howard <tyhoward@utah.gov>, Noah Miterko <noah@healutah.org>

Dear Mr. Hansen, On behalf of the members of the Healthy Environment Alliance of Utah, I am requesting that a public hearing be held to take comments from the public and to answer questions relating to the proposed revisions to EnergySolutions RML UT2300478.

I am also requesting that the date of this hearing be changed from Wednesday, September 1, 2021 to Wednesday, September 8, 2021 or an alternate date after Labor Day since none of the members of HEAL's staff will be in town the week of August 30-September 3.

I am also requesting that arrangements be made so that this hearing can be attended either in person or remotely.

Thank you for your consideration of these requests,

Scott Williams | *he/him/his*
Executive Director

Healthy Environment Alliance of Utah (HEAL Utah)

(801) 355-5055 / (435) 268-2424

Scott@healutah.org

www.Healutah.org

Attachment I

HEAL Utah Initial Comments

Questions and comments HEAL Utah is submitting for a response at the public hearing scheduled for Wednesday September 8, 2021 regarding EnergySolutions: Amendment 3 of 11e.(2) License UT2300478. Submitted to the Utah Division of Waste Management and Radiation Control August 27, 2021.

[Federal Cell Facility Amendment Request](#)

Page 40

EnergySolutions' Radioactive Material License UT2300478 authorizes management and disposal of 11e.(2) byproduct on the same footprint herein being considered for the Federal Cell Facility. In preparation for this Federal Cell Facility Radioactive Material License Application, EnergySolutions previously requested Radioactive Material License UT2300478 be amended license a smaller footprint.⁵

Page 41

EnergySolutions also requests authority to abandon groundwater wells GW-36, GW-37 and GW38R. As groundwater beneath the proposed Federal Cell Facility generally flows toward the north-north east, existing groundwater wells surrounding the combined future Federal stewardship footprint (11e.(2) and Federal Cell Facility) will be adequate for early detection of any unlikely leakage beneath the two adjacent cells (11e.(2) and Federal Cell Facility). Supporting this claim is the recognition that regulatory oversight for both the 11e.(2) byproduct cell and the proposed Federal Cell Facility will be transferred to a single regulatory agency (the U.S. Department of Energy-Legacy Management) following their closure.

Question 1. Why is EnergySolutions Federal Cell Amendment Request being considered as a justification for this 11e.(2) permit amendment request when the former has not yet been approved?

Question 2. How does DWMRC's approval of this 11e.(2) permit amendment affect EnergySolutions ability to proceed in preparing the unused portion of this cell for the receipt of depleted uranium prior to a decision on their DU permit application?

Question 3. Please explain why the three groundwater wells proposed for abandonment were considered necessary and now are not.

[Treatment Amendment document](#)

Page 3-2

The material for disposal is placed on the liner and compacted in place to a waste column height of approximately 34 feet at the embankment shoulder. At the embankment's highest point, the waste column will be approximately 50 feet thick.

Question 4. How often is the temporary cover of this cell inspected by state regulators? Has the state issued findings related to compliance with the temporary cover requirements? Are there air quality monitors that measure the levels of radioactive material that is becoming airborne during disposal operations?

Page 3-3

3.1.1. Storm Water Design

The normal design condition evaluates performance under the 100-year, 24-hour storm event of 2.4 inches of precipitation. The abnormal condition evaluates impacts of the Probable Maximum Precipitation (one-hour storm of 6.1 inches) as the worst-case extreme erosion event. The one-hour event was selected to maximize velocity of precipitation and, accordingly, flow through the cover drainage system.

Page L-7

3.0 Storm Events

The performance of the drainage ditches to contain runoff is only important for the active life of the facility (estimated as 25 years). Upon closure, the drainage ditches will be removed or eventually become silted in to allow sheet flow across the site over the natural grade of the area. Therefore, a reasonable maximum storm event over the active life of the facility is the 25-year, 24-hour storm event (1.9 inches). A reasonable potential worst-case event during the active life of the facility is the 100-year, 24-hour storm event (2.4 inches). Both of these storm events are depicted in the isopluvial maps of the National Oceanic and Atmospheric Administration (NOAA) Atlas 2, Volume VI (1973).

Question 5. The “worst case” storm event scenario described by DWMRC does not include the worst-case extreme erosion event described by EnergySolutions (a one-hour storm of 6.1 inches). It seems inconsistent that 2.4 inches of precipitation could be the maximum projected for a 100 year, 24-hour storm event but the projected maximum precipitation for a one-hour erosion event would be 6.1 inches of precipitation.

Question 6. Please explain this inconsistency. Does DWMRC’s permit include requirements for EnergySolutions cell to withstand a one-hour erosion event?

These precipitation projections are based on NOAA modeling from 1973. Effective August 6, 2003, NOAA Atlas 2 has been superseded by NOAA Atlas 14 Volume 1 for Arizona, Nevada, New Mexico, and Utah. <https://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm> So the projections being used by EnergySolutions and DWMRC are at least 30 years out of date.

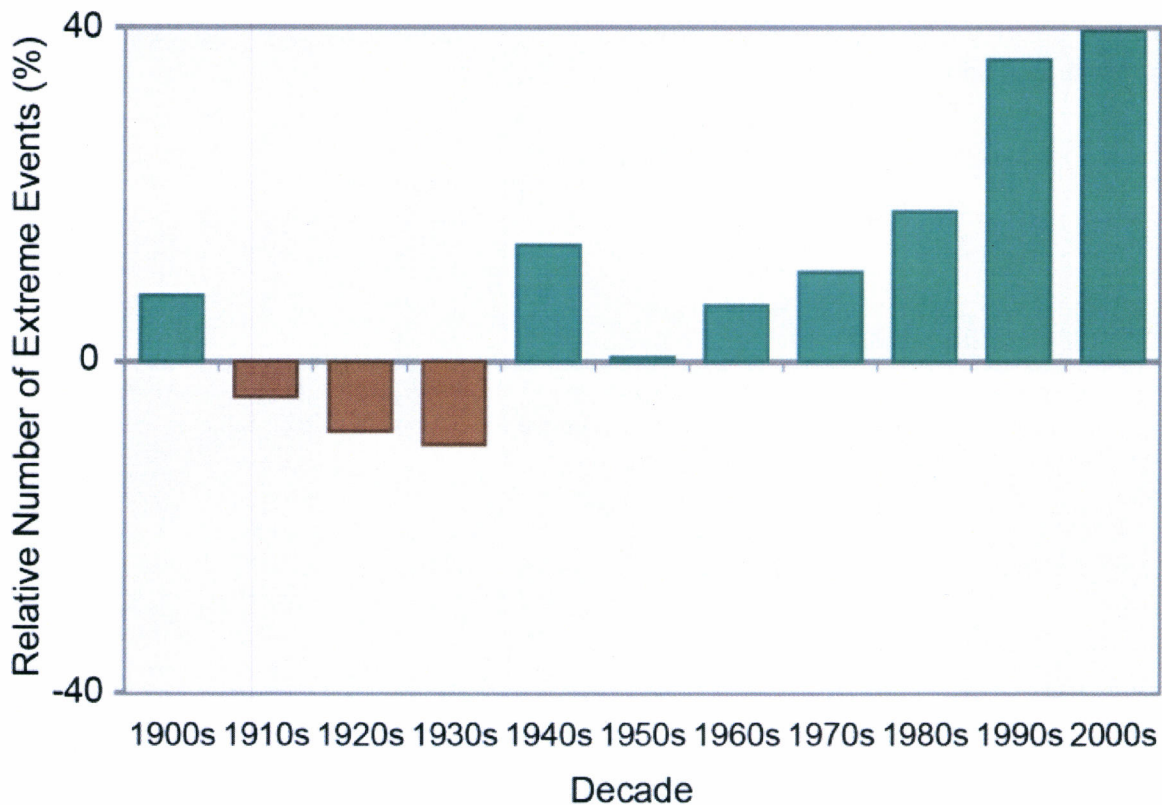
Question 7. Why hasn’t EnergySolutions been required to update their precipitation projections to Atlas 14?

Furthermore, NOAA is in the process of analyzing the impacts of non-stationary climate on depth-duration-frequency (DDF) precipitation magnitudes.

https://www.weather.gov/media/owp/oh/hdsc/docs/202107_HDSC_PR.pdf

Questions 8 and 9. Given the dramatic increase in heavy precipitation events across the U.S. due to climate change (see chart below), even during the 18 years since Atlas 14 was published, what is DWMRC’s confidence in the accuracy of the Probable Maximum Precipitation scenarios? Will DWMRC require EnergySolutions to revise its Storm Events assumptions and design as NOAA’s modeling is updated? <https://www.c2es.org/content/extreme-precipitation-and-climate-change/>

Observed U.S. Trend in Heavy Precipitation



Also, drought is known to change the dynamics of runoff. Does EnergySolutions design for this cell incorporate the effects of prolonged drought on soil conditions and storm water runoff?

Question 10. Have any of the 25-year, 100-year or 1000-year requirements for the site to withstand extreme weather events been updated in light of new projections that have been developed with regards to climate change?

Page C-8

e) Waste with an average concentration above 4,000 pCi/g for natural uranium or for any radio nuclide in the radium-226 series; or above 60,000 pCi/g for thorium-230; or above 6,000 pCi/g for any radionuclide in the thorium series in any truckload or railcar shall not be accepted.

10.17 At the end of every calendar year, the Licensee shall ensure that the cumulative average activity concentration of waste placed within the upper three feet of disposed waste does not exceed 300 pCi/g of Ra 226 or 900 pCi/g of Th 230, and within the next seven feet does not

exceed 500 pCi/g Ra 226 or 1500 pCi/g of Th 230. When both radionuclides are present, the unity rule defined below shall apply to ensure that the Ra-226 limit is not exceeded within 1000 years. Activity of Th 230 (pCi/g)/X + Activity of Ra 226 (pCi)/Y < or = 1 Where: X = 900 pCi/g in the upper three feet and 1500 pCi/g in the next seven feet of waste, and Y = 300 pCi/g in the upper three feet and 500 pCi/gm in the next seven feet of waste 10.18 The cumulative average densities of the waste in the upper ten feet of the 11e(2) embankment and of the compacted radon barrier placed shall not be less than 1.5 g/cm³ for either.

Generally, it isn't the concentration of radioactivity that poses the health and environmental risk but the total amount of radioactivity present. A kilogram of waste with 300 pCi of radium-226 per gram of waste is far less dangerous to the environment or public health than a thousand tons of waste at 3 pCi/g.

Question 11. What are the assumptions regarding human health risks for the use of these metrics as the upper limits of radioactivity in such a large volume of material?

EPA's default Preliminary Remediation Goals for Superfund sites is 0.002 pCi/g for radium-226 and similarly for thorium-230.

Question 12. Assuming that the cells contain the maximum level of radioactivity allowable in the permit, how long will it take before the radioactivity levels fall below these Superfund thresholds?

Attachment J

Public Hearing Sign-in Sheet

Attachment K
Hearing Transcript

Waste Management and Radiation Control
EnergySolutions, LLC Amendment 3 of 11e. (2) License UT2300478
Public Hearing
(In-person and Google Meet Meeting)

Utah Department of Environmental Quality
Multi-Agency State Office Building, (Conf. Room #1015)
195 North 1950 West, SLC
September 8, 2021
5:00 p.m.

Participating at Anchor Location:

Craig Anderson, Charles Bishop, Kevin Carney, David Esser, Doug Hansen, Larry Kellum, Jalynn Knudsen, Arlene Lovato, Bret Randall, Otis Willoughby, Vern Rogers (EnergySolutions), Scott Williams (HEAL Utah)

Virtual Attendees:

Stevie Norcross, Carlee Christoffersen, Tyler Hegburg, Phil Goble, Diane D'Arrigo, David Cronshaw, Carmen ValDez, Noah Miterko, Danielle Endres, Janine Sheldon, Katherine P., Dee Rowland, Eric Kamisher, Vickie Eastman, Meisei Gonzalez

Phone Attendees: 435-***-***63 and 801-***-***20 (MaryAnn Webster)

I. Introduction

1. Welcome and good afternoon. My name is Craig Anderson and I am the hearing officer for today's proceedings.
2. This is the time and place scheduled for a *question and answer* hearing on licensing actions proposed by the Utah Division of Waste Management and Radiation Control.

For those of you participating on-line, please mute your microphones.

- 4.3. The licensing action includes the Amendment 3 of EnergySolutions 11e(2) license UT2300478 to:
- a. Reduce the footprint of the disposal of 11e(2) byproduct material.
 - b. Abandon groundwater wells GW#-36, 37 and 38 and update financial surety.

II. Purpose

1. The primary purpose of the *question and answer* hearing this afternoon is to satisfy the requirements of the federal Atomic Energy Act, which requires that agreement states provide an opportunity for “cross examination” as to major permitting actions.
2. The former Radiation Control Board adopted procedural rules governing the question and answer hearings. These procedural rules are found at Utah Administrative Code R313-17-4. Under these rules, only persons who have previously submitted written questions will be recognized during today’s hearing.- The scope of the questions will be limited to matters *relevant* to the licensing actions.
3. HEAL Utah submitted written questions to the Division on August 27, 2021.

Under Utah Administrative Code R313-17-4.3d^[AL1] the Director has discretion to combine the question and answer hearing with a licensing hearing held for the purpose of taking public comment on the proposed licensing action.

Members of the public may submit written comments any time before the close of the public comment period on Friday, September 10, 2021 at 5:00 pm.

4. Staff from the Division and representatives of the applicant *EnergySolutions* are present to answer the questions which have been submitted by HEAL Utah.

