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United States Nuclear Regulatory Commission
Document Control Desk
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References: (a) License No. DPR-3 (Docket No. 50-29)
(b) USNRC Letter to Yankee, Generic Letter 89-13, dated July 18, 1989
(c) Yankee Letter to USNRC, BYR-90-010, dated January 26, 1990
(d) USNRC Letter to Yankee, NYR 90-040, Generic Letter 89-13, dated March 2, 1990

Subject: Response to Generic Letter 89-13

Dear Sir:

Enclosed is the final documentation and results of actions taken in response to Generic Letter 89-13 by the Yankee Nuclear Power Station. Actions taken and results obtained during our recent refueling and maintenance outage are provided and complete all requirements discussed in the Generic Letter.

We trust this information is satisfactory; however, if you have any questions, please contact us.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

J. K. Thayer
Vice President and Manager of Operations

JD/gjt/WPP79/109
Attachment

COMMONWEALTH OF MASSACHUSETTS)
)ss
WORCESTER COUNTY)

Then personally appeared before me, J. K. Thayer, who, being duly sworn, did state that he is a Vice President of Yankee Atomic Electric Company, that he is duly authorized to execute and file the foregoing document in the name and on the behalf of Yankee Atomic Electric Company and that the statements therein are true to the best of his knowledge and belief.

Helen D. Sammarco Notary Public
My Commission Expires November 7, 1991

A065

ATTACHMENT 1

Response to Generic Letter 89-13

Generic Letter Item I

"For open-cycle service water systems, implement and maintain an ongoing program of surveillance and control techniques to significantly reduce the incidence of flow blockage problems as a result of biofouling...."

Response

Biofouling was last addressed by response to IE Bulletin 81-03, "Flow Blockage of Cooling Water to Safety System Components by Corbicula sp. (Asiatic Clam) and Mytilus sp. (Mussel)." FYR 81-78, dated May 26, 1981, reaffirming "... Both water sampling and component inspection have substantiated past findings that Corbicula sp. is not present in the local environment. Mytilus sp., a brackish and saline water inhabitant, is not a concern since Sherman Pond is a freshwater pond...." Sample testing in May 1989 and limited visual inspections during the 1990 refueling again validates the previous findings. Therefore, implementation of a surveillance and control program is not necessary and this item is closed.

Generic Letter Item II

"Conduct a test program to verify the heat transfer capability of all safety-related heat exchangers cooled by service water. The total test program should consist of an initial test program and a periodic retest program...."

Response

The following hardware has been defined as being or having a safety-related heat exchanger:

- Component Cooling Heat Exchangers, E-11-1 and E-11-2
- Integral annulus of P-19, Shutdown Cooling Pump
- Integral annulus of P-23, Low Pressure Surge Tank Cooling Pump
- Charging Pump fluid drive oil coolers for P-15-1 and P-15-3

The Component Cooling Heat Exchangers, E-11-1 and E-11-2, were cleaned during the 1990 Refueling Outage and base line performance data collected. A procedure for evaluating component cooling heat exchanger performance has been developed, and will be used monthly to trend the operating heat exchanger(s) performance. E-11-1 is normally cleaned in the spring of the year, in anticipation of warmer pond water temperature. This cleaning schedule will be maintained. Because of E-11-2's infrequent use, cleaning frequency will be determined by the new performance trending procedure.

Base line vibration and bearing temperature data for performance trending of P-19 (Shutdown Cooling Pump) and P-23 (Low Pressure Surge Tank Cooling Pump) was collected using the Inservice Testing (IST) Program. Periodic retesting will be performed in accordance with IST Program requirements.

The charging pump (P-15-1 and P-15-3) drive heat exchanger(s) have been routinely cleaned during refueling outages, including the 1990 Refueling Outage. The Maintenance Reqeust used to document the 1990 cleaning provides the service history committed to in Reference (c). This cleaning was proceduralized to confirm frequent regular maintenance on a refueling schedule basis.

This item is closed.

Generic Letter Item III

"... establishing a routine inspection and maintenance program for open-cycle Service Water System piping and components that corrosion, erosion, protective coating failure, silting, and biofouling cannot degrade the performance of the safety-related systems supplied by service water...."

Response

The routine performance trending/maintenance of heat exchangers E-11-1 and E-11-2 (Component Cooling) are in place via plant procedures. Pumps P-19 and P-23 have been included in the In-Service Testing Program. Initial pump data was collected during the 1990 refueling. A procedure to confirm frequent regular maintenance of the Charging Pump (P-15-1 and P-15-3) drive oil coolers is in place.

To confirm performance standards of the Service Water piping system, the safety-related heat exchangers will be operationally trended and/or cleaned as previously described. Anomalies in the piping system are expected to manifest degradation by reducing heat exchanger performance. Any diagnostic testing done on the heat exchangers would be expanded as required, ultimately enveloping the entire system to determine corrective action(s). It is important to note that the plant Service Water system piping does not have any protective coatings, therefore limiting mechanisms for a catastrophic flow restriction.

