



#7914

Bob H.

INTER-OFFICE MEMORANDUM

July 6, 1977

SAVANNAH RIVER PLANT

301.1.1

TO: J. R. HILLEY

FROM: O. M. MORRIS - D. E. GORDON

TANK 16 ANNULUS CLEANING

The removal of waste salt from the annulus of tank 16 to primary containment began on May 19 when 14,000 gallons of low heat waste supernate were transferred from tank 22 to tank 16 for ballast. Water was added to the annular space through the dehumidification supply duct. When the liquid level reached 18 inches, circulation jets in the east and south risers were started to promote circumferential flow. After some jet pluggage problems, both jets were replaced with type S1 canyon jets. Once circumferential flow had been established, steam was sprayed into the top of the annulus to dissolve salt deposits on the wall surfaces. Ten hours of steam spray operation have removed an estimated 90% of the salt deposits above the middle weld and 20% below the middle weld. Three transfers of salt solution have been made to tank 14 removing an estimated 25,500 pounds (1391 gallons) of salt cake. Estimated additions and transfers are shown in the attached table compared to measured changes in annulus liquid level.

The possibility of reopening or causing tank cracks is recognized. Supernate was added to the tank to a level of 25.50 inches, settled to 25.25 inches, and has remained there since startup. Hydrostatic head in the tank must be maintained higher than the hydrostatic head in the annulus to avoid bowing the bottom of the tank upward. Thus, flow would be from the tank to the annulus if a leak path were established. A 0.1-inch change in tank level corresponds to a 0.75-inch change in annulus level. Three-fourths of an inch rise in annulus liquid level with a concurrent drop in tank level would be recognized as a sign of abnormality.

The possibility of either starting or reopening cracks in the secondary pan is recognized. No known cracks exist in the pan, and routine groundwater monitoring since the 1960 overfill gives

no evidence that any subsequent leaks to groundwater have occurred. Some liquid was in the annulus before cleaning started; salt samples indicated that semisolid slush existed beneath a hard crust (estimated approximately 3 inches hard crust and approximately 10 inches slush under that). An expanded groundwater monitoring program around tank 16 began three months prior to the salt removal operation. The radioactivity in water from riser 5 averaged 85 pCi/ml before the start of annulus cleaning and the most recent reading (6/21) was 81 pCi/ml.

Should the annulus pan develop a leak, then waste could escape into the concrete vault or groundwater could seep into the annulus. The water table in the HP wells surrounding tank 16 is 278 feet. The elevations of the bottom and top of the annulus pan are 274 and 279 feet, respectively. Therefore, the direction of flow would be into the annulus should a leak occur.

Conditions in the annulus during cleaning are being controlled. Corrosion inhibitors will be added to the water at dilute salt concentrations to prevent stress corrosion cracking.

Material balances in the table attached show gross discrepancies because of uncertainties in determining in and out flows, liquid levels, and other factors. The uncertainties are:

1. Steam consumption is a calculated value and not measured.
2. Volumes of water used in jet deplugging operations were not accurately measured.
3. Large inaccuracies exist in liquid level determination in the annulus, with dip tube readings corrected for specific gravity.
4. Volume changes that occur as crystallized or slushy salt is dissolved are not known.
5. Annulus volume vs. elevation is a calculated value from print dimensions, not from calibration.
6. ~~Amounts transferred from~~ the annulus to tank 14 are determined by level changes in tank 14 when the annulus is emptied to a heel (June 22). This is not an accurate measurement.
7. Changes in level and specific gravity in the annulus outside the ventilation duct are assumed to be occurring similarly inside the duct.

Estimated error bands on some of these uncertainties are shown in the table.

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The material balance for water added to the annulus and salt solution removed to tank 14 since startup shows a net 3010 gallons in the annulus as of 7/1. A liquid level check on the same date gives 2861 gallons net; difference is 149 gallons, but larger discrepancies occurred at intermediate points in the operations as the table shows. Although the discrepancies are unexplained, data recording in the form of Table 1 will be continued throughout the cleaning operations.

During periods of inactivity in the annular space, the liquid level readings were constant within the accuracy of the instrumentation (plus or minus 130 gallons).

OMM:DEG:bb

Att.

TANK 16 ANNULUS CLEANING MATERIAL BALANCE

<u>Date</u>	<u>Gross H₂O Additions To Annulus (gals)</u>	<u>Water Added Through Air Inlet Duct (gals)</u>	<u>Recir. Jet Conden. (gals)</u>	<u>Steam Spray Conden. (gals)</u>	<u>Other H₂O Added (gals)</u>	<u>Salt Solut. Trans. To Tank 14 (gals)</u>	<u>Annulus Liq. Lev. (in)</u>	<u>Liq. Level Indicated Gross (gals)</u>	<u>Remarks</u>
5/24	1714	1714					17.5	1714	Startup
5/25	1997		87		196		17.9	1898	South Jet Plugged
5/26	2047				50		18.5	2173	South Jet Catheterized
6/1	2072				25		18.6	2219	Replaced South Jet
6/2	2322				250		19.0	2403	Mining H ₂ O
6/10	1657					665	17.9	1898	Transfer to Tank 14
6/15	1757				100		18.1	1989	S1 Jet Installed
6/16	2175		418				18.4	2127	
6/17	2605		430				19.0	2403	
6/20	3001		344	52			19.9	2816	
6/21	3563		468	94			20.7	3183	
6/22	567					2996	(1)		Empty to Heel
6/23	3045	2221	205	52			18.8	3045	(2)
6/24	3301		204	52			19.1	3183	
6/27	3505		204				20.2	3688	
6/28	3709		152	52			20.6	3871	
6/30	3734				25		20.8	3963	Replaced East Jet
7/1 AM	2570					1164	17.6	2494	Transfer to Tank 14
7/1 PM	3010		367	73			18.4	2861	
Error for Each Entry		± 15	± 10	± 10	± 20%	± 220		± 130	

- (1) Liquid level reading was 15.4 inches but dip tubes were in salt pocket so value not good since annulus was emptied to 3-inch liquid heel.
- (2) Annulus liquid level base reestablished.