April 11, 2003

Mr. Mark E. Warner
Site Vice President
c/o James M. Peschel
FPL Energy Seabrook, LLC
Seabrook Station
P.O. Box 300
Seabrook, NH 03874

SUBJECT: SEABROOK STATION - NRC INSPECTION REPORT NO. 50-443/03-005

Dear Mr. Warner:

On February 28, 2003, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Seabrook Station. The enclosed report documents the inspection findings which were discussed at an exit meeting on February 28, 2003, with you and other members of your staff.

The inspection was an examination of activities conducted under your license as they relate to safety system design and performance capability of the high and intermediate head safety injection systems, reactor trip and solid state protection systems and compliance with the Commission's rules and regulations. The inspection consisted of system walkdowns; examination of selected procedures, drawings, modifications, calculations, surveillance tests and maintenance records; and interviews with station personnel.

Based on the results of the inspection, the inspectors identified two findings of very low safety significance (Green), and both of the issues were determined to involve violations of NRC requirements. However, because of their very low safety significance and because they have been entered into your corrective action program, the NRC is treating these issues as a non-cited violations, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny any of these non-cited violations, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Seabrook facility.

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

Sincerely,

/RA/

Lawrence T. Doerflein, Chief
Systems Branch
Division of Reactor Safety

Docket No. 50-443
License No. NPF-86

Enclosure: Inspection Report 50-443/03-005

Attachment 1: Supplemental Information

cc w/encl:
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Board of Selectmen

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U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket/Report No:	05000443/2003-005
License No:	NPF-86
Licensee:	FPL Energy Seabrook, LLC
Facility:	Seabrook Station, Unit 1
Location:	P.O. Box 300 Seabrook, New Hampshire 03874
Dates:	February 10-14 and February 24-28, 2003
Inspectors:	P. Kaufman, Senior Reactor Inspector, Team Leader, DRS T. Cerne, Senior Resident Inspector, DRP N. Della Greca, Senior Reactor Inspector, DRS A. Lohmeier, Senior Reactor Inspector, DRS F. Jaxheimer, Reactor Inspector, DRS C. Colantoni, Reactor Inspector, (Trainee), DRS H. Anderson, NRC Contractor
Approved by:	Lawrence T. Doerflein, Chief Systems Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 050000443/03-05; On 2/10-28/2003; Seabrook Station, Unit 1; Safety System Design and Performance Capability.

This inspection was conducted by four Region I inspectors, one resident inspector, and one NRC contractor. Two findings of very low safety significance (Green) were identified, both of which were considered to be non-cited violations. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using IMC 0609, " Significance Determination Process "(SDP). Findings for which the SDP does not apply may be "Green" or be assigned a severity level after NRC management review. 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.

Cornerstone: Mitigating Systems

Green: The inspectors identified the licensee had not established a procedure to test or monitor the actual performance of the main lube oil pumps for the centrifugal charging pumps (high head injection pumps). Such proceduralized verification that the non safety-related auxiliary lube oil pump shuts down and the main lube oil pump provides adequate oil flow during charging pump operation ensures that the safety-related main lube oil pumps would perform as designed during events.

This finding was more than minor since it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and could affect the cornerstone objective of ensuring the availability, reliability, and capability of the charging pumps. The issue was considered to be of very low safety significance (Green) based on a Phase 1 evaluation of the Significance Determination Process (SDP) since there was indirect evidence that the lube oil system functioned properly and, therefore, no actual loss of safety function. The issue was determined to be a non-cited violation (NCV) of 10CFR 50, Appendix B, Criterion XI, Test Control. (Section 1R21.1)

Green: The inspectors identified that the licensee had not established a procedure to test a safety-related design function of the charging pump minimum flow bypass line valves (CS-V-196 & 197). Specifically, the licensee did not test the automatic function of the valves to reopen to provide recirculation flow and charging pump protection at the low flow setpoint.

