APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-267/89-08 Operating License: DPR-34

Docket: 50-267

Licensee: Public Service Company of Colorado (PSC)
2420 W. 26th Avenue, Suite 15C
Denver, Colorado 80211

Facility Name: Fort St. Vrain (FSV) Nuclear Generating Station

Inspection at: FSV Site, Weld County, Colorado

Inspection Conducted: May 22-26, 1989

Inspectors: J. E. Gagliardo, Team Leader — 8/1/89 Date

D. R. Hunter, Senior Reactor Inspector
Operational Programs Section
Division of Reactor Safety — 8/1/89 Date

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Operational Programs Section
Division of Reactor Safety — 8/1/89 Date

Approved: L. Wheeler, Acting Deputy Director
Division of Reactor Safety — 8/1/89 Date

Inspection Summary

Inspection Conducted May 22-26, 1989 (Inspection Report 50-267/89-08)

Areas Inspected: Special, announced team inspection of overall plant performance related to maintenance, management support of maintenance, and maintenance implementation. Specifically the inspection team evaluated the maintenance activities related to the Reactor Water Cooling System (System 46).

Results:

General: The material condition of System 46 was generally good, but the overall routine operating conditions of System 46 were not well controlled by the licensee. The system was operated in a manner to maintain the cooling water temperature within limits. Cooling water flow rates for 14 of the 36 tubes were in excess of the high flow alarm set points.

Instrument and Control (I&C): In the area of I&C, the calibration, functional testing, and maintenance of the individual system monitors appeared to be acceptable. However, the inspection revealed that the licensee did not periodically assess the system functional requirements (flows, temperatures, levels, pressures, etc.,) and ensure that all the functions were adequately monitored and had been fully tested and retested on a routine basis.

Mechanical: The licensee's maintenance program did not include periodic testing of relief valve set pressures, operability of check valves, operability of system cross-connect valves, surge tank integrity, heat exchanger performance, and other preventive maintenance items. Implementation of existing programs had been adequate, but the work instructions were poor.

Electrical: The licensee's maintenance program did not include preventive maintenance on System 46 motors other than vibration analysis and lubrication. The licensee's lack of control of motor bearing shield status appears to have created problems with the lubrication programs as to which motors were to be lubricated. The electrical functional tests and vibration analysis program appeared satisfactory.

DETAILS

1. Persons Contacted

PSC

*R. Allen, System Engineer
*M. Block, Manager System Engineering
*S. Chesnutt, Supervisor, Nuclear Licensing Compliance
M. Denniston, Supervisor Operations
*D. Evans, Assistant Plant Manager
*C. Fuller, Manager Nuclear Operations
*D. Goss, Manager Nuclear Regulatory Affairs
D. Hackett, I&C Technician
*G. Lacasse, System Engineer
V. Lucero, Chemistry Supervisor
J. McCauley, Superintendent I&C
J. Meisner, Nuclear Training Specialist
*R. Moler, Planning and Scheduling Engineer
R. Porter, I&C Technician
T. Schleiger, Supervisor Chemistry and Radiation Protection
*G. Schneider, NED Engineer
E. Sheron, Equipment Operator
*N. Snyder, Maintenance Department Manager
*P. Tomlison, Manager Quality Assurance
S. Wilford, I&C Training

NRC

*P. Michaud, Resident Inspector

*Denotes those attending the exit interview on May 26, 1989.

2. Maintenance Program Implementation (62700)

The inspectors reviewed and evaluated the maintenance programs and the maintenance activities for selected systems. The inspection was performed to determine that the maintenance program and the implementation of the program was adequate to maintain the selected systems in an operable condition consistent with the design function of the systems. The results of this inspection effort are discussed in the following paragraphs.

2.1 Reactor Water Cooling System

The reactor plant cooling water system (System 46) was designed to cool vital components of the reactor plant. One of the major functions of the system was the cooling (and heating during cold shutdown) of the reactor vessel liner. This safety-related system must be operable during plant operations and during shutdowns. System 46 was one of the systems that must be maintained operable during the extended defueling outage being planned.

