U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-388/88-10

Docket No. 50-388

License No. NPF-22

Licensee: Pennsylvania Power & Light Company
2 North Ninth Street
Allentown, Pennsylvania 18101

Facility Name: Susquehanna Steam Electric Station Unit 2

Inspection At: Berwick, Pennsylvania

Inspection Dates: April 25-29, 1988

Inspectors: T. Rebelowski, Senior Reactor Engineer — 7/6/88 date

D. Caphton, Senior Technical Reviewer — 7/7/88 date

L. Prividy, Reactor Engineer — 7/7/88 date

W. Oliveira, Reactor Engineer — 7/7/88 date

Approved by: N. J. Blumberg, Chief, Operational Programs Section, Operations Branch, DRS — 7/7/88 date

Inspection Summary: Routine inspection on April 25-29, 1988 (Report No. 50-388/88-10)

Areas Inspected: Maintenance/outage inspection to assess the licensee's performance in the areas of: Corrective and Preventive Maintenance Programs, Modification Program, Surveillance Program, and Engineering Support. Also reviewed was licensee's Action on Previous NRC Concerns.

Results: The outage management program to control all phases of maintenance, surveillance, engineering support and modifications was acceptable except for two inspector identified violations and one concern in the area of excessive personnel overtime.

One violation concerned the identification and correction of the root cause was not addressed for service water pump anomalies. (Paragraph 5.0) The other violation addresses the area of radwaste discharge releases where the monitoring flowmeter was not properly calibrated and adjusted to maintain accuracy of flows. (Paragraph 4.4)

The planning and trending of plant work tasks was good and contributed to management's outage control of job tasks although the identification of a perceived fatigue factor in maintenance personnel attributed to excessive overtime was identified by the review of time records and by discussion with plant technicians and mechanics.

DETAILS

1.0 Persons Contacted

R. Beckley, QC Supervisor
*J. Blakeslee, Assistant Plant Superintendent
R. Breslin, Maintenance Services Supervisor
*F. Butler, Supervisor of Maintenance
*R. Byram, Plant Superintendent
*T. Dalpiaz, Technical Supervisor
*E. Figard, Supervisor of Instrument and Control
*J. Graham, Assistant Manager, Nuclear Quality Assurance (NQA)-Operations
J. Hart, Quality Control Engineer
D. Heffelfinger, Senior NQA Auditor
G. Heptinger, Rad Waste Supervisor
*H. Keiser, Vice President Nuclear Operations
*R. Kichline, Licensing Specialist
K. Mattern, Rad Waste Operations Engineer
*H. Riley, Health Physicist and Chemistry Supervisor
*D. Roth, Senior Compliance Engineer
*K. Roush, Supervisor, Nuclear Instruction
K. Tutorow, Foreman, Mechanical Repairs
*R. Wehry, Power Production Engineer-Compliance

United States Nuclear Regulatory Commission

*F. Young, Senior Resident Inspector
*J. Stair, Resident Inspector

*Denotes those attending the exit meeting April 29, 1988.

The inspector also contacted other administrative and technical personnel during the inspection.

2.0 Licensee's Actions on Previous NRC Concerns

2.1 (Closed) Unresolved Item (387/86-06-01 and 388/86-04-01)

A number of unsatisfactory emergency lighting (E.L.) conditions were identified during testing, e.g., lights not working, and missing bulbs. The inspector reviewed the Work Authorizations P62843 and P64202 with PM procedure E119801, E119851 and the annual conditioning cycle of emergency lights, which repaired selected new batteries and replaced defective components and found it satisfactory. In addition, the inspector toured the site and observed functional testing of E.L. which was satisfactory. This item is closed.

2.2 (Closed) Unresolved Item (388/86-19-03)

No procedural method to close excess flow check valve was specified in the Local Leak Procedure for penetration X-31B. A Local Leak Rate (LLR) test of the Mini Purge to the Recirculation Pumps, penetration X-31B did not address a method used to close an excess flow check valve. The procedure SE-259-043 was modified in paragraphs 6.3.7 and 6.3.8 to document this method. In addition procedure SE 259-054 Rev. 2., LLR Testing of the Mini Purge to Recirculation Pumps, (Penetration X-60A) was also modified. The procedure SE-259-043 was performed and successfully completed on March 29, 1988. This item is closed.

2.3 (Open) Unresolved Item (387/85-12-03)

Electrical panels had been modified and a number of lugs were found bent or broken. The licensee had committed to a inspection of the modified panels. A reinspection of electrical panels was performed to determine electrical lug conditions and found acceptable. This item was documented in NRC combined Inspection Report 387/87-22 and 388/87-20. The additional documentation to identify the final inspection of electrical cabinets and surrounding areas necessary to close out the modification was not available for the inspection review. This unsolved item remains open until area closeout is documented by licensee.

