Enclosure 1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
PLANT SYSTEMS BRANCH
MODIFICATION TO LEAKAGE DETECTION CAPABILITY FOLLOWING
THE JULY 15, 1987 STEAM GENERATOR TUBE RUPTURE EVENT
NORTH ANNA POWER STATION, UNIT NO. 1
DOCKET NO. 50-338

1.0 INTRODUCTION

By letters dated September 15 and 25, 1987, the licensee submitted their evaluation of the North Anna, Unit 1 steam generator tube rupture event of July 15, 1987 including their assessment of SGTR failure mechanism and planned modifications to be made to the leakage detection capability in order to detect a significant steam generator tube degradation prior to occurrence of a tube rupture.

2.0 DISCUSSION

The licensee has developed an augmented surveillance program for detection of primary-to-secondary leakage by identifying the early stages of fatigue failure, so that an orderly shutdown can be accomplished before tube failure occurs. The program includes recording and trending of selected radiation monitor data, sample isotopics, and more frequent calculation of primary coolant leakage in order to detect leak rates between 10 gallons per day (gpd) and 100 gpd in a timely manner. This capability will provide assurance that even with fatigue failure, there is adequate time for shutting down the unit prior to exceeding 100 gpd. This licensee volunteered reactor coolant leakage limit is more conservative than existing technical specification limits which require reactor shutdown when one of the following is exceeded:

1. One (1) gpm unidentified leakage
2. One (1) gpm total leakage through all unisolated steam generators
3. Five hundred (500) gpd leakage through any one unisolated steam generator
4. Ten (10) gpm identified leakage

Currently primary-to-secondary radiation monitors are located on the condenser air ejector discharge, three main steamlines, and three steam generator blowdown lines. In addition to these indications, the licensee is installing new N_{16} detectors, one on the main steam header (to be operable prior to restart) and subsequently, one on each main steam line from the steam generator. These detectors will indicate leakage in gallons per day and will provide continuous readout in the control room.

The N_{16} monitors will have three alarm settings that will annunciate in the control room at 10 to 20, 60, and 100 gpd above the initial reactor coolant activity level. The alarm setpoint will be periodically evaluated and adjusted based on primary-to-secondary leakage calculations in order to respond to a leak rate of approximately 10 gpd above the maximum current value. The condenser air ejector alarm will be set consistent with the N_{16} first alarm. The N_{16} second alarm will be set at 60 gpd in order to detect the initial crack propagation of a fatigue failure. The third N_{16} alarm will be set at the administratively imposed shutdown limit of 100 gpd.

The licensee will provide operating procedures for SG leakage rate surveillance prior to unit restart and will verify operability of these N_{16} monitors prior to power ascension greater than 30 percent. The licensee will record and/or evaluate the monitors data for indications of leakage (trend and magnitude) during mode 1 operation. The steam generator blowdown monitors and the condenser air ejector discharge monitor will be recorded and evaluated every four hours. In addition to the above monitors, samples from the air ejector exhaust will be taken and analyzed every 8 hours and from the primary reactor coolant system and secondary coolant (steam generator blowdown) every 24 hours. The result will then be used to calculate the primary-to-secondary leakage during mode 1 operation. Sample activity levels will also be trended. The licensee will then use the radiation detector and sampling data to calculate primary-to-secondary leakage every 8 hours based on air ejector exhaust isotopic activities and every 24 hours based on secondary coolant isotopic activities. The primary isotopic activities will be used to relate the air ejector and secondary isotopic activities to primary-to-secondary leakage. In addition, the condenser air ejector radiation monitor count rate readings will be used to estimate primary-to-secondary leakage every 4 hours and the radiation monitor alarm setpoint will be adjusted to respond if leakage increases to and stays at 10 gpd above the most recent maximum leakage measurement.

3.0 CONCLUSION

Based on the above, the staff concludes that the licensees proposed modification for the augmented surveillance program for monitoring steam generator primary-to-secondary leakage exceeds the requirements identified in the existing technical specifications and will provide early indication of steam generator tube degradation prior to occurrence of a rupture. The staff, therefore, finds the licensees program to be acceptable.

Enclosure 2

PSB SALP INPUT

Plant Name: North Anna Power Station, Unit No. 1
Licensee: Virginia Electric and Power Company
Docket No.: 50-338
SER Subject: Modifications to Leakage Detection Capability Following the July 15, 1967 Steam Generator Tube Rupture Event (TAC No. 65791)

PERFORMANCE PARAMETER:
(1) Management Involvement in Assuring Quality
(2) Approach to Resolution of Technical Issues from a Safety Standpoint
(3) Response to NRC Initiatives
(4) Staffing (Including Management)
(5) Reporting and Analysis of Reportable Events
(6) Training and Qualification Effectiveness
(7) Any other SALP Functional Area

PERFORMANCE PARAMETER	NARRATIVE DESCRIPTION OF LICENSEE'S PERFORMANCE	CATEGORY/RATING
(1)	Not applicable	
(2)	The licensee's proposed steam generator leakage detection capability is beyond that required by existing criteria and will insure early detection of steam generator tube fatigue prior to occurrence of a rupture.	1
(3)	The licensee was very prompt and responsive to staff questions and participated in two meetings to assist the staff in performing an expedious review.	1
(4)	Not applicable	
(5)	Not applicable	
(6)	Not applicable	
(7)	Not applicable	

Overall Rating: 1