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

May 25, 2004

Carolina Power & Light Company
ATTN: Mr. James Scarola
Vice President - Harris Plant
Shearon Harris Nuclear Power Plant
P. O. Box 165, Mail Code: Zone 1
New Hill, NC 27562-0165

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT - NRC PLANT DESIGN - PILOT INSPECTION REPORT NO. 05000400/2004007

Dear Mr. Scarola:

On April 16, 2004, the Nuclear Regulatory Commission (NRC) completed a pilot, plant design inspection at your Shearon Harris reactor facility. The enclosed report documents the inspection findings which were discussed on April 16, 2004, with you and other members of your staff.

This inspection was an examination of 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 operating license. Within these areas, the inspection involved selected examination of procedures and representative records, observations of activities, and interviews with personnel.

Based on the results of the inspection, no findings of significance were identified.

In accordance with 10 CFR 2.390 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 Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Charles R. Ogle, Chief
Engineering Branch 1
Division of Reactor Safety

Docket No.: 50-400
License No.: NPF-63

Enclosure: (See page 2)

Enclosure: NRC Inspection Report No. 05000400/2004007
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-400
License No.:	NPF-63
Report No.:	05000400/2004007
Licensee:	Carolina Power & Light Company
Facility:	Shearon Harris Nuclear Power Plant, Unit 1
Location:	5413 Shearon Harris Road New Hill, NC 27562
Dates:	March 22-26, 2004 April 12-16, 2004
Inspectors:	J. Moorman, Senior Reactor Inspector (Lead Inspector) G. Hopper, Senior Operator Licensing Examiner N. Merriweather, Senior Reactor Inspector M. Scott, Senior Reactor Inspector (Week 1 only) K. VanDoorn, Senior Reactor Inspector (Week 1 only) R. Cortes, Reactor Inspector S. Rudisail, Reactor Inspector
Accompanied by:	C. Ogle, Chief, Engineering Branch 1 N. Staples, Reactor Inspector Intern R. Rodriguez, Reactor Inspector Intern
Approved by:	Charles R. Ogle, Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000400/2004007; 03/22-26/2004 and 04/12-16/2004; Shearon Harris Nuclear Power Plant, Unit 1; Plant Design - Pilot, Enclosures 1, 2, and 3.

This inspection was conducted by a team of regional inspectors. No findings of significance were identified. 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. NRC-Identified and Self-Revealing Findings

No findings of significance were identified.

B. Licensee-Identified Violations

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems and Barrier Integrity

1R.DS Plant Design - Pilot (71111.DS)

1R.DS1 Safety System Design and Performance Capability (71111.DS, Enclosure 1)

This team inspection reviewed selected components and operator actions that would be used to prevent or mitigate the consequences of a steam generator tube rupture (SGTR) event. Components in the main steam (MS) system, auxiliary feedwater (AFW) system, steam generator (SG) blowdown system, chemical and volume control system (CVCS), reactor coolant system (RCS), safety injection (SI) system, and radiation monitoring system were included. This inspection also examined supporting equipment, equipment which provides power to these components, and the associated instrumentation and controls. The SGTR event is a risk-significant event as determined by the licensee's probabilistic risk assessment.

.1 System Needs

.11 Process Medium

a. Inspection Scope

The team reviewed the AFW and high head safety injection (HHSI) net positive suction head and water source calculations, operating/lineup procedures, drawings, licensing and design basis information, surveillance procedures, and vendor manuals. The review included the ability of the steam generator power operated relief valves (PORVs) to support RCS cooldown, and the ability of the HHSI pumps to provide cooling of the RCS. The review also included the refueling water storage tank (RWST) with emphasis on post-accident make-up capability, the condensate storage tank (CST), including minimum-flow flowpaths for AFW and HHSI pumps and vortexing considerations. The team also conducted field walkdowns of the systems in the plant to verify that system design, Technical Specifications (TS), and Updated Final Safety Analysis Report (UFSAR) assumptions were consistent with the actual capability of systems and equipment required to mitigate an SGTR event.

b. Findings

No findings of significance were identified.

.12 Energy Sources

a. Inspection Scope

The team walked down the energy sources of selected components to verify that selected portions of the systems alignment were consistent with the design basis assumptions, performance requirements, and system operating procedures. The team reviewed valve lineup procedures for the steam supply to the turbine-driven AFW pump and the sources of air for air operated valves (AOVs) such as the pressurizer PORVs. The team also reviewed the testing and maintenance history for these AOVs to assess the reliability and availability of alternate air sources.

The team reviewed voltage drop calculations for a sample of safety-related loads such as motors, valve operators, inverters, and radiation monitors to verify that adequate voltage would be available at the end device during worst case minimum grid operating voltage conditions. The team also reviewed surveillance records on breaker alignment checks and bus voltage readings to verify that these checks were being performed in accordance with the requirements specified in the TS. The calculations reviewed are listed in the Attachment. The specific components reviewed are listed below:

- AFW pump motors
- SI pump motors
- Vital Inverters
- 125 volts direct current (VDC) batteries
- Battery chargers
- 6.9 Kilo-Volt (kV) switchgear

b. Findings

No findings of significance were identified.

.13 Instrumentation and Controls

a. Inspection Scope

The team examined, on a sample basis, instrumentation and indication that are used by operators for detection of primary to secondary leakage and an SGTR event, as well as selected control circuits used for SGTR event mitigation. Instrumentation identified for detection of an SGTR event included the main steam line radiation monitors (on each of 3 main steam lines), liquid radiation monitor assembly (i.e., steam generator blowdown), condensor vacuum pump effluent treatment system radiation monitor, and SG narrow range level instruments. Instruments and indications used by operators for mitigation of the event included condensate storage tank level, refueling water storage tank level, and SG narrow range level. For these instruments, the team reviewed the SGTR accident analysis, instrument loop drawings, scaling calculations, surveillance calibration test procedures, annunciator response procedures, and other design documents

establishing the basis for calibration and alarm setpoints, to confirm that the calibration, setpoints, and emergency operating procedures were consistent with the design and licensing basis.

For controls used in SGTR mitigation, the team reviewed various electrical drawings of the control circuits for the steam generator PORVs, the pressurizer PORVs, auxiliary feedwater flow control valves, and the automatic initiation and shutdown controls (including low suction pressure trip instrumentation) for the motor driven and turbine driven auxiliary feedwater pumps to confirm that the control circuits implemented the functional logic requirements described by the design basis documents.

b. Findings

No findings of significance were identified.

.14 Operator Actions

a. Inspection Scope

The team reviewed plant operating procedures (OPs), emergency operating procedures (EOPs), abnormal operating procedures (APs), and annunciator response procedures that would be used in the identification and mitigation of an SGTR event. Specific procedures reviewed are included in the Attachment to this report.

The review was done to verify that the procedures were consistent with the UFSAR description of an SGTR event and with the Westinghouse Owners Group Emergency Response Guidelines, including the periodic updates. In addition, the team compared the procedural requirements against the EPRI guidelines requiring early action for plant shutdown after leak detection. The team reviewed step deviation justifications and compared each step against the requirements of Procedure OMM-006, “Emergency Operating Procedure Writer’s Guide” to verify that procedures were written clearly and unambiguously. The team conducted discussions with licensed operators and reviewed job performance measures and training documents pertaining to an SGTR event to ensure that training was consistent with the procedures.

In addition, the team observed a simulation of an SGTR event on the plant simulator to verify that operator training, procedural guidance, and instrumentation were adequate to identify an SGTR event and implement post-event mitigation strategies. The operator action times for performance of SGTR event mitigation activities were observed and compared against those stated in the UFSAR accident analyses for steam generator overfill.

The team also conducted plant walkdown inspections for selected local operator actions to verify that the installed configuration and system alignments were consistent with design basis assumptions and procedural guidance. These actions included local manual isolation of a stuck open atmospheric dump valve, refilling the reactor water

storage tank with borated water, local operation of an atmospheric dump valve, and auxiliary feedwater lineup.

b. Findings

No findings of significance were identified.

