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ENERGYSOLUTIONS

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

Subject: **Federal Cell Facility Radioactive Material License Application
Groundwater Quality Discharge Permit UGW450005 Modification Request**

Mr. Howard:

In response to pre-file comments received from the LLRW Section Manager of the Division of Waste Management and Radiation Control,¹ EnergySolutions herein formally submits for official consideration a Radioactive Material License Application for a proposed Federal Cell Facility (Application) to authorize EnergySolutions to construct a federal cell for the permanent disposal of concentrated depleted uranium from the U.S. Department of Energy. Application revisions in response to comments from the Section Manager Director are herein summarized. Additional interrogatories were also received from the LLRW Section Manager regarding the performance of the cover system design for the proposed Federal Cell,² the Basal-Depth Aquifer Study of October 2020³ and long-term the stability⁴ of the proposed Federal Cell (also summarized here and specifically addressed in the Application).

1) **Division's Comments on General Facility Description (Section 1.2):**

- a. **Comment 1:** *Following the guidance in the SRP 1.2, NUREG-1200, the general descriptions of the facility should be cross-referenced to the more detailed descriptions elsewhere in the application.*

EnergySolutions' Response: Cross references to more detailed facility descriptions are presented in Tables 1-1 and 1-2.

- b. **Comment 2:** *Section 1.2 states, "A current site layout is provided in Figure 1-4, including the location of the Federal Cell Facility in relation to other site*

¹ Willoughby O.H. "Utah Radioactive Material License Application for a Federal Cell Facility" Letter from the Division of Waste Management and Radiation Control to Vern Rogers of EnergySolutions. February 11, 2021.

² Willoughby O.H. "Comments on EnergySolutions Cover System Described in the DU PA, Draft Federal Cell License application." Letter from the Division of Waste Management and Radiation Control to Vern Rogers of EnergySolutions. December 3, 2020.

³ Willoughby O.H. "Interrogatories for Basal-Depth Aquifer System Study Submitted October 3, 2020." Letter from the Division of Waste Management and Radiation Control to Vern Rogers of EnergySolutions. January 15, 2021.

⁴ Willoughby O.H. "Technical Report" Letter from the Division of Waste Management and Radiation Control to Vern Rogers of EnergySolutions. January 28, 2021.

facilities.” The Federal Cell Facility is not specifically identified on the site layout, as is the CAW Facility. Although the application states that the Federal Cell Facility is conceptually the same as the previously approved CAW embankment except for a smaller footprint and height, the site layout should identify the Federal Cell Facility per Section 1.2 of Areas of Review in the SRP. At a minimum, Section 1.2 of the application should state, “...including the location of the Federal Cell Facility, conceptually shown as the Class A West Embankment, in relation to other site facilities.”

EnergySolutions’ Response: Figure 1-4 and the Applicable references in Section 1.2 have been updated, as requested.

2) Division’s Comments on Schedules (Section 1.3):

- a. **Comment 1:** *This section states: “closure of the Federal Cell Facility will take place during normal operations. As fill and waste are placed in the Federal Cell Facility Director-approved design height, these areas will be covered to meet final design specifications before being closed. Prior to final cover construction, closure activities will include settlement monitoring, as required by the CQA/QC Manual.” If this Application is approved by the Director, the Unit 3 material used to provide the design specification thickness would need to be clean fill, since EnergySolutions would only be allowed to dispose of DU waste in the Federal Cell. That is, under this Application, non-DU Class A waste could not be used to fill the space between the top of the DU and the bottom of the ET cover.*

EnergySolutions’ Response: The narrative in Application Section 1.3 has been limited to placement of concentrated depleted uranium, below grade backfilling with controlled low-strength material and placement of approved fill to the licensed design height of the Federal Cell Facility.

- b. **Comment 2:** *General personnel requirements and/or resource commitments as they relate to major work steps (e.g., construction, operation, closure activities) are not mentioned or referenced per SRP Section 2, Areas of Review.*

EnergySolutions’ Response: A description of the personnel and resource requirements to support Federal Cell Facility construction have been added to the narrative in Application Section 1.3.

3) Division’s Comments on Institutional Information (Section 1.4):

- a. **Comment 1:** *This section states: “EnergySolutions and DOE entered into an Agreement that establishes covenants and restrictions related to DOE long-term stewardship of the Federal Cell Facility. EnergySolutions and the State of Utah are negotiating a similar agreement (see Appendix C). This Agreement*

contemplates transfer of ownership of the closed Federal Cell Facility (including land and disposed waste) from EnergySolutions to DOE for long-term maintenance and monitoring.” However, Appendix C states, “This Real Estate Transfer Agreement (Agreement or Transfer Agreement) for the Federal Cell (FC) between EnergySolutions, LLC (EnergySolutions) and the U.S. Department of Energy (DOE or Department) documents the terms and conditions upon which EnergySolutions will transfer real property to the DOE at no cost, estimated to be in the year 2075 or later. The State of Utah is not a party to this Agreement.” It appears that stating a similar agreement with the State of Utah is being negotiated contradicts Appendix C, which states the State of Utah is not a party to this Agreement (i.e., transfer of real property to DOE).

EnergySolutions’ Response: The narrative in Section 1.4 of the Application has been revised to reflect the agreement executed between DOE and EnergySolutions.

4) Division’s Comments on Conformance to Regulatory Guides (Section 1.6):

- a. **Comment 1:** *Consider adding NUREG-1388, “Environmental Monitoring of Low-Level Radioactive Waste Disposal Facility” to the list of regulatory guides applicable to operations.*

EnergySolutions’ Response: The requested reference has been added to Section 1.6 of the Application.

5) Division’s Comments on Conformance to Summary of Principle Review Matters (Section 1.7):

- a. **Comment 1:** *This section states: “EnergySolutions requests the Director issue a new Radioactive Material License to authorize management and disposal of concentrated depleted uranium in a Federal Cell Facility.” This does not agree with the Appendix A Proposed Radioactive Material License for the Federal Cell Facility, Section 9.A that requests authorization to dispose of “radioactive material as naturally occurring, and accelerator produced material (NARM) and concentrated depleted uranium radioactive waste”. Please clarify; also see Appendix A comments.*

EnergySolutions’ Response: See the responses to the Division’s comments related to revision of Appendix A.

6) **Division's Comments on Site Location and Description (Section 2.1.1):**

- a. **Comment 1:** *Reference is made to "UDRC, 2012", but "UDRC, 2012" is not provided in Section 11, References. Should "UDRC, 2012" be "UDNR, 2012"? Note: this comment applies to the entire Application, which contains a total of 52 references to "UDCR, 2012," not just Section 2.1.1.*

EnergySolutions' Response: The reference in Section 12 (prior renumbered as Section 11) of the Application has been corrected.

