ENCLOSURE 2

Letter from C. A. Schrock (WPSC)

To

Mr. John B. Martin (NRC)

Dated

October 13, 1993

KEWAUNEE NUCLEAR POWER PLANT

SAFETY SYSTEM FUNCTIONAL INSPECTION (SSFI)

SERVICE WATER (SYSTEM 02 - SW)

PUBLIC SERVICE

WISCONSIN PUBLIC SERVICE

Safety System Functional Inspection

of

Kewaunee Nuclear Power Plant

Service Water

System 02 (SW)

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TABLE OF CONTENTS

Table of Contents

SUMMARY

Executive Summary

A self-initiated Safety System Functional Inspection (SSFI) of the Kewaunee Nuclear Power Plant (KNPP) Service Water System (SW) was conducted on January 8 through February 22, 1990. Programmatic and technical concerns, discrepancies and unresolved questions were documented by the inspection team in 160 Documentation Sheets which resulted in 32 Requests for Information (RIs) and 430 minor discrepancies.

Implementation team activities are underway to validate and disposition each RI in accordance with the SSFI Methodology and Plan. Review and evaluation of the minor discrepancies will occur concurrently by the Inspection Team members retained on site.

The inspection scope and findings were summarized in detail during an exit meeting on February 21, 1990.

The functional inspection of the SW System confirms a generally sound system design to which specific recommendations for improvements will be offered. Some of the RIs will improve system operation and reliability. Others, upon closer examination by the Implementation Team, will result in a refined understanding of system design and improved documentation, but will not result in substantial changes to system design or operation.

While the inspection findings supported the team conclusion that the system is operable and capable of performing its intended safety function, concerns were identified in the following areas:

- Single Pump Operation,
- Forebay Circulating Water Level Trip,
- Lack of Controlled Calculations,
- Uncontrolled Maintenance Activities,
- Incorrect Throttle Valve Positions on Area Fan Coil Units,
- ISI/IST Inconsistencies, and
- Component Design Deficiencies.

SECTION 1.0

1.0 Purpose

A Safety System Functional Inspection (SSFI) of the SW System was performed to assess the functionality and operational readiness of the system. This was accomplished by determining if the system has been designed, installed, tested, operated, maintained and managed in accordance with the original design basis and applicable regulations, standards and commitments.

The secondary purpose of the SSFI was to provide information necessary to respond to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment."

SECTION 2.0

2.0 Scope

Boundaries of the SW System included all safety-related components and system interfaces on drawings M202 Sheets 1-3, M218, M547, M588, M606 and K100-19.

2.1 Team Make Up

The Team Leader was a Wisconsin Public Service Corporation staff member with extensive experience in nuclear regulation, mechanical, and instrument and control engineering reviews. He was responsible for coordination of day to day activities of Inspection Team members and for review, approval and accuracy of the RIs which were issued.

The Assistant Team Leader was a United Energy Services Corporation staff member with extensive prior vertical audit experience. He was responsible for reviewing and dispositioning Documentation Sheets, and reviewing RIs.

The SSFI team was divided into eight functional areas with responsibilities assigned as follows:

- Mechanical Design - Assess the technical adequacy of the system mechanical design and modification packages including supporting assumptions, calculations, and analyses.
- Thermohydraulic Design - Assess the technical adequacy of system thermohydraulic design including system and component pressure drop calculations, heat transfer area, fouling factors, heat transfer coefficients, pump head characteristics and other areas pertaining to thermohydraulic performance.
- Electrical Design - Assess the technical adequacy of the system design and modification packages including supporting assumptions, calculations, and analyses. Review wiring schematics and logic drawings to assess technical adequacy and configuration control.
- Operations - Assess the adequacy of operational activities related to the SW System and supporting systems. This area included the normal and emergency operating procedures, operator training, and system configuration controls.
- Maintenance - Assess the adequacy of corrective and preventive maintenance and maintenance training in assuring the system was maintained in a functional state and capable of meeting its design basis requirements.
- Testing - Assess the adequacy of preoperational, surveillance, and post-maintenance and post-modification testing to demonstrate that the system can perform its intended function under the full range of operating conditions.
- Walkdown - Assess the adequacy of management controls over, and in support of, system functionality and operability. This includes a detailed system walkdown and 100% verification of component name plate data.

- Quality Assurance - Assess the adequacy of quality controls and the involvement and awareness of the Quality Assurance organization in verifying the operational readiness of the SW System. This includes vendor controls, procurement activities and corrective action programs.

The SSFI Program Methodology and Plan was used to assess the functionality of the SW System. The program utilized vertical audit techniques with use of horizontal assessment techniques where programmatic assessment was needed.

The team reviewed numerous documents associated with the system including design and modification packages, procedures, QA audits, work requests, I&E Notices, commitment tracking forms, Regulatory Guides, and training materials. A comprehensive list of documents reviewed is contained in the Documents section of this report. SSFI methodology also utilized detailed system walkdowns, observation of ongoing activities including testing, maintenance, operations, training and interviews of personnel.

Daily SSFI team meetings were held to discuss concerns and findings between the various team members. These daily meetings promoted team synergism and allowed team members to pass concerns to other functional area team members for pursuit.

All areas reviewed were documented on Documentation Sheets. Significant concerns or questions requiring additional information, response, or corrective actions were transferred from Documentation Sheets to RI forms and provided to the Implementation Team for validation and disposition. Concerns of lesser significance are recorded and tracked to resolution as minor discrepancies.

SECTION 3.0

3.0 Overall Results and Conclusions

A total of 32 RIs were generated during the course of the inspection. This inspection has concluded that the system is capable of performing its design basis function. Specific areas reviewed and concerns follow.

3.1 Mechanical Design Summary

The Mechanical Design review of the SW System included a review of the system and its major components to meet their functional requirements.

The screen house; forebay; emergency supply line; SW pumps and strainers; diesel generator, component cooling and spent fuel pool heat exchangers; fan coolers; and associated piping were reviewed.

Component reviews included critical performance parameters (levels, temperatures, pressures, flows, and heat transfer capacity); code requirements; materials; seismic design; safety classification; and required operating modes.

Fire protection and Appendix R, flooding analysis, pipe support design, and two-over-one considerations were not included in this review. Non-safety related components were not, in general, reviewed.

The concerns identified in the mechanical design review are in three general areas:

1. Documentation inconsistencies and inadequacies,
2. Design control inadequacies, and
3. Original equipment not meeting specified capabilities.

3.1.1 Documentation Inconsistencies and Inadequacies

The Spent Fuel Pool (SFP) Cooling System Description has not been updated to reflect changes to spent fuel storage capacity and heat load, which were done in 1973. The USAR had not been updated for this purpose until 1989.

Certain critical design data were not obtained from vendors. SW pump required submergence was neither specified, nor supplied. Net Positive Suction Head (NPSH) documentation required by the purchase order (PO), was not supplied. A Tubular Exchanger Manufacturer's Association (TEMA) data sheet was specified for the component cooling heat exchangers, but not supplied.

3.1.2 Design Control

The QA classification of certain SW lines, notably strainer backwash lines and branches, which are isolatable only by manual valves, may not be consistent with the Operational Quality Assurance Program (OQAP) requirements.

Forebay alarm and trip setpoints may not adequately consider required submergence and NPSH for the SW pumps. However, operational data does support pump operability at the present trip setpoint.

SW strainers were downgraded from QA-1 to QA-2, based on the ability to perform manual actions. However, procedures do not address required actions; necessary tools were not available in the screen house; structural interferences may impede manual operation; and seismic analysis of one component could not be located.

The screen house roof ventilation dampers fail open. This is an acceptable failure mode in a hot or temperate climate, but may present problems at very low temperatures. The design appears not to have addressed the consequences of opening the dampers in cold weather.

As noted above, the SW strainer active functions were downgraded, based on the ability to perform manual operations. A seismic event could, however, conceivably bind the overhung motor shaft and prevent manual rotation of the strainer. This configuration was not considered in the vendor's seismic analysis. Integrity of the SW strainer pressure boundary is not in question.

In 1989 an effort was initiated to determine the acceptability of operating the plant with SW supply above 66°F. The evaluation of the Component Cooling System did not fully address the effects of elevated temperature on all components. The evaluation of area temperatures assumed a 104°F acceptance criterion. Justification for elevated temperatures was limited to motors, ignoring other components such as switch gear and solenoid valves. Examination of area fan coil unit design and installation revealed that, under design conditions, SW and air flows to some units may result in area temperatures exceeding 104°F.

3.1.3 Original Equipment Supplied With Less Than Specified Capabilities

Although TEMA data sheets indicate adequate performance, both the Component Cooling Water (CCW) and SFP heat exchangers were supplied with less than specified heat transfer area. The area of the CCW heat exchanger appears to have been miscalculated. Although the service heat transfer coefficient of the SFP heat exchanger is consistent with the supplied heat transfer area, it is not consistent with the clean coefficient and design fouling factors.

In addition to the fact that CCW and SFP heat exchangers were supplied slightly undersized, inspections in 1987 and 1988 revealed fouling, tube blockage, and corrosion which resulted in tube plugging. Despite the obvious degradation, no evaluations were performed to determine these effects on heat exchanger performance.

3.2 Electrical Design Summary

The major subjects reviewed in the Electrical Design area include indentification of installed equipment; interconnecting wiring design; application of protection devices such as fuses, motor heaters, and molded-case circuit breakers; delivery of adequate current and voltage to electrical devices; sizing of electrical drives to satisfy the mechanical requirements; application of test results information; and review of changes from original design to present installations.

Review of the electrical design resulted in the recognition of many documentation errors, but with a general perception of acceptable and operable design, resulting in only two RIs. Most of the errors found can be placed in general categories, such as conductor wiremarks are not continuous for tracing terminations; cables which change numbers between reference drawings; cable connections which are drafted incorrectly on one end; and referenced drawings which do not exist or are incorrect. Many of the vendor (foreign) drawings referenced have not been revised to "as-built" condition.

The problem which was documented as an RI is that the SW pump motors winding temperature is not monitored during periods of high pump flow such as during single pump operation.

During the course of this review, several programs which can be handled on a generic basis were noted as needing revision, or formalization.

1. The Power Plant Facilities Information System (PPFIS) was found to be about 80% accurate.

2. Proceduralized electrical calculations are needed to verify protection settings, parameters for operating equipment, sizing of electrical drive equipment to meet the mechanical requirements, etc. A central index and depository for calculations would also eliminate many errors in baseline information, and data used in formal reports.

3. Several motor operated valve tests reviewed did not require voltage readings and thus the test current readings were not comparable to standard baseline information. The baseline information offered in the test procedures do not agree with equipment nameplate data, nor are they established by calculations which could be located.

4. Drawing control appears to be weak as many drawings do not reflect the "as-built condition." Many drawings are not referenced to other design drawings and vendor (foreign) drawings no longer match the current plant configuration. It is recommended that they should be eliminated as active reference drawings and be used for historical reference only.

5. No procedures were found for establishing a variety of engineering design verification and modification practices. Among these are electrical cable sizing through voltage drop calculations; equipment operating parameter verification when equipment design is not similar to the bus voltages; requirements for degraded bus voltages overload heater selection; selection and coordination of molded-case circuit

breakers; and selection and coordination with other system protective devices.

6. Changes in electrical design have been explicit regarding their installation but lacking in design basis documentation.

3.3 Maintenance Summary

The scope of the maintenance review of the SW System included procedures and directives related to preventative, corrective, and general maintenance; machinery history; vendor technical manuals; Technical Specification; visual observation of system equipment; and discussions with the plant Maintenance Group staff.

The review of procedures was performed to determine if the vendor technical manual recommendations regarding maintenance were appropriately addressed, and if the procedure was adequate for the designated task. Concerns were identified and documented regarding procedural requirements for review of system logic and electrical drawings for tasks performed by mechanical maintenance personnel; the appropriateness, or need, of including system lineups for isolation and restoration of components within the procedure; inconsistencies in lubrication frequencies between maintenance procedures, vendor technical manuals, and grease cards.

The review of machinery history included completed maintenance work requests and a "Nuclear Plant Reliability Data System" report, dated January 12, 1990. The time period of 1985-1989 inclusive was selected for examination. The review resulted in the conclusion that the corrective and preventative maintenance activities have provided, with one notable exception, a high degree of equipment reliability. The exception concerns the SW check valve inside containment, SW-6011, which provides a containment penetration isolation function. It has required maintenance after each local leak rate test for the past four years. It was also determined by discussion with cognizant plant personnel that corrective action to prevent recurrence has been initiated, but not finalized.

The review of vendor technical manuals was limited to the three series of manuals provided for the SW pumps. The scope of the review was not increased because the preliminary findings were consistent with those identified by QA audits and other review groups. It was also learned that corporate management has inititated actions to resolve the identified inadequacies regarding control of vendor technical manuals.

The walkdown of the accessible portions of the SW System indicated that the system is well maintained and functional. This is further evidenced by the absence of any open work requests which require action prior to a scheduled plant outage.

The overall assessment of the maintenance functional area is that the SW System has been maintained in a high state of readiness to perform its intended safety functions.

3.4 Operations Summary

The Operations inspection consisted of a review of normal, abnormal and emergency operating procedures; system related reference material; system walkdowns; and interviews with plant personnel. The inspection was performed to determine if the SW System is being operated within design limitations and if operational activities are being conducted in accordance with adequate procedural guidance.

The steady state operation of the SW System is changed only to a limited degree. Routine operator actions consist of rotating stand-by pumps into service and verifying seal water filter cleanliness. Rarely does the system deviate from three pump operation which is sufficient to maintain system pressure greater than 90 psig as prescribed by procedure.

Routine operator actions were found to be proceduralized. Operation of standby equipment was clearly defined as was as the requirement to check filter cleanliness. A discrepancy was identified in that the procedure lacked detailed guidance on how and when to change filters. Based upon interviews conducted with Operations personnel, this is not felt to be a significant problem.

A review and walkdown of the system startup checklist, N-SW-02-CL, found several discrepancies which were considered to be minor in nature. The Operations walkdown demonstrated that the procedure can be performed as written.

Two equipment deficiencies were noted during the start-up checklist walkdown. First, dirty bullseyes (flow indicating devices) were found in the SW line to the Safety Injection (SI) pumps. Second, the containment fan coil unit SW header leakage alarm has been removed from service for an extended period of time. Neither deficiency has an impact on the operability of the SW System.

The dirty bullseyes are of concern because they inhibit the identification of SW flow from the SI pumps required by the In Service Testing (IST) plan. Further investigation into this subject revealed a lack of awareness by Operations personnel. The procedure used to verify flow does not document flow as an acceptance criteria. Operationally, the bullseye findings are not considered significant. However, a RI was generated in the SSFI testing area regarding acceptance criteria requirements.

The differential pressure alarm, found out-of-service, has no direct impact on the operability of the SW System. The USAR requires this equipment to detect SW leakage into containment. An RI was generated because there was no evidence that a safety evaluation was performed to remove the alarm from service.

An RI was also generated because no procedural guidance to Operating personnel is available for required action during high lake water temperature or low forebay level.

Also examined was the ability to manually operate the SW pump rotating strainers and backwash valves. An RI was generated because no procedural guidance is available.

The final RI in the Operations area resulted because the basis for the SW only (no circulating water flow) dilution curves could not be located. Additionally, no procedure exists to regenerate the curves when the pumps are rebuilt or rebaselined in accordance with the requirements of ASME Section XI.

Overall, the SW System is being operated within the bounds of its design under normal operating conditions. The several deficiencies noted in the operating procedures are not considered significant to safety and the RIs generated in this functional area do not have an immediate impact on the operation of the SW System.

3.5 Testing Summary

The scope of the testing evaluation of the SW System included a review of surveillance test procedures, preoperational tests, construction tests, post-modification testing, post-maintenance testing, and calibration/testing of system instrumentation.