3.0 Maintenance Performance During Outage (62700, 62704, 62705)

A maintenance/outage inspection was conducted to ascertain licensee performance by observation of ongoing and completed work packages in the areas of maintenance, surveillance and field modifications. Surveillances and modifications are documented in paragraphs 4, 5, and 6.

The licensee experienced a number of incidents the weekend prior to the inspection including a spill of radioactive liquid waste due to a misaligned system, inadvertent damage to the feed water spargers during the replacement of the core internals and a injury to a maintenance electrician due to his failure to identify a live electrical panel prior to the start of a work package. Based on the above events the licensee instituted a hiatus on the issuance of all work packages for a two day period in order to review causes of the events, thus limiting the inspectors observation of work in progress. In addition, a review was conducted of the licensee's time management of maintenance personnel to determine if fatigue contributed to the various weekend events. The details of the incidents are documented in NRC Inspection Report No 50-388/88-09.

3.1 Corrective and Preventive Maintenance

3.1.1 Scope

The inspector attended a morning planning meeting to determine the scope of corrective and preventive maintenance work that could be reviewed during the inspection period. Five corrective maintenance and two preventive maintenance activities were observed. The activities were assessed against the primary administrative procedures AD-QA-500, AD-QA-502, OPS-13 and MI-PS-001, as well as the technical requirements listed in Attachment I. The conclusions of the inspection are discussed in paragraph 3.1.2.6.

3.1.2 Maintenance Program

Administrative procedures were reviewed and found to contain the organization charts, functions/duties and the responsibilities delineated for their performance. The administrative procedures reviewed were found to be current, properly indexed and distributed.

Maintenance procedures used in the activities observed also delineated responsibilities mentioned above, were also current, and properly filed and distributed. In addition their step-by-step description of actions prior to, during the conduct of, and the post maintenance testing, were clear, concise and accurate. The procedures also contained the acceptance criteria, technical requirements, corrective and preventive actions, the data recording forms and the interface actions with other organizations. The craft and first line supervision were involved in the development or revision of these procedures.

The plant personnel were trained, qualified and well versed with the administrative procedures as well as the maintenance procedures and technical requirements. The INPO accredited Training Program for the mechanics and technicians does not provide the means for determining whether mechanics or technicians are progressing toward certification. This INPO accredited certification program provides an estimated time to complete the certification. Where the mechanics or technicians should be at any specific time during the certification period could not be readily determined. Maintenance management stated that they will review the INOP accredited Training Program and

determine the status of each mechanic and technician's progress towards completion his or her certification and will monitor their progress by semi-annual audits.

3.1.3 Corrective Maintenance Observation

Work Authorization (WA) V86488 required rework of the Start Up Low Load valve LV 20641 in the Feed Water System. The instrument and control (I&C) technicians were observed balancing the air operated valves under the guidance of the vendor representative. Also observed was on the job training (OJT) of a new I&C technician. The vendor representative was thorough in his guidance and instruction and the I&C technicians were found attentive to the techniques needed to safely complete the work task. No deficiences were identified.

A power potentiometer (POT) on the Rod Block Monitor (RBM) "A' was replaced and functionally tested by two I&C technicians in accordance with WA V86573. Before replacing the power POT the technicians verified that the replacement was identical to the component being replaced. The I&C technicians maintained communication with the control room throughout the functional test. At the request of the control room the I&C technicians followed up on an investigation of the Local Power Range Monitor (LPRM) 24-17 in the Average Power Range Monitor (APRM) "D" as requested by WA V86544. They reported to the control room that the LPRM 24-17A has a bypass indication however the LPRM is not bypassed. This matter was investigated and corrected. No deficiences were identified.

Two electricians were observed troubleshooting a spare 4KV breaker that had failed it's three year preventive maintenance conducted in accordance with WA P 74948. The problem stemmed from the motor ratchet not operating properly. A corrective maintenance request WA V 80313 was subsequently prepared to overhaul the ratchet with the proviso to request assistance of the vendor. This breaker is one of three spare breakers and past experience indicates that the expertise of the vendor will be needed. The vendor has been so advised and is available to assist in the correction maintenance.

Electrical and Structural (E&S) mechanics were observed repacking a HPCI steam drain valve in accordance with WA V 73944. Their foreman reviewed with the inspector the work plan that was developed by Maintenance. In addition to the work plan the mechanics used procedures MT-GM-011 and 036, vendor information regarding packing and valve data from past outages which were part of the WA package. This action provided evidence that they were knowledgeable of the technical requirements and procedures. No deficiences were identified.

A welder was observed completing a weld in accordance with WA U 73019 for a test connection to Unit 2 HPCI Turbine Stop Valve Balance Chamber. This work was part of a Plant Modification Record (PMR) 87-9055. The welder's qualifications were verified by reviewing the biweekly Welder Qualification Status Report. No deficiencies were identified.

3.1.4 Preventive Maintenance

Environmental qualification (EQ) preventive maintenance (PM) was observed being performed by electricians on the standby jacket water pump OP 531C in accordance WA P 80981. The electricians were also performing EQ PM on the "A" Loop Supply valve HV 01112 in accordance with WA P 80982. No deficiences were observed.

