UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

July 28, 2003

Tennessee Valley Authority
ATTN: Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NRC INTEGRATED INSPECTION REPORT 05000390/2003003 AND 05000391/2003003

Dear Mr. Scalice:

On June 28, 2003, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Watts Bar Nuclear Plant, Units 1 and 2. The enclosed integrated inspection report documents the inspection results which were discussed on July 3, 2003, with Mr. L. Bryant and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The NRC identified one finding of very low safety significance (Green) that has been entered into your corrective action program and is discussed in the summary of findings and in the body of the attached inspection report. The finding was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because it was entered into your corrective action program, the NRC is treating the finding as a non-cited violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. Additionally, a licensee identified violation is listed in Section 4OA7 of this report. If you contest any NCV in the enclosed report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Watts Bar facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Stephen J. Cahill, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Docket Nos. 50-390, 50-391
License No. NPF-90 and Construction
Permit No. CPPR-92

Enclosure: NRC Inspection Report 05000390/2003003, 05000391/2003003
W/Attachment: Supplemental Information

cc w/encl: (See page 3)

cc w/encls:
Karl W. Singer
Senior Vice President
Nuclear Operations
Tennessee Valley Authority
Electronic Mail Distribution

James E. Maddox, Vice President
Engineering and Technical Services
Tennessee Valley Authority
Electronic Mail Distribution

William R. Lagergren
Site Vice President
Watts Bar Nuclear Plant
Tennessee Valley Authority
Electronic Mail Distribution

General Counsel
Tennessee Valley Authority
Electronic Mail Distribution

Robert J. Adney, General Manager
Nuclear Assurance
Tennessee Valley Authority
Electronic Mail Distribution

Mark J. Burzynski, Manager
Nuclear Licensing
Tennessee Valley Authority
Electronic Mail Distribution

Paul L. Pace, Manager
Licensing and Industry Affairs
Watts Bar Nuclear Plant
Tennessee Valley Authority
Electronic Mail Distribution

Larry S. Bryant, Plant Manager
Watts Bar Nuclear Plant
Tennessee Valley Authority
Electronic Mail Distribution

County Executive
Rhea County Courthouse
375 Church Street, Suite 215
Dayton, TN 37321-1300

County Executive
Meigs County Courthouse
Decatur, TN 37322

Lawrence E. Nanney, Director
TN Dept. of Environment & Conservation
Division of Radiological Health
Electronic Mail Distribution

Ann Harris
341 Swing Loop
Rockwood, TN 37854

John D. White, Jr., Director
Tennessee Emergency Management Agency
Electronic Mail Distribution

David Lochbaum
Nuclear Safety Engineer
Union of Concern Scientists
1707 H Street, NW, Suite 600
Washington, D.C. 20006-3919

Distribution w/encl: (See page 4)

Distribution w/encl:
K. Jabbour, NRR
M. Chernoff, NRR
L. Slack, RII EICS
RIDSNRRDIPMLIPB
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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-390, 50-391
License Nos:	NPF-90 and Construction Permit CPPR-92
Report No:	05000390/2003003, 05000391/2003003
Licensee:	Tennessee Valley Authority (TVA)
Facility:	Watts Bar Nuclear Plant, Units 1 and 2
Location:	1260 Nuclear Plant Road Spring City TN 37381
Dates:	April 6 through June 28, 2003
Inspectors:	M. King, Acting Senior Resident Inspector (4/20/03-6/28/03) T. Morrissey, Acting Senior Resident Inspector (4/6/03-4/19/03) J. Reece, Resident Inspector M. Maymi, Reactor Inspector (Section 1R07)
Approved by:	Stephen J. Cahill, Chief Reactor Projects Branch 6 Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000390/2003-03, 05000391/20003-03; 04/06/2003-06/28/2003, Watts Bar Nuclear Plant, Units 1 & 2; Post-Maintenance Testing.

The report covered approximately a three-month period of inspection by resident inspectors and an announced inspection by a regional reactor inspector. One Green non-cited violation (NCV) was identified. The significance of issues is indicated by their color (green, white, yellow, red) using the Significance Determination Process in Inspection Manual Chapter 0609, Significance Determination Process (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Revision 3, dated July 2000.

A. Inspector-Identified Findings and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation of Technical Specification (TS) 5.7.1, Procedures, which requires that written procedures be implemented covering programs such as TS 5.7.2.11, In-service Testing Program. Standard Programs and Processes (SPP)-6.3, Pre-/Post-Maintenance Testing (PMT), specifies the process for an adequate PMT and references the inservice testing program. Contrary to this, the procedure used to rebuild the component cooling system thermal barrier booster pump (TBBP) 1A did not specify the required inservice flow test prior to returning the pump to service. The licensee consequently failed to specify and perform a required flow test PMT prior to returning the pump to service.

  The finding is more than minor in that it affects the mitigating systems cornerstone objective and the attribute of protection against the external factor of fire (the pump is credited for response). In addition, a continuation of similar deficient PMTs on this component would become a more significant safety concern in that the absence of a PMT flow test would not allow the detection of an internal pump problem. The finding is of very low safety significance based on the low fire ignition frequencies in the areas that require use of TBBP 1A, the availability of TBBP 1B, and the short duration of time between the return to service of the pump and subsequent completion of a successful flow test. (Section 1R19)

B. Licensee-Identified Violation

A violation of very low safety significance, which was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. The violation and corrective action tracking numbers are listed in Section 4OA7.

