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

September 8, 2005

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

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC SAFETY SYSTEM DESIGN AND PERFORMANCE CAPABILITY INSPECTION REPORT 05000390/2005010

Dear Mr. Singer:

On July 29, 2005, the U. S. Nuclear Regulatory Commission (NRC) completed a safety system design and performance capability team inspection at your Watts Bar Unit 1 facility. The enclosed report documents the inspection results which were discussed on July 29, 2005, with Mr. M. Skaggs 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.

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.: 50-390
License No.: NPF-90

Enclosure: NRC Inspection Report 05000390/2005010
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-390
License No.:	NPF-90
Report Nos.:	05000390/2005010
Licensee:	Tennessee Valley Authority (TVA)
Facility:	Watts Bar Nuclear Plant, Unit 1
Location:	1260 Nuclear Plant Road Spring City, TN 37381
Dates:	July 11 - 15, 2005 July 25 - 29, 2005
Inspectors:	N. Merriweather, Senior Reactor Inspector (Lead Inspector) R. Cortes, Reactor Inspector G. MacDonald, Senior Reactor Inspector D. Mas-Penaranda, Reactor Inspector R. Rodriquez, Reactor Inspector
Accompanied by:	W. Fowler, Reactor Inspector (Trainee) W. Lewis, Reactor Inspector (Trainee)
Approved by:	Charles R. Ogle, Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000390/2005-010; 07/11-15/2005 and 07/25-29/2005; Watts Bar Nuclear Plant Unit 1; Safety System Design and Performance Capability Inspection.

This inspection was conducted by a team of inspectors from the NRC's Region II office. 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 Findings and Self-Revealing Findings

No findings of significance were identified.

B. Licensee-Identified Violations

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events and Mitigating Systems

1R21 Safety System Design and Performance Capability (71111.21)

The team evaluated the capability of installed plant equipment to detect and respond to a loss of coolant accident (LOCA) including a small break LOCA, inter-system LOCA, and large break LOCA. Procedures which direct the mitigating actions for these events were also evaluated.

A specific list of components and documents reviewed for each section is included in the Attachment to this report.

.1 System Needs

.11 Process Medium

a. Inspection Scope

The team reviewed the availability and reliability of water sources required for response and recovery from small break, large break, and inter-system LOCAs. These water sources included the refueling water storage tank (RWST) and the reactor building (RB) recirculation sump. The team reviewed design documentation, drawings, the Updated Final Safety Analysis Report (UFSAR), Technical Specifications (TS), corrective action history, volumetric calculations for the RWST, calculations of system capacity, and calculations of net positive suction head (NPSH) available and required for the safety injection (SI), containment spray (CS), and residual heat removal (RHR) pumps. These reviews were conducted to determine the adequacy of the water supplies for the systems required to respond to LOCA events.

b. Findings

No findings of significance were identified.

.12 Energy Sources

a. Inspection Scope

The team selected a sample of motor operated valves (MOVs) and pump motors from the chemical and volume control system (CVCS), SI, CS, RHR, and emergency raw cooling water (ERCW) systems and reviewed appropriate portions of voltage calculations to verify that adequate voltage would be available to power the components under worst case design basis conditions expected during a LOCA.

b. Findings

No findings of significance were identified.

.13 Controls

a. Inspection Scope

The team conducted the following examinations for selected components to confirm that the control circuits implemented the functional requirements stated in design and licensing basis documents. The team reviewed a sample of schematic drawings that depicted the control logic for the signal to start emergency core cooling system (ECCS) pump motors (i.e., CVCS, SI, and RHR). The team also reviewed control circuits for MOV actuation on SI signals. In addition, the team reviewed the logic and schematic drawings that depict the control logic for the automatic swapover of the ECCS suction sources from the RWST to the RB sump on low RWST level and high containment level as well as the interlocks and permissives for the MOVs. The review was done to verify that the swapover control logic was in accordance with the Design Basic Documents (DBDs).

b. Findings

No findings of significance were identified.

.14 Operator Actions

a. Inspection Scope

The team reviewed plant emergency operating instructions (EOIs), abnormal operating instructions (AOIs), alarm response instructions (ARIs), and plant operating instructions used in LOCA identification and mitigation. The focus of the review was on operator actions related to: switchover from cold leg injection to recirculation; initiation of high pressure recirculation for small break LOCA; initiation of feed and bleed for core cooling; identification and mitigation of inter-system LOCA; and any actions required for LOCA mitigation outside of the main control room (MCR). The review was performed to verify that the instructions were consistent with the guidance of the Westinghouse Owners Group (WOG) Emergency Response Guidelines with differences justified in design differences documents and step deviations documents. The review also assessed procedure clarity and conformance to the Writers Guide for AOIs and EOIs. The team reviewed the LOCA mitigation procedures to determine if procedures accomplished LOCA mitigation operator actions described in the LOCA design criteria documents and the UFSAR.

b. Findings

No findings of significance were identified.

.15 Heat Removal

a. Inspection Scope

The team reviewed vendor manuals, drawings, heat load calculations for LOCAs, surveillance test documentation, and other design basis documentation to assess the design and performance of the mitigating systems including the supporting cooling systems for RHR, SI, and CS systems, which included the heat exchangers, room coolers, and the lubricating oil cooling.