The evaluation of SW surveillance procedures included a review of test adequacy in satisfying plant Technical Specifications and ASME Section XI Code requirements. There were concerns relative to the method used in the performance of SP 02-138, SW Pump and Valve Test - IST, Pump Flow Test. Each pump is tested by establishing a mini-flow recirculation path through its strainer backwash line. By using a fixed-resistance flow path the flow rate is assumed to be constant and pump differential pressure is taken as the performance indicator. This method does not allow for a true indication of pump performance or hydraulic degradation because line resistance is a function of pipe scaling.

Another concern is that an error exists in the calculation of the pumps' total developed head performed in SP 02-138. Correcting this error reveals that the pumps may be tested at a flow rate below the minimum flow requirement as stated by the pump vendor. Also, the upper limit allowed by the procedure could potentially dead head the pump and still satisfy the acceptance criteria for pump discharge pressure.

Review of system surveillance procedures identified concerns with the adequacy of test acceptance criteria contained in Preventive Maintenance Procedures (PMP). Specifically, the acceptance criteria in certain PMPs does not require verification of valve position indication as required by ASME Section XI, IWV-3300.

In the review of SP 02-249 SW System In Service Inspection (ISI) Pressure Test, there is a concern relating to the drawings and the determination of test boundaries. ISI boundary drawing M202 and procedure sketches contain errors which are known but not being corrected.

The SW pre-operational test was reviewed for logic and pump flow testing. Data analyzed in the pump flow test did not agree with data obtained from a plant test performed in 1987. From this assessment, it was determined that the pre-operational test does not clearly establish system performance. Currently there is no testing that monitors system/component flow rates or performance.

Overall, SW System testing is considered adequate to demonstrate that the SW System meets Technical Specification operability requirements. Plans are currently being developed to implement programs to satisfy Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." When these actions are completed, periodic testing of heat exchanger capabilities will allow further monitoring the performance of the SW System.

3.6 Quality Assurance Summary

Quality aspects of various corporate and plant programs were reviewed. Major areas reviewed were design control, document control, procurement, QA oversight, maintenance, and procedure reviews. With respect to procurement, maintenance, and procedure reviews, SW components or those cooled by the system were selected and their appropriate records were reviewed. The selected components were the SW pumps (five total), SW pump discharge check valves, CCW heat exchangers, Control Room chiller condenser and the SFP heat exchanger. Design and document controls were examined for generic concerns.

Procurement controls were evaluated by review of POs for various SW pump spare parts. Quality requirements included in the POs, along with documented manufacturer's site surveillance and inspection activities, and QA audits provide adequate assurance that quality products are being specified and procured.

Maintenance activities were reviewed to verify controls are in place to assure the quality levels of parts and components are sustained throughout their service life. During this review, one issue arose concerning uncontrolled welding performed in 1985. Further review indicated that this concern was of historical interest only, and that current QC and procedural controls are adequate to prevent a recurrence of this issue.

During the course of the design and document control reviews, the following issues were identified that warrant further investigation and resolution:

1. Calculations are not being adequately controlled with respect to identification, indexing and retrievability; interface with other organizations; format; and methodology. Also, calculations to support activities other than DCRs, are not controlled by any specific program.

2. Temporary Change controls are insufficient to prevent temporary changes from being left in place indefinitely.

3. Document control is not fully proceduralized. Procedures currently only exist for drawing control and receipt and revision of vendor technical manuals.

4. Requirements for integrating multidisciplinary design groups are not clearly delineated in engineering procedures.

Quality Assurance oversight was examined briefly through review of three audits involving control of documents and drawings, design changes and field modifications. These audits were found to be satisfactory. Independent Technical Reviews are also performed, but none were reviewed. Inquiries determined that an independent review of the design change process is currently in progress.

3.7 Walkdown Summary

The walkdown of the SW System, verified the configuration of readily accessible system equipment. A set of system flow diagrams were yellow-lined and Documentation Sheets describing system material conditions and discrepancies were written.

A PPFIS verification conducted during the 1989 refueling outage corrected the nameplate information for mechanical components and was available for this inspection. The verification had been conducted on an area by area basis and actual system configuration was not confirmed until this inspection.

Field verifications of data compiled by the Electrical Design Inspector were completed on a selected basis. Information for all motor operated components was compared to the actual field data and subsequently evaluated by The Design Inspector.

3.8 Fluid Mechanics Summary

The scope of the Fluid Mechanics activities included review of existing hydraulic calculations which support the draft version of the System Design Criteria, review of preoperational and 1987 SW Train A flow tests, and review of selected test and surveillance procedures which affect system flow capabilities.

A concern exists with respect to System Design Criteria open item 2.6.4 in that the use of the "non-validated" SW flow requirements creates uncertainties in existing flow calculations and component flow margins. In addition, concern exists because not all calculations pertinent to this system have been included in the document.

Calculations supporting the System Design Criteria were examined in depth. These calculations were primarily in support of the 1985 plant modifications covering installation of Auxiliary Building fan coil units. Review of these calculations generated minor concerns relating to possible use of non-conservative assumptions and/or inconsistent assumptions. Another concern was generated regarding the lack of communication of calculation results for incorporation into a test procedure. This ultimately produced improper field adjustment of SW flow to newly installed fan coil units.

Review of the 1987 SW Train A flow test results raised a concern as to the adequacy of the pump head-flow characteristics to support the operating mode with a single SW pump. Based upon recorded single pump operation test data, a calculation was performed to approximate the SW pressure at the containment inlet penetrations. Results indicate that SW pressure could be considerably below peak LOCA containment pressure. Also, the ability of a single pump to supply design-required flow rates to all user components during an SI scenario is questionable. No verified calculation is available which details the SW flow supplied to each end user and assesses, if appropriate, the consequences of diminished flows. Therefore, a system operability concern exists during single SW pump operation.

3.9 Specific Corrective Actions

In addition to the SSFI examination of system design and operation, WPSC has initiated other specific actions to improve system reliability and the state of knowledge of component performance. Specific actions include:

- Chemical Cleaning of System Piping,
- Radiography of Piping to Identify Flow Restrictions, and
- Instrumentation of Heat Exchangers to Monitor Performance.

A detailed description of these actions is contained in Section 4.0 of this report.

3.10 Conclusion

The SSFI of the SW System confirms a generally sound system design to which specific recommendations for improvements will be offered. A total of 32 RIs were written, some of which will improve system operation and reliability. Others, upon closer examination by the Implementation Team, will result in a refined understanding of system design and improved documentation, but will not result in substantial changes to system design or operation.

SECTION 4.0

4.0 Generic Concerns

Prior to the SW SSFI, numerous actions had already been initiated relating to potential SW System problems. Several different factors led to these actions including:

- NRC Generic Letter 89-13
- INPO SOER 84-1
- The recognized need to address the impact of elevated SW temperatures
- The identification of Zebra Mussels in the Great Lakes

These actions were initiated in several different departments but were also coordinated under a SW working group. This group was established with the purpose of developing an integrated and planned approach for addressing regulatory and operational concerns.

The following are the actions taken or currently in progress and the results of those actions:

1. SW supplied safety-related heat exchangers are being equipped with instrumentation for performance testing. These instrument installations will be started in the 1990 outage and completed during the following year. The performance information collected will be used to evaluate the operational impacts on safety-related equipment.

2. A study of the SW System is currently in progress to evaluate known and potential system problems and to propose corrective actions or system improvements. Some examples of the areas being investigated are sand and silt deposition, material corrosion problems, and Zebra Mussel infestation.

   Examples of possible suggested actions are intake structure modifications or maintenance activities to reduce particulate carry over; installation of backwash capabilities on heat exchangers; pipe replacements or maintenance; and development of an action plan or installation of hardware to address a future Zebra Mussel infestation.

3. Inspections and analysis of SW System piping has been initiated through radiology and removing sections of pipe. The removed pipe sections were sent to chemical cleaning vendors to perform a chemical analysis, followed by testing of their cleaning process. Initially the pipe sections showed lower corrosion product loading than was expected. However, the most recent Control Room chiller return sample contained a larger deposit loading than expected. More important, a pressure tap line was found to be significantly plugged. Samples of this section were again sent to labs to be tested for microbiological corrosion (MIC).

   Radiography was performed on several locations to provide additional information for chemical cleaning evaluations. The radiographs provide gross indication of corrosion product deposition. They are also able to identify any pitting of the pipe. Examinations of these radiographs identified pitting in the Control Room chiller return line. The pits appear to penetrate about 50 percent through-wall. The samples being sent out for MIC analysis were a result of this finding.

Currently, plans are to initiate a large scale radiography program looking for deposits and pitting. It is likely that this will develop into an ongoing program as part of our Generic Letter response.

4. Chemical cleaning of SW pipe will be performed this outage. Nine loops containing safety-related heat exchangers have been identified as candidates for cleaning. It is anticipated that chemical cleaning will be performed on three to five of these loops during the 1990 outage. Also, during this outage, tie-ins and isolation valves will be installed in all nine loops to allow the segmented cleaning approach.

5. Last summer, a study of plant operation at elevated SW temperatures was commissioned. To ensure that all possible conditions were addressed, a SW temperature of 85°F was used as the base temperature. In some cases where potential shortfalls were identified, lower temperatures were considered. Several areas requiring further study were identified including the impact of increasing CCW temperature, Emergency Diesel Generator cooler requirements, and verification of design or analysis values. The first two concerns will be addressed through further design basis investigation. The third will be addressed through planned flow testing and computer modeling.

   The most significant finding of this study involved areas containing safety-related equipment which exceeded the 104°F analyzed post-accident temperature. This will be addressed through revisions to the EQ plan or evaluation of other (non-EQ) electrical equipment using new area temperatures of 120°F. These reviews will be completed as necessary to allow operation through this summer. In the long term, a new SW design basis using a temperature in the 78 to 80°F range will be established.

In addition to these already in-progress actions, the implementation activities for the SSFI findings will be incorporated into the integrated program. It is expected that this approach will result in the most comprehensive and efficient resolution to SW System issues.

5.0 Specific Concerns

The following specific concerns were identified by the Inspection Team. The detailed RIs are provided in the last section of the report under RIs. All RIs presented in this report represent preliminary identification of potential concerns. Validation of RIs by the Implementation Team is ongoing in accordance with the SSFI Methodology and Plan. Therefore, it is expected that additional information provided during the validation process may alleviate some of the concerns.

RI Number	Title
R-02-01A	OPS - NO OPERATOR GUIDANCE TO IDENTIFY CRITICAL SW OPERATING PARAMETERS
R-02-02A	SERVICE WATER PUMP IST ON MINI-FLOW RECIRCULATION
R-02-02B	REFERENCE VALUES FOR SERVICE WATER PUMPS AFTER PUMP REPLACEMENT
R-02-03A	MECHANICAL DESIGN
R-02-04A	MINIMUM TEMPERATURE IN THE SCREEN HOUSE
R-02-05A	QUALITY OF THE SPARE SW PUMP (S/N VTP-27736)
R-02-06A	SERVICE WATER PUMP MINIMUM SUBMERGENCE AND NPSHA
R-02-07A	BASIS FOR MANUAL OPERATION OF STRAINER BACKWASH
R-02-08A	THROTTLE VALVE POSITION
R-02-10A	MECHANICAL DESIGN/FLUID MECHANICS
R-02-10B	DISCREPANCIES IN THE SW ELEVATED TEMPERATURE REPORT
R-02-11A	SINGLE PUMP OPERATION
R-02-13A	QUALITY ASSURANCE CONTROLS OF DESIGN RELATED DOCUMENTS
R-02-14A	RHR PUMP PIT SHIELD PLUGS
R-02-15A	VENDOR'S TECHNICAL MANUALS
R-02-16A	CORRECTIVE ACTION ASSOCIATED WITH LER 84-018-01
R-02-17A	LUBRICATION SCHEDULES
R-02-18A	FLUID TESTS AND ANALYSIS - NETWORK ANALYSIS
R-02-19A	SW WATER PUMPS MOTOR WINDING TEMPERATURE LIMITATIONS
R-02-20A	ISI CLASS BOUNDARIES

RI Number	Title
R-02-21A	ALTERNATIVE COOLING WATER SOURCE
R-02-22A	COMPONENT COOLING HEAT EXCHANGER PERFORMANCE AND MINIMUM WALL THICKNESS
R-02-23A	OPERATIONS - RADIOLOGICAL LIQUID WASTE DISCHARGES
R-02-24A	REPETITIVE FAILURES OF SW-6011 DURING LOCAL LEAK RATE TESTING
R-02-25A	TEST ACCEPTANCE CRITERIA AND TRENDING
R-02-26A	OPERATIONS - ANNUNCIATOR 47002-12 REMOVED FROM SERVICE
R-02-27A	SELECTION OF MOTOR STARTER OVERLOAD HEATERS
R-02-28A	SPENT FUEL COOLING HEAT EXCHANGER PERFORMANCE
R-02-29A	FOULING OF THE 1B MEZZANINE FAN COIL
R-02-30A	LOCAL LEAK RATE TESTING
R-02-31A	LEAK TESTING OF COMPONENT COOLING HEAT EXCHANGER TUBES
R-02-32A	MAINTENANCE ACTIVITIES NOT SUPPORTED BY AUTHORIZING DOCUMENTS

DOCUMENTS

INSPECTION REFERENCES

REGULATORY

INDUSTRIAL CODES/STANDARDS

ANSI

N45.2.11 dtd 1974
18.7

NRC

NRC Bulletin 88-04
NRC IE 86-96
NRC IE 88-46
NRC IE 89-61
NRC Inspection Reports: 1984, 1985
NRC Inspection Reports:
50-261/89-200
50-280/88-032
50-281/88-032
NRC Generic Issue 51
NRC Generic Letter 89-13
NRC Generic Letter 89-04
NRC 88-91 (KNPP Response to NRC 88-04)
10 CFR 50, Appendix B (1989 edition), Criteria 3 and 6

KNPP SPECIFIC

IR

89-016
89-025

LER

83-027/03X-1
83-034/03L-0
84-018-1

COMMITMENT TRACKING NUMBERS

89-102

OEA

83-197
85-246
87-022
88-131
89-138
89-175

SOER

84-1

TECH SPECS

Proposed Amendment File #66 and #83
Sections 3.3, 4.2 and 7.3.1
Table 4.1-1, Item 30

USAR

Appendix B
Sections 1.3.1, 5.2, 8, 9.6.2 and 10
Section 9 (p. T9.3-1)
Table B.1-7, 9.3-1
USAR Question and Response Book, Section 2.17

DIRECTIVES AND PROCEDURES

DIRECTIVES

ACD

1.03 (C)
1.04 (A)
1.06 (L)
1.08 (A)
2.02 (1-22-90)
2.13 (7-27-83)
2.14 (A)
2.14 (6-7-85)
3.04 (F)
3.06 (D)
3.09 (E)
3.09 (F)
4.03 (S)
4.16 (8-31-84)
5.04 (N)
8.05 (H)
8.07 (G)
8.15 (B)
9.04 (Orig.)
9.04 (9-25-84)

ECD

03.2 (6)
04.1 (12)
04.2 (4)
05.02 (21)
05.8 (10)
11.4 (11)

QAD

6.2 (5)

PROCEDURES

ENGINEERING PROCEDURES

DESIGN CHANGE PROCEDURES

1630-7
1631-3 (and QC Inspection Checklist dtd 9-18-85)
1635-6
1635-7
1635-8

Procedures found in DCR 1160

Procedures found in DCR 1645 (1645-1, 1645-2, 1645-3, 1645-4; no dates; no approval signatures)

Procedure found in DCR 1645 and performed under MWR 28737

Procedure found in DCR 1645 and performed under MWR 29658

ECP

04.04 (1)
04.07 (1)
04.08 (0)
04.09 (0)
04.10 (1)
04.11 (0)
04.14 (1)
14.02 (2)

MAINTENANCE PROCEDURES

CMP

02-01
02-02
02-03
02-05
31-02

MAINTENANCE PROCEDURES (Cont.)