2.1.1 Mechanical Maintenance

Areas Examined

The inspector toured the plant and examined the material condition and the status of all accessible portions of the liner cooling system. The inspector also reviewed the licensee's preventive maintenance program for the system, the records of selected maintenance activities performed on the system, and the licensee's program for controlling water chemistry in the system.

Findings

The inspector found that the material condition of the system to be generally good. The inspector found that the manual valves, which were closed to isolate the leaking tubes in the system, had not been tagged and/or locked closed. The valve bodies had been spray painted with an orange-colored paint to identify them as valves that should not be opened. The inspector also noted that the motor for Reactor Water Cooling Pump 4602C had a deficiency tag (No. 014888, dated July 1988) attached to it. Further review determined that the deficient condition had been resolved, but the deficiency tag had not been removed.

The inspector noted that the relief valve, located on the reactor side of one of the isolated tubes (leaking tube), appeared to be new or recently refurbished. The inspector asked to see the test records of the relief valve. There were no records to show that the relief valve had ever been tested to verify its setpoint. The inspector also found that the licensee had no program in place to test periodically the numerous water, air, and steam relief valves in the system.

The inspector also found that the licensee had not tested the backflow prevention feature of the check valves in the system. The licensee had recently contracted a group to come to the plant and test selected check valves with an accoustical monitoring device that would detect or predict disc failure due to flow induced fluttering of the disc. A licensee representative stated that the vendor claimed to have the ability to detect valves that have already failed. The inspector was concerned that not all the check valves would be tested by the vendor. The check valves to be tested were selected based on the flow characteristics of the system and the potential for flutter in the valve. The safety significance of the check valve in the system was not considered in the selection process. The licensee had also failed to define criteria for expanding the sample size based on negative test results.

System 46 was provided with cross-connections to the firewater header to provide cooling water to the liner cooling water system in the event of a loss of all forced circulation in System 46. The inspector reviewed the licensee's program for periodically verifying that the cross-connect valves between the two systems were operable. The inspector found that the licensee had an annual surveillance test (SR 5.3.4c3-A) that cycled the cross-connect valves to verify their operability. It was noted, however, that two of the cross-connect valves (V-46121 and V-46122) were not included in the surveillance test. Valve V-46121 was found to have some packing leakage and had a buildup of chemicals on the valve stem. This condition raised questions regarding the operability of the valve in the event of an emergency. The licensee's failure to periodically test all of the cross-connect valves is an apparent violation (267/8908-01) of TS SR 5.3.4, which requires that all safe shutdown cooling water valves be tested annually.

The two surge tanks in the system provide the suction head for the circulating pumps. The inspector attempted to review the records of the periodic inspections of the tanks. The system engineer for System 46 stated that the tank supports are inspected annually, but he was not aware of any inspection activities on the tanks. The system engineer searched the maintenance history records and found no records of internal inspections or maintenance on the tanks. The surge tanks receive the full loop flow of about 1500 gpm and the inlet water is sprayed into the void space of the tank through a sparger. The licensee's failure to inspect periodically the internals of the tanks or to measure nondestructively the thickness of the tank walls is a poor practice.

The inspector reviewed the licensee's program for monitoring the performance of the System 46 heat exchangers. The licensee had a surveillance procedure (SR-RE-150-X) which was used to calculate the overall heat transfer coefficient and the fouling factors for the four heat exchangers. The records provided by the licensee indicated that this annual surveillance was last performed on March 8, 1988. The inspector was told that the data derived from this surveillance was used to trend the performance of the heat exchangers, but the inspector was shown no other trend data or the test data for tests other than that taken on March 8, 1988. The review revealed that the licensee had repaired Heat Exchangers E-4601 and E-4604 in 1986. The importance of this system, and the fact that the licensee had experienced some fouling in the past, indicated that more vigor was warranted in the monitoring and trending of the heat exchanger performance.