During a five year preventive maintenance surveillance of the HPCI Turbine Stop valve FV 25612 required by WA P 73105, the piston cup seals were found to have deteriorated. The deteriorated seal was observed and notification was made to maintenance engineer who assisted the Technical Engineer in preparing a Non Conformance Report (NCR) No. 88-0333. The NCR is to ensure that Quality Assurance will monitor the resolution of the problem including the actions to preclude recurrence. No deficiences were observed.

3.1.5 QA/QC Interface With Maintenance

A contractor QC inspector was observed performing liquid penetrant testing (PT) on weld joint FW 45A on the test connection for Unit 2 HPCI Turbine Stop valve FV 25612. The QC inspector was well versed with administrative procedures as well as the technical requirements of PT testing. The NRC inspector noted

other QC inspections performed and properly recorded on the weld traveler forms.

NRC review of documentation of other QA/QC activities, the WAs, NCRs and the procedures indicated that sign offs, reviews, and approvals were properly documented by QC inspectors. No deficiences were identified

3.2 Maintenance Department - Apparent Overuse of Overtime

Two days prior to this inspection, a series of incidents (see paragraph 3.0) occurred that indicated that the alertness level of maintenance personnel appeared to be diminished. The inspector reviewed the overtime records for the period March 21 to April 3, 1988 and April 4 to April 17, 1988. The record review of the compilation of hours worked, indicated that the Assistant Foreman, Station Mechanics and Station Repairmen had fifty to one hundred percent overtime over their normal work periods. In one instance, during the biweekly 80 hours normal work period, 75 overtime hours were completed or 93.75% of base hours. Although all overtime was properly authorized by managements administrative procedures the accompanying fatigue factor was not considered by the licensee as a potential contributor to the incidents. Management's response to the incidents included a restriction for a two (2) day period of all work activities that were not started. In addition, supervision and maintenance personnel were required to maintain an eight hour per day work schedule.

Managements now recognizes that controls addressing overtime and the accompanied fatigue levels is a problem that should be addressed by outage management during future outage planning with a conservative manpower loading determination to minimize the use of overtime. No additional deficiences were identified.

3.3 Conclusion

The Maintenance Program is well documented and administratively controlled with the exception of the use of overtime. Craftsmen and first line supervision are involved in the development or revision of the maintenance procedures. Their involvement has made procedures technically superior and easier to implement due to the knowledge of procedures by supervision.

The maintenance personnel including I&C technicians are trained and qualified and are well versed in the administrative and maintenance procedures as well technical requirements. The INPO accredited Training Program does not provide milestones for the determination of the certification progress of a mechanic or technician. Maintenance management plans to monitor the progress of certification by periodic maintenance management training audits.

4.0 Modification Program (37701, 37702)

4.1 Inspection Scope

The inspection reviewed the following modifications:

Modification No.	Modification Description
85-3098 A and B	Standby Liquid Control System (SBLC) Modifications to Comply with 10 CFR 50.62 (ATWS Rule)
87-3013 A	Snubber Reduction Program
87-9013	Cooling Tower Blowdown Flow Instrumentation
86-9039	Replacement of Reactor Cleanup System - Hydrostatic Test

The inspector reviewed the following areas for each of the above modifications:

- Verified by system/equipment walkdowns the as-built information were installed as per drawings.
- Verified that Engineering work was technically sound.
- Verified that the level and type of quality inspection was adequate for the selected work.
- Determined proper classification of work according to ASME, IEEE and EQ requirements.
- Verified that personnel were trained on a timely basis as appropriate.
- Verified that onsite and offsite review committees performed their review responsibilities concerning the modifications.

Specific inspection findings and pertinent inspection observations concerning each of the selected modification are included below.

4.2 Standby Liquid Control (SBLC) System Modification DCP 85-3098 A&B (37702)

4.2.1 Scope

The new ATWS rule (10 CFR 50.62) for Standby Liquid Control (SBLC) systems states in part: "Each boiling water reactor must have a SBLC system with a minimum flow capacity and boron content equivalent in control capacity to 86 gallons per minute of 13-weight percent sodium pentaborate solution." The licensee chose to meet this requirement by making modifications to achieve simultaneous two pump operations. The modifications were accomplished in two major steps. Plant Modification Record (PMR) 85-3098A accomplished the necessary piping changes including new heat tracing and PMR 85-3098B changed the pump control circuit which included a new control switch for the two SLC system pumps in the Main Control Room panel 2C601. Although a new suction line was added to provide independent suction for each pump to the storage tank, the pump discharge piping was not modified. The inspector verified that the licensee's evaluation of the pump discharge piping to accommodate the two-pump flow capacity. Also, the inspector made specific checks to determine the licensee actions concerning periodic testing of the SBLC system to assure that it would perform as intended.

