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REL-6-4

SE System 12-11-90

B. Cleary 10/18/90

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JUN 15 1956

Richland, Washington
November 8, 1951

To: File

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REMOVAL OF RUPTURED HEAVY METAL SLUG FROM

TUBE NO. 2959-F

Summary

The F Reactor was shutdown at 10:11 A.M. on October 24, 1951, to permit the removal of a ruptured slug from tube 2959-F. The removal was accomplished by removing the metal upstream and downstream from the ruptured slug, removing the rear gunbarrel, and discharging the tube containing the ruptured slug. Slug removal, including the sealing off of the tube channel, accounted for 50 hours of the 76.0 hour outage. The remainder of the outage time was devoted to scheduled charging operations and reactor maintenance. An apparent hole in the process tube at the location of the ruptured slug allowed considerable water to enter the reactor and necessitated low-level operation. Operation at reduced levels continues at this writing as residual water is being removed from the reactor through the gas system.

Detection

The initial detection of the presence of a ruptured slug was determined by routine effluent water activity checks at 3:40 A.M., October 24, 1951. This detection was not confirmed by subsequent samples and a check of tube pressures and temperatures on header 29 1/2 did not reveal any abnormal conditions. At approximately 9:30 A.M., during a routine check of tube inlet water pressures, a 17 psi pressure increase since the previous day was noted on tube 2959-F. The unit was shutdown and readings of 25 R/hr. were obtained on the rear pigtail of tube 2959-F.

Removal

Efforts to discharge the metal with the charging machine were unsuccessful at 100 psi. The pieces downstream from the rupture were hydraulically discharged, the charge was backseated 3 3/4 inches with 3,500 lbs. force, and the tube ribs downstream of the ruptured slug were removed. The charge moved into the deribbed portion of the tube with a force of 3,500 lbs. but when forces necessary to keep the charge moving increased to 5,500 lbs., pushing

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Removal (Continued)

operations were stopped. At this point the charge had been moved 10 inches into the latched section of the tube. A syringe was inserted from the rear up to the ruptured piece to dislodge any loose chips, and the tube was reflashed for 30 minutes at 250 psi water pressure. Pressure was then applied alternately from the front and rear. A 3 inch movement was possible in either direction at forces of 500-1000 lbs., but forces up to 4000 lbs. would not move the charge further. The rib cutter was again inserted in an attempt to clear the channel and flushing was repeated as above. Further attempts at discharge, with forces up to 4500 lbs., failed.

Thirty slugs upstream from the ruptured plug were transferred, using the twin tank, into tube 2960-1'. The 31st piece could not be dislodged from the tube. The tube containing the rupture and the other piece was pushed to the rear with approximately 4000 lbs. force until the ruptured piece contacted the rear gunbarrel. Forces of 1000 lbs. failed to bring any further movement. 5000 lbs. force from the rear together with a like pulling force from the front moved the tube and slug back toward the front. The rear gunbarrel was removed and the tube and slug were discharged with less than 3000 lbs. force. The tube channel was blanked and removed from service pending the replacement of the rear gunbarrel.

Data On The Charge

- ① Tube 2955-B contained regular metal charged January 21, 1951, and the metal had reached a concentration of 484 MWD/T. The ruptured piece was the 32nd from the front of the charge. It was canned January 8, 1951, on G-3 line, of M3 material, processed on truck No. 8 and had been autoclaved.

The cap and together with three small pieces, constituting approximately 1/16 of the slug volume, were completely detached from the slug proper. The slug surface appeared to be rough, scaly, and blistered.

Radiation Aspects

There was no over exposure to personnel and contamination was confined to established danger zones.

Slug Disposal

The slug and slug fragments were canned and are currently being held in the 109-B storage pending transfer to 111-B for further examination.

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