

Evaluation of Alternate Disposal of Maywood Lower Activity Materials at US Ecology
Idaho, Using the USDOE Computer Model TSD-Dose.

1. INTRODUCTION

Approval of the proposed disposal procedures in accordance with 10 CFR 20.2002 would allow the US Army Corps of Engineers (USACE) to dispose of materials that based on activity meet the definition of an unimportant quantity of source material at the US Ecology (USEI) facility located near Grand View, Idaho. The purpose of this evaluation is to calculate potential dose to USEI employees and offsite residents from the proposed action based on conservative assumptions and using the USDOE computer code TSD-DOSE.

The TSD-Dose model is capable of modeling many different receptor scenarios. The model parameters were modified to best reflect the potential dose from handling of Maywood material at the maximum activity allowable under the facility Waste Acceptance Criteria.

2. Material Movement Process

The following is a summary of the major steps involved in moving material from Maywood, NJ to USEI, ID.

- 1) Material is loaded into burrito wrap lined gondola cars at the Maywood Interim Storage Site Rail spur and the wraps are then closed, (encapsulating the waste). The gondola is surveyed and shipped by rail to the USEI Rail Transfer Facility (RTF) in accordance with USDOT regulations. Doses to rail workers and the Maywood Site employees are not considered in this assessment.
- 2) Gondolas are surveyed and the material is excavated out of the gondolas directly into dump trucks with pup trailers at the USEI RTF. Gondola cars are unloaded into trucks by a backhoe parked on a platform above the gondola cars. The operator occupies a position 4 meters above the gondola cars while unloading. Unloading a gondola car takes on average 45 minutes and requires 3 truck/trailer combinations. All workers at the RTF are required to wear air purifying respirators.
- 3) USEI uses 15 trucks a day to haul material to the site. Trucks and trailers are surveyed, covered, and driven to the USEI disposal facility. A trip to the site takes 45 minutes. During a routine day each driver will make 4 four trips to deliver waste to the disposal site.

- 4) At the disposal facility trucks are weighed and then proceed to the disposal cell and dump their material or they are inspected at the inspection facility first. Inspection involves visual verification of material and sampling.
- 5) Once dumped the trucks are decontaminated and return to the RTF.
- 6) Two employees at USEI operate heavy equipment in the landfill cell. The workers wear air purifying respirators and sit in enclosed equipment cabs. These individuals would receive an external dose from materials being disposed. Normal procedure requires the material be laid down in lifts of approximately 1 meter depth. Given a gondola volume of approximately 57 m³ at one meter depth this material would cover an area of 57 m². The cell worker takes an average of 10 minutes to spread this material and roll over it a sufficient number of times to achieve a desired compaction. The dose rate calculated using Micro-shield for the heavy equipment operator is 4.3E-2 mrem/hr. Each gondola- equivalent volume spread will result in a dose of 7.2E-3 mrem. As there are 3 truck/trailer combinations per gondola the dose is 2.43E-03 per truck.

3. Model Parameters (see attachment)

A. The model inputs for activity are in Curies and were based on the activity per 30 cubic yard truckload. This is conservative since the trucks used to move material from the RTF to the USEI site are actually a truck and pup trailer configuration. The truck bed volume is approximately 19 cubic yards (16x8x4 feet). The material density is assumed to be 1.3 grams per cubic centimeter.

The attached TSD-Dose output report lists the assumed activities based on the following waste material: For the purpose of this assessment concentrations of the various radionuclides identified were set at the maximum amount they could be and still meet the criterion of less than 0.05% by weight for unimportant quantities of source material. Thus the doses derived represent an upper bound to the doses projected for individuals in the general public. The radionuclides and concentrations used in the assessment follow:

Isotope	pCi/gr
²³² Th	40
²³⁰ Th	45
²²⁸ Th	45
²³⁸ U	45
²³⁴ U	45
²³⁵ U	2
²²⁶ Ra	14

0.05%
by weight
translated
into
pCi/g

B. The Driver model of the code was used to model the dose to the truck drivers. Drivers are conservatively assumed to be exposed for 10 minutes (0.167 hours) during loading (45 minutes to unload a gondola / 3 trucks = 15 minutes per truck trailer combination = approximately 8 minutes to load the truck bed and 7 to load the trailer). The drive is assumed to be 45 minutes. Given this short duration no (zero) rest period is considered. While an infrequent potential, as a conservative measure it is assumed the driver stops to check every load and secure tarps or placards as maintenance in transit (5 minutes or 0.083 hours).