The inspector interviewed the individuals responsible for maintaining the chemistry in the system. The inspector was provided with a computer printout of the results of analyzed samples from the system during November 2, 1988 through May 22, 1989. Samples had been taken nearly every week and were analyzed for pH, dissolved oxygen, total dissolved solids, sodium, and silica. The data indicated that the licensee had effectively maintained the chemistry of the system. The three occasions (in which the pH was found to be slightly below the acceptance criteria) were promptly corrected by chemical additions and the system was resampled to verify that the coolant was within specification.

The inspector reviewed the preventive maintenance program for System 46. A licensee representative provided him with a copy of the master lubrication list, which was the only preventive mainterance item performed on System 46. This list included lubrication (greasing) schedules for all of the pumps and pump motors (where applicable) in the system. It also included lubrication schedules for many, but not all, of the subheader isolation valves. The licensee needed to review their preventive maintenance practices to assure that items have not been overlooked that could eventually cause operability problems for the system.

The inspector reviewed a number of station service requests (SSRs) for maintenance that had been performed on System 46 over the past 2 years. The SSRs had received the appropriate levels of review, but the work instructions were generally handwritten and provided very generalized guidance for the performance of the maintenance task. Acceptance criteria were not well defined and were qualitative (not quantitative) in nature. In general, the instructions relied heavily on the skills and knowledge of the craftsmen. The licensee should critically evaluate the adequacy of this approach to providing maintenance instructions.

Conclusions

The material condition of System 46 was generally good, and the performance of the system had been acceptable. The success of the system's performance did not appear to be the result of strong maintenance practices, with the possible exception of chemistry control.

The licensee's maintenance program did not include periodic checks or tests of: (a) relief valve set pressures, (b) check valve operability determinations, (c) cross-connect valve operability determinations, (d) surge tank integrity measurements, (e) heat exchanger performance checks, and other preventive maintenance items. Unless these program weaknesses are corrected and implemented, the licensee is likely to experience future problems in maintaining the operability of the system.

2.1.2 Electrical Maintenance

Areas Inspected

The inspectors reviewed the maintenance activities associated with the cooling water pump motors and their power supplies. This review included a walkdown inspection of the related equipment, a review of related work documents, and interviews with several personnel involved with the maintenance and operational activities of the equipment.

Findings

During the inspector's tour of System 46 components, several observations were made that raised questions about control and status of the components. These observations included:

- Pump Motor "A" was missing a nameplate;
- Motors "B" and "C" were missing air screens;
- Motors "A", "B", and "C" had grease zirc fittings while "D" did not;
- Motor "C" had an eye bolt installed;
- Transfer switches N-4877, N-4878, N-4879, and N-4880 were not locked in position; and
- Breaker handling gear and a ladder were not secured in the essential switchgear room.

The inspector reviewed Surveillance Test Procedure SR 5.2.21-5A, "ACM Pneumatically and electrically operated valves and transfer switch functional test." This procedure was primarily reviewed for the transfer switch functional test. The procedure provided proper precautions, prerequisites, authorization, and procedural steps.

The vibration analysis system and test data was reviewed for Pump Motors "B" and "C". Only one set of the test data had been taken for these motors. Pump Motors "A" and "D" had no baseline test data. The inspector found that an adequate system was in place to provide a good vibration and trending program. The vibration analysis program had only been in operation for a short period of time. The inspector's evaluation of the program was made from data available on other than System 46 components that had enough data taken to provide a history and a set of trending curves.

The inspector reviewed the work package for Station Service Request 88502872, covering the repair of Cooling Water Pump "C." The work package included the necessary portions of Procedures MP-2261, MPE-1904, and MPE-1001-EQ. Other documentation for the motor repair included the bearing requisition card for this motor, which specified SKF double shielded bearings. The work package had no provisions for removing any of the bearing shields, but a review of the post work history on the licensee's computer indicated that some of the cooling water pump motors had the bearing shields removed during installation. A review of the licensee's master lubrication list indicated that Motors "A" and "C" were being lubricated once a year with grease, and Motors "B" and "D" had sealed bearings and were not to be greased. The inspectors informed the licensee that the lubrication master list was not consistent with work history as to which motors had shielded bearings and which did not.

