FITZPATRICK - 24 MONTH OPERATING CYCLE

SERVICE WATER SYSTEM SURVEILLANCE TEST IMPROVEMENTS

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FOR INFORMATION ONLY

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24 MONTH OPERATING CYCLE
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I. Executive Summary

The Fitzpatrick plant will be operating on a 24 month operating cycle. This longer cycle length has a direct effect on surveillance testing and maintenance activities that are currently performed on an 18 month or refuel outage basis.

At Fitzpatrick, the Service Water System (SWS) is routinely inspected, tested, and maintained to provide high reliability. This system is subject to tests which verify the operability of two subsystems; the Emergency Service Water System (ESW), and the Residual Heat Removal Service Water System (RHRSW).

Test frequencies are mandated by the plants' technical specifications, operational requirements, inservice inspection schedules, IST Program, and Generic Letter 89-13.

This study evaluates the changes to surveillance requirements to support a nominal twenty four month operating cycle. Justification is provided, where appropriate, to support test extensions.

Our evaluations conclude that one of two current surveillance test intervals can be safely extended to support a nominal 24 month operating cycle.

II. Purpose

The Fitzpatrick plant will be operating on a 24 month operating cycle. To avoid either an 18 month surveillance outage or an extended mid-cycle outage, changes are required to the Service Water System surveillance test intervals prescribed by the Fitzpatrick Technical Specifications. Substantiating the impacts of the longer cycle length on the SWS surveillance, and test activities requires a comprehensive review of the system, its individual components, and the integrated effect of all test activities on operability.

III. System Description

The Service Water System consists of three subsystems: the Emergency Service Water System, the Normal Service Water System, and the RHR Service Water System. The three systems transfer heat from selected plant components to Lake Ontario during various modes of operation. Specific functions are described below.

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A. Emergency Service Water

The Emergency Service Water System (ESW) is a safety related system. It provides heat removal for Emergency Core Cooling System components and other equipment essential to safe reactor shutdown.

The system consists of two independent supply loops, each supplied by a 100% (loop capacity), motor driven, vertical wet pit pump. Each pump takes suction from a separate bay in the screenwell and discharges through independent strainers into separate supply headers. The system also includes five MOVs (two pump discharges, two test valves, and one cross-connect). Each train of the ESW system is required to supply raw water cooling to one train of the following safety related loads:

- EDG Jacket Water Heat Exchangers
- Electric Bay Unit Coolers
- Cable Tunnel/Switchgear Room Coolers
- Control Room and Relay Room Air Handling Units
- Crescent Area Unit Coolers

Each train also has the capability to supply raw water to several non-safety related loads.

The ESW system is provided with a keep-full system which maintains the system full of water when the pumps are not running. Makeup water is supplied by the SWS.

Twin basket strainers are located at each pump discharge to prevent plugging of component coolers. DP alarms annunciate in the CR on high strainer dp. System flow data can be displayed on the EPIC.

Normally, the ESW System is maintained in standby condition and operates automatically in response to an indicated loss of RBCLCW, or upon start of one or more Emergency Diesel Generator.

B. Normal Service Water

The Normal Service Water System (SWS) is not a nuclear safety related system. It acts as the ultimate heat sink for the TBCLCW (Turbine Building Closed Loop Cooling Water System) and the RBCLCW (Reactor Building Closed Loop Cooling Water System) during all planned operations. The system also provides a heat sink for plant AC units, mechanical vacuum pump and vacuum priming pump seal water coolers, and the steam jet air

ejectors precooler. Additionally, the system supplies water to the traveling screen water wash nozzles, backup seal water for the Service Water and Circulating Water pumps, backup motor bearing cooling water to the Service Water pumps, Condenser Vacuum Priming System Drain Tank makeup, and the Makeup Water Treatment System.

Three motor driven, 50% (system capacity), vertical wet pit pumps, arranged in parallel, take suction from the screenwell and discharge through separate automatic backwash strainers to a common supply header.

Normally, two pumps operate continuously. The running pump(s) are operated manually from the CR. The standby pump starts automatically on low service water header pressure or on trip of a running pump.

C. Residual Heat Removal Service Water System

The Residual Heat Removal Service Water (RHRSW) System is a safety related system. It acts as the ultimate heat sink for the RHR heat exchangers during normal and post accident conditions. The system also provides an additional source of water for post-accident containment flooding.