7) **Division's Comments on the Basal-Depth Groundwater (Section 2.4.2):**

- a. **Comment 1:** *Regarding the quoted paragraph, please indicate which of the Division Director's requirements, as outlined in the listed rules and as specifically requested by the Director and referenced in the study Plan, have already been met, and which requirements still need to be met, and explain why.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- b. **Comment 2:** *Please (i) provide an update on plans to obtain this missing information and subsequently report it to the Division, or (ii) justify the absence of the missing information despite having indicated previously in the Plan that EnergySolutions would obtain and report this information.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- c. **Comment 3.1:** *For depths down to 275 ft bgs, which conceptual model, if either, appears to be correct? Please provide justification for your answer.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- d. **Comment 3.2:** *Neptune's conceptual model (Neptune, 2015b) describes a single deep aquifer at depths beyond 275 ft bgs. Stantec (2020b) describes two aquitards, as well as a leaky aquifer, in this depth range. Which description is correct?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- e. **Comment 3.3:** *Please represent the correct types and locations of all aquifers and aquitards in a revised Figure 3 for the Report.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- f. **Comment 4.1:** *The calculations for hydraulic gradient in Table 3-4 appear to have been done differently, using instead the freshwater mid-screen interval, corrected for buoyancy. Please clarify what was done for what purpose, and justify why.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- g. **Comment 4.2:** *The text refers to mid-points of the saturated zone elevations, whereas Table 3-3 gives the mid-points of the filter pack elevations as well as the mid-points of the saturated zone elevations, and the calculations in Table 3-4 are based on the mid-screen elevations. Why?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- h. **Comment 4.3:** *It appears that some part of each range of what are called the buoyancy-corrected vertical gradients associated with the shallow aquifer well (I-1-30) indicate downward flow to any of the wells in what Neptune (2015) has called the deep aquifer (i.e., I-1-50, I-1-100, and I-1-700). This is because some part of each range has negative values, which, according to the Stantec (2020b) sign convention, represents downward flow. Is this also how EnergySolutions interprets this?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- i. **Comment 4.4:** *Looking at Table 3-4, for the well pair I-1-30 and I-1-700, how does the sum of 0.041, the freshwater mid-screen gradient, and 0.040, the buoyancy correction, supposedly equal 0.002?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- j. **Comment 4.5:** *What is the overall range of vertical gradients calculated for the well pair I-1-30 and I-1-700, when accounting for well geometry and water level elevations, as indicated in the last column of Table 3-4? Do the negative values given for some of these data combinations indicate (according to the Stantec convention) the possibility of downward flow?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- k. **Comment 4.6:** *What is the overall calculated range of corrected vertical gradients for the well pair consisting of I-1-50 and I-1-100? Do the negative values given for each of these data combinations indicate (according to the Stantec convention) downward flow?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- l. **Comment 4.7:** *Please look at density and specific gravity values found in Neptune (2015) and indicate based on this much-larger sample what fraction of the calculated flow-direction values would indicate upward flow, and what fraction would indicate downward flow for each specific-gravity value in the range for each aquifer.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- m. **Comment 4.8:** *Please justify, if possible, why it would be valid to do what Stantec (2020b) has done, i.e., apply an analytical model designed for homogeneous conditions to the heterogeneous site at Clive, where aquitards are known to exist between aquifers.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- n. **Comment 4.9:** *Table 3-4 shows that for the I-1-30 and I-1-700 pair, the buoyancy corrected vertical gradient range varies from -0.002 to 0.005. The lower part of this range, i.e., from -0.002 to slightly below zero, represents downward flow, based on the Stantec (2020b) sign convention. Why is Stantec not using the values in the negative range?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- o. **Comment 5:** *Does a lack of discernible drawdown response in Well I-1-30 throughout the pumping test show limited hydraulic connection between Well I-1-700 and Well I-1-30 over the duration of the pumping test or for all time?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- p. **Comment 6:** *Is there a reason why EnergySolutions would continue to choose to conduct the analysis using a value of 325 feet?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- q. **Comment 7:** *Please justify use of the Hantush (1960) method in the Report without utilizing data from an observation well or a piezometer.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- r. **Comment 8:** *Please justify implementation of the Hantush (1960) method of analysis for analyzing drawdown test data in Well I-1-700.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- s. **Comment 9:** *Please justify the lack of use of drawdown data from the aquitard when implementing the Neuman and Witherspoon (1969b) method..*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- t. **Comment 10:** *Please justify why the values of any of the parameters in Table 3-5 should be considered accurate, or even approximate.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- u. **Comment 11:** *Please justify presenting a low storativity value.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- v. **Comment 12:** *The assumptions required by the analysis for the confined aquifer (e.g., Cooper-Jacob method assumptions) were not met during testing. Is this not the case?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- w. **Comment 13:** *Please provide justification for the statement that "groundwater chemistry of I-1-700 is typical of deep groundwater isolated from recharge." What set of data is identified in the Report that indicates that the groundwater in the aquifer screened by I-1-700 is isolated from, or is typical of groundwater isolated from, recharge?*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- x. **Comment 14:** *This statement, which refers to "the observed most permeable zone from 325 to 355 ft bgs," seems to contradict the information in Table 3-5 indicating that the most permeable zone is the one covering a depth range of 90-100 ft bgs. Please provide justification for this statement.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- y. **Comment 15:** *Please provide justification for the assessment given that results of lab tests indicate hydraulic conductivities for samples being two to three orders of magnitude lower than aquifer-test calculated values.*

EnergySolutions' Response: Response provided in Appendix D to the Application.

- z. **Comment 16:** *The Section 4, Summary and Conclusions, states, “The vertical hydraulic gradient, calculated using fresh water equivalent heads for I-1-700 and three nested wells, indicates an upward direction of vertical groundwater flow between I-1-700 and the shallower monitoring wells at this location.” Please provide justification for this conclusion.*

EnergySolutions’ Response: Response provided in Appendix D to the Application.

- aa. **Comment 17:** *The phase “poor water quality” is subjective. It is the Division’s position that this groundwater still needs to be protected.*

EnergySolutions’ Response: Response provided in Appendix D to the Application.

- bb. **Comment 18:** *What is the evidence or justification for assuming that there is “limited connectivity between the shallow zones and the deeper basal aquifer at the Facility?” And what is the precise meaning of the term “limited” in the statement quoted above? What is the significance of the hydraulic connection that is shown to exist in the upper aquifer, owing to the measured drawdown in the groundwater observed in it during the aquifer test?*

EnergySolutions’ Response: Response provided in Appendix D to the Application.

8) Division’s Comments on Construction Considerations (Section 3.3):

- a. **Comment 1:** *Section 3.3.1 states: “it is not feasible at this time to provide a more detailed schedule for cover construction over the proposed Federal Cell Facility; nor is there a regulatory basis to require one.” (emphasis added) This is true so long as EnergySolutions does not desire to dispose of non-DU Class A waste within the Federal Cell. However, if EnergySolutions desires to dispose of non-DU Class A waste within the Federal Cell prior to cover construction, then the Director would need to approve a PA that accounted for both DU and non-DU waste.*

EnergySolutions’ Response: EnergySolutions is applying for a license to dispose of depleted uranium in a Federal Cell Facility. Anything beyond that is outside of the scope of this Application. Having been licensed for various operations over more than 30 years, EnergySolutions is well aware and has demonstrated its abilities to revise the necessary performance assessments and

amend the licenses necessary to expand disposal capacity and waste stream authorizations. Any decision by EnergySolutions' to request amendment to any Federal Cell License will be subject to business opportunities and industry factors. This comment requires no revision of the Application.

9) **Division's Comments on Erosion and Flood Control Systems (Section 3.4.4):**

- a. **Comment 1:** *Suggest characterizing the flood potential at the site in the introduction of the section per NUREG-1200, standard review plan (SRP) 3.4.4.*

EnergySolutions' Response: The discussion of flood potential in Section 3.4.4 has been expanded, as requested.

- b. **Comment 2:** *In the introduction, differentiate the use of run-on and run-off berms at the Federal Cell Facility. The Construction Quality Assurance and Quality Control (CQA/QC) Manual provides run-on and run-off control requirements during the project for both in Specifications 6 and 7, however only run-on construction requirements are referred to in the CQA/QC Manual.*

EnergySolutions' Response: The discussion of run-on and run-off controls berms has been expanded, as requested.

- c. **Comment 3:** *The CQA/QC Manual requires monthly berm inspections in accordance with Specification 8 to verify compliance with height requirements. Paragraphs 2 and 3 discuss annual inspection requirements. Suggest adding this requirement to the discussion for completeness.*

EnergySolutions' Response: The discussion of berm inspections has been added to Section 3, as requested.

- d. **Comment 4:** *The analysis needs to conclusively document how surface features have been designed to direct surface drainage away from disposal units at velocities and gradients that will not result in flooding or erosion per NUREG-1199, 3.4.4 and NUREG-1200, 4.1. The analysis refers to general engineering drawings in Appendix B, however specific drawings are not cited to show the requirements in NUREG-1199 and NUREG-1200 are being met. Provide a reference to the specific drawing(s) that provide the design details discussed in this section.*

EnergySolutions' Response: References to specific drawings that illustrate the surface features that serve to direct surface drainage away from the disposal embankments have been added to the Section, as requested.

- e. **Comment 5:** *Table 3-1, “Pertinent Characteristics of the Principal Design Features” referenced in the last paragraph of this section is not provided in this application.*

EnergySolutions’ Response: The reference has been corrected, as requested.

10) Division’s Comments on Waste Disposal Operations (Section 4.3):

- a. **Comment 1:** *In the Federal Cell, there would need to be two distinct types of waste disposal operations: 1) during the DU disposal period, when no other LLW could be disposed of and 2) after DU disposal has been completed, when the remaining volume of the embankment is filled with non-DU Class A waste. In response to DU PA Interrogatory 113, EnergySolutions stated: “Bulk Class A LLRW will be placed above the DU. It will not be placed below or between the concentrated DU. ...”. In response to Interrogatory 157, EnergySolutions stated: “EnergySolutions has committed not to dispose of any “other wastes” in the Federal Cell until a Performance Assessment can be compiled that includes both DU and other Class A wastes. Until that time, EnergySolutions will only dispose of depleted uranium waste below grade in the Federal Cell.” The EnergySolutions response to DU PA Interrogatory 166 states, “CLSM will be the fill material used in DU disposal,” not soil or debris.*

EnergySolutions’ Response: See response to comment 1 of Section 3.3.

- b. **Comment 2:** *The Application states: “Waste placement of waste that does not contain concentrated depleted uranium will be controlled according to the type of waste as defined by the CQA/QC Manual.” As per the DU PA, there can be no placement of radioactive waste “that does not contain concentrated depleted uranium” within the DU waste layer.*

EnergySolutions’ Response: See response to comment 1 of Section 3.3.