This finding was more than minor since it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and could affect the cornerstone objective of ensuring the availability, reliability, and capability of the charging pumps. This issue was considered to be of very low safety significance (Green) based on a Phase 1 evaluation of the SDP because some previous calibration data and valve stroke testing results provided evidence of proper valve operation, and there was no actual loss of safety function. This finding was determined to be a non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XI, Test Control. (Section 1R21.2)

Report Details

1. REACTOR SAFETY

Cornerstones: Mitigating Systems and Barrier Integrity

1R21 Safety System Design and Performance Capability (IP 71111.21)

Introduction

The inspectors selected the high and intermediate head safety injection systems, and the reactor trip system (RTS)/solid state protection system (SSPS) for its review of the design and performance capability of safety systems at the Seabrook facility. The systems were selected because of their risk significance in mitigating systems and barrier integrity. The inspection procedure used for this effort was IP 71111, Attachment 21.

a. Inspection Scope

The inspectors reviewed design and licensing basis documents for the high and intermediate head safety injection systems and RTS/SSPS to determine the system and component functional requirements during normal operation and accident mitigation. The design and licensing documents reviewed for the systems included the Updated Final Safety Analysis Report (UFSAR), the plant Technical Specifications (TS), and the design basis document for each system. In addition, the inspectors reviewed component vendor manuals, engineering analyses and calculations, equipment qualification records, instrument setpoints, plant procedures, system modifications, piping and instrument drawings, electrical schematics, instrumentation and control drawings and logic diagrams. The inspectors also reviewed selected portions of design documents for interfacing systems such as the primary component cooling system.

The inspectors selected several major components within these systems for in-depth inspection. The components included the high head charging system (CS) pumps and the intermediate head safety injection (SI) pumps, the refueling water storage tank (RWST), volume control tank (VCT), and several motor-operated valves. The inspectors reviewed this equipment to assure availability, reliability, and functional capability had been maintained.

For selected calculations and analysis, the inspectors reviewed the design basis functional requirements and assumptions to verify that they were appropriate and agreed with the current plant configuration, that proper engineering methods and models were used, and that there were adequate technical bases to support the conclusions. When appropriate, the inspectors performed independent calculations to evaluate the adequacy of the document. Additionally, plant procedures including emergency operating procedures (EOPs) and surveillance test results were reviewed to ensure they supported the system licensing and design basis. The inspectors reviewed the licensee's evaluations of generic communications, such as NRC Information Notices, that pertained to the components or system operation.

In reviewing modifications, the inspectors assessed the ability of the systems selected to perform their design functions, assuring that the changes did not adversely affect the system operation and/or design and licensing bases. The inspectors reviewed design change request (DCR) and minor modification (MMOD) packages including reviews and approvals, 10CFR50.59 screening and evaluations, design descriptions, applicability determinations, environmental impact screening, UFSAR change requests, interdisciplinary reviews, independent reviewer evaluations, and related change drawings. The inspectors verified the adequacy of supporting engineering documents and post modification testing for selected modifications. During plant walkdowns, the inspectors observed the material condition of the systems to verify that equipment and component degradation was being adequately addressed and resolved and that the systems were installed and configured consistent with design drawings.

The inspectors reviewed selected operating and surveillance procedures and test results to verify that the high and intermediate head safety injection systems and RTS/SSPS were being operated, maintained, and tested in accordance with design and licensing requirements. Work orders, system health reports, and corrective actions taken to upgrade the system equipment, valves and control components, were reviewed.

The inspectors reviewed the adequacy of the licensee's implementation of the in-service test (IST) program for pumps and valves in the high and intermediate head safety injection systems and supporting systems. The review included applicable surveillance test procedures and focused on the ability of these systems to provide emergency cooling to the core during design basis accident conditions. Acceptance criteria included in the pump tests to satisfy the licensing and design basis conditions were reviewed. IST results for the charging and safety injection pumps were reviewed to verify the ability of each pump to develop the required pressure head.

The inspectors reviewed IST procedures and test results for selected motor-operated, air-operated, check, and relief valves with regard, as applicable, to actuator and valve type; normal, safety, and fail positions; system location; valve class, category, and size; and test frequency.

b. Findings

.1 Performance Monitoring of the Centrifugal Charging Pumps Main Lube Oil Pump

Introduction

The inspectors identified that the licensee had not established a procedure to test or monitor the actual performance of the main lube oil pumps for the centrifugal charging pumps (high head injection). This issue was determined to be of very low safety significance (Green) and a non-cited violation (NCV) of 10CFR 50 Appendix B, Criterion XI, Test Control.