The team reviewed the acceptance criteria basis for minimum service water flow to each room cooler to verify adequate cooling during design basis accident (DBA) conditions. This basis incorporated hydraulically limiting flow velocities, vendor manual information, and site specific environmental conditions. Additionally, a review of the calculated internal heat loads were compared to the calculated site specific heat removal capabilities for the specific room coolers.

The team also reviewed component cooling system (CCS) flow balancing procedures and walked down control room instrumentation indicators to verify adequate flow of cooling medium through the RHR pump seal heat exchanger, as well as the RHR and CS oil coolers.

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 portions of systems which mitigate LOCAs to observe the present condition and configuration. The team walked down portions of the CVCS, SI, CS, and RHR systems as well as portions of the RWST suction source to verify that they were aligned so that they would be available for operators to mitigate a DBA. The walkdown was performed to verify that alignment of valves, breakers, and switches was consistent with the approved drawings and system operating instructions and that adequate material condition was being maintained. The team compared valve positions with those specified in the system operating procedure line-ups and drawings, and observed the material condition of the components to verify that they would be adequate to support operator actions. Equipment examined included accessible portions of the selected system valves, piping, and related components. Additionally, the team reviewed historical maintenance work order records to verify that the suction strainers installed on the RHR and CS pump suction during pre-operational testing had been removed prior to initial plant operation.

The team also performed a field inspection of the RWST level instruments. Field inspection of the level transmitters was to verify that the instruments were installed in accordance with the instrument installation drawing. The instrument elevations were checked by measurement to verify that they were consistent with the elevations specified in scaling and setpoint documents. Additionally, the team verified that the material condition of the field mounted instruments were acceptable, freeze protection was provided where necessary, and that redundant instrument sensing lines were routed and protected to prevent common cause failure of the instrument channels.

The team performed field walk downs of portions of the 6900 volt (V) alternating current (AC) shutdown boards as well as 480 VAC shutdown boards and motor control centers to verify that the installed configuration was consistent with design basis information. Also, the team visually inspected the 125 V direct current (DC) vital batteries along with their respective chargers, inverters, and DC distribution panels to evaluate material condition and system installed configuration.

b. Findings

No findings of significance were identified.

.22 Operation

a. Inspection Scope

The team observed conduct of LOCA simulator training and post-drill critiques. Licensed operator requalification staffing for June 7 - July 15, 2005 was checked against the technical specification staffing requirements. The team reviewed operator training lesson plans for LOCA identification and mitigation to determine if training was consistent with the applicable AOIs and EOIs. The team reviewed job performance measures (JPMs) and conducted procedure walkthroughs of operator actions for: transfer of ECCS suction to containment sump; initiation of hot leg recirculation; establishment of reactor coolant system (RCS) feed and bleed cooling paths, and inter-system LOCA. The procedure walkthrough assessed the adequacy of labeling, lighting, communications, noise, accessibility, and whether the operator actions could be accomplished within design basis time requirements.

b. Findings

No findings of significance were identified.

.23 Design

a. Inspection Scope

.1 Mechanical Design Review

The team reviewed design calculations, specifications, and the UFSAR to verify that system and equipment design functions were appropriately evaluated and maintained. Surveillance test procedures and equipment monitoring activities were reviewed to verify the design criteria were appropriately translated into the acceptance criteria on the tests. The team reviewed Design Basis Documents, selected piping, selected TSs, Problem Evaluation Reports (PERs), and corrective maintenance history for systems used to identify and mitigate LOCAs to assess the implementation and maintenance of the systems design basis.

The team reviewed head curves and calculations that assessed the NPSH available for the CS, RHR, and SI pumps to verify the capability of the system to meet the minimum specified flow and head requirements during DBA conditions. The review included verifying that adequate NPSH is available at the sump temperature during a LOCA. Additionally, the team reviewed drawings and discussed with design engineers the potential for air accumulation between the RB recirculation sumps and the sump isolation valves to verify the system was not adversely affected by air entrainment. The team also reviewed drawings and surveillance procedures to verify minimum flow protection for the RHR, CS, and SI pumps.

The team reviewed the RHR and SI design calculated flow rates as well as suction piping configuration drawings to verify that the potential for vortexing had been evaluated in the RWST and RB recirculation sump. The team also reviewed the flow passage opening sizes in the most restrictive portions of the RHR system to verify that the flow passage opening sizes in the RB sump strainers were sized accordingly. The team also reviewed drawings for the RHR, SI, and CS piping to verify relief valve discharge was circulated to a closed system.

.2 Electrical and Instrumentation and Controls Design Review

The team reviewed setpoint and scaling documents for a selected sample of instruments to verify that the setpoint calculations had included appropriate instrument uncertainties. The team also verified that the instrumentation and controls setpoints for the SI actuation and RWST swapover were in accordance with design basis documents and TS.

The team reviewed thermal overload (TOL) sizing calculations for the selected sample of risk significant MOVs to verify they met design requirements. Additionally, the team reviewed the sizing calculations for the Class 1E 125 VDC electrical distribution system batteries, and assessed the adequacy of the batteries to provide reliable power for selected Class 1E instrumentation required to mitigate a LOCA event.

b. Findings

No findings of significance were identified.