- c. **Comment 3:** *The Application states: “Debris placed with bulk soil will be distributed throughout the lift.” If debris and/or soil is used to fill the void space in the DU layer, then to comply with the DU PA, the debris/soil must be radiologically clean.*

EnergySolutions’ Response: See response to comment 1 of Section 3.3.

11) Division's Comments on Surface Drainage and Erosion Protection (Section 5.1.1):

- a. **Comment 1:** *The first paragraph identifies requirements of Utah Administrative Code (UAC) R313-25-7(7). UAC R313-25-7, General Information, does not have a subsection (7). The subsections end at (4). Revise reference accordingly.*

EnergySolutions' Response: The regulatory reference quoted in Section 5.1.1 has been corrected to UAC R313-25-8(7).

- b. **Comment 2:** *Characterize the flood potential at the site in the introduction of the section per SRP 5.1.1 and SRP 6.3.1, Section 2.1 or refer to characterization if performed in Sections 2.4.1 and/or 3.4.4. The characterization includes determination of precipitation potential, precipitation losses, runoff response characteristics of the watershed, the accumulation of flood runoff through river channels and reservoirs, the magnitude of the probable maximum flood (PMF) or project design flood (if a flood less than the PMF was used) at the site, and the critical water levels and velocity conditions at the site. Provide the probable maximum precipitation potential, and resulting runoff, for site drainage and for drainage areas adjacent to the site.*

EnergySolutions' Response: The description and impact of flooding and the PMF has been expanded in Section 5.1.1, as requested.

- c. **Comment 3:** *Provide an evaluation of possible geomorphic changes that could affect the potential for flooding and erosion at the site per SRP 6.3.1, Section 2.2. This includes: (1) types of geomorphic instability, (2) changes to, and effects associated with, flooding and flood velocities resulting from geomorphic changes, and (3) mitigative procedures to reduce or control geomorphic instability.*

EnergySolutions' Response: The description and impact of geomorphic changes that could affect flooding and erosion has been expanded in Section 5.1.1, as requested.

- d. **Comment 4:** *Provide a discussion on dam failure considerations, such as a conclusion from an existing analysis that states seismic or hydrologic events will not cause failures of upstream dams that could produce the governing flood at the site per SRP 6.3.1, Sections 2.3 and 3.2.3.*

EnergySolutions' Response: There are no dams, streams or other surface water features located upgradient of the Federal Cell Facility.

- e. **Comment 5:** *Provide information on what methods and data were used for estimating flood peaks, such as the peak discharge rates, water levels, and flood velocities, that formed the design basis for the erosion protection measures in accordance with SRP 5.1.1 and SRP 6.3.1, Section 2.4.*

EnergySolutions' Response: See the response to Comment 2 and expanded narrative in Section 5.1.1.

- f. **Comment 6:** *Per SRP 6.3.1, Sections 2.4 and 3.2.4, provide a discussion on erosion protection against the effects of flooding from nearby large streams (or indicate there are none if that is the case) and durability of the erosion protection features.*

EnergySolutions' Response: The description and impact of flooding and the protections inherent with Federal Cell Facility's erosion protection features have been expanded in Section 5.1.1, as requested.

- g. **Comment 7:** *Provide information on the monitoring and observation period of the engineered features to ensure proper functioning and no degradation per SRP 5.1.1.*

EnergySolutions' Response: The information presented in Section 5.1.1 has been expanded regarding the monitoring and observation period of the Federal Cell Facility's engineered features.

- h. **Comment 8:** *Provide information to ensure significant windblown or waterborne sedimentation will not occur based on engineering features per SRP 5.1.1.*

EnergySolutions' Response: The Clive basin is a cumulative depositional environment. The analysis in Appendix H addresses the deposition and its beneficial impact on the performance of the engineering features of the Federal Cell Facility.

- i. **Comment 9:** *Provide a discussion on the ability of the site design to meet applicable long-term stability requirements. Include the sensitivity of the site design to small increases in the peak flood magnitude (as the magnitude of the PMF is approached) and how the integrity of the site, particularly in light of the uncertainties associated with the magnitude and occurrence of rare floods, meets stability requirement per SRP 6.3.1, Section 4.3.2.*

EnergySolutions' Response: The discussion of the Federal Cell Facility design's ability to meet the applicable long-term stability requirements has been expanded in Section 5.1.1

- j. **January 2021 Letter - Comment 1:** *Models of erosion of rock-armored side slopes on a similar analog embankment show erosion as deep as 23 feet in 1,000 years. This apparent outcome needs to be addressed to show stability of erosion protection for the appropriate period of time.*

EnergySolutions' Response: The discussion of the Federal Cell Facility design's ability to meet the applicable long-term stability requirements has been expanded in Appendices K, M and N.

- k. **January 2021 Letter - Comment 1.1:** *The DU PA needs to account for degradation resulting from erosion and discontinued functioning of the engineered barriers after they have been in service for 500 years or more.*

EnergySolutions' Response: The discussion of the Federal Cell Facility design's ability to meet the applicable long-term stability requirements has been expanded in Appendices P and Q.

- l. **January 2021 Letter - Comment 1.2:** *The EnergySolutions/Neptune note that rip-rap is now proposed for the side slopes of the Federal Cell. EnergySolutions / Neptune need to provide quantitative analysis of the cover's long-term response to erosional forces and explain the analysis mechanistically.*

EnergySolutions' Response: The discussion of the Federal Cell Facility design's ability to meet the applicable long-term stability requirements has been expanded in Appendices P and Q.

- m. **January 2021 Letter - Comment 1.3:** *Erosion modeling for the new hybrid cover must be performed.*

EnergySolutions' Response: The discussion of the Federal Cell Facility design's ability to meet the applicable long-term stability requirements has been expanded in Appendices P and Q.

- n. **January 2021 Letter - Comment 1.4:** *The following discrepancy needs to be clarified. Section 2.0 states the ditch length along each side of the Federal Cell Facility is 30.6 feet farther than what is described in Figure D-1. The Section 3.0, Storm Events, references are not provided. The Drainage Areas drawings were not available. In Section 4.1, Table 7, there is no reference for the Cover Test Cell (CTC) Run-Off Coefficient Data. In Section 5.1.1, there is not enough information to determine how the rainfall intensity was determined and extrapolated for 105.8 minutes. The calculated peak flow rates for the 25-year and 100-year storm event could not be replicated since the rainfall intensities calculated during the review are different than what were determined in this section. The iterative process for the maximum height of water in the CAW ditch system could not be replicated. There is not enough information to determine how the rainfall intensity was determined and extrapolated for 154.4 minute..*

EnergySolutions' Response: The discussion of the Federal Cell Facility design's ability to meet the applicable long-term stability requirements has been expanded in Appendices P and Q.

12) Division's January 2012 Comments on Geotechnical Stability (Section 5.1.2):

- a. **Comment 1.4:** *A more complete description of structural design and performance is requested.*

EnergySolutions' Response: See Appendix M.

- b. **Comment 2.0:** *EnergySolutions/Neptune need to provide quantitative analysis of the long-term geotechnical stability of the disposal site along with explaining the analysis mechanistically.*

EnergySolutions' Response: See Appendix M.

- c. **Comment 2.1:** *More discussion is needed about calculating and/or estimating the long-term deep-seated slope stability of the proposed Federal Cell embankment considering the uncertainty of design assumptions.*

EnergySolutions' Response: See Appendix M.

- d. **Comment 2.2:** *More discussion and information is needed that explains how the disposal site responds in the long-term to the results from the settlement analyses of the proposed Federal Cell embankment and how the DU PA modeling has considered the uncertainties associated with geotechnical mechanisms out beyond 500 years.*

EnergySolutions' Response: See Appendix M.

- e. **Comment 2.3:** *More discussion and information are needed that explain how the disposal site might respond if ground water rises below the proposed Federal Cell embankment and how the DU PA modeling has considered the uncertainties associated with geotechnical mechanisms out beyond 500 years.*

EnergySolutions' Response: See Appendix M.

- f. **Comment 3:** *EnergySolutions/Neptune need to explain quantitatively and mechanistically how the DU PA has accounted for the potential for enhanced infiltration due to the potential erosion of the cover.*

EnergySolutions' Response: See Appendix M.

13) Division's Comments on Decontamination and Decommissioning (Section 5.2):

- a. **Comment 1:** *Bullet "a" in the second paragraph references the CQA/QC Manual for approved disposal methods for soil contaminated with depleted uranium (DU). Under Construction Activities, Item 35A, the CQA/QC Manual states, "In accordance with UAC R313-25-8, the Licensee shall not dispose of significant quantities of concentrated depleted uranium prior to the approval by the Director of the performance assessment required in UAC R313-25-8." The CQA/QC Manual does not discuss disposal methods for soil contaminated with DU during decommissioning.*

EnergySolutions' Response: A Construction Quality Assurance / Quality Control manual specific to the Federal Cell Facility (FCF CQA/QC Manual) has been added to Appendix B.