III. Procedure

The hearing today has been scheduled for one hour and should conclude by 6:00 pm.

The written questions will be read into the record by staff and designated staff members will respond to each question.

Under Utah Administrative Code, R313-17-45e, the applicant in this case, *EnergySolutions* has the right to respond to any question.

After the response to a question, the person that submitted the question has the right to ask additional questions based upon the response provided.

The Division has decided to reserve responses to any follow up questions until the end of the Q&A.

The hearing will be recorded and transcribed. The written transcript, will be included in the administrative record. In order to have a clear record of the proceedings, it will be necessary for questioners and respondents not to talk over one another. Also, since the questions have been submitted in advance they are already in the record, and no additional narrative or opening statement is necessary. – s

1. Public Hearing. As previously noted, it is not anticipated that there will be sufficient time for general public comments to be received today. The Division will, however, accept written comments in this matter through the close of business on Friday, September 10, 2021 and the Division's response to any written comments will be included in the record..

With that said, I would like to invite the parties to state their appearances for the record

Hi, my name is Doug Hansen and I am the Director of the Division of Waste Management and Radiation Control.

Thank you Mr. Anderson, I appreciate the opportunity to participate in this public process.

My name is Vern Rogers and I am here on behalf of the licensee, *EnergySolutions*.

Craig Anderson: Thank you Mr. Rogers.

Good afternoon and I really appreciate the opportunity for this hearing to occur and for accommodating our schedule. I am Scott Williams. I am the Executive Director of HEAL Utah and have submitted the questions. (Commenter stated it is very difficult to hear). I am Scott Williams from HEAL Utah.

Craig Anderson: Thank you Mr. Williams.

I am Jalyann Knudsen, the Assistant Director for the Division.

My name is Bret Randall. I am an Assistant Attorney General and I am appearing as counsel for the Division and I believe the Division will reserve introduction of the staff after response to questions.

Division Begins:

We appreciate your participation in the public process. We have prepared answers to the 12 questions submitted by HEAL Utah for the Energy Solutions 11e.(2) License, Amendment 3 Request.

We will begin with Charlie Bishop, an Environmental Scientist in our Division. He will state and answer Questions 1 through 3.

My name is **Charlie Bishop**. I have been asked to answer questions number 1 through 3.

Question number 1 begins with a reference to sections in the Federal Cell Amendment Request on Page 40 and 41. I will not be reading the reference; however, it is shown on the screen. I will proceed with the question:

“Why is EnergySolutions Federal Cell Amendment Request being considered as a justification for this 11e.(2) permit amendment request when the former has not yet been approved? “

The Divisions Answer:

The 11e.(2) License amendment request relates solely to the reduction of the licensed footprint and allows final closure of the 11e.(2) embankment. The final result of the early closure of the 11e.(2) embankment will be its transfer to the U.S. Department of Energy under the Atomic Energy Act and related federal statutes, regulations, and programs dealing with byproduct materials. The published Statement of Basis for the 11e.(2) amendment does not mention the Federal Cell. The proposed Federal Cell was not considered, and will not be considered, in the Division’s evaluation of the 11e.(2) License amendment request; however, the final geometry of the 11e.(2) embankment does allow space for an embankment to the west. While the proposed Federal Cell relates to a portion of the same property, Amendment 3 is independent from and not contingent upon the proposed Federal Cell. The Division has not yet accepted EnergySolutions’ application for a Federal Cell west of the 11e.(2) embankment. The Federal Cell license application, if accepted by the Division, will be evaluated on its own merits at a later time in a separate administrative proceeding.

Question number 2:

“How does DWMRC’s approval of this 11e.(2) permit amendment affect EnergySolutions ability to proceed in preparing the unused portion of this cell for the receipt of depleted uranium prior to a decision on their DU permit application?”

The Divisions Answer:

Approval of Amendment 3 would not approve construction activities for any new embankment to dispose of any licensed material, including depleted uranium, in the former footprint of the 11e.(2) embankment. The approval of the 11e.(2) License amendment would simply reduce the 11e.(2) licensed footprint. If approved, Amendment 3 will result in the creation of an area to the west of the reduced 11e.(2) embankment and does not approve disposal of licensed material, including depleted uranium. While EnergySolutions may utilize this area for limited purposes, if EnergySolutions wants to receive depleted uranium or conduct disposal operations on the undeveloped property, EnergySolutions will need to receive Division approval.

Question number 3:

“Please explain why the three groundwater wells proposed for abandonment were considered necessary and now are not.”

The Divisions Answer:

The 11e.(2) embankment was licensed by the NRC before the State became an Agreement State for byproduct materials. As licensed by the NRC, the 11e.(2) embankment incorporated two separate triangular-shaped disposal embankments, the Northwest and Southeast embankments. These were separated diagonally by an area where three monitoring wells were located, GW-36, GW-37 and GW-38. In 2001, Envirocare of Utah (the predecessor to EnergySolutions) submitted a revised engineering design for the 11e.(2) embankment that incorporated a single rectangular shaped cell that was approved. In 2002, Envirocare submitted an 11e.(2) embankment well spacing analysis that was also approved. The well spacing analysis did not incorporate the three wells in the diagonal. With completion of the 2000 evaporation pond, GW-36 has been used as a downgradient compliance well for the 2000 evaporation pond. Since 2002 wells GW-37, and GW-38 have not been used for water quality compliance monitoring. The wells have been used for water level monitoring but contribute little to that data set. GW-36 will continue as a monitoring well as long as the 2000 evaporation pond exists.

Jalynn: Thank you Charlie. We will now have Dave Esser an Environmental Engineer in our Division state and answer Question 4.

My name is **Dave Esser**. I have been asked to answer Question 4:

Question number 4 begins with a reference in the Treatment amendment document page 3-2. I will not be reading the reference; however, it is shown on the screen. I will proceed with the question:

“How often is the temporary cover of this cell inspected by state regulators? Has the state issued findings related to compliance with the temporary cover requirements? Are there air quality monitors that measure the levels of radioactive material that is becoming airborne during disposal operations?”

The Divisions Answer:

This question has three parts. As to inspections, the Division has divided inspections at the facility into health physics, operational, and engineering modules. The inspection modules are completed and documented annually. As to findings regarding temporary cover requirements, there is an engineering module specifically based on temporary cover issues. To date, there have not been findings of significant regulatory issues relating to temporary cover at the facility. As to the air quality monitoring question, there are multiple active air monitoring stations surrounding the facility, including the 11e.(2) embankment. Air monitoring is dictated by the Environmental Monitoring Plan that covers the Clive facility as a whole and includes the 11e.(2) embankment. A primary use of the monitoring data accrued under the Environmental Monitoring Plan is to assess and demonstrate continuing compliance with requirements. Finally, in addition to the inspection modules that cover the 11e.(2) embankment specifically, multiple Division personnel are present at the Clive Facility on a regular basis and at least weekly conducting inspections and performing other functions. During these times, Division personnel are able to observe any operations or changes with respect to the 11e.(2) embankment.

Jalynn: Thank you Dave. We will now have Larry Kellum an Environmental Scientist in our Division state and answer Questions 5 through 11.

My name is **Larry Kellum**. I have been asked to answer Questions number 5 through 11

Questions 5 and 6 are prefaced by text that is quoted from EnergySolutions' 11e.(2) license application. I will not be reading the reference; however, it is shown on the screen.

Question number 5, It appears to the Division that this is not a question but rather a statement, intended as a preface for Question number 6. I will proceed with the statement:

"The "worst case" storm event scenario described by DWMRC does not include the worst-case extreme erosion event described by EnergySolutions (a one-hour storm of 6.1 inches). It seems inconsistent that 2.4 inches of precipitation could be the maximum projected for a 100 year, 24-hour storm event but the projected maximum precipitation for a one-hour erosion event would be 6.1 inches of precipitation."

Question number 6:

"Please explain this inconsistency. Does DWMRC's permit include requirements for EnergySolutions cell to withstand a one-hour erosion event? These precipitation projections are based on NOAA modeling from 1973. Effective August 6, 2003, NOAA Atlas 2 has been superseded by NOAA Atlas 14 Volume 1 for Arizona, Nevada, New Mexico, and Utah. Link included. So the projections being used by EnergySolutions and DWMRC are at least 30 years out of date."

The Divisions Answer:

Calculations for drainage ditches and rock cover design are based on methodologies and information contained in NUREG/CR-4620, Methodologies for Evaluating Long-Term Stabilization Designs of Uranium Mill Tailings Impoundments; and NUREG-1623, Design of Erosion Protection for Long-Term Stabilization. The 2.4 inch performance standard for drainage ditches to contain run-off is calculated on potential storm events from the time of construction until the closure of the facility. Following closure, the drainage ditches are removed. The 6.1 inch performance standard is based on potential storm events occurring during the long-term life of the closed embankment.

Question number 7 begins and ends with statements pointing to NOAA modeling, including links. I will not be reading the references; however, it is shown on the screen. I will proceed with the question:

"Why hasn't EnergySolutions been required to update their precipitation projections to Atlas 14?"

The Divisions Answer:

The 11e.(2) License was formerly approved and administered under a Nuclear Regulatory Commission (NRC) License prior to the state of Utah assuming regulatory responsibility and authority for 11e.(2) materials in 2004. Therefore, the 11e.(2) License was initially approved by the NRC and subsequent renewals by the Division were found satisfactory. The purpose of Amendment 3 is to facilitate the closure of the 11e.(2) embankment, not to reevaluate the performance objective of the embankment. The Division is aware of ongoing climate and precipitation research and will incorporate that data when appropriate. Since January 1993, Part I.F.11 of the Ground Water Quality Discharge Permit UGW450005 has required EnergySolutions to maintain an annual report of site precipitation (in addition to various meteorological parameters). Part I.H.10 of the permit requires EnergySolutions to submit an annual meteorological report for the previous meteorological year, for the express purpose: "... to show that the meteorological assumptions made in the infiltration and unsaturated zone modeling used to support issuance of the Permit were conservative or representative of the actual conditions at the site." The Division's reliance on site-specific measurements provides more accurate data than generic regional projections from Atlas 14.

Question number 8 and 9 were combined and included a precipitation chart, link and statement. . I will not be reading the references; however, it is shown on the screen. I will proceed with the question:

"Given the dramatic increase in heavy precipitation events across the U.S. due to climate change (see chart below), even during the 18 years since Atlas 14 was published, what is DWMRC's confidence in the accuracy of the Probable Maximum Precipitation scenarios? Will DWMRC require EnergySolutions to revise its Storm Events assumptions and design as NOAA's modeling is updated?"

The Divisions Answer:

The overall purpose of Amendment 3 is to facilitate the closure of the 11e.(2) embankment, not to reevaluate the License application. As explained in more detail in response to Question 7, since 1993, EnergySolutions and its predecessor have monitored precipitation and other weather-related events at the Clive site through an on-site weather station. The Division uses this site-specific data in any licensing and permitting activities, where appropriate. In the Division's judgement, this site-specific data is more accurate than regional data and provides site specific answers when used at the site. The probable maximum precipitation scenarios used at the Clive site are conservative estimates and when compared to the site-specific data

are reasonable. The Division is evaluating climate and weather conditions at the Clive site and will require EnergySolutions to use the appropriate Climate and Weather data in any future evaluations.

Question number 10:

“Have any of the 25-year, 100-year or 1000-year requirements for the site to withstand extreme weather events been updated in light of new projections that have been developed with regards to climate change?”

The Divisions Answer:

The Division is evaluating climate and weather conditions at the Clive site and requires EnergySolutions to use the appropriate Climate and weather data in any future evaluations.

Question number 11 begins with a reference to a condition on Page C-8 e) and 10.17 then is followed by a statement. I will not be reading the reference or statement; however, it is shown on the screen. I will proceed with the question:

“What are the assumptions regarding human health risks for the use of these metrics as the upper limits of radioactivity in such a large volume of material?”

The Divisions Answer:

The NRC issued Envirocare of Utah the 11e.(2) license in 1994 and Utah re-issued the license in 2004. Modeling assumptions of the radiological impacts regarding human health and the environment were evaluated prior to license issuance by the NRC. The modeling assessments included worst-case scenarios pertaining to maximum volumes of waste in the licensed disposal cell in the full footprint. This assessment adhered to the regulatory requirements in effect at the time the license was issued. Amendment 3 proposes to reduce the size of the 11e.(2) cell by approximately 70%, thereby reducing the modeled volumes of waste anticipated to be placed into the 11e.(2) cell by that same amount.

Jalynn: Thank you Larry. We will now have Otis Willoughby the Manager of the Low Level Radioactive Material Section in our Division state and answer Question 12.

My name is **Otis Willoughby**. I have been asked to answer Question 12.

Question number 12 begins with a statement. I will not be reading the statement; however, it is shown on the screen. I will proceed with the question:

“Assuming that the cells contain the maximum level of radioactivity allowable in the permit, how long will it take before the radioactivity levels fall below these Superfund thresholds?”

The Divisions Answer:

The Division has several concerns with the computational and analytical exercise posed by this question.

First, the 11e.(2) byproduct materials placed in the 11e.(2) embankment is expressly excluded from CERCLA’s definition of hazardous substances. CERCLA is the Superfund statute. Superfund preliminary remediation goals (or PRGs), do not apply to 11e.(2) byproduct material, either legally or as a practical matter. As previously stated, the US DOE will become the perpetual owner and steward of the 11e.(2) embankment by operation of federal law.

The Superfund program deals with risks posed to human and environmental receptors based on uncontrolled releases of hazardous substances. PRGs are conservative, default, screening-level standards that are used to address exposed wastes that may come into contact with human and environmental receptors. The Superfund program, and its PRG screening criteria, do not apply to wastes disposed in engineered waste embankments.

