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U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Perry Nuclear Power Plant
Docket No. 50-440
Implementation of Generic Letter 89-13,
"Service Water System Problems Affecting
Safety-Related Equipment"

Gentlemen:

Generic Letter 89-13 requested that Licensees evaluate the continuing capability of open-cycle service water systems which affect safety-related structures, systems or components.

The applicable system at the Perry Nuclear Power Plant (PNPP) is the Emergency Service Water (ESW) system. Although the Fire Protection System is not considered a service water system as defined in Generic Letter 89-13, it is discussed in the enclosure to this letter since it shares the ESW pump bay as a water source.

The response to Generic Letter 89-13 for PNPP (letter PY-CEI/NRR-1121L, dated January 26, 1990) documented the status of the program development and implementation at that time. The letter also anticipated a final letter, describing continuing programs for certain activities, by completion of the fourth refuel outage. At that time, the fourth refuel outage was scheduled for completion during the fourth quarter of 1993. The fourth refuel outage actually began February 5, 1994, and is expected to be completed during the second quarter of 1994.

The Attachment to this letter provides an update on the programs and is the final anticipated letter requested by Generic Letter 89-13.

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Operating Companies
Cleveland Electric Illuminating
Toledo Edison

The continuing program for periodic retesting of the heat exchangers is in the process of being substantially revised which will better assess heat exchanger performance, accurately accounting for the uncertainty of the results. The improved program is based upon:

- implementing test methods recommended by EPRI Report No. NP-7552, Heat Exchanger Performance Monitoring Guidelines; and

- utilizing methods prescribed in the ASME PTC 19.5 to statistically assess the test data as part of the uncertainty evaluation.

The revised program structures these methods such that testing is conducted and evaluated in a consistent manner. In the original response it was felt that the test frequencies could be adjusted by this fourth refueling outage based on previous tests. However, the present testing frequencies of once per cycle will be maintained until such time as the continuing program demonstrates that a reduced frequency is warranted. In no case will the testing be less frequent than every 5 years as specified in Generic Letter 89-13.

Furthermore, issues associated with Generic Letter 89-13 implementation as identified in NRC Information Notice 94-03 will be reviewed and addressed as part of PNPP's continuing monitoring program.

If you have questions or require additional information, please contact Henry Hegrat- Regulatory Affairs at (216) 280-5606.

Very truly yours,

for Robert A. Stratman

RAS:GGR:sc

Enclosure

cc: NRC Project Manager
NRC Resident Inspector Office
NRC Region III

IMPLEMENTATION OF GENERIC LETTER 89-13

Generic Letter 89-13 requested that Licensees evaluate the continuing capability of open-cycle service water systems which affect safety-related structures, systems or components. Recommended actions included:

I. Surveillance and control of biofouling
II. Heat exchanger performance testing
III. Periodic inspection and maintenance
IV. Confirmation of design basis
V. Adequacy of maintenance practices, operating and emergency procedures and training

Updates to NRC Recommended Actions contained in Generic Letter 89-13 are included below:

NRC Action 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. Initial activities should be completed before plant startup following the first refueling outage beginning 9 months or more after the date of this letter. All activities should be documented and all relevant documentation should be retained in appropriate plant records."

Enclosure 1 to Generic Letter 89-13 describes recommended programs to be used to address Action Item I. Four techniques are described: two for surveillance activities and two for control activities. Based on PNPP history, the original response addressed all four of the techniques (Surveillances A and D, Controls B and C).

A. **"The intake structure should be visually inspected, once per refueling cycle, for macroscopic biological fouling organisms (for example, ... Asiatic clams at freshwater plants), sediment, and corrosion. Inspections should be performed either by scuba divers or by dewatering the intake structure or by other comparable methods. Any fouling accumulations should be removed."**

Response

The original response letter (PY-CEI/NRR-1121L, dated January 26, 1990) confirmed that appropriate procedures were implemented for annual inspections, and this submittal reconfirms that no operational problems have resulted from mussel or clam shell accumulation.

B. "The service water system should be continuously (for example, during spawning) chlorinated (or equally effectively treated with another biocide) whenever the potential for macroscopic biological fouling exists (for example, ... Asiatic clams at freshwater plants). Chlorination or equally effective treatment is included for freshwater plants without clams because it can help prevent microbiologically influenced corrosion. However, the chlorination (or equally effective) treatment need not be as stringent for plants where the potential for macroscopic biological fouling species does not exist compared to those plants where it does. Precautions should be taken to obey Federal, State, and local environmental regulations regarding the use of biocides."

Response

Several alternative biocide treatments have been tested and evaluated at PNPP to determine their relative effectiveness in eliminating zebra mussels from safety-related plant systems (Asiatic clams have not yet been detected at the PNPP site). The chosen chemical treatment for the ESW system consists of intermittent, low-level chlorination at the ESW pump suction to control zebra mussel veligers. In addition, annual treatments of ESW intake water with a commercial molluscicide benefit both ESW and Fire Protection Systems, including the intake tunnel. This annual regimen was first placed into operation before the heavy entrainment period for zebra mussels in the summer of 1990 and will continue to be used as needed based on monitoring results.

ESW settlement monitors are placed each mussel season to monitor for mussel settlement and/or fouling. Settlement monitors are plexiglass enclosures with multiple vertical surfaces which provide a low flow region of representative intake water to facilitate the settlement of entrained veligers, if any are present, where they can be easily and consistently observed. This was also done for two years (1991-1992) on the fire protection system.

It has been concluded that water treatment for control of mussels adequately prevents mussel fouling in the ESW and Fire Protection Systems. Treatment effectiveness will continue to be evaluated and adjusted as required as part of the continuing program.