GMP

200 series

ICP

02.01 (C)
02.02 (D)
02.03 (I)
02.04 (F)
02.06 (D)
02.07 (F)
02.09 (C)
02.10 (D)
02.11 (F)
02.18 (D)
02.19 (H)
04.09 (9-17-85)
25.05 (F)

PMP

2-1 (G)
2-2 (G)
2-3 (E)
2-4 (G)
2-5 (J)
2-6 (D)
2-7 (E)
2-8 (E)
2-12 (D)
16-2 (B)
17-2 (I)
18-6 (C)
25-1 (H)

PMP Data Sheets

PMP 02-03 dtd
11-21-85
10-9-86 to 10-10-86
12-9-87
10-20-88
10-19-89

OPERATIONS PROCEDURES

OPS

A-SW-02 (H)
E-CW-04 (J)
E-O-05 (E)
E-SW-02 (H)
N-ACA-17-CL (L)
N-FW-05B-CL (U)
N-O-01 (AC)
N-O-01-CLA (J)
N-O-01-CLC (K)
N-O-02-CLA (F)
N-O-02-CL (AA)
N-O-02-CLB (AA)
N-SW-02 (H)
N-SW-02-CL (Z)
N-SW-02-CL (AA)

ALARM RESPONSE SHEETS

47006-11
47006-23
47006-24
47006-25
47007-41

PLANT MODIFICATION/TESTS

1630-6
1631-3
1634-1
P.I.S. 2.1 Service Water Pump Train A Flow Test Procedure dtd 3-22-87

PRE-OP & CONSTRUCTION TESTS

PT SW-01
PT SW-02
CT SW-02
CT SW-03
CT SW-04
CT SW-05

SURVEILLANCE

SP 02-138 (Q)
SP 02-138 (R)
SP 02-249 (A)
SP 04-134 (I)
SP 04-135 (I)
SP 05A-104 (Y)
SP 05A-105 (AG)
SP 08-185-1 (E)
SP 08-185-2 (F)
SP 08-185-3 (G)
SP 08-185-4 (I)
SP 08-185-5 (F)
SP 31-168 (N)
SP 32A-136 (K)
SP 33-098 (Y)
SP 33-110 (Q)
SP 42-047 (D)
SP 42-109 (AB)
SP 42-152 (J)
SP 56-090 dtd 1-23-89
SP 87-273 (A)
SP 87-274 (A)

SP DATA SHEETS

SP 02-138 Test Results 1985-1989
SP 56A-090 Test Results 1989

DRAWINGS

ELECTRICAL

E-0240 (X)
E-0244 (T)
E-0256 (AK)
E-0258 (AU)
E-0259 (AJ)
E-0260 (AS)
E-0261 (AK)
E-0268 (J)
E-0300 (E)
E-0328 (AW)
E-0329 (S)
E-0332 (AY)
E-0344 (BC)
E-0488 (AA)
E-0489 (E)
E-0490 (T)
E-0491 (Q)
E-0492 (E)
E-0495 (J)
E-0502 (E)
E-0503 (N)
E-0504 (P)
E-0505 (E)
E-0526 (J)
E-0527 (F)
E-0555 (M)
E-0566 (H)
E-0578 (Q)
E-0592 (G)
E-0602 (BA)
E-0603 (AE)
E-0604 (AG)
E-0605 (AA)
E-0606 (AA)
E-0608 (AJ)
E-0610 (AS)
E-0612 (X)
E-0613 (AA)
E-0614 (Z)
E-0615 (AV)
E-0618 (Y)
E-0619 (AD)
E-0623 (AQ)
E-0626 (J)
E-0627 (AP)
E-0628 (X)
E-0641 (N)
E-0642 (K)
E-0715 (A - superseded)
E-0734 (AJ)
E-0736 (AH)
E-0744 (?)
E-0761 (K)
E-0762 (H)
E-0767 (Y)
E-0772 (Z)
E-0774 (AG)
E-0775 (AK)
E-0777 (AD)
E-0778 (AH)
E-0793 (AZ)
E-0798 (BP)
E-0799 (CE)
E-0805 (E)
E-0843 (BB)
E-0875 (M)
E-0885 (AF)
E-0890 (X)
E-0947 (AU)
E-0957 (AN)
E-1017 (F)
E-1033 (A)
E-1040 (N)
E-1041 (P)
E-1045 (K)
E-1057 (N)
E-1058 (L)
E-1059 (H)
E-1189 (C)
E-1307 (E)
E-1335 (D)
E-1347 (D)
E-1349 (T)
E-1360 (F)
E-1361 (F)
E-1363 (D)
E-1391 (Q)
E-1406 (B)
E-1413 (G)
E-1414 (S)
E-1426 (M)
E-1430 (M)
E-1470 (C)
E-1491 (E)
E-1498 (D)
E-1509 (K)
E-1511 (M)
E-1513 (E)
E-1531 (AA)
E-1544 (T)
E-1587 (N)
E-1589 (N)
E-1590 (H)
E-1591 (G)
E-1614 (R)
E-1623 (M)
E-1630 (J)
E-1631 (C)
E-1631 (J)
E-1632 (S)
E-1633 (M)
E-1774 (J)
E-1807 (T)
E-1816 (AG)
E-1823 (K)
E-1823 (AE)
E-1829 (AH)
E-1830 (AR)
E-1832 (AE)
E-1833 (AE)
E-1834 (AA)
E-1900 (A)
E-1920 (E)
E-1921 (F)
E-1923 (N)
E-1985 (E)
E-2004 (C)
E-2045 (M)
E-2125 (A)
E-2157 (E)
E-2158 (F)
E-2166 (B)
E-2182 (E)
E-2183 (E)
E-2184 (B)
E-2316 (V)
E-2317 (AG)
E-2330 (D)
E-2339 (AB)
E-2349 (AF)
E-2340 (E)
E-2344 (L)
E-2491 (F)
E-2586
E-2607 (L)
E-2612 (M)
E-2906 (D)
E-2910 (F)
E-2932 (F)
E-2979 (-)
E-3080 (M)
E-3096 (G)
E-3107 (F)
E-3120 (C)
E-3122 (D)
E-3163 (C)
E-3168 (N)
E-3169 (L)
E-3217 (A)
E-3218 (A)
E-3258 (B)
E-3259 (U)
E-3394 (-)
E-3395 (B)
E-3396 (B)
E-3397 (C)

DRAWINGS (Cont.)

MECHANICAL

M-202 (OPS; BD; sheet 1 of 3)
M-202 (BD; sheet 2 of 3)
M-202 (OPS; BE; sheet 2 of 3)
M-202 (OPS; BJ; sheet 1 of 3)
M-215 (AT)
M-218 (T)
M-232 (FH)
M-233 (AC)
M-477 (D)
M-544 (6-68)
M-547 (C)
M-585 (A)
M-588 (A)
M-600 (N)
M-601 (BF)
M-606 (OPS; AK)
M-623 (E)
M-624 (K)
M-635 (L)
M-702 (sheet 2.0)
M-702 (sheet 2.1)
M-702 (sheet 2.2)
M-927 (?)
SKM-79-14-M202 (4)
SKM-1370
SKM-1371
SKM-1374
SKM-1376
SKM-1399

VENDOR

XK-100-0019 (U)
XK-100-0197
XK-100-0318 (C)
XK-100-0747 (A)
XK-100-0763 (L)
XK-100-0905 (K)
XK-100-1146 (-)
XK-100-2029
XK-100-2557
XK-124-0005 (2)
XK-124-0057 (4)
XK-124-0087 (-)
XK-134-0009
XK-134-0013
XK-143-0058
XK-144-0002 (F)
XK-148-0001 (B)
XK-148-0001 (E)
XK-148-0001 (K)
XK-148-0002 (CI)
XK-148-0004
XK-148-0004A
XK-148-0005
XK-148-0013
XK-162-0003
XK-162-0004
XK-162-0005
XK-162-0013
XK-162-0014
XK-204-1553 (-)
XK-204-1554 (-)
XK-216-0031 (1)
XK-216-0032 (1)
XK-216-0033 (2)
XK-216-0035 (1A)
XK-216-0039 (1)
XK-216-0040 (2)
XK-216-0049 (-)
XK-250 Drawing Files
XK-252-0008 (-)
XK-525-0001 (-)
XK-8752-1
XK-84824-1

DESIGN AND ENGINEERING INFORMATION

<u>CALCULATIONS</u>

Calculation performed by Stevens DH as part of the Service Water SSFI

Fluor Calcs

- M-1052-1
- M-1052-2
- 607.1630-M1
- 607.1631-M6
- 607.1634.M2
- 607.1635.M1
- 607.1635.M3
- 607.1635.M2
- 611.1134.M1 (Rev. 0)
- 611.1134.M1
- 611.1134.M2
- 611.1134.M3
- 1179.5
- 1179.M8
- SSFI-23-1 (Rev. 0; attachment to KPS-11884)

Mathers Wells Calculation 68-06-1519 dtd 10-25-68

<u>DCR</u>

0961
1054
1189
1372
1428
1484
1510
1547
1616
1628
1630
1631
1634
1635
1650
2136
2351

<u>ESR</u>

89-61
89-89

<u>TCR</u>

84-15
84-16
84-19
89-08
89-13

DESIGN AND ENGINEERING INFORMATION (Cont.)

ENGINEERING SPECS

Pioneer Original Motor Purchase Specifications

Pioneer Spec #148 dtd 6-19-68

SS-M1240 Specific Specification for Control Room Air Conditioning Chiller dtd 3-71

TEMA Engineers and Fabricators Data Sheet No. P-68-4102

Westinghouse AH-CC550 dtd 11-15-68

Westinghouse G-676454

Westinghouse PO# 546-CRH-98904

WPS-ECN-210-6

ENGINEERING SPECS (WPS)

ES-2003 (Rev. 7)ES-2005 (Rev. 2)
ES-9000
ES-9001
ES-9002
ES-9003
ES-9004
ES-9005
ES-9006
ES-9007
ES-9008
ES-9009
ES-9010
ES-9011
ES-9012
ES-9013
ES-9014
ES-9015
ES-9016
Operating Budget Decision Unit for Safety-Related (QA-1) Heat Exchanger Instrumentation

REPORTS

ASME Section VIII, U-1 Form for Component Cooling Heat Exchangers
Certified Performance Curve for VTP-27736
Certified Performance Curve for 75TU1719-1
Cramer and Lindell Engineers, Inc Report of Component Cooling Heat Exchanger Eddy Current Inspection 1987, 1988
Elevated Service Water Temperature Report, Fluor Project 834823 dtd 11-89
Ellis and Watts' Document #N0028 dtd 4-4-85
ESR (Draft) for "Service Water Safety Related Heat Exchangers" by Finnemore PM
General Electric Series 7700 Overload Heater Selection Table
ISI Inspection Reports (KNPP) 1987
Kinney Seismic Report
Material Test Report for Kinney PO# 4589 dtd 5-25-70
OE 3168 dtd 2-16-89
Pioneer QA Audit for K-162 dtd I0-8-71
Pioneer QA Report for K-162 dtd 6-23-70
Safeguard Fan Coil Study, Fluor Project #834740 dtd 9-23-85
Siemens-Allis Engineering Design (Motors) Norwood OH
Standards of Tubular Exchanger Manufacturers Association (6th edition, 1978)

DESIGN AND ENGINEEERING INFORMATION (Cont.)

REPORTS (Cont.)

Struthers Wells TEMA Data Sheet #1-68-06-1519
Trane Co. Capacity and Performance Report per ARI Standard 590 (P.O. K-253)

PLANT DOCUMENTATION

INTERVIEWS

Conference call with Marchi ML, Evers KH and Krueger JT dtd 2-5-90
Interview with Brandtjen JP dtd 1-16-90
Interview with Cole DE, Pioneer, dtd 1-25-90
Interview with Finnemore PM dtd 2-5-90
Interview with Hess AL dtd 2-14-90
Interview with Hooker TD dtd 2-9-90
Interview with Kaliaden J, Fluor Daniel, dtd 1-23-90 (PMF)
Interview with Maintenance Crew Leader dtd 2-1-90
Interview with Masarik DL dtd 2-6-90 and 2-7-90)
Interview with Nalepka DS, WPSC, dtd 1-25-90
Interview with Norsetter LA dtd 2-13-90
Interview with Nuclear Systems Supervisor dtd 2-1-90
Interview with Pulec RP, WPSC, dtd 1-25-90
Interview with Richmond JS, WPSC, dtd 1-29-90
Interview with Ropson DJ, WPSC, dtd 1-25-90
Interview with Ruiter GH, dtd 1-24-90
Interview with Schrock CA, WPSC, dtd 1-29-90
Interview with Streich EE dtd 1-16-90
Interview with Tomes CA dtd 2-13-90
Interview with Webb TJ and Sviatoslavsky PI dtd 01-23-90 (DHS)
Interviews with Hansen RL dtd 1-24-90, 1-25-90, 1-29-90
Interviews with Repshas RP dtd 2-1-90 and 2-8-90
Phone Interview with Auman DE, dtd 2-6-90

LETTERS

Correspondence Data File - Electrical References dtd 11-30-88
K-162 dtd 9-28-71
KNPP Memorandum concerning Service Water Pump operation dtd 1-5-87
KNPP Memorandum from Weinberg DE to Truttman WJ dtd 3-29-76
KPS-1674 dtd 6-30-71
KPS-2197 dtd 2-25-72
KPS-8736 dtd 6-25-85
KPS-8943 dtd 10-25-85
KPS-8996 (w/ attachments) dtd 12-04-85
Letter from Berzins RP and Cole DE, Fluor to Michalkiewicz PE, WPSC dtd 9-26-85
Letter from Bright RD, Worthington to Berzins RP, Pioneer dtd 10-10-73
Letter from Hammar RK, Teledyne Geotech to Tarney, W, Pioneer dtd 8-3-73
Letter from Snyder WR, Westinghouse to Leppke DM, Pioneer dtd 5-14-68
Letter from Turnbull GW, Allis-Chalmers to Peterson WL, Pioneer dtd 6-13-72
Letter from Western Engine Co to Pioneer dtd 3-26-70

LETTERS (Cont.)

Pioneer Memo dtd 2-18-72 found in K-148
Pioneer Memo from Lowry W to Hickey F dtd 11-9-72
Pioneer Memo from Newhart LE and Lowry WL to Loukota ED dtd 9-28-71
WPSC Letter from Michalkiewicz PE to Weinhauer KH, dtd 10-07-85
WPSC Letter from Ristau DJ to Schrock CA dtd 2-22-85
WPSC Letter from Van Essen D to Sviatoslavsky PI dtd 2-2-87
WPSC Letter to White WA dtd 6-22-73
WPSC Memo from Spiering GA to Draheim RE dtd 2-27-80
WPSC Memorandum from Weinberg DE to Hirst RR dtd 2-5-80

MAINTENANCE HISTORY FILES

SW-903A
SW-903B
SW-903C
SW-903D
MOV-32058
MOV-32059
MOV-32060

MAINTENANCE WORK REQUESTS

00531
02248
02249
02250
02363
02625
03091
03117
03360
04280
04447
04597
04672
05953
09657
09770
09803
09849
09865
09944
09952
10248
10970
11537
11976
12776
14286
15588
18535
19402
21030
21031
21759
23168
23249
24201
24318
24454
28340
28429
29384
29386
29388
29390
29506
29576
29577
29575
31757
32058
32395
32452
32592
33337
34599
34826
35036
35835
36164
36214
36531
39190
39195
39721
40310
41384
42128
42630
43046
43224
43217
46335
46336

MANUALS

Appendix R Design Description, Part 2.1

Durco Pump Manual, 1979

Project Design Manual, Account 321.262 (Section 4)

ASME Section XI, Subsection IWP, Articles IWP-1000 and IWP-3000, 1980-1981.

