U.S. NUCLEAR REGULATORY COMMISSION

REGION 2

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License No:	DPR-72
Report No:	50-302/96-08
Licensee:	Florida Power Corporation
Facility:	Crystal River 3 Nuclear Station
Location:	15760 West Power Line Street Crystal River, FL 34428-6708
Dates:	July 14 through August 10, 1996
Inspectors:	R. Butcher, Senior Resident Inspector T. Cooper, Resident Inspector J. Bartley, Resident Inspector, Farley Nuclear Plant, paragraphs, O1.1, O8.1, O8.2 W. Bearden, Reactor Inspector, paragraphs M8.2, M8.3, M8.4 G. Hopper, Reactor Engineer, paragraphs O1.1, O8.2 F. Wright, Senior Radiation Specialist, paragraphs R2.1, R3.1, R3.2, R3.3, and R5.1
Approved by:	K. Landis, Chief, Projects Branch 3 Division of Reactor Projects

EXECUTIVE SUMMARY

Crystal River 3 Nuclear Station
NRC Inspection Report 50-302/96-08

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a four week period of resident inspection; in addition, it included the results of announced inspections by a reactor inspector, a reactor engineer, a visiting resident inspector, and a senior radiation specialist.

Operations

The plant staff's response to a main condenser tube rupture event and a plant transient due to a governor valve component failure were considered appropriate. However, there was a concern regarding an operating crew that did not implement a valid abnormal procedure because they were not comfortable with it. (paragraph O1.1)

An Operations self-assessment appeared to be of insufficient depth. There were no findings identified, although recent NRC inspections have identified problem areas. (paragraph O7.1 and O7.2)

Maintenance

The vital battery charger change out work was accomplished in a professional manner, with good project manager oversight. (paragraph M1.1)

A Weakness was identified in maintenance personnel communications with operators during the conduct of a surveillance. (paragraph M3.1)

An Inspector Followup Item (50-302/96-08-02) was identified for the followup of a permanent fix for thermal relief protection for reactor building cavity cooling piping. (paragraph M8.2)

Interim corrective actions for a deficiency regarding the use of non-safety related positioners on safety related valves (identified by the Integrated Performance Assessment Process team as Unresolved Item 50-302/96-201-04) were inspected and found to be acceptable. (paragraph M8.3)

Engineering

A Weakness was identified in the Problem Report tracking system in that incomplete corrective actions for make-up system audit findings were closed out as complete. (paragraph E8.1)

A Violation (50-302/96-08-01) was identified for failure to take timely corrective actions for make-up system audit findings and excessive vibration on a spent fuel pump cooling fan motor. (paragraphs E8.1 & E2.1)

Plant Support

Inspectors observed that calibration of Reactor Building Radiation Monitor process was adequate. (paragraph R2.1)

The 1995 Annual Radiological Environmental Monitoring and Annual Radiological Effluent Monitoring Reports met Technical Specification requirements, and did not report any adverse radiological trends. The licensee appeared to be adequately managing radiological effluents to maintain offsite doses as low as reasonably achievable. (paragraph R3.1 and R3.2)

Shipping papers for the transportation of radioactive material, and radioactive waste met regulatory requirements. (paragraph R3.3)

A weakness was identified in that a Quality Assurance audit failed to properly identify that two PCS issued during the audit should have been characterized as PRs. (paragraph F7.1)

Report Details

Summary of Plant Status

The unit began the inspection period with the output breakers closed, and the unit at 100 % power. No major evolutions occurred during this inspection period.

I. Operations

01 Conduct of Operations

01.1 Review of Previous Operational Events

a. Inspection Scope (92700)

The inspectors reviewed a Main Condenser Tube Rupture Event, and a Governor Valve transient to determine if the licensee responses to the events were adequate and met regulatory requirements, license conditions, and commitments and to verify that the licensed operator's performance was adequate to ensure safety.

b. Observations and Findings

The inspectors reviewed the Main Condenser tube rupture event which occurred on January 9, 1996, in detail. This event was previously described in NRC Inspection Report (IR) 50-302/96-03, paragraph 2.4. The inspectors interviewed some of the operators involved, and reviewed the plant's procedures and the licensee's investigation. The inspectors found that the licensee responded to the event in accordance with the existing procedures with the exception of implementing abnormal procedure (AP) AP-510, Rapid Power Reduction, Revision 00, dated December 14, 1995.

During the event the operators had discussed alternatives such as tripping the reactor early and initiating Emergency Feedwater (EFW), but did not feel the event warranted placing the plant in such a transient, and deviating from plant procedures. The operators also stated that the increased attention to procedural compliance affected the decision not to initiate EFW. The licensee had a valid procedure for conducting a rapid shutdown which was appropriate for the existing situation. Procedure AP-510, Rapid Power Reduction, Revision 00, was issued on December 14, 1995. If the licensee staff had implemented procedure AP-510, the plant could have been in Mode 3 within one hour of commencing the shutdown, instead of taking four hours and 40 minutes. This would have significantly reduced the amount of salt water that entered the Once Through Steam Generators (OTSGs). The operators stated that they did not implement procedure AP-510 because they had not yet received simulator training on the new procedure, and that one of the reactor operators (ROs) was not a normal member of the crew. The operators on this crew had only received on shift training for procedure AP-510, the crew's simulator training was scheduled for their next training

rotation. The inspectors were concerned that a crew would not implement a valid AP because they were not comfortable with using a newly issued procedure. The inspectors found that the delay in feeding the OTSGs with clean water after the shutdown was due to: 1) the licensee staff prioritization of minimizing the transient on the plant, 2) developing a procedure for feeding the OTSGs with the EFW system, and 3) a lack of management direction in emphasizing the importance of initiating clean feedwater to the OTSGs.

The inspectors concluded that the plant staff responded to the plant transient adequately using the existing plant procedures and equipment. NRC Inspection Report 50-302/95-21 described the "Conservative and thorough management of the shutdown" as a strength. However, use of procedure AP-510 to shut the plant down in a more expeditious manner could have been more appropriate to reduce chloride intrusion into the OTSGs. In addition, the licensee could have been more prompt in developing and implementing the procedure to feed the OTSGs using EFW. The inspectors found that no safety limit or procedural violations occurred during this event. The inspectors also noted that the licensee issued procedure AP-610, Waterbox Tube Failure, on April 8, 1996. This procedure was developed from the lessons learned in this event, and provided explicit guidance to the operators for condenser tube failures.