Assuming for the sake of argument that the Superfund PRGs were applied to the 11e.(2) embankment, the PRGs would be used to measure radium-226 and thorium-230 on the final engineered surface. It is improper to apply Superfund PRGs to wastes *inside* the engineered embankment.

Finally, based on the statutory and regulatory definition of 11e.(2) byproduct material, there is no way to calculate a hypothetical “maximum level of radioactivity” based solely on the two isotopes mentioned in the question. 11e.(2) byproduct material is not defined or measured in this manner. Thank you.

Jalynn: This concludes the Divisions response to the submitted questions.

Craig Anderson: We can now open the hearing to any comments or questions that members of the public may want to propound.

Arlene Lovato: Nobody is raising their hand (virtual participants).

Jalynn Knudsen: Let's just give them one more minute.

Arlene Lovato: Participants can you hear me?

Unknown Participant: Yes

Arlene Lovato: Does anyone have any public comments?

Craig Anderson: While there are no commentors on-line and none here in the audience today, so this concludes the hearing. Thank you for your participation. The public comment period will remain open until the close of business on Friday, September 10, 2021 at 5 pm.

PUBLIC COMMENTS

Diane D'Arrigo:

I do have a question.

Craig Anderson:

Please state your name.

Diane D'Arrigo:

This is Diane D'Arrigo. I'm with the Nuclear Information and Resource Service. I just wanted to understand as it looks to me like you're closing down part of one facility at the site to make room for another type of waste that has not been approved to be disposed of at that site. So, it seems like it's a step in the direction of accepting depleted uranium. Which has been very much contested and I think even the State has not been enthusiastic about that idea. But now, it would be opening the door to, well, providing potential capacity for depleted uranium.

Craig Anderson:

So, the questions that has been propounded will be responded to in writing at the conclusion of the public comment period.

Diane D'Arrigo:

Oh. I'm sorry. So, you don't say anything now. It just goes on the record as a question?

Craig Anderson:

That's correct.

Diane D'Arrigo :

Okay. So, the question is. Why is the state paving the way for depleted uranium when depleted uranium is not allowed? That would be that question.

Then, you were talking about climate change data...(I had a second question here). You were talking about Noah Atlas 1973 and so forth, and then you just said that you would

require the appropriate data to be used by the company in the future. What is that appropriate data? Does it include the most recent available data in light of clear and present climate change/increasing climate change?

Craig Anderson:

Once again, the response to your question will be included in the response to public comments.

Diane D'Arrigo:

Great. Thank you.

Caller Participant:

I have a question if I'm allowed?

Craig Anderson:

Yes. Would you state your name for the record, please?

Phone Participant:

I'm just on the phone aspect of this meeting.

Craig Anderson:

Yes. But would you give us your name?

Phone Participant:

This is Maryann Webster. I am a parent and resident in Salt Lake City.

Craig Anderson:

And you have a question or comment?

MaryAnn Webster (Phone Participant):

Yes. I am wondering why the state is even entertaining this foot in the door tactic by EnergySolutions for Utah to take high level nuclear waste that's toxic for hundreds of thousands of years. I mean to quote Orrin Hatch roughly, why don't the communities who benefited from and generated this waste with their nuclear power store it on-site. There is absolutely no reason why this waste cannot be stored on the site of the facility that has generated it. Utahn's have no nuclear power plants and have not benefited in any way from nuclear waste. We shouldn't have to be subjected for hundreds of thousands of years to that type of danger. And I would also submit that regulators have no right to foist this upon the residents in the Salt Lake Valley and all downwind direction eastward. Thank you.

Craig Anderson:

And again, your comments and response to your question will be included in the response to public comments at the close of the public comment period.

MaryAnn Webster (Phone Participant):
Thanks.

Craig Anderson:
Mr. Williams.

Scott Williams (HEAL Utah):

I did not realize that you were about to wrap up. I thought you were still going to be looking for comments from the Zoom Meeting.

I just want to thank everybody for spending the time. Our questions, I want to assure you, are sincere. This is very highly technical information and sometimes it's hard to follow to connect the dots through all of the regulatory documentation.

We do have concerns about why depleted uranium wasn't mentioned in the materials that were included in this permit. The answer that was given was helpful, but it is still concerning to us that-that is even a reference in this proceeding. Given the fact that the permit has not been decided on and then the climate change information was also very helpful. That answer, it wasn't referenced in the material that we were reading. I think the things you were talking about. So, it appears that the 1993 Atlas is the basis of the projections. And given what is happening right now with the climate (even this week) not sure that past performance is a predictor of future weather and probably need to be thinking about that. We will be submitting additional questions and comments before Friday as part of this hearing. We will not take up any more of your time today. Thank you very much for holding this hearing it has been very helpful for us to hear more detailed explanation on these issues.

Electronic Participant:

Is there some way that we could hear that person more? It's really hard to hear.

Craig Anderson:

I will note for the record that Mr. Williams comments have been recorded and will be transcribed and appropriate responses will be included in the response to public comments at the close of the public comment period on Friday.

Craig Anderson:

Are there any other questions?

Diane D'Arrigo:

I do have one more. I know that... [this is Diane with Nuclear Information and Resource Service once again]. I know that in a separate proceeding completely, that

EnergySolutions is applying for a landfill that would get a solid or industrial waste license but would take nuclear waste. So, they're calling it VLLW Waste Pit. I'm wondering if there is a connection between that application and the changes that are going on here? The NRC has rejected (The Nuclear Regulatory Commission) has rejected its proposal to create a very low level (VLLW) category. So, it would be Utah's own creation really, because it doesn't really exist in federal regulation to have a nuclear waste site that is not licensed for nuclear waste.

Craig Anderson:

Thank you your question will be responded to in the response to public comments at the close of the public comment period on Friday. Thank you.

Diane D'Arrigo:

Thank you so much.

Craig Anderson:

Any other questions. Well, it does not appear that we have any other questions either on-line or in the audience. So, we will now conclude the hearing and again remind everyone that the public comment period closes on Friday at the close of business 5 pm. Any comments or written questions can be submitted up to that time and responses will be included in the record.

Thank you.

Attachment L

HEAL Utah Second Round Comments



Otis Willoughby Iii <owilloughby@utah.gov>

Fwd: HEAL Utah Comments regarding EnergySolutions Amendment 3 of 11e.2 License UT2300478 091021

Doug Hansen <djhansen@utah.gov>

Fri, Sep 10, 2021 at 3:59 PM

To: Jalynn Knudsen <jknudsen@utah.gov>, Otis Willoughby Iii <owilloughby@utah.gov>, Bret Randall <bfrandall@agutah.gov>

----- Forwarded message -----

From: **Scott Williams** <scott@healutah.org>

Date: Fri, Sep 10, 2021, 3:35 PM

Subject: HEAL Utah Comments regarding EnergySolutions Amendment 3 of 11e.2 License UT2300478 091021

To: Doug Hansen <djhansen@utah.gov>

Cc: Noah Miterko <noah@healutah.org>

Dear Mr. Hansen, Please see HEAL Utah's written comments and cover letter attached.

thanks,

Scott Williams

Scott Williams, M.D. | [he/him/his](#)

Executive Director

Healthy Environment Alliance of Utah (HEAL Utah)

(801) 355-5055/ (435) 268-2424

Scott@healutah.org

www.Healutah.org



2 attachments

HEAL Utah Cover Letter Re EnergySolutions Amendment 3 of 11e.(2) License UT2300478.docx
132K

HEAL Utah Comments regarding EnergySolutions Amendment 3 of 11e.2 License UT2300478 091021.docx
266K

Questions and comments HEAL Utah is submitting for a response at the public hearing scheduled for Wednesday September 8, 2021 regarding EnergySolutions: Amendment 3 of 11e.(2) License UT2300478. Submitted to the Utah Division of Waste Management and Radiation Control August 27, 2021.

Federal Cell Facility Amendment Request

Page 40

EnergySolutions' Radioactive Material License UT2300478 authorizes management and disposal of 11e.(2) byproduct on the same footprint herein being considered for the Federal Cell Facility. In preparation for this Federal Cell Facility Radioactive Material License Application, EnergySolutions previously requested Radioactive Material License UT2300478 be amended license a smaller footprint.5

Page 41

EnergySolutions also requests authority to abandon groundwater wells GW-36, GW-37 and GW38R. As groundwater beneath the proposed Federal Cell Facility generally flows toward the north-north east, existing groundwater wells surrounding the combined future Federal stewardship footprint (11e.(2) and Federal Cell Facility) will be adequate for early detection of any unlikely leakage beneath the two adjacent cells (11e.(2) and Federal Cell Facility). Supporting this claim is the recognition that regulatory oversight for both the 11e.(2) byproduct cell and the proposed Federal Cell Facility will be transferred to a single regulatory agency (the U.S. Department of Energy-Legacy Management) following their closure.

Question 1. Why is EnergySolutions Federal Cell Amendment Request being considered as a justification for this 11e.(2) permit amendment request when the former has not yet been approved?

Question 2. How does DWMRC's approval of this 11e.(2) permit amendment affect EnergySolutions ability to proceed in preparing the unused portion of this cell for the receipt of depleted uranium prior to a decision on their DU permit application?

This question was not fully answered in the public hearing. Why is the Federal Cell Facility Amendment Request included in the Division's list of materials related to Amendment 3 of 11e.(2) License UT2300478 at all? Specifically, in this document there are 13 references to EnergySolutions' plans to dispose of depleted uranium. HEAL requests that the Division's approval of EnergySolutions 11 e. (2) amendment request be modified to include explicit language that this approval does not include approval for EnergySolutions to initiate any activity related to the preparation of the unused portion of the 11 e. (2) cell for the disposal of depleted uranium.

Question 3. Please explain why the three groundwater wells proposed for abandonment were considered necessary and now are not.

The verbal response to this question given by Division staff in the public hearing suggests that the G-36 well will continue to operate as part of the monitoring of the 2000 evaporation pond but that approval will be granted for the G-37 and G-38 wells to be abandoned. The abandonment appears to be based on a determination that these two wells do not add useful information to that gathered from the other monitoring wells. Given the facts a) that underground conditions can change due to seismic and hydrologic forces, b) the Great Salt Lake is at its lowest level in

recorded history, c) that the 11 e. (2) material in the Federal Cell will now transition to long-term custody and monitoring, and d) that the future use of the unused portion of the Federal Cell is still undetermined, HEAL Utah opposes the abandonment of any monitoring wells that are already in place.

Treatment Amendment document

Page 3-2

The material for disposal is placed on the liner and compacted in place to a waste column height of approximately 34 feet at the embankment shoulder. At the embankment's highest point, the waste column will be approximately 50 feet thick.

Question 4. How often is the temporary cover of this cell inspected by state regulators? Has the state issued findings related to compliance with the temporary cover requirements? Are there air quality monitors that measure the levels of radioactive material that is becoming airborne during disposal operations?

Page 3-3

3.1.1. Storm Water Design

The normal design condition evaluates performance under the 100-year, 24-hour storm event of 2.4 inches of precipitation. The abnormal condition evaluates impacts of the Probable Maximum Precipitation (one-hour storm of 6.1 inches) as the worst-case extreme erosion event. The one-hour event was selected to maximize velocity of precipitation and, accordingly, flow through the cover drainage system.

Page L-7

3.0 Storm Events

The performance of the drainage ditches to contain runoff is only important for the active life of the facility (estimated as 25 years). Upon closure, the drainage ditches will be removed or eventually become silted in to allow sheet flow across the site over the natural grade of the area. Therefore, a reasonable maximum storm event over the active life of the facility is the 25-year, 24-hour storm event (1.9 inches). A reasonable potential worst-case event during the active life of the facility is the 100-year, 24-hour storm event (2.4 inches). Both of these storm events are depicted in the isopluvial maps of the National Oceanic and Atmospheric Administration (NOAA) Atlas 2, Volume VI (1973).

Question 5. The "worst case" storm event scenario described by DWMRC does not include the worst-case extreme erosion event described by EnergySolutions (a one-hour storm of 6.1 inches). It seems inconsistent that 2.4 inches of precipitation could be the maximum projected for a 100 year, 24-hour storm event but the projected maximum precipitation for a one-hour erosion event would be 6.1 inches of precipitation.

Question 6. Please explain this inconsistency. Does DWMRC's permit include requirements for EnergySolutions cell to withstand a one-hour erosion event?

These precipitation projections are based on NOAA modeling from 1973. Effective August 6, 2003, NOAA Atlas 2 has been superseded by NOAA Atlas 14 Volume 1 for Arizona, Nevada, New Mexico, and Utah. <https://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm> So the projections being used by EnergySolutions and DWMRC are at least 30 years out of date.