ASME Section XI, Subsections IWA, IWB and IWC

MEETING MINUTES

QA Typing Committee Meeting No. 30

PURCHASE ORDERS

K-140
K-148
16473
16557
19016
22807
27265
38998
41851
51970
59107
76559
84771
98904
99236
99671

PURCHASE REQUISITION

K-140
K-148
K-162
K-250
K-253-4
K-253-7

PPFIS AND OTHER COMPUTER REPORTS

KNP Calculation Index from Design Basis Database

Maintenance Planning and Scheduling Report

Maintenance Work Request Tracking System Printout dtd 2-1-90

Nuclear Plant Reliability Data System (NPRDS)

Nuclear Plant Reliability Data System (NPRDS) Report #NPRSO1AA

Sequence of Events Recorder Printouts dtd 8-5-87 through 8-8-87

QA AUDITS

75-047
75-049
75-052
76-008
76-021
76-029
76-056
84-010
84-030
85-067
85-098
85-099
85-100
85-133
86-005
87-091
88-005
88-115
88-135
89-016
89-031

QSL EVALUATIONS (dates)

02-22-80
06-11-84
05-09-86
10-18-88
02-19-89

SYSTEM DESCRIPTIONS

02 - Service Water (Rev. ORIG)
04 - Circulating Water (Rev. ORIG)
10 - Diesel Generator - Mechanical (Rev. ORIG)
16 - Turbine Building and Screenhouse Ventilation (Rev. ORIG)
21 - Spent Fuel Cooling and Cleanup (Rev. ORIG)
22 - Heating System (Rev. ORIG)
25 - Control Room Air Conditioning (Rev. ORIG)

SYSTEM DESIGN CRITERIA DOCUMENTS

Service Water (Draft)

TRAINING MATERIALS

O-EO-LP 3.1.2 (Rev. A)
O-EO-QC 4.3.2 (Rev. B)
NonLicensed Operator Continuing Training Schedule, 10-89 through 5-90

OTHER

Environmental Qualification (EQ) Plan, Rev. 8
Hydraulic Institute Standards, 11th edition (1965) and 13th edition (1975)
IST Plan Notes (p. 2)
IST Plan Table 2 (p. 8 of 15)
KNP ESR Status Report dtd 1-4-90
Machine Design Article "Induction Motors" by Anderson WA (Westinghouse)
Operating Instruction "Operator Aids" dtd 7-29-87
Operational Quality Assurance Program, Sections 1.0, 2.0, 3.1.4, Appendix C Rev. 8)
Pioneer Quality Control Inspection Plan for K-162, Rev. 0
Pump and Valve IST Plan (E)
Pump and Valve IST Plan (H)
QA File K-148
QC Vault Records 2344, 2345, 2348
QSL Change Request CR-QSL-80-6
Strip Charts: Service Water Pumps 1A1 and 1A2 Motor Current
Tagout Control Sheet (Rev. 1-86)
Tagout Control Sheets 89-52, 89-200, 89-215 and 89-224

ACRONYMS

ABBREVIATIONS AND ACRONYMS

A	Abnormal
A,B	Identification Letters
ACA	Auxiliary Building Air Conditioning
ACD	Administration Control Directive
AMP	Ampere
ANI	American Nuclear Insurers
ANSI	American National Standards Institute
APP	Appendix
ARI	American Refrigeration Institute
ASME	American Society of Mechanical Engineers
BTU	British Thermal Unit
CAD	Computer Aided Drafting
CALC	Calculation
CCW	Component Cooling Water
CFM	Cubic Feet per Minute
CL	Check List
CLA,CLB,CLC	Check Lists A, B, C
CMP	Corrective Maintenance Procedure
CFR	Code of Federal Regulations
CR	Change Request
CT	Construction Test
CV	Control Valve
CW	Circulating Water
D	Documentation Sheet
DBA	Design Basis Accident
DCR	Design Change Request
DP	Differential Pressure
DPI	Differential Pressure Indicator
DTD	Dated
E	Electrical Drawing, Emergency
ECD	Engineering Control Directive
ECP	Engineering Control Procedure
ELEC	Electrical Engineering
EO	Equipment Operator
EQ	Environmental Qualification
ESR	Engineering Support Request
FCU	Fan Coil Unit
FMECH	Fluid Mechanics
FW	Feedwater
GMP	General Maintenance Procedure
GPM	Gallons Per Minute

ABBREVIATIONS AND ACRONYMS

HDR	Header
HR	Hour
HVAC	Heating, Ventilation and Air Conditioning
HX	Heat Exchanger
ICP	Instrument and Control Procedure
ICS	Internal Containment Spray
ID	Identification
INPO	Institute for Nuclear Power Operations
IR	Incident Report
ISI	Inservice Inspection
IST	Inservice Testing
K	Foreign Drawing Designation, Purchase Order Designation.
KNP	Kewaunee Nuclear Plant
KNPP	Kewaunee Nuclear Power Plant
KPS	Letter Identification (From Fluor Daniel (formerly Pioneer) to Kewanee Nuclear Power Plant)
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
LOOP	Loss of Offsite Power
LP	Lesson Plan
M	Mechanical Drawing
MAINT	Maintenance
MECH	Mechanical Engineering
MIC	Microbiological Corrosion
MOV	Motor Operated Valve
MR	Shortened Version of MWR
MV	Motor Valve
MWR	Maintenance Work Request
NA	Not Applicable, Not Available
Ni	Nickel
NDE	Non-Destructive Examination
NPRDS	Nuclear Plant Reliability Data System
NPSH	Net Positive Suction Head
NPSHA	Net Positive Suction Head Available
NRC	Nuclear Regulatory Commission
OE	Operating Experience
OEA	Operating Experience Assessment
OH	Ohio
OL	Overload
OP	Operating Procedure
OPS	Operations

ABBREVIATIONS AND ACRONYMS

OQAP	Operational Quality Assurance Program
ORIG	Original
PM	Preventive Maintenance (Program)
PMP	Preventive Maintenance Procedure
PO	Purchase Order
PORC	Plant Operations Review Committee
PT	Pre-Operational Test
PPFIS	Power Plant Facility Information System
PSI	Pounds per Square Inch
PSIA	Pounds per Square Inch Absolute
PSID	Pounds per Square Inch Differential
PSIG	Pounds per Square Inch Gauge
QA	Quality Assurance
QA1	Quality Assurance Type 1
QA2	Quality Assurance Type 2
QA3	Quality Assurance Type 3
QAD	Quality Assurance Directive
QC	Qualification Card, Quality Control
QSL	Qualified Suppliers List
R	Shortened Version of RI
RE/S	Responsible Engineer/Supervisor
REV	Revision
RHR	Residual Heat Removal
RI	Request for Information
RR	Relay Rack, Relief Request
SI	Safety Injection
SFP	Spent Fuel Pool
S/N	Serial Number
SOER	Significant Operating Experience Report
SKM	Mechanical Sketch
SP	Surveillance Procedure
SPEC	Specification
SSFI	Safety Systems Functional Inspection
SW	Service Water
TCS	Tagout Control Sheet
TDH	Total Developed Head
TEMA	Tubular Exchangers Manufacturers Association
TER	Technical Evaluation Report
TEST	Testing
TCV	Temperature Control Valve
TCR	Temporary Change Request
TS	Technical Specification

ABBREVIATIONS AND ACRONYMS

USAR	Updated Safety Analysis Report
WPS	Wisconsin Public Service
WR	Work Request
XK	Foreign Drawing Designation, Purchase Order Designation
1A,1B,1C,1D	Identification Numbers
50.59	Safety Evaluation

RI's

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-01A

SUBJECT: Operations - No Operator Guidance to Identify Critical SW Operating Parameters

TEAM MEMBER: Harringtion, GI

SUPPORTING DOC SHEETS: D-02-015

BACKGROUND:

The Service Water System has maximum temperature and minimum forebay water level requirements for system operability. However, the USAR, System Description, Technical Specifications, or Operating Procedures do not identify what the temperature or water limitations are. Therefore, no guidance is available to operations personnel on what actions to take when the SW System approaches, reaches or exceeds its design limitations.

CONCERNS:

1. Operating Procedures do not provide required actions to take in the event that the Service Water System reaches or exceeds its design inlet temperature.

2. Operating Procedures do not provide required actions to take in the event that forebay water level reaches or exceeds the minimum design level.

3. No requirement exists to declare the Service Water System inoperable when outside the design basis forebay level or lake water temperature.

Team Leader: DW Sauer

Date: 1-23-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-02A

SUBJECT: Service Water Pump IST on Mini-Flow Recirculation

TEAM MEMBER: Kloman, CS

SUPPORTING DOC SHEETS: D-02-017, D-02-031

BACKGROUND:

Pump differential pressure and flow rate are two parameters that are normally measured and evaluated jointly to determine pump hydraulic performance. Service Water pumps are tested in accordance with Relief Request IST-RR-5 by establishing a mini-flow recirculation path through the pump's respective strainer backwash line. Since the pumps are tested using a fixed-resistance flow path, the flow rate is assumed to be constant during test performance. If the characteristics of the recirculation line were to change, flow rate would change with a corresponding change in measured pump differential pressure.

Calculation of pump differential pressure in SP 02-138 is performed by subtracting the static head of the forebay level from the pump discharge pressure. The pump head required to lift the water from the pump suction to the pressure gauge is not taken into account. Given that the distance from the pump suction to the discharge pressure gauge is 29' Total Developed Head (TDH) would be calculated by the equation:

TDH= (Discharge gauge pressure) (2.31)+29'- (Forebay level over impeller center line).

Using the test method in SP 02-138, any result above 102 psid could be running the pump at shutoff head. SP 02-138 established an acceptable upper limit of 105 - 107 psid depending on the pump.

Furthermore, SP 02-138 typically establishes an acceptable pressure range of 96 to 105 psid. Considering instrument error ($\pm$ 1 psi) and parallex error ($\pm$ 1 psi) this span of 10.5 psi represents a change in flow of approximately 4,200 gpm.

Kewaunee Nuclear Power Plant response to NRC Bulletin 88-04 stated that SW pumps typically run for 15 minutes in reduced flow maintained at approximately 15-30% of BEP flow, which is approximately 960 to 1920 gpm. System Design Criteria No. 2, Service Water, paragraph 2.4.5 states Worthington indicated that the minimum flow requirements for the Service Water pumps are 4500 gpm for normal operation and 1800 gpm for short term operation. Pump flow rates taken from actual test results and read from the pump curve shows flows of 1200 to 1400 gpm.

REQUEST FOR INFORMATION (RI)

RI NUMBER: ,R-02-02A

Generic letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs", states where only the minimum flow return line is used for pump testing that flow instrumentation which meets the requirements of IWP-4110 and 4120 must be installed in the mini-flow return line.

CONCERNS:

1. SP 02-138 establishes an upper acceptance criteria for the quarterly pump performance test of 105-107 psid. Since shutoff head is 102 psid, a potential exists to dead head the pump without evaluating performance problems.

2. The current method used to test Service Water pump performance allows for changes of up to 10.5 psid pump differential when considering instrument errors. This change can be caused by a change in recirculation line characteristics or pump flow variations of up to 4,200 gpm. This method does not allow for a true indication of pump performance or hydraulic degradation.

3 Pumps are tested at a flow rate below the minimum flow requirement as stated by the Vendor.

4. Instrumentation which meets the requirements of IWP-4110 and 4120 is not installed to provide flow rate measurements during pump testing.

Team Leader: DW Sauer

Date: 1-30-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-02B

SUBJECT: Reference Values for Service Water Pumps After Pump Replacement

TEAM MEMBER: Kloman, CS

SUPPORTING DOC SHEETS: D-02-048

BACKGROUND:

Service Water pumps are rebuilt every four years on a rotating basis. ASME Section XI requires a test of the pump to demonstrate that it is operable and to obtain a new reference value each time a pump is replaced. The controlling procedure for the pump replacement (PMP 2-3) does not require SP 02-138, Service Water Pump and Valve Test - IST, to be performed in the Section 6.0 retest section. However, for the years 1985-1987 new reference values were obtained and SP 02-138 acceptance criteria for the effected pumps were correctly revised.

In 1988 pump 1B1 was tested after pump replacement and was found to have a baseline value of 99 psid which was within the acceptance criteria of 91-100 psid. The next quarter, SP 02-138 was performed and pump 1B1 tested to the action level of 101.7 psid. Maintenance Work Request 43716 was written to identify and correct the problem. The explanation given in the comment section of the MWR attributed the high differential pressure to pump replacement. This resulted in pump 1B1 being baselined for a second time in 1988.

In 1989 pump 1B2 was replaced in October with a new reference value being obtained in the post maintenance test. Revision R to SP 02-138 was submitted on 10-24-89 to change the acceptance range on pump 1B2. This revision has still not been issued.

CONCERNS:

1. There is no procedural requirement in PMP 2-3 to assure that the Service Water pumps will be tested as required by Section XI to obtain new reference values after pump replacement.

2. Pump 1B1 is in the current required action range of SP 02-138 established after 1988 pump replacement. However, the acceptable (normal) range has been adjusted to accommodate for the pump's higher differential pressure without an adequate justification.

3. The new reference value for pump 1B2 has not been incorporated in SP 02-138.

Team Leader: DW Sauer (signature) Date: 2-5-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-03A

SUBJECT: Mechanical Design

TEAM MEMBER: Finnemore, PM

SUPPORTING DOC SHEETS: D-02-019, D-02-026, D-02-037

BACKGROUND:

The Service Water strainer backwash line originates at the strainer and runs directly to the trash trough. The strainer is classified as QA-1 and the backwash line QA-3; there is no isolation valve serving as the QA boundary. During a seismic event a break of this line will divert SW flow from safety-related components. (D-02-026 and D-02-037).

There are four cases where normally open manual valves separate QA-1 and QA-3 piping. During a seismic event, if rupture of the QA-3 piping were to occur coincident with a failure of the opposite train diesel generator (single active failure) adequate flow may not reach safety-related components downstream on the Service Water header containing the ruptured branch.

The four examples of this configuration are identified in Document Sheet D-02-025. Specifically identified were QA-3 pipe sections downstream of SW-6001, SW-6006, SW-5003 and SW-1250. The table below summarizes the four cases.

VALVE	PIPE DIAM.	HEADER DIAM.	HEADER
SW-6001	2"	4"	A
SW-6006	2"	4"	A
SW-5003	1½"	16"	B
SW-1250	1½"	16"	A

No analysis exists to determine if isolation of the ruptured branch line could be accomplished prior to failure of equipment served by the header.

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-03A

Several cases of QA-1 to QA-2 boundaries with open isolation were also identified. Specifically, the Service Water backwash line to the traveling screens, SW line to the circulating water pumps, and the SW line to the fire jockey pumps. The table below summarizes these cases.

VALVE	PIPE DIAM.	HEADER DIAM.	HEADER
SW-200A	6"	24"	A
SW-200B	6"	24"	B
SW-100A	1½"	24"	A
SW-100B	1½"	24"	B
SW-20A	1½"	24"	A
SW-20B	1½"	24"	B

No analysis could be located to determine the effect on either the SW header or the equipment served by the branch, should the branch rupture due to seismic or other causes.

CONCERNS:

1. Failure of QA-2 or QA-3 piping without an appropriate means of isolation from the QA-1 source will result in a reduction of Service Water flow to downstream components.

2. No analysis exists to determine if isolation of the ruptured branch line could be accomplished prior to failure of equipment served by the header.

Team Leader: D W Sauer Date: 1-31-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-04A

SUBJECT: Minimum Temperature in the Screen House

TEAM MEMBER: Stevens, DH

SUPPORTING DOC SHEETS: D-02-044

BACKGROUND:

The Screen House Ventilation System includes four outside air inlet dampers and two exhaust fans with exhaust dampers. The heating system provides four steam fan coil heaters in the screen house. In warm weather the "A" diesel generator ventilation is discharged through the screen house. High and low screen house temperature alarms are provided in the Control Room.

The screen house air temperature low alarm setpoint is 35°F. The Equipment Qualification Plan, however, lists a screen house minimum temperature of 60°F. In addition, the four screen house roof inlet dampers fail open on loss of air, are not accessible for manual closure without ladders or scaffolding and are not provided with local accumulators. Under cold weather conditions, the screen house heat input from the diesel generator room ventilation discharge is reduced because the supply damper is throttled to 75% closed position. Under loss of offsite power (LOOP) conditions, steam and power is not assumed to be available to the screen house fan coil heaters.

CONCERNS:

1. The minimum screen house temperature stated in the EQ Plan is above the screen house low temperature alarm setpoint.

2. The basis for the alarm setpoint and EQ Plan minimum temperatures are not clear, and appear inconsistent with screen house design minimum temperature.