The inspectors also reviewed the governor valve event which occurred on May 20, 1996. This event was previously described in NRC Inspection Report 50-302/96-05. The event caused three power transients within a 30 minute period. The inspectors interviewed the operators involved and the plant's investigation report. The inspectors verified that the plant never met the conditions to initiate a manual reactor trip as specified in procedure AI-0505, Conduct of Operations During Operational Events and Emergency Events.

The inspectors determined that the operators adequately controlled the plant, and that their actions were appropriate. The inspectors also determined that while a reactor trip may have been considered a more conservative response, it would have initiated a larger transient on the plant than the power swings caused by the governor valve. The inspectors asked the operators if any other actions were considered in response to the event. The operators all stated that the option of using the test feature to slow close the governor valve was considered, but no one mentioned it until the post-event critique. Further discussions revealed that the senior reactor operator (SRO) did not pursue the slow close option because it was contained in a performance test (PT), and operators could not use the PT in response to the event. The operators reduced power to close the governor valve, and then isolated electro-hydraulic control (EHC) oil to the valve. The event was witnessed by the resident inspector who was in the control room at the time. He considered the crew's response to the event demonstrated technically sound judgement.

c. Conclusions

The inspectors recognized that the Emergency and Abnormal procedure network was not intended to be the optimal recovery strategy for any single event, but rather an enveloping strategy for a family of events. While the inspectors found a procedure whose use may have been more appropriate, the licensee appropriately followed an existing procedure. The licensee has taken the lessons learned from this event and developed a more appropriate strategy for combatting this specific type of event. The inspectors noted that any potential consequences of the chloride intrusion were longterm and could not be evaluated during the inspection. The inspectors concluded that the licensee's response to both events was adequate.

06 Operations Organization and Administration

06.1 Operator Shift Scheduling

a. Inspection Scope (71707)

Technical Specification 5.2.2.e requires that the amount of overtime worked by unit staff members performing safety related functions shall be limited and controlled in accordance with approved administrative procedures.

b. Observations and Findings

Licensee procedure OI-11, Operations Schedules, section 4.0, Overtime Policy, provides guidance for the operations staff for the control of overtime. The requirements in OI-11 are in accordance with Genetic Letter (GL) 82-12, Nuclear Power Plant Staff Working Hours, as required by the NRC order transmitted on May 14, 1983, confirming the commitments to implement NUREG-0737 post-TMI related requirements contained in a letter from the licensee responding to GL 82-10.

OI-11 requirements address the issue of controlling overtime to avoid fatigue in operators and a degradation in their performance. OI-11 limits include:

- An individual should not be permitted to work more than 16 hours straight.
- An individual should not be permitted to work more than 16 hours in any 24 hour period, nor more than 24 hours in any 48 hour period, nor more than 72 hours in any seven day period.
- A break of at least 8 hours should be allowed between work periods.

Licensee procedure, AI-100, Administrative Policies, Section 4.10.2, Scheduled Work Implementation, places certain administrative limitations on the scheduling of overtime:

- No work will normally be scheduled for more than 60 hours per week.
- If it becomes necessary to schedule or work more than 60 hours but less than 72 hours, department management approval is required.
- If more than 72 hours per week needs to be scheduled or worked, it must be approved by the Director, Nuclear Plant Operations (DNPO).

The licensee's practice is to have the Manager of Nuclear Plant Operations Support review shift schedules for compliance and approval prior to issuance. The inspectors reviewed the shift schedules for the operations department since start-up from the recent refueling outage. During the refueling outage, large amounts of overtime were routinely scheduled. Since the outage, it has been determined that time in excess of 60 hours in any seven day period has been routinely scheduled, for the licensed ROs and SROs. During this period, it has been a common practice to schedule shift periods from five to nine days long. No times were found where more than 72 hours were worked in a seven day period, but a large number of times where a licensed operator worked between 60 and 72 hours were found. A review of the NLO schedule revealed that the NLOs rarely worked more than 60 hours in a seven day period.

c. Conclusions

A PC has been issued to address concerns with the scheduling practices in the operations department, including overtime control practices. Actions have been taken to address the concern expressed in the PC, including maintaining support personnel with active licenses to provide additional coverage and starting a new license training class to provide additional personnel for shift coverage. The inspectors have concluded that the licensee did not violate any overtime restrictions but the continued use of routine overtime provided the potential for degradation of operator performance.

07 Quality Assurance in Operations

07.1 96-02-REFL, Audit Report of 1996 Refuel Outage

a. Inspection Scope (40500)

The inspectors reviewed the licensee quality assurance (QA) audit for the 1996 refueling outage, 96-02-REFL. The audit included, but was not limited to, field observations, review of the plant shutdown, control of contractors, nuclear quality control activities, ISI activities, fuel movement, adherence to technical specifications, corrective actions, and maintenance activities.

b. Observations and Findings

As a result of the audit, five findings (characterized by the Licensee as violations), fifteen weaknesses, numerous negative comments, and

fifteen strengths were identified. Several conclusions were identified by the licensee in the report:

1. Ineffective training and understanding of procedures was evidenced by the problems with foreign material exclusion.
2. Lack of attention to detail in failures to complete signoffs as actions occurred.
3. Management expectations in the areas of communications, self checking and the utilization of available resources were not consistently met.
4. Management oversight is lacking as evidenced by improper reviews of procedures.

c. Conclusions

The inspectors discussed the audit with the audit team leader and reviewed the audit report. There were many individual findings, however, conclusions drawn tended to be specific to the identified items (a list), without any programmatic findings discussed. Plant management is aware and is currently assessing these findings, therefore no NRC follow-up will be taken.

07.2 Operations Self-Assessment

a. Inspection Scope (40500)

The inspectors reviewed the operations self-assessment performed at the site by current and formerly SRO licensed individuals on loan from other licensees. The areas assessed by the team included: professionalism and skills of plant operators, self checking and questioning attitude, interface and communications, conservative decision making, shift turnover, control room traffic, and procedural adherence and usage.

b. Observations and Findings

The assessment team provided a number of recommendations, areas for improvement, and strengths. No findings or problem reports were identified as a result of this assessment. A number of recommendations were provided, which have the potential to improve the effectiveness of operations. However, no programmatic assessments were evident, although a number of areas for improvement were identified.

c. Conclusions

The operations self-assessment, while providing a number of observation; characterized as strengths, weaknesses, areas in need of improvement, or recommendations; did not provide an assessment of operational programs. There were no problem reports issued as a result of the assessment. Three PCs were issued as a result of the assessment, two on recurring recorders problems in the main control room. No conclusions were reached on the overall effectiveness of the licensee's operations department, by the self-assessment.