- b. **Comment 2:** *Bullet “b” in the second paragraph discusses “decontaminating any on-site support structures and contents dedicated to supporting Federal Cell Facility construction and operation.” However, there is no discussion or reference to the survey methods proposed for characterizing and identifying equipment and structures requiring decontamination to meet applicable regulatory limits and guidelines before the activities associated with dismantlement, transfer, release for unrestricted use, or disposal on-site take place per SRP 5.2, Section 3.2. In accordance with SRP 4.3.2, “importance will be placed on the sensitivity and accuracy of the survey instruments, the competency of the personnel conducting the survey, and the reasonableness of the proposed technique to accurately survey a structure or a specific piece of equipment” and should be included in this section.*

EnergySolutions’ Response: Section 5.2 has been expanded to address the survey methods proposed for characterizing and identifying equipment and structures requiring decontamination to meet applicable regulatory limits and guidelines before the activities associated with dismantlement, transfer, and release for unrestricted use or disposal on-site.

- c. **Comment 3:** *Provide a discussion or reference to information on the procedures for dismantlement of equipment or aboveground structures (10 CFR 61.62(a)) and the details of the final means of disposal per SRP 5.2, Section 3.2. In accordance with SRP 4.3.3, “The dismantlement methods are acceptable if the applicant’s proposed alternative assessments that incorporate limited cost-benefit considerations for the various methods of decontamination and decommissioning are similar to the alternative approaches recommended in NUREG/CR-0570, Vols. 1 and 2.”*

EnergySolutions’ Response: Section 5.2 has been expanded to include the procedures applicable to dismantlement of equipment of aboveground structures.

- d. **Comment 4:** *Provide an estimate of the volume activities (waste class for significant radionuclides) and a description of the anticipated waste that will be generated during decontamination and decommissioning per SRP 5.2, Section 3.2.*

EnergySolutions’ Response: The volumes of waste expected to be generated during closure of the Federal Cell Facility are included in the surety estimates for premature closure of the Cell (see Appendix R).

- e. **Comment 5:** *Provide a discussion on the procedures for processing waste generated during decontamination and decommissioning operations to provide reasonable assurance that they meet waste form, packaging, and acceptance criteria, and that the final waste disposal operations are in accordance with 10 CFR 61 and per SRP 5.2, Section 3.2. Approved disposal methods are referenced to the CQA/QC Manual; however, processing and packaging procedures are not discussed.*

EnergySolutions' Response: In addition to the specifications included in the Federal Cell Facility's CQA/QC Manual, Section 5.2 has been expanded to discuss the procedures for processing waste generated during decontamination and decommissioning operations that provide reasonable assurance that they meet waste form, packaging, and acceptance criteria, and that the final waste disposal operations are in accordance with 10 CFR 61.

- f. **Comment 6:** *Provide a discussion on the assessment of occupational exposure anticipated during decommissioning operations to determine that these levels are in accordance with applicable regulations and are as low as is reasonably achievable per SRP 5.2, Section 3.2.*

EnergySolutions' Response: The anticipated occupational exposures from closure of the Federal Cell Facility have been included in Section 5.

- g. **Comment 7:** *Provide a discussion on procedures for site surveys to ensure that fixed and removable contamination of buildings and grounds are at acceptable levels. The contamination could potentially result from: (1) surface contamination on waste packages, (2) routine release of gases and particulates from partially breached waste packages, and (3) accidental spills not completely removed per SRP 5.2, Section 3.2. In accordance with SRP 4.3.6, information should include: (1) The background characteristics of radioactivity in the soil for the significant radionuclides determined in item (3), below, should be evaluated. (2) A site map indicating soil sampling and gamma survey points on square grid locations should be provided. Each grid location should contain at least five equally spaced gamma survey measurements and soil sampling points. The grid spacing should be based on considerations of site radiological conditions, necessary adequacy of survey meter measurements, and the level of confidence necessary for required measurements. (3) Direct radiation dose rates and radionuclide concentrations should be reported for each of the locations indicated in item (2) above. Direct radiation measurements should be taken 1 meter above the ground surface. Soil samples taken for determining radionuclide concentrations should characterize the soil concentrations down to 15 centimeters.*

EnergySolutions' Response: The narrative in Section 5.2 has been amended to discuss EnergySolutions' procedures for site surveys of buildings and grounds supporting the Federal Cell Facility.

- h. **Comment 8:** *Provide a discussion on proposed limits on residual contamination and external gamma radiation levels taking into consideration the potential restrictions on land use and the estimated dose to the maximally exposed individual following decommissioning per SRP 5.2, Section 3.2.*

EnergySolutions' Response: Section 5.2 has been expanded to discuss residual contamination and external gamma radiation levels and their influence on eventual land use.

- i. **Comment 10 (comment 9 was not included in the LLRW Section Manager February 2021):** *Provide a discussion on the commitment and procedures to maintain records for transfer to the custodial agency per Section 5.2 of NUREG-1199 and SRP 5.2, Sections 3.2 and 4.4.9.*

EnergySolutions' Response: The process of transferring the Federal Cell Facility is presented in Section 10.4.

- j. **Comment 11:** *Per SRP 5.2, Section 3.2, provide a discussion or reference for the estimate of required funding for the decontamination and decommissioning activities to ensure that sufficient funds are available for closure as required by 10 CFR 61.62.*

EnergySolutions' Response: Justification for the fund amounts to support closure and post-closure of the Federal Cell Facility are included in the surety estimates for premature closure of the Cell (see Appendix R). The Director and DOE will review the sureties annually to assess their sufficiency.

14) Division's Comments on Post-Operational Environmental Monitoring and Surveillance (Section 5.3):

- a. **Comment 1:** *Paragraph 3 references R313-15-420, Table II for Rn-222 compliance with concentration limits. There is no subsection 420 in Utah Administrative Code, Rule R313-15, Standards for Protection Against Radiation. Revise accordingly.*

EnergySolutions' Response: Section 5.3 has been revised, as requested.

- b. **Comment 2:** *SRP 5.3, Section 2, Areas of Review, includes quality assurance and quality control as an evaluation aspect of the environmental monitoring program. Provide a discussion or reference on the quality assurance and quality control program included in post-operational environmental monitoring and surveillance.*

EnergySolutions' Response: Section 5.3 has been revised, as requested.

- c. **Comment 3:** *There is no discussion or reference to plans for EnergySolutions to remain at the site for the 5-year post-closure and observation period (SRP 5.3, Section 3.2.1). Suggest providing a brief discussion on the 5-year post-closure and observation period plan or reference the discussion provided in Appendix C, Long-Term Stewardship Agreement for the Federal Cell Facility.*

EnergySolutions' Response: See Appendix T and Application Section 10.

15) Division's Comments on Performance of the Cover (Section 6):

- a. **Comment 1:** *A new hybrid-cover design is proposed and included in the Federal-Cell license application. EnergySolutions and its contractor, Neptune and Company, Inc., need to submit a supplemental document that describes and justifies with supportive analysis and calculations how results from the modeling of an evapotranspiration (ET) cover as presented in Clive DU PA Model v1.4 are applicable to this new hybrid-cover design.*

EnergySolutions' Response: See Appendices P and Q.

- b. **Comment 2:** *A validation of the snowmelt algorithm utilized by HYDRUS is required and has not been presented.*

EnergySolutions' Response: See Appendices P and Q.

- c. **Comment 3:** *Provide a comparison of the engineering properties determined for the individual components of the rock-armored Cover Test Cell as studied in connection with its deconstruction to the properties used in the current model of an evapotranspiration (ET) cover system in the Clive DU PA Model v1.4.*

EnergySolutions' Response: See Appendices P and Q.

- d. **Comment 4:** *Explain why the regression model used for abstraction of HYDRUS results into the GoldSim model is insensitive to K_{sat} of the cover soils.*

EnergySolutions' Response: See Appendices P and Q.

- e. **Comment 5:** *EnergySolutions should collect and test samples of sufficiently large scale to generate appropriate saturated hydraulic conductivities and SWCC data and submit these results. If this is not possible at this stage of the project, EnergySolutions needs to incorporate the new snapshot-in-time SWCC data obtained from the recent Cover Test Cell deconstruction, at least for the radon barrier.*

EnergySolutions' Response: See Appendices P and Q.

- f. **Comment 6:** *Show that the hydraulic properties assigned to the Frost Protection Layer of the evapotranspiration cover, which were obtained from the Rosetta database, are representative of long-term conditions naturally developing at the Clive site. Compare the hydraulic properties assigned to the Frost Protection Layer with the measured and/or described properties of the Sacrificial Soil Layer from the Cover Test Cell deconstruction.*

EnergySolutions' Response: See Appendices P and Q.

