September 8, 2010

MEMORANDUM TO: John Kinneman, Director
Division of Nuclear Materials Safety
Region I

FROM: Christepher A. McKenney, Branch Chief **/RA/**
Performance Assessment Branch
Environmental Protection
and Performance Assessment Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

SUBJECT: ACCEPTANCE OF U.S. ARMY, ABERDEEN PROVING GROUND REQUEST TO TRANSPORT DU-CONTAMINATED SOIL TO U.S. ECOLOGY IDAHO, INC. UNDER THE PROVISIONS OF 10 CFR 40.13, "UNIMPORTANT QUANTITIES OF SOURCE MATERIAL"

Region I submitted a Technical Assistance Request, dated July 12, 2010, requesting a review of a 10 CFR 40.13(a) request for soil from the Building 1103A Area of Aberdeen Proving Ground, Maryland. The Army notified the U.S. Nuclear Regulatory Commission (NRC) of its intention to transfer 305 tons of soil contaminated with depleted uranium in accordance with 10 CFR 40.13, "Unimportant Quantities of Source Material," in a letter dated May 10, 2010 (ML101340631).

NRC staff has reviewed the licensee's assumptions and calculations associated with possible risks to workers and the general public associated with the transport of the contaminated waste to U.S. Ecology Idaho, Inc. Additional scenarios not specifically analyzed by the licensee were also considered. Based on the review NRC staff determined that the parameter values used are sufficiently conservative and the resulting doses are below regulatory requirements. NRC staff concludes that, based on these analyses, the proposed action is acceptable. A detailed review is provided in the enclosed Safety Evaluation Report.

Enclosure:
Safety Evaluation Report

CONTACT: Adam Schwartzman, DWMEP/FSME
(301) 415-8172

MEMORANDUM TO: John Kinneman, Director
Division of Nuclear Materials Safety
Region I

FROM: Christepher A. McKenney, Branch Chief
Performance Assessment Branch
Environmental Protection
and Performance Assessment Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

SUBJECT: ACCEPTANCE OF U.S. ARMY, ABERDEEN PROVING GROUND REQUEST TO TRANSPORT DU-CONTAMINATED SOIL TO U.S. ECOLOGY IDAHO, INC. UNDER THE PROVISIONS OF 10 CFR 40.13, "UNIMPORTANT QUANTITIES OF SOURCE MATERIAL"

Region I submitted a Technical Assistance Request, dated July 12, 2010, requesting a review of a 10 CFR 40.13(a) request for soil from the Building 1103A Area of Aberdeen Proving Ground, Maryland. The Army notified the U.S. Nuclear Regulatory Commission (NRC) of its intention to transfer 305 tons of soil contaminated with depleted uranium in accordance with 10 CFR 40.13, "Unimportant Quantities of Source Material," in a letter dated May 10, 2010 (ML101340631).

NRC staff has reviewed the licensee's assumptions and calculations associated with possible risks to workers and the general public associated with the transport of the contaminated waste to U.S. Ecology Idaho, Inc. Additional scenarios not specifically analyzed by the licensee were also considered. Based on the review NRC staff determined that the parameter values used are sufficiently conservative and the resulting doses are below regulatory requirements. NRC staff concludes that, based on these analyses, the proposed action is acceptable. A detailed review is provided in the enclosed Safety Evaluation Report.

Enclosure:
Safety Evaluation Report

CONTACT: Adam Schwartzman, DWMEP/FSME
(301) 415-8172

ML102500437

OFC	DWMEP	DWMEP	DWMEP
NAME	ASchwartzman	TMoon	CMcKenney
DATE	09/7/10	09/8/10	09/8/10

OFFICIAL RECORD COPY

SAFETY EVALUATION REPORT
REQUEST TO TRANSFER DEPLETED URANIUM-CONTAMINATED SOILS FROM ABERDEEN PROVING GROUND TO U.S. ECOLOGY, INC., UNDER THE PROVISIONS OF 10 CFR 40.13, "UNIMPORTANT QUANTITIES OF SOURCE MATERIAL"

1.0 BACKGROUND

On May 10, 2010, the U.S. Army, Aberdeen Proving Ground (APG), Maryland provided the U.S. Nuclear Regulatory Commission (NRC) with a notice of intent to dispose of soil contaminated with low concentrations of Depleted Uranium (DU) at the U.S. Ecology Idaho (USEI) Resource Conservation and Recovery Act (RCRA) Subtitle C disposal facility in Grand View, Idaho (ML101340631). The contaminated material consists of 305 tons of contaminated soil removed from the Building 1103A Area site at APG. The Army requested confirmation from the NRC to allow the alternative disposal of the DU waste as an "unimportant quantity of source material" under the criteria discussed in 10 CFR 40.13(a).