Recent inspections by the NRC have identified multiple problems, including procedural adherence, communications, and log keeping practices. Even though recommendations exist in these areas, no assessment of the current effectiveness, nor any examples of specific problems were identified.

The performance of the self-assessment was a good initiative, but the implementation was not of sufficient depth.

08 Miscellaneous Operations Issues

08.1 (Closed) Licensee Event Report (LER) 50-302/96-017-01, Reactor Trip on High Reactor Coolant Pressure During Turbine Testing Caused by Debris in Manual Isolation Valve

a. Inspection Scope (92901)

This event was discussed in IR 50-302/96-05. The inspector performed additional followup interviews with the operators to clarify their response when the main steam safety valve (MSSVs) did not operate at the proper setpoints.

b. Observations and Findings

The inspector determined that the operators followed plant procedures and that their actions were adequate.

c. Conclusions

This LER is closed.

08.2 (Open) Violation (VIO) 50-302/93-16-07, Inadequate Emergency Operating Procedure (EOP) and AP Procedures

a. Inspection Scope (92901)

This item concerned multiple examples of a violation of 10 CFR 50, Appendix B, Criterion V. The inspector reviewed the remaining procedures cited in the violation, AP-581, Loss of (Non-Nuclear Instrumentation power supplies) NNI-X, and AP-582, Loss of NNI-Y.

b. Observations and Findings

The inspector noted that the procedural discrepancies noted in the Notice of Violation had been corrected for these procedures. However, an outstanding Request for Engineering Assistance (REA) 95-0406 was initiated in April 1995, and has yet to be completed. This item requested that an engineering review be conducted on the above procedures to ensure the lists of reliable and unreliable instrumentation contained in the above procedures were correct.

c. Conclusions

This item will remain open pending completion of REA 95-0406, and final review of the procedures for accuracy.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Vital Battery Charger 1F Change Out

a. Inspection Scope (62707)

The inspectors witnessed portions, on various days, of the performance of WR NU 0331781, Vital battery charger 1F change out, per Modification Approval Record 93-05-07-01.

b. Observations and Findings

The inspectors reviewed the work package and verified that all reviews and approvals had been received prior to the beginning of work. The licensee utilized SMC support personnel to perform this task. The inspectors verified that the personnel were qualified by the licensee's program and were the same personnel used to change out battery chargers 1A, 1B, 1C, and 1D during the recent refueling outage.

c. Conclusions

The vital battery charger change out work was accomplished in a professional manner, with good project manager oversight.

No problems were identified.

M1.2 Shoot and Clean Nuclear Services Closed Cycle Cooling Water System Heat Exchanger (SWHE) 1D

a. Inspection Scope (62707)

The inspectors witnessed the performance of portions of WR NU 0336700, Shoot and Clean SWHE-1D.

b. Observations and Findings

A review of the work package revealed that all reviews and approvals had been received prior to beginning the task. The inspectors discussed the task with the technicians.

c. Conclusions

The inspectors determined, that the technicians were knowledgeable of the requirements and performance of the work. No problems were identified.

M3 Maintenance Procedures and Documentation

M3.1 Surveillance Observations

a. Inspection Scope (61726)

The inspectors witnessed the performance of surveillance procedure, SP-130, Engineered Safeguards Monthly Functional Test. This procedure was performed to verify operability of the Engineered Safeguards Actuation System (ESAS) instrumentation, as required by TS 3.3.5, ESAS Instrumentation.

b. Observations and Findings

The inspectors witnessed the performance of SP-130, Engineered Safeguards Monthly Functional Test. The inspectors noted some weaknesses with the instrument technicians communications. When the technician asked the RO to verify the reactor building pressure, he did not specify the instrument to be used until the RO asked if one was specified in the procedure. While performing steps of the procedures which would cause an alarm, the technician would just state that there would be noise coming, and did not specify which alarms to expect, until the RO requested that the technician be more specific. Even though there were no problems with the completion of the surveillance, the RO had to prompt the technician for more accurate communications.

c. Conclusions

Weaknesses were identified with the instrument technician communications skills, but the RO prompted better communications during the performance of the test.

M8 Miscellaneous Maintenance Issues

M8.1 Main Steam Safety Valve

a. Inspection Scope (92902)

A reactor trip followed by one steam generator dryout due to the failure of one main steam safety valve to close occurred at Arkansas Nuclear I on May 19, 1996. The main steam safety valve had apparently been maintained improperly, allowing a stem nut (release nut) to move, preventing valve closure. An Industry Report had previously been issued due to the same failure mechanism having occurred at Crystal River.

b. Observations and Findings

In IR 50-302/96-06, Paragraph M8.1, the residents discussed their review of applicable licensee documents, and concluded that the corrective actions taken for the main steam line safety valves release nut restraint problem were adequate to prevent recurrence. Subsequently, the residents walked down the main steam line safety valves and verified that the release nuts were properly restrained by the release nut cotter pin.

c. Conclusions

No further follow-up of this issue is required.

M8.2 Cavity Cooling Piping Thermal Relief Protection

a. Inspection Scope (62703)

The inspector reviewed the licensee's interim corrective actions associated with a potential concern associated with containment integrity. During the recent NRC IPAP inspection an NRC inspector had questioned the adequacy of the existing cavity cooling (CI) piping configuration associated with AHHE-14A and AHHE-14B within the Reactor Building. This system provides cavity cooling during power operation and provides no post-accident safety related function. The specific concern was that the CI piping or cavity coolers could fail following a loss of cooling accident (LOCA) due to over pressurization after containment isolation. CI piping within the Reactor Building was not provided with thermal relief protection.

b. Observation and Findings

The inspector reviewed Problem Report (PR) 96-0261 which was issued by the licensee to address this issue along with the licensee's interim and proposed long term corrective actions and determined that they were adequate. The licensee evaluated this issue and determined that containment integrity would not have been affected by a failure of the CI piping located within the reactor building (RB). However, the licensee also issued temporary modification, (T-MAR) T96-07-16-01, to provide interim thermal relief protection for the CI piping in the containment. The inspector reviewed this T-MAR along with maintenance work request WR 0336793 which implemented this temporary modification. This WR added CI thermal relief valves, CIV-279, 280, at AHHE-14A and 14B. The relief valves were added downstream of piping vent valves, CIV-90 and 91, and the vent valves administratively controlled under the licensee's equipment clearance program. Installation of this T-MAR required the licensee to modify their system venting instructions to allow removal of a relief valve for venting purposes. The inspector was further informed that a permanent plant modification would be issued at a later date to replace this T-MAR.

c. Conclusions

The inspector determined that the licensee's interim corrective actions were acceptable. IFI 50-302/96-08-02, Reactor building cavity cooling piping thermal relief protection, will be issued to track permanent resolution of this concern.