Report Details

Summary of Plant Status

Unit 1 operated at or near 100 percent power for the entire inspection period. Unit 2 remained in a suspended construction status.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection

a. Inspection Scope

The inspectors reviewed the licensee's preparations for inclement weather conditions, because thunderstorms with a tornado watch were forecast in the vicinity of the Watts Bar facility for May 5. On May 5, the inspectors walked down portions of the condensate system, the ultimate heat sink, emergency diesel generators (DGs), the switchyard, and the general plant grounds areas. The inspectors toured the plant grounds for loose debris, which could become missiles during a tornado, and ascertained if operators could access controls and indications for those systems required for safe control of the plant. The areas were selected because their functions could be adversely affected or the systems would be needed for mitigating the effects caused by adverse weather. The inspectors reviewed documents listed in the Attachment and observed plant conditions, evaluating those conditions using criteria documented in the licensee's Abnormal Operating Instruction (AOI)-8, Tornado Watch or Warning.

The inspectors evaluated the licensee's procedure and the operator's response to actual adverse weather conditions. On June 16, the facility did experience heavy wind and rain and lightning-related issues due to thunderstorms. The inspectors reviewed the licensee's response to these conditions and conducted plant walkdowns to assess any adverse affects and to ascertain that the plant grounds were properly cleared of debris which could become missiles during subsequent storms. The inspectors reviewed several licensee-identified problem evaluation reports (PERs) and discussed security issues with regional security inspectors. Reviewed PERs are listed in the Attachment.

During the inspection period, the inspectors also reviewed PER 03-001907-000, which evaluated the licensee's Freeze Protection Program based on recent failures and determined if any common cause issues existed. The purpose of the inspectors' review was to verify that lessons learned the previous winter and corrective actions from this PER would limit the risk of initiating events and adequately protect mitigating systems from the effects of the adverse weather (freezing conditions).

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

a. Inspection Scope

Partial System Walkdowns: The inspectors conducted three equipment alignment partial walkdowns to evaluate the operability of selected redundant trains or backup systems, listed below, with the other train or system inoperable or out of service. The inspectors reviewed the functional system descriptions, Updated Final Safety Analysis Report (UFSAR), system operating procedures, and Technical Specifications (TS) to determine correct system lineups for the current plant conditions. The inspectors performed walkdowns of the systems to verify that critical components were properly aligned and to identify any discrepancies which could affect operability of the redundant train or backup system.

- 1B-B auxiliary feedwater (AFW) system when 1A-A AFW was out of service for preventative maintenance (PM)
- 1A-A, 1B-B, and 2A-A when 2B-B Diesel Generator (DG) was out of service for PMs
- 1A-A, 1B-B and 2B-B when 2A-A DG was out of service for PMs

Complete System Walkdown: The inspectors conducted a detailed review of the alignment and condition of the Unit 1 AFW system. The AFW system is a risk-important mitigating system that supplies emergency feedwater to the steam generators for removing thermal energy from the reactor coolant system (RCS) when normal feedwater is unavailable. The inspectors used the procedures and other documents listed in the Attachment, as well as applicable chapters of the UFSAR, to verify proper system alignment.

The detailed review also verified electrical power requirements, steam supply line-up, labeling, hangers and support installation, and associated support systems status. Pumps were examined to ensure that pump packing leakage was not excessive and that the pumps were properly ventilated. In-service test data was reviewed to ensure that vibration was not excessive and that flow and developed head met acceptance critieria. The inspectors discussed system history and trending of system health and upcoming maintenance and design change packages with the system engineer.

The walkdowns reviewed the material condition of the two motor-driven AFW pumps and the steam-driven turbine AFW pump and also included evaluation of system piping and supports against the following considerations:

- piping and pipe supports did not show evidence of water hammer;
- oil reservoir levels indicated normal;
- snubbers did not indicate any observable hydraulic fluid leakage;
- component foundations were not degraded.

A review of outstanding maintenance work orders (WOs) was performed to verify that the deficiencies did not significantly affect the AFW system function. The inspectors reviewed PER 02-007683-000, which evaluated the level control valves' capability to close and stay closed under high differential operating pressure conditions to ensure

that the system design function and requirements were met. In addition, the inspectors reviewed the PER database and discussed various issues with the system engineer to verify that AFW equipment and system problems were being identified and appropriately resolved.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

Routine Fire Area Tours: The inspectors conducted tours of eight areas important to reactor safety, listed below, to verify the licensee's implementation of fire protection requirements as described in the Fire Protection Program, Standard Programs and Processes (SPP)-10.0, Control of Fire Protection Impairments, SPP-10.10, Control of Transient Combustibles, and SPP-10.11, Control of Ignition Sources (Hot Work). The inspectors evaluated, as appropriate, conditions related to (1) licensee control of transient combustibles and ignition sources; (2) the material condition, operational status, and operational lineup of fire protection systems, equipment, and features; and (3) the fire barriers used to prevent fire damage or fire propagation.

- All 125 volt vital battery rooms
- Control building 689 elevation
- Control room, control building 755 elevation
- Auxiliary building 737 elevation
- Auxiliary building 757 elevation
- Unit 1 and 2 auxiliary instrument rooms
- 480 volt shutdown board room 1B
- Unit 1 480 volt transformer room 1A

Unannounced Fire Drill - Annual Inspection: The inspectors observed performance of a licensee's unannounced fire drill that occurred on June 8, 2003, to evaluate the onsite response. The fire drill scenario involved a simulated fire in the safety-related vital battery room IV.

The inspectors evaluated the readiness of the licensee's personnel to prevent and fight fires including the following aspects:

- Verify that communications with plant operators and between fire brigade members were efficient and effective;
- Verify that the fire brigade leader's fire fighting directions were thorough, clear and effective, and request for offsite fire team assistance was timely;
- Observe whether protective clothing and self-contained breathing apparatus (SCBA) equipment were properly worn and used;
- Determine whether fire hose lines were properly laid out and nozzle pattern simulated being tested prior to entering the fire area of concern;
- Verify that the fire area was entered in a controlled manner;

- Review if sufficient firefighting equipment was brought to the scene by the fire brigade to properly perform their firefighting duties;
- Confirm that fire brigade members checked for fire victims and fire propagation into other plant areas;
- Observe if effective smoke removal operations were simulated;
- Verify that the fire fighting pre-plans were properly utilized and were effective;
- Verify that the licensee pre-planned drill scenario was followed, the drill objectives met the acceptance criteria, and the deficiencies were captured in post-drill critiques.