This item is closed.

Generic Letter Item IV

"Confirm that the Service Water System will perform its intended function in accordance with the licensing basis for the plant.... This confirmation should include a review of the ability to perform required safety functions in the event of failure of a single active component. To ensure that the as-built system is in accordance with the appropriate licensing basis documentation, this confirmation should include recent (within the past two years) system walkdown inspection...."

Response

The as-built Service Water System walkdown was completed on July 11, 1990. The service water system has been reviewed for its ability to perform required safety functions in the event of a single active component failure.

During normal plant operation, two service water pumps will be running with the third pump in standby. Low service water supply header pressure of 45 psig will automatically start the standby pump and give an alarm at the main control board. One service water pump can supply the requirements of the system during the winter when the pond temperature is low.

The service water pumps are normally started and stopped with their discharge valve closed. This will give slower changes in service water flow and allow more time for the temperature control valves in the system to adjust for the changing service water flow conditions. It will also prevent back flow through a pump when it is stopped if the check valve should fail to close. The discharge valves on the No. 1 and No. 3 service water pumps are motor operated. This allows complete control of the pump starts and stops from the main control board. When a pump train is lined up for AUTO start, the discharge valve is left fully open.

The Service Water System supports the safety-related loads of (1) shutdown cooling and (2) main coolant inventory/boration control by the operation of the charging pumps.

1. The Shutdown Cooling System is placed in service after the main coolant temperature has been reduced to approximately 330°F and the pressure to less than 300 psi gage. The Shutdown Cooling System then reduces the main coolant temperature to 140°F or less and operates continuously to maintain the temperature.

   The components of the Service Water System reviewed for single active failure in this item are Pumps P-6-1, P-6-2, and P-6-3; SW-MOV-603 and SW-MOV-609; and Check Valves SW-V-602, SW-V-605, and SW-V-608.

   If any of the operating pump trains: P-6-1 with SW-V-602 and SW-MOV-603; P-6-2 with SW-V-605; or P-6-3 with SW-V-608 and SW-MOV-609 were to fail, automatic initiation would start the standby train and operator action would isolate the failed train. For the condition of the standby pump failing to start, check valve to malfunction, or, in the case of Pump P-6-1 or P-6-3, the spurious operation of SW-MOV-603 or SW-MOV-609, the low service water header pressure alarm at the main control board would alert the operator.

2. Two of the three charging pumps, P-15-1 and P-15-3, require service water for drive oil cooling.

The service water flow is metered through oil coolers attached to the pumps' variable speed hydraulic drive units. SC-TCV-425 (P-15-1) and SW-TCV-426 (P-15-3) modulate to keep the drive oil at a predetermined operating temperature. SW-TCV-425 and SW-TCV-426 are Robershaw reverse-acting temperature regulating valves. These valves are of a "fail-safe" (fails full open) design. Charging Pump P-15-2 has a mechanical drive unit and does not require service water.

The primary auxiliary operator can mitigate anomalies in the operation of SW-TCV-425 or SW-TCV-426 with the installed bypass loop on each of the two control valves.

SUMMARY

The limiting condition for the Service Water System is the need for a continuous supply to P-15-1 and P-15-3 drive oil coolers. The drive manufacturer has confirmed degraded performance of the drive if operated without cooling water.

Pump train redundancy, automatic start of "standby" pump(s), and the fail-open design of the TCVs effectively mitigates the complete loss of cooling to the drive heat exchanger(s). The manufacturer has also reviewed the drive's operation with reduced cooling water flow (approximately 50%), i.e., the loss of an operating pump train and the failure of the standby train, when water inlet temperature dictates two train operation, and finds the condition satisfactory for operation. When the pond water temperature allows for single pump operation, two redundant (standby) trains are available for service.

This item is closed.

Generic Letter Item V

"Confirm that maintenance practices, operating and emergency procedures, and training that involves the service water system are adequate to ensure that safety-related equipment cooled by the service water system will function as intended and that operators of this equipment will perform effectively. This confirmation should include recent (within the past two years) reviews of practices, procedures, and training modules...."

Response

The maintenance practices for the Service Water System have been enhanced by adding a monthly performance test for the operating Component Cooling Heat Exchanger, monitoring the Shutdown Cooling and Low Pressure Surge Tank Cooling pumps with the Inservice Test Program and proceduralizing the Charging Pump fluid drive oil cooler cleaning to provide a service history.

The review of plant procedures is current, based on the biennial review program set forth in Administration Procedure (AP)-0001 Plant Procedures. Department Procedure (DP)-0550 Performance Based Training Program is used to ensure that training modules are up-to-date. The operators are trained and evaluated annually through classroom work and simulator practice in the normal, abnormal, and emergency operation of the service water's safety-related equipment. This item is closed.