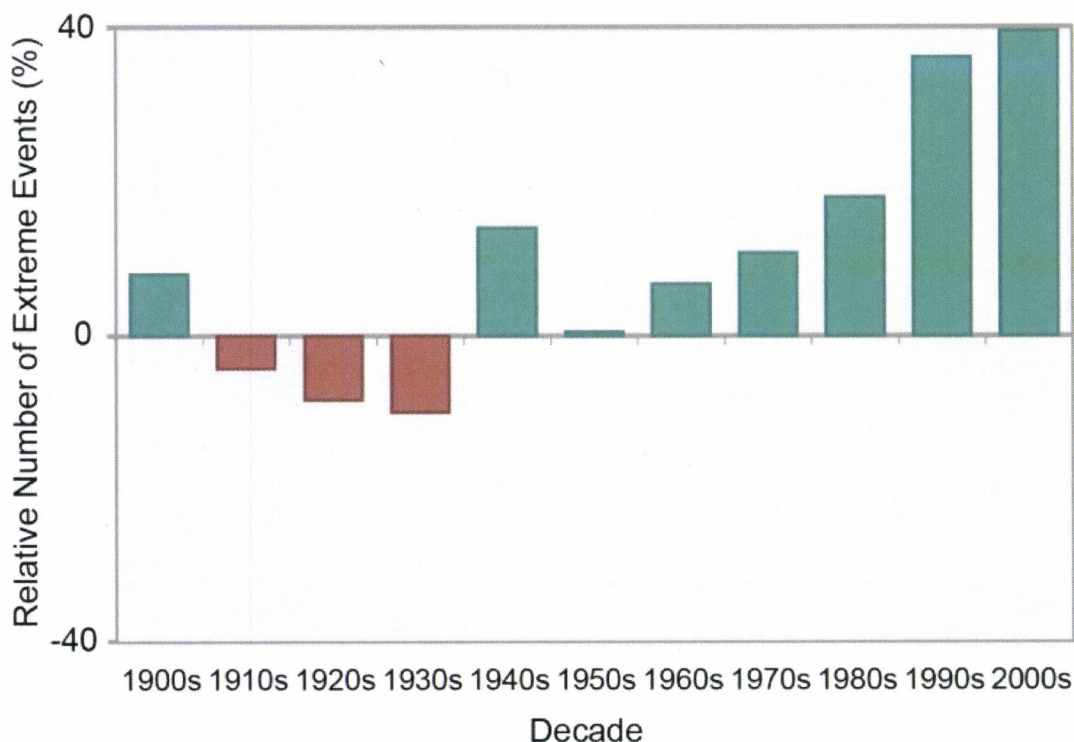
Based on federal regs. Difference between drainage ditches used during active cell operations and long term custody of the cell

Question 7. Why hasn't EnergySolutions been required to update their precipitation projections to Atlas 14?

Furthermore, NOAA is in the process of analyzing the impacts of non-stationary climate on depth-duration-frequency (DDF) precipitation magnitudes. https://www.weather.gov/media/owp/oh/hdsc/docs/202107_HDSC_PR.pdf

Questions 8 and 9. Given the dramatic increase in heavy precipitation events across the U.S. due to climate change (see chart below), even during the 18 years since Atlas 14 was published, what is DWMRC's confidence in the accuracy of the Probable Maximum Precipitation scenarios? Will DWMRC require EnergySolutions to revise its Storm Events assumptions and design as NOAA's modeling is updated? <https://www.c2es.org/content/extreme-precipitation-and-climate-change/>

Observed U.S. Trend in Heavy Precipitation



Also, drought is known to change the dynamics of runoff.

Question 9 a. Does EnergySolutions design for this cell incorporate the effects of prolonged drought on soil conditions and storm water runoff?

Question 10. Have any of the 25-year, 100-year or 1000-year requirements for the site to withstand extreme weather events been updated in light of new projections that have been developed with regards to climate change?

The Division's responses to questions 5-10 did not satisfactorily address our concerns about the requirements for the site to withstand extreme weather events once the drainage ditches have been removed or are silted in and runoff occurs via "sheet flow" across the site. This includes the lack of information about drought effects on soil erosion posed in question 9a as is now labeled above but which was not specifically labeled in HEAL's original submission of questions for the public hearing. The explanation offered verbally by the Division staff is that it uses the previous year's precipitation records to predict extreme weather scenarios into the future. When talking about "extreme" weather, a one-year site-specific data set is obviously an inadequate basis upon which to predict extreme weather events, which may only occur at some time decades into the future. And given the rapid acceleration of climate change and the resulting recent increase in extreme weather events around the world, even 25-year or 100-year data sets are no longer very reliable predictors of extreme weather. HEAL Utah requests that the Division provide a full written explanation and justification of the methodology it uses for extreme weather modeling and how that methodology incorporates the most recent scientific climate projections.

To facilitate the closure of the cell

Page C-8

e) Waste with an average concentration above 4,000 pCi/g for natural uranium or for any radio nuclide in the radium-226 series; or above 60,000 pCi/g for thorium-230; or above 6,000 pCi/g for any radionuclide in the thorium series in any truckload or railcar shall not be accepted.

10.17 At the end of every calendar year, the Licensee shall ensure that the cumulative average activity concentration of waste placed within the upper three feet of disposed waste does not exceed 300 pCi/g of Ra 226 or 900 pCi/g of Th 230, and within the next seven feet does not exceed 500 pCi/g Ra 226 or 1500 pCi/g of Th 230. When both radionuclides are present, the unity rule defined below shall apply to ensure that the Ra-226 limit is not exceeded within 1000 years. Activity of Th 230 (pCi/g)/X + Activity of Ra 226 (pCi)/Y < or = 1 Where: X = 900 pCi/g in the upper three feet and 1500 pCi/g in the next seven feet of waste, and Y = 300 pCi/g in the upper three feet and 500 pCi/gm in the next seven feet of waste 10.18 The cumulative average densities of the waste in the upper ten feet of the 11e(2) embankment and of the compacted radon barrier placed shall not be less than 1.5 g/cm³ for either.

Generally, it isn't the concentration of radioactivity that poses the health and environmental risk but the total amount of radioactivity present. A kilogram of waste with 300 pCi of radium-226 per gram of waste is far less dangerous to the environment or public health than a thousand tons of waste at 3 pCi/g.

Question 11. What are the assumptions regarding human health risks for the use of these metrics as the upper limits of radioactivity in such a large volume of material?

EPA's default Preliminary Remediation Goals for Superfund sites is 0.002 pCi/g for radium-226 and similarly for thorium-230.

Question 12. Assuming that the cells contain the maximum level of radioactivity allowable in the permit, how long will it take before the radioactivity levels fall below these Superfund thresholds?

If closure and partition of the 11 e. (2) cell is approved, HEAL Utah requests that the Division issue a final report that includes

- 1) the final radio nuclide concentration metrics for Ra 226 and Th 230 specified in item 10-17 of the Treatment Amendment document
- 2) similar metrics for any other radio nuclides in the Ra 226 or Th 230 series
- 3) the total volumes of disposed waste containing each of these radio nuclides
- 4) the average concentration of natural uranium, radio nuclides in the radium 226 series, thorium-230 and radio nuclides in the thorium series in each truckload or rail car of waste disposed of in the 11 e. (2) cell.

Attachment M

Division Request for Response Comments from EnergySolutions



State of Utah

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality

Kimberly D. Shelley
Executive Director

DIVISION OF WASTE MANAGEMENT
AND RADIATION CONTROL

Douglas J. Hansen
Director

September 21, 2021

Vern C. Rogers, Director of Regulatory Affairs
EnergySolutions, LLC
299 South Main Street, Suite 1700
Salt Lake City, UT 84111

RE: Amendment 3 of 11e.(2) License No. UT2300478
Request for Response Comments

Dear Mr. Rogers:

In the above-referenced matter, the Division has received oral and written questions and comments from HEAL Utah. Please find these comments enclosed. While the general public comment period for this matter is now closed, the procedural provisions governing the permit review process set forth in the Utah Code anticipate that UDEQ division directors may solicit supplemental information in response to public comments. See Utah Code Section 19-1-301.5(9)(b)(vii). The statute does not afford the right to any person to unilaterally supplement the record, only in response to a request made by a division director. If the director then designates such requested information as the basis for the decision on any given permit order, it will become part of the official administrative record. *Id.*

To assist the Division in its evaluation and review of the Comments, and to help create a more balanced and detailed administrative record, the Director solicits the submission of response comments from EnergySolutions. Submission of response comments by EnergySolutions is optional. Response comments should be submitted no later than October 5, 2021.

The Director considers this solicitation of response comments to be a limited extension of the general public comment period (which is closed) for the purpose of supplementing the record as to the specific issues raised by HEAL Utah. It is important that the scope of any response comments be limited to the scope of the Comments. If response comments are submitted, the Director intends to request that HEAL Utah submit optional reply comments. Reply comments must be within the scope of the issues raised in EnergySolutions' response comments. The Director intends that the requirements of Section 19-1-301.5 generally, and Sections 19-1-301.5 (4) and (6)(e) specifically, shall apply to issues and arguments raised in the response and reply comments because these are being solicited and evaluated in connection with the limited extension of a formal public comment period.

(Over)

DRC-2021-013044

195 North 1950 West • Salt Lake City, UT
Mailing Address: P.O. Box 144880 • Salt Lake City, UT 84114-4880-
Telephone (801) 536-0200 • Fax (801) 536-0222 • T.D.D. (801) 536-4284
www.deq.utah.gov

Printed on 100% recycled paper

If you have any questions, please contact Otis Willoughby at (801) 536-0220.

Sincerely,



Douglas J. Hansen, Director
Division of Waste Management and Radiation Control

DJH/OHW/wa

Enclosure: HEAL Utah Comments (DRC-2021-013141)

- c: Vern C. Rogers, Director of Regulatory Affairs, *EnergySolutions*, LLC (Email)
- Jeff Coombs, EHS, Health Officer, Tooele County Health Department
- Bryan Slade, Environmental Health Director, Tooele County Health Department
- EnergySolutions* General Correspondence (Email)
- LLRW General Correspondence (Email)

Questions and comments HEAL Utah is submitting for a response at the public hearing scheduled for Wednesday September 8, 2021 regarding EnergySolutions: Amendment 3 of 11e.(2) License UT2300478. Submitted to the Utah Division of Waste Management and Radiation Control August 27, 2021.

Federal Cell Facility Amendment Request

Page 40

EnergySolutions' Radioactive Material License UT2300478 authorizes management and disposal of 11e.(2) byproduct on the same footprint herein being considered for the Federal Cell Facility. In preparation for this Federal Cell Facility Radioactive Material License Application, EnergySolutions previously requested Radioactive Material License UT2300478 be amended license a smaller footprint.⁵

Page 41

EnergySolutions also requests authority to abandon groundwater wells GW-36, GW-37 and GW38R. As groundwater beneath the proposed Federal Cell Facility generally flows toward the north-north east, existing groundwater wells surrounding the combined future Federal stewardship footprint (11e.(2) and Federal Cell Facility) will be adequate for early detection of any unlikely leakage beneath the two adjacent cells (11e.(2) and Federal Cell Facility). Supporting this claim is the recognition that regulatory oversight for both the 11e.(2) byproduct cell and the proposed Federal Cell Facility will be transferred to a single regulatory agency (the U.S. Department of Energy-Legacy Management) following their closure.

Question 1. Why is EnergySolutions Federal Cell Amendment Request being considered as a justification for this 11e.(2) permit amendment request when the former has not yet been approved?

Question 2. How does DWMRC's approval of this 11e.(2) permit amendment affect EnergySolutions ability to proceed in preparing the unused portion of this cell for the receipt of depleted uranium prior to a decision on their DU permit application?

This question was not fully answered in the public hearing. Why is the Federal Cell Facility Amendment Request included in the Division's list of materials related to Amendment 3 of 11e.(2) License UT2300478 at all? Specifically, in this document there are 13 references to EnergySolutions' plans to dispose of depleted uranium. HEAL requests that the Division's approval of EnergySolutions 11 e. (2) amendment request be modified to include explicit language that this approval does not include approval for EnergySolutions to initiate any activity related to the preparation of the unused portion of the 11 e. (2) cell for the disposal of depleted uranium.

Question 3. Please explain why the three groundwater wells proposed for abandonment were considered necessary and now are not.

The verbal response to this question given by Division staff in the public hearing suggests that the G-36 well will continue to operate as part of the monitoring of the 2000 evaporation pond but that approval will be granted for the G-37 and G-38 wells to be abandoned. The abandonment appears to be based on a determination that these two wells do not add useful information to that gathered from the other monitoring wells. Given the facts a) that underground conditions can change due to seismic and hydrologic forces, b) the Great Salt Lake is at its lowest level in

recorded history, c) that the 11 e. (2) material in the Federal Cell will now transition to long-term custody and monitoring, and d) that the future use of the unused portion of the Federal Cell is still undetermined, HEAL Utah opposes the abandonment of any monitoring wells that are already in place.

Treatment Amendment document

Page 3-2

The material for disposal is placed on the liner and compacted in place to a waste column height of approximately 34 feet at the embankment shoulder. At the embankment's highest point, the waste column will be approximately 50 feet thick.

Question 4. How often is the temporary cover of this cell inspected by state regulators? Has the state issued findings related to compliance with the temporary cover requirements? Are there air quality monitors that measure the levels of radioactive material that is becoming airborne during disposal operations?

Page 3-3

3.1.1. Storm Water Design

The normal design condition evaluates performance under the 100-year, 24-hour storm event of 2.4 inches of precipitation. The abnormal condition evaluates impacts of the Probable Maximum Precipitation (one-hour storm of 6.1 inches) as the worst-case extreme erosion event. The one-hour event was selected to maximize velocity of precipitation and, accordingly, flow through the cover drainage system.

Page L-7

3.0 Storm Events

The performance of the drainage ditches to contain runoff is only important for the active life of the facility (estimated as 25 years). Upon closure, the drainage ditches will be removed or eventually become silted in to allow sheet flow across the site over the natural grade of the area. Therefore, a reasonable maximum storm event over the active life of the facility is the 25-year, 24-hour storm event (1.9 inches). A reasonable potential worst-case event during the active life of the facility is the 100-year, 24-hour storm event (2.4 inches). Both of these storm events are depicted in the isopluvial maps of the National Oceanic and Atmospheric Administration (NOAA) Atlas 2, Volume VI (1973).