The inspectors attended a drill critique to verify that the licensee addressed observed areas for improvement and deficiencies in the corrective action program.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

a. Inspection Scope

The inspectors reviewed internal flood protection barriers associated with an essential raw cooling water (ERCW) strainer room pipe break to verify that the flood protection barriers and equipment were being maintained consistent with the UFSAR. The inspectors reviewed the licensee's individual plant examination (IPE) internal flooding analysis which indicated internal flooding represented 15 percent of the initiating events leading to core damage. The ERCW strainer pipe break flood represented 99 percent of this internal flooding risk. The inspectors reviewed licensee instructions for shutdown in the event of severe flooding and other documentation regarding flood protection as listed in the Attachment. The licensee's corrective action documents were reviewed to verify that flood-related items identified in PERs were adequately addressed.

The inspectors walked down the selected area, which contains risk-important equipment located below design flood levels, to evaluate the adequacy of flood barriers, doors, floor drains, sump level switches, and sump pumps to protect the equipment, as well as their overall material condition. The inspectors discussed various aspects of an ERCW strainer room pipe break and associated internal flooding with a system engineer, a design engineer, and a licensee probability safety analysis risk analyst. A record review of sump pump performance tests, component maintenance history, and various design calculations for the internal flood area was performed to verify flood protection preparation. The inspectors also discussed with operators the abnormal and emergency response procedures for coping with this internal flooding to determine if they could effectively implement the licensee's recovery plans.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed inspection records, work documents, preventive maintenance procedures, and other documentation to ensure that heat exchanger (HX) deficiencies that could mask or degrade performance were identified. Inspection records for risk-significant HXs were reviewed which included performance trending and recent inspection, cleaning, and Eddy Current Test (ECT) results for the Component Cooling and emergency Diesel Generator (DG) jacket water HXs. In addition, recent inspection, cleaning, and ECT records were reviewed for the Containment Spray HXs and Shutdown Board Room Chillers.

The inspectors also reviewed general health of the ERCW system via review of results for the ERCW strainer and intake pump bay inspections, review of chemistry activities to control bio-fouling, review of ERCW corrective maintenance, review of ERCW health reports, review of wall thinning and component flow blockage evaluations, and discussions with the ERCW system engineer. In addition, the inspectors reviewed preventive maintenance records for the ERCW back up supply line to the charging pumps' oil coolers. Selected PERs were reviewed for potential common cause problems and problems which could affect system performance to confirm that the licensee was entering problems into the corrective action program and initiating appropriate corrective actions. These PERs included actions regarding the biocide treatment program and DG jacket water Hxs tube plugging margins and fouling resistance. In addition, the inspectors conducted a walkdown of all selected Hxs and major components for the ERCW system.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

The inspectors observed operators in the plant's simulator during licensed operator requalification training to verify that operator performance was adequate and that training was being conducted in accordance with procedures TRN-1, Administering Training, and TRN-11.4, Continuing Training for Licensed Personnel. In addition, the inspectors verified that the training program included risk-significant operator actions, emergency plan implementation, and lessons learned from previous plant experiences.

The inspectors observed an as-found licensed operator requalification testing scenario which included a load escalation, a misaligned control rod, a loss of non-essential air, and a reactor coolant system leak/loss of coolant accident (LOCA) including emergency plan classifications.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors sampled portions of two selected structures, systems or components (SSCs), listed below, as a result of performance-based problems, to assess the effectiveness of maintenance efforts that apply to scoped SSCs and to verify that the licensee was following the requirements of Technical Instruction (TI)-119, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting 10 CFR 50.65 and SPP-6.6, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting -10 CFR 50.65. Reviews focused, as appropriate, on: (1) maintenance rule scoping in accordance with 10 CFR 50.65, Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants; 2) characterization of failed SSCs; (3) safety significance classifications; (4) 10 CFR 50.65 (a)(1) or (a)(2) classifications; and (5) the appropriateness of performance criteria for SSCs classified as (a)(2) or goals and corrective actions for SSCs classified as (a)(1). Specific documents reviewed are listed in the Attachment.

- PER 02-003409-000, Goal-setting review for 480-volt shutdown power system, improvement plans in accordance with PER 03-008763-000 (1-BKR-212B2/4B)
- PER 02-005858-000, Return of radiation monitoring system loop 1-LPR-90-120/121 to (a)(2) status

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

The inspectors evaluated, as appropriate, for the five selected SSCs listed below: (1) the effectiveness of the risk assessments performed before maintenance activities were conducted; (2) the management of risk; (3) that, upon identification of an unforseen situation, necessary steps were taken to plan and control the resulting emergent work activities; and (4) that maintenance risk assessments and emergent work problems were adequately identified and resolved. The inspectors verified that the licensee was complying with the requirements of 10 CFR 50.65 (a)(4); SPP-7.0, Work Control and Outage Management; SPP-7.1, Work Control Process; and TI-124, Equipment to Plant Risk Matrix.

- Turbine-driven AFW pump component outage
- 1A-A AFW pump component and 1A-A component cooling system (CCS) pump component outages

- 2A DG and radiation monitors (0-RM-90-122, 2-RM-90-400) out of service (Emergent work)
- Emergent WO on Eagle 21 rack 9 channel III failure and subsequent work scrub
- Scheduled activity on breaker 5098 in the switchyard while the 2B DG was out of service.

b. Findings

No findings of significance were identified.