- g. **Comment 7:** *Document and explain mechanistically why the water content below the Evaporative Zone appears insensitive to meteorological conditions, based on the HYDRUS simulation outputs. Document and explain what is / are the controlling mechanism(s) responsible for the apparent lack of flow across these interfaces, and how will these mechanisms be maintained or remain operative throughout the required service life and the compliance period associated with the cover.*

EnergySolutions' Response: See Appendices P and Q.

- h. **Comment 8:** *Provide annual water balance graphs over a 10-year period for each of the model layers, in addition to water balance graphs provided earlier.*

EnergySolutions' Response: See Appendices P and Q.

- i. **Comment 9.** *Demonstrate the efficacy of the abstraction model used to determine percolation rates used in GoldSim by conducting an independent set of blind-forward simulations with HYDRUS over a broader range of conditions to represent the range of percolation rates in the abstraction model.*

EnergySolutions' Response: See Appendices P and Q.

- j. **Comment 10.** *Provide the rational basis for the appropriateness of this approach to characterize uncertainty, including appropriate documentation of supporting information from the hydrologic literature specific to unsaturated flow and vadose-zone processes.*

EnergySolutions' Response: See Appendices P and Q.

- k. **Comment 11.** *Explain mechanistically why tails of the distribution for water content predicted in GoldSim differ from those predicted by HYDRUS.*

EnergySolutions' Response: See Appendices P and Q.

- l. **Comment 12.** *Explain mechanistically why the percolation rates predicted with the original DU PA, Model v1.4, and those utilizing the 1000-year precipitation record differ.*

EnergySolutions' Response: See Appendices P and Q.

16) Division's Comments on Stability of Slopes (Section 6.3.2):

- a. **Comment 1:** *NUREG/CR-4620, also known as ORNL/TM-10067 and OSTI 5348444, is not readily available as a reference for the D15/D85 criteria discussed in this section. It is not listed or provided in the U.S. Nuclear Regulatory Commission (NRC) website's NUREG-Series publications and was not found in a search conducted in NRC's ADAMS Public Documents or Oak Ridge National Lab online library. Suggest providing this reference as an appendix and more detail regarding the D15/D85 criteria.*

EnergySolutions' Response: As suggested, NUREG/CR-4620 has been included as an appendix to the Application.

- b. **Comment 2:** *It is not clear what calculations are used to demonstrate that the filter layer underlying the side-slope riprap meets the D15/D85 criteria as concluded. Provide a title and full reference for the calculation, design, and analysis presented in detail used to support this conclusion per SRP 6.3.2, Section 2.*

EnergySolutions' Response: Gradation and rock quality are amongst several specifications dictating the process for mining, staging, sorting/processing and validation of riprap material prior to its use in construction of filter layers in embankment cover. In addition to required validation that materials gathered meet the contractually-designated specifications, the Federal Cell Facility Construction Quality Assurance / Quality Control Manual (FCF CQA/QC Manual) further requires application of ASTM D 5519, ASTM D 422, ASTM D 75, ASTM C 702, ASTM C 535, ASTM C 136 and ASTM C 131 to confirm filter materials are mined and processed to meet the necessary specifications.

- c. **Comment 3:** *Provide a discussion or reference on the provisions for quality control during construction of the Federal Cell side-slope cover to provide long-term stability with respect to minimizing potential long-term internal erosion per SRP 6.3.2, Section 2. Discuss or reference any geotechnical and geophysical investigations conducted in the vicinity of the slopes that are designated for stability analyses per SRP 6.3.2, Section 3.2.1.2.*

EnergySolutions' Response: As is demonstrated with the stable rock armored side slopes of the closed LARW embankment, final cover portions of the Class A West embankment, covered regions of the 11e.(2) cell, EnergySolutions has extensive experience in constructing stable rock armored side slope covers on embankments. Quality control that specifications created for material mining, processing, staging and placement are included in the FCF CQA/QC Manual.

- d. **Comment 4:** *Provide a reference and the values determined for the comparison of calculated interstitial velocities to permissible velocities from NUREG/CR-4620, worst case scenario.*

EnergySolutions' Response: The context surrounding the interstitial velocity analysis summarized in Appendix K has been expanded. Additionally, NUREG/CR-4620 has been included as an appendix to the Application.

- e. **Comment 5:** *Reference the calculation and/or analysis used for demonstrating the selected characteristics of the proposed riprap materials that would be placed in and used to line the Federal Cell perimeter ditches would be adequate.*

EnergySolutions' Response: The context surrounding the specification selection for clay and rock materials used in ditch construction presented in Appendix K has been expanded. Additionally, NUREG/CR-4620 has been included as an appendix to the Application.

- f. **Comment 6:** *Provide a reference for the precipitation values used in the performance assessment (PA) for the 100-year, 24-hour storm event for the normal condition and the 1-hour abnormal storm event.*

EnergySolutions' Response: References have been added, as requested

- g. **Comment 7:** *The third paragraph in this section states, "Analyses of slope stability of the Federal Cell and other disposal embankments at the Clive Facility demonstrate that all slopes will be stable in the long term." Provide a discussion on short-term stability and more detail or reference regarding the testing and soil parameters used in the stability analysis per SRP 6.3.2, Section 3.2.1.3, as well as slope characteristics, method of analysis, and liquefaction potential per SRP 6.3.2, Section 3.2.2 to support this conclusion.*

EnergySolutions' Response: Analysis of slope stability, impact of seismic events and liquefaction potential have been expanded, as requested.

- h. **Comment 8:** *Provide a discussion or reference to groundwater conditions at the site including: (1) the location of the groundwater table and the elevation range of its seasonal fluctuation in the vicinity of the slope area, (2) the presence of perched, artesian, and aquifer conditions, groundwater movement, etc. at the site location of the slopes being analyzed, (3) design water level in the vicinity of the slope area as determined by design-basis events, such as the probable maximum flood per SRP 6.3.2, Section 3.2.1.4.*

EnergySolutions' Response: The discussions of the groundwater beneath the Federal Cell Facility have been expanded. Recent annual groundwater reports have also been added as appendices to the Application.

- i. **Comment 10 (comment 9 was not included in the LLRW Section Manager February 2021):** *Provide a discussion or reference to the fill borrow material exploration program and testing per SRP 6.3.2, Section 3.2.1.5.*

EnergySolutions' Response: Validation that mined borrow materials meet their applicable specifications is addressed in the FCF CQA/QC Manual.

- j. **Comment 11:** *Provide a discussion or reference to compaction and quality control that ensures it is feasible to compact the materials to the compaction specifications per SRP 6.3.2, Section 3.2.1.6.*

EnergySolutions' Response: Validation that compaction of materials meet their applicable specifications is addressed in the FCF CQA/QC Manual. As is required with performance-critical components of the Federal Cell Facility design, EnergySolutions will demonstrate that equipment, materials and construction processes are appropriate to meet the necessary specifications through construction of test pads.

- k. **Comment 12:** *Provide a reference for the normal (static) and abnormal (seismic) condition analysis and values presented in the conclusion. The conclusion states, "The calculated minimum static factor of safety, based on use of drained shear strength values for the embankments and foundation materials, was previously determined to be greater than 1.5." SRP 6.3.2, Section 4.3.2.2 states, "The lowest factor of safety from the short-term and long-term static stability analyses under the worst combination of water levels and pore pressures should be 1.30 and 1.50, respectively." Discuss how or if the calculated static safety factor (greater than 1.5) meets the static stability criteria in SRP 6.3.2, 4.3.2.2 and clarify whether these safety factors are for short-term or long-term stability.*

EnergySolutions' Response: The analysis of static and seismic stability of the Federal Cell Facility has been expanded, as requested.

17) Division's Comments on Settlement and Subsidence (Section 6.3.3):

- a. **Comment 1:** *The CQA/QC Manual specifications are referenced for settlement prior to the final cover placement. SRP 6.3.2, Section 2, Areas of Review, indicates "areas that are potentially susceptible to long-term settlement are identified and are modeled (representative sections and design parameters) reasonably and conservatively; the uncertainties are considered and addressed appropriately in the settlement analyses; the applicant has committed to monitor*

settlement and/or subsidence and to perform remedial actions if long-term settlement should be a potential problem that would adversely affect the facility's meeting its performance objectives." The CQA/QC Manual provides the specifications to monitor and measure prior to cover placement; however, there is no discussion or information presented prior to the conclusion stating that the settlement analysis is adequate. Provide a discussion indicating the areas of review above have been evaluated.

EnergySolutions' Response: Discussion of the application of data collected from settlement monitoring analysis has been expanded, as requested.