3. Loss of offsite power during cold weather could expose the screen house interior to outside air temperatures, with no mitigating heat source. This could produce temperatures well below the 35°F design basis water temperature, including possible freezing of instrument and seal water lines.

4. Operation of electrical equipment below the qualified temperature may result in failure, due to condensation, freezing or other mechanisms.

5. All four screen house roof dampers are supplied from a single air line. Therefore a loss of a single line will fail all four dampers open.

Team Leader: DW Sauer   Date: 2-5-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-05A

SUBJECT: Quality of the Spare SW Pump (S/N VTP-27736)

TEAM MEMBER: Chappelle, S

SUPPORTING DOC SHEETS: D-02-042, D-02-018

BACKGROUND:

During a review of the various Work Requests (WR) documenting the overhauls of 5 Service Water pumps, it was noted that one WR (No. 28340) referred to repair welding of the upper suction bell damaged during removal of a shaft bearing and repair welding of the lower suction bell damaged by an apparent overtightening (time of damage not known) of a pipe plug (pump S/N VTP-27736). A detailed review of WR 28340 (12/84 through 2/85) revealed the following work control weaknesses:

1. Welding of cast iron components was carried out without an approved procedure and no control of preheat temperature, interpass temperature and post heat/cooldown times.

2. Weld rod was released from the warehouse to perform welding without a controlling weld procedure.

3. No evidence exists indicating performance of an acceptable NDE test after flaw removal and/or completion of welding.

Further review of WRs for the Service Water pumps revealed that pump S/N VTP-27736 was rebuilt under WR 41384 (10/89 - 12/89). This WR documents discovery of a crack in the upper suction bell "most likely caused by stress induced by a previous weld repair". This component was replaced. No mention of the lower suction bell is made in this WR package.

Review of QA Vault record copies of procedure PMP 2-3 (Service Water Pump Replacement) from 1985 to present revealed SW pump S/N VTP-27736 was placed in Service in position 1B2 on 11/21/85 and remained in that position until 10-19-89 when it was removed for rebuilding per WR 41384.

The weld rod (Ni Rod) was withdrawn from the warehouse under a KNPP Weld Rod Withdrawal Slip. The Rod Withdrawal slip attached to WR 28340 indicated "NA" on the line for indicating the applicable weld procedure. A review of the current procedure for weld rod control (ACD 3.9 Rev. F) indicates that weld material not used in conjunction with a specific weld procedure may be stored in the warehouse provided it is segregated and its issue must be authorized by the QC group (ref. paragraph 5.1 or ACD 3.9). The rod withdrawal slip in the WR package does not indicate any spearate QC review of the withdrawal slip.

As no mention of the lower suction bell is made in the most recent overhaul package (WR 41384) for SW pump S/N VTP-27736 it is apparent that a component of questionable structural integrity is currently installed in the spare SW pump.

The governing procedure for the pump overhaul is CMP 2-5 (current Rev. F) "Service Water Pump Overhaul". This procedure contains no reference to weld repair of the cast iron components (i.e. bowl assembly). Also, there are currently no site approved weld procedures for welding of cast iron.

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-05A

CONCERNS:

1. Repair by welding of cast iron components was carried out without an approved or qualified procedure to control preheat and interpass or post heat/cooldown times.

2. No evidence could be located to indicate an acceptable NDE after the weld repair.

3. A weld repair was made on a QA-1 pressure retaining component without the involvement of the ANI.

Team Leader: D W Sauer Date: 2-7-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-06A

SUBJECT: Service Water Pump Minimum Submergence & NPSHA

TEAM MEMBER: Stevens, DH

SUPPORTING DOC SHEETS: D-02-047

BACKGROUND:

The current design basis minimum forebay level is 568.4'.

The current forebay Lo alarm level is 567'-6". The current forebay Lo-Lo alarm and circulating water pump trip level is 566.0'.

Available data indicates that submergence may not be adequate to prevent vortexing for normal operation below the Lo alarm setpoint, and that NPSHSA may not be adequate to prevent cavitation with single-pump, high-flow operation, even at the 568.4' minimum operating level.

CONCERNS:

1. The determination of minimum forebay level for Service Water pump minimum submergence and NPSHA appears not to have considered all design basis operating modes.

2. The determination of forebay level alarm and circulation water pump trip setpoints appears not to have adequately considered minimum forebay level required for Service Water pump minimum submergence and NPSHA.

Team Leader: DW Sauer Date: 2-19-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-07A

SUBJECT: Basis for Manual Operation of Strainer Backwash

TEAM MEMBER: Stevens, DH

SUPPORTING DOC SHEETS: D-02-056

BACKGROUND:

Each Service Water pump is provided with a rotating strainer on its discharge. These strainers are classified as OA Mechanical 1 and QA Electrical 2.

A Pioneer Service & Engineering Co. letter, dated September 28, 1971 provides justification for downgrading the classification of the strainer motors to OA Electrical 2. Specifically the letter indicated that;

1. The strainers will see very little dirt or suspended matter in the intake due to shutdown of the CW pumps during emergencies.

2. An alarm is provided on each strainer to alert operators of high differential pressure.

3. When the operator goes out to the screenhouse to investigate the alarm condition, the strainer can be manually rotated and backwashed.

This justification was evaluated during the SSFI and as a result, several concerns were generated.

CONCERNS:

1. No analysis is provided to establish an acceptable time limit within which manual rotation of the strainers must be performed in order to assure acceptable system performance.

2. The seismic analysis for the strainers does not include either the motor drive or motor mount. It is therefore not certain that a strainer could be rotated, by any means, following a seismic event.

3. Procedure A-SW-02, "Abnormal Service Water System Operation", does not address manual rotation of the strainer. In addition, no instruction is provided for isolating and venting the backwash valve air supply. Venting would be required in order to manipulate the valve. Finally, the procedure does not identify the need for a 3/4" wrench which would be required to rotate the strainer motor shaft and backwash valve stem.

4. No valve wrenches or strainer motor shaft wrenches could be located during tours of the screen house.

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-07A

CONCERNS: (cont'd)

5. The 1B1 strainer motor appears to have been replaced with a motor with a different shaft end (i.e., round vs. square). This configuration would require a different wrench for rotation.
6. Rotation of 3 of the 4 screens may be blocked by interferences.
7. Access to the shaft ends to facilitate rotation may be difficult due to height of the components above the floor.

Team Leader: D W Sauer Date: 2-12-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-08A

SUBJECT: Throttle Valve Position

TEAM MEMBER: Schweitzer, G./Witman, P.

SUPPORTING DOC SHEETS: D-02-028, D-02-035, D-02-050

BACKGROUND:

Service Water (SW) flow to auxiliary building fan floor fan coil units 155-301 and 155-302 and auxiliary building basement fan coil units 155-311 and 155-312 are balanced using the fan coil units SW outlet valves. Flow balancing tests were performed on each fan coil unit to establish the required position of the outlet valve so as to provide the design flow of 65 gpm through each auxiliary building fan floor fan coil unit and 45 gpm through each auxiliary building basement fan coil unit. This was accomplished by throttling the outlet valve until a predetermined pressure differential was achieved across the coils (10.9 psi across each auxiliary building fan floor fan coil unit and 10.5 psi across each auxiliary building basement fan coil unit). The technique used in the flow balancing procedures is acceptable provided the SW System is operating at 'worst case' conditions (i.e., maximum SW flow demand with minimum number of pumps operating), or if system flow balance calculations exist to verify that the required flow rate is maintained during 'worst case' SW System operation.

On a yearly basis, the throttled outlet valves are closed to allow flushing of the fan coil unit heat exchanger per procedure PMP 17-2. The flushing is performed using a Work Request Card, from which a Tagout Control Sheet (TCS) is generated. All equipment that requires a tagout is identified on the TCS, which includes the throttled outlet valves. Verification that the outlet valves are properly restored to their required throttled positions is intended to be documented on the TCS.

The required throttled positions to restore the outlet valves are documented in Operating Procedure N-ACA-17-CL, "Auxiliary Building Ventilation System Restart Checklist", and on the valve metal ID tags (handwritten with a black marker).

Procedure PMP 17-2 does not identify the required throttled positions for restoring the outlet valves, nor does PMP 17-2 reference Operating Procedure No. N-ACA-17-CL. As a result, the auxiliary operators rely on the position information on the tags to restore the outlet valves. In addition, no formal procedure or program is in place that controls these valve tags, nor are the tags in the Operating Aid Information Book.

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-08A

If the required throttled position of one or more of the outlet valves were to be changed (e.g., due to maintenance on the valve, changeout of valve, etc.) revision of the valve's tag would depend on 'operator awareness'. In other words, the auxiliary operator and shift supervisor would become aware of the new required position when the outlet valve is restored and the unit is returned to operation. Based on this awareness, the Operations Department would initiate a revision of Operating Procedure N-ACA-17-CL, then revise the valve tags to reflect the new valve positions. There is, however, no program in place that requires this process to occur, particularly with updating the tag.

CONCERNS:

1. No documentation could be located that identifies the operating status of the Service Water System (e.g., No. of pumps running, user components receiving SW flow) during performance of the flow balancing tests on the fan coil units. This information is required to determine whether the valve positions established are valid during 'worst case' SW System operation.

2. A system calculation could not be located to verify that the required flows through the fan coil units would be maintained during 'worst case' demands on the SW System.

3. No procedures or other administrative controls could be located that ensures that the outlet valve is set to its proper throttle position after performing PMP 17-2. For example, PMP 17-2 was performed on the fan coil units in January and February 1989. The corresponding Tagout Control Sheets for outlet valves SW-1007C, SW-1007D, and SW-1017A show the verified restored position for the valves as simply 'open', not their required throttled positions (i.e., 1 5/8, 2 1/8, and 3 1/2 turns open respectively). Verification that these outlet valves were throttled correctly did not occur until several months later when procedure N-ACA-17-CL was performed.

4. No procedures or other administrative controls could be located that ensures valve position information on ID tags attached to SW outlet valves SW-1017A, SW-1007C, and SW-1007D would be properly updated if required.

Team Leader: D W Sauer   Date: 2-5-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-010A

SUBJECT: Mechanical Design/Fluid Mechanics

TEAM MEMBER: Finnemore/Witman

SUPPORTING DOC SHEETS: D-02-023, D-02-022, D-02-028, D-02-059, D-02-098

BACKGROUND:

DCR 1630 was initiated to install two new fan coil units (FCU's) on the Auxiliary Building fan floor. Supporting Fluor calculation 607.1630.M1 determined that replacement of the existing half serpentine coils with single serpentine coils on the purchased units would be necessary and was expected in the "near future". The replacement would provide a 9 psi savings which was necessary to meet the SW design flow requirements. Based on a document review, it appears that WPSC failed to recognize the design deficiencies of the existing coils; thus the modification to the fan coil units was not accomplished. As a result the design calculation in support of these fan coil units was invalidated until Fluor calculation 611.1134.M1, performed in 1988 (i.e., half serpentine coils), superceded the 1985 calculation and showed that the current design was adequate.

In addition to the preceding, D-02-098 expresses questions/concerns over the throttling of the Aux. Bldg. fan floor fan coil units. Fluor calculations 607.1630.M1 (3-29-85) and 611.1134.M1 (3-21-88) both demonstrate that the capability to supply SW to the units during the DBA scenario is marginal. However, in April, 1985, under DCR Test Procedure 1630-6 (reference D-02-028) these units were throttled to establish design required flow rates (65 gpm). This action (throttling) appears to be inconsistent with the conclusion of the calculations unless the system was in DBA alignment at the time of the throttling or unless calculations supporting the throttling were performed. The test procedure does not provide details on the alignment of the system when the valves were throttled and no calculations supporting the throttling have been located. Therefore, a concern exists in that an inadequacy in the testing procedure (i.e., inadequate prerequisite as to system operating state) may have caused improper throttling of Aux. Bldg. fan floor FCU valves such that during the DBA, the units may be starved for cooling water.

Calculation 611.1134.M1, Rev. 0, states that the "initial design" required SW flow to Aux. Bldg. Mezzanine FCU-1A (60 gpm) is void and that the "final design" required flow is 40 gpm. This conclusion is based on the fact that 40 gpm is an achievable flow rate. Consideration was given to the heat transfer capacity of the FCU at this reduced flow rate (see calculation 611.1134.M1, Rev. 0, page 15); however, adequate documentation (references) pertaining to the source of "FCU design btu/hr" is lacking (i.e., on page 15 of 611.1134.M1, what is the origin of "FCU design btu/hr?"). Furthermore, after documentation on the "FCU design btu/hr" was provided and examined, it appears that the data used on page 15 contains no allowance for fouling (per system design criteria Item 2.3.2, a fouling factor of 0.001 should be applied to the coils). If fouling allowances were applied, several of the units may be undersized or improperly balanced on the air side. Therefore, the conclusion of this calculation is not considered valid.

A review of calculation 611.1134.M1 Rev. 0 identified inconsistencies between plant operating procedures and conclusions arrived at in the calculation. The conclusion states that the slight shortfall of SW flow to Aux. Bldg. Basement FCU 1A will be compensated for by higher than required SW flow to Aux. Bldg. Basement FCU 1C & 1D. However, according to Design Change Procedure No. 1635-8 and N-ACA-17-CL (see Document Sheet D-02-028), Aux. Bldg. Basement FCU 1C & 1D are throttled to their design required flow rates of 45 gpm. A concern exists with the lack of coordination between throttle positions required by operating procedures and design calculation assumptions.

In addition to the preceding concern, D-02-098 expresses questions/concerns over the throttling of Aux. Bldg. Basement FCU 1C & 1D. The concern is based upon the operating state (which is not well defined) of the SW System at the time the units were throttled. If the units were throttled to design required flow at a system pressure substantially greater than that anticipated during the DBA scenario, the units may become starved during a DBA. Therefore, a concern exists in that an inadequacy in the test procedure (i.e., inadequate prerequisite as to system operating state) may have caused improper throttling of the units such that during a DBA the units may be starved for cooling water.

Calculation 611.1134.M1, Rev. 0 was specifically reviewed and a concern was identified regarding non-conservative assumptions. The calculation assumes only one of two pump strainers in backwash. In this configuration, system pressure would be higher than if both strainers were assumed to be in backwash. Also, the total SW flow demand in the calculation should reference the most recent data tabulation (1985) rather than relying on the 1971 data.

Calculation 1179.M8, November 1989, "Service Water Elevated Temperature Report" was examined for consistency with calculation 611.1134.M1. A discrepancy was noted in that this calculation reverted back to a flow rate of 60 gpm rather than the currently assumed value of 40 gpm. Therefore, concerns exist with the control and consistency of design data.

Calculation 611.1134.M1 Rev. 0, dated 3-27-88 is not currently in the System Design Criteria. Therefore, a concern exists with the accuracy of the information contained in the System Design Critiria.

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-010A

CONCERNS:

1. The configuration of fan floor FCUs does not match that assumed in the analysis of record.

2. Inadequate test procedure may have caused improper throttling of Aux. Bldg. fan floor FCU valves such that during the DBA, the units may be starved for cooling water.

3. Fluor calculation 611.1134.M1 is inadequately documented (lacking references) and may be based upon non-conservative assumptions inconsistent with the System Design Criteria.

4. Fluor design calculation 611.1134.M1 Rev. 0 accepted a slight shortfall of SW flow to the Aux. Bldg. Bsmt. FCU 1A due to higher than required flow to Aux. Bldg. Bsmt. FCU 1C & 1D. However, FCU 1C & 1D SW flow is throttled to their design flow rate of 45 gpm. Therefore no margin is available to compensate for lower SW flow rates to the 1A FCU. In addition, inadequate test procedure may have resulted in improper throttling of Aux. bldg. Basement FCU 1C & 1D.

5. Concern exists that nonconservative assumptions may have been used in calculation 611.1134.M1 in that only one of two strainers were assumed to be in backwash.

6. Fluor calculation 1179.M8, November 1989, "Service Water Elevated Temperature Report", assumed a SW flow rate to the fan floor FCU of 60 gpm. However, maximum achievable flow as delineated by Fluor calculation 611.1134.M1, March 1988, is 40 gpm.