.15 Heat Removal

a. Inspection Scope

The team reviewed design calculations, drawings, and surveillance and test procedures for selected equipment to assess the reliability and availability of equipment used to provide cooling for the HHSI pumps and AFW pumps. The team conducted field walkdowns of the equipment to verify that operating conditions were consistent with design assumptions. The equipment reviewed was reviewed to verify that there was adequate cooling for these pumps at both full and minimum flow conditions. The team also verified design calculations, machinery history, and heat transfer removal capability for the HHSI pump room air handling units to ensure adequate room cooling during design basis events.

b. Findings

No findings of significance were identified.

.2 System Condition and Capability

.21 Installed Configuration

a. Inspection Scope

The team performed field walkdowns of selected components in the HHSI, AFW, MS, service water and emergency service water (ESW) systems to assess observable material condition and the installed configuration of components. This review was also conducted to verify that selected valves and components in these systems were in their required position and that the configuration was consistent with design drawings. The team reviewed action requests on foreign material exclusion and on the CST bladder with emphasis on possible bladder material deterioration and other failure mechanisms that could lead to obstruction the AFW pump suction.

The team reviewed design drawings and walked down the accessible portions of the main steam line monitors, the liquid radiation monitor assembly (SG blowdown), and the condenser vacuum pump effluent treatment system radiation monitor, to confirm that the instrument configurations were installed consistent with the plant design. The team specifically sought to verify that the radiation detector locations, power supplies, as well as, control room indicators, annunciators, and setpoints, were consistent with design

drawings and the UFSAR description of the radiation monitor channels. The team performed field walkdowns and/or reviewed the design drawings to verify that the taps for the RWST and CST level instruments were located so as to preclude adverse velocity effects on the process measurement. In addition, the team visually inspected the routing of the tubing and measured the installed elevations of the CST level and AFW suction pressure transmitters to verify that the instruments were located consistent with design drawings as well as scaling and setpoint calculations.

The team also performed field inspections of portions of the Class 1E electrical distribution system; including the 6900 volts alternating current (VAC) switchgear, 480 VAC load centers, 480 VAC motor control centers, and 125 VDC batteries, chargers, and panels. The purpose of the inspections was to assess general material condition, verify that system alignments were consistent with design and licensing basis assumptions, and to identify degraded conditions of SGTR mitigation equipment.

b. Findings

No findings of significance were identified.

.22 Operation

a. Inspection Scope

The team performed field walkdowns of selected components specified in the SGTR EOP for which local operation or main control room operation was required to verify that operators could adequately determine component status and that the components could be operated under conditions that would exist during an SGTR event. These components included the turbine driven AFW steam supply motor operated valve (MOV), and the SG PORVs. Another aspect that was reviewed was post-accident RWST make-up capability using the CVCS. The team reviewed machinery history and performed field walkdowns of the boric acid transfer pumps, the make-up water pumps and selected valves located between the boric acid tank and reactor makeup water storage tank to the RWST to verify that operators could adequately operate the system during an SGTR event.

b. Findings

No findings of significance were identified.

.23 Design

a. Inspection Scope

Mechanical Design

The team reviewed vendor manuals for the HHSI and AFW pumps, vendor manuals for selected flow control valves, the UFSAR, and the TS to verify that vendor recommendations and licensing basis requirements had been appropriately translated into design calculations and surveillance requirements. The team also reviewed the design of the AFW flow control valves and minimum-flow lines to determine if operating experience items were applicable to this design. In addition, net positive suction head calculations and head curve data for both the AFW and HHSI pumps were reviewed to verify that adequate water levels were available in the CST and RWST. Vortexing considerations were also reviewed.

The team reviewed records of preventive maintenance and performed field walkdowns of selected components in the HHSI, CVCS, ESW, MS, and AFW systems to verify that these activities were maintaining the assumptions of the licensing and design bases. During these reviews, the team focused on potential common mode failure vulnerabilities that could be introduced by design or maintenance activities.

Instrumentation and Controls Design

The team reviewed instrument detail drawings showing installed transmitter and sensing line elevations, process instrumentation control scaling calculations, and level setpoint calculations of the CST, RWST, AFW suction pressure instrument channels to determine if the setpoints for the level alarms and interlocks (e.g., high, low, low-low, and empty RWST tank levels) were correctly established to meet technical specifications and the design performance requirements of the system. In addition, the surveillance and calibration test procedures and test records were reviewed for the above instruments to verify that they specified setpoints consistent with the results of the setpoint calculations or applicable scaling documents. The team also reviewed a sample of replacement part evaluations involving both commercial grade and safety-related parts to determine if appropriate critical attributes were identified and appropriately addressed in the evaluations.

Electrical

The team reviewed records of completed design changes, corrective maintenance, and preventive maintenance; and walked down selected components of the AFW, SI, 6900 VAC, 125 VDC and 120 VAC systems to verify that these activities were maintaining the assumptions of the licensing and design bases. During these reviews, the team focused on potential common mode failure vulnerabilities that could be introduced by design or maintenance activities.

b. Findings

No findings of significance were identified.

.24 Testing and Inspection

a. Inspection Scope

The team reviewed records of preventive maintenance, maintenance history, surveillance tests, inspections, and performed field walkdowns of selected components in the RCS, HHSI, CVCS, AFW and MS systems to verify that the tests and inspections were appropriately verifying that the assumptions of the licensing and design bases were being maintained. This review included testing of HHSI and AFW pump discharge pressures and flowrates during full and recirculation flow conditions, MOV torque and limit switch settings, relief valve pressure set point opening, check valve operation; and analysis of pump bearing oil and vibration. A more detailed list of the components reviewed is provided in the Attachment.

The team reviewed calibration test records and/or channel operational tests for the following instrument channels:

- main steam line radiation monitor
- SG blowdown radiation monitor
- condenser vacuum pump radiation monitor
- CST level
- RWST level
- AFW slave relays
- AFW suction pressure transmitters
- AFW time delay relays

The calibration test records were reviewed to confirm that test acceptance criteria were satisfied or that appropriate corrective actions had been taken.

The team reviewed records of completed surveillance tests, performance tests, inspections, and predictive maintenance; and walked down selected components of the SI, AFW, 125 VDC, 6900 VAC systems to verify that the tests and inspections were appropriately verifying that the assumptions of the licensing and design bases were being maintained.

The team reviewed the surveillance testing and test records for the 125 VDC batteries to verify that the battery capacity was adequate to supply and maintain in operable status, the required emergency loads for the design basis duty cycle.

b. Findings

No findings of significance were identified.

.3 Selected Components

.31 Component Degradation

a. Inspection Scope

The team reviewed systems with Maintenance Rule functional failures, maintenance records, action requests, and performance trending of selected components in the RCS, HHSI, ESW, AFW, MS, demineralizer water, boric acid transfer and instrument air (IA) systems to verify that components that were relied upon to mitigate an SGTR event were not degrading to unacceptable performance levels. Among the selected components were safety reliefs, AOVs, MOVs, manual valves, check valves, room coolers and pumps. A more detailed list of components reviewed is provided in the Attachment.

The team conducted plant walkdowns and reviewed drawings of the turbine driven AFW steam supply piping to verify the inclusion of steam drains that would prevent water accumulation in the piping. The team also performed walkdowns to assess the observable material condition of the components shown in the Attachment.

The team visually inspected the as-built configuration of the condenser vacuum pump effluent radiation monitor, SG blowdown radiation monitor, CST level, and AFW suction pressure transmitters to confirm that the visible material condition of the impulse lines, instruments, supports, and connections was adequate with no components degraded (e.g., rusting, missing parts, or leaking fluids). The team also confirmed that the instruments were physically separated from redundant channels.

The team reviewed the maintenance history for the electrical components listed below to determine their current performance capability to mitigate an SGTR event.

- AFW pump motor breakers
- 125 VDC batteries
- 125 VDC battery chargers
- vital inverters

Specifically the team reviewed:

- each component's maintenance history by reviewing selected corrective-maintenance and preventive-maintenance work order summaries and trends of component performance data, to verify that unexpected degradation had not been found, and that performance problems had not reappeared; and

- each component's preventive-maintenance schedule, to verify that the schedule was based either on vendor recommendations or appropriate industry experience.

b. Findings

No findings of significance were identified.