.24 Testing and Inspection

a. Inspection Scope

The team reviewed performance and post-maintenance testing of selected pumps and valves to verify that the assumptions of the licensing and design bases documents were being maintained and any performance degradation would be identified. The team reviewed valve leak testing procedures on RHR and CS suction sump valves to verify piping sections do not drain and ingest air.

The team reviewed selected full flow surveillance test data to ensure that injection flow rates remained within system design calculations. The team reviewed documentation of completed surveillance tests, and pump head curves to verify that equipment performance was appropriately monitored and maintained consistent with the design and licensing bases.

The team reviewed valve operability stroke time testing, thrust testing, differential pressure (dP) inputs, and corrective maintenance records for selected risk significant MOVs, including the ECCS injection valves on the SI, RHR, and CS systems. This review was conducted to verify the availability of the selected valves, adequacy of surveillance testing acceptance criteria, and monitoring of these valves for degradation. The team reviewed completed surveillance procedures related to system venting for the RHR and CS piping, valve position verification, and RWST level verification to verify that testing was being performed in accordance with applicable TS requirements. The team also reviewed selected risk-significant check valve periodic tests to verify these valves would function in the appropriate (open/check) positions to support system operation.

The team also reviewed completed surveillance tests of selected valves and pump motors that actuate on an SI to verify that individual tests validate integrated system operation under DBA conditions consistent with TS requirements.

The team reviewed surveillance test records of the 125 VDC batteries (I, II, III, IV, and V) that were completed in accordance with the requirements of the TS. The records were reviewed to verify that the batteries were capable of meeting design basis load requirements. Additionally, the team reviewed calibration records of selected process instruments to verify that the instruments were sufficiently accurate to comply with the plant's licensing and design bases requirements.

b. Findings

No findings of significance were identified.

.3 Selected Components

.31 Component Degradation

a. Inspection Scope

The team reviewed maintenance and testing documentation, modifications, performance trending, and equipment history as identified by work orders, PERs, and system health reports to assess the licensees' actions to verify and maintain the safety function, reliability and availability of selected components. Equipment reviewed included LOCA mitigating pumps and pump motors, selected MOVs, selected 6900 VAC breakers, check valves, and relief valves. Field walkdowns were performed to assess observable material condition and identify degraded equipment on the equipment selected.

The team also reviewed the potential for common cause failure mechanisms in maintenance. Additionally, the team reviewed in-service trending data for selected components to verify that the components were continuing to perform within the limits specified by the test and DBDs. In addition, the team reviewed current monitoring of RCS leakage to verify requirements for the program were not being exceeded. The review included verifying valves that do not see DBA pressures are not leaking beyond the licensee specified thresholds during normal operations and verifying that selected check valves were included in the check valve test program.

The team reviewed charging pumps motor preventive maintenance procedures to verify the tracking of number of cycles for each train and the periodicity of motor change outs. The team also reviewed on a sample basis, preventive maintenance records for the RHR and ERCW pump motors to verify that each motor's load current and vibration readings under full load conditions were consistent with the manufacturer's guidelines.

The team reviewed documentation of oil analysis and results for the RHR and SI pumps common reservoir (inboard and outboard pump bearings) to verify the analysis results indicate normal, anticipated oil conditions. The team also reviewed documentation of completed performance as well as the frequency of oil changes for these pumps to verify the results were within the normal acceptance criteria.

The team reviewed work orders that implemented a modification package that replaced the containment sump level transmitters to verify that the component replacement was consistent with inservice and equipment qualification life. Additionally, the team reviewed preventive maintenance for the last two years for selected electrical 6900 VAC breakers to verify that potential degradation was monitored or prevented.

b. Findings

No findings of significance were identified.

.32 Equipment/Environmental Qualifications

a. Inspection Scope

The team reviewed qualification test data associated with the environmental testing of selected components used to mitigate LOCAs. The test data was reviewed to confirm that the components were qualified for the worst case postulated accident environments where they are installed. The PM procedures associated with the selected components were also reviewed to verify that all required EQ maintenance was being implemented. The team conducted in-plant walkdowns to verify that the observable portions of selected mechanical components were suitable for the environment expected under all conditions, including high energy line breaks (HELBs).

b. Findings

No findings of significance were identified.

.33 Equipment Protection

a. Inspection Scope

The team walked down portions of the systems used to mitigate LOCAs to verify the equipment was adequately protected against external events such as a HELB in the RHR or CS pump rooms. During the walkdowns, the team also verified that there was no observable damage to installations designed to protect selected components from potential effects of high winds, flooding, and high or low outdoor temperatures.

The team walked down the RWST level channels (1-LT-63-50, -51, -52, and -53) to visually inspect the heat tracing for instrument housings and sensing lines to verify that freeze protection was installed in accordance with installation drawings.

b. Findings

No findings of significance were identified.

.34 Component Inputs/Outputs

a. Inspection Scope

The team reviewed selected MOV operator requirements calculations and evaluated the capability of the MOVs to perform their design function under degraded voltage and dP conditions. The team reviewed the dP calculations for the selected MOVs and verified the completed thrust testing procedures would include the dP inputs as part of their acceptance criteria calculations.

The team reviewed vendor documentation for the General Electric multicontact auxiliary relay, which is located in the breaker closing logic for ECCS and auxiliary pump motors related to the LOCA accident, to verify that the auxiliary relay is suitable for the application under degraded voltage conditions.

b. Findings

No findings of significance were identified.