Conclusions

The licensee did not appear to have an adequate system to control equipment in seismically qualified areas, such as the essential switchgear room as indicated by the lack of requirements to secure the breaker handling equipment when not in use and the unsecured ladder. This lack of control presented additional risks to qualified equipment during the design basis seismic event.

The licensee appeared to have lost control of motor bearing status for lubrication purposes and may have modified the motor bearing from what was the original design and qualification basis of the motors.

The licensee did not have a preventive maintenance program for the motors, other than the lubrication list, that would provide identification of deficiencies. None of the deficiencies identified by the inspector had been identified by the licensee.

Although Procedure SR 5.2.21-SA provided satisfactory control of the motor transfer switches, the inspector was concerned over the switches not being locked in position. The operation of these switches occurs only during an abnormal condition and was controlled by procedure. There appeared to be no valid reason why the breakers were not protected against inadvertent operations. The transfer switches did have a warning tag on them which stated that they were not to be opened when the motor was running, but the switch handle, which was designed with locking capability, was not padlocked or otherwise restricted from unauthorized operation. Both switches were in the general vicinity of the motors and the inspector was concerned that in case of a fire or other abnormal condition, an operator could open the transfer switch while the motor was running without realizing the consequences of opening a knife switch under load.

Although the licensee's vibration analysis system had been in effect for a short period of time, the inspector was satisfied with the progress the licensee had made to get this program off to a good start. The licensee's continued support of this program should help to improve their preventive maintenance program.

2.1.3 Instrumentation and Control

2.1.3.1 Areas Inspected

The inspector reviewed the I&C maintenance activities for System 46 in the following selected areas:

- System temperature monitoring
- System flow monitoring
- System pressure monitoring
- System surge tank level monitoring
- Data acquisition system

2.1.3.2 Findings

During the inspector's review of System 46 maintenance, several observations were made that raised questions which impacted the operability of the system. The observations are discussed in the following sections.

2.1.3.2.1 System Temperature Monitoring

The inspector reviewed Procedure SR 5.4.4-M/5.4.4 A-1, "PCRV Cooling Water Temperature Test and Subheader Temperature Indication Calibration," (Issue 37), and observed the performance of the procedure during the inspection period.

The I&C technician performed the appropriate parts of the procedure and calibrated three temperature indicators (TI-46332, TI-46184, and TI-46330) in an oil bath. Two of the three TIs were found to be within 2° F of the standard; however, TI-46332 required minor adjustments.

The calibrated TIs were reinstalled in the cooling water subheader, and the calculated subheader temperatures were compared to the associated individual cooling tube exit temperature. The TIs had an acceptance criteria of plus or minus 6°F with the average exit temperature, but a number of the temperature channels did not meet this criteria. The test was forwarded to results engineering for evaluation of such items as the actual system configuration (isolated cooling tubes) and known hot tubes (poor insulation).

The inspector reviewed Procedure SR 5.4.11-M, "PCRV Surface Temperature Indicator Functional Test," (Issue 18), and observed the performance of the procedure during the inspection period.

The I&C technician performed the appropriate parts of the procedure and compared the two temperature elements (TE-733360-1 and TE-73336-2) with the calibrated temperature element, and verified the control room recorder (TR-4637 and TR-4638) to be indicating within allowable tolerances. The inspector also observed the I&C technician check the PCRV surface temperature (TR-4637 and TR-4638) to be within 50°F of the outlet water temperature averaged over 24-hours (TS 4.2.15). The inspector also noted that this TS item was checked by the operators daily on the night shift by rolling the strip chart and recording the check on a control room monthly log sheet.

The inspector reviewed selected records and procedures regarding the system calibrations.