4.2.2 Findings

Based on discussions with the system engineer and other licensee personnel, review of various documentation concerning PMRs 85-3098A and 85-3098B, and in-plant walkdowns of the modified SBLC system, the inspector noted the following:

- SBLC system procedures 50-253-002 and 50-253-003 were revised to be consistent with the modified SBLC system. These procedures were satisfactorily performed on April 13, 1988 to demonstrate actual injection into the reactor vessel using 2-pump control.

- The 2-pump injections test was performed with the reactor vessel at atmospheric pressure. However, the inspector verified that the engineering evaluation and the injection test performed per 50-253-002 demonstrated satisfactory SBLC system operations.

- The inspector determined that the plant simulator was modified and the training procedures were upgraded to reflect these modifications. All operators had been trained on these modifications.

- Discussions with the licensee indicated that the SBLC system pumps had a good operating history with minimal vibration problems. Two-pump operations did not appear to introduce any new pump operating problems during the tests performed.

- Review of the modification safety evaluation indicated that it was a detailed and thorough evaluation.

- The inspector verified that each pump discharge relief valve was properly bench tested.

- During the plant walkdown of the SLC pump/storage tank area, it was evident that the area was well kept and conducive to good operating practices.

In summary these modifications were implemented in an overall satisfactory manner. No unacceptable conditions were noted.

4.3 Snubber Reduction Program (DCP No. 87-3013A) (37702)

4.3.1 Scope

This design change is part of the Unit 2 Snubber Reduction Program to remove or replace safety-related snubbers located on the Standby Liquid Control (SBLC) and Reactor Water Clean Up (RWCU) systems. The intent of the overall snubber reduction program is to reduce the number of snubbers thus reducing testing and inspection requirements and personnel radiation exposures. This phase of the modification called for removal of 24 safety-related snubbers from the SBLC/RWCU systems including replacing one snubber with a larger size snubber and in eight cases removing some steel supports. Four cases involved removing pipe clamps. Removal of other pipe clamps was optional. The construction work package specified that any pipe clamp left after the snubbers were removed was to be tagged or stencilled "Abandoned - Snubber Reduction."

4.3.2 Findings

The PP&L design change package 87-3013A was approved on December 31, 1987. The PP&L installation engineering (IEG) group assigned an engineer who prepared a construction work order package to effect the modification. The plant modification records contained an approved 50.59 safety evaluation covering the modification. The modification work was stated to have been completed with the exception of the final review of the modification by IEG. A visual inspection was made of snubber DBA-201-H12

located on the reactor water clean-up system piping in the drywell. This snubber had been replaced with a larger Grinnel Part No. 307 size No. 3 mechanical shock suppressor. Support attachment surfaces were visually observed to be painted per the specification. No problems were identified during the inspection of this snubber design change/modification.

The inspector observed two locations where snubbers had been removed. Snubbers DBA 201-H-11 and DBA 201-H-14 had been removed. Visual inspection did not identify the marking "Abandoned - Snubber Reduction" specified in the construction work order (CWO) to be marked on the remaining snubber supports not removed. The CWO had been signed off as completed at the working level; however, the review and acceptance of the work was still outstanding. No other problem was identified with the snubber removal.

4.4 Cooling Tower Blowdown Flow Instrumentation Modification (37702) DCP87-9013

4.4.1 Scope

The purpose of this modification is to complete the installation of the Ramapo flow element and transmitter in Unit 2. In addition, this modification will sum the cooling tower blowdown flow signals from Unit 1 and Unit 2 transmitters with a new summer (FY-01503) and send the combined signal to a common flow switch (FSL-01503) which provides an permissive interlock for the discharge of liquid radwaste. The modification also provides for integration of cumulative blowdown flow to the river with a display counter (FQI-01501A) mounted on Panel 0C693 in the main control room.

During the review of this modification at Unit 2, problems were identified based upon the Unit 2 modification and the portion of the modification already completed and operating at Unit 1. The inspection focus was broadened to encompass related operational problems. Discussed below are findings that the existing calibration procedure for the flow device was not adequate and there was no calibration procedure (cited as a violation) for the valve position indicator being used by operators to set the dilution flow. The liquid rad waste being released to the environs was over extended periods of time as noted by bypasses required to open the interlocked radwaste valve in order to make liquid rad waste releases. In addition a potential problem was

noted in that the new flow device can fail nonconservatively by indicating to the operators that there is more dilution flow than actually exists. No procedures existed to alert the operators to this failure potential or how to check for it.

Cooling tower blowdown flow is monitored by flow devices in each Unit's blowdown pipe line to the river. This flow is used to achieve dilution of liquid rad waste being released to the environs. Technical Specifications require the flow to be greater than 5000 gpm before batch release of liquid radwaste. The Units 1 and 2 blowdown pipe lines merge to form a common blowdown pipe to the river. The existing logic allows for batch release from liquid rad waste to the river when either unit's flow exceeds 5000 gpm. The normal blowdown flow is 2500-3500 gpm per unit during operations. Unit 1 instrumentation was previously changed to a Ramapo Mark V1-24PSD flow element and a Ramapo SGA-8451 BD2FGE flow transmitter designed for dirty water applications. (Note - The cooling towers evaporate water thus resulting in concentrations of mud and silt, etc., in the cooling tower reservoir in which the flow elements must operate.)