1R14 Personnel Performance During Non-routine Plant Evolutions

a. Inspection Scope

The inspectors reviewed two events as described below: (1) personnel performance during selected non-routine events and/or transient operations; (2) licensee event reports (LERs) focusing on those events involving personnel response to non-routine conditions; and (3) operator response after reactor trips which required more than routine expected operator responses, or which involved operator errors. As appropriate, the inspectors (1) reviewed operator logs, plant computer data, or strip charts to determine what occurred and how the operators responded; (2) determined if operator responses were in accordance with the response required by procedures and training; (3) evaluated the occurrence and subsequent personnel response using the significance determination process (SDP) delineated by Manual Chapter (MC) 0609; and (4) confirmed that personnel performance deficiencies were captured in the licensee's corrective action program.

- A mild earthquake on April 29, review of plant and operator response including plant walkdowns and earthquake instrumentation data. AOI-9, Earthquake, guidance reviewed.
- PER 03-010882-000, letdown isolation and pressurizer pressure transient on May 22, resulting in a TS 3.4.1 entry (RCS departure from nucleate boiling (DNB) parameter limit briefly exceeded) due to a failure in a protection Rack 9 power supply distribution panel and entry into AOI-20, Malfunction of Pressurizer Level Control System.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed five selected operability evaluations affecting risk-significant mitigating systems, listed below, to assess, as appropriate (1) the technical adequacy of the evaluations; (2) whether continued system operability was warranted; (3) whether other existing degraded conditions were considered as compensating measures; (4) whether the compensatory measures, if involved, were in place, would work as

intended, and were appropriately controlled; and (5) where continued operability was considered unjustified, the impact on TS Limiting Conditions for Operation (LCOs) and the risk significance in accordance with the SDP. The inspectors verified that the operability evaluations were performed in accordance with SPP-3.1, Corrective Action Program, and SPP-10.6, Engineering Evaluations for Operability Determinations.

- PER 03-011864-000, NIS channel N-42 spiking causing power range deviation alarms
- PER 03-000006-000, Safety injection system relief valve leak
- Safety Function Determination Program (SFDP) evaluations per TS LCO 3.0.6
- PER 03-011274-000, Biocide injection to 1B-B MDAFW pump was not aligned correctly to allow treatment of ERCW suction piping
- PER 03-010882-000 Channel III, Rack 1-R-9, Failure of the power-up time delay circuitry for the safety-related loop processor subsystem.

b. Findings

No findings of significance were independently identified by the inspectors. However, a Green licensee-identified non-cited violation (NCV) was associated with PER 03-010882-000 and is discussed in Section 4OA7.

1R16 Operator Work-Arounds

a. Inspection Scope

The inspectors reviewed the cumulative effects of operator work-arounds to assess (1) the effect on the reliability, availability, and potential for misoperation of a system; (2) the potential for increasing an initiating event frequency or affecting multiple mitigating systems; and (3) the cumulative effects on the ability of the operators to respond in a correct and timely manner to plant transients and accidents. The inspectors reviewed the current operator work-arounds as defined by Operations Department Procedure (OPDP)-1, Conduct of Operations, and interviewed operators to determine if there were other conditions which would require actions to compensate for equipment problems or deficiencies. The operator work-arounds reviewed were:

- Reactor coolant pump standpipes require frequent filling
- Reactor coolant pump seal leakage flow trending higher than normal.
- Damper swap causes TS entry due to auxiliary building pressure changes

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

The inspectors reviewed seven post-maintenance test (PMT) procedures and/or test activities, as appropriate, for selected risk-significant mitigating systems to assess whether (1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; (2) testing was adequate for the maintenance performed; (3) acceptance criteria were clear and adequately demonstrated operational readiness consistent with design and licensing basis documents; (4) test instrumentation had current calibrations, range, and accuracy consistent with the application; (5) tests were performed as written with applicable prerequisites satisfied; (6) jumpers installed or leads lifted were properly controlled; (7) test equipment was removed following testing; and (8) equipment was returned to the status required to perform its safety function. The inspectors verified that these activities were performed in accordance with SPP-8.0, Testing Programs; SPP-6.3, Pre-/Post-Maintenance Testing; and SPP-7.1, Work Control Process.

- 2B-B DG 12-Year PM Extended Outage (see attachment for list of WO's reviewed)
- WO 03-005765-000, DG1B1 air start valves (WBN-1-PCV-082-202 A-B)
- WO 02-016748-000, 120V AC inverter 2-1 upgrade oscillator card
- WO 03-010262-000, Eagle 21 card replacement WBN-1-FI-068-006A RCS Loop 1
- WO 03-012062-000, Steam flow transmitter (1-FT-001-0003B) replacement - failed high
- WO 02-016715-000, Rebuild component cooling system thermal barrier booster pump in accordance with MI-0.020 to correct oil and water leaks at seals
- WO 02-007294-000, Perform 12 year maintenance on 2A-A DG in accordance with MI-82.078

b. Findings

Introduction: A Green NCV for an inadequate post-maintenance test was identified by the NRC.

Discussion: The inspectors reviewed the PMT for WO 02-016715-000 which involved rebuilding of the component cooling system (CCS) thermal barrier booster pump (TBBP) 1A. The inspectors identified that the PMT did not specify testing per Fire Operating Requirement procedure, 1-FOR-70-4, Component Cooling System Thermal Barrier Booster Pump 1A Quarterly Performance Test. The PMT appeared to use only the guidance for testing specified in Maintenance Instruction (MI)-0.020, Repair of Goulds Model 3196 Pumps. However, 1-FOR-70-4, Step 1.3.C, states that testing is required any time maintenance or normal servicing has been performed that may have affected pump or valve performance.

Subsequent investigation by the inspectors indicated that 1-FOR-70-4 was due for its normal quarterly performance. Therefore, the pump work was placed with this test procedure in the work control schedule. On April 3, 2003, the PMT as specified by the

WO was completed and the respective operating requirement (OR)-14.10 was exited on day shift. Operations did not perform the required PMT flow test per 1-FOR-70-4 until later on night shift.