Description

Each centrifugal charging pump has a safety-related shaft driven main lube oil pump which supplies oil pressure while the charging pump is operating, and a non safety-related electric motor driven auxiliary lube oil pump which supplies lube oil pressure while the charging pump is in standby. The auxiliary lube oil pump is designed to stop automatically when oil pressure increases above 10 psig and start automatically if oil pressure drops below 8 psig.

During the review of normal operating and in-service testing (IST) procedures to evaluate the licensee's monitoring of the charging pump lube oil system, the inspectors noted that the test procedures did not contain a deliberate step to verify that the auxiliary lube oil pump stopped after the charging pump came to operating speed. Such documented and proceduralized verification ensures that the main lube oil pumps are operable and capable of performing their safety-related function, as well as provide the opportunity to identify degrading pump performance. The inspectors also noted that the direct verification of the stopping of the auxiliary lube oil pump was a vendor procedure recommendation during the early stages of a proposed design change request for the lube oil system.

10 CFR 50, Appendix B Criterion XI requires licensees establish a test program to demonstrate that structures, systems and components will perform satisfactorily in service, and that the testing be identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits. The inspectors noted that specific IST requirements provided in American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Section XI are not applicable to skid mounted components when the skid mounted components are verified to be challenged and operated during the normal testing or operation of the primary component. This is because it is assumed that the failure or serious degradation of skid mounted components would become evident during the required monitoring of the primary component during required Technical Specification surveillance testing, normal operation, or post maintenance testing. However, in this case, the auxiliary lube oil pumps and the associated non safety-related control circuit have the potential to mask a performance problem including the inoperabilty of the qualified safety-related main lube oil pumps. The inspectors found that the auxiliary lube oil pumps were not qualified for accident environmental conditions, were not qualified for seismic events, and were not controlled by safety-related instrumentation circuit.

The licensee initiated condition report CR-03-01606, to document the lack of procedure verification that the main lube oil pump supplied the lube oil demands of the centrifugal charging pumps during in-service testing.

Analysis

This issue is a performance deficiency since the licensee failed to test the function of the centrifugal charging system pumps' main lube oil pumps in a procedurally controlled manner. Additionally, the licensee could not provide where the proper function and operability of this qualified safety-related sub-component was tracked, monitored or documented as part of the station test control program.

The finding is more than minor because this condition if left uncorrected had the potential to render components which are credited to perform a safety function, high head injection, incapable of performing this function credited in the UFSAR, as well as for additional events modeled in the station Probabilistic Risk Assessment. This finding is also more than minor because it is associated with the reliability and availability of emergency core cooling system (ECCS) components and thus is associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone. The finding affects the Mitigating Systems objective of ensuring availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was of very low safety significance because, although the licensee did not provide for the level of test control as defined in Appendix B, Criterion XI, there was online monitoring of other lube oil system parameters that would likely trigger investigation into bearing and speed changer oil lubrication performance problems even if the function was supplied by the non safety-related auxiliary oil pumps. There was also indirect monitoring of related components that when thoroughly reviewed established evidence that the lube oil system has functioned properly. Therefore, the lack of direct verification of the main lube oil pump operation had not resulted in the system becoming incapable of performing the intended function. Since no failures of components occurred and equipment remained operable, the finding screened to Green (very low safety significance) through phase 1 of the SDP.