- b. **Comment 2:** *AMEC study is referenced for demonstrating that most embankment settlement occurs during operations in the waste-placement phase. Is this the same reference provided in References, Section 12: AMEC, Report: "Geotechnical Update Report, Energy Solutions Clive Facility, Class A West Federal Cell Facility," AMEC Environment & Infrastructure, Inc., February 15, 2011. (AMEC, 2011)? Provide the complete title of the reference and how it supports this section.*

EnergySolutions' Response: The reference and discussion of its application has been expanded, as requested.

- c. **Comment 3:** *Section 6.3.3 references the conclusion of the settlement analysis for the neighboring Class A West (CAW) embankment and concludes that since the Federal Cell has identical 5H:1V side-slope inclinations yet a smaller design height, settlement would be expected to be less in the Federal Cell relative to the CAW embankment. As referenced, the CQA/QC Manual provides specifications to monitor and measure settlement prior to cover placement, however this reference does not provide the details of the method of analysis used or settlement evaluation to reach this conclusion. Information on the site characteristics, construction and operations phase data should be discussed or referenced to an analysis performed per SRP 6.3.3, Section 3.2.1 for the settlement evaluation. Also, SRP 6.3.3, Section 4.3.3 states, "A detailed discussion should be included on how the magnitudes of settlements calculated at various locations have been used to estimate the magnitudes of differential settlement (on both a short- and long-term basis) and the potential for cracking of the disposal unit excavation cover."*

EnergySolutions' Response: The discussion of the site characteristics, construction and operations phase data has been expanded to include the impact of settlements calculated at various locations are used to estimate the magnitudes of differential settlement (on both a short- and long-term basis) and the potential for cracking of the disposal unit excavation cover.

- d. **Comment 4:** *Provide a reference for the results of differential settlement discussed in the second paragraph of this section. What methodology and data were used to determine the maximum distortion amounts in the liner of the Federal Cell provided?*

EnergySolutions' Response: The discussion of how maximum distortions related to differential settlement has been expanded, as requested.

- e. **Comment 5:** *Discuss modeling of the site characteristics that was conducted for the settlement analysis per SRP 6.3.2, Section 3.2.2 and NUREG-1199, 6.3.3.*

EnergySolutions' Response: The discussion of settlement analysis has been expanded, as requested.

- f. **Comment 6:** *There is no discussion on subsidence in this section in accordance with NUREG-1199, 6.3.3. Per SRP 6.3.3, Section 3.2.3, "Are there any areas of subsidence caused by total settlement instead of areas of cracking caused by differential settlement? Is there a potential for cracking of the disposal unit excavation cover in the long term? If so, is there an estimate of the probable openings or pathways in the cover that would inhibit flow and/or infiltration of rainwater into the disposal unit excavation?"*

EnergySolutions' Response: The discussion of subsidence has been expanded, as requested.

- g. **Comment 7:** *Discuss any commitment to monitor settlement and/or subsidence and to perform remedial actions, if necessary, per SRP 6.3.3, Section 3.2.4.*

EnergySolutions' Response: Mitigating actions that EnergySolutions will take if excessive settlement is detected are included in the FCF CQA/QC Manual. Examples of application of these steps with other embankments located at the Clive site have been added to the Application.

18) Division's Comments on Premature Closure (Section 10.1):

- a. **Comment 1:** *In both NUREG-1199 and NUREG-1200, Section 10.1 is entitled "Financial Qualifications of Applicant." NUREG-1200 requires the regulator to "review the following information to ensure that it demonstrates the financial qualifications of the applicant: (1) a legal description of the applicant (individual, corporation, or public entity) (2) a description of the applicant's operations from all of its business activities, including those proposed to be conducted under the license. (3) a detailed financing plan. (4) information, if applicable, with regard to parent or holding company activities, U.S. Securities*

and Exchange Commission (SEC) forms submitted, bond ratings, or involvement in any litigation.” This information needs to be supplied by EnergySolutions in the application.

EnergySolutions’ Response: Section 10.1 has been retitled and expanded to address the information requested.

- b. **Comment 2:** *Table 10-1 states that Mobilization costs are “(included in unit costs)”. Section 10.1 states that the cost estimates were “calculated using RSMMeans reference rates.” RSMMeans (no date) states, “Equipment mobilization and demobilization costs are not included in equipment rental costs and must be considered separately.” Also, both Appendix A, Table 35 and UT 2300249, Table 73 specify the percentage of direct labor to be assigned to Mobilization / Demobilization. Please clarify.*

EnergySolutions’ Response: Table 10-1 has been revised and expanded for clarity.

- c. **Comment 3:** *The Federal Cell column of Table 10-1 includes phases such as “LLRW ... support federal cell” and “LLRW ... used for federal cell.” Does this mean that the decommissioning cost has been included with the CAW cell? If so, please explicitly state. If not, please explain.*

EnergySolutions’ Response: Utah Code §19-3-104(12)(f)(ii) allows a Licensee to determine closure and post closure costs: “(A) for an initial financial assurance determination and for each financial assurance determination every five years thereafter, a competitive site-specific bid for closure and post-closure care of the facility at least once every five years; and (B) for each year between a financial assurance determination described in Subsection (12)(f)(ii)(A), 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.” As has been the Director-approved practice since 2015, EnergySolutions commissioned a third-party entity to estimate the process and activities associated with all premature closure and post-closure activities for the Clive Disposal Facility (including the proposed Federal Cell Facility). This process included third-party calculation of direct and indirect costs and was completed in March 2021 and is currently under evaluation by the Director. The information in Section 10 has been revised to reflect the 2021 third-party comprehensive cost estimates.

- d. **Comment 4:** *On page 10-8, item 302, Contingency, states, “In accordance with EnergySolutions’ 2015 third-party surety estimate, a contractor charge of 10% of the sum of direct costs will be required as contingency for unanticipated expenses.” Appendix A, Table 35 and UT 2300249, Table 73 both specify the contingency to be 15%. Please clarify.*

EnergySolutions’ Response: Section 10 has been retitled and expanded to address the information requested.

- e. **Comment 5:** *On page 10-8, item 304, Profit and Overhead, states, “In accordance with EnergySolutions’ 2015 third-party surety estimate, a contractor charge of 15% of the sum of direct costs will be required for contractor profit and overhead expenses.” Appendix A, Table 35 and UT 2300249, Table 73 both specify the profit and overhead to be 19%. Please clarify.*

EnergySolutions’ Response: Section 10 has been retitled and expanded to address the information requested.

- f. **Comment 6:** *Page 10-10 states, “a team of one engineer and one CAD designer (utilizing AutoCAD Land Desktop or similar software) will redesign, including reviews and revisions, the premature closure embankment design within ten to twelve (10-12) working weeks.” Appendix G, item 303, Engineering and Redesign shows that a flat rate of 2.25% of the Sub-Total cost was used. Please clarify.*

EnergySolutions’ Response: Section 10 has been retitled and expanded to address the information requested.

- g. **Comment 7:** *NUREG-1199, Section 10.5 suggests that an “applicant wishing to use a ... surety bond [such as EnergySolutions] should also establish a standby trust fund.” Section 10.1 indicates that “a Standby Trust Agreement [has been] executed with Zions Bank” for the Federal Cell. No response required.*

EnergySolutions’ Response: Section 10 has been expanded to address the Standby Trust Agreements, as requested.

19) Division's Comments on Site Transition (Section 10.2):

- a. **Comment 1:** *Neither NUREG-1199 nor NUREG-1200 contain a section on site transition. Rather, EnergySolutions obtained the format and content for this section from the U.S. Department of Energy's (DOE's) "Site Transition Framework for Long-Term Surveillance and Maintenance." No response required.*

EnergySolutions' Response: EnergySolutions' agrees that no further response is required to address this comment.

- b. **Comment 2:** *As written, the fourth bullet in Section 10.2.1 is incomplete. Recommend revising it back to the DOE Framework's wording, i.e., Authorities relating to Institutional Controls are further discussed in Section 10.2.4.*

EnergySolutions' Response: The section (now labeled as 10.2.2) has been revised to mirror DOE's Transition Framework, as requested.

- c. **Comment 3:** *The fourth bullet in Section 10.2.3 indicates that there will be a time when engineering controls are no longer necessary. Since this license is for DU, what is the basis for making this determination? Also, what engineering controls are envisioned?*

EnergySolutions' Response: Section 10.2.3 has been clarified.

- d. **Comment 4:** *The fifth bullet in Section 10.2.5 needs to refer to the UDEQ license that is the subject of this application, rather than an "NRC license." As per this application, EnergySolutions will be the license holder and does not need to be identified.*

EnergySolutions' Response: Section 10.2.5 has been clarified.

- e. **Comment 5:** *Section 10.2.6, first bullet, development of this Technical Basis does not appear to be included in the Appendix G cost estimate.*

EnergySolutions' Response: Section 10.2.5 has been revised.