Team Leader: DW Sauer   Date: 2-13-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-010B

SUBJECT: Discrepancies in the SW Elevated Temperature Report

TEAM MEMBER: Stevens, DH

SUPPORTING DOC SHEETS: D-02-059, D-02-076, D-02-078, D-02-091, D-02-090, D-02-123

BACKGROUND:

The acceptability of system operation at temperatures exceeding the 66°F Service Water System upper design limit was the subject of a study performed by Fluor Daniel in late 1989. The Service Water Elevated Temperature Report, calculation 1179.MS, November 1989 was produced to document the results of the study. This report was reviewed during the SW SSFI and several concerns were identified.

These concerns appear to reflect an absence of readily available, clearly documented, confirmed design basis information, traceable to its original sources and maintained to reflect design changes and changes required as a result of actual performance data.

Review of this study also prompted review of field data to confirm design air flows (D-02-090), and discrepancies were found between as-designed and as-found data.

CONCERNS:

1. CCW operating temperature limits are uncertain, because maximum operating temperatures limits for components served by CCW are not well established and are not well documented. The review of CCW heat exchanger requirements showed a possible CCW outlet temperature above the 95°F CCW normal design operating temperature with elevated Service Water temperature. The possibility that maximum CCW return temperature might be above the 110.8°F normal design operating temperature was not adequately addressed. The report also expects CCW supply temperatures up to 125°F for normal RHR cooldown, and up to 130°F for post-LOCA cooldown (pages 9, 10). Return temperatures would be much higher. Operability of several components at these elevated CCW temperatures was not addressed, including three loads required for cooldown (RCP bearings, letdown heat exchanger, and seal water heat exchanger).

2. The review of area fan coil units assumed maximum design Service Water flows and maximum design air flow rates for determining allowable Service Water temperatures. In some cases the values used do not correspond to revised design values, and test data exist which indicate that even revised design values are not being met. Furthermore, although tests found air flows less than the design value and acceptance criterion, no exception report was generated and no justification for the discrepancy was documented (D-02-090).

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-010B

CONCERNS: (cont'd)

3. The review of area fan coil units also assumed a single maximum allowable 104°F design basis room temperature. In the auxiliary building fan floor, this conflicts with values in the EQ plan. In the battery rooms, the 104°F agrees with the EQ plan, but conflicts with the HVAC System description 80° value, and with concerns raised in the DC System SSFI (Report paragraphs 3-6, 6-6; concerns 1-B, 1.B.2; Document Sheet D-02-078. See also D-038-043, 064, and 101).

4. The report argues for the acceptability of room temperatures above 104°F based on a Westinghouse letter. This letter however

   A. Emphasizes the need to "...maintain a 40°C ambient (104°F)...during all modes of operation...,"

   B. Allows excursions to 50°C (122°F) only for "temporary" conditions, and for less than design cooling system operability (one cooler out of operation), and

   C. Does not address components other than motors.

   The Fluor Report

   A. Does not provide adequate justification for extension of 50°C operation from a temporary condition to a normal operating mode, and

   B. Does not address components other than motors.

   All critical components must be addressed. Normal operation of motors above 40°C must consider the resulting reductions in service life.

Team Leader: D. C. Sauer Date: 2-15-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-011A

SUBJECT: Single Pump Operation

TEAM MEMBER: Witman, PM

SUPPORTING DOC SHEETS: D-02-038, D-02-068

BACKGROUND:

Kewaunee Nuclear Power Plant Technical Specification 3.3.C basis states that, "A total of four Service Water pumps are installed and a minimum of two are required to operate during the postulated loss-of-coolant accident." This operational configuration is also dicussed in FSAR Section 9.6 which states, "The capacity of two of the four Service Water pumps is sufficient to supply the cooling water requirements for safely controlling a loss of coolant accident."

A January 5, 1987 memorandum approved by PORC with distribution including the Shift Supervisor's office appears to contradict the aforementioned statements. The memorandum states, in part, that "one SW pump can be removed from service without affecting the train's operability, provided that the train with two pumps is supplying the turbine building and the appropriate SW supply valve, SW-4A or SW-4B is danger tagged open". The purpose of the memoramdum appears to have been to provide an interpretation of Technical Specifications which allows the operational flexibility of removing one pump from service for PM without having to declare the train inoperable. Using this interpretation, one train "A" Service Water pump could be removed from service, in addition to the alternate train EDG without exceeding a Technical Specification. This would result in only one Service Water pump being available for mitigation of LOCA coincident with a LOOP.

This interpretation, as stated in the January 5, 1987 memorandum, was intended to be an interim measure until a single pump flow test could be conducted. The flow test was required to gather data to support single pump operation.

The aforementioned flow test and data collected for single pump operation was reviewed during the SSFI. Based on this review it appears that during single pump operation SW System pressure could fall below the peak design basis accident containment pressure of approximately 46 psig. Service Water pressure at the containment inlet penetrations could be below 39.7 psig with pump 1A2 operating and below 37.2 psig with pump 1A1 operating.

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-011A

The data reviewed also revealed single pump operation may result in certain end users receiving less than design flow. The test results reviewed indicate a measured SW flow of 2820 gpm at the 16" header supplying several components including the CCW heat exchanger, and spent fuel pool heat exchanger. Summation of the design required flow to these components is 2762 gpm (this value assumes 140 gpm to the spent fuel pool heat exchanger). However, during the test, the spent fuel pool heat exchanger valve was failed open. With the valve full open, flow rates would be significantly higher than 140 gpm. Under accident conditions if this valve was to fail open, the result could be starvation of other safety related components served off this header.

CONCERNS:

1. A single SW pump has insufficient head-flow characteristics to maintain SW pressure at the containment inlet penetrations above peak containment pressure during a design basis accident.

2. A single SW pump may not be capable of producing design required flow rates to safety-related equipment.

3. A discrepancy appears to exist between the January 5, 1987, PORC interpretation and the Technical Specification regarding the number of SW pumps required for train operability.

Team Leader: D. W. Sauer (signature)   Date: 2-12-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-013A

SUBJECT: Quality Assurance Controls of Design Related Documents

TEAM MEMBER: Chappelle, SJ

SUPPORTING DOC SHEETS: D-02-071, D-02-149

BACKGROUND:

Appendix A in the OQAP lists the regulatory guides and ANSI specifications to which KNPP is committed to. With respect to design control, KNPP is committed to ANSI N45.2.11 "Quality Assurance Requirements for the Design of Nuclear Power Plants", revision 1974. Following are pertinent excerpts from N45.2.11-1974 regarding design document (e.g., calculations) control.

1. Paragraph 7, Document Control states, "Documented procedures shall be used to control issuance of design documents and changes thereto."

2. Paragraph 7.1 Document Preparation, Approval and Issue states, "Personnel shall be made aware of and use proper and current... drawings and design inputs. Participating organizations shall have documented procedures for control of design documents and changes thereto to assure that current and appropriate documents are available for use."

3. Paragraph 8, Design Change Control states, "Documented procedures shall be provided for design changes to approved design documents, including field changes... These changes shall be justified and subjected to design control measures commensurate with those applied to the original design."

The design control requirements of ANSI N45.2.11 are implemented through the following heirarchy of documents:

1. Applicable portions of the Operational Quality Assurange Program (OQAP).

    a) Section 4 "Design Control"
    b) Section 5 "Document Control"
    c) Section 9 "Modification Planning and Control"

2. Applicable Administrative Control Directives (ACD's) and Engineering Control Directives (ECD's)

3. Applicable Engineering Control Procedures (ECP's)

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-013A

A review of ACD's, ECD's and ECP's revealed the below listed documents as being those that most directly affect the design control process by providing the instructions necessary to implement the requirements stated in the OQAP.

ECD 4.1 Design Change Control
EDC 4.2 Power Plant Design Group/Corporate Nuclear Staff DCR Interface
ECP 4.8 DCR - Conceptual Design
ECP 4.9 DCR - Detailed Design Process
ECP 4.10 DCR Implementation
ECP 4.11 DCR Closeout
ECP 4.14 Design Considerations
ECP 4.4 Guide to Safety Evaluations and Second Level Review
ECP 14.2 Conduct of Independent Technical Reviews
ECD 5.2 Drawing Control
ACD 9.4 Quality Assurance Boundary
EDC 11.4 Reporting of Defects and Noncompliance
ACD 8.7 Operating Experience Assessment Program
ACD 8.5 Engineering Support Requests
ECP 4.7 Design Change Prioritization and Annual Plan
ECD 5.8 Preparation & Control of Engineering Specs.
ACD 5.4 Work Request
ACD 1.6 Temporary Changes
ACD 2.14 Technical/Instruction Manual Revision Control
ACD 1.3 Jumper and Lifted Control Log

These sub-tier documents appear to provide the necessary instructions to implement the design control process except for the following noted concerns.

CONCERNS:

1. There appear to be no procedural controls for generating/revising engineering documents (e.g., calculations) for situations other than plant Design Changes (DCR's).

2. OQAP Section 4, Paragraph 3.6.2 requires that calculations shall be identifiable and retrievable. No directive or procedure could be located which provides instruction for the identification, indexing and control of calculations. Also, no instructions are provided to standardize the format and content requirements for calculations generated by WPS personnel for support of DCR's or other purposes.

3. OQAP Section 5, Paragraphs 3.2.2 and 3.2.3 require incomming and outgoing technical documents be controlled through ECD's for documents recieved at or sent from WPS Engineering and ACD's for documents received at or sent from the plant site. The only directives that could be located were ECD 5.2 which is strictly for drawing control and ACD 2.14 which is for control of Technical/Instruction Manuals.

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-013A

CONCERNS: (cont'd)

4. OQAP Section 4, Paragraph 3.11.1 requires that ACD's provide a system for controlling the implementation of temporary changes. Upon review of ACD 1.6, it was noted that no time limit is imposed on a temporary change nor is "temporary" defined with respect to time. The possibility exists for a TCR to remain in effect indefinitely.

5. OQAP Section 4, Paragraph 3.1.2 requires directives to provide the method of exchanging technical information across internal and external interfaces. Review of design change ECP's (4.7, 4.8, 4.9) revealed that design interfaces are the responsibility of the DCR Responsible Engineer/Supervisor (RE/S) but no definitive design interface mechanisms are stated, (Ref. ECP 4.9 paragraph 4.4.8 and 4.7.4). Reference also related RI R-02-010A and Document Sheets D-02-066 and D-02-135.

Team Leader: D W Sauer　　Date: 2-20-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-014A

SUBJECT: RHR Pump Pit Shield Plugs

TEAM MEMBER: Nelson, RL

SUPPORTING DOC SHEETS: D-02-070

BACKGROUND:

Preventative Maintenance Procedure PMP 17-2 Rev. I, "ACA Inspection and Cleaning", Step 2.3 States, "This maintenance may be accomplished during normal plant operation or plant shutdown."

Step 2.8 states, "An hourly fire watch tour shall be established any time the concrete covers (plugs) are removed for access to the 1B RHR Pump Pit. This will satisfy Appendix "R" criteria."

CONCERN:

The levels and effects of radiation post-DBA to equipment and personnel, with the plugs removed, may not have been considered during the performance of the shielding study.

Team Leader: DW Sauer (signature) Date: 2-8-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-015A

SUBJECT: Vendor's Technical Manuals

TEAM MEMBER: Nelson, RL

SUPPORTING DOC SHEETS: D-02-072, D-02-100

BACKGROUND:

Three series of Vendor Technical Manuals pertaining to the Worthington Service Water pumps currently exist. The manuals are delineated below:

1. K-148-4 was supplied with the initial order of four Service Water pumps, serial numbers VTP-27736 through 27739.

2. XK-148-4A was provided following a modification relative to an alternate packing type stuffing box arrangement. This modification was accomplished under Design Change Request 560 on Service Water pumps, serial numbers VTP-27736 - 27739.

3. Manual, WPS Purchase Order 19016 was provided with the pump ordered as a spare, serial number 75-TV1719.

A review of these manuals from the master file resulted in identification of concerns regarding the consistency of information presented from one manual to the next. As an example, information pertaining to bearing loading, although applicable to all three manuals, was only contained in K-148-4. There appears to be no control over these manuals in so far as consolidation of information is concerned. In addition, it is difficult to determine which copy is considered "controlled" and as such acceptable for use as a reference document. An example of this concern was noted during a review of Maintenance Procedures CMP 2-5 and PMP 2-3. Both these procedures reference manual XK-148-4 which contains outdated information.

CONCERNS:

1. Lack of information consolidation and a formal program to identify "controlled" copies of Vendor manuals could adversely impact maintenance activities.

2. Current Maintenance Procedures CMP 2-5 and PMP 2-3 reference a manual series which appears to be outdated. Specifically, K-148-4 does not contain information regarding the modified shaft packing type stuffing box.

3. No requirement exists for a plant specific engineering review of Vendor manuals for applicability or procedure revision.

Team Leader: [signature] Date: 2-15-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-016A

SUBJECT: Corrective Action Associated With LER 84-018-01

TEAM MEMBER: DeGraff, M

SUPPORTING DOC SHEETS: D-02-066

BACKGROUND:

Supplemental Licensee Event Report (LER) 84-018-01, issued in April of 1985, described a condition where in several fan coil units (FCU's) serving ESF components were found to have degraded cooling capacity. The degraded cooling capacity, as described in the LER, was attributed to: a) exterior fin fouling resulting in excessive differential pressure across the coil and b) silt build up on the Service Water side of the coils.

Subsequent to identification of these concerns, the LER indicated that additional reviews were conducted to; a) assure equipment operability and b) evaluate the need to increase the cooling capacity of existing FCU's or provide additional cooling in certain areas. As a result of these additional evaluations, the LER described seven corrective action items that had been or would be implemented.

During the SSFI, these corrective action items were evaluated for adequacy and timeliness of completion. Based on this review it was determined that two of the original seven items had not yet been completed.

The first item deals with the statement that FCU's serving equipment important to safety would be included in the PM Program to ensure periodic cleaning. Based on a review of various PMP's. it does not appear procedural requirements exist to periodically clean containment fan coil units 1A/1B/1C/1D.

The second item pertains to replacement of the cooling coils on the Turbine Building Basement, Auxiliary Building Basement and Mezzanine fan coil units. Replacement of the aforementioned coils, as documented in DCR packages 1631, 1634 and 1635 was required to offset cooling capacity shortages identified in a safeguards fan coil analysis accomplished by Fluor. Based on a review of Maintenance Requests associated with the DCR's it appears only three out of six coils were actually replaced. The remaining three coils, as documented in the MR's, were only cleaned. No justification supporting the reduced work scope could be located.

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-016A

CONCERNS:

1. DCR packages 1631, 1634 and 1635 clearly indicate that coil replacement is required to offset cooling capacity shortages identified by analysis. However, a review of associated Maintenance Requests regarding the actual work accomplished reveals that only 3 of 6 coils were replaced. No justification could be located supporting the reduced work scope.

2. LER 84-018-01 states that fan coil units serving equipment important to safety would be included in a PM Program to ensure periodic cleaning. However, based on a review of various PMP's it does not appear containment fan coil units have been included.

Team Leader: D W Sauer Date: 2-8-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-017A

SUBJECT: Lubrication Schedules

TEAM MEMBER: Nelson, RL

SUPPORTING DOC SHEETS: D-02-024, D-02-092

BACKGROUND:

A review of various Vendor Technical Manuals, Preventative Maintenance Procedures and equipment grease cards identified numerous discrepancies pertaining to lubrication periodicity requirements. In some cases the procedure requirements were less conservative than the Vendor recommendations and grease card intervals.

CONCERN:

Failure to maintain lubrication intervals consistent with vendor recommendations could degrade equipment service life.

Team Leader: [signature] Date: 2-9-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-018A

SUBJECT: Fluid Tests and Analysis - Network Analysis

TEAM MEMBER: Witman, PM

SUPPORTING DOC SHEETS: D-02-022, D-02-059, D-02-038, D-02-095, D-02-101, D-02-068

BACKGROUND:

A number of Fluor SW design basis flow calculations and WPSC system flow tests have been examined (some in detail, others in a cursory manner) during the SSFI.

