

I. Inputs and Assumptions

1. EPA CAP88-PC Code, Ver 4.1 used for offsite dose receptor calculations
2. Nearest potential offsite receptor is at Rail Transfer facility fenceline 50m to the Southeast of MVF
3. List of radionuclides was chosen based on highest dose potential, taking into consideration the scope of proposed MVF licensed activities (i.e., LLRW & VLLW waste verification and processing)
4. For Uranium, Thorium, and Radium, cases were run for individual parent nuclides as well as the entire decay chain in secular equilibrium
5. CAP88-PC was modeled with a standard release rates of 1uCi/yr for all radionuclides. Dose to source ratios (in units of mrem/uCi) were then calculated and used for scaling to a limiting dose of 1Rem to arrive at postulated limited release rate.

II. CAP-88 Results for Select Radionuclides

Nuclide	Release Rate (1uCi/yr)	Effective Dose Equivalent Conversion (mrem/uCi)	Release Rate (Ci/yr) to get to 1 rem	Effective Dose Equivalent (mrem)
U-238	1.00E-06	4.22E-05	2.37E+01	1000
U-238 equil	1.00E-06	6.17E-04	1.62E+00	1000
U-235	1.00E-06	4.86E-05	2.06E+01	1000
U-234	1.00E-06	3.55E-05	2.82E+01	1000
Th-232	1.00E-06	4.84E-04	2.07E+00	1000
Th-232 equil	1.00E-06	1.03E-03	9.71E-01	1000
Ra-226	1.00E-06	2.55E-04	3.92E+00	1000
Ra-226 equil	1.00E-06	3.69E-04	2.71E+00	1000
Cs-137	1.00E-06	5.29E-05	1.89E+01	1000
Co-60	1.00E-06	3.86E-05	2.59E+01	1000
Pu-239	1.00E-06	5.82E-04	1.72E+00	1000
Pu-240	1.00E-06	5.82E-04	1.72E+00	1000
Pu-241	1.00E-06	1.07E-05	9.35E+01	1000

III. Results

1. Th-232 (in equil.) was chosen as the limiting radionuclide based on the CAP88-PC results. A scaled Release Rate of 0.971 Ci/yr was determined to be needed to incur an Effective Dose Equivalent (EDE) of 1Rem to the nearest postulated offsite receptor. CAP88-PC output file is attached.
2. In order to have a release of ~1Ci of Th-232 (in equil.) from LLRW & VLLW shipments expected at the MVF, the following types of scenarios would need to occur. Several scenarios are presented given the potential for the MVF to process wastes prior to eventual offsite disposal.
 - a. Gondola Railcar - (3) Gondola Railcars each loaded to 3,000pCi/g USEI WAC limit (each carrying 106 net tons of soil-like waste)
 - b. Drum - (1) single drum of waste with an equivalent 0.971 Ci of total inventory, containing ~400lb of soil-like material. This results in an equivalent waste concentration of ~5uCi/g in the drum.
 - c. Intermodal Container - 20yd³ of soil-like waste (24 tons @ 1.2 tons/yd³). Equivalent waste concentration at limiting total activity (0.971Ci) = 4.46E+04 pCi/g
 - d. Sealed Sources or Other Items - Although the MVF license application is requesting receipt of sources and items for brokerage purposes, all potential sources will only be received for purposes of offsite disposition, either for licensed LLRW disposal or transfer to Qal-Tek's Idaho Falls, ID facility license for future considerations. For these reasons, potential releases from sources are not considered in this evaluation.

III. Analysis

Waste Scenarios

1. The Drum and Intermodal Container scenarios were analyzed for potential of occurrence due to their operational plausibility.

a. Drum Scenario - Scenario posits a spill of a 400lb drum of Thorium-bearing waste that results in a total of 0.971Ci of waste that is available for transport to the site boundary. As presented in Section II above, this scenario is physically impossible for multiple reasons (activity is distributed over 400lb of soil-like waste; receptor cannot ingest/inhale all of the available limiting activity). Concentration of the soil-like wastes does increase the plausibility of such an event but at the concentrations required ($>5\text{uCi/g}$), the contact dose rates on the drum would likely exceed 1Rem/hr. A waste package of this type would require shielding and extensive downblending in order to meet the WAC at USEI, making it highly unlikely for acceptance at the MVF.

b. Intermodal Container - Scenario posits a spill of a 20 cubic yard intermodal container of Thorium-bearing waste that results in a total of 0.971Ci of waste that is available for transport to the site boundary. Approximate concentration of the waste is $45,000\text{pCi/g}$ in a soil-like matrix. Although the Th-232 concentration of the waste in this scenario places it in the "possible" category for processing for alternate disposal, the sheer volume of the material (24 tons) places it outside of the realm of plausibility for sake of an offsite receptor dose (per CAP88-PC).

IV. Conclusions

1. Based on the CAP88-PC results and review of the plausibility for the MVF to operationally receive and handle the required radionuclide quantities to exceed an EDE of 1Rem to an offsite receptor, the MVF should not be required to prepare and administer an Emergency Plan per 10CFR30.32(i).

2. Supporting Information for Conclusion:

a. Given that the MVF is being designed and licensed as a LLRW (i.e., VLLW) diffuse- waste verification and processing facility, the potential for radionuclide releases that could result in plausible large exposures to offsite receptors is very low.

b. MVF waste activities to be performed will be limited to physical movements of waste containers for consolidation or future trans-loading of VLLW. The most credible events will be ordinary "spills" that are easily manageable within the contained facility. The expected physical form of most waste will be soils, soil-like materials and debris that will be lightly contaminated. Furthermore, The MVF will be closed during active or open-container operations and is capable of being closed and confined to the extent that any 'spills' can be contained and appropriately responded to without a release to the environment.

c. No processing will be performed that involves changes to physical or chemical form of the waste or use of compaction, heat or other treatment processes that could alter chemical or physical form of the waste. These operational constraints remove nearly all sources of potential (or stored) energy that could expel radioactive materials from the MVF facility and make them available for transport to the site boundary.

d. The MVF will not process wastes that are pressurized or contain gases that are capable of being released.

e. It is worth noting that all scenarios considered in this evaluation ignore the operational requirement that shipments being routed through the MVF for purposes of Alternate Disposal to USEI meet the dose and ALARA constraints in 10CFR20.2002 and all applicable license conditions. These dose constraints would most likely take precedent in Qal-Tek's

evaluation of acceptable waste streams into the MVF since dose to the maximally-exposed individual (MEI) at the unlicensed USEI landfill must remain within stated program limits. This constraint thus limits the working activities of received waste shipments.