- f. **Comment 6:** *Section 10.2.7, fifth bullet, costs associated with the development and approval of a Facility Information and Records Transition Plan do not appear to be included in the Appendix G cost estimate.*

EnergySolutions' Response: Section 10.2.7 has been revised.

- g. **Comment 7:** *Section 10.2.8, last bullet, costs associated with public involvement do not appear to be included in the Appendix G cost estimate.*

EnergySolutions' Response: Section 10.2.8 has been revised.

- h. **Comment 8:** *In general, it appears that the bulleted items from DOE's "Site Transition Framework for Long-Term Surveillance and Maintenance" (DOE 2019) have been inserted into Section 10.2, with only a limited attempt to make them Federal Cell specific. Section 10.2 needs to be revised to ensure that all of its bullets are specific to the Federal Cell, and that the information it presents is consistent with other parts of the application, e.g., the Appendix G cost estimate.*

EnergySolutions' Response: Section 10.2.2 has been revised, as suggested.

- i. **Comment 9:** *In addition to DOE 2019, EnergySolutions needs to incorporate the ideas and information from DOE's "Process for Transition of Uranium Mill Tailings Radiation Control Act Title II Disposal Sites to the U.S. Department of Energy Office of Legacy Management for Long-Term Surveillance and Maintenance" (DOE 2016). Specifically, DOE 2016 identifies a four-track transition process: 1) Project management, 2) Regulatory closure, 3) Real property, and 4) Information management, including records and environmental and geospatial data. The individual step in each track are displayed in a flowchart, reproduced here as Figure 1. (Note: The numbers that appear in the activity boxes in Figure 1 refer to sections in DOE 2016.)*

EnergySolutions' Response: EnergySolutions appreciates the reviewers suggested reference to DOE, 2019. However, DOE-WM and DOE-LM have requested that EnergySolutions address the guidelines and requirements in their "Site Transition Framework for Long-Term Surveillance and Maintenance in Application Section 10.2.2 and not the references suggested in DOE, 2019.

- j. **Comment 10:** *Conduct a NEPA evaluation is one transition action identified in Figure 1, but not in Section 10.2 or elsewhere in the license application. Please explain why a NEPA evaluation would not be required as part of license transfer.*

EnergySolutions' Response: Section 10.2 has been expanded.

- k. **Comment 11:** *The calculated cost of routine perpetual care activities (i.e., \$770,290.82) does not include any of the Appendix A, Table 35 multipliers (see also Appendix G comments). When the Table 35 multipliers have been included, the cost increases to \$1,184,322.*

EnergySolutions' Response: The premature closure and post-closure costs included in Section 10 have been revised to reflect the third-party estimates conducted March 2021, as authorized in Utah Code §19-3-104(12)(f)(ii).

20) Division's Comments on Perpetual Care (Section 10.3):

- a. **Comment 1:** *The first three bullets of Section 10.3.1 simply repeat information from R313-25-20, the fourth and fifth bullets simply repeat information from R313-25-22, the sixth bullet repeats information from R313-25-21, and the last bullet repeats information from R313-25-23. Instead of simply repeating the regulations, this section needs to describe how EnergySolutions intends to meet these regulations at the Federal Cell.*

EnergySolutions' Response EnergySolutions has determined that perpetual care funding are not required by Utah Code §19-3-104(12)(f)(ii) and UAC R313-25-33. This section and discussion have been removed from the Application.

- b. **Comment 2:** *The reference to UAC R313-15-1008(2)(a) in the Section 10.3.2 heading is incorrect. The correct reference is UAC R313-15-1009(2)(a).*

EnergySolutions' Response: See EnergySolutions' response to comment 1 for this section.

- c. **Comment 3:** *UAC R313-15-1009(2)(a) contains nine bullets that define waste characteristics that are acceptable for disposal. Section 10.3.2 repeats four of the nine 1009(2)(a) bullets (i.e., (i), (ii), (iv), and (ix)). What was the rationale for not including the remaining five 1009(2)(a) bullets in the Federal Cell waste characteristic requirements? Also, instead of simply repeating the regulations, this section needs to describe how EnergySolutions intends to meet these regulations at the Federal Cell. The Section 10.3.2 fourth bullet indicates that EnergySolutions may need to treat the DU prior to its disposal. What capabilities are available to EnergySolutions to treat DU?*

EnergySolutions' Response: See EnergySolutions' response to comment 1 for this section.

- d. **Comment 4:** *Section 10.3.3, the evaluation of the DU PA to meet the requirements of UAC R313-25-9 is being performed under a separate effort and will not be repeated here.*

EnergySolutions' Response: See EnergySolutions' response to comment 1 for this section.

- e. **Comment 5:** *Section 10.3.4 repeats the 11 site suitability requirements contained within R313-25-24. Section 10.3.4 differs from Sections 10.3.1 and 10.3.2 in that each of the 11 Section 10.3.3 bullets contain a reference to a section elsewhere in the application where compliance with the R313-25-24 criteria is addressed. However, it is observed that in some of its criteria, R313-25-24 refers to "the performance objectives of Rule R313-25." Elsewhere, R313-25 states, "the performance objectives in Sections R313-25-20 and R313-25-21" for the General Population and for Individuals from Inadvertent Intrusion, respectively. Please explain why EnergySolutions has excluded the inadvertent intruder performance objectives from Section 10.3.4.*

EnergySolutions' Response: See EnergySolutions' response to comment 1 for this section.

- f. **Comment 6:** *Section 10.3.5 repeats the six design requirements contained within R313-25-25. Section 10.3.5 differs from Sections 10.3.1 and 10.3.2 in that the title of Section 10.3.3 contains a reference to Section 3 of the application where compliance with the six requirements are addressed. As in Section 10.3.4, when referring to the R313-25 performance objectives EnergySolutions has chosen not to include the inadvertent intruder performance objectives from R313-25-21.*

EnergySolutions' Response: See EnergySolutions' response to comment 1 for this section.

- g. **Comment 7:** *The nine bullets of Section 10.3.6 contain criteria (4) through (10) of R313-25-26. Instead of simply repeating the regulations, this section needs to describe how EnergySolutions intends to comply with the R313-25-26 regulations at the Federal Cell.*

EnergySolutions' Response: See EnergySolutions' response to comment 1 for this section.

- h. **Comment 8:** *Please explain why EnergySolutions chose not to include R313-25-26 criteria (11) "Only wastes containing or contaminated with radioactive material shall be disposed of at the disposal site."*

EnergySolutions' Response: See EnergySolutions' response to comment 1 for this section.

- i. **Comment 9:** *The three bullets of Section 10.3.7 contain the four criteria of R313-25-27. Instead of simply repeating the regulations, this section needs to describe how EnergySolutions intends to comply with the R313-25-27 regulations at the Federal Cell.*

EnergySolutions' Response: See EnergySolutions' response to comment 1 for this section.

- j. **Comment 10:** *Sections 10.3.1 to 10.3.7 repeat essentially verbatim selected portions of UAC R313-25, and in some cases refers the reader to elsewhere in the application where compliance is demonstrated. While this is good information to present, SC&A does not understand the rationale for including it in Section 10.3, which is entitled Perpetual Care. It is recommended that the information contained within Sections 10.3.1 to 10.3.7 be moved to a more appropriate location(s) within the application. For example, 1) a new section on regulatory compliance could be added, or 2) each subsection could be placed in the main section that is most applicable (e.g., Section 10.3.5 could be moved to Section 3, Section 10.3.4 could be moved to Section 2, etc.), or 3) these section could be re-located to Section 1.1 were Table 1-1 "Utah Radiation Control Rules Compliance Matrix" is presented. Also, Sections 10.3.1 to 10.3.7 are not included under the appropriate UAC rule in Table 1-1 (e.g., in Table 1-1 R313-25-26 does not include Section 10.3.6).*

EnergySolutions' Response: See EnergySolutions' response to comment 1 for this section.

- k. **Comment 11:** *The fourth sentence of the second paragraph of Section 10.3.8 states: “Class A West Facility funds for airborne dust particulate and groundwater leachate monitoring are provided for the entire Clive Disposal Complex’s licensed footprint and are not duplicated for the Federal Cell Facility.” However, Table 10-2 shows that the CAW Facility’s Perpetual Care Funds for Routine Monitoring is zero. Please explain this apparent discrepancy.*

EnergySolutions’ Response: See EnergySolutions’ response to comment 1 for this section.

- l. **Comment 12:** *The last sentence of the second paragraph of Section 10.3.8 states: “This value will be adjusted annually to reflect additional depleted uranium disposal in the Federal Cell Facility.” This statement conflicts with Table 10-2 that states that the Perpetual Care Funds for Routine Monitoring will be “adjusted annually for inflation.” Is the annual adjustment for the amount of DU or for inflation or both?*

EnergySolutions’ Response: See EnergySolutions’ response to comment 1 for this section.