Enforcement

10CFR 50, Appendix B, Criterion XI, Test Control, requires a test program be established to assure that all testing required to demonstrate that structures, systems and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. Contrary to this, the licensee had not established written procedures that were adequate to demonstrate that the safety-related main lube oil pump was operating satisfactorily with no flow from the non safety-related auxiliary oil pump. Such testing is required since the main lube oil pumps are the components designed and qualified for the purpose of supporting the charging pumps emergency core cooling function. However, because of the very low safety significance of this issue and because it was entered into the licensee's corrective action program as CR 03-01606, this issue was treated as a Non-Cited Violation (NCV), consistent with Section VI.A.1 of the NRC Enforcement Policy, issued on May 1, 2000 (65 FR 25368) **(NCV 50-443/03-005-01)**

.2 Testing of Charging Pump Minimum Flow Bypass Line Valves

Introduction

The inspectors identified that the licensee had not established a procedure to test a safety-related design function of the charging pump minimum flow line isolation valves (valves CS-V-196 & 197). Specifically, the licensee did not test or document the automatic function of the valves to reopen to provide recirculation flow and charging pump protection at the low flow setpoint. This issue was determined to be of very low safety significance (Green) and was a Non-Cited Violation (NCV) of 10 CFR 50, Appendix B, Criterion XI, Test Control.

Description

Each centrifugal charging pump has a minimum flow (miniflow) line on the discharge of the pump to ensure there is a sufficient flow of water to keep the pump internals cool and lubricated. Each minimum flow line contains a normally open motor-operated valve which closes on receipt of a safety injection (SI) signal. The minimum flow isolation valve for each charging pump will reopen if the flow through its respective pump drops below the low flow setpoint.

The inspectors noted that quarterly valve stroke testing of the charging pump minimum flow valves (valves CS-V-196 and 197) was conducted in accordance with the surveillance test program requirements, as delineated in procedure OX1456.01, "Charging Pump A & B Quarterly Flow and Valve Stroke Test and 18 Month Remote Position Indication Verification". The inspectors noted that the procedure required stroke time testing of valves CS-V-196 and 197 in both the open and close directions. The inspectors also found that quarterly Engineered Safety Features Actuation System (ESFAS) slave relay testing for Train A (OX1456.22) and Train B (OX1456.45) was conducted to test the "close" function of valves CS-V-196 and 197 upon receipt of an SI signal with flow greater than 122 gpm. However, the inspectors determined there was no surveillance test in the station test program to check that valves CS-V-196 and 197 reopen if charging pump forward flow drops below 82 gpm, as specified as the low flow setpoint in the high-head system description for minimum centrifugal charging pump flow.

The inspectors also reviewed test records for engineering surveillance ES1815.001, "Differential Pressure Test of Chemical and Volume Control System Valves," which provided evidence that valves CS-V-196 and 197 did reopen upon lowering charging pump forward flow. However, the inspectors determined that the procedure did not adequately test the reopen safety function of the valves in that: no check of the setpoint at which the valves reopened was conducted or documented; no credit was taken for the conduct of this test as a means of verifying the safety-related valve "reopen" function; and, no test of this function was performed, or required to be performed, by the existing station test control program during the last refueling outage in 2002.

The licensee initiated condition report CR-03-01735 to document the lack of testing for the "reopen" function of valves CS-V-196 and 197 and to establish the requisite mechanism and controls for future testing of the valves safety-related functions under the station's test control program.

Analysis

This issue was a performance deficiency since the licensee failed to test the reopening function of valves CS-V-196 and 197 in a procedurally controlled manner. Additionally, this automatic function was not tracked or documented as a test requirement of the station's test control program.

The inspectors determined that this finding was more than minor since it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and could affect the cornerstone objective of ensuring the availability, reliability, and capability of the charging pumps which make up the high head injection system. The inspectors noted that the subject valves safety function of reopening is only required during accident sequences that might develop after the initial high-head charging flow to the reactor coolant system upon initiation of a safety injection signal. The inspectors also noted that some calibration data and valve stroke testing results obtained during previous (but not the 2002) refueling outages provided evidence of proper valve operation. Since there was no actual loss of safety function of the high head injection system or train, this finding screened to Green (very low safety significance) based on Phase 1 of the At-Power Reactor Safety Significance Determination Process (SDP).

