WPO 31165

# Sandia National Laboratories

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subject : **Estimation of Maximum RH-TRU Thermal Heat Load for WIPP**

[1] **Requested Information**

In previous communications [Ref. Hi-1], a request was made for an estimate of the upper bound for the expected thermal payload (internal heat generation) of a RH-TRU canister. This information can then be used to estimate the maximum temperature rise in the immediate vicinity of a RH-TRU canister with the largest expected thermal payload. Calculations presented in this memo correspond to two major analysis steps: 1) inverse internal shielding calculations, to identify the corresponding thermal payload for maximum allowable surface dose; and 2) heat conduction calculations for thermal payloads based on limited empirical data. The analysis steps are discussed below.

[2] **Inverse Internal Shielding Calculations**

These calculations yield first order "hand calculations" that are used to identify the radiation source term corresponding to the maximum allowable surface dose rate (1,000 *rem/hr*) for RH-TRU canisters [Ref. LWA-1]. The shielding calculations were performed only for gamma radiation because betas and alphas would not penetrate the waste matrix and/or the RH canister in any appreciable quantities (note: the internal heat generation of betas and alphas are incorporated when converting gamma activities to total (alpha, beta, and gamma) internal activities). Neutrons are not included because the dose equivalent rate from neutrons is about three orders of magnitude less than that for the maximum total allowable surface dose rate (i.e., the allowed neutron dose rate is 270 *mrem/hr* max [Ref. DOE-5]) and the corresponding neutron heating rate is insignificant. The computational steps used for gamma shielding are shown in Table 1.

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