- SR 5.4.4-A3/M, "PCRV Area Core Support Floor, Bottom Section and Penetration Cooling Water Thermocouple Calibration," (Issue 1), performed between March 1987 and April 1989.
- SR 5.4.4-A1, "PCRV Cooling Water Top Penetration Thermocouple Calibration," (Issue 2), performed August 14, 1987.

2.1.3.2.2 System Flow Monitoring

The inspector reviewed the System 46 operating conditions during the inspection on May 23, 1989, including the field observation of selected cooling water flow transmitters (Foxboro Model 82-turbine flowmeter/transmitter) and the data scan system. The inspector requested a data printout for review of the system flow data. The review revealed that 14 of the 36 subheaders (8 in Loop 1 and 6 in Loop 2) were operating with cooling water flow rates in excess of the high flow alarm setpoints. The high flow alarms were indicated on monitors located at the data scan equipment and also in the control room behind the control board. System 46, Subheader 46249 (FT-46160) was operating in alarm at 43 gpm, with the high flow alarm set at 40 gpm. The low flow alarm was set at 15 gpm, substantially below the normal (43 gpm) flow rate. Subheader 4623B (FT-46133) was operating in alarm at 207 gpm, with the high flow alarm set at 100 gpm. The low flow alarm was set at 72 gpm, substantially below the normal (207 gpm) flow rate. None of the System 46 subheaders (total of 367) cooling water flow rates were at low flow alarm setpoints. Discussions with licensee representatives and document reviews revealed that the low flow alarms indicated locally, in the control room (behind the control board), and also annunciated in the control room. Discussions with the unit operators revealed that the full capability of the remote monitors was not well understood by the operators. This item was brought to the attention of the licensee for review and evaluation.

The inspector reviewed select records and procedures regarding the annual calibration of 6 subheader flow meters and the calibration check of each of the subheader flow channels.

The inspector also reviewed the maintenance, calibration, and post-maintenance testing of a failed subheader flow transmitter (FT-46137) for core support floor bottom cooling water (Loop 2). The work package, (SR 8858174), completed on April 24, 1989, also contained the parts and materials requisitions, a termination control form (TCF), the QC inspection report, and the inservice leak test report. The work package included the completion of Procedures SR 5.4.5AX2 and SR 5.4.5-AZ, "PCRV Cooling Water Flow Scan Calibration," on April 23 and 24, 1989, associated with the flow channel and low flow alarm setpoint (51 gpm).

The inspector reviewed Procedure SR 5.4.5-M, "PCRV Cooling Water Flow Scan Functional Test," (Issue 31), and discussed the system header flow channels with licensee personnel. The PCRV cooling water subheader low flow alarms were functionally tested monthly; however, the scanner high flow alarms were not included in the monthly test, nor tested utilizing other procedures. The inspector also reviewed Procedure SR 5.4.5-A1, "PCRV Cooling Water Flow Scan Calibration," (Issue 20), and noted that the flow scanner and low flow alarms were calibrated annually; however, the scanner high flow alarms were not calibrated. The inspector noted that the high flow alarms appeared to be functional at the time of the inspection, but the failure to functionally check the high flow alarms each month and to calibrate the high flow alarms annually is an apparent violation (267/8908-02) of TS SR 5.4.5, which requires that the PCRV cooling water scanner system alarms be functionally checked monthly and calibrated annually.

Document reviews and interviews of licensee representatives revealed that low flow conditions were simulated periodically to check the low flow alarms. Procedure SR 5.4.5-A1, Step 5.2.2 required that the System 46 hand switches (HS46227 for Loop 1 and HS-46228 for Loop 2) were in the "normal mode" position. Therefore, during the performance of the procedure calibrating the scanner flow channels, the loop header isolation function was bypassed.

The System 46 isolation on low flow was discussed in the updated FSAR, Section 9.7.3.5. This section indicates that when the reactor was depressurized, cooling water would leak into the reactor resulting in a low flow condition. The affected subheader low flow would alarm and the subheader would isolate to terminate the in leakage of water into the reactor. This criteria was described in the FSAR and was based on the flow system capability (3 percent deviation from normal), at a maximum water velocity of 8ft/sec. and a scanner cycle of 54 seconds. The TS SR 5.4.5 basis indicates that the flow scanning acts as a backup to temperature scanning and initiates no automatic protective actions, only an alarm.

