Safety Evaluation for Material Generated at U.S. Army Facility Camp Doha, Kuwait Resulting from a 1991 Fire

1. INTRODUCTION

US Ecology Idaho has developed this safety assessment for material generated in a 1991 fire at Camp Doha, a U.S. Army facility located in Kuwait. The material is intended for disposal at US Ecology Idaho's Grand View, Idaho facility as an unimportant quantity of source material based on uranium concentrations less than .05% by weight consistent with 10 CFR Part 40.13(a).

US Ecology Idaho has performed a conservative radiological dose assessment of the proposed action and determined that the potential dose to workers during transportation and disposal of the material and to members of the general public after site closure will be no more than a few millirem per year total effective dose equivalent (TEDE). This dose is a small fraction of the NRC decommissioning limits for exposure to members of the public of 25 millirem/yr TEDE. This safety assessment was performed to demonstrate that the intended disposal action is adequately protective notwithstanding the applicable general exemption.

2. DISPOSAL SITE CHARACTERISTICS

A description of the USEI facility located near Grand View, Idaho is attached (Attachment 1).

3. DESCRIPTION OF THE WASTE

The waste consists of sand contaminated with varying but low concentrations of depleted uranium. As the DU was consumed in a fire, it is generally in the form of an oxide. The range of concentrations is from less than 0.37 Bq/g (10 pCi/g) to 4.9 Bq/g (134 pCi/g). Most of the sand is contaminated at less than 0.37 Bq/g (10 pCi/g). The waste will be disposed in a permitted RCRA cell at US Ecology Idaho that routinely receives similar wastes.

4. RADIOLOCICAL ASSESSMENTS

In the following scenarios the dose equivalent for the Maximally Exposed Individual (MEI) will not exceed a few (e.g., five (5)) millirem/yr. This standard of a "few millirem/yr" to a member of the public is defined in NRC Regulatory Issue Summary 2004-08. The transportation workers and workers at the US Ecology site are treated as members of the public as the US Ecology site is not licensed by the NRC. Evaluations of both potential external and internal dose hazards to the transportation worker are discussed below.

4.1. Transport Worker Dose Assessment

Most of the cubic meter bags will contain concentrations of depleted uranium (DU) considerably below 1 Bq/g (27 pCi/g). A few will contain up to 4.6 Bq/g (134 pCi/g). Because of the very low average concentrations of the DU and its lack of significant gamma emissions the potential external dose to workers will be very low. The bags will be packaged within sea-land containers. Each sea-land container is capable of holding 16 one cubic meter bags without exceeding weight limits for transportation. The maximum dose rate expected one meter from the side of a sea-land container carrying a full load of the DU contaminated sand (at 4.6 Bq/g) is predicted to be 1.03E-5 mSv/hr (Attachment 2). The sea-land containers will be off-loaded at the Port of Houston and transferred by truck to a permitted hazardous material truck-to-rail transfer facility. At that facility the bags will be transferred by forklift to gondola railcars for shipment to Idaho.

Assuming all sea-land containers were filled with the highest concentration of contaminated sand, the maximum dose to a dock worker or transporter is estimated to be 8 E-5 mSv (8 E-3 mrem), assuming there are four workers transferring 375 sea-land containers. Also assuming four trucks are used to haul the sea-lands to the transfer facility and 30 minutes to make a trip, a driver is estimated to receive a dose of 0.063 μSv (attachment 3) for the completed job. This is a conservative estimate since most bags will contain less than 1 Bq/g (27 pCi/g).

When they arrive at the transfer facility, the sea-land containers will be unlatched and removed from the trucks. Individuals performing this function would be expected to receive a dose no greater than the dose received by the dock workers who latched the sea-land containers on the trucks (8E-5 mSv or 8E-3 mrem). Once the bags are unloaded from the sea-land containers, they will be placed into gondola cars by fork lifts. The fork lift operator will be approximately one meter from the bag during this operation. The transloading of each bag should take about 3 minutes. Multiple fork lift operators are likely to be used. For this assessment two fork lift operators are assumed. The dose for each operator from trans-loading 6000 bags is calculated to be 3.6 E-4 mSv (3.6 E-2 mrem)(Attachment 4)

Internal dose from inhalation is not applicable in this evaluation since the material is contained in bags in a sea-land container until transferred to the gondola cars.