.32 Equipment/Environmental Qualification

a. Inspection Scope

The team reviewed environmental qualification requirements in the vendor manuals for major components in the AFW, MS, and HHSI systems. The team then performed field walkdowns of the components to assess suitability of the environment in terms of temperature and humidity anticipated under accident conditions, including high energy line breaks.

The team reviewed preventive maintenance records for selected Class 1E electrical equipment to verify that environmental qualification requirements were being implemented during mentioned activities. Specifically, while reviewing calibration procedures for steam generator level transmitters included in the licensee's environmental qualification program, the team confirmed that appropriate requirements were included for replacement of O-ring seals as required to maintain qualification.

In addition, the team reviewed preventive maintenance records for the main steam radiation monitors (i.e., Work Orders 0018037001, 0018036901, and 0018235201) in order to verify that the batteries were being or had been replaced within the 4.5 year replacement frequency required by the PM program and vendor recommendations.

b. Findings

No findings of significance were identified.

.33 Equipment Protection

a. Inspection Scope

The team performed field walkdowns of selected components in the HHSI, MS, AFW, CVCS and service water systems to verify that the components were adequately protected from potential effects of missiles, flooding, high winds and high or low outdoor temperatures.

The team visually inspected the main steam radiation monitors, condenser vacuum pump radiation monitor, and steam generator blowdown radiation monitor to confirm that the instruments and connections were not vulnerable to the effects of design basis events for which they were credited to be functional, including the effects of extreme ambient temperatures and background dose rates.

In addition to the above, the team reviewed the equipment specifications for the SG PORVs, pressurizer PORVs, RWST level, CST level, SG narrow range level, and AFW suction pressure transmitters to verify the design was adequate for anticipated ambient conditions and system application.

b. Findings

No findings of significance were identified.

.34 Loose Parts Monitoring

a. Inspection Scope

The team reviewed historical records on the operational performance of the digital metal impact monitoring system (DMIMS) to assess whether the system was operational and was being used by the licensee to monitor for loose parts in the reactor coolant system and steam generators consistent with the licensing and design basis for the plant. Specifically, the team reviewed documentation demonstrating that the system had been tested and calibrated in accordance with the surveillance test program. The team also reviewed an Alarm Event Summary of the DMIMS, an Action Request, and an Action Plan (Rev.0) as well as the results from SG “C” secondary side tubesheet inspection to determine if alarms previously received on SG “C” DMIMS Channels 758 and 759 were properly evaluated by the licensee to determine the significance on plant operation.

b. Findings

No findings of significance were identified.

.35 Operating Experience

a. Inspection Scope

The team reviewed the licensee’s applicability evaluations and corrective actions for industry experience issues related to radiation monitors and SG level uncertainties. The specific documents reviewed are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.4 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed a sample of Action Requests as well as corrective maintenance work order records initiated over the past three years, to confirm that the licensee was

adequately identifying, evaluating, and dispositioning adverse conditions. The specific documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R.DS2 Permanent Plant Modifications (71111.DS, Enclosure 2)

a. Inspection Scope

The team evaluated design change packages for eight modifications, in all three cornerstone areas, to verify that the modifications did not degrade system availability, reliability, or functional capability. The team reviewed attributes such as: energy requirements can be supplied by supporting systems; materials and replacement components were compatible with physical interfaces; replacement components were seismically qualified for application; Code and safety classification of replacement system, structures, and components were consistent with design bases; modification design assumptions were appropriate; post-modification testing established operability; failure modes introduced by the modification were bounded by existing analyses; and appropriate procedures or procedure changes had been initiated. For selected modification packages, the team reviewed the as-built configuration to verify that it was consistent with the design documentation.

Documents reviewed included procedures, engineering calculations, modification packages, work orders, site drawings, corrective action documents, applicable sections of the UFSAR, supporting analyses, TS, and design basis documentation. The samples reviewed are listed below:

- ESR 00-00322, Component Cooling Water System Design Pressure Increase
- ESR 00-00197, AFW Substitution and Relocation Evaluation
- ESR 01-00014, Ground Detector Relay Replacement for TDAFW
- EC 52543, MSIV Damaged Threads
- EC 48993, ECCS High Point Vent Installations
- ESR 00-00336, Motor Replacement for MOVs 1AF-55, 74, and 93
- ESR 01-00061, PORV Block Valve Fuse Coordination
- ESR 01-0013, Temporary Modification Affecting Switchover to ACP

The team also reviewed selected Action Requests (ARs) to confirm that problems were identified at the appropriate threshold, were entered into the corrective action program, and appropriate corrective actions had been initiated. These documents are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R.DS3 10 CFR 50.59 Safety Evaluations (71111.DS, Enclosure 3)

a. Inspection Scope

The team reviewed selected samples of evaluations to verify that the licensee had appropriately considered the conditions under which changes to the facility or procedures may be made, and tests conducted, without prior NRC approval. The team reviewed evaluations for six changes. The team verified, through review of additional information, such as calculations, supporting analyses and drawings that the licensee had appropriately concluded that the changes could be accomplished without obtaining a license amendment. The six evaluations reviewed are listed below:

- ESR 00-00322, Component Cooling Water System Design Pressure Increase
- ESR 01-00014, Ground Dectector Relay Replacement for TDAFW
- ESR 00-00294, PORV Cycling During SGTR
- ESR 01-00087, Chemical and Volume Control System Recirculation Flow Path Change
- ESR 01-00005, RCP Standpipe Alarms
- Evaluation No. 01-0013, Temporary Modification affecting Switchover to ACP

The team also reviewed samples of design and engineering packages and procedure changes for which the licensee had determined that evaluations were not required. This review was performed to verify that the licensee's conclusions to "screen out" these changes were correct and consistent with 10 CFR 50.59. The ten "screened out" changes reviewed are listed below:

- ESR 01-00197, AFW Substitution and Relocation Evaluation
- Emergency Operating Procedure PATH-1, Rev. 14
- Emergency Operating Procedure PATH-2, Rev. 13
- ESR 00-00336; Motor Replacement for MOVs 1AF-55, 74, and 93
- ESR 01-00061, PORV Block Valve Fuse Coordination
- EC 51918, Service Water Booster Pump B Annunciator Relay Causes Blowdown Relays to Cycle
- EC 52295, Update of Calculation for Degraded Voltage Relay Tolerance
- Abnormal Operating Procedure 004, Remote Shutdown, Rev. 28
- EC 52543, MSIV Damaged Threads
- EC 48993, ECCS High Point Vent Installations

The team also reviewed the results of a recent self-assessment report (57664; Processing of Changes, Tests, and Experiments) of engineering activities and ARs related to the 10 CFR 50.59 process, to confirm that problems were identified at the appropriate threshold, were entered in the corrective action process, and appropriate corrective actions had been initiated. The ARs are listed in the Attachment.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Meetings, Including Exit

The lead inspector presented the inspection results to Mr. J. Scarola, and other members of the licensee staff, at an exit meeting on April 16, 2004. The licensee acknowledged the findings presented. Proprietary information is not included in this inspection report.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

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J. Caves, Supervisor, Licensing
F. Dean, Senior Engineer
F. Diya, Engineering Manager
J. Dufner, Supervisor, Reactor Support
W. Gurganious, Manager, Nuclear Assessment
C. Hemming, Senior Engineer
I. LaCross, Senior Engineer
E. McCartney, Training Manager
M. Moss, Supervisor, Radiation Protection
R. Mullis, PES Assessor
S. O'Connor, Superintendent, Design Engineering
W. Ponder, Lead Engineer
M. Robinson, Superintendent, Chemistry
J. Scarola, Site Vice-President
M. Wallace, Senior Specialist, Licensing
M. Weber, Superintendent, Operations Support
J. Yadusky, Lead Licensing Engineer

NRC (attended exit meeting)

C. Ogle, Chief, Engineering Branch 1, Division of Reactor Safety
R. Musser, Senior Resident Inspector
P. O'Bryan, Resident Inspector

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

None.