Two 100% capacity independent loops are provided for redundancy. Only one loop is necessary for safe shutdown. Each loop consists of two motor driven vertical pumps, one twin basket strainer, and three MOVs (one HX outlet isolation, and two cross-connect isolations).

A twin basket strainer is located downstream of each pump pair, in a common supply header, to prevent plugging of system components. DP alarms annunciate in the CR on high strainer dp.

Total flow through the inlet header to each RHR heat exchanger is monitored and indicated in the CR.

Normally the system is maintained in a standby mode. The system is manually actuated in the event of a LOCA.

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IV. Surveillance Test Evaluations

A. Surveillance Tests

The operability of systems and components required by plant safety analyses is established by the surveillance requirements contained in the JAF Technical Specifications. Service Water System surveillance and calibration activities were thoroughly evaluated to determine the impacts of a 24 month operating cycle. The longer cycle length requires an extension of the ESW Logic System Functional Test and Simulated Automatic Actuation Test (ST-08E) and the RHRSW Pump Motor Cooling Water Solenoid Valve and RHRSW Loop Crosstie Drain Solenoid Valve Test (ST-2AA).

B. Surveillance Test Extension Justifications

The decision to extend surveillance test intervals considered the function of the test in determining overall system availability.

This consideration was applied to an evaluation of Fitzpatrick Service Water System (SWS) surveillance tests.

The following Service Water System surveillance tests are presently required to be performed once per operating cycle (18 months):

1. ST-08E ESW Logic System Functional Test and Simulated Automatic Actuation Test (Rev 14).

   The purpose of this procedure is to demonstrate RBCLC pump discharge header pressure switches and ESW Lockout Matrix Relays will cause ESW pumps to start and RBCLC and ESW motor operated valves (MOVs) to reposition to an ESW injection lineup.

   Ten tests (1987 to 1993) were reviewed. Two problems were noted. Both problems dealt with contacts 3 & 4, on ESW Lockout Matrix Logic Relay 63A1ESWB04, failing to operate. These contacts are required to operate and automatically open 46MOV-101B (ESW System B Injection Valve). A work request (71435) was written to troubleshoot this problem. The relay was removed from service, tested, and operated correctly. A decision was made to replace the relay with a new one. Surveillance testing frequency was increased to quarterly. Seven consecutive tests were performed satisfactorily. The

testing frequency was returned to once per operating cycle.

There are no documented failures of similar (General Electric HFA) relays used in this system. All other system logic functions operated satisfactorily during the test periods reviewed. The November, 1988 test failure appears to be a random and isolated occurrence. The GE HFA relays have a history of good performance at the Fitzpatrick Plant. Additionally, HFA relays are checked on-line during channel functional testing of other systems (eg., RPS and ECCS instrument channel functional tests) and any common cause type failures of these relays would be detected and investigated.

Extension of this test to 24 months will not negatively affect system performance or reliability because:

- the relays used by this logic matrix have proven to be reliable as documented by numerous tests, and
- all pumps, and valves operated by this system are frequently tested with the plant on line (flow rate tests are performed quarterly, pump and MOV operability is checked monthly, instrumentation is checked both daily and quarterly and calibrated quarterly).

Note: ISP-32 "RHR and RHR Service Water Flow Loop A and B Calibration" and ISP-40 "Remote Shutdown RHR B and RHR Service Water Flow Instrument Calibration" will be covered by the Accident monitoring instrumentation evaluation.

2. ST-2AA RHRSW Pump Motor Cooling Water Solenoid Valve and RHRSW Loop Crosstie Drain Solenoid Valve Test (IST) (Rv 2)

The purpose of this procedure is to demonstrate the operability of the RHRSW loop crosstie drain solenoid valves and that each RHRSW pump motor cooling water solenoid valve is capable of passing greater than or equal to 5 gpm.