Many of the calculations are based upon an assumed value of flow rate (usually SI maximum design required flow rate) in the SW System's headers and piping runs. A typical approach to these calculations is:

Assuming SI maximum system design required flow through the SW pump(s) and each user component,

- °Calculate "available" pressure in the main header.
- °Calculate "required" pressure needed to push flow to individual user components.
- °If "available" header pressure exceeds "required" header pressure, system design is deemed acceptable.

This approach, typical of hand generated design calculations, does not consider that the SW pump(s) seeks its (their) own operating point and each user component may receive more or less than its design required flow based upon overall system hydraulic conditions.

Thus, the calculational procedure described above may not be capable of analyzing the flow patterns and pressures in the system at a level of detail necessary to assure each component receives at least its design required flow rate in a variety of operating scenarios.

Results of the 1987 Train A flow test examined during the SSFI appear to indicate that single SW pump operation during a DBA may not satisfy all safety requirements. From an overview perspective, two pump operation appears to meet safety requirements. However, in as much as measured variables during the test was limited, it would be beneficial to have test results substantiated by or factored into a verified analysis which supports, in a quantitative manner (i.e., simulates within reasonable accuracy), the conclusion that even user component receives at a minimum its design required flow rate.

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-018A

CONCERNS:

In addition, in some key aspects the comparable pre-operational and 1987 SW flow tests do not compare favorably. Therefore, based upon the above, a concern exists as to the lack of detailed analyses quantifiying the flow rates provided individual SW user components during various operating scenarios.

1. A concern exists as to the lack of detailed flow analyses supporting various SW operating scenarios.

2. A concern exists that future system modifications or operating decisions may be made without reference to a current detailed analysis of the existing system operating state.

Team Leader: D W Sauer Date: 2-14-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-019A

SUBJECT: SW Water Pumps Motor Winding Temperature Limitations

TEAM MEMBER: VonEschen, RL

SUPPORTING DOC SHEETS: D-02-060, D-02-065, D-02-088, D-02-112, D-02-115

BACKGROUND:

Based on a Review of the Service Water flow test (dated 3-18-87) it was determined that during single pump operation the motor was operating within the service factor range, but at an undetermined factor. The documented motor test parameters, referenced in the work request, recorded bus voltage at 4276 and the attached charts show a maximum current of 55 amps. The typed statement attached to the charts and the Service Water flow test procedure limited motor current to 60 amps due to the motor design voltage of 4000 volts, and a service factor of 1.15.

A review of the original motor purchase documentation indicates that operation in excess of the 1.15 service factor dictates a limitation on operation to under 5 minutes.

Published motor design reference states that operation of squirrel-cage induction motors at voltages exceeding the design, results in the following; At 10% overvoltage: 1) full load current decreases by 7%, 2) motor efficiency decreases by 1%, and 3) service factor decreases by 3%. Also, large squirrel-cage induction motors have an efficency of about 93%. Summarizing the above information, during the Service Water flow test the pump motor was operated above rated load and at an undetermined service factor. Operation was within the procedure specified 60 amp per phase limit, however, monitoring of motor winding temperatures did not occur.

CONCERNS:

1. The 60 amp limit provided in the procedure is not consistent with information supplied by the Vendor regarding operation of motors in excess of design voltages. These inconsistencies could result in exceeding the motor winding temperature limitations.

2. No documented use of the motor winding temperature detectors or other devices to determine actual motor loading, when operating the motor well into the service factor range was found.

3. No calculation was found to determine the service factor limit of the Service Water pump motors when operated under normal and emergency operating bus voltage, ambient temperature, and Service Water flow requirements.

Team Leader: DW Sauer Date: 2-15-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-020A

SUBJECT: ISI Class Boundaries

TEAM MEMBER: Kloman, CS

SUPPORTING DOC SHEETS: D-02-077, D-02-129

BACKGROUND:

Service Water ISI pressure test SP-02-249, test boundaries are determined each time the test is performed. The ISI boundary drawing, 273127A - ISI M202, on the Service Water System and sketches provided in SP-02-249 contain errors. Operations drawings are used when defining the test boundary because of a higher confidence in drawing accuracy. Components are tested in procedure SP-02-249 which are not considered by the ISI ten-year plan as code class components. The test does not discriminate between components tested to satisfy code requirements and components tested above and beyond code requirements.

CONCERNS:

1. ISI boundary drawings and test procedure sketches that are in error should be corrected to reflect actual code class boundaries.

2. Pressure test procedures should clearly state what components are tested to meet code requirements and which components are tested beyond code requirements.

3. Each time the Service Water pressure test is performed the test boundaries are re-defined. Consistency in the test program relies on the knowledge of test personnel making similar interpretations of code requirements.

Team Leader: [signature] Date: 2-15-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-021A

SUBJECT: Alternative Cooling Water Source

TEAM MEMBER: Stevens, DH

SUPPORTING DOC SHEETS: D-02-094

BACKGROUND:

The Service Water System design provides an alternative cooling water source to mitigate the consequences of a loss of the main circulating water intake. This alternative source of lake water is supplied to the forebay via a 30 inch recirculation line from the circulating water discharge structure.

During an event which would rely on this design feature, the discharge structure will initially be filled with warm discharge water, and thereafter, a significant portion of hot circulating water discharge would be directed back to the forebay. This could raise Service Water temperature above 66°F.

CONCERN:

Calculations supporting operation of the Service Water System on the circulating water recirculation line could not be located.

Team Leader: [signature] Date: 2-13-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-022A

SUBJECT: Component Cooling Heat Exchanger Performance and Minimum Wall Thickness

TEAM MEMBER: Stevens, DH

SUPPORTING DOC SHEETS: D-02-104, D-02-105, D-02-106,

BACKGROUND:

The CCW HX Manufacturer's TEMA (Tubular Exchanger Manufacturer's Association) data sheet lists a tube surface area greater than that actually supplied in the two CCW HX's. The larger area was used in the Manufacturer's performance calculations, instead of the area actually supplied. This resulted in a stated capacity greater than that supplied.

In 1987 and 1988 eddy current examinations were performed on the heat exchangers to determine the condition of the tubes, and of the heat exchangers in general. The reports of these examinations note considerable blockage and fouling. At least 17 tubes (1.8%) were blocked in the "A" heat exchanger and 105 (10.9%) were blocked in the "B" heat exchanger. These conditions were noted after an initial cleaning. Pitting indications resulted in 2 tubes being permanently plugged in the "A" heat exchanger and 4 in the "B". The examination reports also note corrosion and pitting in the Service Water channel components up to 1/8" deep. The corrosion allowance is 1/8".

CONCERNS:

1. Installed area less than design, or reductions to less than design area due to either repair plugging or blockage by silt, or fouling greater than design fouling factors, will reduce performance (heat transfer capacity) below the original design capacity.

2. The tube plugging was accomplished without an evaluation of the consequences of reducing area. In addition, the tube blockage and fouling conditions noted in the eddy current examinations were apparently not calculated for effects on capacity.

3. Fouling factors are critical to performance. However:

   A. No PMP's require examination of CCW HX condition.
   B. No PMP's require periodic cleaning of CCW HX's.
   C. No IST's exist to determine and trend CCW HX performance.

   Furthermore, installed instrumentation is inadequate for any such program.

4. Corrosion and pitting may have exhausted the corrosion allowance in the Service Water channels. Actual minimum wall and actual remaining corrosion allowance should be evaluated, and periodic surveillance initiated if found to be required. This evaluation should have been initiated promptly after observation of the condition.

Team Leader: DW Sauer   Date: 2-16-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-023A

SUBJECT: Operations - Radiological Liquid Waste Discharges

TEAM MEMBER: Harrington, GI

SUPPORTING DOC SHEETS: D-02-128

BACKGROUND:

A review of plant procedures identified that no procedural guidance is provided to delineate the actions necessary to conduct a radiological liquid waste discharge with only Service Water dilution flow. Furthermore, no procedural guidance is available to describe the actions necessary to prevent the possibility of exceeding regulatory discharge limitations in the event Service Water (SW) System flow changes during a discharge.

In addition, it was noted that the method used to determine SW System flow is through the use of a "System Pressure vs. Flow" graph. This graph was provided by the Chemistry Department for determining SW System flow based upon the number of SW pumps that are operating. No supporting documentation is available to describe how this graph was developed, approved or modified to account for changing flow characteristics. Without this documentation, there is no means of determining the accuracy of the graph.

CONCERNS:

1. Procedural guidance is not provided to describe the steps necessary to conduct a radiological liquid waste discharge when circulating water pumps are not available to provide dilution water flow.

2. Abnormal procedural guidance is not provided to describe the actions necessary in the event of an inadvertant change in the flow characteristics during a radiological waste liquid discharge without CW pumps.

3. No supporting documentation could be found to describe how the SW flow graph used to determine Service Water dilution flow rates for radiological waste liquid discharges was developed, approved or modified to account for changing characteristics.

Team Leader: D W Sauer (signature) Date: 2-14-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-024A

SUBJECT: Repetitive Failures of SW-6011 During Local Leak Rate Testing

TEAM MEMBER: Nelson, RL

SUPPORTING DOC SHEETS: D-02-125

BACKGROUND:

Service Water check valve, SW-6011, is installed in the SW line to the containment hose connections. This valve functions as a containment isolation on a class 5 penetration (penetration 24). Based on maintenance history reviews it was noted that SW-6011 has experienced a high rate of failure during as-found leak rate testing. The valve has failed 3 of the most recent 4 tests, the one satisfactory test was considered a near failure as stated on MWR No. 40310.

CONCERNS:

1. Valve SW-6011 has failed its local leak rate test 3 of 4 years following a satisfactory performance for five consecutive years. This was concluded by the absence of MWR's in the QA Vault for the period of 1981-1985. An evaluation of the rate of failure has not been made and no corrective action has been initiated to prevent recurring failures.

2. An evaluation has not been made to determine the suitability of using this type valve for isolation of the containment penetration.

Team Leader: D W Sauer   Date: 2-15-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-025A

SUBJECT: Test Acceptance Criteria and Trending

TEAM MEMBER: Kloman, CS

SUPPORTING DOC SHEETS: D-02-032, D-02-075, D-02-131

BACKGROUND:

Service Water Pump and Valve Test-IST, is performed each quarter to determine component operability. The results from these tests are reviewed against the acceptance criteria provided in ASME Section XI Table IWP-3100-2. The current program does not require evaluation/trending of the test results over time.

ASME Section XI, IWV-3300 requires verification of valve remote position indication be accomplished at least once every two years. This requirement is met in SP 87-273 and SP 87-274. These procedures specify various PMP's that need to be performed in order to satisfy the intent of IWV-3300. The acceptance criteria in the PMP's does not require verification of valve position indication.

In procedure SP 33-098, to exercise SW 1111A/B and SW 1211A/B, flow is verified through the SI pumps stuffing box and lube oil H/X using a sight glass. The procedure does not identify flow through the bullseyes as an acceptance criteria for the IST plan.

CONCERNS:

1. American National Standard N18.7 - 1976 states procedures should contain acceptance criteria against which success or failure can be judged. Procedures written and performed to satisfy Section XI requirements do not contain sufficient acceptance criteria to fulfill this commitment.

2. Article 1100 in Section XI states that the results of the quarterly tests are to be used in assessing operational readiness of the pump by detecting deviations in pump performance. Assessments should also include trending of test results for detection of pump degradation, establishing frequency of maintenance, and indication of test inadequacies.

Team Leader: DW Sauer Date: 2-20-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-026A

SUBJECT: Operations - Annunciator 47002-12 Removed From Service

TEAM MEMBER: Harrington, GI

SUPPORTING DOC SHEETS: D-02-135

BACKGROUND:

Temporary Change Requests, 84-15 and 84-19, removed annunciator 47002-12, "Containment Cooling Service Water Header Leakage Alarm" from service. The justification for removing the alarm from service was spurious actuation. The TCR's stated that the estimated duration of the change would be one year.

A third TCR, 84-16, requested that the alarm setpoint be increased so that TCR 84-15 could be cleared and the alarm restored to service. The setpoints were reset, however the alarm was never placed back into service. It appears that the leakage alarm has not been operable since 8-3-84, the date that TCR 84-16 was implemented.

The safety evaluation reports associated with TCRs 84-15 and 84-19 indicated that removing the alarm from service did not constitute an unreviewed safety question. These reports referenced the safety evaluation written for TCR 84-16 which only addressed raising the alarm setpoint. Therefore, no safety evaluation report is available to describe removing the alarm from service.

The USAR makes two references to the leak detection instrumentation as follows:

1. Page 9.6-3: Differential pressure instrumentation was installed on the fan coil units, providing an aid in detecting leakage on each fan coil unit.

2. Page 9.6-5: An in-flow/out-flow comparison system is provided to detect leakage in the containment fan coil units.

CONCERNS:

1. The Temporary Change Evaluation forms associated with the TCR's determined that in both cases, the deactivation of the leakage detection alarm did not constitute a change in the facility. This appears to contradict statements made in USAR Section 9.6.2.

2. No Safety Evaluation Report could be located to support removal of the leakage alarm from service for an extended period of time.

Team Leader: DW Sauer   Date: 2-20-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-027A

SUBJECT: Selection of Motor Starter Overload Heaters

TEAM MEMBER: VonEschen, RL

SUPPORTING DOC SHEETS: D-02-151

BACKGROUND:

Reviews of installed motor overload protection for various Servie Water System motor operated valves, reveals in many cases, installed overload heaters allow current in excess of full load.

Review of DCRs 1160 and 1645 did not identify applicable procedures or calculations for determining overload sizing.

Review of data sheets pertaining to motor operated valve testing reveals recorded currents in excess of nameplate full load.

RNS:

1. Will O.L. heaters currently applied to the motor operated valve operating motor circuits jeopardize the operation of valves during an emergency?
2. By what approved procedure were the installed overload heaters selected?
3. What calculations are used to evaluate test procedure baseline current limits in excess of motor nemeplate full load current?
4. How are motor operated valve test results factored into review of overload heater sizing?
5. What procedure is used to determine the overload heater ambient compensation settings specified in the maintenance procedures such as # CMP 40-19095?
6. What procedure will be used for future O.L. Sizing?

Team Leader: W W Sauer

Date: 2-22-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-028A

SUBJECT: Spent Fuel Cooling Heat Exchanger Performance

TEAM MEMBER: Stevens, DH

SUPPORTING DOC SHEETS: D-02-137, D-02-105

BACKGROUND:

The Manufacturer's claimed service heat transfer coefficient for the spent fuel pool cooling heat exchanger is 268 Btu/hr Ft^2 °F. When this coefficient was re-calculated by the inspection team members using the clean heat transfer coefficient and design fouling factors, a slightly lower value was obtained (263.8 Btu/Hr Ft^2 °F). The as-supplied capacity is therefore 1.6% less than that specified.

The design load has been increased by the SFP rerack from the original value of 8.5×10^6 Btu/hr. to 9.2×10^6 Btu/hr., with a worst-case load of 19.0×10^6 Btu/hr.

CONCERN:

Either of these first two factors taken alone would not be significant for the spent fuel heat exchanger, since at worst a small increase in spent fuel pool temperature would result, under design load conditions. The increased design load, however, coupled with a marginal as-supplied capacity and possible further reduction in capacity due to blockage and fouling, similar to that noted in the CCW HX may result in a net capacity significantly less than required to meet spent fuel cooling loads under worst-case conditions.

Team Leader: [signature] Date: 2-20-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-029A

SUBJECT: Fouling of the 1B Mezzanine Fan Coil

TEAM MEMBER: Nelson, RL

SUPPORTING DOC SHEETS: D-02-156

BACKGROUND:

Filtering about 50 gallons of the flushing water from the fan coil through a 400 micron filter entrapped about a quarter-cup of moss. To determine if the flush water supply was the source of the moss, approximately 50 gallons of the supply water was passed through an identical filter with negative results. Following this flush, a flush of the Auxiliary Building 1A Basement fan coil was performed. Prior to flushing the coils, about 50 gallons of the flush water supply was filtered which produced no indication of moss, the coil flushing also produced no moss.