M8.3 Non Safety-Related Positioners on Safety-Related Valves

a. Inspection Scope (62703)

The inspector reviewed the licensee's interim corrective actions associated with a concern associated with the safety-related and non-safety-related interface on Decay Heat Closed Cycle Cooling valve positioners and whether a failure of the valve positioner could potentially result in a failure of the associated valve to remain in the correct position during a LOCA. During the recent NRC IPAP inspection, an inspector had questioned the adequacy of the configuration associated with the non-safety related positioners installed on the DC outlet valves, DCV-177 and DCV-178, and bypass valves, DCV-17 and DCV-18, for the Decay Heat Removal Heat Exchangers. During a review of the subject valves it was discovered that although control air to the pneumatic controls were isolated, the supply air to these non safety-related positioners was not normally isolated.

b. Observation and Findings

The inspector determined that PR 96-0220 had been subsequently issued by the licensee to address this concern. The licensee's interim resolution of this issue was to temporarily close IAV-228 to isolate the supply air to the pneumatic controls to the valves and place IAV-228 under administrative control by use of an equipment clearance.
These DC valves are required to be in their safety related ES positions during a LOCA to provide maximum cooling flow to the DH heat exchangers (DCV-17 and 18 full closed with DCV-177 and 178 full open). However, these valves also have a non-safety related function in that they are throttled to control the rate of decay heat removal from the reactor core during plant shutdown. During power operation these valves were previously failed to their safety related position by isolating control air to the positioners by Procedure OP-404, Decay Heat Removal System, while supply air was not isolated. The actual valve position on loss of air would be determined by the actuator spring. Although the positioners were not considered safety related, the valve actuators were classified by the licensee as safety-related.

The inspector reviewed plant modification MAR 94-09-02-01, DC Cooling Instrumentation Enhancement. The inspector determined that this MAR, when implemented, will simplify the control logic of DC cooling to the heat exchangers by permanently removing the existing pneumatic temperature controller and piping the emergency preparedness (E/P) output directly to the valve positioners. This modification will remove the temperature control function and allow the operator to command a

valve position demand signal directly to the valve positioners. This modification would also result in a change in the method of failing the valves to their safety-related ES positions by isolating DCV-194 and DCV-196 and venting of supply air by opening DCV-195 and DCV-197 rather than only isolating the input control air signal to the positioners. This would isolate all air to the valve positioners and no longer require closure of IAV-228.

c. Conclusions

The inspector determined that the licensee's interim corrective actions were acceptable. Additionally, the inspector determined that completion of this MAR was listed as part of the corrective action plan (CAP) for PR 96-0220 with a completion date of September 30, 1996. This item was identified by the IPAP team, and will be tracked as part of IPAP Open Issues. (See IPAP URI 50-302/96-201-04.)

M8.4 Safety-Related Battery Chargers

a. Inspection Scope (62703)

The inspector reviewed the status of licensee actions to address an industry issue which could potentially affect reliability of the safety-related battery chargers. During installation testing of replacement safety-related 125 VDC battery chargers at Salem, it was found that three wire lugs were landed on a terminal with insufficient thread engagement to the terminals. This deficiency could have resulted in failure of those battery chargers during power operation. All six safety-related chargers at Crystal River were recently replaced with new battery chargers from the same manufacturer as those at Salem.

b. Observation and Findings

The inspector was informed that licensee management had contacted Salem management, and had determined that the actual problem was that up to three wire lugs were landed on common screw terminal connections on the battery charger high voltage shutdown board. This board is located within the alternating current (AC) side of the battery chargers and provides high AC voltage input protection for the battery and charging circuits. The terminal screws were not of sufficient length to provide adequate thread engagement with three wire lugs landed on the associated terminal.

Each of Crystal River's two safety-related batteries is supported by two 125 VDC chargers and a single 125 VDC spare charger (total of six chargers). The safety-related chargers at Crystal River are from the same manufacturer but are a different size and model (Charter Power Systems Model ARR200F) than those used at Salem (Charter Power Systems Model ARR300F). However, the non-safety related chargers in use at Crystal River are the same type chargers as those being questioned at Salem. The inspector was informed that the non-safety related chargers had also been inspected and no loose connections were identified.

However, the engineer noted that there were three wire lugs landed on common screw terminal connections on the high voltage shutdown boards on these chargers. A precursor card had been written to address this potential problem with the non-safety related chargers at Crystal River.

The inspector was informed that a licensee engineer had inspected all six safety-related chargers and verified the adequacy of all screw terminals located within the safety-related chargers. The inspector interviewed the engineer that conducted these inspections. The engineer informed the inspector that all screw terminals located on the high voltage shutdown boards had less than three wire lugs installed. The inspector was also informed that each of these chargers did have three wire lugs landed on a common terminal on the power terminal block. The lug connections on these terminals had been closely examined by the licensee and the licensee determined that the installations were acceptable. The power terminal blocks and connections appeared sound and the type and length of the screw used to secure the wire lugs was verified to be of sufficient length to allow full thread engagement with three wire lugs attached by a common terminal screw. Additionally, the engineer verified all wire terminal points on the six safety-related chargers which utilized lug nuts had full thread engagement.

The inspector selected one safety-related charger, DPBC-1E, which had been previously inspected by the licensee and visually inspected all internal wire lug connections. The inspector verified that all screw terminals and lug nut installations were acceptable.

c. Conclusions

The results of the inspector's observations were consistent with the results from the inspection performed by the licensee engineer. Based on this review the inspector determined that this potential industry issue had been adequately dispositioned by the licensee. No further review of this issue is required.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Degraded Safety Related Equipment

a. Inspection Scope (37551)

On July 17, 1996, the inspectors reviewed the licensee's Plant Equipment Condition Monitoring Program report dated July 12, 1996. This report is a quarterly report summarizing the plant equipment condition monitoring program.

b. Observations and Findings

The inspectors noted that AHF-8A, Spent Fuel Pump Motor Cooling Fan 8A, continued to be operated with an increasing trend of excessive vibration

levels on the motor and with a high priority action level. The report referenced REA 94-0026, which was previously written to improve the fan motor base attachment. The fan housing is not stiff enough to dampen the belt vibrations, and a contributing factor may be a mismatch between the adjustable dual groove sheave and the non-adjustable double wide powerband belt, which drives the fan. The inspector reviewed the Plant Equipment Condition Monitoring Program report dated October 15, 1995. That report also indicated that AHF-8A had excessive vibration levels but with a low priority action level.