Enforcement

10 CFR 50, Appendix B, Criterion XI, Test Control, requires that a test program be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. Contrary to this requirement, the licensee had not established a procedure to test the safety-related design function of the charging pumps minimum flow bypass line valves, valves CS-V-196 and 197, to reopen if charging pump forward flow dropped below the low flow setpoint for minimum centrifugal charging pump flow. However, because of the very low safety significance of this issue, and because it was entered into the licensee's corrective action program as CR-03-01735, this issue was treated as a non-cited violation (NCV), consistent with Section VI.A.1 of the NRC Enforcement Policy, issued on May 1, 2000 (65 FR 25368). **(NCV 50-443/03-005-02)**

1. OTHER ACTIVITIES (OA)

4OA1 Identification and Resolution of Problems (IP 71152)

a. Inspection Scope

The inspectors reviewed the licensee's activities associated with the identification and resolution of problems associated with the high and intermediate head safety injection systems and the reactor trip and solid state protection systems. The inspectors conducted system walkdowns, reviewed work orders, plant modifications, operating experience reports, system health reports, audits and surveillance reports to assess the licensee's adequacy of identifying problems. The inspectors reviewed a sample of condition reports (CRs) associated with these systems to assess the scope of identified

problems and to evaluate the adequacy and timeliness of the corrective actions resulting from the identified problems.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

During an exit meeting on February 28, 2003, the inspectors presented the results of the inspection to Mr. Mark Warner and other members of the licensee's staff. Proprietary information examined during the inspection was identified and returned to the licensee at the conclusion of the inspection. The inspectors verified the inspection report does not contain proprietary information.

ATTACHMENT 1
SUPPLEMENTARY INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

FPL Energy

P. Brown, Principal NSSS Engineer/Analyst
T. Couture, CS System Engineer
J. Crowley, Unit Supervisor
S. Doody, SI System Engineer
R. Faix, Mechanical Design Engineering Supervisor (NSSS)
S. Fournier, Design Engineering
K. Fox, I&C Engineer/Analyst
R. Gwinn, Senior Engineer, CBM, Plant Engineering
J. Hill, Operations Engineer
D. Kelly, EOP Coordinator
G. Kilby, Assistant Operations Manager - Support
K. Kiper, Nuclear Risk Engineer/Analyst
G. Kotkowski, Electrical Design Supervisor
G. Lavigne, Regulatory Compliance
M. Makowicz, Engineering Supervisor (NSSS Systems)
J. Malone, 50.59 Review Coordinator
E. Metcalf, Plant Engineering Supervisor
T. Nichols, Plant Engineering Manager
R. Parry, IST Supervisor
J. Peschel, Licensing Manager
R. White, Mechanical Engineering Manager

Nuclear Regulatory Commission (NRC)

L. Doerflein	Chief, Systems Branch, DRS
G. Dentel	Senior Resident Inspector

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened/Closed

05000443/2003-005-01	NCV	Failure to Test The Function of The Charging Pumps' Main Lube Oil Pumps
05000443/2003-005-02	NCV	Failure to Test a Safety-Related Design Function of the Charging Pumps Minimum Flow Bypass Line Valves

