From: "Suttora, Linda" <Linda.Suttora@em.doe.gov>
To: "Xiaosong Yin" <XXY@nrc.gov>
Date: 07/12/2006 3:49:32 PM
Subject: Encapsulation Grout Pour_7-11-061.pdf

Xiaosong-
Please find the attached description of the volume of grout required for encapsulating residuals in the INTEC tanks. This is in response to questions raised during the NRC/DOE meeting in Idaho on June 20. I hope this answers any lingering questions as to the required volume of grout for encapsulation. Within a few days I should be able to send you the final information request from that meeting, specifically the modified inputs and outputs to the groundwater model questions. Please call me if you have any concerns.
Thanks,
Linda Suttora
301-903-7921

<<Encapsulation Grout Pour_7-11-061.pdf>>

CC: "Kaltreider, Randall" <Randall.Kaltreider@em.doe.gov>

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Volume of Encapsulation Grout Pour

The response to RAI 17 (Section RAI-17-B-2 in Appendix RAI-17-B) discussed volumes of grout to be used in calculating final waste form concentrations in the 300,000-gal TFF tanks. In that response the volumes of grout required for adequate encapsulation were 85 m^3 for the engineered grout pours (initial encapsulation) and 33 m^3 for the encapsulation pour. During discussions with the NRC on June 20, 2006, the NRC requested additional details regarding the methodology used to calculate the 33 m^3 value. The following discussion provides the additional details.

The volume of the encapsulation grout pour in a 300,000-gal tank was determined by first reviewing photos of the grout mockup to observe the extent of surrogate staining after the engineered grout placements were completed. The depth of grout was estimated by reviewing photographs of the grout placement mockup. The areas without grout or with minimal grout were estimated after the engineered grout placements were poured. Additionally, areas that contained staining, showing the presence of surrogate materials, were also noted. The dimensions of the mockup tank are known (50 ft in diameter and 3.5 ft deep) and the areas and subsequent volumes without grout and those with residual staining were calculated. As stated in the response to NRC Comment 17, the encapsulation grout pour was calculated to be approximately 33 m^3. The total volume shown in Table 1 was rounded up to 33 m^3 in the response.

The engineered grout placements are depicted in Figure 1 (below). The first two engineered grout placements create significant mounds and occupy approximately two-fifths of the tank bottom. The area near the steam jet (pump) contains no significant amount of grout after the engineered grout placement is complete. The encapsulation grout pour volume necessary to adequately encapsulate residual material at the engineered grout placement interfaces results in varying depths over the residuals. Simple geometric figures were used to calculate several location volumes. The depths of the locations considered ranged from 2 ft at the steam jet location to a minimum of 6 in. based on the slope of the engineered grout placements. Actual depths of encapsulation grout pours in the identified locations will likely range from well over a foot to 6 in. in depth to adequately encapsulate the residuals. To simplify these calculations, a 1-ft depth was assumed over the identified locations. The area around the steam jet is shown as Location 1 in Figure 2 (below). The volume (4 m^3) shown in Location 1 was calculated using 1 ft of grout to simplify calculations. The remaining grout around the jet was calculated as part of Location 2. Figure 2 shows the encapsulation grout pour locations as the simple geometric figures used to calculate area and volume.

Location 2 is the large area above the steam jet and includes the area surrounding the steam jet, which contains approximately 8 in. of grout as a result of the engineered grout placements. The depth of grout is known based on the height of the cooling coils in the tank bottom. The top of the cooling coils are 7 in. from the bottom. The cooling coils have been covered, as is evident in photographs in the response to NRC Comment 17, but streaks of surrogate material remain. To simplify the calculations, an average of 1 ft of grout is used to calculate the volume needed over Location 2 to ensure that all the waste materials have been covered. Location 2 has a calculated area of 37 m^2 and volume of 11.4 m^3.

Location 3 (interface between Placements 2 and 3) and Location 4 (interface between Placements 1 and 4) are sections of the tank bottom that require additional grout because of the presence of surrogate on the surface and near the tank wall. These two locations have equal area and bound Location 2 on each side. An average of 1 ft of grout was used in the volume calculations over an area of 21 m^2. Locations 3 and 4 have a calculated volume of 6 m^3 each.