On July 17, 1996, the inspector questioned the licensee regarding the operable status of AHF-8A. This safety related component has been operating with known excessive vibration levels since 1994 and the monitoring data shows an increasing trend of vibration levels.

Licensee procedure CP-150, Identifying and Processing Operability Concerns, Revision 1, dated May 7, 1996, paragraph 4.1.3 states in part that the discovery of degraded conditions of components, where performance is called into question, requires an operability determination. CP-150, paragraph 4.2, Phase 2: Evaluation, states in part that the shift supervisor on duty (SSOD) evaluates the degraded condition for immediate disposition. If the component is important to safety the SSOD makes an immediate disposition of either Operable, Inoperable, or Complex Requiring Further Review. If the component requires further review, the SSOD is to initiate an Operability Concern Resolution (OCR). The OCR is, among other requirements, to contain the applicable Problem Report number and an immediate disposition.

10 CFR 50, Appendix B, Criterion XVI, Corrective Actions, requires that measures be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.

The failure of the licensee to initiate prompt corrective actions to address the July 12, 1996 identification of an increasing trend in excessive vibration on the spent fuel pump cooling fan motor, which was originally identified in 1994, is first of two examples of a violation. This violation will be tracked as the first example of VIO 50-302/96-08-01, Failure to take timely corrective actions.

The system engineer put together an action plan for AHF-8A as follows:

Description of Problem

Vibration levels on the fan motor were first identified as high in 1992 through the Plant Equipment Condition Monitoring Program, and again early in 1994 through REA 94-0026. The motor subsequently burned up in May 1994 and was replaced. Vibrations have since increased to the present level of about 2"/sec., which is extremely rough. Contributing factors may include a mismatch between the adjustable dual groove sheave and the non-adjustable double wide powerband belt which drives the fan.

Another factor seems to be insufficient stiffness of the sheet metal housing upon which the motor base is mounted.

Proposed Resolution

1. Implement WR318701 to troubleshoot high vibration problem via MP-531. Include correct size fixed motor sheave (pitch diameter must provide desired fan RPM of approximately 1111) to replace original adjustable sheave; determine whether existing dual powerband belt is acceptable or whether two single belts should be used. This may require a review of FIMIS documentation to determine how this mismatch (if it is) may have occurred.

2. If Step 1 improves the overall vibrational characteristics, the Rapid Response Team will take steps to make a permanent sheave / belt change via PEERE, CGWR or MAR. It must be remembered that this cooling unit is Safety Related.

3. If, upon installation of a correct sheave/belt configuration, vibration continues to be amplified by flexing of the mounting surface, stiffening of the housing will be pursued. REA 96-0727 is in place to begin this modification process.

On July 19, 1996, PR 96-0239, AHF-8A High Vibration, was initiated. The SSOD dispositioned the AHF-8A as Conditionally Operable/Potentially Inoperable with a due date for OCR AH-96-AHF-8A of September 19, 1996. No corrective actions had been initiated at the time this report period ended.

c. Conclusions

The Plant Equipment Condition Monitoring report is very comprehensive, and is an excellent summary of the status of plant equipment. One violation was identified for a failure of the licensee to initiate prompt corrective actions.

E8 Miscellaneous Engineering Issues

E8.1 IFI 50-302/95-08-02, Corrective Actions for Makeup System Audit Findings

a. Inspection Scope (92901)

The inspectors reviewed corrective action plan developed in response to quality assessments audit 95-02-MAKP, 1995 Audit Report for Make-Up System, February, 1995.

b. Observations and Findings

In February 1995 an audit of the make up system disclosed numerous problems with the system (see IR 95-08 and IR 95-18). A Corrective Action Plan (CAP) was documented in PR 95-0041. In June 1996 a follow-up review, performed by quality assessments, was performed to verify the status of the corrective action plan.

The auditor reviewed the corrective actions for CAP item 1 and found that the item was partially completed with a request from engineering to open a CAP item to track additional engineering review of discrepancies identified during subsequent piping walkdowns. CAP item 3 was completed with a request by engineering to add two additional CAP items to develop a DCN to modify the support drawings for MUH-518 and MUH-519 and to track completion of the work requests written to verify torque on anchor bolts to MUH-807 and MUH-819. To address CAP item 5, systems engineers initiated 19 work requests to correct deficient conditions identified in the original audit. This CAP item was closed, based on the issuance of the WRs.

The auditor's review revealed that the tracking system for PRs, PRSTATUS, showed all CAP items completed for PR 95-0041, with no additional CAP items added. One of the 19 WRs written had been completed. The other 18 WRs had not been planned. The failure to create additional steps in PRSTATUS to document the additional CAP items or track the implementation of the CAP items, such as planning and performing work activities, resulted in failure to complete these actions in a timely manner. Since engineering relied on PRSTATUS to drive the activities committed to in the additional CAP items, these additional corrective actions were not completed.

10 CFR 50, Appendix B, Criterion XVI, Corrective Action, requires that measures be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. The failure of the licensee to take prompt and adequate corrective actions to correct deficiencies identified in February 1995 during a make-up system audit is the second example of a violation, VIO 50-302/96-08-01, Failure to take timely corrective actions. This also indicates a weakness in the PR tracking system.

c. Conclusions

IFI 50-302/95-08-02 is closed. One Violation and one Weakness were identified.