LIST OF DOCUMENTS REVIEWED

Calculations/Evaluations

C-S-1-50007 Rev. 0, Charging Pump IST Uncertainties
C-S-1-84203 Rev. 0, Charging Pump NPSH from VCT
C-S-1-84206 Rev. 0, Charging Pump NPSH Study
C-S-1-45424 Rev. 0, FEMA Review for Zone 30A
C-S-1-45425 Rev. 0, FEMA Review for Zone 30B
C-S-1-45431 Rev. 0, FMEA Review for Zone 32C
C-S-1-45465 Rev. 0, FMEA Review for Zone 33C
C-S-1-E-0130 Rev. 1, RWST Time to Vortex
C-S-1-24101 Rev. 0, Effects of Nitrogen Transport into the SI Pump Discharge Piping
C-S-1-45697 Rev. 0, Safety Injection Intermediate Head System Design Pressure Review
C-S-1-50013 Rev. 0, Safety Injection Pumps (SI-P-6A/B) IST Uncertainties
C-S-1-80904 Rev. 0, Motor Operated Valve Calculations
C-S-1-84104 Rev. 1, Maximum Void Size in Charging and SI Pump Suction Piping
CWS-NAH-307C File NAH-282/2, VCT Level Instrument Malfunction
9763-F-FS-01 Flooding Study for Primary Auxiliary Building Moderate Energy Lines
9763-F-FS-02 Flooding Study of High Energy Line Break in PAB
Report TP-7 Rev. 5, Moderate Energy Line Break Study, prepared by UE&C
GL 95-07 Rev. 2, Pressure Locking and Thermal Binding of Gate Valves
EE-99032 Rev. 1& 2, Maximum Allowable Gas Bubble Size at ECCS High Points
EE-99033 Rev. 0, Charging Pump Cubicle Internal Flooding Evaluation
SS-EV-980002 Evaluation of ECCS High Points, dated October 28, 1999
SS-EV-980006 Rev. 2, IST Pump Surveillance Requirements
SBC-69 Rev. 0, Minimum SI Pump Flow to Remove Decay Heat
SBC-535 Rev. 1, 5 & 6 Seabrook Sensitivity Study on ECCS Pump Degradation for Cycle 5 Design Basis Accidents
4.3.02.16F Rev. 1, Pipe Break Flow rates
4.3.4.2F Rev. 7, SI System Pressure / Temperature Design Basis
4.3.4.14F Rev. 2, Safety Injection System Penetration Relief Valve
4.3.4-17F Rev. 2, Safety Injection SI Pump NPSH
4.3.4.21F Rev. 1, Safety Injection Syst. Relief Valves Set Pressure Adjusted
4.3.4.27F Rev. 0, SI System Transient Evaluation
4.3.05.10F Rev. 6, Containment Building Spray Hydraulic Analysis
4.3.05.20F Rev. 2, Containment Building Spray Sump Water pH Values
4.3.05.31F Rev. 3, RWST Vortex Studies
4.3.05-34F Rev. 2, Containment Building Spray System Mixing Chamber Design & Spray pH
4.3.05.61F Rev. 0, Revise Containment Spray and Sump pH Calculations
4.3.22.F06 Rev. 2, RHR/SI/CBS Water Height in Containment following a LOCA
4.3.22-07F Rev. 6, Water Level in Containment following a Postulated LOCA
4.3.22-40F Rev. 2, Determine Containment Pressure / Temperature Response
4.3.23-36F Rev. 0, Containment Upper Bound Analysis of Sump Water Temperature
9763-F-FS-03 Rev. 0, Component Cooling and Residual Heat Removal Flooding Effect - Equipment Vault

Design Drawings

1-SI-D20446 Rev. 13, Safety Injection System Intermediate Head Injection System Detail
1-CS-D20722 Rev. 16, Chemical & Volume Control System Heat Exchanger Detail
1-CS-D20723 Rev. 16, Chemical & Volume Control System Purification Detail
1-CS-D20724 Rev. 12, Chemical & Volume Control System Letdown De-gasification
1-CS-D20725 Rev. 22, Chemical & Volume Control Charging System Detail
1-CS-D20726 Rev. 18, Chemical & Volume Control System Seal Water Detail
1-CS-D20729 Rev. 10, Chemical and Volume Control System Boric Acid Detail
9763-F-803212 Primary Auxiliary Building Piping Composite Zone 32-C
9763-F-815214 Primary Auxiliary Building Piping Composite Zone 33-C
1-NHY-804979 ESF Flow Diagram
1-NHY-503258 CBS-ECCS/Spray Logic Generation Diagram
Drawing No. 8, Pittsburgh - Des Moines Steel Company, Refueling Water Storage Tank Seabrook Station Rev. C1 , N. H. - Units 1 & 2 Mixing Chamber Details
Drawing No. E6 Rev. F , Pittsburgh - Des Moines Steel Company, Drawing No. E6 - Refueling Water Storage Tanks Seabrook Station, N. H. - Units 1 & 2
1-CBS-B20233 Rev. 26, Containment Spray System
1-RC-B20841 Rev. 18, Reactor Coolant System Loop No. 1
1-RC-B20842 Rev. 11, Reactor Coolant System Loop No. 2
1-RC-B20843 Rev. 14, Reactor Coolant System Loop No. 3
1-RC-B20844 Rev. 17, Reactor Coolant System Loop No. 4
1-RH-B20662 Rev. 19, Residual Heat Removal System Train A Detail
1-RH-B20663 Rev. 16, Residual Heat Removal Sys. Train B Cross-Tie Detail
1-SI-B20450 Rev. 12, Safety Injection System Low Head Injection (Accumulators) Detail
1-SI-D20446 Rev. 13, Safety Injection System Intermediate Head Injection System Detail
1-SI-D20447 Rev. 12, Safety Injection System High Head Injection System Detail
1-SI-D20449 Rev. 8, Safety Injection System Low Head Injection System Sheet 2 of 2 Detail
9763-F-805201 Rev. 10, PAB Vaults Piping Zone 30B Plan at El. (-)50'-0"
9763-F-805204 Rev. 9, PAB Vaults Piping Zones 30A, B, C, & D Section "A-A"
9763-F-805370 Rev. 5, RHR & Cntmnt. Spray Equip. Vaults Floor & Equipment Drains Plans at
EL (-)61'-0", (-)50"-0", & (-)34'-6"