.35 Operating Experience

a. Inspection Scope

The team reviewed a sample of extent of condition reviews and corrective actions for industry and station operating experience issues related to equipment problems, use of non-conservative acceptance criteria in safety related pump surveillance tests, and check valve problems to verify that plant specific issues were appropriately identified and addressed. Work orders, procedures, field observations, and discussions with engineering and licensing staff were used to verify if operating experience related corrective actions were accomplished. The team reviewed a sample of PERs related to SI pump discharge relief valves and restoration of reactor coolant pump (RCP) seal cooling to verify that plant specific issues were addressed. The team reviewed the WOG ERG background document for Emergency Contingency Action (ECA-0.0), Loss of all AC Power and applicable plant instructions to determine if the licensee implemented seal cooling via RCS cooldown for extended losses of seal cooling. PER 85969 for SI pump discharge relief valves was reviewed. Relief valve test history for 1-RFV-063-0535-S, 1-RFV-063-0534-A and 1-RFV-063-0536-B were reviewed to determine if results were within the allowable range on vendor relief valve data sheets. Procedure MI-0.011, Safety Relief Valve Maintenance Instruction, was reviewed to determine if relief valve ring settings were in accordance with vendor relief valve data sheets.

b. Findings

No findings of significance were identified.

.4 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed selected system health reports, maintenance records, surveillance test records, audit reports, self-assessments, and PERs to verify that design and performance problems were identified and entered into the corrective action program. The team assessed the problem identification, extent of condition, and corrective actions for the selected sample. The team reviewed PERs addressing process instrument equipment problems, 125 VDC system problems, 6900 VAC system problems, and foreign material in the RCS and ECCS piping to verify proper corrective action were taken to address the discoveries.

The team reviewed calibration test records to verify that “out of tolerance” conditions were properly entered into the corrective action program for evaluation and disposition. Additionally, the team reviewed a sample of corrective maintenance work orders on the selected pumps and valves to verify that the problems had been corrected.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Meetings, including Exit

The lead inspector presented the inspection results on July 29, 2005, to Mr. M. Skaggs and other members of the licensee staff. The licensee acknowledged the results presented. Proprietary information is not included in this inspection report.

SUPPLEMENTAL INFORMATION
PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Bushnell, Licensing Engineer
M. DeRoche, Site Nuclear Assurance Manager
J. Laughlin, Plant Manager
R. McCollom, Maintenance and Mods Manager
L. McCormick, Design Engineering Manager
P. Pace, Licensing and Industry Affairs Manager
P. Salkeld, Operations Specialist
M. Skaggs, Site Vice President
A. Smith, MOV Engineer
R. Stockton, Licensing Engineer
D. Voeller, Site Scheduling Manager

NRC (attended exit meeting)

G. Cameron, Co-op Engineer
L. Mellen, Senior Reactor Inspector
M. Pribish, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

None

Attachment

LIST OF COMPONENTS AND DOCUMENTS REVIEWED

Components:

Section 1R21.11a, Process Medium
RWST
RB Sump
Valves:
1-FCV-74-21, -3, RHR Suction from RWST
1-FCV-63-5, SI Suction from RWST
1-FCV-62-135, -136, CVCS Suction from RWST
1-FCV-72-21, -22, CS Suction from RWST
1-FCV-72-506, CS Suction from RWST

Section 1R21.12a, Energy Sources and Section 1R21.13a, Controls

Valves:
1-FCV-74-21, -3, RHR Suction from RWST
1-FCV-63-72, -73, RHR Suction from RB Sump
1-FCV-63-5, SI Suction from RWST
1-FCV-62-135, -136, CVCS Suction from RWST
1-FCV-63-11, RHR Discharge to SI
1-FCV-63-8, RHR Discharge to CVCS
1-FCV-72-44, -45, CS Suction from RB Sump
1-FCV-72-21, -22, CS Suction from RWST

Pump Motors:
RHR
CS
ERCW
CCS Pump Motors

Section 1R21.15a, Heat Removal

Heat Exchangers:
RHR Heat Exchanger A and B
HX 74-10, -20, RHR Pump Seal Heat Exchanger
1A-A, 1B-B, RHR Pump Room Cooler
1A-A, 1B-B, SI Pump Room Cooler
1A-A, 1B-B, CS Pump Room Cooler

Section 1R21.21a, Installed Configuration

RWST

Valves

Safety Injection System
1-FCV-63-1, RWST to RHR Suction
1-FCV-63-22, SI Pumps to Cold Leg Injection
1-FCV-63-3, SI Pump Mini Flow recirc header to RWST Isolation
1-FCV-63-4, SI Pump A Min Flow
1-FCV-63-175, SI Pump B Min Flow
1-FCV-63-5, RWST to SI Pump Suction Isolation
1-FCV-63-6, RHR HX A to SI Pump Suction
1-FCV-63-7, RHR HX A Outlet to SI Pump A Suction
1-FCV-63-177,RHR HX A Outlet to SI Pump Suction
1-FCV-63-8, RHR Pump A to Chg Pump and SI Pump A Suction Isolation
1-FCV-63-11, RHR HX B Outlet to SI Pump Suction Isolation