Analysis: The Watts Bar Fire Protection Report identifies the CCS TBBPs as required equipment for ensuring that safe shutdown capability can be maintained during and after a fire in accordance with 10 CFR 50, Appendix R, Sections III.G, III.J, III.L, and III.O. The inspectors determined that the finding is more than minor in that it affects the mitigating systems cornerstone objective and the attribute of protection against the external factor of fire. In addition, a continuation of similar PMTs on this component would become a more significant safety concern in that the absence of a flow test would not allow the detection of an internal pump problem. The inspectors determined that the finding was of very low safety significance (Green) based on the low Appendix R fire ignition frequencies in the areas that required use of TBBP 1A, the availability of TBBP 1B, and the short duration of time between the return to service of the pump and subsequent successful completion of an inservice flow test per 1-FOR-70-4.

Enforcement: TS 5.7.1 requires that written procedures be implemented covering programs such as TS 5.7.2.11, Inservice Testing Program. SPP-6.3, Pre-/Post-Maintenance Testing, specifies the process for an adequate PMT, including the use of appropriate inservice testing procedures. Contrary to this on April 23, WO 02-016715-000 that involved a rebuild of CCS TBBP 1A did not specify the required PMT per inservice test procedure 1-FOR-70-4. Because this violation is of very low safety significance and has been entered in the licensee's corrective action program under PER 03-010602-000, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 50-390/03-03-02, Failure to Adequately Perform a Post-Maintenance Test.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors witnessed six surveillance tests and/or reviewed test data of selected risk-significant SSCs, listed below, to assess, as appropriate, whether the SSCs met the requirements of the TS; the UFSAR; SPP-8.0, Testing Programs; SPP-8.2, Surveillance Test Program; and SPP-9.1, ASME Section XI. The inspectors also determined whether the testing effectively demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions.

- WO 03-30228-000, Perform 1-SI-62-901-B, Centrifugal charging pump 1B-B quarterly performance test,
- WO 03-302409-000, Perform 1-SI-92-131, 31-day test and full power alignment of source range N-31
- WO 03-003660-000, Perform 1-SI-72-901-A, Containment spray pump 1A-A quarterly performance test
- WO 03-002442-000, Perform O-SI-67901-A, Essential raw cooling water pump A-A and C-A performance test
- WO 03-004171-000, Perform 1-SI-68-32, RCS water inventory balance procedure

- WO 02-011631-000, Perform 0-SI-82-20-B, 184-day fast start and load test DG 2B-B.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed the two following temporary plant modifications against the requirements of SPP-9.5, Temporary Alterations, and SPP-9.4, 10 CFR 50.59 Evaluation of Changes, Test, and Experiments, and verified that the modifications did not affect system operability or availability as described by the TS and UFSAR. In addition, the inspectors verified that the installation of the temporary modification was in accordance with the work package, that adequate configuration control was in place, procedures and drawings were updated, and post-installation tests verified operability of the affected systems.

- TACF 0-03-3-077 R1, Liquid effluent line to cooling tower blowdown line
- TACF 1-03-6-062 R0, Install temporary ultrasonic flow instrumentation on RCP #4 seal leakoff piping for the #1 seal

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verifications

Licensee records were reviewed to determine whether the submitted performance indicator (PI) statistics were calculated in accordance with the guidance contained in Nuclear Energy Institute 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 2.

Mitigating System and Barrier Integrity Cornerstones

a. Inspection Scope

The inspectors verified the accuracy of three areas of PI data (noted below) which was reported to the NRC. The inspectors reviewed data applicable to four quarters of operation beginning with April 2002 and ending April 2003. The inspectors also independently calculated the reported values to verify their accuracy, and also witnessed and reviewed data from a RCS leakage rate calculation performed by 1-SI-68-32, RCS Water Inventory Balance. Additional documents reviewed are listed in the attachment.

- Safety system functional failures (mitigating system cornerstone)
- RCS identified leakage (barrier integrity cornerstone)
- RCS specific activity (barrier integrity cornerstone)

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

a. Inspection Scope - annual sample

The inspectors conducted an in-depth review of the licensee's problem identification and resolution (PI&R) activities related to PER 03-003677-000 (unplanned entry into TS 3.6.1, Containment Integrity, due to maintenance activities on containment spray pump (CSP) 1B resulting in the loss of the closed loop outside containment feature for containment isolation). This particular PER was reviewed to verify that the full extent of the issues was identified, an appropriate evaluation was performed, and appropriate corrective actions were specified and prioritized. The inspectors also evaluated the PERs against the requirements of the licensee's administrative control procedure, SPP-3.1, Corrective Action Program, and 10 CFR 50, Appendix B, Criterion XVI, Corrective Action.

b. Findings and Observations

There were no findings of significance identified associated with the PER review; however, the inspectors did identify a leakage evaluation problem and a problem with the extent of condition that, from a documentation point of view, was limited to only one previous occurrence of the same condition as documented by PER 980045 and NRC Inspection Reports (IRs) 50-390/98-01 and 50-390/98-06. NRC IR 50-390/98-01 also identified a similar event in PER 961061. The inspectors reviewed PER 961061 and determined that there were similarities that were pertinent to the evaluation for PER 03-003677-000; however, the licensee had failed to document the occurrence of PER 961061 in its extent of condition evaluation. In addition, the licensee discovered that another similar event occurred in September 2001 as documented in WOs 01-008378-001 and -002, and 01-008406-001 and -002, associated with disassembly and inspection of check valves for CSP 1B. The licensee revised PER 03-003677-000 to include the 2001 event in the functional evaluation and concluded that the root cause for the 2001 and the 2003 events was ineffective implementation of previous corrective actions from PER 980045. As a result of inspector questions, the licensee noted that the relevance of PER 961061 with respect to PER 03-003677-000 had been evaluated with a conclusion that the corrective actions necessary to prevent recurrence remained unchanged. No additional corrective actions for PER 03-003677-000 were identified by the licensee or the inspectors.