4.2. USEI Worker Dose Assessment

Gondolas will be received at the Idaho rail transfer facility (RTF). Prior to being off-loaded each gondola will be surveyed by qualified operators. The survey normally takes an operator 20 minutes to complete. The operator will stand approximately one meter from the gondola railcar when conducting the survey. The dose rate at one meter for the highest concentration of material to be received

is estimated to be 8.1E-6 mSv/hr (8.1 E-4 mrem/hr) (Attachment 5). The surveying work is shared between four operators. The estimate of the total dose for the project to each gondola surveyor is 7.8 E-5 mSv (7.8 E-3 mrem). An operator in the enclosed cab of an excavator will then remove the material from the gondola with this equipment and load it into dump trucks for transport to the disposal site. It normally takes the excavator operator 45 minutes to unload a gondola. He occupies a position approximately 2 meters from the material he is unloading in a radiation field of 5 E-6 mSv/hr (5 E-4 mrem/hr)(Attachment 6). There are two excavator operators per shift, therefore the total dose for the project to an excavator operator is expected to be 2.2 E-4 mSv (2.2 E-2 mrem).

After each truck and its trailer are loaded, both are surveyed prior to departure for the disposal site. The survey usually requires 5 minutes to perform. Again, the surveyor will stand an average of one meter from the exterior of the truck. The dose rate at that distance from the truck has been calculated to be 1E-5 mSv/hr (1E-3 mrem/hr) (Attachment 7). Two individuals usually perform the truck surveys. The dose for the project to a truck surveyor will be 1.4 E-4 mSv (1.4 E-2 mrem). The trip to the disposal site takes 45 minutes. The calculated dose rate in the driver's position is 1.35E-5 mSv/hr (1.35 E-3 mrem/hr). There are 15 trucks that make the circuit to the site from the RTF. The expected dose to an individual driver for the total project is 2.4 E-4 mSv (2.4 E-2 mrem)(Attachment 8).

The dose from inhalation of this material is not considered in this analysis for the following reasons. The dust loading normally found in the rail transfer station during unloading and loading operations is 5 mg/m^3 or less. The maximum air concentration for ^{238}U to be expected would be 6.7 E-13 µCi/ml. or about 2 orders of magnitude below the airborne occupational limit. The concentrations for ^{234} and ^{235}U will be at least one order of magnitude less in DU. Also rail transfer station workers are required to wear respirators while working with any waste materials. All workers who handle hazardous or exempt radioactive materials are included in a program which is compliant with OSHA regulations for respiratory protection.

Some dose will also apply to cell workers who will spread and compact the material once it has been deposited in the cell. For this material a dose rate from the deposited material was calculated to be 9.8 E-6 mSv/hr (9.8 E-4 mrem/hr)(Attachment 9). This is based upon the amount of material to be disposed in one day (1980 cubic yards). At this rate it would take 6 days to dispose of all the material. There are two operators who operate the heavy equipment in the cell. The total dose to each of those workers was calculated to be 8.8 E-5 mSv (8.8 E-3 mrem).

All personnel working in the disposal cell are required to wear respirators. For the same reasons discussed for the rail station workers, a dose from airborne material is not considered significant for the cell workers.

4.3. Post Closure Dose to the General Public

US Ecology's permit requires that it demonstrate that no person will receive a dose exceeding 15 millirem for 1000 years after closure of the facility. A site-specific Resrad model was used to make that demonstration. The naturally occurring isotopes of uranium are evaluated in the assessment of dose. As can be seen uranium isotopes do not contribute to dose during the time frame of the model (attachment 10).

5.0 Conclusion

Based on the above analysis, the proposed disposal procedures would be protective of workers and the general public. Timely disposal is a preferable ALARA practice to continued interim storage in Kuwait.

Attachment 1

Disposal Site Characteristics

Attachment 2

Dose Rate on Sea-Land Container

Attachment 3

Dose Rate on Sea-Land Container for Driver

Attachment 4

One Cubic Meter Bag-Dose Rate

Attachment 5

Dose to Gondola Surveyor

Attachment 6

Dose to Excavator Operator

Attachment 7

Dose to Truck Surveyor

Attachment 8

Dose to Truck Driver

Attachment 9

Dose to cell Worker

Attachment 10

Resrad Assessment for US Ecology Idaho