CVCS System
1-FCV-62-39, SIS Boron Injection Tank (BIT) Inlet Isolation
1-FCV-62-40, SIS BIT Inlet Isolation
1-FCV-62-25, SIS BIT Outlet Isolation
1-FCV-62-26, SIS BIT Outlet Isolation
1-FCV-62-98, Centrifugal Charging Pump (CCP) Min Flow
1-FCV-62-99, CCP Min Flow
1-LCV-62-132,Volume Control Tank Outlet
1-LCV-62-133,Volume Control Tank Outlet
1-LCV-62-135, RWST to CCP
1-LCV-62-136, RWST to CCP

RHR System
1-FCV-63-72, Containment Sump to RHR Pump A
1-FCV-63-73, Containment Sump to RHR Pump B
1-FCV-74-1, RCS Hot Leg #4 to RHR
1-FCV-74-2, RCS Hot Leg #4 to RHR
1-FCV-74-3, RHR A Suction Isolation
1-FCV-74-21, RHR B Suction Isolation
1-FCV-74-33, Hot Leg Injection
1-FCV-74-35, RHR HX B Outlet Crosstie
1-HCV-74-36, RHR HX A Manual Bypass
1-HCV-74-37, RHR HX B Manual Bypass
1-FCV-74-172, Hot Leg Injection
1-FCV-74-16, RHR HX A Outlet Flow Control
1-FCV-74-28, RHR HX B Outlet Flow Control

Containment Spray
1-FCV-72-21, -22, CS suction from RWST

Breakers
1-Brkr-074-1A
1-Brkr-062-39
1-Brkr-062-40
1-Brkr-062-98A
1-Brkr-062-98B
1-Brkr-074-8
1-Brkr-062-99A
1-Brkr-062-99B
1-Brkr-074-2A
1-Brkr-074-9
1-Brkr-063-1A
1-Brkr-063-1B
1-Brkr-063-3
1-Brkr-063-7
1-Brkr-063-8
1-Brkr-063-25
1-Brkr-063-4
1-Brkr-063-5
1-Brkr-063-6
1-Brkr-063-11
1-Brkr-063-22A
1-Brkr-063-22B
1-Brkr-063-10
1-Brkr-063-15

Miscellaneous Equipment

1-HS-63-131, RWST Htr Temp Control
1-HS-63-132, RSWT Htr Temp Control
1-LT-63-50, RWST Level
1-LT-63-51, RWST Level
1-LT-63-52, RWST Level
1-LT-63-53, RWST Level

125 VDC vital batteries
Battery chargers
DC distribution panels
6900 VAC Shutdown boards
480 VAC Shutdown boards
480 VAC motor control centers

Section 1R21.23a, Design

RWST

Pumps:

1-PMP-74-10-A, -B, RHR Pumps A-A and B-B

1-PMP-63-10, -15, SI Pumps A-A and B-B
1-PMP-72-10, -27, CS Pumps A-A and B-B

Heat Exchangers:
HTX-72-1A, -1B, CS Heat Exchangers
HTX-74-30, -31, RHR Heat Exchangers

Thermal overload sizing for valves:
1-FCV-74-21,-3, RHR Suction from RWST
1-FCV-63-72,-73, RHR Suction from RB Sump
1-FCV-63-5, SI Suction from RWST
1-FCV-62-135, -136, CVCS Suction from RWST
1-FCV-63-11, RHR Discharge to SI
1-FCV-63-8, RHR Discharge to CVCS
1-FCV-72-44, -45, CS Suction from RB Sump
1-FCV-72-21, -22, CS Suction from RWST

Batteries: 125 VDC batteries I, II, III, IV, and V

Process Instruments:
1-LT-63-50, -51, -52, -53, RWST Level Channels
1-LT-63-180, -181, -182, -183, Containment Sump Level Channels
1-PT-68-340, -334, -323, Pressurizer Pressure Channels
1-PDT-30-42, -43, -44, -45, Containment Pressure

Section 1R21.24a, Testing and Inspection

Pumps:
1-PMP-74-10-A, -B, RHR Pumps A-A and B-B
1-PMP-63-10, -15, SI Pumps A-A and B-B

Valves:
1-FCV-72-44, -45, CS Suction from RB Sump
1-FCV-63-72, -73, RHR Suction from RB Sump
1-FCV-74-21, -3, RHR Suction from RWST
1-FCV-63-5, SI Suction from RWST
1-FCV-63-5, SI Suction from RWST
1-FCV-62-135, -136, CVCS Suction from RWST
1-FCV-72-21, -22, CS Suction from RWST
1-FCV-63-11, RHR Discharge to SI
1-FCV-63-8, RHR Discharge to CVCS

Process Instruments:
1-LT-63-50, -51, -52, -53, RWST Level Channels
1-LT-63-180, -181, -182, -183, Containment Sump Level Channels

1-PT-68-340, -334, -323, Pressurizer Pressure Channels
1-PDT-30-42, -43, -44, -45, Containment Pressure

Batteries: 125 VDC Battery Banks I, II, III, IV, and V

Pump Motors:
RHR
CS
ERCW
CCS

1R21.31a, Component Degradation

Pumps:
1-PMP-62-108-A, -014-B, CVCS pPumps 1A-A and 1B-B
1-PMP-74-10-A, -B, RHR Pumps A-A and B-B
1-PMP-72-10, -27, CS Pumps A-A and B-B