Question 5. The "worst case" storm event scenario described by DWMRC does not include the worst-case extreme erosion event described by EnergySolutions (a one-hour storm of 6.1 inches). It seems inconsistent that 2.4 inches of precipitation could be the maximum projected for a 100 year, 24-hour storm event but the projected maximum precipitation for a one-hour erosion event would be 6.1 inches of precipitation.

Question 6. Please explain this inconsistency. Does DWMRC's permit include requirements for EnergySolutions cell to withstand a one-hour erosion event?

These precipitation projections are based on NOAA modeling from 1973. Effective August 6, 2003, NOAA Atlas 2 has been superseded by NOAA Atlas 14 Volume 1 for Arizona, Nevada, New Mexico, and Utah. <https://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm> So the projections being used by EnergySolutions and DWMRC are at least 30 years out of date.

Based on federal regs. Difference between drainage ditches used during active cell operations and long term custody of the cell

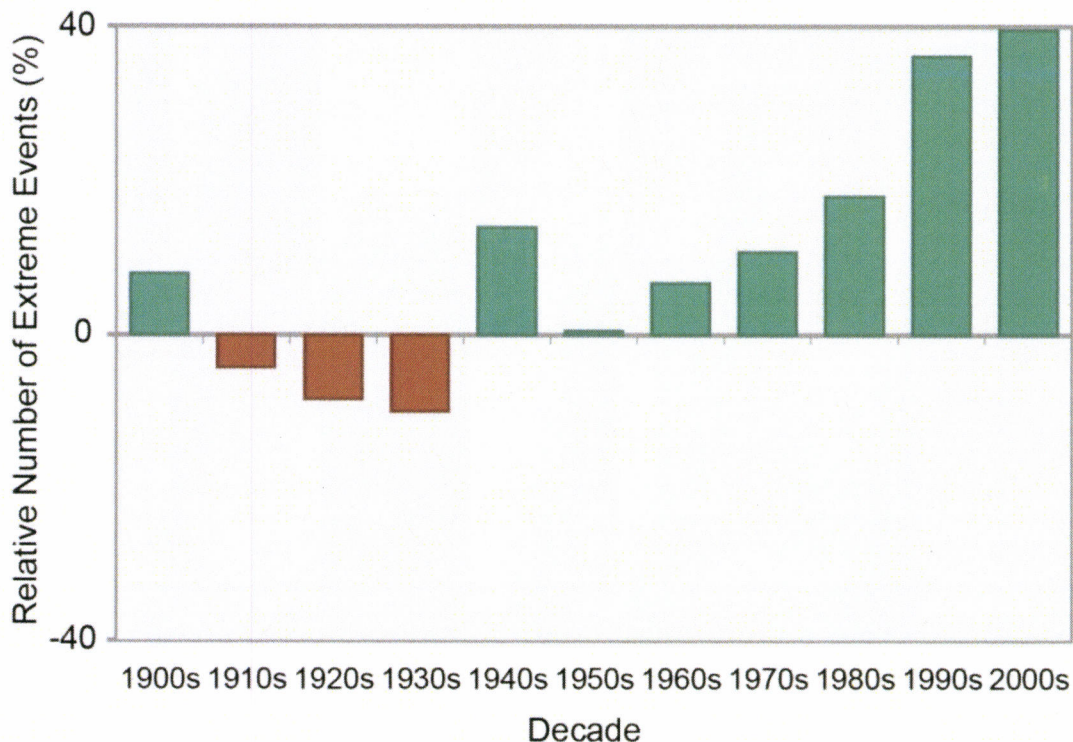
Question 7. Why hasn't EnergySolutions been required to update their precipitation projections to Atlas 14?

Furthermore, NOAA is in the process of analyzing the impacts of non-stationary climate on depth-duration-frequency (DDF) precipitation magnitudes.

https://www.weather.gov/media/owp/oh/hdsc/docs/202107_HDSC_PR.pdf

Questions 8 and 9. Given the dramatic increase in heavy precipitation events across the U.S. due to climate change (see chart below), even during the 18 years since Atlas 14 was published, what is DWMRC's confidence in the accuracy of the Probable Maximum Precipitation scenarios? Will DWMRC require EnergySolutions to revise its Storm Events assumptions and design as NOAA's modeling is updated? <https://www.c2es.org/content/extreme-precipitation-and-climate-change/>

Observed U.S. Trend in Heavy Precipitation



Also, drought is known to change the dynamics of runoff.

Question 9 a. Does EnergySolutions design for this cell incorporate the effects of prolonged drought on soil conditions and storm water runoff?

Question 10. Have any of the 25-year, 100-year or 1000-year requirements for the site to withstand extreme weather events been updated in light of new projections that have been developed with regards to climate change?

The Division's responses to questions 5-10 did not satisfactorily address our concerns about the requirements for the site to withstand extreme weather events once the drainage ditches have been removed or are silted in and runoff occurs via "sheet flow" across the site. This includes the lack of information about drought effects on soil erosion posed in question 9a as is now labeled above but which was not specifically labeled in HEAL's original submission of questions for the public hearing. The explanation offered verbally by the Division staff is that it uses the previous year's precipitation records to predict extreme weather scenarios into the future. When talking about "extreme" weather, a one-year site-specific data set is obviously an inadequate basis upon which to predict extreme weather events, which may only occur at some time decades into the future. And given the rapid acceleration of climate change and the resulting recent increase in extreme weather events around the world, even 25-year or 100-year data sets are no longer very reliable predictors of extreme weather. HEAL Utah requests that the Division provide a full written explanation and justification of the methodology it uses for extreme weather modeling and how that methodology incorporates the most recent scientific climate projections.

To facilitate the closure of the cell

Page C-8

e) Waste with an average concentration above 4,000 pCi/g for natural uranium or for any radio nuclide in the radium-226 series; or above 60,000 pCi/g for thorium-230; or above 6,000 pCi/g for any radionuclide in the thorium series in any truckload or railcar shall not be accepted.

10.17 At the end of every calendar year, the Licensee shall ensure that the cumulative average activity concentration of waste placed within the upper three feet of disposed waste does not exceed 300 pCi/g of Ra 226 or 900 pCi/g of Th 230, and within the next seven feet does not exceed 500 pCi/g Ra 226 or 1500 pCi/g of Th 230. When both radionuclides are present, the unity rule defined below shall apply to ensure that the Ra-226 limit is not exceeded within 1000 years. Activity of Th 230 (pCi/g)/X + Activity of Ra 226 (pCi)/Y < or = 1 Where: X = 900 pCi/g in the upper three feet and 1500 pCi/g in the next seven feet of waste, and Y = 300 pCi/g in the upper three feet and 500 pCi/gm in the next seven feet of waste 10.18 The cumulative average densities of the waste in the upper ten feet of the 11e(2) embankment and of the compacted radon barrier placed shall not be less than 1.5 g/cm³ for either.

Generally, it isn't the concentration of radioactivity that poses the health and environmental risk but the total amount of radioactivity present. A kilogram of waste with 300 pCi of radium-226 per gram of waste is far less dangerous to the environment or public health than a thousand tons of waste at 3 pCi/g.

Question 11. What are the assumptions regarding human health risks for the use of these metrics as the upper limits of radioactivity in such a large volume of material?

EPA's default Preliminary Remediation Goals for Superfund sites is 0.002 pCi/g for radium-226 and similarly for thorium-230.

Question 12. Assuming that the cells contain the maximum level of radioactivity allowable in the permit, how long will it take before the radioactivity levels fall below these Superfund thresholds?

If closure and partition of the 11 e. (2) cell is approved, HEAL Utah requests that the Division issue a final report that includes

- 1) the final radio nuclide concentration metrics for Ra 226 and Th 230 specified in item 10-17 of the Treatment Amendment document
- 2) similar metrics for any other radio nuclides in the Ra 226 or Th 230 series
- 3) the total volumes of disposed waste containing each of these radio nuclides
- 4) the average concentration of natural uranium, radio nuclides in the radium 226 series, thorium-230 and radio nuclides in the thorium series in each truckload or rail car of waste disposed of in the 11 e. (2) cell.

Attachment N

Reply Comments from EnergySolutions to Division

September 22, 2021

CD-2021-118

Mr. Doug Hansen, Director
Division of Waste Management and Radiation Control
195 North 1950 West
Salt Lake City, UT 84114-4880

Subject: **Radioactive Material License UT2300478: Supplemental Response
Comments to Amendment 3**

Mr. Hansen:

In response to the Director's invitation of September 21, 2021,¹ EnergySolutions hereby supplements the official record of its request to amend Radioactive Material License UT2300478.² This supplemental information is specifically offered "...to assist the Division in its evaluation and review of the Comments, and to help create a more balanced and detailed administrative record."³ Supplemental information is provided below for each of the four additional Responses identified by the Director.

Supplemental Questions 1 and 2: This question was not fully answered in the public hearing. Why is the Federal Cell Facility Amendment Request included in the Division's list of materials related to Amendment 3 of 11e.(2) License UT2300478 at all? Specifically, in this document there are 13 references to EnergySolutions' plans to dispose of depleted uranium. HEAL requests that the Division's approval of EnergySolutions 11 e. (2) amendment request be modified to include explicit language that this approval does not include approval for EnergySolutions to initiate any activity related to the preparation of the unused portion of the 11 e. (2) cell for the disposal of depleted uranium.

As justified in the amendment request dated October 19, 2020, "*EnergySolutions has recognized a dramatic reduction in the volume of 11e.(2) by-product material received for disposal.*"⁴ Justification for the request to reduce the licensed capacity of the 11e.(2) byproduct cell is independent of any possible future use of the unused property footprint. In Title 10 of the Code of Federal Regulations (CFR) subsection 40.44 (adopted by reference into Utah Administrative Code § R313-24), a licensee may request amendment

¹ Hansen, D.J. "Amendment 3 of 11e.(2) License No. UT2300478 – Request for Response Comments." Letter to Vern Rogers of EnergySolutions from the Utah Division of Waste Management and Radiation Control. September 21, 2021.

² Rogers, V.C. "Radioactive Material License UT 2300478-Groundwater Quality Discharge Permit UGW450005; Amendment and Modification Request to Reduce Capacity and Disposal Footprint." (CD-2020-157). Letter to Ty Howard, Utah's Director of Division of Waste Management and Radiation Control from EnergySolutions. October 19, 2020.

³ Ibid, Hansen.

⁴ Ibid, Rogers.

of a byproduct license, so long as the conditions in 10 CFR § 40.31 and Appendix A to 10 CFR 40 are satisfied. Specific prohibition of any future use of private property available following a reduction in licensed footprint is not required by 10 CFR 40.

Supplemental Question 3: The verbal response to this question given by Division staff in the public hearing suggests that the G-36 well will continue to operate as part of the monitoring of the 2000 evaporation pond but that approval will be granted for the G-37 and G-38 wells to be abandoned. The abandonment appears to be based on a determination that these two wells do not add useful information to that gathered from the other monitoring wells. Given the facts a) that underground conditions can change due to seismic and hydrologic forces, b) the Great Salt Lake is at its lowest level in recorded history, c) that the 11 e. (2) material in the Federal Cell will now transition to long-term custody and monitoring, and d) that the future use of the unused portion of the Federal Cell is still undetermined, HEAL Utah opposes the abandonment of any monitoring wells that are already are in place.

EnergySolutions' Comment Response: The direction of groundwater flow beneath 11e.(2) byproduct cell is well characterized and flows from the southwest to the northeast.⁵ Wells GW-37 and -38 are located approximately 400 feet immediately west of the current byproduct footprint on the 11e.(2) byproduct cell. As such, they are neither located directly up- nor down-gradient of the byproduct material disposed in the 11e.(2) byproduct cell. Therefore, neither well is expected to successfully intercept any highly unlikely byproduct material that may eventually be leached from below the cell into the groundwater. Therefore, active monitoring of GW-37 and GW-38 provides no beneficial information that further informs the Director's assessment of the continuing performance of the current 11e.(2) byproduct cell footprint nor of the 11e.(2) byproduct cell's ability to isolate the byproduct material from the environment.

Supplemental Questions 5-10: The Division's responses to questions 5-10 did not satisfactorily address our concerns about the requirements for the site to withstand extreme weather events once the drainage ditches have been removed or are silted in and runoff occurs via "sheet flow" across the site. This includes the lack of information about drought effects on soil erosion posed in question 9a as is now labeled above but which was not specifically labeled in HEAL's original submission of questions for the public hearing. The explanation offered verbally by the Division staff is that it uses the previous year's precipitation records to predict extreme weather scenarios into the future. When talking about "extreme" weather, a one-year site-specific data set is obviously an inadequate basis upon which to predict extreme weather events, which may only occur at some time decades into the future. And given the rapid acceleration of climate change and the resulting recent increase

⁵ Sobocinski, R. W. "2020 Annual 11e.(2), LARW, Class A West and Mixed Waste Groundwater Monitoring Report." Report from EnergySolutions to Dennis Hansen, Director of Utah's Division of Waste Management and Radiation Control. February 25, 2021.

in extreme weather events around the world, even 25-year or 100-year data sets are no longer very reliable predictors of extreme weather. HEAL Utah requests that the Division provide a full written explanation and justification of the methodology it uses for extreme weather modeling and how that methodology incorporates the most recent scientific climate projections.