Attachment

LIST OF DOCUMENTS REVIEWED

Instructions/Procedures

OMM-006 , Emergency Operating Procedure Writer's Guide
OMM-020 , Emergency Operating Procedure Verification and Validation Program
OMM-021, Maintenance of Emergency Operating Procedures
OMM-027, AOP User's Guide
OMM-028, AOP Writer's Guide
AOP-016, Excessive Primary Plant Leakage
EOP-EPP-014, Faulted Steam Generator Isolation
EOP-EPP-017, Post-SGTR Cooldown Using Backfill
EOP-EPP-020, SGTR With Loss of Reactor Coolant: Subcooled Recovery
EOP-EPP-021, SGTR With Loss of Reactor Coolant: Saturated Recovery
EOP-EPP-022, SGTR Without Pressurizer Pressure Control
EOP-Guide-2, Path-2 Guide
EOP-Path-1, Path-1
EOP-Path-2, Path-2
EOP-Users Guide
OP-107, Chemical and Volume Control System Section 8.7
OST -1011, Auxiliary Feedwater System Operability Test
OST - 1076, Auxiliary Feedwater Pump 1B-SB Operability Test Quarterly Interval Modes 1-4

Plant Specific Technical Guidelines Documents

SDD-Path-1, ERG/EOP Transition Document Part 5 Step Deviation Document Path-1
SDD-Path-2, ERG/EOP Transition Document Part 5 Step Deviation Document Path-2

Training Material

Isolate Ruptured Steam Generator (JPM-CR-104R6)
Isolate Ruptured SG – MSIV Will Not Close (JPM-CR-105R6)
Estimate Primary to Secondary Leakage (JPM-CR-143R5)
SGTR Without Pressurizer Pressure Control (JPM-CR-150R4)Ruptured SG Steam Release Path Isolation – In-Plant Actions (JPM-IP-113R5)
EOP-SIM-17.67, Exercise Guide FSAR Basis SGTR

Drawings

CAR 2166-B-041, Unit No. 1 Power Distribution and Motor Data
CAR 2166-B-401, Control Wiring Diagram Main Steam Line Radiation Monitors
CAR 2166-G-042S01, 250 VDC, 125VDC, and 120 V Uninterruptible AC One Line Diagram
CAR 2166-G-029, Main & 6900 Volt Auxiliary One Line Diagram
CAR 2166-G-030, 480 Volt Auxiliary One Line Diagram
1364-49706R2, Orifice Assembly, Rev. 7
1364-007776, 3" 900 LB. BE CS Valve 3AF-F4, F5, F6 w/ Hydromotor Actuator, Rev. 4

CPL-2165-S-0542, Simplified Flow Diagram Main Steam System, Rev. 24
CPL-2165-S-0544, Simplified Flow Diagram Feedwater System Unit 1, Rev. 39
CPL-2165-S-0544, Simplified Flow Diagram Feedwater System (Sheet 02), Rev.1
CPL-2165-S-0545, Simplified Flow Diagram Condensate & Air Evacuation System, Rev. 52
CPL-2165-S-0547, Simplified Flow Diagram Circulating & Service Water System, Rev. 38
CPL-2165-S-799, Simplified Flow Diagram Primary & Demineralizer Water System, Rev. 11
CPL-2165-S-801, Simplified Flow Diagram Instrument Air System, Rev. 34
CPL-2165-S-1300, Simplified Flow Diagram Reactor Coolant System (Sheet 01), Rev. 22
CPL-2165-S-1301, Simplified Flow Diagram Reactor Coolant System (Sheet 02), Rev. 9
CPL-2165-S-1303, Simplified Flow Diagram Chemical and Volume Control System, Rev. 9
CPL-2165-S-1303, Simplified Flow Diagram Chemical and Volume Control System (Sheet 01), Rev. 3
CPL-2165-S-1303, Simplified Flow Diagram Chemical and Volume Control System (Sheet 02), Rev. 3
CPL-2165-S-1304, Simplified Flow Diagram Chemical and Volume Control System (Sheet 02), Rev. 12
CPL-2165-S-1305, Simplified Flow Diagram Chemical and Volume Control System, Rev. 21
CPL-2165-S-1307, Simplified Flow Diagram Chemical and Volume Control System, Rev. 7
CPL-2165-S-1309, Simplified Flow Diagram Safety Injection System (Sheet 02), Rev. 17
CPL-2165-S-1310, Simplified Flow Diagram Safety Injection System (Sheet 03), Rev. 12
CPL-2165-S-1324, Simplified Flow Diagram Residual Heat Removal, Rev. 11
CPL-2165-S-0998, HVAC-Essential Services-Chilled Water Distribution Unit 1-SA, Rev. 5
CPL-2165-S-0998, HVAC-Essential Services-Chilled Water Details Unit 1-SA (Sheet 03), Rev. 9
CPL-2165-S-0998, HVAC-Essential Services-Chilled Water Details Unit 1-SA (Sheet 04), Rev. 6
CPL-2165-S-0999, HVAC-Essential Services-Chilled Water Distribution Unit 1-SB, Rev. 4
CPL-2165-S-0999, HVAC-Essential Services-Chilled Water Condenser Unit 1-SB (Sheet 02), Rev. 20
CPL-2165-S-0999, HVAC-Essential Services-Chilled Water Details Unit 1-SB (Sheet 03), Rev. 8
CPL-2165-S-0999, HVAC-Essential Services-Chilled Water Details Unit 1-SB (Sheet 04), Rev. 6

Calculations

Calculation No. E4-0008, 125 VDC 1E Battery Sizing and Battery/Panel Voltages for Station Blackout, Revision 4
Calculation No. E4-0006, Safety Batteries 1A-SA & 1B-SB Load Profile Determination LOCA/SBO, Revision 1
Calculation No. E4-0012, 125 VDC 1E Battery Sizing and Battery/Panel Voltages for LOCA, Revision 2
Calculation No. E5, Analysis of Motor Output Torque for AC Motor Operated Valves, Revision 7
Calculation No. E-6000, Auxiliary System Load Study, Revision 8
Calculation No. E2-0005.09, Degraded Grid Voltage Protection for 6.9 KV Busses 1A-SA &1B-SB, Revision 2
HR/00-085, CVCS BAT/RWST Inventory Requirements, RRW-017 Data Request
NSSS-41, Boric Acid and RWST Tank - Technical Specifications Data, Rev. 1
NSSS-49, Accumulator Pressure versus Valve Cycles for Pressurizer PORV Accumulator Tanks 1A-SA and 1C-SB, Rev. 1
NSSS-52, PORV Operability for a SGTR Event, Rev. 0

EQS-02, Refueling Water Storage Tank Level Setpoint, Rev. 7
EQS-03, Condensate Storage Tank Level Setpoints, Rev. 6
CT-30, Containment Spray Switchover Calculation, Rev. 4
SD-17, Containment Sump Screen Design Velocity, Rev. 1
AF-13, Auxiliary Feedwater Verification & Setpoints, Rev. 2
AF-14Ro, Turbine Driven AFWPS - Mini Flow Line Orifice Sizing, Rev. 0
AF-15Ro, Motor Driven AFWPS SA/SB - Mini Flow Line Orifice Sizing, Rev. 0
MS-41, MS Safety Valves, Rev. 1
SI-0049, Minimum Net Positive Suction Head for Charging/SI Pumps, Rev. 0
SD-18, Containment Sump Vortex Prevention Calculation, Rev. 0
9-RAB-7CP, Charging Pump Area, El. 236.00', Served by AH-9 and AH-10, Rev. 1
Tank-14, Condensate Storage Tank Minimum Water Level, Rev. 4
Tank-16, Head Requirement to Prevent Vortex in RWST, Rev. 0
Tank-20, CST Minimum Useable and Maximum Required Inventory Analysis, Rev. 1

Completed Work Orders (WOs) and Work Requests (WRs)