C. "Redundant and infrequently used cooling loops should be flushed and flow tested periodically at the maximum design flow to ensure that they are not fouled or clogged. Other components in the service water system should be tested on a regular schedule to ensure that they are not fouled or clogged. Service water cooling loops should be filled with chlorinated or equivalently treated water before lay-up. Systems that use raw service water as a source, such as some fire protection systems, should also be chlorinated or equally effectively treated before lay-up to help prevent microbiologically influenced corrosion. Precautions should be taken to obey Federal, State, and local environmental regulations regarding the use of biocides."

Response

The original response confirmed that appropriate procedures were in place and implemented. Implemented monitoring programs include quarterly ESW flow testing. Pressurization of the fire protection system (as discussed in the original response) was found to have no benefit regarding mussel control. As discussed in (B) above, the water treatment for control of mussels adequately prevents mussel fouling in the Fire Protection System.

Program improvements based on both internal and external inputs will continue to be made. For example, the recently issued NRC Information Notice 94-03 has indicated a need to address critical instrument lines and small bore piping in the program.

D. "Samples of water and substrate should be collected annually to determine if Asiatic clams have populated the water source. Water and substrate sampling is only necessary at freshwater plants that have not previously detected the presence of Asiatic clams in their source water bodies. If Asiatic clams are detected, utilities may discontinue this sampling activity if desired, and the chlorination (or equally effective) treatment program should be modified to be in agreement with paragraph B, above."

Response

Substrate sampling is performed on a quarterly basis to detect Asiatic clams and zebra mussels in accordance with a requirement in the PNPP Environmental Protection Plan (Appendix B to the Operating License). Asiatic clams have not yet been detected by substrate sampling; however, zebra mussels have been.

NRC Action 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. Both the initial test program and the periodic retest program should include heat exchangers connected to or cooled by one or more open-cycle systems as defined above...

A program acceptable to the NRC for heat exchanger testing is described in "Program for Testing Heat Transfer Capability" (Enclosure 2) [to the Generic Letter]. It should be noted that Enclosure 2 is provided as guidance for an acceptable program. An equally effective program to ensure satisfaction of the heat removal requirements of the service water system would also be acceptable..."

Response

The ESW system is the only system at PNPP within the scope of Generic Letter 89-13. The fire protection system shares the ESW pump bay as a water source, and applicable Generic Letter 89-13 actions have been discussed above. There are 10 ESW heat exchangers at PNPP within the scope of Generic Letter 89-13 which have been serviced as follows since the original response in January 1990 (2 refuel outages have been completed and a third is in progress since the original response):

Heat Exchanger Duty	Designation	Inspections	Cleanings	Tests
Residual Heat Removal (RHR)	A	2	2	7
	B	1	1	4
	C	2	2	7
	D	1	1	4
Emergency Closed Cooling (ECC)	A	1	1	4
	B	1	1	3
Diesel Jacket Cooling Water	Div. 1	1	1	3
	Div. 2	1	1	2
	Div. 3	-	-	3
High Pressure Core Spray Room Cooler	-	2	2	-

PNPP has recently concluded that much of the previous testing of the tabulated heat exchanger yielded inconclusive results due in part to problems with unreliable test methods, insufficient data acquisition, and analytical treatment of measurement uncertainty. However, based on the past and present test results that have been received plus the inspections to date, all of the subject heat exchangers have been and remain operable.

PNPP is in the process of implementing a substantially revised test program which will better assess heat exchanger performance, accurately accounting for the uncertainty of the results. The improved program is based upon:

- implementing test methods recommended by EPRI Report No. NP-7552, Heat Exchanger Performance Monitoring Guidelines; and

- utilizing methods prescribed in the ASME PTC 19.5 to statistically assess the test data as part of the uncertainty evaluation.

The program will structure these methods such that testing is conducted and evaluated in a consistent manner.

Heat exchanger testing using the improved program methods was completed on the four RHR heat exchangers at the start of the fourth refueling outage. The results of this testing were conclusive, and accounting for test uncertainty, showed these heat exchangers to be operating within the prescribed limits for fouling (i.e., within Updated Safety Analysis Report operating limits).

The original response committed to inspection of the High Pressure Core Spray (HPCS) room cooler in lieu of testing. With available improvements in methodology cited above, the HPCS room cooler will now be tested, or alternate monitoring methods will be determined in accordance with EPRI NP-7552.

PNPP will maintain the present testing frequencies of once per cycle until such time as our testing demonstrates that a reduced frequency is warranted. In no case will the testing be less frequent than every 5 years as specified in Generic Letter 89-13.

NRC Action Item III

"Ensure by 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...

This program should be established before plant startup following the first refueling outage beginning 9 months after the date of this letter. A description of the program and the results of these maintenance inspections should be documented. All relevant documentation should be retained in appropriate plant records."

Response

As stated in the original response, raw water systems are inspected for clams and mussels when open for maintenance or repair. In addition, each refueling outage, one of the Diesel Generator cooling water heat exchangers is opened exposing the inlet ESW piping. This section of piping is visually inspected, cleaned as necessary, and tested for evidence of MIC or other corrosion. This inspection is performed on a different Diesel Generator cooling water heat exchanger's piping every refueling outage, such that each heat exchanger's piping is inspected every third refuel outage. To date, none of these inspections have indicated any abnormal accumulation of biofouling agents, corrosion products, or silt which could have affected the performance of the ESW system. The refueling frequency for this inspection will continue until such time as it is determined that the interval can be extended without detrimental effects on system performance.

NRC Action Items IV and V

Implementation of required actions was described in letter PY-CEI/NRR-1121L, dated January 26, 1990.