The inspector asked to review documentation of the testing of the subheader isolation function in the "redistribute" mode (PCRV depressurized) of operation. No such surveillance test data were found.

The apparent discrepancy between the updated FSAR and the Technical Specification basis was brought to the attention of the licensee for review. The licensee indicated that this item would be included in the review and evaluation of System 46. This is an inspector followup item (267/8908-C3) and will be reviewed upon completion of the licensee's evaluation.

The inspector had no further questions regarding this item.

2.1.3.2.3 System Pressure Monitoring

The inspector reviewed the System 46 pressure indication and control system to assure that it was in accordance with the license requirements, including the system isolation function resulting from high system pressure caused by a cooling water tube rupture. Document reviews and discussions with licensee representatives indicated that the test of the system's automatic isolation on high pressure had been performed; however, documentation of the completed test and test data could not be located. The licensee indicated that this matter would be pursued. The NRC inspector reviewed the approved procedure, SR-RE-57-X, "46 and 47 Systems Automatic Isolation Functional Test," (Issue 2), (including changes to PDR 87-1785, June 10, 1987; PDR 88-1163, December 8, 1988; PDR 89-0030, January 12, 1989; and PDR 89-0034, January 19, 1989), which was provided by the licensee. The procedure addressed the calibration and functional tests of the 46 and 47 systems. Procedure Change PDR 89-0029 required that "during power operation both 46 system loops must be operable." The system isolation at high pressure condition was at 161 to 163 psig increasing (PDR-1785), for Loop 1 Pressure Switch 46225 and Loop 2 Pressure Switch 46226. The procedure required the isolation function to be verified by reading the subheader flow rates (normal flow subheader isolation valve open, zero flow-subheader isolation valve closed). The NRC inspector noted that the procedure did not require verification of valve closing and opening (valve travel and series isolation valves). This concern was brought to the attention of the licensee for consideration. The NRC inspector reviewed the I&C calibration data sheets dated July 1, 1987, associated with the System 46 pressure switches (PSH-46225, Loop 1, set at 162 psig increasing and PSH-467226, Loop 2, set at 162 psig increasing).

The System 46 isolation on high pressure was discussed in the updated FSAR, Section 9.7.3.5, which indicated that a subheader isolation was provided for a tube rupture (PCRV to System 46). Document review and interviews with licensee representatives revealed that the function appeared to be available; however, testing of the function, inclusive of the loops, subheader isolation valves, subheader flow and flow alarms, was not performed and appeared to be warranted.

2.1.3.2.4 System Surge Tank Level Monitoring

The inspector reviewed the System 46 surge tank level indication and control systems. The document review and interviews revealed that the level transmitters, LT 4605 (Loop 1) and LT 4606 (Loop 2), were calibrated in June 1987; however, the total level system function (low level and high level alarms, PCRV loop subheader isolation, and cooling water pump trips on surge tank low level) apparently had not been tested. The isolation of the suheaders in the affected loop when the level in the surge tank dropped by 300 gallons is discussed in the Updated FSAR, Section 9.7.3. The surge tank level isolation was described as a backup to the flow scanner system and is active in the redistribution mode of operation. The TS do not specifically address the surge tank level indication and control system.

The concerns regarding the testing of the surge tank level indication, alarm, and control system was brought to the attention of the licensee for consideration.

The inspector had no further questions in this area.