It should be noted that USEI is permitted by the Idaho Department of Environmental Quality (IDEQ) to operate a RCRA Subtitle C facility located near Grand View, Idaho and is not a NRC licensee. However, as a matter of policy the NRC reviews the safety implications of disposing of unimportant quantities of material at sites other than Atomic Energy Act-licensed disposal facilities.

2.0 EVALUATION

The Army supplied information on the DU contents of the waste and evaluated different possible exposure scenarios for workers and members of the public. These scenarios include dose to the transportation workers, USEI workers, and post-closure dose to the general public. It should also be noted that Idaho's state RCRA permit allows the disposal of exempted radioactive material including uranium as either naturally occurring radioactive material or unimportant quantities of source material provided they meet the requirements outlined in 10 CFR 40.13(a) and can demonstrate that no individual would receive a dose in excess of 0.15 mSv/yr (15 mrem/yr) for a period of 100 years after closure of the facility.

3.0 SOURCE MATERIAL

The waste of concern consists of 305 tons of soil and building material contaminated with DU at concentrations equal to or less than the concentrations listed in Table 1.

Table 1. Concentrations of Parent Nuclides (pCi/g)

U-234	U-235	U-238
60	3	169

Enclosure

4.0 SCENARIOS

The Army performed a dose assessment for a variety of scenarios to determine the critical group associated with the transport and disposal of the contaminated soil. The Army plans to use a combination of gondola railcars and trucks to transport and dispose of the material at USEI. It is estimated that three gondola cars will be required to ship the entire 305 tons of material to USEI for disposal. Upon arrival at the Rail Transfer Facility (RTF) the material will be transferred and trucked to the disposal site. Surveys of the material will be conducted prior to removal from the rail cars and after being loaded onto the trucks for transport. Several different worker doses are calculated, including surveyors, excavator operators, truck drivers, and cell workers. Dose calculations are based on the assumption that a single operator will perform each task during the transport and disposal process. Post-closure analysis in the form of a resident farmer scenario was also included. NRC staff also evaluated the dose associated with an intruder well-drilling scenario.

5.0 RESULTS

Both Microshield and RESRAD were used, as appropriate, to evaluate each of the scenarios. Appropriate site-specific parameters and realistic exposure times were considered. Overall, the staff finds the selection of scenarios and the conservative use of site-specific parameter values to be acceptable.

External Dose

The dose to individuals involved with the transport and disposal activities were determined using Microshield. Individual dose rates were converted to an estimated dose by assuming each task required a specific amount of time and could be completed by a single worker. The calculated dose during rail transport of the material is not significant since the material is covered and the driver is a distance away from the material and not involved in the loading and unloading processes. The annual or projected dose per person for each of the individual transport and disposal tasks is presented in Table 2.

Internal Dose

Since the material being shipped to USEI will be contained in sealed shipping containers internal exposures to transport workers is considered minimal and not significant. The greatest potential of internal exposure is associated with the transport and disposal processes that will occur at the USEI RTF. An airborne dust study conducted at the RTF demonstrated respirable dust loading rates of 0.2 mg/m^3. The internal doses associated with airborne radionuclides are based on a variety of factors including the concentration of airborne radionuclides, time of exposure, and an individual's inhalation rate.

The excavator operator was identified as the maximally exposed individual at USEI for inhalation due to the constraints of his job and the need to be present during the entire process of trans-loading materials from the rail cars to the trucks. However, due to the small number of gondola cars that will require unloading and the low dust levels routinely measured at the RTF the inhalation dose calculated for the excavator operator was low (Table 3).