Valves:
1-FCV-72-44, -45, CS Suction from RB Sump
1-FCV-63-72, -73, RHR Suction from RB Sump
1-FCV-63-11, RHR Discharge to SI
1-FCV-63-8, RHR Discharge to CVCS
1-FCV-74-21, -3, RHR Suction from RWST
1-FCV-63-5, SI Suction from RWST
1-FCV-62-135, -136, CVCS Suction from RWST
1-FCV-72-21, -22, -506, CS Suction from RWST
1-FCV-63-626, -627, RHR Discharge
1-FCV-63-640, -641, RHR Discharge to Hot Legs
1-FCV-63-560, -633, -632, -561, RHR Discharge to Cold Legs

1R21.32a, Equipment/Environmental Qualification

RWST

Pumps:
1-PMP-74-10-A, -B, RHR Pumps A-A and B-B
1-PMP-72-10, -27, CS Pumps A-A and B-B
1-PMP-63-10, -15, SI Pumps A-A and B-B

Instruments:
1-LT-63-180, -181, -182, -183, Containment Sump Level
1-PT-68-340, -334, -323, Pressurizer Pressure
1-PDT-30-42, -43, -44, Containment Pressure

1R 21.33a, Equipment Protection

1-LT-63-50, -51,-52, and -53, RWST LEVEL

1R21.34a, Component Inputs/Outputs

Valves**:**
1-FCV-74-21, -3, RHR Suction from RWST
1-FCV-63-72, -73, RHR Suction from RB Sump
1-FCV-63-5, SI Suction from RWST
1-FCV-62-135, -136, CVCS Suction from RWST
1-FCV-63-11, RHR Discharge to SI
1-FCV-63-8, RHR Discharge to CVCS
1-FCV-72-44, -45, CS Suction from RB Sump
1-FCV-72-21, -22, CS Suction from RWST

1R21.35a, Operating Experience

Valves

1-RFV-063-0535-S
1-RFC-063, -0534-A
1-RFV-063, 0536-B

1R21.4a, Identification and Resolution of Problems

Pumps:
1-PMP-74-10-A, -B, RHR Pumps A-A and B-B
1-PMP-72-10, -27, CS Pumps A-A and B-B
1-PMP-63-10, -15, SI Pumps A-A and B-B

Valves:
1-FCV-72-44, -45, CS Suction from RB Sump
1-FCV-63-72, -73, RHR Suction from RB Sump
1-FCV-63-11, RHR Discharge to SI
1-FCV-63-8, RHR Discharge to CVCS
1-FCV-74-21, -3, RHR Suction from RWST
1-FCV-63-5, SI Suction from RWST
1-FCV-62-135, -136, CVCS Suction from RWST
1-FCV-72-21, -22, CS Suction from RWST

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EPM-CPH061692, Required Thrust/Torque Calculations for 1-FCV-72-45, Rev. 5
EPM-DCB-082592, Required Thrust/Torque Calculations for 1-FCV-62-135, Rev. 6
EPM-DCB-082692, Required Thrust/Torque Calculations for 1-FCV-62-136, Rev. 5
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1-45W700-1, Key Diagram 120V AC & 125V DC Vital Plant Control Power System, Rev.20
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1-45W724-1, Wiring Diagrams 6900V Shutdown Board 1A-A Single Line, Rev. 22
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1-45W751-9, Wiring Diagrams 480V Reac MOV BDS 1B1-B & 2B1-B Single Line Sh.3, Rev. 37
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1-45W751-7, Wiring Diagrams 480V Reac MOV BDS 1B1-B & 2B1-B Single Line Sh.1, Rev. 52
1-45W751-2, Wiring Diagrams 480V Reac MOV BDS 1A1-A & 2A1-A Single Line Sh.2, Rev. 28
1-45W751-1, Wiring Diagrams 480V Reac MOV BDS 1A1-A & 2A1-A Single Line Sh.1, Rev. 46
1-45W756-6, Wiring Diagrams 480V Cont & Aux Bldg VT BD 1B1-B & 2B1-B Single Line Sh.2, Rev. 73
1-45W756-2, Wiring Diagrams 480V Cont & Aux Bldg VT BD 1A1-A & 2A1-A Single Line Sh.2, Rev. 67
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1-47W809-1 through -7, -9, Flow Diagram CVCS System, Rev. 50
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1-47W812-1, Flow Diagram Containment Spray System, Rev. 24
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1-47A8910-63-08, Mechanical Table of MOV Requirements, Rev. 4
1-47A8910-63-04, Mechanical Table of MOV Requirements, Rev. 5
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1-SI-74-901-B, RHR Pump 1B-B Quarterly Performance Test, Rev. 7
1-SI-74-901-A, RHR Pump 1A-A Quarterly Performance Test, Rev. 10
1-SI-0-903, Isolation Valve Leak Test (Boron Injection and SI/RHR Hot Leg Injection Check Valves), Rev. 6
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1-SI-72-905, Check Valve Disassembly and Inspection - CS Pump 1B-B, Rev. 5
1-SI-63-907, RHR Hot Leg and Cold Leg Injection Check Valve Testing, Rev. 14
1-SI-62-907, Chemical Volume Control System Valve Position Indication Verification and Full Stroke Exercising, dated 3/17/05
1-SI-99-300-B, Engineered Safety Feature Actuation System Slave Relay Go Test Train B, dated 3/27/05
1-SI-63-903-B, Valve Full-Stroke Exercising During Cold Shutdown- Safety Injection (train B), Rev. 11, dated 4/01/05
1-SI-99-10-B, 31 Day Functional Test of SSPS Train B and Reactor Trip Breaker B, dated 4/22/05, 6/15/05