IV. Plant Support

R2 Status of Radiation Protection and Chemistry Facilities and Equipment

R2.1 Calibration of Reactor Building Air Sample Line Monitor RM-A6

a. Inspection Scope (84750, 83750)

The inspectors observed the calibration of the gaseous detector channel on the Reactor Building Air Sample Line Monitor RM-A6 to evaluate the adequacy of the licensee's process and procedures.

b. Observations and Findings

The licensee utilized CH-232, "Atmospheric Radiation Monitoring System Calibration Procedure, Revision 30, dated August 6, 1996, for the calibration of plant atmospheric monitors. The procedure was utilized to calibrate all of the atmospheric monitors and was somewhat cumbersome to use, in that it required the user to skip portions of the procedure not applicable to the monitor being calibrated. Additionally, some of the steps were not specific and could result in inconsistent actions. For example, the step for connecting the radioactive calibration gas loop in the observed calibration did not specify the specific connecting points to the radiation monitor. The calibration gas loop connecting points were not identified on the radiation monitors. The technicians performing the calibration spent considerable time looking for the most appropriate connecting points and selected the most direct path to the detector chamber. The inspectors noted the radioactive gas could have been connected at several locations, which could have resulted in some calibration problems if the equipment was not placed in an appropriate valve alignment. The procedure also did not include sign-offs for valve alignment verifications. These issues were discussed with licensee personnel, and the inspectors learned that the licensee was developing specific procedures for each monitor to make the calibration procedure more user friendly. However, the inspectors noted that the draft procedures also did not include valve position verification sign-offs. The inspectors discussed the value of the valve position verification activities with licensee management. The licensee did not indicate whether valve position verification sign-offs would be included in the new procedures.

During the observation of calibration activities in the control room, the inspectors noted numerous (approximately 10) deficiency and work order tags on the radiation monitoring panel. Most of the radiation monitoring system was fully operational and most of the monitors with a deficiency tag remained operable to some extent. Many of the tags were less than a month old, however, three were four to eight months old. An assessment of the adequacy of the maintenance activities on the radiation monitoring system was not made during this inspection. However, the inspectors discussed the maintenance of the radiation monitoring equipment in general with licensee management. The licensee personnel reported that other maintenance activities having a higher

priority were resulting in the maintenance delays on the radiation monitoring system. The inspectors acknowledged that there were maintenance activities having a higher safety significance, but reported the operability of the plant radiation monitoring equipment was an important component in detecting adverse plant and radiological conditions of fission product barriers, which could warrant a higher work priority assignment. The licensee management noted the inspector's concerns, but did not make any specific commitments to revise maintenance priorities for the radiation monitoring system.

c. Conclusions

The calibration process was adequate. The technicians performing the calibration appeared to understand the characteristics of the radiation monitor being calibrated and the calibration procedure and process. The calibration procedure was properly utilized throughout the calibration process. Instrument settings were proper considering the instrument's response during the calibration. The quality controls in the calibration procedure could be improved by identifying calibration connecting points for gaseous source loop and inclusion of valve position verification sign-offs.

The operability of plant radiation monitoring system could be improved with more timely maintenance of system equipment.

R.3 Radiological Protection and Chemistry Procedures and Documentation

R3.1 Annual Radiological Environmental Operating Report

a. Inspection Scope (84750)

The Annual Radiological Environmental Operating Report for 1995 was reviewed to identify any adverse trends and to verify that the requirements of Technical Specifications (TS) were met.

b. Observations and Findings

The report indicated that plant operations in 1995 had not resulted in any significant impact on the environment resulting from radiological effluents. The inspectors compared the reported radiation measurements in the 1995 report with those of previous years and did not identify any adverse trends. The report was complete and met TS requirements.

c. Conclusions

No concerns with the 1995 Annual Environmental Monitoring Report were identified.

R3.2 Annual Radiological Effluent Release Report

a. Inspection Scope (84750)

The Annual Radiological Effluent Release Report for 1995 was reviewed to identify any adverse trends and to verify that the requirements of TS were met.

b. Observations and Findings

The inspectors compared the reported measurements in the 1995 report with those of previous years and did not identify any adverse trends. The quantity of radioactive liquid and gaseous effluents were generally down from the previous year (1994) with the exception of liquid tritium, which was slightly higher than reported in the last few years. The quantity of radioactive iodine released in gaseous effluents was reported as zero. The licensee did not have a refueling outage in 1995 and as a result did not need to generate and release the additional water needed for refueling activities. The licensee also stored additional water to take advantage of radioactive decay prior to its release. Radioactive gases were also stored for radioactive decay prior to their release. The licensee appeared to be effectively managing radiological effluents to maintain offsite doses as low as reasonably achievable.

c. Conclusions

The 1995 Effluent Report was complete and met TS requirements. No concerns with the 1995 report were identified.

R3.3 Transportation of Radioactive Waste and Material

a. Inspection Scope (86750)

Shipping papers were reviewed to determine whether they met applicable regulatory requirements.

b. Observations and Findings

The inspectors reviewed the licensee's documentation for selected radioactive material and radioactive waste shipments to verify that the licensee was properly documenting radioactive material transportation activities.

c. Conclusions

Reviewed shipping documentation appeared appropriate and in compliance with applicable transportation regulations. No concerns with the licensee's transportation records were identified.

R5 Staff Training and Qualification in Radiological Protection and Chemistry

R5.1 Review of Training Lesson Plans

a. Inspection Scope (84750)

The inspectors reviewed selected training lesson plans for staff performing functions related to the program areas reviewed during the inspection. The selected training plans addressed activities associated with transportation of radioactive waste and material, calibration of radiation monitoring systems, and radioactive effluent monitoring and releases. The reviews were made to verify lesson plans included appropriate information.

b. Observations and Findings

In general, the lesson plans reviewed by the inspectors clearly addressed lesson objectives, addressed regulatory requirements and referenced other related guidance and procedures. Basic physical concepts, analytical techniques, equipment operation and system descriptions were included in the lesson plans, as appropriate. Lesson plans also addressed proper documentation and response requirements and included appropriate laboratory exercises.

c. Conclusions

The inspectors found the reviewed lesson plans addressed appropriate topics in the program area. No concerns with the reviewed lesson plans were identified.

F7 Quality Assurance in Fire Protection Activities

F7.1 96-04-FPEP, Audit Report of Fire Protection/Emergency Planning

a. Inspection Scope (40500)

The inspectors reviewed the quality assessments audit, 96-04-FPEP, in the areas of fire protection and emergency planning.

b. Observations and Findings

No direct audit findings were identified. Seventeen weaknesses were identified, which resulted in the issuance of PCs. Two of the PCs have resulted in three problem reports being issued, after review by licensee management. These problem reports addressed various problems with fire protection surveillance procedures, inadequate corrective actions to address concerns identified in LER 90-002, the failure to transfer fire protection technical specifications to the fire protection plan per GL 88-12, and failure to take corrective actions for questions on the fire service tank water volume. The audit team did not consider that any of these issues met the criteria for issuing a PR. However, the review of

the PCs by line management did identify the issues as requiring a PR and upgraded the concern.