The inspectors also identified a deficiency in an evaluation of leakage past a suction relief valve, 1-RFV-72-509, that involved using a containment design pressure of 15 psig as opposed to a higher possible pressurizer relief tank (PRT) pressure of 85 psig to account for events involving higher PRT pressures below the rupture disc value. The

licensee revised their evaluation to account for this potential scenario. The inspectors concluded that these discrepancies did not constitute significant violations of regulatory requirements or findings of significance.

4AO3 Event Followup

(Closed) License Event Report (LER) 50-390/2003-001: Automatic Reactor Trip Due to Moisture Intrusion into an Electrical Connector

On March 10, 2003, with Watts Bar Unit 1 at 100 percent power, a generator backup relay unexpectedly actuated causing an automatic turbine trip/reactor trip. All systems operated as designed following the trip which included an automatic start of the AFW system. The relay actuated due to a ground fault caused by a broken o-ring in the C phase main transformer's high side bushing capacitance tap connector. Root cause of the event was an inadequate preventative maintenance procedure because the licensee failed to incorporate vendor recommendations for maintaining an expansion space when filling the tap well with transformer insulating oil and to tighten the cap only snug tight. This event was reviewed and characterized as a Green finding in NRC Inspection Report 50-390/03-02, Section 4OA3.1. No additional findings of significance were identified. This LER is closed.

4OA6 Meetings, including Exit

The inspectors presented the inspection results to Mr. Larry Bryant and other members of licensee management at the conclusion of the inspection on July 3, 2003. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

4OA7 Licensee-Identified Violation

The following finding of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as an non-cited violation:

- An inadequate operability evaluation resulted in operators failing to place affected channels in the tripped condition in the required time, contrary to Technical Specifications (TS) 3.3.1, Reactor Trip System Instrumentation. As a result, the reactor protection system (RPS) 1-R-9 channel III was inoperable for greater than the TS allowable time of six hours without the affected channels being placed in the tripped condition. This finding is more than minor because, if left uncorrected, it would become a more significant safety concern affecting the mitigation systems cornerstone and could reasonably be viewed as a precursor to a significant event (reactor protection/safety-related trip functions not assured if called upon).

- The finding is of very low safety significance because of the level of redundancy and diversity in the RPS and the short duration that the condition existed before the required TS actions were implemented. The finding is entered into the licensee's corrective action program under PERs 03-010882-000 and 03-011113-000.

SUPPLEMENTAL INFORMATION
PARTIAL LIST OF PERSONS CONTACTED

Licensee

D. Boone, Radiological Control Manager
L. Bryant, Plant Manager
S. Casteel, Human Performance Manager
J. Cox, Training Manager
E. Robinson, Radwaste/Environmental Manager
L. Hartley, Maintenance Rule Coordinator
M. King, Chemistry Manager
D. Kulisek, Assistant Plant Manager
W. Lagergren, Site Vice President
P. Pace, Licensing and Industry Affairs Manager
K. Parker, Maintenance and Modifications Manager
J. Roden, Operations Superintendent
T. Wallace, Operations Manager
J. West, Site Nuclear Assurance Manager

ITEMS OPENED AND CLOSED

Closed

50-390/2003-001	LER	Automatic Reactor Trip Due to Moisture Intrusion into an Electrical Connector (Section 4AO3)
50-390/03-03-01	NCV	Failure to Adequately Perform a Post-Maintenance Test (Section 1R19)

LIST OF DOCUMENTS REVIEWED

Section 1R01

- AOI-8, Tornado Watch or Warning
- PER 03-005603-000, NRC identified problem regarding improper securing of loose lumber and scaffolding materials in yard contrary to AOI-8, Tornado Watch or Warning.
- PER 03-011835-000, licensee-identified problem - during storms 6/16/03 roof of low volume shack near the pond blew off
- PER 03-011935-000, licensee-identified problem - management review committee (MRC) questions on what process/procedures exist to ensure roofs for site buildings are adequate to withstand adverse weather conditions (possibility for roof interaction with switchyard equipment)
- PER 03-011858-000, licensee-identified problem - 2-LS-002-0232A, repeated alarms during heavy rain - characterized as nuisance alarms in the control room.
- PER 03-011901-000, licensee-identified problem - A & B plants failed at the sewage treatment plant due to flooding during heavy rain.
- PER 03-011906-000, licensee-identified problem- turbine building station sump radiation monitor alarmed during period of heavy rainfall. Sample results indicate all natural components.
- PER 03-011856-000, licensee-identified problem -communications with four security local intelligence units lost following a lightning strike onsite, 6/16/03 - work orders and compensatory measures initiated
- PER 03-011843-000, licensee-identified problem - unplanned protective relay and breaker operation on a 161KV line affected four radiation monitors
- PER 03-001907-000, licensee-identified problem- evaluate the Freeze Protection Program based on recent failures and determine if common cause issues exist

Section 1R04

- SOI-3.02, Auxiliary Feedwater System
- 1-SI-3-80 (81), 18 Month Channel Calibration of Auxiliary Feedwater Pump 1A-A (1B-B) Differential Pressure Loops 1-LPP-122C and 1-LPP-3-122A (132C and 132A)
- 0-PI-OPS-17.0, 18 Month Locked Valve Verification, (for AFW valves only)
- E-0, Reactor Trip Safety Injection
- FR-H.1, Loss of Secondary Heat Sink
- FR-H.2, Steam Generator Overpressure
- FR-H-3, Steam Generator High Level
- FR-H.5, Steam Generator Low Level
- TVA Flow, Wiring and Control Diagram Drawings,
- 1-47W610-3-3,4
- 1-47W803-2,3
- 1-47W804-1
- List of all open WOs for System 003
- List of all open PERs for System 003 relating to auxiliary feedwater SSCs
- PER 01-014170-000, Self-revealing problem - AFW Pump B failed to start following reactor trip on 9/4/01.