C. Only the Weigh and Inspect portion of the Receiving and Sampling model of the code was used. It is assumed that the truck/trailer load is inspected and sampled and that process takes 10 minutes (0.167 hours). Only a representative number of trucks are inspected in this fashion. The inspector is on a platform approximately three feet from the waste.

D. The Burial at Onsite Landfill model of the code was used to assess doses to RTF personnel. Again a conservative measure since no single individual performs all RTF functions on all material. Steps C and D of this model were not used as this is accounted for in the Driver assessment. Step B was not used as it is not applicable.

The Unload Waste To Mixing Pit (Step A) portion of the code was used to evaluate the dose per truck/trailer of the RTF worker. It takes approximately 15 minutes to load a truck/trailer combination, a single employee is assumed to load, survey, and decontaminate a truckload. It is therefore assumed that the total duration of this operation is 20 minutes. Based on consultation with USEI dust loading of 0.05 mg/cubic meter/truck is considered a conservative estimate of dust concentrations (8mg/ton * 30 tons/truck / 7935 cubic meter facility). A respiratory protection factor of 10 is assumed for the half face air purifying respirator worn by all RTF employees.

E. The dose to the hypothetical offsite individual was also assessed. The default parameters in TSD-DOSE for the offsite individual were used and are considered extremely conservative given the USEI location and facility size.

4. TSD-DOSE Results (See the attached TSD-DOSE output report.)

The resultant doses are presented below.

Worker	Dose mrem/Truck-Trailer	# of Workers	Individual Dose mrem/Truck-Trailer
Drivers	4.1E-02	15	2.73E-3
Receiver/Inspector	6.5E-03	1 at 33%	2.15E-3
Rail Transfer Facility	1.1E-02	4	2.75E-3
Disposal Cell	2.43E-03 *	2	1.22E-3
Offsite Individual	5.0E-05	NA	5.0E-05

*From USEI calculations, see paragraph 2, bullet 6 above.

5. Summary of Dose To Critical Receptor From the Proposed Action.

As determined above the critical receptor is the RTF worker (dose of $2.7E-3$ mrem/truck).

Although not probable, a worst case scenario of all Maywood generated wastes (52,000 tons in one year) being sent to USEI and all shipments at the maximum activity allowable per the waste acceptance criteria is assumed. This results in approximately 1733 truck/trailer combination loads (approximately 30 tons/load) per year. Assuming the 1733 loads and the calculated dose to the critical receptor ($2.7E-3$ mrem/load) the hypothetical worst case dose to a USEI worker is 4.7 mrem/yr.

A review of all Maywood shipments from the years 2001 to 2004 indicates that the average activity of waste shipments (eligible under USEI WAC) were less than 25% of the activities evaluated here. Therefore, the actual dose is expected to be significantly less (approximately 1 mrem/yr).

6. Conclusion

Disposal of Maywood Site waste soils and debris (that meet the facility waste acceptance criteria) at the RCRA Subtitle C, US Ecology facility located near Grand View, Idaho is protective of human health and the environment. Doses from this disposal approach are less than a few millirem per year given worst case conservative assumptions and are expected to be less than 1 mrem/yr typically.

The doses, calculated with TSD-DOSE and worst case assumptions, as presented here are very similar to those calculated in the accompanying document *Evaluation in Support of Alternate Waste Disposal Procedures, USACE and USEI, 2005*.