4.4.2 Findings

The Unit 2 Ramapo flow device installation at the cooling tower and at the main control room panel OC693 was inspected. No abnormal conditions or problems were noted at these locations.

A safety evaluation for modification 87-9013 was PORC approved in meeting 87-135 on October 22, 1987. The safety evaluation concurred with the new permissive logic to provide a signal for the radwaste discharge valve to open when the combined cooling tower blowdown discharge flow from Unit 1 and Unit 2 was 5000 gpm or greater.

The 87-9013 modification work was assigned to the Installation Engineering Group (IEG) and eight work packages were developed and approved including conduit installation, wiring changes, replacement of a power supply in the main control room, and a checkout and calibration of the flow device.

The Ramapo vendor's manual for the new Unit 2 target flow measuring device was reviewed and interviews with I&C personnel determined that failures had been experienced

with the similar and newly installed Unit 1 Ramapo flow device. A Unit 1 Work Authorization (WA) S-76302 dated February 2, 1987 indicated the Unit 1 "flow recorder reads 1000 gpm when blowdown valve is fully closed." To correct this problem, the target flow element was removed, cleaned and recalibrated. The WA stated that some mud was found on the element. The inspector noted that this target flow device tends to show more flow if the target size is increased, for example, by any debris or mud that is deposited on the target. The Ramapo target flow measuring device measures deflection of the target's support rod with increasing or decreasing flow. The effect of the target drag in the water stream produces a force on the target support rod thus results in an electrical output signal from the strain gage transducer in the flowmeter. The flow device will give nonconservative flow information relative to having adequate dilution flow if the target size is changed by debris. Debris at the support penetration was also believed to be a calibration failure cause.

The calibration procedure for the flow measuring device, S1-241-301, Revision 3, stipulates an 18-month calibration frequency for the Cooling Tower Discharge Flow Monitor FT-21503. The calibration, however, is for the flow transmitter and no procedure was stated to exist for periodic removal and calibration of the flow sensor. The Ramapo vendor's manual has a procedure for sensor removal and calibration. Based upon the problems experienced at Unit 1 it appears that the transmitter calibration on an 18-month frequency is less than adequate to assure dependable calibration. The experience to date, indicates that periodic Ramapo target sensor removal, cleaning and calibration is needed and this is not part of the existing program. This appears to be a deficiency in the procedures. The licensee agreed at the exit meeting to terminate further radwaste liquid releases until resolution of the identified deficiencies are addressed. Since failure of the Ramapo target sensor tends to be in a nonconservative direction relative to providing adequate radwaste dilution flow, i.e., tends to indicate more flow if debris accumulates on the sensor, operators need to be provided information regarding this potential including possible methods for checking.

Facility records indicated 342 liquid radwaste releases were made in 1987. Seventy-one required installation of jumpers to bypass the radwaste permissive interlock and fifty-eight involved bypass of the cooling tower flow

permissives. When the blowdown flow measuring devices are inoperative or 5000 gpm or greater flow will not result in a permissive, a bypass jumper is installed in order to get the interlocked radwaste discharge valve to open. During these times operators rely upon the blowdown valve position indicator in the control room to set up the technical specification required dilution flow for making rad waste releases.

Procedure AD-QA-310-3, Liquid Effluent Release, contains the Radioactive Liquid Release Permit. Review of release permits and interviews with operators determined that the dilution flow rates were being estimated for releases being made when the cooling tower flow measuring devices were not operable. These estimates, per the operators, were made in accordance with AD-QA-310 step 6.3 based on the position of the control room indicator for the cooling tower blowdown valve. A check was made to determine the surveillance and calibration program for the valve and position indicator. This check identified that there was no program. The valve and valve position indicator was stated by licensee's representatives to not be in any program for periodic surveillance and calibration. TS 3.3.7.10 and procedure AD-QA-310-1 provide for making releases based upon estimated dilution flow. However, making estimates of dilution flow from the cooling tower discharge valve position indicator whose position versus flow is not verified through a surveillance and calibration program appears to be contrary to 10 CFR Part 50 Appendix B. Criterion XII states "Measures shall be established to assure that... instruments...are properly...calibrated, and adjusted at specified periods to maintain accuracy...." This item is an apparent violation. (50-388/88-10-02)

4.5 TP 261-013, Hydrostatic Test - Reactor Water Cleanup System (RWCU) (DCP86-9039) (37702)

The licensee had replaced a RWCU system bypass valve (HV 244F104) on Plant Modification Request 86-9039. A hydrostatic test was performed within boundaries of the RWCU pump discharge valve and other isolation valves on regenerative heat exchanger and feedwater loop A. The inspector observed location of the valve, observed hydro pump setup in areas of proper relief valve setpoint, water source, test pressure of hoses, calibrated gauges and protection to personnel. The test was successfully completed on April 28, 1988, and the procedure was properly followed. No deficiencies were identified.