- PER 02-017683-000, licensee-identified problem with auxiliary feedwater level control valve design deficiencies
- PER 01-017054-000, Part 21 Report on potential degraded/non-conforming condition for the TDAFW trip and throttle valve (spindle screw material issue)
- UFSAR 10.4.9, “Auxiliary Feedwater System
- TS 3.7.5 Auxiliary Feedwater (AFW) System, 3.7.6 Condensate Storage Tank (CST)
- 3-OT-SYS003B, Nuclear Training Materials for Auxiliary Feedwater System
- AFW System (system number 003B) Quarterly Health Reports
- List of WO’s for System 003 relating to auxiliary feedwater SSCs
- TS 3.8.1, AC Sources-Operating
- PER 03-008810-000, Self-revealing event - B train CVI actuation during restoration of a radiation monitor to service, 60 day report per 50.73 (a) (2) (iv)(A).
- UFSAR Table 6.2.4-1, Containment Penetrations and Barriers
- SOI-82.02, Diesel Generator (DG) 1B-B
- SOI-82.01, Diesel Generator (DG) 1A-A
- SOI-82.03, Diesel Generator (DG) 2A-A
- UFSAR Section 8.3, Onsite (Standby) Power System
- TS 3.8.1, AC Sources - Operating

Section 1R05

- PER 03-011525-000, NRC identified problem regarding fire brigade Personal Alert Safety Systems device number limitations (some fire brigade responders not wearing PASS devices)
- PER 03-011530-000, NRC identified problem regarding consideration for the need for two evaluators/controllers during fire drills
- PER 03-012043-000, NRC identified problem of Kaowool fibers missing around the penetration 0-SLV-304-A1109 located in 480V transformer room 1A
- Watts Bar Fire Drill Critique Form for Vital Battery Room IV, dated 6/12/03
- Fire Protection Pre-Plan for vital battery room IV, auxiliary building 772 level
- NRC Inspection Procedure 71111.05, “Fire Protection.”
- Fire Protection Program, Standard Programs and Processes (SPP)-10.0
- Control of Fire Protection Impairments, SPP-10.10
- SPP-10.11, Control of Ignition Sources (Hot Work)

Section 1R06

- USFAR Section 2.4, Hydrologic Engineering
- USFAR Section 3.4, Water Level (Flood) Design
- USFAR Section 3.8.4, Other Category I Structures
- Watts Bar Unit 1 Individual Plant Examination Update Internal Flooding Analysis, Section 3.3.8
- TR 3.7.2, Flood Protection Plan
- AOI 7.0.1, Maximum Probable Flood
- ARI-166-172, Miscellaneous & HPFP
- ARI- 223-229, ERCW
- AOI-13, Loss of Essential Raw Cooling Water (ERCW)
- Moderate Energy Line Break Flooding Study, WBN-OSG-4099
- Flood Protection Provisions, WB-DC-40-29

- Intake Pumping Station Strainer Room A Sump A Performance Test, TI-50.021
- 0-PMP-040-0003A-E Cleaning, inspection and testing of sumps and related components
- PER 02-009358-000, 0-DOOR-410-C026 flood barrier door - found not latched
- Maintenance history for 0-PMP-40-003A IPS sump pump and associated assets
- Outside AUO Station Responsibilities, 1-PI-OPS-1-OS (for IPS/ERCW areas)

Section 1R07

Procedures

- TI-79.000, Generic Letter 89-13 Heat Exchanger Test Program, Rev. 8
- TI-79.001, Heat Exchanger Program, Rev. 0
- TI-79.701, Component Cooling System Heat Exchanger A Performance Test, Rev. 2
- TI-79.821, Diesel Generator 1A-A Jacket Water Cooler Performance Test. Rev. 0
- TI-50.030, Manual Valve Exercising (System 67), Rev. 8
- MI-70.002, Component Cooling Heat Exchanger Maintenance & Testing, Rev. 11
- NEDP-17, Heat Exchanger Program, Rev. 0
- AOI-15, Loss of Component Cooling Water (CCS), Rev. 23

Drawings

- 1-47W859-4, Component Cooling System, Rev. 23
- 1-47-W845-4, Essential Raw Cooling Water, Rev. 28

Problem Event Reports (PERs)

- 03-011274-000, Biocide Recirc ERCW Header 1B Isolation Valve found closed, 06/03/03
- 03-011040-000, Non-Oxidizing Biocide to ERCW Systems Failed to Kill Asiatic Clams, 05/27/03
- 02-008687-000, ERCW Strainer 2A-A Excessive Shaft Packing Leakage, 06/26/02
- 02-013555-000, DG Heat Exchanger 2B1 Has One Plug Installed When Vendor Design Does Not Currently Allow for Tube Plugging, 09/25/02
- 03-011066-000, Unconservative Fouling Factors Used in Heat Exchanger Sizing by DG Jacket Water Cooler Vendor, 05/28/03
- 02-008136-000, Monitoring of Clam Death Rate Following Chemical Injection was Performed with ERCW B Discharge Header Instead of ERCW A Discharge Header, 06/04/02
- 02-008203-000, CSS Heat Exchanger B Not Placed in Scheduled Chemical Lay-up, 06/07/03
- 02-008314-000, Plant Raw Water System Treated with Ineffective Non-Oxidizing Biocide, 06/13/02
- 03-010343-000, A-Train ERCW Equipment Did Not Receive Treated Raw Water, 05/16/03