The RHRSW Loop Crosstie Drain Solenoid valves (10SOV-150A & B) are designed to keep the line between their respective RHRSW to RHR crosstie MOVs (10MOV-148A & B and 149A & B) drained during normal operation. The MOVs are

normally closed and the SOVs are normally open. When it is necessary to cross connect the RHRSW and RHR systems by opening the MOVs, the respective loop drain SOV automatically closes (allowing the line to fill). When the MOVs are closed, the SOV opens and drains the line. The purpose of keeping this line drained is an effort to prevent RHRSW (lake water) from leaking into the RHR system during normal operations. In addition to ensuring SOV operability, drainage flow is monitored to ensure the drain line is not plugging up with silt (JSEM-92-072). It was agreed in a memo (JTS-92-0751) that observation of drainage flow would be required only once per operating cycle. It appears that these two SOVs continue to clog and block drainage of this line. A modification is scheduled for the 1994 refueling outage to solve this problem. **Based on the probability that these solenoids are continuing to clog whenever RHRSW is flowing through them, the current 18 month frequency is probably not sufficient to ensure that they are performing the function they were installed to perform.**

Pending approval and implementation of this modification, extension of this portion of the test is not justified.

The RHRSW Pump Motor Cooling Water Solenoid Valves (10SOV-101A, B, C, & D) are designed to provide a continuous flow path for RHRSW pump bearings when the pumps are running. The SOVs are normally closed, and open automatically when their respective pump is started. Seven tests were reviewed, all performed during 1992, some for post maintenance testing. Test results were satisfactory in all cases.

Present information indicates that extending this portion of the test to 24 months will not have a negative impact on RHRSW system performance or reliability.

V. Summary and Conclusions

1. To support the 24 month fuel cycle, extension of the ESW Logic System Functional Test and Simulated Automatic Actuation Test (ST-8E) can be safely extended for the following reasons: a) a review of past performance indicates that the components making up the logic system are reliable, b) on-line testing and calibration of individual components actuated by this system is performed and will provide early indication of functional degradation.

2. The RHRSW Pump Motor Cooling Water Solenoid Valve and RHRSW Loop Crosstie Drain Solenoid Valve Test (ST-2AA) should not be extended because a review of past performance indicates that there is a probability that the RHRSW Loop Crosstie Drain Solenoid Valves will clog each time flow is initiated through the valves. Potential clogging of these valves may occur during performance of ST-2A which is performed quarterly. There is no requirement to check flow through these lines during this test. JAF should reevaluate adding this requirement to ST-2A until a modification can remedy the clogging problem.

3. Based on this review one technical specification change will be required. Section 4.11.D.1.a, under the column labeled frequency, should be changed from "Each operating cycle" to "Once every 24 months." Refer to the markup page contained in Attachment A.

VI. References

1. James A. Fitzpatrick Nuclear Power Plant Final safety Analysis.

2. James A. Fitzpatrick Nuclear Power Plant Technical Specifications.

3. DBD-046, Rev. 0, James A. Fitzpatrick Nuclear Power Plant Design Bases Document for the Normal Service Water, Emergency Service Water, and Residual Heat Removal Service Water Systems.

4. JSEM-92-072, Investigation of Silt Buildup in RHRSW to RHR Crosstie.

5. JTS-92-0751, Observation of Drainage Flow From the RHRSW to RHR Crosstie.

6. ST-08E, Rv 14, ESW Logic System Functional Test and Simulated Automatic Actuation Test.

7. ST-2AA, Rv 2, RHRSW Pump Motor Cooling Water Solenoid Valve and RHRSW Loop Crosstie Drain Solenoid Valve Test (IST).

8. ESK-11AC, Elementary Diagram - 125VDC Circuit Lockout Matrix for ESW System MOV.

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ATTACHMENT A

TECHNICAL SPECIFICATION CHANGES

. (cont'd)

D. Emergency Service Water System

1. To ensure adequate equipment and area cooling, both ESW systems shall be operable when the requirements of specification 3.5.A and 3.5.B must be satisfied, except as specified below in specification 3.11.D.2.

4.11 (Cont'd)

D. Emergency Service Water System

1. Surveillance of the ESW system shall be performed as follows:

Item	Frequency
a. Simulated Automatic Actuation Test	Each operating cycle (Once every 24 months)
b. Flow Rate Test - ESW pumps shall deliver at least 3,250 gpm against a system head corresponding to a total pump head of ≥ 80 psi, as determined from the pump certification curve by measuring the pump shutoff head which shall be ≥ 117 psi.	Once/ 3 months
c. Pump Operability	Once/month
d. Motor Operated Valves	Once/month

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