00329763 01,MST-E00027, 1E Battery Cell Connection Resistance and Service Test 1A-SA
00192559 0, MST-E00027, 1E Battery Cell Connection Resistance and Service Test 1A-SB
00186004 01, PM-E0028, NonClass 1E Station Battery Performance Test, 125 VDC Station Battery Bank 1A
00185995 01, PM-E0028, NonClass 1E Station Battery Performance Test, 250 VDC Station Battery Bank 1A
00104649 01, PM-E0005, Inspect, Clean, 6.9 KV Safety Injection Charging Pump Breaker 1B-SB
00100502 01, PM-E0005, Inspect, Clean, 6.9 KV Safety Injection Charging Pump Breaker 1A-SA
00100094 01, PM-E0005, Inspect, Clean, 6.9 KV Safety Injection Charging Pump Breaker 1CB-SAB
Work Request No. AJKQ 002, 6.9 KV 1200/2000 Amp Air Circuit Breaker PM for AFW Pump 1A-SA
00100193 01, 6.9 KV 1200/2000 Amp Air Circuit Breaker PM for AFW Pump 1A-SB
WR No. APRD 001, MST-E006, 480 VAC Molded Case Circuit Breaker Test
00210107, RFO-11, MS SRV 1MS-56 leaking by seat, support Furmanite in repair, 04/22/03
00210108, RFO-11, MS SRV 1MS-50 leaking by seat, support Furmanite in repair, 04/22/03
00210109, MS SRV 1MS-47 leaking by seat, support Furmanite in repair, 04/22/03
00394988, 1MS-45 audible evidence of leak, support Furmanite in repair, 04/22/03
00409206, 1MS-58 will not work in auto from the MCB M/A station, 05/16/03

Surveillance Test Procedures

TMM-406, Analysis of MOV Diagnostic Data (Attachment 1), Rev. 8
TMM-406, Rising Stem Static Test Analysis (Attachment 10.1), Rev. 10
MMM-035, Analysis of MOV Diagnostic Data (Attachment 1), Rev. 0
MMP-004, Installation of Pipe Supports, Rev. 17
EST-223, Insitu Main Steam Safety Valve Test Using Assist Device, Rev. 10

PM-I0054, Diagnostic Test Data (pages 24 thru 29), Rev. 3
OST-1007, CVCS/SI System Operability Train "A" Quarterly Interval Modes 1-4, Rev. 23
OST-1017, Pressurizer PORV Block Valve Full Stroke Test Quarterly Interval Modes 1-2-3-4, Rev. 14
OST-1046, Main Steam Isolation Valve Operability Test Quarterly Interval Modes 3-5, Rev. 9
OST-1808, Main Steam Isolation: ESF Response Time 18 Month Interval Modes 3-5, Rev. 10
OP-107, CVCS Valve Lineup (pages 189 thru 220), Rev. 22
OP-110, Safety Injection System Valve Lineup Checklist (pages 52 thru 87), Rev. 22
OP-137, AFW System Valve/Switch Lineup Checklist (pages 47 thru 58), Rev. 22

Action Requests (ARs)

052640, Foreign material found in service water supply line to the TDAFW
053461, TDAFW controller setpoint determined per EST-230
054291, S/G safety valve leakage
054786, "C" CSIP speed increaser high particle count
055010, "B" CSIP oil results revealed high particle counts
055727, RM-11-4 inoperable and will not re-boot
056692, High particle counts on the "C" CSIP pump and speed increaser
059893, RWST inventory loss
060965, PRT level increase
061057, PORV functional failures during RFO-10
062522, High oil particle counts on the "B" CSIP pump
064023, "A" S/G PORV inoperable due to hydraulic fluid leak
076746, "A-SA" ESW screenwash pump differential pressure low
082164, RWST inventory loss
085951, S/G safety relief valve maintenance rule monitoring
089441, Inappropriate closure of significant adverse AR (AR 56692)
092685, S/G upper lateral support loose bolting
093097, Loose steam generator support bolts
093985, Seven MSSV(s) leaking
096163, Elevated temperatures in the AFW piping to the "A" S/G
101909, TDAFW pump speed indication failure
102167, Evaluate "B" SG PORV response following the 8/17/03 Rx Trip
104969, Low DP on "A" ESW booster pump
105354, "B" CSIP operating near its minimum full flow limit
109760, TDAFW pump tripped on over speed during OST-1411
111775, Degrading trend on "B" ESW Pump DP
113182, "A" SG PORV initial stroke time outside code criteria

Design Basis Documents

Design Basis Document No. DBD-100, Reactor Coolant System, Rev. 7
Design Basis Document No. DBD-104, Safety Injection System, Rev. 7
Design Basis Document No. DBD-105, Residual Heat Removal System, Rev. 8
Design Basis Document No. DBD-111, Metal Impact Monitoring (MIM) System, Rev. 1

Design Basis Document No. DBD-125, Steam Generator, Main Steam, Extraction Steam, Steam Dump and Auxiliary Steam Systems, Rev. 5
Design Basis Document No. DBD-131, Component Cooling Water System, Rev. 9
Design Basis Document No. DBD-133, Compressed Air System, Rev. 9

UFSAR

Section 9.3, Process Auxiliaries
Section 15.6.3, Steam Generator Tube Rupture
Section 15.6.3 Figures

Condition Reports Written Due To This Inspection

124241 - Pressurizer accumulator alarm setpoint is inconsistent with the SGTR analyzed PORV minimum supply pressure
124227 – OST-1805, Section 7.5 Acceptance criteria. There are past performances when a negative leak rate was documented and accepted.
122613 – Incorrect number in FSAR Section 9.3.2-1 regarding the number of pressurizer PORV valve strokes necessary for steam generator tube rupture event mitigation.
123209 – Annunciator response procedure ALB-15, Window 5-4 references an incorrect device tag number.
124435 - AOP-16 improvement item
124439 - Main steam line radiation monitor shine
124440 - EOP human factor improvement

Miscellaneous Documents

SD-CH3000 2/91, MDAFW Pump Flow Control Valves Vendor Manual (pages 10 and 11)
CAR-SH-BE-08, Ebasco Specification Air Handling Units, Rev. 9

Operating Experience Documents

NRC Information Notice 2004-01, Auxiliary Feedwater Pump Recirculation Line Orifice Fouling - Potential Common Cause Failure, dated January 21, 2004
NRC Information Notice 2004-07, Plugging of Safety Injection Pump Lubrication Oil Coolers With Lakeweed1, dated April 7, 2004

Components referenced in Section 1R.DS1.24 - Testing and Inspection

Pumps
MDAFW 1A-SA, 1B-SB
TDAFW 1X-SAB
HHSI 1A-SA, 1B-SB, 1X-SAB

Safety relief valves and PORVs
- 1MS-43 thru 57 (main steam safety valves)
- RC-114, 116, 118 (pressurizer PORVs)
- 1MS-80, 82, 84 (main steam isolation valves)

Closing stroke times
- 1RC-113, 115, 117 (pressurizer PORVs block valves)

Motor operated valve (MOV) torque and limit switch setting
- CS-165, 166 (VCT to charging pumps isolation valves)
- CS-291, 292 (RWST to charging pumps suction valves)
- CS-746, 752 (alternate mini-flow valves for charging system)

Check valve operation
- 1CS-294 (HHSI pump suction check valve)
- 1AF-54, 73, 92, 136, 142, 148 (AFW discharge check valves)

Analysis of pump bearing oil and vibration
- HHSI pumps - vibration and oil verification
- AFW pumps - vibration and oil verification

<u>Components referenced in Section 1R.DS1.31 - Component Degradation</u>

Pumps
- MDAFW 1A-SA, 1B-SB
- TDAFW 1X-SAB
- HHSI 1A-SA, 1B-SB, 1X-SAB
- Boric Acid Transfer pumps 1A-SA, 1B-SB
- Reactor Make-up Water pumps 1A-SN, 1B-SN

AOVs
- RC-114, 116, 118 (pressurizer PORVs)
- 1CS-151 (RWST refill, Reactor make-up water storage tank source line)
- 1CS-283 (RWST refill, Boric acid storage tank source line)

MOVs
- CS-165, 166 (VCT to charging pumps isolation valves)
- CS-291, 292 (RWST to charging pumps suction valves)
- CS-746, 752 (alternate mini-flow valves for charging system)
- 1MS-58, 60, 62 (SG PORVs)