5.0 Engineering and Technical Support - Residual Heat Removal Service Water (RHRSW) Pump Review

5.1 Scope

The licensee had identified to NRR in correspondence dated June 30, 1986 that several of the RHRSW pumps had experienced cavitation damage to the impeller liner. The 2A RHRSW pump's impeller liner had a rough surface due to cavitation and the 2B RHRSW pump had not yet been inspected. The licensee concluded that continued operation of the RHRSW pump was acceptable on the basis that (1) the root cause of the pump damage was understood (i.e., cavitation damage) and (2) expected pump lifetimes were determinable based on inspection findings and operating history.

5.2 Findings

5.2.1 Evaluation of RHRSW Pump 1P506B Hydraulic Performance

On January 6, 1988, during quarterly testing of RHRSW pumps per procedure SO-116-003 to fulfill the requirements of Section XI of the ASME Code, RHRSW pump 1P506B failed to meet its acceptance criteria of 64 to 70 PSID for pump differential pressure. The licensee formally identified this problem by immediately issuing Significant Operating Occurrence Report (SOOR) 1-88-004. Also the inspector noted that this pump failure and subsequent licensee corrective action had been reviewed and documented in a prior NRC Inspection Report (Combined Report 50-387/88-04 and 50-388/88-03). The inspector discussed with various licensee personnel the series of events that occurred from the time of pump failure on January 6, 1988 until the pump was repaired and retested on January 26, 1988. Based on these discussions, the inspector determined that the licensee recognized on January 6, 1988 that there was significant degradation in the hydraulic performance of RHRSW pump 1P506B. However, the licensee chose to justify continued operability of the pump based on a RHRSW system analysis. The inspector indicated that determination of component corrective action based on system analysis is not intended by paragraph IWP-3230.(c) of Section XI of the ASME Code to be interpreted as a valid long term solution to a pump problem.

The pump assembly for RHRSW pump 1P506B that was removed on January 25, 1988 was disassembled, cleaned and inspected under the direction of the pump vendor per WA S83069 on February 1, 1988. It was determined that the general

condition of the pump was good and that the block of wood found lodged in the suction bell caused the degraded pump performance. While the licensee replaced the failed pump in a relatively short period (2½ weeks), the inspector emphasized that the intent of paragraph IWP-3230 of Section XI of the ASME Code is to determine the cause of the pump problem as soon as possible, correct it and then return it to service.

In summary the inspector concluded that the engineering support in the decision process concerning RHRSW pump 1P506B operability was weak, especially in light of subsequent events concerning corrective actions associated with the block of wood found in the pump.

5.2.2 Corrective Actions Associated with Foreign Material Found in RHRSW Pump 1P506B

A change in the nature of the RHRSW pump 1P506B problem occurred when the block of wood was found in the pump suction bell on January 25, 1988. The new problem was foreign material in the RHRSW system. The inspector discussed with various licensee personnel the licensee's approach to problem resolution including root cause analysis. Based on these discussions, the inspector determined the following.

After 3 months the root cause of the wood introduction into the pump was still undetermined. There was an apparent low level effort being devoted to the task of determining the root cause of wood introduction into the RHRSW system. This was probably due in part to the fact that neither a Nonconformance Report nor an upgraded SOOR were issued to formally identify the foreign material problem. Based on discussions with maintenance personnel, the inspector determined that only planning efforts had been devoted to determine the root cause of the problem. The inspectors discussions with QA/QC personnel indicated an unawareness of the block of wood in the RHRSW pump 1P506B even though QC personnel were involved with specific inspection points during the pump disassembly and reassembly per WA S83079. Due to this unawareness, no Non-Conformance Report (NCR) was issued by any QA/QC personnel and QA/QC had not participated in the corrective action process concerning this problem. The inspector concluded that the licensee's failure to issue an NCR concerning the foreign material in the suction of the RHRSW pump 1P506B is an apparent violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action (50-388/88-10-01).

6.0 Surveillance Testing Program (61725)

6.1 Inspection Scope

In order to ascertain whether the licensee surveillance testing program is reflected in the observed surveillance tests, the inspector verified that Master Surveillance schedule for surveillance testing was up to date and that the surveillance schedule included the frequency for each test and calibration. In addition, responsibilities for the performance and planning were assigned. Approved procedures included acceptance criteria that reflected good engineering judgement were in use.

The licensee "Unit 2 Second Refueling and Inspection Outage Bulk Work Indication" was extensively used to trend the surveillance program status. The results of the trending verifies that program completion is on target and will support unit startup. No deficiencies were identified.