EnergySolutions' Comment Response: EnergySolutions has safely constructed and operated its 11e.(2) byproduct cell under Radioactive Material License UT2300478 (which was originally granted by the U.S. Nuclear Regulatory Commission as SMC-1559) since 1993. In order to justify receipt of its original license (which has been twice renewed), EnergySolutions has been required to provide regulatory authorities with the information promulgated in 10 Code of Federal Regulations (CFR) §40.31 and Appendix A to 10 CFR 41 (where Appendix A "...establishes technical, financial, ownership, and long-term site surveillance criteria relating to the siting, operation, decontamination, decommissioning, and reclamation of mills and tailings or waste systems and sites at which such mills and systems are located"). Criterion 1 of Appendix requires a design that focuses on "...minimizing erosion, disturbance, and dispersion [of disposed byproduct material] by natural forces over the long term." Similarly, in order to grant a byproduct License, Criterion 3 requires NRC to conclude that "... an above grade disposal program will provide reasonable equivalent isolation of the tailings from natural erosional forces."

In order to assess the validity of this information and conclude that it satisfies the applicable requirements, Appendix A requires of NRC that "[a]ll site specific licensing decisions based on the criteria in this Appendix ... take into account the risk to the public health and safety and the environment with due consideration to the economic costs involved and any other factors the Commission determines to be appropriate."

Therefore, as the license has been active for almost 30 years with multiple amendments and several renewals, NRC and the Director have repeatedly deemed EnergySolutions' byproduct operations as appropriately protective of human health and the environment. The amendment request to reduce the licensed byproduct disposal capacity and related cell footprint does not materially limit the cell's ongoing ability to continue to isolate byproduct material from the environment.

Additionally, the NRC discourages licensing-based assessment and modeling based on broad, unbounded climatological speculation, recommending "... consideration given to the issue of evaluating site conditions that may arise from changes in climate or the influences of human behavior should be limited, so as to avoid unnecessary speculation. It is possible that, within some disposal site regions, glaciation or an interglacial rise in sea level could occur in response to changes in global climate. These events are envisaged as broadly disrupting the disposal site region to the extent that the human population would leave affected areas as the ice sheet or shoreline advances. Accordingly, an appropriate assumption under these conditions would be that no

individual is living close enough to the facility to receive a meaningful dose.”⁶ Therefore, no speculative evaluation of rapid acceleration in climate change is required.

Supplemental Questions 11-12: If closure and partition of the 11e. (2) cell is approved, HEAL Utah requests that the Division issue a final report that includes 1) the final radio nuclide concentration metrics for Ra 226 and Th 230 specified in item 10-17 of the Treatment Amendment document 2) similar metrics for any other radionuclides in the Ra 226 or Th 230 series 3) the total volumes of disposed waste containing each of these radio nuclides 4) the average concentration of natural uranium, radio nuclides in the radium 226 series, thorium-230 and radio nuclides in the thorium series in each truckload or rail car of waste disposed of in the 11 e. (2) cell.

EnergySolutions’ Comment Response: During active operations, Conditions 10.3, 10.4, 10.14, 10.17 and 10.18 of Radioactive Material License UT2300478 requires EnergySolutions to annually report to the Director the distribution of Ra-226 and Th-230 concentrations in the byproduct material placed in the upper 10 feet of the waste zone; the total volume of byproduct waste disposed; the volume of byproduct material disposed with elevated concentrations of natural uranium, Ra-226 decay chain, Th-230 of other radionuclide in the thorium decay series; the cumulative average Ra-226 and Th-230 activity concentration of waste placed within the upper three feet of disposed waste; and the cumulative average densities of the waste in the upper ten feet of the 11e.(2) byproduct cell. Additionally, Groundwater Quality Discharge Permit UGW450005 requires EnergySolutions to annual report the Director the volume of byproduct material disposed and remaining disposal capacity available according to the approved license and quarterly report to the Director the radionuclide concentrations of byproduct materials received for disposal. Therefore, EnergySolutions already reports to the Director the information of interest.

EnergySolutions’ appreciates the opportunity to supplement the Director’s record for the 11e.(2) byproduct material license amendment request. Please contact me at (801) 649-2000 if you have any questions.

Sincerely,



Vern C. Rogers
Sep 22 2021 1:14 PM

cosign

Vern C. Rogers
Director of Regulatory Affairs

⁶ U.S. Nuclear Regulatory Commission. “A Performance Assessment Methodology for Low-Level Radioactive Waste Disposal Facilities: Recommendations of NRC’s Performance Assessment Working Group (NUREG-1573).” Division of Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington D.C., October 2000. pg 3-10.

Attachment O

Division Response to HEAL Utah Second Round Comments

Question 2: HEAL's Follow-up question:

This question was not fully answered in the public hearing. Why is the Federal Cell Facility Amendment Request included in the Division's list of materials related to Amendment 3 of 11e.(2) License UT2300478 at all? Specifically, in this document there are 13 references to EnergySolutions' plans to dispose of depleted uranium. HEAL requests that the Division's approval of EnergySolutions 11e.(2) amendment request be modified to include explicit language that this approval does not include approval for EnergySolutions to initiate any activity related to the preparation of the unused portion of the 11e.(2) cell for the disposal of depleted uranium.

Division Answer to HEAL's Follow-up to Question 2:

Language has been added to the Statement of Basis for Amendment 3 that specifies that the changes allowed by this amendment only pertain to the reduced footprint of the 11e.(2) cell and does not give approval of any other licensed activity within Section 32 or any other area.

Question 3: HEAL's Follow-up question:

The verbal response to this question given by Division staff in the public hearing suggests that the G-36 well will continue to operate as part of the monitoring of the 2000 evaporation pond but that approval will be granted for the G-37 and G-38 wells to be abandoned. The abandonment appears to be based on a determination that these two wells do not add useful information to that gathered from the other monitoring wells. Given the facts a) that underground conditions can change due to seismic and hydrologic forces, b) the Great Salt Lake is at its lowest level in recorded history, c) that the 11 e. (2) material in the Federal Cell will now transition to long-term custody and monitoring, and d) that the future use of the unused portion of the Federal Cell is still undetermined, HEAL Utah opposes the abandonment of any monitoring wells that are already are in place.

Division Answer to HEAL's Follow-up to Question 3:

The 11e.(2) embankment was licensed by the NRC before the State became an Agreement State for byproduct materials. As licensed by the NRC, the 11e.(2) embankment incorporated two separate triangular-shaped disposal embankments, the Northwest and Southeast embankments. These were separated diagonally by an area where three monitoring wells were located, GW-36, GW-37 and GW-38. In 2001, Envirocare of Utah (the predecessor to EnergySolutions) submitted a revised engineering design for the 11e.(2) embankment that incorporated a single rectangular shaped cell that was approved. In 2002, Envirocare submitted an 11e.(2) embankment well spacing analysis that was also approved. The well spacing analysis did not incorporate the three wells in the diagonal. With completion of the 2000 evaporation pond, GW-36 has been used as a downgradient compliance well for the 2000 evaporation pond. Since 2002, wells GW-37, and GW-38 have not been used for water quality compliance monitoring.

GW-36 will continue as a monitoring well as long as the 2000 evaporation pond exists. The other wells have been used for water level monitoring but contribute little to that data set. Groundwater monitoring wells do provide access to the subsurface for compliance work; however, to a degree, every monitoring well is an environmental liability because of the potential to act as a conduit for contamination to reach groundwater. To limit the environmental risk, a groundwater monitoring well is legally/properly abandoned when it is not needed. This policy also pertains to other wells that may be temporary, such as observation wells, test wells, etc, they are properly abandoned when not needed. When a future use of the area west of the proposed 11e.(2) cell is determined, adequate monitoring will be evaluated at that time. If a future cell is located in this area, a new well network will be installed that provided protection of the environment and human health.

Question 10: HEAL's Follow-up question:

Provide a full written explanation and justification of the methodology it uses for extreme weather modeling and how that methodology incorporates the most recent scientific climate projections

Division Answer to HEAL's Follow-up to Question 10:

The design and engineering of the 11e.(2) embankment provided a reasonable assurance of its stability for a 1,000-year period to the extent practicable, but in any case, for a minimum of a 200-year period. To meet these design requirements numerous methodologies using weather data are employed in the evaluation of the design, to meet regulatory requirements. Such as, ditches around the 11e.(2) cell were qualified using U.S. Nuclear Regulatory Commission's guidance criteria for long-term stabilization for uranium mill tailings. The ditch design criteria required them to last less than 50 years. In using this guidance, the Division requires the most recent climate data available at that time be used. Another example is infiltration and transport modeling for the 11e.(2) cell, where site-specific, aggregated weather data from the site was compared and supplemented with surrounding NOAA weather station data to build a longer weather data base for the 11e.(2) cell evaluation that captured extreme weather events. The Division has not proposed to, nor does it currently evaluate strictly a single year's worth of meteorological data when considering extreme weather scenarios and climatological factors. The Division finds that there is still uncertainty in the absolute predictions of direct climate change that may impact future weather patterns in the Eastern Great Basin, the available research suggests that changes in the timing (and perhaps location) of precipitation are more likely than large changes in average precipitation amount. The Division will use site-specific, aggregated weather data in licensing and permitting activities, where appropriate. The Division considers it more appropriate to use this aggregated site-specific weather data as a method to capture what is occurring at the site than more regional data. In the Division's judgement, this aggregated site-specific data is more accurate than regional data and provides site specific answers when used at the site. In determining a methodology for modeling the Division uses procedures that conform to standard engineering practices that provide for flexibility and engineering judgment. The weather scenarios used at the Clive site are conservative estimates and when compared to the

site-specific data produce reasonable results that reflect climate changes. The technical methods for evaluating climate change impacts have grown more sophisticated over time, but there is still a high degree of uncertainty in absolute response predictions. The Division is evaluating climate and weather conditions at the Clive site and will require EnergySolutions to use the appropriate Climate and Weather data in any future evaluations

Question 12: HEAL's Follow-up question:

If closure and partition of the 11e.(2) cell is approved, HEAL Utah requests that the Division issue a final report that includes

- 1) the final radio nuclide concentration metrics for Ra 226 and Th 230 specified in item 10-17 of the Treatment Amendment document
- 2) similar metrics for any other radio nuclides in the Ra 226 or Th 230 series
- 3) the total volumes of disposed waste containing each of these radio nuclides
- 4) the average concentration of natural uranium, radio nuclides in the radium 226 series, thorium-230 and radio nuclides in the thorium series in each truckload or rail car of waste disposed of in the 11 e. (2) cell.

Division Answer to HEAL's Follow-up to Question 12:

The licensing action that is currently being examined by the Division of Waste Management and Radiation Control pertains to a proposed size reduction of the 11e.(2) cell's footprint, not cell closure. The final concentration/activity of these radionuclides will not be known until the cell is closed. The questions proposed by HEAL regarding radionuclide concentrations and disposal volumes will be addressed at the time of cell closure and will be included in the final safety evaluation report.

Meeting Participant Comments/Questions

Q:Diane D'Arrigo:

This is Diane D'Arrigo. I'm with the Nuclear Information and Resource Service. I just wanted to understand as it looks to me like you're closing down part of one facility at the site to make room for another type of waste that has not been approved to be disposed of at that site? So, it seems like it's a step in the direction of accepting depleted uranium. Which has been very much contested and I think even the State has not been enthusiastic about that idea. But now, it would be opening the door to, well, providing potential capacity for depleted uranium.....

- 1) Okay. So, the question is. Why is the state paving the way for depleted uranium when depleted uranium is not allowed? That would be that question.

Division's Response:

The Division is responding to the Licensee's request for a license amendment to reduce the size of the footprint of the 11.e(2) cell. The Divisions did not consider depleted uranium in their evaluation of the request and has made no commitment for the disposal of depleted uranium in the area vacated in the request. The Licensee has the right to propose the disposal of any waste in that vacated area and the Division will evaluate that request when and if it is submitted.

- 2) Then, you were talking about climate change data...(I had a second question here). You were talking about NOAA Atlas 1973 and so forth, and then you just said that you would require the appropriate data to be used by the company in the future. What is that appropriate data? Does it include the most recent available data in light of clear and present climate change/increasing climate change?

Division's Response:

The appropriate weather data would depend on what is being evaluated at the time. The Division uses site-specific, aggregated weather data in licensing and permitting activities, where it can be used effectively. In the Division's judgement, this aggregated site-specific data captures the changing weather conditions at the Clive site and is more accurate than regional data when used at the site. If an evaluation requires a technique, conforming to standard engineering practice, requiring a regional weather data set, then the Division requires the most recent available weather data set. If the evaluation involves a long-time period, then the weather data will undergo additional evaluation to see that it captures the predicted future climate. The weather scenarios used in evaluations at the Clive site are designed to be conservative estimates and when compared to the site-specific data are capturing changes in the region. The Division is evaluating climate and weather conditions at the Clive site and will require EnergySolutions to use the appropriate climate and weather data that reflect potential changes in the Climate in any future evaluations

C: MaryAnn Webster (Phone Participant):

Yes. I am wondering why the state is even entertaining this foot in the door tactic by EnergySolutions for Utah to take high level nuclear waste that's toxic for hundreds of thousands of years. I mean to quote Orrin Hatch roughly, why don't the communities who benefited from and generated this waste with their nuclear power store it on-site. There is absolutely no reason why this waste cannot be stored on the site of the facility that has generated it. Utah's have no nuclear power plants and have not benefited in any way from nuclear waste. We shouldn't have to be subjected for hundreds of thousands of years to that type of danger. And I would also submit that regulators have no right to foist this upon the residents in the Salt Lake Valley and all downwind direction eastward. Thank you.