Safety relief valves and isolation valves
- 1MS-43 thru 57 (main steam safety valves)
- 1MS-80, 82, 84 (main steam isolation valves)

Check Valves

1CS-294 (HHSI pump suction check valve)
1AF-54, 73, 92, 136, 142, 148 (AFW discharge check valves)
1CS-152 (RWST refill, Reactor make-up water storage tank source line)
1CS-284 (RWST refill, Boric acid storage tank source line)
1IA-1000-C1 (IA to PORVs & accumulator)
1IA-2403 (IA to RAB header)
1IA-999-C1 (IA to PORVs & accumulators)
1IA-999-C3 (IA to PORV 1RC-116)
1RC-174 (N2 to PORV 1RC-118)
1RC-175 (N2 to PORV 1RC-116)
1RC-176 (N2 to PORV 1RC-114)
1SI-444 (IA to PORV 1RC-118)
1SI-446 (IA to PORV 1RC-114)

Manual Valves

1CE-34 (CST to AFW system suction)

Room Coolers

AH-09, 10 (Charging pump rooms)

Section 1R.DS1.12: Calculations

Calculation No. E4-0008, 125 VDC 1E Battery Sizing and Battery/Panel Voltages for Station Blackout, Revision 4
Calculation No. E4-0006, Safety Batteries 1A-SA & 1B-SB Load Profile Determination LOCA/SBO, Revision 1
Calculation No. E4-0012, 125 VDC 1E Battery Sizing and Battery/Panel Voltages for LOCA, Revision 2
Calculation No. E5, Analysis of Motor Output Torque for AC Motor Operated Valves, Revision 7
Calculation No. E-6000, Auxiliary System Load Study, Revision 8
Calculation No. E2-0005.09, Degraded Grid Voltage Protection for 6.9 KV Busses 1A-SA &1B-SB, Revision 2

Section 1R.DS1.13: Instrumentation and Controls

108D831, Sheet 7, Functional Diagrams Steam Generator Trip Signals, Rev. 7
108D831, Sheet 14, Functional Diagrams Auxiliary Feedwater Pumps Startup, Rev. 8
7243D61, Sheet 22, Interconnection Diagram, Rev. 11
1364-45841S51, Sheet 1 of 1, SSPS Schematic Diagram, Rev. 8
1364-45841S28, Sheet 1 of 1, SSPS Schematic Diagram, Rev. 6
CAR-2166-B-401, Sheet 1158, Control Wiring Diagram Emergency Load Sequencer ESS CAB. 1B-SB, Rev. 12
CAR-2166-B-401, Sheet 1113, Control Wiring Diagram Emergency Load Sequencer ESS CAB. 1A-SA, Rev. 13

CAR-2166-B-401, Sheet 1971, Control Wiring Diagram AFW Turbine IX-SB Steam C Isolation Valve 2MS-V95B-1, Rev. 14
CAR-2166-B-401, Sheet 1975, Control Wiring Diagram AFW Turbine IX-SB Steam B Isolation Valve 2MS-V8SA-1, Rev. 14
CAR-2166-B-401, Sheet 1977, Control Wiring Diagram Auxiliary Feedwater Turbine 1X-SB Stop Valve SB Solenoid Trip, Rev. 6
1364-46574S09, Sheet 1, Interconnect Wiring CAB 01 NSSS Unit 1, Rev. 10
1364-046575S09, Sheet 9, PCS Interconnect Wiring Diagram Cabinet 2 Protection II Unit 1, Rev. 8
1364-046576S09, Interconnecting Wiring Diagram Cabinet Protection 3 Unit 1, Rev. 9
1364-46574S10, Sheet 1, Interconnect Wiring Cabinet 01 NSSS Unit 1, Rev. 10
1364-046575S10, Sheet 10, PCS Interconnect Wiring Diagram Cabinet 2 Protection II Unit 1, Rev. 9
1364-046576S10, Interconnecting Wiring Diagram Cabinet Protection 3 Unit 1, Rev. 9
1364-46574S11, Interconnect Wiring Cabinet 01 NSSS Unit 1, Rev. 10
1364-046575S11, Sheet 11, PCS Interconnect Wiring Diagram Cabinet 2 Protection II Unit 1, Rev. 8
1364-46576S11, Interconnecting Wiring Diagram Cabinet 03 Protection III Unit 1, Rev. 10
CAR-2166-B-401, Sheet 156, Control Wiring Diagram Pressurizer Power Relief Valve 1-PCV-444B, Rev. 18
CAR-2166-B-401, Sheet 157, Control Wiring Diagram Pressurizer Power Relief Valve 1-PCV-445A, Rev. 20
CAR-2166-B-401, Sheet 158, Control Wiring Diagram Pressurizer Power Relief Valve 1-PCV-445B, Rev. 16
CAR-2166-B-401, Sheet 1254, Control Wiring Diagram Steam Generator (SG) A Atmospheric Relief Valve 2MS-PI8-SA-1, Rev. 11
CAR-2166-B-401, Sheet 1255, Control Wiring Diagram SG B Atmospheric Relief Valve 2MS-P19-SB-1, Rev. 12
CAR-2166-B-401, Sheet 1256, Control Wiring Diagram SG C Atmospheric Relief Valve 2MS-P20-SA-1, Rev. 9
CAR-2166-B-401, Sheet 1921, Control Wiring Diagram Auxiliary Feedwater Pump 1A-SA (Motor Driven), Rev. 10
CAR-2166-B-401, Sheet 1922, Control Wiring Diagram Auxiliary Feedwater Pump 1B-SB (Motor Driven), Rev. 11
1364-92079S05, Sheet 1, Interconnect Wiring Cabinet 17 BOP Unit 1, Rev. 4
1364-92079S06, Sheet 1, Interconnect Wiring Cabinet 17 BOP Unit 1, Rev. 4
1364-92079S07, Sheet 1, Interconnect Wiring Cabinet 17 BOP Unit 1, Rev. 4
1364-47236S08, Sheet 1, Interconnect Wiring Cabinet 09 BOP Unit 1, Rev. 6
CAR-2166-G-428, Steam Driven Auxiliary Feedwater Pump Instrument Schematics and Logic Diagrams Unit 1, Rev. 6
CAR-2166-G-427, Motor Driven Auxiliary Feedwater Pumps Instrument Schematics and Logic Diagrams Unit No. 1, Rev. 7
2447D51, Sheet 11, Interconnecting Wiring Diagram Aux FWP A Suction Pressure, Rev. 7
2447D52, Sheet 13, Interconnecting Wiring Diagram Aux FWP B Suction Pressure, Rev. 6
2447D52, Sheet 20, Interconnecting Wiring Diagram Aux FW Turbine Pump Suction Pressure, Rev. 6

2447D51, Sheet 3, Interconnecting Wiring Diagram Condensate Storage Tank Water Level, Rev. 7
2447D52, Sheet 4, Interconnecting Wiring Diagram Condensate Storage Tank Water Level, Rev. 7

