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GENERAL ELECTRIC

HANFORD ATOMIC PRODUCTS OPERATION - RICHLAND, WASHINGTON

TITLE

LEAK REPAIR OF THE 107-D EFFLUENT RETENTION BASIN

AUTHOR

J. D. Ryan

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LEAK REPAIR OF THE 107-D RETENTION BASINSUMMARY

Leakage of effluent water from the 107-D Basin had increased from 6,000 gallons per minute in November of 1959 to the peak of 8,000 gallons per minute in April of 1963. Washout of fines had apparently created large voids beneath the north and west walls and endangered the integrity of the structure by settling the wall 2" at one place. The leakage was arrested in March of 1963 by filling the voids with concrete and grout and sealing the repairs with a newly developed sealant. Present total leakage is 3,750 gallons per minute.

DISCUSSION

Inspection of the basin with the water level lowered revealed separation of the floor from the wall with fissures up to 8" wide along 20 per cent of the north wall. Sealing compound used in expansion and construction joints had become embrittled and broken, probably by prolonged temperature and radiation exposure. Cracks were enlarged by chipping to reveal voids under the 4" sloping Gunitite slab. The largest void coincided with the settled portion of the wall. A trench was excavated adjacent to and outside the wall 30' long and 2' deep then filled with lean concrete. A pour of 12 cubic yards of grout was made over this concrete and rammed below the wall into the void.

Twelve holes were drilled in the wall from the outside downward at a 70° angle; then a slurry of clay and cement was pumped into the holes to fill smaller voids where cracks had formed. Closing up the cracks was done by pouring a compressible aluminated cement (Lumnite) at the same time forming a reglet over a cushioning material (Celotex) set against the wall (see detail 1 in attached sketch). The channel (reglet) was filled with 3M-EC 1291 (Minnesota Mining and Manufacturing Co.), a polysulfide sealant with properties of high adhesion to concrete, resistance to high temperature (325°F) and to radiation (5×10^6 R/hr for 48 hours) and which cures to a firm elastic solid. Vertical expansion joints on the wall were caulked with this material. Several cycles of heating and of cooling of the basin have revealed no leakage from the repaired sections. In previous experimental applications, leaking expansion joints in 107-D and in the 183-D clearwell were sealed with 3M-EC 1291 by troweling from the outside. No leakage has been noted after five months.

CONCLUSIONS

The three older 107 basins are ruptured in many places by the expansion and contraction from temperature variations. Leakage directly to the ground, however, is secondary to structural damage made by formation of pockets under the walls. Leak repair to minimize voids and concrete shoring where washout occurs, with selection of materials that meets the temperature and radiation exposure, is the apparent first approach to extend the life of the basins.

JD Ryan/crt
5-15-63

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PLAN NORTH WALL

No.		REV. BY	APPD. BY	FOR	DATE
REVISIONS					
SCALE: None		NEXT USED ON			
APPROVALS	FOR	DRAWN <i>Ryan</i>	DATE 5-9-63		
		CHECKED	PROJ. NO.		
		ISSUED	INST. NO.		
		DES. ENG. <i>Ryan</i>	UNIT P.C.		
BLDG. NO.	107-D	INDEX NUMBER			
DWG. NO.		SHEET NO.		SHEETS	

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