2.1.3.2.5 Data Acquisition System (ACUREX)

The inspector reviewed the ACUREX system to ensure that the system provided adequate monitoring of the system and included the functions described in the Updated FSAR, Section 9.7.3. The inspector reviewed selected items associated with the ACUREX system. The following findings were identified:

- Document review and interviews revealed that the electrical power for the ACUREX was supplied from either emergency diesel generator through a voltage sensing automatic transfer switch or from the ACM via a manual transfer switch;
- Scanner (ACUREX) failure alarms were provided and annunciated in the control room;
- The ACUREX provided temperature monitoring for each cooling water loop exit, subheader exits, and PCRV concrete liner;
- Temperature/alarms-cooling water tube exit to the calculated subheader average (temperature/(25°F alarm) and tube high temperature alarm (119°F);
- The ACUREX provided subheader flow monitoring (36 total, 18 for Loop 1 and 18 for Loop 2), low flow alarms, and high flow alarms;
- Manually operated checks (software) of the system functions;

- Two remote monitors in the control room, located behind the control board; and

- System 46 parameter input to the plant monitoring/annunciator systems.

Document review interviews and field inspections revealed that the ACUREX system was adequately maintained and was providing the system monitoring locally and to the control room. The inspector noted that the alarming conditions on the local and remote monitors were visual only as indicated by an asterisk on the monitors. Interviews revealed that the local audible alarm was disconnected to eliminate a nuisance alarm. The alarms in the control room had been annunciated, as appro-priate. The inspector had no further questions regarding this item. Discussions with the system engineer revealed that when individual cooling water tube exit temperatures increased above normal (indicating a decrease in the flow through the individual cooling water tube), the tubes were flushed (flow increased above normal) for a short period of time to improve the flow rate and heat transfer capability. The system engineer identified a weekly surveillance performed on the system to monitor overall operating conditions. The surveillance procedure, SR-OP/RE-26-B&M, "System 46 System Flow and Temperature Scan Evaluation," (Issue 15) which was reviewed with the system engineer. The surveillance required the evaluation of the following data and conditions:

- Tube exit temperatures (data sheet 1-36)
  Several warm tubes (greater than or equal to 25°F temperature rise);

- Individual hot liner cooling tubes (data sheet 40)
  Six known hot tubes were identified;

- Subheader flows and flow changes (data sheet 38)
  Several changes noted;

- Flow adjustments needed (data sheet 39-1 through 39-8)
  Several flows needed adjustment to reduce the cooling water exit temperatures to normal (14-20°F);

- Temperature Channels greater than 18°F above the subheader inlet temperature (data sheets 37-1 through 37-8);

- Cooling water tube flushing;

- Unexplained temperature rises; and

- General comments.

The inspector and the system engineer reviewed and compared selected surveillance data (system parameters) recorded during early 1988 (March 4), mid-1988 (June 24), and mid-1989 (May 17) during similar reactor conditions. The review was performed to note any adverse trends associated with the PCRV cooling water performance over a long period of time. The inspector noted that the system engineer had not performed this type of trend review in the past. The inspectors were concerned that the licensee had not compared recent operating conditions to similar past conditions to detect any degradation of the system performance or PCRV insulation performance, resulting in elevated concrete temperatures. It was noted by the inspector that, no gross difference in the data existed. However, the inspector noted that the plant staff could have provided much more attention to the System 46 operating conditions to ensure: (1) the system was operating within the system design requirements; (2) the prompt identification of changes in system parameters; and (3) the identification and correction of long term changes in system parameters. The review, evaluation, and comparison of System 46 data and the need to provide more attention to System 46 appeared to be warranted by the licensee.

Discussions and records review revealed that the reason for operating the system at the existing flow rates and temperatures was based on attempting to maintain the system temperature rise across the individual cooling water tubes to less than 20°F. Certain cooling water tube flow velocities were at the maximum under the system conditions (valves full open); however, the maximum allowable flow velocities for the cooling water tubes had not been established or checked by the licensee. The potential for erosion/corrosion of the individual tubes because of high flow rate was presented to the licensee for review and evaluation.

During the inspection, the licensee performed a flow check on selected cooling water tubes and the maximum flow rate was about 7 ft./sec. The licensee stated that degradation of System 46 would occur at flow velocities greater than 10 ft./sec.

The inspector noted that the 7 ft./sec. flow rate was less than the flow rate assumed in USAR (8.3 ft./sec.) regarding tube location and water entering the PCRV due to a cooling water tube rupture.