Design Bases Documents

DBD-ESF-01 Rev. 1, Engineered Safety Features Response Times
DBD-CC-01 Rev. 2, Primary Component Cooling Water System

Station Procedures

ES1804.061	IST Relief Valve Testing, Rev. 1
ES1815.001	Differential Pressure Test of Chemical & Volume Control System Valves, Rev. 1
ES-1.3	Transfer to Cold Leg Recirculation, Rev. 19
EX1804.061	Safety Injection Hot Leg Flow Balance, Rev. 1
EX1804.062	Safety Injection Cold Leg Flow Balance, Rev. 0
EX1804.063	Flow Balance of ECCS High Head Injection Lines, Rev. 9
EX1850.015	Check Valve Condition Monitoring Program, Rev. 0
ODI.05	Pump Starts from MCB or Other Remote Location, Rev. 6
OS1000.09	Refueling Operation, Rev. 6
OS1002.02	Operation of Letdown, Charging and Seal Injection, Rev. 12
OS1005.05	Safety Injection System Operation, Rev. 10
OS1008.01	Chemical and Volume Control System Makeup Operations, Rev. 8
OS1015.18	Setting Containment Integrity for Mode IV, Rev. 5
OS1202.02	Charging System Failure, Rev. 7
OS1202.04	Rapid Boration, Rev. 9
OX1405.07	Safety Injection Quarterly and 18 Month Pump Flow and Valve Test, Rev. 7
OX1405.10	Safety Injection System Cold Shutdown and Refueling Valve Test, Rev. 5
OX1405.10	Safety Injection System Cold Shutdown and Refueling Valve Test, Rev. 5
OX1405.11	Safety Injection System, Rev. 3
OX1405.12	SI Accumulator Cold Shutdown & 18 Month Refueling Valve Stroke Test, Rev. 2
OX1405.13	Safety Injection Comprehensive Pump Test, Rev. 0
OX1408.02	Boron Injection Flow Path Monthly Valve Alignment Check, Rev. 7
OX1456.01	Charging Pump A & B Quarterly Flow and Valve Stroke Test, Rev. 10
OX1456.02	ECCS Monthly System Verification
OX1456.05	ECCS Throttle Valve 18 Month Verifications, Rev. 6
OX1456.22	Train A ESFAS Slave Relay K602 Quarterly Go Test, Rev. 7
OX1456.28	Train A ESFAS Slave Relay K616 Quarterly Block/Go Test, Rev. 7
OX1456.45	Train B ESFAS Slave Relay K603 Quarterly Go Test, Rev. 7
OX1456.81	Operability Testing of IST Valves, Rev. 5
OX1456.86	Operability Testing of IST Pumps, Rev. 0
SM 7.16	Reactivity Management, Rev. 0