CONCERN:

If the moss is in fact growing in the coils, it is unlikely that backflushing will remove all of the growth. A visual inspection of the coil needs to be performed to determine the degree of fouling. If the inspection reveals the presence of moss, an evaluation should be made regarding the susceptibility for other fan coils to have similar type of fouling.

Team Leader: D W Sauer Date: 2-20-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-030A

SUBJECT: Local Leak Rate Testing

TEAM MEMBER: Kloman, CS

SUPPORTING DOC SHEETS: D-02-086

BACKGROUND:

The NRC in Technical Evaluation Report TER-C5257-26 indicated that type "C" testing of Service Water isolation valves to the containment fan coil units was not required. This is based on the assumption that the Service Water System is closed to the containment atmosphere, does not communicate with the reactor coolant pressure boundary and does not rupture as a result of a LOCA. However, experience has shown the fan coils are susceptible to leakage thus exposing the system to the containment atmosphere. Under an accident condition, it is possible that one train of Service Water would be depressurized thus not providing isolation for two of the four penetrations. During this condition, the i[illegible]tion valves in this "closed system" would be relied upon to prevent the e[illegible]e of containment air to the outside atmosphere.

CONCERN:

10CFR50, App.J III.C.3 requires the combined leakage rate for all penetrations and valves subject to Type B and C tests shall be less than 0.60 La. Results from local leak rate testing of penetrations 37A-D and 38A-D should be included in the combined leakage rate for all penetrations as reported per 10CFR50 App.J.

Team Leader: [signature] Date: 2-20-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-031A

SUBJECT: Leak Testing of Component Cooling Heat Exchanger Tubes

TEAM MEMBER: Nelson, RL

SUPPORTING DOC SHEETS: D-02-158

BACKGROUND:

Corrective Maintenance Procedure (CMP 31-2), Step 4.2.3, limits the shell to tube delta P to a maximum of 15 PSI during the inspection for tube, and tube to tube sheet leakage. This pressure is estimated to be 85 PSI less than the normal operating delta P. The estimated delta P of 100 PSI is based on observations made during normal plant full power operation on 2-20-90. The observations were as follows:

CCW Pump Discharge Pressure	132 PSIG
CCW Outlet Pressure From HX	120 PSIG
SW Supply to the CCW HX TCV	80 PSIG
CCW HX TCV Position	Mid Position
CCW HX SW Outlet Pressure	Not Available

The CCW HX SW outlet is a 10 inch line which drains to the auxiliary building standpipe, therefore, it is estimated that about 75% of the SW supply pressure drop occurs across the TCV.

CONCERNS:

1. The limit of 15 PSI maximum delta P between shell and tube pressures does not have a valid technical basis.

2. Leak testing at the relatively low pressure may not provide a true representation of the heat exchanger condition at the higher normal operating pressure.

Team Leader: D W Sauer Date: 2-20-90

REQUEST FOR INFORMATION (RI)

RI NUMBER: R-02-032A

SUBJECT: Maintenance Activities not Supported by Authorizing Documents

TEAM MEMBER: Nelson, RL

SUPPORTING DOC SHEETS: D-02-042, D-023-129

BACKGROUND:

Maintenance Work Request No. 28340 was issued for refurbishment of a service water pump in accordance with CMP 2.5. The maintenance required welding of cracks in the cast iron upper and lower suction bells. Neither the CMP, nor the MWR provided approved and qualified procedures for welding of those cast iron parts.

Maintenance Work Request No. 33490 temporarily changed the current limiter setting for the station battery chargers to prevent tripping of the output breakers while charging the batteries following a test discharge. The temporary setting was at approximately 90% of the value stated in the USAR.

A stainless steel tube was installed between the main gear box and spring pack casing on MOVs ICS-5A and ICS-6A without a DCR or approved safety evaluation.

CONCERN:

The above maintenance activities which were authorized by the issuance of a MWR, or verbal instruction, or both, are beyond the scope of authorization which was provided. The activities identified were authorized in a manner which circumvents established plant policies and regulatory requirements. No formal 50.59 program exists to control plant changes outside the scope of the DCR process.

Team Leader: D W Sauer Date: 2-22-90

ENCLOSURE 3

Letter from C. A. Schrock (WPSC)

To

Mr. John B. Martin (NRC)

Dated

Octoher 13, 1993

SW SSFI CORRECTIVE ACTION STATUS

RI#	Inspection Team Concern(s)	Summary of Implementation Team Response	RI Response Status
R-02-01A	Lack of operator guidance in the event of low forebay level and high SW temperature.	The response determined that additional operator guidance for low forebay level is not warranted because the SW pumps are capable of operating at a reduced NPSH for a short period of time. High SW temperature procedural guidance is not needed because we have analyzed our SW inlet temperature for 80°F which we do not expect to achieve. The response recommended installation of a control room computer alarm to annunciate at 78°F.	Open until installation of control room alarm.
R-02-02A	Concerns were identified regarding the surveillance procedures and system line-up associated with SW pump In-Service Testing (IST).	The response in conjunction with an ongoing evaluation proposed a method to perform full flow SW pump IST in lieu of verifying SW pump flow through a recirculation flow path. This response also recommended changes to our SW Pump IST surveillance procedures to take into account the full SW pump lift pressure used to determine SW pump testing ΔP.	Response corrective actions complete. Response closed out.
R-02-02B	Concerns were identified regarding establishing new pump operating reference values following a SW pump replacement.	The response to the RI recommended revising the SW Pump Installation Maintenance Procedure to add a requirement to baseline the pump parameters following a SW pump replacement.	The RI response corrective actions have been implemented and the response closed out.
R-02-03A	This RI questioned the method of isolating QA2 and QA3 SW branch lines following a postulated pipe break.	The evaluation determined that in the event of a SW line break downstream of a manual isolation valve that the SW flow out the break would not affect the SW flow to the downstream components and could be isolated prior to any detrimental internal flooding effects.	Recent modifications to the SW system need to be reviewed to ensure that the conclusions of the RI response are not impacted.

SW SSFI CORRECTIVE ACTION STATUS

RI#	Inspection Team Concern(s)	Summary of Implementation Team Response	RI Response Status
R-02-04A	Concerns surrounding the minimum screenhouse temperature and equipment operation at these minimum temperatures were identified.	The RI response stated that because of the existing screenhouse low temperature alarm and the resultant actions, equipment operation would not be affected due to low screenhouse temperatures.	This RI response is closed out.
R-02-05A	Questions were identified regarding SW pump cast iron component weld repairs.	The response for this RI validated the RI's concerns and identified procedural changes that were implemented since the time of the weld repairs noted in the RI. The RI response concluded that these procedural changes would prevent re-occurrence of this issue.	This RI response is closed out.
R-02-06A	Concerns were identified regarding the determination for SW pump minimum submergence and NPSHA.	The response concluded that SW pump forebay level alarm setpoints are adequate and that prior operator actions that have been performed in response to low forebay level ensure that minimum SW pump submergence and NPSHA will be maintained.	The RI response is closed out.
R-02-07A	Questions and concerns were identified surrounding the design and operation of the SW backwash line.	This RI was invalidated by the Implementation Team because the design, seismic qualification, and ability to manually operate the backwash valve were shown to exist in the RI response.	The RI response is closed out.
R-02-08A	Concerns involving the initial setting of SW system throttle valves were identified.	SW flow testing performed in support of this RI response verified the position of the throttle valves and implemented procedural changes to ensure the proper valve position is maintained following maintenance. Subsequent evaluations performed have eliminated the need to have manual throttle valves in the SW system.	The RI response is closed out.

SW SSFI CORRECTIVE ACTION STATUS

RI#	Inspection Team Concern(s)	Summary of Implementation Team Response	RI Response Status
R-02-10A	This RI identified calculational concerns to support modifications to install new fan coil units.	Based on SW flow testing, SW system calculations performed in support of SW system SSFI implementation efforts, and information developed in other SW system SSFI RI's, all the issues of this RI were resolved.	The RI response is closed out.
R-02-10B	This RI identified some concerns regarding a 1989 SW System Elevated Temperature Study.	The concerns of this RI were generally misinterpretations of the study results or reiterations of issues identified in the study as requiring additional evaluation.	A formal response has not yet been prepared, the open issues relevant to elevated SW temperatures have been resolved and there are no outstanding concerns.
02-11A	Various concerns were identified involving operation of a single SW pump.	Based on SW flow test information, adequate SW system pressure at the containment penetrations exist, however, SW flow to all components is marginal. Due to the complexity of the SW system, it was recommended that a SW system computer flow model be developed. Use of the flow model can then be used to analyze the operation of a single SW pump.	Development of a SW flow model is essentially completed. Minor changes to the model are required. This RI response is open pending these open items and evaluation of single SW pump operation.
R-02-13A	Concerns with some activities associated with our engineering processes were identified.	The most significant concern of this RI identified that no specific procedural controls exists for performing calculations. As part of the implementation of this response, a calculation control procedure was developed and issued. The RI response also identified other minor changes to our engineering control procedures.	This RI response is open pending implementation of the procedure revisions.

SW SSFI CORRECTIVE ACTION STATUS

RI#	Inspection Team Concern(s)	Summary of Implementation Team Response	RI Response Status
R-02-14A	This RI identified a concern questioning the post-DBA radiation levels at the RHR pumps with the RHR pump pit covers removed.	The RI response validated the RI concerns and recommended that a shielding study be performed to take into account the post-DBA radiation levels with the RHR pump plugs removed. Additionally, it was recommended that plant practices be revised to allow removal of only one RHR pump pit cover at a time.	This RI response is open until the recommended corrective actions are implemented.
R-02-15A	This RI identified concerns involving the control and review of the SW Pump Vendor Technical Manual.	This concern was resolved based on implementation of our Configuration Management Vendor Technical Manual Review Effort.	This RI response is closed.
R-02-16A	This RI identified questions involving the corrective actions stated in an LER.	The response for this RI concluded that 1 out of 2 of the LER corrective actions have been implemented. Not implementing the second LER corrective action did not change the intent of the information presented in the LER, but it will be reviewed and dispositioned.	This RI response is closed pending LER review.
R-02-17A	The RI identified a few instances where the current lubrication intervals did not match those recommended by the vendor.	The response for this RI concluded that based on service life, our current lubrication frequencies are acceptable. As part of the SW RCM, the lubrication frequencies were reviewed.	This RI response is closed.
R-02-18A	This RI identified a lack of detailed SW flow analysis necessary to adequately review the SW system for various operating scenarios and for safety evaluations of SW system modifications.	The SW system flow testing and SW flow model development provide a comprehensive tool to help base SW system decisions on.	This RI response is open pending completion of the SW flow model.

SW SSFI CORRECTIVE ACTION STATUS

RI#	Inspection Team Concern(s)	Summary of Implementation Team Response	RI Response Status
R-02-19A	Operation of a single SW pump may cause the pump motor to operate in its service factor range.	The response for this RI determined that the SW pump motor, during single pump operation, was operating within the motor FLA rating.	This RI response is closed.
R-02-20A	ISI boundary drawings have errors and SW system pressure test procedure have inconsistencies.	ISI drawings are currently being revised which addresses the deficiencies identified in the RI. The SW System Pressure Test SP has been revised which resolves the procedural concerns of this RI.	This RI response remains open pending completion of the ISI drawing revision effort.
R-02-21A	This RI raised an issue with the lack of calculations to support the alternate cooling water source to the SW system.	The alternate source would only be required if the main CW intake (a Class I structure) and its auxiliary supply connections were lost due to a catastrophic failure. Since the auxiliary supplies are protected against ice blockage, such a failure is extremely unlikely. Original evaluations of this RI were done based on demonstrating that such a failure was not a credible event. Subsequently, we have determined that although it is extremely unlikely, we will evaluate the impacts if it should occur. Preliminary evaluations indicate that the alternate source was originally designed considering the appropriate factors and will be an acceptable cooling water supply. This will be formally described and documented in the completed evaluation.	A formal RI response needs to be prepared.

SW SSFI CORRECTIVE ACTION STATUS

RI#	Inspection Team Concern(s)	Summary of Implementation Team Response	RI Response Status
R-02-22A	Concerns were identified on the SW portion of the CCW heat exchanger in the areas of tube fouling, assumed fouling factors, heat exchanger shell and tube sheet pitting and tube plugging.	As part of this response, an evaluation was performed that determined the maximum number of tubes that could be plugged. Based on this evaluation, annual heat exchanger cleaning was recommended to maintain the fouling factor assumptions in the evaluation. To address the heat exchanger pitting concern, a ceramic coating has been applied to the heat exchanger shell tube sheet and end covers.	This RI response is closed.
R-02-23A	This RI identified procedural concerns related to radiological discharges using SW only for dilution flow.	The response for this RI recommended changes to the procedures used to make radiological discharges.	This RI response is closed.
02-24A	SW to containment isolation valve was found to have frequently failed its leak rate test.	This RI was found to be invalid because this problem was previously recognized and corrective actions were initiated.	This response is closed.
R-02-25A	During SW IST, MOV positions are not always locally verified. Additionally, there is no acceptance criteria for SW flow verification to the SI pump lube oil heat exchangers.	The response for this RI concluded that there are procedures that verify the accuracy of the remote position indication of MOV's. This response recommended a surveillance procedure revision to include in its acceptance criteria SW flow verification to the SI pump lube oil coolers.	This response is open until the procedure revision is implemented.
R-02-26A	The annunciator for the "Containment Cooling SW Header Leakage Alarm" was removed from service due to spurious actuation under a TCR. The TCR safety evaluation did not fully document this.	An Engineering Support Request has been issued to document the development of the 10CFR50.59 Safety Evaluation.	This response is closed.

SW SSFI CORRECTIVE ACTION STATUS

RI#	Inspection Team Concern(s)	Summary of Implementation Team Response	RI Response Status
R-02-27A	This RI questioned the methodology and controls in place to size motor overload (OL) heaters.	The RI response performed sample calculations of motor OL heaters in the SW system and found them to be sized conservatively. This is consistent with previous motor OL heater evaluations. The response also noted that an OL sizing procedure is in development. A RI response corrective action was initiated to follow the development of this procedure.	This RI response will remain open pending completion of the motor OL sizing procedures.
R-02-28A	This RI noted a possible minor discrepancy in the spent fuel pool heat exchanger heat transfer coefficient and raised the concern that this factor combined with SFP rerack for increased fuel storage density could result in inadequate heat removal capability.	The minor nature of the concerns in this RI coupled with preliminary evaluation results have resulted in its being given low priority. The heat transfer coefficient difference is so small as to be of little significance. The impact of the SFP reracking on heat removal requirements was addressed in the design changes which implemented the reracks. Additionally, one RHR heat exchanger is available for SFP cooling, therefore, providing alternate heat removal capability.	Development of a formal RI response is in progress.
R-02-29A	Flushing of an area fan coil unit observed during the SSFI noted a foreign substance resembling moss in the effluent flush water.	The RI response concluded that based on the volume of matter identified as well as historical heat exchanger performance data that the observed foreign substance had little impact on the heat removal capability of the fan coil unit.	This RI response is closed.

SW SSFI CORRECTIVE ACTION STATUS

RI#	Inspection Team Concern(s)	Summary of Implementation Team Response	RI Response Status
R-02-30A	This RI questioned whether the leak rate results of the containment fan coil unit SW line containment penetrations should be included in our reporting for 10CFR50 Appendix J.	The RI response determined that Appendix J does not require testing of these penetrations because these lines do not communicate with the containment atmosphere.	This RI response is closed.
R-02-31A	The basis for the component cooling water heat exchanger tube leak testing differential pressure was questioned.	The RI response confirmed that the estimated ΔP used in the maintenance procedure for tube leak testing had little basis and revised the maintenance procedures accordingly.	This RI response is closed.
R-02-32A	This RI identified generic concerns with maintenance activities being performed beyond the scope of the authorizing document.	The response to this RI concluded that there was no technical basis for this RI. This RI was subsequently designated as invalid.	This RI response is closed.