Completed Work Orders

- 01-005100-000 & 99-015625-000, Disassembly, Inspection and Eddy Current Testing of Containment Spray Heat Exchanger 1A-A & 1B-B, completed 03/15/02 & 09/30/00
- 02-000520-000 & 01-005099-000, Disassembly, Inspection and Eddy Current Testing of Containment Cooling System Heat Exchanger C & A, completed 03/14/02 & 03/14/02
- 02-010914-000 & 00-010786-000, Annual Inspection of Shutdown Board Room Chiller, completed 09/07/02 & 03/23/01
- 02-008588-000 & 02-008589-000, Inspection of Diesel Generator Jacket Water Cooler 2B1 & 2B2, completed 03/18/03 & 03/18/03
- 02-008389-000 & 02-008388-000, Inspection of Diesel Generator Jacket Water Cooler 1B1 & 1B2, completed 03/04/03 & 03/04/03
- 02-008129-000 & 02-008130-000, Inspection of Diesel Generator Jacket Water Cooler 2A1 & 2A2, completed 02/25/03 & 02/25/03
- 02-008770-000 & 02-008771-000, Inspection of Diesel Generator Jacket Water Cooler 1A1 & 1A2, completed 03/20/03 & 03/20/03
- 011125200 & 000058700, Manual Valve Exercising (System 67), completed 03/20/02, 09/07/00
- 02-012532-000, Flush/removal of debris from CCS Surge Tank A ERCW Supply Header B Flood Mode Connection Deadleg, completed 12/06/02
- 020770400 & 020682900, ERCW Train A & B Component Flow Blockage Testing, completed 03/17/03 & 12/18/02
- 02-012534-000, Flush of Train A ERCW Piping to AFW Turbine Driven Pump Blockage
- 02-008491-000, ERCW Strainer 2A-A Temporary Shaft Packing, completed 08/09/02
- 02/008491-001, ERCW Strainer 2A-A Packing Replacement, completed 10/16/02
- 01-005101-000 & 99-007825-000, ERCW Strainer 2A-A & 2B-B Three Year Lubrication, completed 03/06/02 & 09/30/00
- 01-005108-000, Inspection and Lubrication of ERCW Strainer and Drum 1A-A, completed 03/06/02
- 99-015704-000, Inspection of ERCW Strainer and Drum 1B-B, completed 09/23/00
- 99-016757-000 & 99-016758-000, IPS Train A & B Pump Bay Inspection, completed 09/23/00 & 09/17/00

Miscellaneous

- WBN 2-2, RIMS No. W11890907800, Eddy Current Examination Report of Diesel Generator Cooler Heat Exchangers 2B1 and 2B2, 07/31/89
- Heat Exchanger Eddy Current Testing History and Long Rage Test Schedule Database for DG, CCS and CS Heat Exchangers
- Trending Data for CCS Heat Exchangers A & C Performance Testing Results, 1994-2002
- Trending Data for DG Heat Exchangers 1A-A, 1B-B, 2A-A, & 2B-B Performance Testing Results, 1997-2000

Section 1R11

- Simulator Event Guide, 3-OT-SRT0116A, Revision 0
- TRN-1, Administering Training,
- TRN-11.4, Continuing Training for Licensed Personnel

Section 1R12

- WBN Maintenance Rule Information summary
- WBN System Status Reports

Section 1R13

- PER 03-006902-000, NRC-identified problem with failure of licensee to consider isolation of one train of ERCW to TDAFW pump in their risk analysis.
- PER 03-011497-000, NRC-identified problem with MIG maintenance personnel removing temperature switch equipment cover on 1A-A DG while 2B-B DG was out of service.
- PER 03-009376-000, Licensee-identified work planning and scheduling problem regarding a pre-job brief for SSPS B train removal briefed LCO 3.3.1Q note 1 action statement as two hours for surveillance testing, actual LCO action statement was only for one hour for the maintenance activity.
- PER 03-010353-000, self-revealing problem involving failure of the A reactor trip breaker to open during surveillance testing - failure to hold test pushbutton long enough - trouble-shooting increased LCO time.

Section 1R14

- Abnormal Operating Instruction, AOI-9, Earthquake
- 0-TRI-52-10, Calibration of Kinemetrics Altus ETNA Strong Motion Sensor
- AOI-20, Malfunction of Pressurizer Level Control System
- PER 03-010882-000 Channel III, Rack 9 Eagle-21 failure

Section 1R19

- PER 03-0120170-000, licensee-identified problem - Repair 1-DRV-62-528-B (1B CCP drain valve) the valve failed the PMT based on RCS leak rate
- PER 03-012056-000, NRC-identified problem involving inadequate precautions to prevent exceeding 1100 RPM when performing an overspeed test on the 2A-A DG.

2B-B Diesel Generator 12 year PM outage

- WO 02-007295-000, Perform 12-year PM on 2B-B DG per MI-82.078
- WO 03-008364-000, DG engine 2B1 cooling water immersion heater control PM
- WO 03-002792-000, DG engine 2B2 jacket water outlet high temperature alarm PM
- WO 03-002796-000, DG engine 2B2 jacket water high temperature shutdown PM
- WO 03-010997-001, Replace rubber guards on 2B-B DG disconnect switch
- PER 03-010995-000, NRC-identified problem of damaged/missing rubber guards on DG disconnect switches

- PER 03-011646-000, a licensee-identified problem of failure to review all DG outage work packages to ensure specific plant conditions were identified for PMTs as opposed to a generic requirement of normal operating temperature/pressure
- WO 02-011443-003, 2B-B DG speed setting governor
- WO 02-008555-000, 2B-B DG electrical inspection
- WO 03-005770-000, Install new valve on 2B2 DG air start system
- WO 01-013439-000, Repair oil leak on 2B-B DG at oil scavenging pump disch. piping
- WO 01-002469-000, Rebuild check valve on 2B2 DG air start system
- WO 01-001704-000, Inspect air start check valve on 2B1 tank A
- WO 02-007295-003, Replace 2B1 DG engine lube oil cooler
- WO 02-007295-005, Replace 2B2 DG engine lube oil cooler
- 0-SI-82-20-B, 184-Day Fast Start and Load Test DG 2B-B
- TI-50.045, 2B-B Diesel Starting Air System Quarterly Check Valve Test

Section 4OA1

- PER 03-011933-000, NRC-identified problem involving inaccurate data reporting for RCS identified leakage
- PER 03-011954-000, NRC-identified problem involving inaccurate data reporting for RCS specific activity