Section 1R.DS1.21: Installed Configuration

CAR-2166-B-430, Sheet 234, Steam Generator Blowdown System Instrument Schematics and Logic Diagrams, Rev. 11
CAR-2166-B-430, Sheet 31.234, Turbine Bldg. Condenser Vacuum Pump Effluent Treatment Exhaust Instrument Schematics and Logic Diagrams, Rev. 11
0352-5120, Connection Diagram Steam Line Monitor, Rev. 0
CAR-2166-B-431, Sheet R-11, Impulse Piping To Local-Moisture Control Unit & Radiation Monitor Instrument Installation Details, Rev. 6
CAR-2166-B-401, Sheet 716, Control Wiring Diagram Gas Effluent Radiation Monitor System, Rev. 10
CAR-2166-B-401, Sheet 674, Control Wiring Diagram Main Steam Line Radiation Monitor RM-IMS-3591SB, Rev. 7
CAR-2166-B-401, Sheet 675, Control Wiring Diagram Main Steam Line Radiation Monitor RM-IMS-3592SB, Rev. 6
CAR-2166-B-401, Sheet 676, Control Wiring Diagram Main Steam Line Radiation Monitor RM-IMS-3593SB, Rev. 6
CAR-2166-B-401, Sheet 723, Control Wiring Diagram Liquid Process Radiation Monitor REM-3527, REM-3528 & Turbine Building Drain Composite Sampling, Rev. 10
CAR-2166-B-430, Sheet 12.7, Condensate Storage Tank Instrument Schematics and Logic Diagrams, Rev. 9
CAR-2166-B-431, Sheet L-04, Instrument Installation Details, Rev. 6
PC-N19683-604, Construction Details Racks A21-R15-ESF-B & A21-R17-ESF-A, Rev. 5
CAR-2166-B-401, Sheet 2092, Control Wiring Diagram Condensate Storage Tank 1X-SAB Instrumentation, Rev. 10
2651C63, Sheet 12, CQL/CRL/CSL/CTL Level Systems Installation Schematic Refueling Water Storage Tank, Rev. 4
IS/1-AF-209, Isometric for PT-1AF-2250B-SB, Rev. 4
IS/1-AF-215, Isometric for PT-01AF-2250A-SA, Rev. 5
IS/1-AF-335, Isometric for PT–1AF-2170SB & -2270SB, Rev. 7
CAR-2166-G-436S03, Reactor Auxiliary Building Instrument Location Arrangement Elevation 236'-0, Rev.15
UFSAR Section 11.5, Process and Effluent Radiological Monitoring and Sampling Systems
3-B-12-003, Steam Line Monitor Calibration Response Factors, Rev. 01
3-B-12-023, Main Steam Line Radiation Monitor Response to a Fuel and RCS Breach, Rev. 2

Section 1R.DS1.21: Drawings

CAR 2166-B-041, Unit No. 1 Power Distribution and Motor Data
CAR 2166-B-401, Control Wiring Diagram Main Steam Line Radiation Monitors
CAR 2166-G-042S01, 250 VDC, 125VDC, and 120 V Uninterruptible AC One Line Diagram

CAR 2166-G-029, Main & 6900 Volt Auxiliary One Line Diagram
CAR 2166-G-030, 480 Volt Auxiliary One Line Diagram

Section 1R.DS1.23: List of Design Documents Reviewed Including Setpoint and Uncertainty Calculations

EQS-2, RWST Level Setpoint, Rev. 7
SC-N-155, RWST Level L-0993, Rev. 5
SC-N-156, RWST Level L-0991, Rev. 5
SC-N-157, RWST Level L-0990, Rev. 5
SC-N-158, RWST Level L-0992, Rev. 4
HNP-I/INST-1030, RWST Level Accuracy Calculation/L-990, L-991, L-992, L-993, Rev. 2
MST-I0040, RWST Level (L-0990) Calibration, Rev. 10
MST-I0041, RWST Level (L-0991) Calibration, Rev. 10
MST-I0042, RWST Level (L-0992) Calibration, Rev. 11
MST-I0043, RWST Level (L-0993) Calibration, Rev. 12
2651C63, Sheet 12, Level Systems Installation Schematic RWST, Rev. 10
2445D42, Sheet 16, Interconnecting Wiring Diagram RWST Liquid Level, Rev. 8 (typical all four channels)
2445D46, Sheet 10, Interconnecting Wiring Diagram RWST Liquid Level, Rev. 8 (typical all four channels)
SC-B-085, Process Instrumentation Control Scaling Calculations for “A “ AFW Pump Suction Pressure, Rev. 2
SC-B-086, Process Instrumentation Control Scaling calculations for “B” AFW Pump Suction Pressure, Rev. 2
SC-B-136, Process Instrumentation Control Scaling Calculations for LT-01-CE-9010-ASA, Rev. 2
SC-B-146, Process Instrumentation Control Scaling Calculations for AFW Turbine Pump Suction Pressure P-2270, Rev. 2
SC-B-336, CST Water Level Process Instrumentation Control Scaling Calculations for LT-01-CE-9010-BSB, Rev. 3
HNP-I/INST-1027, EOP Setpoint Inaccuracy Calculation for CST Level, Rev. 2
HNP-I/INST-1030, RWST Level Accuracy Calculation L-990, L-991, L-992, L-993, Rev. 2
ME 00803R03, Relays, P&B MDR
ME 06102R00, Transformer, Control Power, 500VA, 480 VAC-120VAC, 60 HZ
ME 05393R01, Transmitter, Press, Gage, 0-250 PSIG
ME 05385R00, Agastat E7000 Series Timing Relay
ME 05276R00, Mallory Capacitor Series VTL versus SK
ME 05246R00, Bussmann Fuses, Type FRN-R

Section 1RDS1.23: Work Orders and Surveillance Procedures

WO 00329763 01,MST-E00027, 1E Battery Cell Connection Resistance and Service Test 1A-SA
WO 00192559 0, MST-E00027, 1E Battery Cell Connection Resistance and Service Test 1A-SB
WO 00186004 01, PM-E0028, NonClass 1E Station Battery Performance Test, 125 VDC Station Battery Bank 1A

WO 00185995 01, PM-E0028, NonClass 1E Station Battery Performance Test, 250 VDC Station Battery Bank 1A
WO 00104649 01, PM-E0005, Inspect, Clean, 6.9 KV Safety Injection Charging Pump Breaker 1B-SB
WO 00100502 01, PM-E0005, Inspect, Clean, 6.9 KV Safety Injection Charging Pump Breaker 1A-SA
WO 00100094 01, PM-E0005, Inspect, Clean, 6.9 KV Safety Injection Charging Pump Breaker 1CB-SAB
Work Request No. AJKQ 002, 6.9 KV 1200/2000 Amp Air Circuit Breaker PM for AFW Pump 1A-SA
WO 00100193 01, 6.9 KV 1200/2000 Amp Air Circuit Breaker PM for AFW Pump 1A-SB
Work Request No. APRD 001, MST-E006, 480 VAC Molded Case Circuit Breaker Test
OST -1011, Auxiliary Feedwater System Operability Test
OST - 1076, Auxiliary Feedwater Pump 1B-SB Operability Test Quarterly Interval Modes 1-4

Section 1R.DS1.24: Completed Surveillance Procedures, Preventive Maintenance (PM), Calibration and Test Records

MST-I0086, CST Level Loop (L-9010A) Calibration, completed by WO 0013927501 on 8/22/02
MST-I0086, CST Level Loop (L-9010A) Calibration, completed by WO 0010223001 on 4/30/01
MST-I0087, CST Level Loop (L-9010B) Calibration, completed by WO 0014637501 on 8/7/02
MST-I0087, CST Level Loop (L-9010B) Calibration, completed by WO 0010252901 on 4/19/01
MST-I0023, SG A Narrow Range (NR) Level, L-0474, Protection Set II, completed by WO 0019734401 on 5/10/03
MST-I0023, SG A NR Level, L-0474, Protection Set II, completed by WO 0010236002 on 12/3/01
MST-I0024, SG A NR Level, L-0475, Protection Set II, completed by WO 0019734301 on 5/10/03
MST-I0024, SG A NR Level, L-0475, Protection Set II, completed by WO 0010234902 on 12/3/01
MST-I0025, SG A NR Level, L-0476, Protection Set III, completed by WO 0019734201 on 5/8/03
MST-I0025, SG A NR Level, L-0476, Protection Set III, completed by WO 0010234802 on 12/3/01
MST-I0026, SG B NR Level, L-0484, Protection Set I, completed by WO 0010235202 on 5/9/03
MST-I0026, SG B NR Level, L-0484, Protection Set I, completed by WO 0010235202 on 12/3/01
MST-I0027, SG B NR Level, L-0485, Protection Set II, completed by WO 0019734101 on 5/8/03
MST-I0027, SG B NR Level, L-0485, Protection Set II, completed by WO 0010235102 on 12/3/01
MST-I0028, SG B NR Level, L-0486, Protection Set III, completed by WO 0019734001 on 5/8/03
MST-I0028, SG B NR Level, L-0486, Protection Set III, completed by WO 0010235002 on 12/3/01
MST-I0029, SG C NR Level, L-0494, Protection Set I, completed by WO 0019733901 on 5/8/03
MST-I0029, SG C NR Level, L-0494, Protection Set I, completed by WO 0010235502 on 12/3/01
MST-I0030, SG C NR Level, L-0495, Protection Set II, completed by WO 0019929101 on 5/8/03
MST-I0030, SG C NR Level, L-0495, Protection Set II, completed by WO 0010235902 on 12/10/02