1-SI-99-10-A, 31 Day Functional Test of SSPS Train B and Reactor Trip Breaker A, dated 3/9/05, 5/10/05
1-SI-99-226, response Time of Refueling Water Storage Tank and Containment Sump Transmitter (ID-100 Method) for Cycle A, dated 9/18/02, 2/28/05
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1-SI-30-44, 18 Month Channel Calibration Containment Pressure Channel II Loop 1-LPP-30-44 (P-936),Rev. 8, dated 3/9/05 , 9/15/03
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1-SI-68-5, 18 Month Channel Calibration Pressurizer Pressure Channel I Loop 1-LPP-68-340 (P-455),Rev. 10, dated 3/18/05 , 9/20/03
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1-SI-63-51, 18 Month Channel Calibration RWST Level Channel II Loop 1-LPL-63-51 (P-914),Rev. 11, dated12/10/04 , 8/19/03
1-SI-63-50, 18 Month Channel Calibration RWST Level Channel I Loop 1-LPL-63-50 (P-913),Rev. 10, dated 1/20/05 , 9/04/03
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6785, Oil Leak on 1B Centrifugal Charging Pump, dated 02/14/03
8835, System Failed to Respond During 1-SI-99-300-B, dated 10/03/03
14688, DCN W36588 Installed 1/2' Diameter Relief Lines on Various Valves, dated 03/05/04
8592, Cooling of RHR Hx "B" Was Terminated by 0-SI-82-3 by Blackout Signal, dated 09/10/03
12838, CS Hx "A" Has Borated Water Leakage at the Flange, dated 10/19/03
12906, 1B-B CCS Pump Auto Started on Low Discharge Pressure. dated 12/12/03
12664, Wrong Breaker Rracked Out Making CS Pump 1A Inoperable, dated 07/18/03

2054, Conflict between CCS System Description and SFPC System Description Regarding Cooling Flow Through SFP Hxs, dated 04/03/01
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6559, Compliance Instrument 1-PR-68-340 was Found To have the Red Pen Stuck, dated 01/23/03
4858, During Performance of 0-SI-82-4, DG 1B-B BO Test, 1B-B CCS Pump Started in 3.49 seconds, dated 10/25/04
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6572, An Error Was Found in the Electronic Version of the WB Technical Specifications
6695, System Description N3-63-4001 and the FSAR Incorrectly Specify that Post-LOCA Hot Leg Recirc Occurs at 9 Hours After Initiation of Cold Leg Recirc
33226, NRC Bulletin 2003002 Was Incorrect Regarding Screens Over Drains
12145, Temperature Loops 1-T-74-14 25 Provide Indication for RHR Pumps 1A-A 1B-B
4704, Residual Heat Removal Pump (RHRP) 1A-A Has an Adverse Trend in Mechanical Seal Leakage
02-002407-000, Functional Evaluation of RHR Pump Seal Leakage
4554, Ametek Power Instruments 10CFR21 Notification
6785, WO 02-05507 was Written on Oil Leak on 1B Centrifugal Charging Pump Brg TE
85969, SIP 1A-A Lifted During Quarterly Performance Test
03-000006-000, During Performance of 1-SI-63-901A (SIP 1A-A) One of the SI Relief Valves Leaked Through
01-012637-000, During Operation of SIP 1A to Fill CLA #1 PRT Level Increased Unexpectedly

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00-007917-000, 125VDC Vital Battery III 60 Month Performance Test and 125VDC Vital Battery Charger III Test
00-008330-000, 125VDC Vital Battery IV 60 Month Performance Test and 125VDC Vital Battery Charger IV Test
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04-826216-000, 125VDC Vital Battery I Quarterly Inspection

04-817073-000, 125VDC Vital Battery I 18 Month Service Discharge Test
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05-810518-000, 125VDC Vital Battery III Quarterly Inspection
04-818257-000, 125VDC Vital Battery III 18 Month Service Discharge Test
04-824157-000, 125VDC Vital Battery IV Quarterly Inspection
05-811478-000, 125VDC Vital Battery IV Quarterly Inspection
04-818424-000, 125VDC Vital Battery IV 18 Month Service Discharge Test
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05-810342-000, 125VDC Vital Battery V Quarterly Inspection
03-017418-000, 125VDC Vital Battery V 18 Month Service Discharge Test
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02-012844-000, RHR MTR 1B-B Bridge, Megger & Hi-pot Testing
01-005632-000, RHR MTR 1A-A Bridge, Megger & Hi-pot Testing
98-007112-000, RHR MTR 1A-A Bridge, Megger & Hi-pot Testing
04-822842-000, Essential Raw Cooling Water Pumps F-B and H-B Performance Test
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05-810310-000, Component Flow Blockage Testing – ERCW (Train B), dated 05/30/05
05-810520-000, Component Flow Blockage Testing – ERCW (Train A), dated 06/12/05
05-811726-000, Component Flow Blockage Testing – ERCW (Train A), dated 07/12/05
03-03473-00, Oil leak on Outboard Bearing of CCP 1B, dated 04/15/02
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97-001967-000, Replace the U1 RHR Hx with the U2 Hx, dated 10/10/97
98-002459-000, Disassemble and Reassemble RHR Hx 1A, dated 03/14/99
97-001967-001, Plug Hx Tubes for 1-HTX-74-31-B, dated 09/06/97
93-05855-00, Removal of Temporary Flush Strainers, dated 03/24/03
03-012564-000, Regear Limitorque Motor Operator, dated 09/25/03
05-815317-000, Limits for External Leakage in Auxiliary Building, dated 04/18/05
03-012562-000, Regear Limitorque Motor Operator, dated 09/27/03
03-019058-000, MOVATS Testing on FCV-72-21, dated 03/22/05
99-016170-000, Limitorque Operator Maintenance, datee 06/08/00
02-014389-000, MOVATS Testing on FCV-63-72, dated 10/03/03
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03-021057-000, Limitorque Operator Maintenance 1380V on FCV-62-135, dated 03/02/05
03-021056-000, Limitorque Operator Maintenance 1380V on FCV-62-136, dated 03/12/05