6.2 Surveillance Tests Witnessed and Findings

6.2.1 Operational Surveillance Of Suppression Chamber Vacuum Relief Valve

The Vacuum Breaker Relief Valves are adjusted and tested in surveillance SM 259-001. The position of vacuum breaker switches are tested to verify that they will detect valve failures. The operational test verifies the valve position and the detection of the midpositions during valve traverse from valve open to close positions. The inspector witnessed the performance of surveillance SO 259-002 at the Miscellaneous System Recording Panel. Each valve was cycled and all required indicating light position and annunciator alarms were verified by the operator with additional test personnel at the remote station. Two minor adjustments were made to the open and closed positions. Each valve was satisfactorily recycled to the open and closed positions. All vacuum valves were properly set and responded to test panel indicated positions. No deficiencies were identified.

6.2.2 SE-259-033, Local Leak Rate Testing (LLRT) of Reactor Water Cleanup Supply - Penetration X-14

Two LLRT tests were performed using surveillance procedure SE-259-033 to determine the leakage of valves HV244 F004 and HV244 F001. These valves are the associated isolation

valves for Penetration X-14. The inspector observed the hydraulic test stand with the accompanied level tanks and the calibrated test gauge on test location. The valve lineup and vent paths were verified. Initial fill of system within test boundaries was observed. Discussions with test technician and system engineers ascertained that personnel were a knowledgeable group dedicated to safety in performance of the surveillances. The two tests were successfully completed at a test pressure of 64 psig. One adjustment to the valve torque switch was performed and this valve was restroked at the completion of test. The licensee had a well defined surveillance program for the control of the Mechanical, Electrical and Instrument and Control areas. No deficiencies were identified.

6.3 Trending - Surveillances and other Parameters

The licensee outage management trends the status of Instrument and Control Surveillance, Electrical Maintenance, Mechanical Maintenance with indicators such as number of items: identified, planned, staged, released, actual completion progress, completion and closure of documentation.

Numerous other indicators including Local Leak Rate Testing, Status and Completion of Motor Operated Valve Repair and Enviromental Qualification, Non-Conformance Reports and Man-Rem in various work packages are trended. The trending allows management to ascertain progress of outage in many areas, allowing decisions to be made on available work progress completions. The trending aids in outage/management controls of safety related elements. No deficiences were identified.

7.0 Exit Meeting

Licensee management was informed of the scope and purpose of the inspection at the entrance meeting conducted on April 24, 1988. The findings of the inspection were periodically discussed with licensee representatives during the course of the inspection. An exit meeting was conducted on April 29, 1988, at which time the findings of the inspection were presented.

At no time during this inspection was written material concerning the inspection findings provided to the licensee by the inspectors. The licensee did not indicate that any proprietary information was involved within the scope of this inspection.

ATTACHMENT I

The following referenced documents (noted in Paragraph 3.1.1) pertain to the material reviewed and used to determine reports findings and conclusions.

A. Procedures

AD-QA-310,	Rev. 8,	Liquid Effluent Release
AD-QA-410,	Rev. 8,	Plant Modification Program
AD-QA-410,	Rev. 10,	Plant Modification Program
AD-QA-422,	Rev. 6,	Surveillance Testing Program
AD-QA-424,	Rev. 6,	Significant Operating Occurrence Report
AD-QA-475,	Rev. 0,	Technical Test Program
AD-QA-482,	Rev. 0,	Post Maintenance Test Program
AD-QA-500,	Rev. 9,	Conduct of Maintenance
AD-QA-502,	Rev. 11,	Work Authorization System
AD-QA-900,	Rev. 1,	Conduct of the Installation Engineering Group
AD-QA-901,	Rev. 4,	Installation/Work Package - Development and Closeout
AD-00-540,	Rev. 6,	Preventive Maintenance Scheduling System
IE-000-E01,	Rev. 0,	Installation of Electric Cable
OPS-7,	Rev. 2,	Auditing and Surveillance Activities
OPS-13	Rev. 2,	Maintenance Installation of Modifications, and Related Activities
MI-PS-001,	Rev. 11,	Maintenance
MS-PS-008,	Rev. 0,	Post Maintenance Test Guide
MT-099-006,	Rev. 2,	Snubber Removal and Installation
SE-030-002,	Rev. 0,	18 Month Control Structure Ventilation System Operability Test
SI-141-201,	Rev. 3,*	Quarterly Functional Test of the Cooling Tower Discharge Flow Monitor Channel FT-11503 and FT-21503
SI-141-301,	Rev. 3,*	18 Month Calibration of Cooling Tower Discharge Flow Monitor Channel FT-21503
SI-241-301,	Rev. 3,	18 Month Calibration of Cooling Tower Discharge Flow Monitor Channel FT-21503
SM-024-002C,		18 Month Inspection Diesel Generator
SM-104-009,		Monthly 4KV 1A201 Degraded Voltage Channel
TP-116-012,		PMT for Alignment Check, Vibration Data and Operation - Test Runs of 01/06/88 and 01/26/88

* Procedures were revised drafts, unapproved.