MST-I0030, SG C NR Level, L-0495, Protection Set II, completed by WO 0010235902 on 12/10/02
MST-I0031, SG C NR Level, L-0496, Protection Set III, completed by WO 0019733801 on 5/8/03
MST-I0031, SG C NR Level, L-0496, Protection Set III, completed by WO 0010235802 on 12/2/01
MST-I0040, RWST Level, L-0990, completed by WO 0018670801 on 8/22/02
MST-I0040, RWST Level, L-0990, completed by WO 0028641001 on 1/5/04
MST-I0041, RWST Level, L-0991, completed by WO 0028979101 on 10/2/03
MST-I0041, RWST Level, L-0991, completed by WO 0012579901 on 8/9/02
MST-I0043, RWST Level, L-0993, completed by WO 0028508401 on 12/31/03
MST-I0043, RWST Level, L-0993, completed by WO 0018670901 on 8/13/02
MST-I0042, RWST Level, L-0992, completed by WO 0023044601 on 8/26/03
MST-I0042, RWST Level, L-0992, completed by WO 0010143601 on 4/10/02
MST-I0040, RWST Level, L-0990, completed by WO 0010204401 on 6/4/01
MST-I0040, RWST Level, L-0990, completed by WO 0029716805 on 8/29/02
MST-I0041, RWST Level, L-0991, completed by WO 0029716904 on 9/18/02
MST-I0041, RWST Level, L-0991, completed by WO 0010240901 on 3/28/01
MST-I0042, RWST Level, L-0992, completed by WO 0029717005 on 9/11/02
MST-I0042, RWST Level, L-0992, completed by WO 0010204501 on 8/2/01
MST-I0043, RWST Level, L-0993, completed by WO 0029717204 on 9/25/02
MST-I0043, RWST Level, L-0993, completed by WO 0010240801 on 3/28/01
PIC-E027, Electromechanical Timing Relay DC Pickup Calibration, completed by WO 0010407701 on 9/26/01
PIC-E027, Electromechanical Timing Relay DC Pickup Calibration, completed by WR/JO AIIP004 on 4/19/00
MST-I0405, Main Steam Line Radiation Monitor RM-01MS-3591SB Calibration, completed by WO 0017664901 on 7/15/03
MST-I0405, Main Steam Line Radiation Monitor RM-01MS-3591SB Calibration, completed by WO 0010152401 on 10/9/01
MST-I0407, Main Steam Line Radiation Monitor RM-01MS-3592SB Calibration, completed by WO 0017664801 on 7/15/03
MST-I0407, Main Steam Line Radiation Monitor RM-01MS-3592SB Calibration, completed by WO 0010152301 on 10/10/01
MST-I0409, Main Steam Line Radiation Monitor RM-01MS-3593SB Calibration, completed by WO 0017738501 on 7/15/03
MST-I0409, Main Steam Line Radiation Monitor RM-01MS-3593SB Calibration, completed by WO 0010152201 on 10/12/01
PIC-I915, Inspect & Calibrate Radiation Monitor System, completed by WO WR/JO AFJC-003 on 10/27/00
PIC-I906, Clean, Adjust & Inspect Calibration of General Atomics Liquid Radiation Monitor Assembly, completed by WO WR/JO AFTA-003 on 10/18/00
OST-1045, ESFAS Train B Slave Relay Test Quarterly Interval Modes 1 - 4, completed 3/8/04
OST-1044, ESFAS Train A Slave Relay Test Quarterly Interval Modes 1 - 4, completed 3/8/04
OST-1826, ESF Response Time Train B 18 Month Interval on a Staggered Test Basis Mode 5 - 6, completed on 5/14/03

WO 00329763 01,MST-E00027, 1E Battery Cell Connection Resistance and Service Test 1A-SA
WO 00192559 0, MST-E00027, 1E Battery Cell Connection Resistance and Service Test 1A-SB
WO 00186004 01, PM-E0028, NonClass 1E Station Battery Performance Test, 125 VDC Station Battery Bank 1A
WO 00185995 01, PM-E0028, NonClass 1E Station Battery Performance Test, 250 VDC Station Battery Bank 1A
WO 00104649 01, PM-E0005, Inspect, Clean, 6.9 KV Safety Injection Charging Pump Breaker 1B-SB
WO 00100502 01, PM-E0005, Inspect, Clean, 6.9 KV Safety Injection Charging Pump Breaker 1A-SA
WO 00100094 01, PM-E0005, Inspect, Clean, 6.9 KV Safety Injection Charging Pump Breaker 1CB-SAB
Work Request No. AJKQ 002, 6.9 KV 1200/2000 Amp Air Circuit Breaker PM for AFW Pump 1A-SA
WO 00100193 01, 6.9 KV 1200/2000 Amp Air Circuit Breaker PM for AFW Pump 1A-SB
Work Request No. APRD 001, MST-E006, 480 VAC Molded Case Circuit Breaker Test
OST -1011, Auxiliary Feedwater System Operability Test
OST - 1076, Auxiliary Feedwater Pump 1B-SB Operability Test Quarterly Interval Modes 1-4

Section 1R.DS1.35: List of Operating Experience Items Reviewed

AR 00049412, 10 CFR Part 21 on Microprocessor Based Radiation Monitor
AR 00069230, SG Water Level Uncertainties
AR 00081332, NSAL 02-05R1 SG Water Level Uncertainties
AR 00106110, NSAL 03-09 SG Water Level Uncertainties
AR 00064637, IN 2002-10, Supplement 1, Diablo Canyon SG Level Setpoint Uncertainty

Section 1R.DS1.34: Loose Parts Monitoring Document Review List

MST-I0247, Metal Impact Monitoring System Operational Test, completed by WO 0046302301 on 12/16/03
MST-I0247, Metal Impact Monitoring System Operational Test, completed by WO 0027695701 on 8/27/02
MST-I0257, Metal Impact Monitoring System Calibration, completed by WO 0020126001 on 5/14/03
AR # 90194-2, A Channel 758 DMIMS alarm was received on 4/10/03
Action Plan (Rev.0), Determine Source of Metal Impacts on Channel 758, dated 4/17/03
Steam Generator "C" Videotape Log Sheet, dated 5/2/03
Steam Generator "C" Tubesheet Map Hot Leg
DMIMS Alarm Event Review Summary, dated 8/29/02

Section 1R.DS1.4: Action Requests and Corrective Maintenance Work Orders

WO 0020149801, Replace PT-01RC-0456II, completed 12/20/01
WO 0015787801, Breaker tripped, completed 10/15/01
WO 0017990501, 1RC-118 indicated dual position when switch was placed to open, completed 11/12/01

WO 0017990502, 1RC-116 indicated dual position when it should have gone open, completed 11/12/01
WO 0019938401, 1RC-902 control switch will not go to pull to lock, completed 12/16/01
WO 0019938403, Troubleshoot 1RC-902, completed 12/15/01
WO 0040767601, Replace Solenoid PSE-445B2 for 1RC-116, completed 5/13/03
AR 00092810, LT-495 outside of its allowable range

ARs Reviewed for Section 1R.DS2 and 1RDS3

23395, Inadequate post modification testing on contacts for selected MOVs
53454, ERFIS SG level alarm setpoints incorrect
104345, Calculations and ESRs do not correlate
117473, EC had too many errors
61146, Deficiencies in three 50.59 screens
76637, Plant lacking vigorous routine review process for monitoring 50.59 process
76640, Weakness in 10 CFR 50.59 program
76641, Weakness related to the process for exempting procedures from the 10 CFR 50.59 process
76642, Weakness related to 10 CFR 50.59 procedure clarity
98134, Evaluation did not provide adequate justification
118449, Increasing trend in number of 50.59 keyword NCRs