A total of 17 PCs were identified, which were evaluated by the audit team leader for trends or common concerns. The team leader reported that there were four basic types of issues:

1. There were indications of a weakness at the first and second level of defense of quality. These represent a deficiency that originated at the worker level and was not detected during the review and approval process.

2. There was the need for more attention to detail when documenting or otherwise describing activities.

3. There appeared to be an indication of a weakness in management oversight function.

4. A weakness was identified in the timely distribution of industry information specific to emergency planning issues.

c. Conclusions

The review of the audit noted that programmatic assessments were made, however the assessments were restricted to the specific areas being audited. The licensee appears to be attempting to improve their audits to include programmatic assessments, but the assessments produced to date are limited in scope.

A weakness was identified in that a Quality Assurance audit failed to properly identify that two PCs issued during the audit should have been characterized as PRs.

V. Management Meetings

X1 Exit Meeting Summary

The inspection scope and findings were summarized on August 9, 1996. The inspectors described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

X3 Management Meeting Summary

On July 25, 1996 the IPAP team held a pre-exit meeting for the findings identified during their inspection. A special public exit meeting was held on August 6, 1996 at the CR-3 site. The meeting was attended by NRC staff from Region II and from HQ. The results of this inspection were issued on August 23, 1996 as Final Assessment Report 50-302/96-201.

PARTIAL LIST OF PERSONS CONTACTED

Licensees

K. Baker, Manager, Nuclear Configuration Management
P. Beard, Senior Vice President Nuclear Operations
G. Becker, Operations
C. Bergstrom, Jr., Manager, Nuclear Plant Operations Support
G. Boldt, Vice President Nuclear Production
J. Campbell, Manager, Nuclear Security
J. Campbell, Assistant Plant Director, Maintenance and Radiation Protection
W. Conklin, Jr., Director, Nuclear Operations Materials and Controls
R. Davis, Assistant Plant Director, Operations and Chemistry
D. DeMontfort, Manager, Nuclear Plant Operations
R. Enfinger, Manager, Safety Assessment Team
R. Fuller, Manager, Nuclear Chemistry
B. Gutherman, Manager, Nuclear Licensing
G. Halnon, Manager, Nuclear Licensing
B. Hickle, Director, Nuclear Plant Operations
L. Kelley, Director, Nuclear Operations Site Support
H. Koon, Manager, Nuclear Outages
K. Lancaster, Manager, Nuclear Projects
J. Maseda, Manager, Engineering Programs
P. McKee, Director, Quality Programs
R. McLaughlin, Nuclear Regulatory Specialist
B. Moore, Manager, Nuclear Integrated Scheduling
W. Rossfeld, Manager, Site Nuclear Services
J. Stephenson, Manager, Radiological Emergency Planning
F. Sullivan, Manager, Nuclear Engineering Design
R. Widell, Director, Nuclear Operations Training
D. Wilder, Manager, Radiation Protection

NRC

J. Bartley, Resident Inspector, Farley NP (August 5 through 9, 1996)
W. Bearden, Reactor Inspector, Region II (August 6 through 9, 1996)
J. Cummins, IPAP Contractor (July 14 through 25, 1996)
T. Foley, IPAP Team Member (July 14 through 25, 1996)
R. Gallo, Chief, Special Inspection Branch, NRR (August 6, 1996)
A. Gibson, Director, Div. of Reactor Safety, Region II (July 25 and August 6, 1996)
G. Hopper, Reactor Engineer, Region II (August 5 through 9, 1996)
J. Isom, IPAP Team Member (July 14 through 25, 1996)
J. Jacobson, IPAP Team Leader (July 14 through 25, 1996 and August 6, 1996)
S. Klementowicz, IPAP Team Member (July 14 through 25, 1996)
K. Landis, Branch Chief, Region II (August 1 through 2, 1996)
R. Mathew, IPAP Team Member (July 14 through 25, 1996)
O. Mazzoni, IPAP Contractor (July 14 through 25, 1996)
D. Norkin, Section Chief, Special Inspection Branch, NRR (July 25, 1996)

L. Raghavan, Project Manager, NRR (August 6, 1996)
M. Shylamberg, IPAP Contractor (July 14 through 25, 1996)
D. Solorio, IPAP Team Member (July 14 through 25, 1996)
L. Stratton, Physical Security Specialist, Region II (July 29 through August 2, 1996)
J. Williams, Project Manager, NRR (August 6, 1996)
F. Wright, Senior Radiation Specialist, Region II (August 5 through 9, 1996)

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving and Preventing Problems
IP 61726:	Surveillance Observations
IP 62703:	Maintenance Observation
IP 62707:	Conduct of Maintenance
IP 71707:	Plant Operations
IP 83750:	Ocupational Radiation Exposure
IP 84750:	Radioactive Waste Treatment and Effluent and Environmental Monitoring
IP 86750:	Solid Radioactive Waste Management and Transportation of Radioactive Materials
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92901:	Followup - Operations
IP 92902:	Followup - Maintenance
IP 92903:	Followup - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

Type	Item Number	Status	Description and Reference
VIO	50-302/96-08-01	Open	(Two Examples) Failure to take timely corrective actions for make-up system audit findings and excessive vibration on a spent fuel pump cooling fan motor. (paragraphs E8.1 & E2.1)
IFI	50-302/96-08-02	Open	Reactor building cavity cooling piping thermal relief protection. (paragraph M8.2)

Closed

Type	Item Number	Status	Description and Reference
IFI	50-302/95-08-02	Closed	Corrective actions for make-up system audit findings. (paragraph E8.1)
LER	50-302/96-017-01	Closed	Reactor trip on high reactor coolant pressure during turbine testing. (paragraph O8.1)

Discussed

Type	Item Number	Status	Description and Reference
VIO	50-302/93-16-07	Open	Inadequate EOP and AP Procedures. (paragraph O8.2)
URI	50-302/96-201-04	Open	Non-safety related positioners used on safety related decay heat cooling system air operated valves. (paragraph M8.3)

