



State of Utah

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Department of
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Kimberly D. Shelley
Executive Director

DIVISION OF WASTE MANAGEMENT
AND RADIATION CONTROL

Douglas J. Hansen
Director

March 28, 2024

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

RE: Federal Cell Facility Application Request for Information

Dear Mr. Rogers:

The Division of Waste Management and Radiation Control (Division) hereby provides follow up Requests for Information (RFI) regarding the Federal Cell Facility Application dated August 4, 2022.

Each RFI in the attached document represents a follow up to an RFI issued earlier in the application review process. The numbering system ties the additional questions to the initial RFI with an added letter designation. When responding to an RFI, please use the assigned number representing the question.

With this round of follow up RFIs, the Division recommends that appropriate staff from the Licensee, the Division and consultants meet to discuss each matter for clarity.

Please contact Otis Willoughby at 385-622-2213 to schedule a meeting.

Sincerely,

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

(Over)

DJH/OHW/JMK/wa

Enclosure: Federal Cell Application Review, Requests for Info. or Updates to the Application (RFI)

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

Federal Cell Application Review

Request for Information or Updates to the Application (RFI)

General

- Each of the RFI's has been assigned an identifier with a numbering convention as follows-
 - Application/Appendix Section
 - Section/Appendix Subsection
 - Section/Appendix Subsubsection (when applicable)
 - Sequential numbering

Example: A question in Section 1, subsection 1, subsubsection 1 -The first RFI # would be 1.1.1-1, the next question in that section/subsection would be numbered 1.1.1-2

Please refer to the assigned RFI number when submitting a response.

Section 1: General Information

1.2.3(3)-1.a

The application and RFI response indicate regional groundwater flow was determined from groundwater levels measured within Section 32. Recently, water level measurements from Sections 30 and 31 were presented to the Division. Please use all available data to verify and update the overall site groundwater flow direction.

Additionally, the application states the direct infiltration of water into the shallow aquifer is negligible due to low precipitation and high evapotranspiration. However, Section 2.4.2 of the application states that mounding in the area has been observed and lists three anthropogenic perturbations due to infiltration of water from the ground surface. Please address the inconsistency.

Section 2: Site Characteristics

2.4.2-7.a

The groundwater characterization in this section states the confined deep aquifer begins at around 40-45 feet below ground surface and that recharge to the confined deep aquifer occurs. Please explain why an upward vertical gradient is necessary to isolate the embankment at this confined deep aquifer depth. In addition, please provide a citation confirming the characterization of the confined deep aquifer.

Appendix O: Federal Cell Facility Waste Characterization Plan

O-11.a

The RFI response did not adequately demonstrate why thermally driven flows will not be realized or important at the Federal Cell Facility, when they are considered a significant mechanism driving flow in other cover systems in the region.

Please provide an analysis of the impact of thermal flow on the annual percolation rate, using methods that have been validated based on experience in the region. This analysis should be used to draw a quantitative and specific inference regarding the impact of thermal flow on the conclusion of the DU PA v2.0 model.

O-12.a

The initial RFI requested appropriate documentation for the analysis conducted by Bingham Environmental (1991) cited in the application. The documentation is necessary to justify the hydraulic property inputs used in the unsaturated zone analysis. This justification should include an assessment of potential borrow sources and their hydraulic properties to demonstrate the containment system can be constructed as proposed in the application. Please provide detailed documentation of hydraulic properties used in the DU PA v2.0 analysis.

O-13.a

The initial RFI requested documentation regarding the assignment of unsaturated hydraulic properties in the cover analyses, including how the assignment of hydraulic properties is consistent with accepted industry standards. Additionally, the response uses data from the cover-test-cell but does not acknowledge that the cover-test-cell was unvegetated. This unvegetated condition is unlikely to persist over the intended service life of the cover for the Federal Cell Facility.

The response describes how some of the hydraulic properties used in the analysis are comparable to those recommended in NUREG/CR 7288 on the topic, notably q_s , K_s , a , and n and attempts to justify using q_r substantially greater than zero, as inherent in the Bingham data set, by stating the “effect of using a zero value for θ , is to increase the storage capacity of the soil. In addition, a zero value of θ , will also affect the water content at which percolation occurs.” This does not adequately recognize that using q_r that is too large, compresses the effective saturation in the Mualem equation that defines the unsaturated hydraulic conductivity, resulting in unsaturated hydraulic conductivities that are unrealistically low and model predictions that underestimate percolation.

The pore interaction term remains unresolved. Please address this RFI using the information provided above.

O-14.a

The initial RFI requested information regarding materials proposed for the frost protection layer, which also serves to create a capillary break. This break is critical in controlling the percolation rate and is a main driver for low percolation results in the DU PA v2.0.

The response indicated properties were estimated from publicly available databases, which are largely populated with hydraulic properties for agricultural soils. Please provide relevant data for frost protection materials intended for use at the Federal Cell Facility, and measurements of their hydraulic properties including a detailed assessment of potential borrow sources and their properties, to demonstrate the containment system can be constructed as proposed in the application.

O-17.a

The RFI response presented “a mechanistic explanation for the capillary barrier performance based on the theory of unsaturated flow” and an illustration of different soil water characteristic curves that were realizations from previous simulations, however, this does not adequately address the underlying consideration of a sensitivity analysis discussing capillary break.

When conducting the sensitivity analysis, please consider systematically varying a and n for the frost protection layer and rerunning the model in each case.

O-18.a

The response to this RFI does not adequately address the potential impacts of bioturbation and biointrusion towards the earthen covers. Please consider impacts of burrowing mammals, birds and insects simulated by varying K_s , including how mixing by bioturbation at the textural contrast forming the capillary break affect the efficacy of the capillary break and percolation through the cover.

The initial response indicated the effects of bioturbation on hydraulic performance were not explicitly modeled considering potential impact to the hydraulic properties of the Federal Cell Facility cover system. However, a broad distribution for the saturated hydraulic conductivity (K_s) of the radon barriers is used for unsaturated zone modeling.

Please justify the use of K_s in determining flow through the Federal Cell Facility cover system as it pertains to biointrusion and bioturbation.

Appendix U: Draft Memorandum of Agreement

U-2.a

In accordance with the requirements in NUREG 1200 SRP 8.7, please provide diagrams, to approximate scale, displaying the following:

- (a) location of alarm stations
- (b) location of access control points to controlled areas
- (c) location of relevant law enforcement agencies and their geographical jurisdictions
- (d) interaction of the plant operations staff with the security staff.

Please include the process for how testing and maintenance of intrusion alarms, communication equipment, other security-related equipment and passive security devices will be conducted.