Division's Response:

This Division is not considering any proposal that would allow for the disposal of High-Level Nuclear Waste in the State of Utah, nor is it aware of any such proposal. High-Level

Nuclear Wastes are highly radioactive materials produced as a byproduct of the reactions that occur inside nuclear reactors. High-level wastes take one of two forms: Spent (used) reactor fuel; or waste materials remaining after spent fuel is reprocessed. These waste forms are not permitted to be disposed of in the State of Utah. The waste taken at the Clive site is mostly low-level radioactive waste and there are many sources of low-level radioactive waste, and some of those sources do benefit the citizens of Utah. 11e,(2) waste, which is the subject of this license amendment consist of waste from the milling of uranium and thorium ores that has and does take place in the State of Utah. The Division (regulators) is providing assurances that there is disposal of this waste to protect the public and environment.

Q: Diane D'Arrigo:

I do have one more. I know that... [this is Diane with Nuclear Information and Resource Service once again]. I know that in a separate proceeding completely, that *EnergySolutions* is applying for a landfill that would get a solid or industrial waste license but would take nuclear waste. So, they're calling it VLLW Waste Pit. I'm wondering if there is a connection between that application and the changes that are going on here? The NRC has rejected (The Nuclear Regulatory Commission) has rejected its proposal to create a very low level (VLLW) category. So, it would be Utah's own creation really, because it doesn't really exist in federal regulation to have a nuclear waste site that is not licensed for nuclear waste.

Division's Response:

This license amendment request has no connection to *EnergySolutions'* proposed Exempt Waste Cell (referred to by Ms. D'Arrigo as the "VLLW Waste Pit"). The Exempt Waste Cell is a separate, proposed licensing action that will come before the public at a future date.

Attachment P

Approval Letter with Revised 11e.(2) License UT#2300478

Amendment 3



State of Utah

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality

Kimberly D. Shelley
Executive Director

DIVISION OF WASTE MANAGEMENT
AND RADIATION CONTROL

Douglas J. Hansen
Director

March 16, 2022

Vern C. Rogers
Director of Regulatory Affairs
EnergySolutions, LLC
299 South Main Street, Suite 1700
Salt Lake City, UT 84111

RE: **Conditional Approval:** Revised Amendment and Modification Request, Capacity and Disposal Footprint 11e.(2) License, February 26, 2021 (CD-2021-030), Amendment and Modification Request to Reduce Capacity and Disposal Footprint, October 19, 2020 (CD-2020-157), EnergySolutions (ES) Response to wells remaining and abandonment regarding the 11e.(2) embankment only, April 9, 2021 (CD-2020-052), Public Notice, July 21, 2021 (DRC-2021-006545)
EnergySolutions Radioactive Material License UT2300478

Dear Mr. Rogers:

In letters dated February 26, 2021 (CD 2021-030), October 19, 2020 (CD-2020-157), and April 9, 2021 (CD-2020-052), EnergySolutions requested approval for Revised Amendment 3 and Modification Request Capacity and Disposal Footprint, and the surety update to 11e.(2) Radioactive Material License UT2300478. In conjunction EnergySolutions requested that the Groundwater Quality Discharge Permit GWQDP, No. UGW450005 be modified to abandon several monitoring wells.

The Division of Waste Management and Radiation Control (DWMRC) held a public hearing regarding this matter on September 8, 2021. Comments received during the public comment period are documented in the Public Participation Document (DRC-2022-002682) created by the Division. The Division considers the administrative record relating to this amendment request to now be complete and adequate to support the Director's final agency action.

(Over)

After reviewing the complete administrative record, the Director hereby approves *EnergySolutions*' Radioactive Material License UT2300478 Amendment 3, modification of GWQDP, No. UGW450005 and the associated engineering drawings submitted on February 26, 2021 (CD-2021-030), subject to the following conditions:

1. Groundwater monitoring well GW-36 shall remain in service as a down gradient monitoring well for the 2000 evaporation pond.
2. Wells GW-37 and GW-38 may be abandoned because the wells will no longer be compliance monitoring points in an upcoming modification of GWQDP, No. UGW450005. Well abandonment will be performed in accordance with requirements in Utah Administrative Code (UAC) R655-4-12 including:
 - a. Any groundwater monitoring well that is to be permanently abandoned shall be done in accordance with the provisions of UAC R655-4-14.
 - b. Permanently abandoned wells shall be completely filled in such a manner as to prevent vertical movement of water within the borehole as well as preventing the annular space surrounding the well casing from becoming a conduit for possible contamination of the groundwater.
 - c. The well closure shall be completed under the direct supervision of a currently licensed water well driller who shall be responsible for verification of procedures and materials used.
 - d. *EnergySolutions* will meet the requirements of Part II.M. of GWQDP, No. UGW450005.
3. This approval is limited to *EnergySolutions*' Radioactive Material License UT2300478 and GWQDP, No. UGW450005.

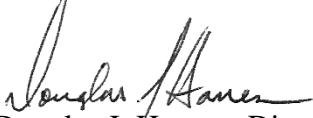
The basis for the Director's conditional approval is set forth in the Administrative Record, including the Statement of Basis (DRC-2022-002684) and the Public Participation Summary (DRC-2022-002682). Based on the Administrative Record, the Director has determined that the foregoing conditions are appropriate.

NOTICE OF RIGHT TO APPEAL

NOTICE is hereby given that any person may file a Petition for Review regarding the above-referenced docket, pursuant to Utah Code Section 19-1-301.5 and Utah Admin. Code R305-7, within 30 days of the date that this agency action is signed.

If you have any questions, please call David Esser at (801) 536-0079 or Otis Willoughby at (801) 536-0220.

Sincerely,



Douglas J. Hansen, Director
Division of Waste Management and Radiation Control

Enclosure: Radioactive Material License #2300478 (DRC-2022-003082)

DJH/DKE/wa

- c: Jeff Coombs, EHS, Health Officer, Tooele County Health Department
- Bryan Slade, Environmental Health Director, Tooele County Health Department
- EnergySolutions General Correspondence (Email)
- LLRW General Correspondence (Email)
- Douglas Tonkay, USDOE (Email)
- Lexi Tuddenham, HEAL Utah (Email)
- Ty L. Howard, Deputy Director, Utah Department of Environmental Quality
- Kimberly D. Shelley, Executive Director, Utah Department of Environmental Quality

**UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WASTE MANAGEMENT AND RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE**

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

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*****
                LICENSEE                ) 3. License Number: UT 2300478
                                           ) Amendment #3
1. Name EnergySolutions, LLC           ) *****
                                           ) 4. Expiration Date
2. Address 299 S. Main St., Suite 1700 ) November 13, 2027
   Salt Lake City, UT 84111           ) *****
                                           ) 5. License Category 2-c
*****
6. Radioactive material (element and mass number)
   11e.(2) Byproduct Material
7. Chemical and/or physical form
   Packaged or Bulk Radioactive Waste
8. Maximum quantity
   Licensee may possess at any one time
   1,629,255 Cubic Yards
*****
    
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SECTION 9.0. ADMINISTRATIVE CONDITIONS

- 9.1 All notices to the Division of Waste Management and Radiation Control required under this license shall be addressed to the Director of the Division of Waste Management and Radiation Control (Director), Department of Environmental Quality, 195 North 1950 West, P.O. Box 144880, Salt Lake City, UT 84114-4880.
- 9.2 Authorized place for use shall be the Licensee's facility located in Section 32 of Township 1 S, Range 11 W, Tooele County, Utah, near Clive.
- 9.3 Authorized use is for the receipt, storage and disposal of 11e.(2) byproduct material in accordance with statements, descriptions, and representations contained in the Licensee's application, including appendices.
- 9.4 In order to ensure that no disturbance of cultural resources occurs, the Licensee shall cease any work resulting in the discovery of previously unknown cultural or historical artifacts and report the discovery, in writing, to the Director and the State Historic Preservation Office (SHPO). The artifacts shall be inventoried and evaluated in accordance with UCA 9-8-404, and no disturbance shall occur until the Licensee has received written authorization from the Director and SHPO to proceed.
- 9.5 The Licensee shall:

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- a) Establish, implement and comply with standard operating procedures (SOPs) for all operational activities involving the handling, storing or disposal of radioactive materials. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. In addition, SOPs shall be established and implemented for non-operational activities to include environmental monitoring, bioassay analysis and instrument calibration. An up-to-date copy of each written SOP, as controlled under the quality assurance (QA) procedures, shall be kept in each area where it is used.
 - b) Design, implement and comply with an effective air sampling program in the workplace based on Revision 1 to Nuclear Regulatory Commission (NRC) Regulatory Guide 8.25 (June 1992), "Air Sampling in the Workplace" or an equivalent program.
- 9.6 The Licensee shall have all written SOPs reviewed and approved by the Radiation Safety Officer (RSO), or designee, qualified by way of specialized radiation protection training equivalent to that required for the RSO as defined in License Condition 9.8, before being implemented and whenever a change in a procedure is proposed. All existing facility SOPs related to operational and non-operational activities shall be reviewed and documented by the RSO on an annual basis in the 11e.(2) Annual Report, to be submitted to the Director by April 30.
- 9.7 Any change to the Licensee's corporate organizational structure, as presented in the license application, affecting the assignment or reporting responsibility of the radiation staff shall conform to the NRC's Regulatory Guide 8.31, "Information Relevant to Ensuring That Occupational Radiation Exposures at Uranium Mills Will Be As Low As Is Reasonably Achievable" as amended.
- 9.8 The Licensee's staff shall meet the qualifications as described in the currently approved *Organization Layout* of Condition 32.A of Radioactive Material License UT 2300249. In addition to the responsibilities and qualifications specified in the Licensee's application, the RSO or designee shall be qualified as specified in Sections 1.2 and 2.4 of the NRC Regulatory Guide 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills will be As Low As Reasonably Achievable," as amended. In addition, the RSO shall also receive 40 hours of related health and safety refresher training every two years.
- 9.9 For the purposes of this License Condition, reference to "uranium mill" or "milling" in the NRC Regulatory Guide 8.31, as amended, shall mean the Licensee's facility and authorized activities.
- 9.10 The Licensee shall conduct:
- a) Annual training for its facility inspectors that covers all areas included in the daily inspections of the 11e.(2) byproduct material and the disposal area.
 - b) Annual operational training that covers all aspects of operational safety and emergency procedures for all employees. The SOPs shall be used to conduct operations training to assure consistency and thoroughness.

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- 9.11 The Licensee shall, at all times, maintain a Surety that satisfies the requirements of R313-24-4 (10 CFR 40, Appendix A, Criterion 9 and 10 incorporated by reference), as defined by License Condition 9.13 (a) or 9.13 (b) (or more frequent, at the Licensee's sole discretion) and shall include closure and post-closure costs in all areas subject to the portions of the facility herein licensed.
- 9.12 Annually, by March 1, the Licensee shall submit proposed closure and post-closure costs in a Surety Report, upon which financial assurance amounts are based, including costs of potential remediation at the licensed facility, as if accomplished by a third party contractor, for completion of a Director-approved reclamation/decommissioning plan of the Licensee's licensed grounds, equipment and facilities including above-ground decommissioning and decontamination, soil and water sample analyses and groundwater restoration associated with the site, as warranted.
- 9.13 At its election, the Licensee's annual proposed closure and post-closure costs shall be based on either:
- a) a proposed annual cost estimate using unit rates from the current edition of RS Means Facilities Construction Cost Data and other site-specific processes, indirect costs based on the sum of applicable direct costs in accordance with the indirect cost multipliers in Table 9.13A or others mutually agreed to by the Licensee and the Director; or

Table 9.13A

Description	Percentage
Working Conditions	5.5%
Mobilization / Demobilization	4.0%
Contingency	11.0%
Engineering and Redesign	2.25%
Overhead and Profit	19.0%
Management Fee and Legal Expenses	4.0%
DEQ Oversight	4.0%

- b) an initial financial assurance determination and for each financial assurance determination every five years thereafter, a proposed competitive site-specific estimate for closure and post-closure care of the licensed facility shall be used; and for each year between this financial assurance determination, a proposed financial assurance estimate that accounts for current site conditions and that includes an annual inflation adjustment to the financial assurance determination using the Gross Domestic Product Implicit Price Deflator of the Bureau of Economic Analysis, United States Department of Commerce, calculated by dividing the latest annual deflator by the deflator for the previous year shall be used.

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- 9.14 The annual Surety Report shall be prepared under the direct supervision of and be certified by a professional with at least five years of construction cost estimation experience, who bears the seal of either a Professional Engineer or Professional Geologist currently licensed by the State of Utah. The Licensee shall provide the Surety Report in both paper and electronic formats. Within 60 days of the Director's approval of the Surety Report, the Licensee shall submit written evidence that the surety instruments have been adequately funded. The currently-approved Surety Report and instrument(s) shall be maintained as a Surety Appendix to the License.
- 9.15 The combined annual surety is \$82,460,030.51 with the 11e.(2) subtotal of \$10,805,563.27 as approved in the Director's letter dated June 23, 2020.
- 9.16 The Licensee shall require a radiation work permit (RWP) for work where the potential for significant exposure to radioactive materials exists and for which no SOP exists. Each RWP shall contain the information specified in Regulatory Guide 8.31, as amended.
- 9.17 The RSO, or designee, qualified by way of special radiation protection training equivalent to that required for the RSO as defined in License Condition 9.8, shall indicate by signature, the review and approval of each RWP, prior to the initiation of the work.
- 9.18 The Licensee shall provide SOPs for controlling internal contamination of workers from dust inhalation, which shall include the use of dust suppressants (c.g., magnesium chloride or water) on all operational roads, as necessary.
- 9.19 The Licensee shall have qualified individuals, designated by the RSO and Manager, Health and Safety, perform quantitative respirator fit tests on all employees required to wear respirators prior to the initial use of a respirator and annually thereafter. During the annual fit test, the qualified individual performing the test shall ensure that the employee is correctly performing negative pressure fit checks and shall instruct the employee that the fit test is to be performed each time a respirator is donned and prior to entering an area where respirators are required. The Licensee shall follow the guidance provided in the NRC Regulatory Guide 8.15 "Acceptable Programs for Respiratory Protection" as amended.
- 9.20 The Licensee shall complete "as built drawings" of the facility on an annual basis. The as built drawings shall be certified by a professional engineer.
- 9.21 The Licensee shall provide for an independent internal audit of facility operations to ensure compliance with applicable regulations and license conditions. The independent internal audit shall be conducted annually by a qualified health physicist knowledgeable of operations concerning radiation protection programs at milling/waste disposal facilities. The contractor report shall be submitted to the Director as part of the 11e.(2) Annual Report.
- 9.22 The operational environmental monitoring program shall be conducted in accordance with the current Environmental Monitoring Plan approved by the Director.

