WPO36044

Sandia National Laboratories

Albuquerque, New Mexico 87185-1341

date: March 13, 1996

to: R. Vann Bynum 6831 MS 1395

from: Kurt Larson 6751 MS 1341

subject: Brine-Waste contact volumes for scoping analysis of organic ligand concentration

You requested information on the volume of brine required in the repository prior to possible release, for the purpose of estimating bounds to the possible concentration of organic ligands.

I have discussed your question with Palmer Vaughn and Peter Swift, and suggest the following.

In general, assume that a 75% brine saturation is required in any unit volume of waste prior to releases being possible up an intrusion borehole. It is considered that this is a lower but still reasonable value, in that such a high gas saturation (25%) would likely segregate brine near the base of any region intersected by a borehole and effectively prevent upward flow. In other words, higher saturations would likely be required to initiate and sustain flow upward through a borehole, but can't be proven at this time given your need for immediate information on this subject.

There are two time scales that you should be aware of with respect to brine contacting waste. In the long-term and for undisturbed conditions, it is reasonable and the project position that no barriers constructed within the repository will be effective in isolating regions from fluid flow.

In the short time frame, perhaps up to two hundred years, panel closures, or closures on other scales such as the room scale (if constructed), will be relatively effective in isolating the intersected, closed off volume from the rest of the repository volume. This is especially true if boreholes are assigned high permeabilities in PA. High permeability boreholes could allow saturation with Castile brine of intruded waste regions because flow into them could occur more rapidly than flow through closures would drain the intruded area. Because a project position on borehole properties has not been established, I cannot speculate further.

In the following table, I present excavation volumes, and consolidated void volumes for several divisions of the repository. These volumes are taken from or

calculated based on [1] Sandia WIPP Project, (1992, V. 3, 3-4) and [2] Freeze et al., (1995, 2-7 to 2-8).

Scale	Excavated Volume m^3	Room Equivalents	Consolidated Porosity[1]	Consolidated Void Volume m^3	Brine Volume (saturation) m^3
room	3644. [1]	1	0.22 [2]	343. [2]	257. (75%)
exterior panel	46100. [1]	12.65	0.22 [2]	4339.	3254. (75%)
waste region	420881.[2] [1]	116	0.22 [2]	39788.	29841. (75%)

[1] assumes no gas generation, a bounding case
[2] excluding panel closure volume

References:

Freeze, G.A., Larson, K.W., and Davies, P.B., 1995. A Summary of Methods for Approximating Salt Creep and Disposal Room Closure in Numerical Models of Multiphase Flow. CENT.-0251. Albuquerque, NM: Sandia National Laboratories.

Sandia WIPP Project, 1992. Preliminary Performance Assessment for the Waste Isolation Pilot Plant, December 1992. CENT.-0700/3. Albuquerque, NM: Sandia National Laboratories.

Copy To:
E.J. Nowak 6831 MS 1395
P. Vaughn 6749 MS 1328
R.F. Weiner 6751 MS 1341
P. Swift 6751 MS 1341
Day File
SWCF-A: 1.1.7.1: CO/INT: non-QA: brine volumes