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DIVISION OF WASTE MANAGEMENT
AND RADIATION CONTROL

Douglas J. Hansen
*Director*

October 27, 2022

Vern C. Rogers, Director of Regulatory Affairs
Energy*Solutions*, 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 hereby provides Requests for Information (RFI) regarding the Federal Cell Facility Application dated August 4, 2022. Each individual paragraph in the attached document is numbered and represents an issue identified in a review of the application. When responding to an RFI, please use the assigned number representing the question. The Division will track all responses and provide regular updated information to the public and reviewers.

The current review does not represent a comprehensive evaluation of the Application's merit and additional RFI's will follow where appropriate.

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

Sincerely,

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

DJH/OHW/wa

Enclosure: Request for Information or Updates to the Application (RFI) (DRC-2022-022189)

c: Jeff Coombs, EHS, Health Officer, Tooele County Health Department
Bryan Slade, Environmental Health Director, Tooele County Health Department
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# 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.**

### *Appendix Y: Occupational Dose Calculations*

- **Y-1**

Energy*Solutions* used the MicroShield computer software to determine reasonable worker doses associated with operations involving DU waste. However, eight short-lived daughter products from the decay of U-238, U-235 and Ra-226 were not included in the "DU Without Grout" MicroShield case. Uranium-238 (U-238) has two short-lived daughter products: Th-234 and Pa-234m; Th-230; Ra-226 has five short-lived daughter products: Rn-222, Po-218, Pb-214, Bi-214, and Po-214; and U-235 has one short-lived daughter product. Th-231 short-lived daughter products: Cs-137 and Sr-90 (i.e., Ba-137m and Y-90, respectively) were included. Re-analyze the "DU Without Grout" case with all the short-lived daughter products including Cs-137 and Sr-90.

- **Y-2**

In addition, the "DU With Grout" case will also need to be reanalyzed with all the short-lived daughter products from above including Cs-137 and Sr-90.

- **Y-3**

Energy*Solutions* MicroShield source term assumes that activation and fission products are present in all the DU waste (i.e., clean/unirradiated DU waste, as well as contaminated/ recycled DU waste). Appendix O, NAC-0023_R5 indicates that activation and fission products are only present in contaminated/recycle DU and that contaminated/recycled DU waste constitutes only about 3.92% of the DU waste. Provide justification for including activation and fission products in the clean/unirradiated DU waste for Appendix Y.

- **Y-4**

Energy*Solutions* used a radiation weighting factor of 20, which is recommended in International Commission on Radiological Protection (ICRP) 103 for alpha radiation, to convert from rads to rems. Although many of the DU-waste radionuclides are alpha emitters, the dose rate calculated by MicroShield is entirely due to gamma radiation. Therefore, the ICRP 103 recommended gamma (i.e., photon) radiation weighting factor of 1 needs to be used to convert to total equivalent dose equivalent (TEDE). Convert from rads to rems using the ICRP 103 recommended gamma radiation weighting factor.

When the short-lived daughter products are included and the photon radiation weighting factor are utilized, the "DU Without Grout" and "DU With Grout" occupational doses will be about 3.4 and 0.49 rem/yr, respectively.

- **Y-5**

The "DU Without Grout" occupational annual dose is expected to be greater than the EnergySolutions Administrative Control Limit of 1.5 rem/yr (FCF-RS-PG-002, Section 2.1.5). What precautions are EnergySolutions proposing to ensure that the annual occupational dose does not exceed the Administrative Control Limit?

- **Y-6**

FCF-RS-PG-001, Section 5.3.1 indicates that EnergySolutions will "Investigate all semiannual personnel radiation exposures that exceed a TEDE of 100 mrem." Since there is a high likelihood that occupational doses will exceed this level for "DU With Grout", what actions to reduce exposures will likely result from such investigations?

- **Y-7**

The DOE's Environmental Impact Statement (DU-Waste EIS) indicates that DU waste may be shipped in Bulk Bags (also referred to as Super Sacks) (DOE/EIS-0359-S1; DOE/EIS-0360-S1, Section S.7). If Bulk Bags are used, it is assumed that the worker would be exposed to a radon flux of 190 $pCi/m^2$-s, as provided in Appendix AB. Since the EPA's radon flux

limit is 20 pCi/$m^2$-s, what actions will Energy*Solutions* take to reduce FCF worker exposure to radon if DU is disposed of in Bulk Bags?

**References**:

Energy*Solutions*, 2022, "Federal Cell Facility Worker Dose Calculation," Technical Basis Document, From Vern C. Rogers, Director of Regulatory Affairs, to File, June 22.

Grove Software, Inc., 2009. *MicroShield® User's Manual*, Version 8.03.

Neptune and Company, 2021a, "Radioactive Waste Inventory for the Clive DU PA – Clive DU PA Model v2.0," NAC-0023_R5, August 2.

Neptune and Company, 2021b, "Model Parameters for the Clive DU PA – Clive DU PA Model v2.0," NAC-0026_R5, September 24.