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SECTION 10.0. OPERATIONAL CONTROLS, LIMITS AND RESTRICTIONS

- 10.1 The Licensee shall restrict eating and drinking to the administrative offices and enclosed lunch areas that are separated from the disposal areas. With the exception of drinking from closeable containers, there shall be no eating, drinking, smoking, defecating or urinating in the restricted areas at any time.
- 10.2 The Licensee shall analyze and adequately characterize all incoming waste to identify any new hazardous constituents not listed in the Waste Characterization Plan referenced in Condition 58 of Radioactive Material License UT 2300249. The Licensee shall develop, implement and comply with methodologies and procedures for systematic characterization and analysis of the incoming waste so that any new hazardous constituents are identified. The Licensee shall assume that the baseline background concentrations for any new constituents are at their detection levels, unless the Licensee demonstrates to the Director's satisfaction that the constituents will not reach the water table in one year and proceeds to establish background based on direct monitoring of these constituents in the Point of Compliance (POC) wells for one full year.
- 10.3 The following key radon attenuation model parameter values shall be used during placement to verify that the values used in the Licensee's model (see Licensee's correspondence to the NRC dated August 30, 2000 and to the DRC dated October 31, 2007) have been achieved: (1) dry density and (2) moisture content (percent by dry weight) of the placed compacted radon barrier material and the upper ten feet of 11e.(2) byproduct material. Average values for each parameter by lift, for the upper ten feet of the 11e.(2) embankment only, per year shall be calculated and submitted to the Director in the 11e.(2) Annual Report.
- 10.4 The distribution of the Ra-226 and Th-230 concentrations in the 11e.(2) byproduct material in the upper 3.3 meters (10 feet) of the contaminated material shall be used to verify that the concentration in any lift does not exceed the values used in the radon attenuation model. The Licensee shall measure the Ra-226 and Th-230 concentrations using standard analytical procedures for every 2500 cubic yards of material placed for compaction and at least once per lift for lifts smaller than 2500 cubic yards. This sampling may be performed from the waste container/conveyance at receipt or on the lift during waste placement. In the case where sampling will be performed from the waste container/conveyance, proper tracking shall be performed to accurately identify disposal location (or lift number). In the case where sampling will be performed at the disposal lift, each sample shall be a composite sample consisting of ten aliquots from random locations on the lift. The data shall include the elevation (or lift number) of the sample location. The results shall be presented as average values for each lift and submitted to the Director in the 11e.(2) Annual Report.
- 10.5 The Licensee shall assume full responsibility for remediation of any groundwater contamination caused by hazardous constituents originating from the 11e.(2) disposal facility that have been detected at the Point of Compliance (POC) wells in concentrations exceeding the limits specified in Tables 1-C and 1-D of the Groundwater Discharge Quality Permit UGW450005. It shall be

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assumed that the 11e.(2) disposal facility is the source of all of the hazardous constituents detected in the POC wells, unless it can be demonstrated to the Director's satisfaction that the 11e.(2) facility is not the source of those constituents.

- 10.6 The Licensee shall undertake corrective action to clean up groundwater contamination if and when required, but no later than 18 months from the date when exceedance of a standard has first been discovered and without taking credit for any delays caused by disagreements as to the source of contamination. The Licensee shall consider and evaluate existing and new groundwater clean-up technologies before selecting and implementing an appropriate clean-up program.
- 10.7 The Licensee shall continue groundwater and land surface monitoring at all POC locations throughout the post closure period until the disposal facility is transferred to long-term government custody.
- 10.8 The Licensee shall implement the quality assurance plan as provided in the license application.
- 10.9 The Licensee shall, prior to managing waste for disposal, determine the presence of free liquids as described in Section IV of the Waste Characterization Plan referenced in Condition 58 of Radioactive Material License UT2300249. Solid waste received for disposal shall contain as little free standing and non-corrosive liquid as reasonably achievable, but shall contain no more free liquids than one percent of the volume of the waste.
- 10.10 The Licensee shall not accept any waste containing free liquid for disposal. Solid waste received and containing unexpected aqueous free liquids in excess of 1% by volume shall have the liquid removed and placed in the evaporation ponds or the liquids shall be solidified prior to its management.
- 10.11 Unexpected non-aqueous free liquids less than 1% of the volume of the waste within the container shall be solidified prior to disposal.
- 10.12 Should shipments arrive with greater than 1% unexpected free liquids (total of aqueous and non-aqueous), the Licensee shall notify the Director within 24 hours that the shipments failed the requirements for acceptance and shall be managed in accordance with the Waste Characterization Plan as referenced in Condition 58 of Radioactive Materials License UT2300249.
- 10.13 The Licensee shall, upon arrival of waste, perform external exposure rate measurements of the waste conveyances. Any shipment with exposure rates greater than five mrem per hour at a distance of 30 cm from any surface and which cannot be disposed of within 24 hours, shall be posted as a Radiation Area in compliance with R313-15-901, R313-15-902 and R313-15-903 [10 CFR 20.1902(a) incorporated by reference] until disposed.
- 10.14 The Licensee shall operate the facility in compliance with the following specifications:

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- a) The maximum bulk mass of waste disposed of annually shall not exceed 4.536×10^5 tonnes (5×10^5 tons) or ($3.82 \times 10^5 \text{ m}^3$) or ($4.00 \times 10^5 \text{ yd}^3$).
- b) The open cell area shall not exceed $78,038.55 \text{ m}^2$, $93,333.33 \text{ yd}^2$, $840,000 \text{ ft}^2$ or 19.28 acres.
- c) The total embankment capacity shall not exceed $1,245,655 \text{ m}^3$ ($1,629,255 \text{ yd}^3$).
- d) The maximum volume of waste that may be stored as in-cell bulk storage on site prior to disposal shall not exceed $10,000 \text{ yd}^3$ or ($7,645.55 \text{ m}^3$) at any one time.
- e) Waste with an average concentration above 4,000 pCi/g for natural uranium or for any radionuclide in the radium-226 series; or above 60,000 pCi/g for thorium-230; or above 6,000 pCi/g for any radionuclide in the thorium series in any truckload or railcar shall not be accepted.
- 10.15 The Licensee shall maintain the detailed documents demonstrating compliance with the specifications in License Condition 10.16 on-site and shall summarize the data in Condition 10.17 and Condition 10.18. This information shall be submitted to the Director in the 11e.(2) Annual Report.
- 10.16 The minimum compacted radon barrier thickness placed in accordance with the specifications authorized in the LLRW and 11e.(2) Construction Quality Assurance / Quality Control Manual, as revised (CQA/QC Manual) shall be 4.0 ft. on the top and 3.5 ft. on the side of the disposal cell. CLSM shall not be used in the upper ten feet of the 11e.(2) embankment.
- 10.17 At the end of every calendar year, the Licensee shall ensure that the cumulative average activity concentration of waste placed within the upper three feet of disposed waste does not exceed 300 pCi/g of Ra-226 or 900 pCi/g of Th-230, and within the next seven feet does not exceed 500 pCi/g Ra-226 or 1500 pCi/g of Th-230. When both radionuclides are present, the unity rule defined below shall apply to ensure that the Ra-226 limit is not exceeded within 1000 years.
- $$\text{Activity of Th-230 (pCi/g)/X} + \text{Activity of Ra-226 (pCi)/Y} < \text{or} = 1$$
- Where:
- X = 900 pCi/g in the upper three feet and 1500 pCi/g in the next seven feet of waste, and
- Y = 300 pCi/g in the upper three feet and 500 pCi/gm in the next seven feet of waste
- 10.18 The cumulative average densities of the waste in the upper ten feet of the 11e.(2) embankment and of the compacted radon barrier placed shall not be less than 1.5 g/cm^3 for either.

SECTION 11. INSPECTION, MONITORING AND RECORDING REQUIREMENTS

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- 11.1 The Licensee shall fulfill and comply with all conditions and all compliance schedules stipulated in the Ground Water Discharge Permit, number UGW 450005, issued by the Director, as amended.
- 11.2 The Licensee shall require that the RSO and the Engineering Director or designee perform and document joint inspections of all work areas at least quarterly. The Licensee shall correct any deficiency noted during the inspection within seven working days. The results of the inspections and any necessary corrective actions shall be submitted to the Director in the 11e.(2) Annual Report.
- 11.3 The Licensee is granted an exemption from R313-15-201(4) and R313-15-302(2) and is authorized to use Annual Limit on Intake (ALI) and Derived Air Concentration (DAC) values based on dose coefficients adopted by the International Commission on Radiological Protection (ICRP) and published in ICRP publication No. 68 and adult dose factors published in ICRP publication No. 72, as required to demonstrate compliance with the requirements of Subpart C and Subpart D of 10 CFR 20 (UAC R313-15).
- 11.4 The Licensee shall conduct an analysis to assess the need to characterize the basal aquifer.

SECTION 12. REPORTING REQUIREMENTS

- 12.1 The Licensee shall perform an annual ALARA audit of the radiation safety program which shall be led by the RSO or designee, qualified by way of specialized radiation protection training equivalent to that required for the RSO as defined in License Condition 9.8, in accordance with Section 2.3.3 of NRC Regulatory Guide 8.31, as amended. A report of this audit shall be submitted to the Director in the 11e.(2) Annual Report. The report shall include detailed summaries of the analytical results of the radiological surveys. In order to evaluate the ALARA objective, the Licensee shall, at a minimum, review the following records:
- a) Bioassay results including any actions taken when the results exceed established action levels as referenced in the NRC Regulatory Guide 8.9, "Acceptable Concepts, Models, Equations, and Assumptions For A Bioassay Program" as amended.
 - b) Records of external and internal exposure.
 - c) Safety meeting minutes, attendance records, and training program records.
 - d) Daily inspection log entries and summary reports of the annual review.
 - e) Radiological survey and monitoring data, as well as environmental radiological effluent and monitoring data.
 - f) Surveys required by radiation work permits.
 - g) Reports on overexposure submitted to the Director and previously submitted to the NRC.
 - h) Reviews of operating and monitoring procedures completed during the period.

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- 12.2 The ALARA audit shall also address any statistically significant trends in personnel exposures for identifiable categories of workers and types of activities, any trends in radiological effluent data and the performance of exposure and effluent control equipment as well as its utilization, maintenance and inspection history. Any recommendations to further reduce personnel exposures or environmental releases of uranium or radon and radon progeny shall be included in the report.
- 12.3 The Licensee shall conduct an annual land use survey for a five km radius around the site. The purpose is to assess population growth or industry growth in the immediate vicinity of the Clive facility and provide an inventory of domestic and agricultural wells within the survey area. The Licensee shall document this survey in the 11e.(2) Annual Report submitted to the Director.
- 12.4 The Licensee shall orally notify the Director within 24 hours and by submitting a letter within seven days of any waste shipment where a violation of applicable regulations or license conditions occurs. For example:
- a) Free liquids and leaking shipment discrepancy notifications made in accordance with applicable provisions of the Waste Characterization Plan as referenced in Condition 58 of Radioactive Materials License UT2300249.
- 12.5 Shipment discrepancies not addressed by the Waste Characterization Plan shall be noted on the manifest and the manifest retained on site for Division review.
- 12.6 The Licensee shall, unless otherwise specified, include in 11e.(2) the Annual Report submitted to the Director:
- a) The annual reporting requirements as specified in the license conditions;
 - b) The results of calibration of equipment;
 - c) Reports on audits and inspections completed during the year;
 - d) The results of all meetings and training courses required by this license; and
 - e) Any other significant subsequent information, reviews, investigations and corrective actions. Unless otherwise specified by rule, all such documentation shall be maintained at the site and corporate headquarters for a period of at least five years.
- 12.7 The Licensee shall, at least three months prior to license termination, submit to the Director a report which demonstrates the site has met all applicable provisions for license termination and transfer of the facility to the government for long-term custody in accordance with R313-24-4 (10 CFR Part 40, Appendix A, Criterion 11 incorporated by reference). Specifically, the Licensee shall document that:

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- a) The concentrations of all of the listed hazardous constituents at the POC are within their designated concentration limits (standards);
- b) If a corrective action program was implemented, that the hazardous constituents contaminating the groundwater were returned to their designated limits; and
- c) The facility has been properly decontaminated and decommissioned in accordance with the decontamination and decommissioning plan proposed by the applicant in the license application and approved by the Director. The license termination shall not occur until the Licensee has demonstrated that these actions have been completed.

12.8 The Licensee shall immediately report to the Director:

- a) Any failure of the 11e.(2) byproduct material disposal cell that results in a release of waste into unrestricted areas; or
- b) Any unusual conditions that, if not corrected, could indicate the potential or lead to the failure of the system and result in a release of waste into an unrestricted area.

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Douglas J. Hansen, Director

3-15-2022

Date