LIST OF ACRONYMS USED

ac - Alternating Current
ADI - Absolute Drift Indications
AHD - Air Handling Vent and Cooling Damper
AHV - Air Handling Vent and Cooling Valve
AI - Administrative Instruction
ALARA - As Low as Reasonably Achievable
ANSI - American National Standards Institute
ANSS - Assistant Nuclear Shift Supervisor
APC - Alternate Plugging Criteria
ASME - American Society of Mechanical Engineers
ASV - Auxiliary Steam Valve
B&PV - Boiler and Pressure Vessel
B&W - Babcock & Wilcox
BS - Building Spray
BSP - Building Spray Pump
BVT - Below Voltage Threshold
BWST - Borated Water Storage Tank
CAL - Confirmatory Action Letter
CAP - Corrective Action Plan
CCTV - Closed Circuit Television
CFR - Code of Federal Regulations
CFT - Core Flood Tank
CFV - Core Flood Valve
CGWR - Commercial Grade Work Request
CI - Cavity Cooling
CP - Compliance Procedure

CREVS - Control Room Emergency Ventilation System
CR3 - Crystal River Unit 3
CST - Condensate Storage Tank
dc - Direct Current
DC - Decay Heat Closed Cycle Cooling
DCHE - DC Heat Exchanger
DCN - Design Change Notice
DEV - Deviation
DFP - Diesel Fuel Pump
DH - Decay Heat
DHHE - Decay Heat Heat Exchanger
DHP - Decay Heat Pump
DHR - Decay Heat Removal
DHV - Decay Heat Valve
DNPO - Director, Nuclear Plant Operations
dp - Differential Pressure
EA - Enforcement Action
ECCS - Emergency Core Cooling System(s)
EDBD - Enhanced Design Basis Document
EEI - Escalation Enforcement Item
EFIC - Emergency Feedwater Initiation and Control
EFP - Emergency Feedwater Pump
EFT - Emergency Feedwater Tank
EFW - Emergency Feedwater
EFV - Emergency Feedwater Valve
EGDG - Emergency Diesel Generators
EM - Emergency Plan Implementing Procedure
EOP - Emergency Operating Procedure
EP - Emergency Preparedness
ES - Engineered Safeguards
ESF - Engineered Safeguards Feature
ESAS - Engineered Safety Actuation System
ET - Eddy Current Test
EVS - Emergency Ventilation System
F - Fahrenheit
FIMIS - Fully Integrated Materials Information System
FPC - Florida Power Corporation
FSAR - Final Safety Analysis Report
FWP - Feedwater Pump
FWV - Feedwater Valve
GL - Generic Letter
gpm - Gallons Per Minute
HELB - High Energy Line Break
HP - Health Physics
HPI - High Pressure Injection
in. Hg - Inches of Mercury
I&C - Instrumentation and Control
ICC - Inadequate Core Cooling
ICS - Integrated Control System
IEEE - Institute of Electrical and Electronics Engineers
IFI - Inspection Followup Item
INPO - Institute of Nuclear Power Operations

IP - Inspection Procedure
IR - Inspection Report
ISA - Instrument Society of America
ISI - Inservice Inspection
ISO - Isometric Drawing
IST - Inservice Test
ITS - Improved Technical Specification
JCO - Justification for Continued Operation
JPM - Job Performance Measure
Kv - Kilovolt
Kw - Kilowatt
LCO - Limiting Condition for Operation
LER - Licensee Event Report
LOCA - Loss of Coolant Accident
LOOP - Loss of Offsite Power
LTE - Lower Tube End
LTS - Lower Tube Sheet
MAR - Modification Approval Record
MCB - Main Control Board
MCC - Motor Control Center
MFW - Main Feedwater
MOV - Motor Operated Valve
MOVATS - Motor Operated Valve Analysis and Test System
MP - Maintenance Procedure
MRP - Management Review Panel
MSSV - Main Steam Safety Valve
MSV - Main Steam Valve
MT - Magnetic Particle Testing
MU - Make Up
MUP - Make-up Pump
MUT - Make-up Tank
MUV - Make-up Valve
MW - Megawatt
NCV - Non-cited Violation
NDE - Nondestructive Examination
NEP - Nuclear Engineering Procedure
NOD - Nuclear Operations Department
NOV - Notice of Violation
NPSH - Net Positive Suction Head
NQI - Non-Quantifiable Indication
NRC - Nuclear Regulatory Commission
NRR - Office of Nuclear Reactor Regulation
NSM - Nuclear Shift Manager
NSSS - Nuclear Steam System Supplier
NUREG - NRC technical report designation
OCR - Operability Concerns Resolution
OP - Operating Procedure
OSB - Operations Study Book
OTSG - Once Through Steam Generator
PEERE - Plant Equipment Equivalency Replacement Evaluation
PM - Preventive Maintenance
PORV - Power Operated Relief Valve

ppb - Parts Per Billion
PR - Problem Report
PRC - Plant Review Committee
PSI - Preservice Inspection
psig - pounds per square inch gauge
PT - Liquid Penetrant
PTLR - Pressure and Temperature Limits Report
QC - Quality Control
QA - Quality Assurance
QAP - Quality Assurance Procedure
RB - Reactor Building
RC - Reactor Coolant
RCA - Radiation Control Area
RCP - Reactor Coolant Pump
RCPPM - Reactor Coolant Pump Power Monitor
RCS - Reactor Coolant System
REA - Request for Engineering Assistance
RFO - Refueling Outage
RG - Regulatory Guide
RO - Reactor Operator
RPC - Rotating Pancake Coil
RP&C - Radiological Protection and Chemistry
RT - Radiographic Inspection
RW - Nuclear Services and Decay Heat Seawater
RWP - Nuclear Services and Decay Heat Seawater Pump
RWV - Nuclear Services and Decay Heat Seawater Valve
SALP - Systematic Assessment of Licensee Performance
SAT - Systems Approach to Training
SDT - Station Drain Tank
SER - Safety Evaluation Report
SFPD - Safety Function Determination Program
SG - Steam Generator
SOER - Significant Operating Event Report
SP - Surveillance Procedure
SR - Surveillance Requirement
SRO - Senior Reactor Operator
SSOD - Shift Supervisor on Duty
STI - Short Term Instruction
SW - Nuclear Services Closed Cycle Cooling System
SWHE - SW Heat Exchanger
SWP - SW System Pump
SWV - SW System Valve
T_c - Cold Leg Temperature
TI - Temporary Instruction
TMAR - Temporary Modification Approval Record
TMI - Three Mile Island
TS - Technical Specification
TSC - Technical Support Center
TSCR - Technical Specification Change Request
TW - Through Wall
UAf - A measure of heat exchanger effectiveness

UHS - Ultimate Heat Sink
URI - Unresolved Item
USAS - United States of America Standards
UT - Ultrasonic Test
VIO - Violation
VOTES - Valve Operation Test and Evaluation System
Vpp - Volts point-to-point
WR - Work Request