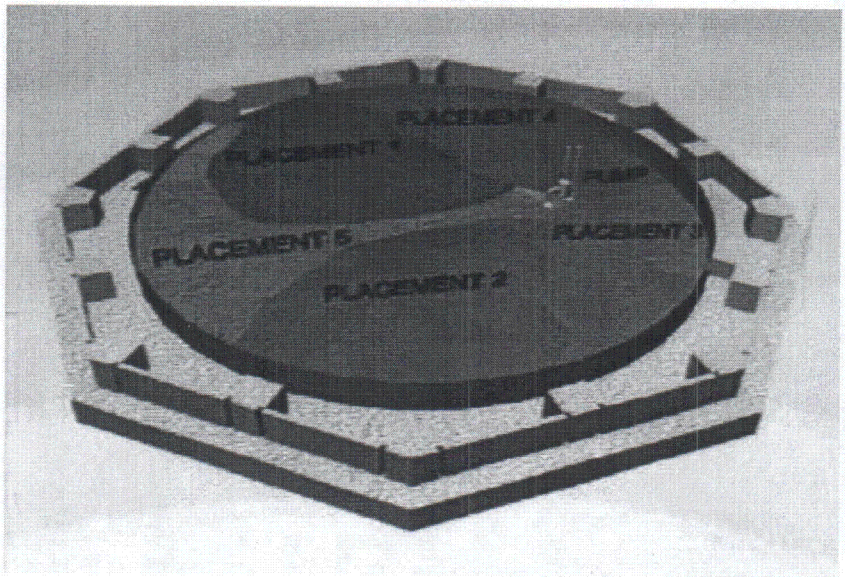

Figure 1. Schematic of the grout placement sequence.

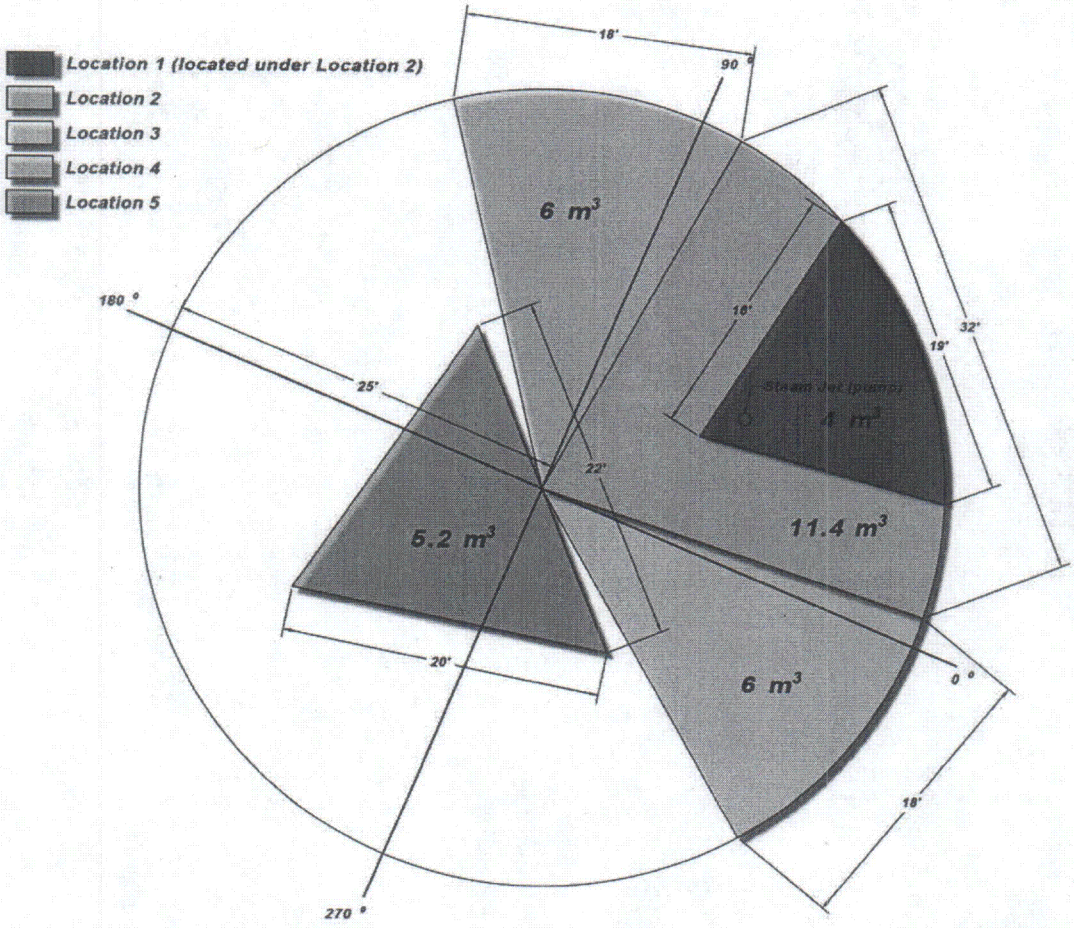

Figure 2. Encapsulation grout pour locations.

Location 5 (interface between Placements 1, 2, and 5) is triangular shaped and covers the area where the various engineered grout placements converged. It is larger near the center of the tank and narrows as it moves from the steam jet location. The location covers 17 m^2 and the calculations used an average depth of 1 ft of grout resulting in a volume of 5.18 m^3. As with Locations 3 and 4, the volume of grout is necessary to cover the surrogate waste materials on the surface of the engineered grout placements. Table 1 summarizes the volume and area of the encapsulation grout pour by location.

Table 1. Area and volume of encapsulation grout pour by location.

Location Number	Volume (m^3)	Area (m^2)
1	4	11
2	11.4	37
3	6	21
4	6	21
5	5.2	17
Total	**32.6**	**107**