Table 2. External Dose Estimations for Operators and Surveyors

Function	Number of People	Dose Rate From Microshield (mrem/hr)	Time to perform task (hr)	Number of Iterations	Multiplier to equate to one gondola volume	Annual/Project Dose per person (mrem)	(mSv)
Gondola Surveyor	1	3.03E-02	0.33	3	1	3.00E-02	3.00E-04
Excavator Operator	1	2.46E-02	0.58	3	1	4.28E-02	4.28E-04
Truck Surveyor	1	3.28E-02	0.083	3	3	2.45E-02	2.45E-04
Truck Driver	1	3.28E-02	0.75	3	3	2.21E-01	2.21E-03
Cell Operator	1	2.59E-02	0.25	3	1	1.94E-02	1.94E-04

Table 3. Estimation of Inhalation Dose

	U-234	U-235	U-238
Conc. in Waste (pCi/g)	60	3	169
Inhalation Factor ($g_{inhaled}$/rc)	1.11E-04	1.11E-04	1.11E-04
Dose Conv. Factor (mrem/pCi)	1.33E-01	1.23E-01	1.18E-01
Dose/Railcar/nuclide (mrem)	8.86E-04	4.10E-05	2.21E-03
No. Railcars per year	3	3	3
Dose/Nuclide (mrem)	2.66E-03	1.23E-04	6.64E-03
Total Dose (mrem)	9.42E-03		
Total Dose (mSv)	9.42E-05		

Post Closure Dose

The USEI permit with the IDEQ requires that it demonstrate that no person will receive a dose exceeding 0.15 mSv/yr (15 mrem/yr) for 1000 years after closure of the facility. The licensee completed a post-closure dose analysis for a resident farmer scenario using RESRAD, Version 6.4. The analysis included site-specific RESRAD parameters for USEI and the maximum concentrations of U-234, U-235, and U-238 measured in the soil from APG. Assuming waste disposition over the entire USEI site (88221 m^2) resulted in a dose of 1.42E-09 mSv/yr (1.42E-07 mrem/yr). Independent analyses completed by NRC staff resulted in similar doses. An additional scenario considered by NRC staff assumed that all of the contaminated soil was disposed in a single lift with dimensions of 4301 m^2 and 0.3 m deep. This scenario yielded a dose of 2.41E-07 mSv/yr (2.41E-05 mrem/yr).

The resident farmer scenario, however, does not consider impacts associated with direct exposure to the disposed waste. The commonly used inadvertent intruder-construction scenario, which considers the construction of a house with basement, does not apply to the conditions at this site due to the inclusion of a 3.6 m cover that would protect individuals from possible exposure to waste during excavation activities. Therefore NRC staff considered a well drilling scenario to evaluate impacts from direct exposure to the disposed waste. Using guidance provided in NUREG/CR-4370 and data provided in the licensee's RESRAD analysis, NRC staff assumed that the well was 2.03E-01 m (8 inches) in diameter and 62.5 m deep. The

resulting volume of material exhumed during the well drilling process, which includes cover material, material from the waste cell, and uncontaminated material below the waste cell, is 2.01 m^3. Assuming waste disposal followed the current practice of using 0.305 m (1 ft) lifts the volume of waste estimated to be removed during well excavation was 9.88E-03 m^3. Using the initial radionuclide concentrations provided by the Army and assuming that the exhumed material is spread over an area of 13.4 m^2 at a depth of 0.15 m NRC staff calculated a dose of 0.04 mrem/yr, which is significantly below the 1 mSv/yr (100 mrem/yr) dose threshold for the general public. Since refinement of this conservative scenario would result in further reduction of the dose, NRC staff chose not to calculate refined dose estimates for this intruder scenario.

Table 4. RESRAD Analyses Evaluated and Resulting Doses

Area (m^2)	Thickness (m)	Cover Depth (m)	U-234	U-235	U-238	Dose (mSv/yr)	Dose (mrem/yr)	at t= (yrs)
Inadvertent Intruder Resident Farmer Scenario								
88221	33.6	3.6	3.7E-03	1.70E-04	1.00E-02	1.42E-09	1.42E-07	1.00E+03
Original bounding concentrations and considering homogeneous disposition across entire site								
4301	0.3	3.6	7.59E+00	3.49E-01	2.05E+01	2.41E-07	2.41E-05	1.00E+03
Original bounding concentrations but considering waste disposed in a more consolidated fashion (waste consolidated in a single lift of 4301 m2 and 0.3 m deep)								
Inadvertent Intruder Well Construction Scenario								
13.4	0.15	0	2.96E-01	1.48E-02	8.34E-01	4.10E-04	4.10E-02	0.00E+00
Original bounding concentrations considering removal of all DU waste during construction of drinking water well (1 ft lift)								

6.0 FINDINGS

Based on the analyses summarized above and the resulting doses (Table 4) the NRC staff finds that the transfer of 305 tons of DU-contaminated soil from the Building 1103A Area site at APG to USEI is in accordance with 10 CFR 40.13, “Unimportant Quantities of Source Material” and acceptable with current Commission policy.