- m. **Comment 13:** *The calculated cost of highly unlikely catastrophic events (i.e., \$2,383,386) does not include any of the Appendix A, Table 35 multipliers (see also Appendix G comments). When the Table 35 multipliers have been included, the cost increases to \$3,664,456.*

EnergySolutions’ Response: See EnergySolutions’ response to comment 1 for this section.

21) Division’s Comments on Annual Adjustments (Section 10.4):

- a. **Comment 1:** *NUREG-1200, SRP 10.2, Section 4.2(1) requires the regulator to “(not less than annually) ... review the adequacy of coverage, to account for variations in site conditions, inflation, and site closure and stabilization plans.” This section meets that requirement.*

EnergySolutions’ Response: EnergySolutions’ agrees that no further response is required to address this comment.

- b. **Comment 2:** *Elsewhere in Chapter 10, reference is made to Utah Code §19-3-104(12)(f)(ii) for the method to be used to perform the annual cost adjustments. It is recommended that Section 10.4 also include this information.*

EnergySolutions' Response: Reference to Utah Code 19-3-104(12) has been added to the narrative in Section 10.4.

- c. **Comment 3:** *NUREG-1199, Section 10.7 "suggests a two-step adjustment procedure because of an inherent time delay (of 9 to 18 months) that exists in the publication of a historical annual Implicit Price Deflator for Gross National Product (AIPD-GNP) by the U.S. Department of Commerce. The procedure will use both the latest published historical figure for AIPD-GNP as well as the latest forecast of AIPD-GNP." Will the NUREG-1199 suggested two-step procedure be used for the Federal Cell adjustments? If not, why not.*

EnergySolutions' Response: EnergySolutions has proposed the same method of annual inflationary adjustments for the Federal Cell Facility as the Director has accepted for the site's other annual surety revisions.

22) Division's Comments on Proposed Radioactive Material License for the Federal Cell Facility (Appendix A):

- a. **Comment 1:** *Section 6. Please delete "and naturally occurring radioactive material (NORM)."*

EnergySolutions' Response: Section 6 of the suggested Radioactive Material License in Appendix A has been revised, as requested.

- b. **Comment 2:** *Section 9.A states: "The Licensee may receive, store and dispose by land burial, radioactive material as naturally occurring, and accelerator produced material (NARM) and concentrated depleted uranium radioactive waste." Since all non-DU waste was excluded from the DU PA (i.e., Section 6 "Safety Analysis" of the Application), all reference to NARM needs to be removed from the Proposed Radioactive Material License.*

EnergySolutions' Response: Section 9.A and the remainder of the suggested Radioactive Material License in Appendix A have been revised, as requested.

23) Division's Comments on Engineering and Construction Drawings (Appendix B):

- a. **Comment 1:** *Drawings 9420-4 and 9420-7B are referenced in the application, however they are not provided as part of Appendix B.*

EnergySolutions' Response: Appendix B has been revised, as requested.

24) Division's Comments on Cover / Liner Construction Estimates (Appendix E):

- a. **Comment 1:** *The ET Cover, Surface Zone (gravel) entry needs to indicate that gravel only composes 15% of the surface zone layer.*

EnergySolutions' Response: The volume and cost estimated have been revised to reflect the proposed Federal Cell Facility's footprint and amended cover design.

- b. **Comment 2:** *The ET Cover, Surface Zone (clay/loam) entry needs to indicate that clay/loam only composes 85% of the surface zone layer.*

EnergySolutions' Response: See the response to Comment 1 of Appendix E.

- c. **Comment 3:** *The Side Slope (apply slope factor=1.0198) indicates that a slope factor of 1.0198 was applied to the side slope area. It was not.*

EnergySolutions' Response: See the response to Comment 1 of Appendix E.

- d. **Comment 4:** *For the Federal Embankment Liner - Phase 1, Total Construction Cost, 20% inflation was added instead of 2%.*

EnergySolutions' Response: See the response to Comment 1 of Appendix E.

- e. **Comment 5:** *Various Top Slope Surface Layer thicknesses are reported and used at various locations in the Application, i.e., Appendix E: 1 ft; Drawing 10014, C05: 12 inches; Table 2-4: 2 ft; Appendix F, NAC-0018_R4 (p 34): 6 inches; and Appendix F, NAC-0015_R4 (p 13): 6 inches. Also, Table 2-4 shows a Top Slope Erosion Barrier (0.5 ft) that is not shown or discussed elsewhere. Please clarify this confusion regarding the Top Slope.*

EnergySolutions' Response: See the response to Comment 1 of Appendix E.

- f. **Comment 6:** *The Cover System Cost Estimates sheet states: “Mobilization/Demobilization; (Included)” and “Contingency & Adders (40.75%).” From Appendix G, it is clear that the 40.75% does not include any allowance for Mobilization/Demobilization. Please explain how the Mobilization/Demobilization costs have been included.*

EnergySolutions’ Response: See the response to Comment 1 of Appendix E.

- g. **Comment 7:** *Some of the data provided in Appendix E is identified as being the same as data presented in Appendix G. However, the numerical values are not always the same between the two appendices for the same data. Table 2 presents a comparison of the Appendix G data used to calculate the installation of the Premature Closure (Phase 1) cover to similar data provided in Appendix E. The cells in Table 2 that show differences between the Appendix E and G data are highlighted in red.*

EnergySolutions’ Response: See the response to Comment 1 of Appendix E.

25) Division’s Comments on Financial Surety Calculations (Appendix G):

- a. **Comment 1:** *Some of the data provided in Appendix G is identified as being the same as data presented in Appendix E. However, the numerical values are not always the same between the two appendices for the same data. Table 2 presents a comparison of the Appendix G data used to calculate the installation of the Premature Closure (Phase 1) cover to similar data provided in Appendix E. The cells in Table 2 that show differences between the Appendix G and E data are highlighted in red.*

EnergySolutions’ Response: Utah Code §19-3-104(12)(f)(ii) allows a Licensee to determine closure and post closure costs: “(A) for an initial financial assurance determination and for each financial assurance determination every five years thereafter, a competitive site-specific bid for closure and post-closure care of the facility at least once every five years;” In March 2021, EnergySolutions submitted to the Director results of an analysis that was commissioned for a third-party to estimate the process and activities associated with all premature closure and post-closure activities for the Clive Disposal Facility (including the proposed Federal Cell Facility). The information in Appendices A and G have been revised to reflect the 2021 third-party comprehensive cost estimates.

- b. **Comment 2:** *Table 3 shows that the Contingency and Overhead and Profit direct labor multipliers used in Appendix G differ from those specified in both Appendix A, Table 35 and UT 2300249, Table 73. Also, Appendix G included no allowance for Mobilization/Demobilization. Please explain these differences.*

EnergySolutions' Response: See the response to Comment 1 of Appendix G.

- c. **Comment 3:** *The assumptions used to estimate item 320, Facility Stewardship Transfer, appear to be optimistic. For example, it only assumes that 2 inspectors will be involved, that implies only a single individual each from UDEQ and EnergySolutions. It seems unlikely that transfer would involve only a single individual from each organization. Also, the assumed transfer duration of 90 workdays may be too short. For example, DOE (2016, Section 3.0) states: "LM will begin the structured process to complete the real property, records, and administrative transition functions, which generally require about 2 years to complete." (emphases added) Under Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), a number of sites have been transferred to DOE's Office of Legacy Management (DOE-LM) for long-term management, maintenance, and monitoring. Based on this experience, what is the average time and effort necessary to transfer a closed and decommissioned site to DOE-LM?*

EnergySolutions' Response: To secure an April 2020 execution of the *Real Estate Transfer Agreement for the Federal Cell* by and between EnergySolutions, LLC and the U. S. Department of Energy (Appendix C), DOE mandated that Clause 6.1.7 reflect an appropriate transition time period by requiring that "...EnergySolutions shall observe, monitor, and carry out necessary maintenance and repairs at the [Federal Cell] disposal site for at least five years, prior to transfer of ownership to DOE and termination of the License by UDWMRC."

- d. **Comment 4:** *The calculated cost of item 400, Routine Perpetual Care Activities, (i.e., \$770,290.82) 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 \$1,184,322.*

EnergySolutions' Response: See the response to Comment 1 of Appendix G.

- 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 be modified and Part I.F.1.4 be added, as herein illustrated.

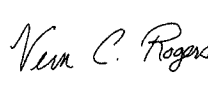
⁵ Rogers, V.C. "Radioactive Material License UT 2300478 - Groundwater Quality Discharge Permit UGW450005; Revised Amendment and Modification Request to Reduce Capacity and Disposal Footprint." (CD-2021-030) Letter from EnergySolutions to Ty Howard of the Utah Division of Waste Management and Radiation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