B. Work Authorities

WA V73339	Rebuild RHR Service Water Pump Assembly Removed from 1P506A
WA S83070	Remove RHR Service Water Pump 1P506B and Installed New Pump Rebuilt per WA V73339
WA S83069	Rebuild RHR Service Water Pump Assembly Removed from 1P506B per WA S83070
WA S83375	Inspect Inlet Screen & Pump Bay ESW Pump OP504A
WA S83376	Inspect Inlet Screen & Pump Bay ESW Pump OP504B

WA S83377	Inspect Inlet Screen & Pump Bay ESW Pump OP504C
WA S83378	Inspect Inlet Screen & Pump Bay ESW Pump OP504C
WA S83372	Inspect Inlet Screen & Pump Bay RHRSW Pump 1P506A
WA S83373	Inspect Inlet Screen & Pump Bay RHRSW Pump 1P506B
WA V83469	Inspect Inlet Screen & Pump Bay RHRSW Pump 2P506A
WA V83470	Inspect Inlet Screen & Pump Bay RHRSW Pump 2P506B
WA V73861	Test Set Pressure of SLC System Relief Valve PSV-248 F029A
WA V73862	Test Set Pressure of SLC System Relief Value PSV-248F029B
SO-116-003	Quarterly RHR Service Water System Flow Verification, Test Runs of 01/26/88 and 04/08/88
SO-253-002 Rev. 4	10-month SLC System Initiation and Injection-Test of 04/13/88
SO-253-003 Rev. 5	18-month SLC System Operability Demonstration-Test of 04/13/88

		Identified on	Completed
S-76302	Cooling Tower Blowdown Flow	2/2/87	3/7/87
S-78056	Cooling Tower Blowdown Flow	9/25/87	10/16/87
S-77151	Cooling Tower Blowdown Flow	5/17/87	5/29/87
S-76962	Cooling Tower Blowdown Flow	4/14/87	4/22/87

C. Surveillance and Work Authorizations (SAs & WAs)

SA A71781, 18 Month Inspection
SA A74729, Monthly 4KV 1A201 Degraded Voltage Channel

WA 65609, Head Flow Degradation Work for RHR Pump 1P500B

D. Construction Work Orders (CWOs)

CWO 60542, Install FK 2V2693C Cable
CWO 60543, Install FK 2V2693A Cable
CWO 60549, Install FP 2V2693A & C Cable

CWO No.		
C78304	PMR 87-3013A	Snubber Reduction
C78305	PMR 87-3013A	Snubber Reduction
C78306	PMR 87-3013A	Snubber Reduction

E. Quality Control Inspection Reports (QCIRs)

QCIR 86-1916, 86-1921, 86-1974, 87-2500, 87-3669, 87-4048, and 87-4053

F. QA Surveillance Reports (QASRs)

QAS 87-028, 87-052, 87-160, 87-195, 87-221, 87-229, 87-246, and 87-259

G. NQA/SRC Audits

NQA/SRC 86-88, 86-090, and 87-050

H. Nonconformance Reports (NCRs)

NCR 88-0333. 87-0355, 87-0509 87-0704, 87-0810, 87-0822, 87-0830, 87-0834, and 87-0462

I. Significant Operating Occurrence Reports (SOORs)

SOOR 1-88-070, 1-87-100, 1-87-265

J. Monthly Deficiency Tracking Status Reports

July 1987, September 1987, October 1987, and November 1987

K. Plant Operations Review Committee (PORC) Meeting Reports

Meeting No. 87-017, 87-080, 87-114, and 87-151

L. Plant Management Information System (PMIS)

Categorized by SOOR Trends (SOOR7), Management Attention to Deficiencies (MAD2), QA Audits (AUD2)

M. Planning Meetings

April 26, 1988 Morning Planning Meeting

N. Drawing Change Mechanism

Control No.	PMR No.	Drawing No.
88-6075	87-9013	J5AC-95
88-6112	87-9013	J1P-0379
88-6113	87-9013	J1P-0380
88-6114	87-9013	SE1S
88-6115	87-9013	E1P-0716
88-6116	87-9013	J05-AC-145

O. Miscellaneous

DCP No. 87-9013	Plant Modification Record
EWR M1S 86-0012	Cooling Tower Blowdown Flow Monitoring
ER CTN 743309/PL1-51867	Scope 87-9013 Cooling Tower Blowdown
PMR No. DCP 87-9013	Safety Evaluation
PMR No. 87-3013A/EWR No. D73013	Snubber Reduction
DCP No. 87-3013A	Plant Modification Record

P. Quality Control Inspection Records

QC1R No. 88-0746	Snubber Reduction
VT-88-551*	Snubber DBA-201-H12 S/N 19822
VT-88-552*	Snubber DBA-201-H12 S/N 19822

*Witnessed and signed by ASME Authorized Code Inspector.