The licensee stated that an evaluation of the routine operation of System 46 would include the system subheader normal flow rates and the subheader flow alarms. Setpoints (low and high) based on the detection of flow changes in excess of 10 gpm.

Discussions and document reviews indicated that one cooling water tube to the lower core support floor was isolated. The NRC inspector requested the safety evaluation(s) associated with the isolated tube(s). At the conclusion of the inspection, the safety evaluations had not been provided. This is considered an inspector followup item (267/8908-04) pending NRC review of the safety evaluation.

2.2 Repair of Leak in Main Steam System

On May 19, 1989, a through wall crack was discovered on the weld at a 1-inch weld-o-let to the 11-inch hot reheat steam piping from Steam Generator B-2-1. The licensee evaluated the leak and decided to have it repaired by installing a special clamp-on assembly over the piping and the leak followed by the injection of a sealant material into the cavity between the pipe and the assembly.

The inspector reviewed the documents related to the repair effort, including the 10 CFR 50.59 safety evaluation, the seismic analysis of the repaired piping configuration, the justification for continued operation of the plant, the work instructions, and the approved temporary configuration report. The only question that the inspector had, was in regard to the third step of the work instructions. This step required that after the clamp-on assembly was installed, a soap bubble test was to be performed on the assembly to check for leaks. The inspector asked licensee representatives if they really wanted to spray a soap-water solution on the high temperature steam piping. The licensee representatives promptly removed this step from the instructions.

The inspector observed the preparations for, and the initial efforts to install the clamp-on assembly. Appropriate precautions had been taken and the evolution was being monitored and supervised by senior management.

No violations or deviations were identified in the review of this program area.

3. Maintenance Program

During the course of reviewing the maintenance activities documented in the previous paragraphs, the inspectors made a number of observations regarding the licensee's overall maintenance process. These findings are documented below.

The inspectors found that test procedures were generally good, but as noted above, the work instructions for corrective maintenance were weak at best and relied heavily on the skills and knowledge of the craftsmen.

At the time of the inspection, the total backlog of corrective and predictive maintenance items (SSRs) was about 1250. About 20 percent of this total was classified as Priority 1 (the highest priority). The licensee had been completing about 500 SSRs each month. Therefore, the licensee's total backlog represented about 2.5 months of effort. The inspector found that the fraction of overdue SSRs that were awaiting parts was quite small. It appeared that the major bottleneck was engineering. System engineers were heavily loaded with preparation efforts for the upcoming defueling activities which left insufficient time to be devoted to reducing the maintenance backlog.

The involvement of the quality assurance organization (QA/QC) was evident, but this was not reviewed in detail.

The licensee's operating experience program appeared to be functioning satisfactorily. Licensee representatives were aware of issues and experiences that other plants had reported, but the NRC inspectors found that in cases such as check valve failures and pipe wall thinning, the licensee had taken no action to determine the applicability of the issue to Fort St. Vrain. The licensee needs to have a stronger followup effort to assure that the information communicated by this system is applied to Fort St. Vrain systems, components, and practices.

The inspector encountered great difficulty in obtaining information from the document control center for material cross-referenced in component specification sheets. Specifically, the inspector attempted to locate and review the vendor manuals applicable to the actuators and the pressure reducers for the air operated valves in System 46. The inspector had to review the document control center's list of various manuals to determine the appropriate manuals. One manual was not located. This indicated that either system engineers and others were not reviewing the vendor manuals when they plan maintenance activities, or they were finding the manuals by the same search technique used by the inspector, but were not providing the feedback to have the system fixed.

This system was in need of management attention to facilitate cross-referencing of specific components with all of the subcomponents related to them. The current practices were very wasteful of valuable resources.

4. Exit Interview

The inspectors met with Mr. C. Fuller and other licensee representatives denoted in paragraph 1 on May 26, 1989, and summarized the scope and findings of this inspection. The licensee did not identify as proprietary any of the information provided to, or reviewed by, the inspectors.