04-811771-000, Limitorque Operator Maintenance 1380V on FCV-74-21, dated 07/26/04
02-012885-000, Limitorque Operator Maintenance 1380V on FCV-63-05, dated09/06/03
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04-815907-000, Disassembly and Inspection of SI Cold Leg Check Valves, dated 03/17/05
04-817572-000, Sample Bearing Oil Lubricant, dated 05/16/05
04-822846-000, SI pump 1B-B Quarterly Performance Test, dated 02/10/05
04-826329-000, CS pump 1A-A Quarterly Performance Test, dated 05/16/05
05-810174-000, Add Oil to Reach Half Full, dated 01/09/05
05-810263-000, CS (train B) Check Valve Testing, dated 07/03/05
05-810292-000, CS pump 1B-B Quarterly Performance Test, dated 06/06/05
05-811524-000, RHR pump 1B-B Quarterly Performance Test, dated 06/28/05
05-813668-000, RHR pump 1A-A Quarterly Performance Test, dated 03/05/05
05-813773-000, Test valve RFV-63-626 per 1-SI-0-902, dated 05/26/05
05-813950-000, Disassemble and Replace Mechanical Seal on RHR 1A-A, dated 03/25/2005
03-021078-000, Inspection of Switchgear Bus and MCC, 480V REAC MOV BD 1A1-A
03-021081-000, Inspection of Switchgear Bus and MCC, 480V C&A Vent BD 1A1-A
02-013544-000, Inspection of Switchgear Bus and MCC, 480V C&A Vent BD 1B1-B
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03-002744-000, 6.9kV SD BD SYS 211 Circuit Breaker Inspection 0-BKR-067-0047-B

Miscellaneous
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WB-DC-40-64, Section 4.11, SB LOCA
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FSAR Section 15.4, Condition IV - Limiting Faults
N3-63-4001, SI System Description
System Health Report, System 74, RHR, 1st Period FY05
System Health Report, System 63, Safety Injection, 1st Period FY05
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WBN-VTM-L200-0010, Limitorque Valve Controls, Rev. 29
BR-5N-58A-C, Trip Report – MOV User's Group Meeting, dated 03/09/90
PS4M15, Classification, Procurement, Receipt, and Use of Lubricants, Rev. 3
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NRC Notice 88-74, Potentially Inadequate Performance of ECCS in PWRs during Recirculation Operation Following a LOCA, dated 6/25/90
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SSD-1-L-63-50, Setpoint and Scaling Document for RWST Level 1-L-63-50, Rev. 6
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SSD-1-L-63-53, Setpoint and Scaling Document for RWST Level 1-L-63-53, Rev. 6
SSD-1-63-180, Process Parameters , Setpoint and Scaling Document for Containment Sump Level Channel 1-L-63-180, Rev. 4
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SSD-1-P-68-340,Setpoint and Scaling Document for Pressurizer Pressure 1-P-68-340, Rev. 5

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N3-63-4001, Safety Injection System, Rev. 18
N3-70-4002, Component Cooling System, Rev. 14
N3-67-4002, Essential Raw Cooling Water System, Rev. 16
N3-62-4001, Chemical Volume and Control System, Rev. 23
N3-30AB-4001, Auxilary Building HVAC System, Rev. 21

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WBNFQ-MOV-001, Limitorque Motorized Valve Operators with Type RH Insulated Motors, Rev. 25
WBNEQ-MOT-001, Westinghouse Motors on RHR, CVCS, CS, and SIS, Rev. 21
WBNEQ-ILT-002, Containment Sump Level Transmitter, Rev. 7
WBNEQ-XMTR-004, Pressurizer Pressure Transmitter, Rev. 18
WBNEQ-XMTR-001, containment Pressure Transmitter, Rev. 23

PERs Written During This Inspection

85944, PSA dependency tables were incorrect for certain valves and thermal expansion calculation used the wrong maximum RB sump temperature of 195 degrees F versus the design temperature of 190 degrees F.

86727, WBNP Operating Instructions and System Description Didn't Reflect Transfer Between Hot Leg Recirc and Cold Leg Recirc Every 24 Hours Following a LOCA

End Attachment