Repetitive Task Sheets

1-CS-OT003	18 Month Emergency Boration Flow Test Surveillance
1-CS-OT004	Weekly Borated Water Source Evaluation
1-CS-P-2-B-OT006	Charging Pump B Flow Test
1-ECCS-OT027	ECCS Valve Verification
1-SI-OT005	Train A Safety Injection Test (Group B Pump Test)
1-SI-OT007	Safety Injection Train A Valve Position Indication Verification
1-SI-OT011	SI Containment Isolation Valve Quarterly Stroke Test
1-SI-OT015	Safety Injection System Cold Shutdown Valve Test
1-SI-OT026	Train B Safety Injection Comprehensive Pump Test

Alarm Response Procedures

B6073	RWST LEVEL LO-LO
B6074	RWST LEVEL LOW
B6795	CHG PMP B MTR OTBD BRG TEMP HI
B6796	CHG PMP B MTR WDG TEMP HIGH
B6797	CHG PMP B MTR INBD BEARING TEMP HIGH
B6798	CHG PMP A MTR OTBD BRG TEMP HIGH
B6799	CHG PMP A WDG TEMP HIGH
B6800	CHG PMP A INBD BEARING TEMP HIGH
B6801	CHG PMP DISCH HEADER PRESS LOW
B6909	SI PUMP A MTR WINDING TEMP HIGH
B7068	SI PMP A MTR INBD BRG TEMP HIGH
B7069	SI PMP A MTR OTBD BRG TEMP HIGH
B7070	SI PMP B MTR INBD BRG TEMP HIGH
B7071	SI PMP B MTR WINDING TEMP HIGH
B7072	SI PMP B MTR OTBD BRG TEMP HIGH
D4660	BA MAKEUP VLV-110B TO CHG PMP OPEN
D4669	VCT LEVEL LOW
D5452	SEISMIC EVENT IN PROGRESS
F4548	SI PUMP A TRIP

Simulator Examinations

Demonstrative Examination #01, Rev. 11, dated September 6, 2002
Demonstrative Examination #02, Rev. 8, dated October 10, 2002
Demonstrative Examination #04, Rev. 8, dated November 7, 2002
Demonstrative Examination #12, Rev. 6, dated November 7, 2002
Demonstrative Examination #13, Rev. 10, dated November 8, 2002
Demonstrative Examination #32, Rev. 7, Undated
Crew Simulator Evaluation, NT-5701-3, Undated

Condition Reports (those with an asterisk were initiated due to NRC inspection activities)

01-00198	01-09404	02-05319	02-10593	03-01327*	03-01725*
01-02563	01-09479	02-06087	02-12558	03-01560*	03-01735*
01-03270	01-11178	02-07465	02-12906	03-01561*	03-01743*
01-06337	01-11940	02-08910	02-14009	03-01606*	03-01759*
01-06356	01-13082	02-08911	02-14447	03-01633*	03-02050*
01-06360	02-00471	02-09300	02-15343	03-01655*	
01-06543	02-00514	02-09338	02-15379	03-01696*	
01-07167	02-00863	02-09567	02-16016	03-01698*	
01-07343	02-03959	02-09752	02-16524	03-01701*	
01-08027	02-04623	02-10129	03–01303*	03-01716*	

PRA Model Change Request # 344*

Design Change Records (DCR)

Safety Injection System

MMOD 93-556 Hot Leg Recirculation Throttle Valve Adjustment, Rev. 0
MMOD 94-561 RC, SI RF04 Motor Operated Valve Design Changes, dated September 14, 1994
MMOD 98-608 SI, SI Check Valves Material Substitution, dated June 9, 1998
MMOD 99-538 SI, Elimination of Pipe Support M/S-223-2-223-SG-07, dated April 6, 1999
MMOD 99-550 Revised ECCS Flow Balance Criteria, Rev. 0
MMOD 99-558 SI, Elimination of Pipe Support M/S-221-4-221-SG-09, dated May 13, 1999
MMOD 00-549 SI, Removal of SI System Pipe Support M/S 222-4-222-SG-09, dated October 18, 2000
01DCR016 SI System Design Pressure Change, dated May 4, 2002

Chemical & Volume Control System

93DCR0053 Auxiliary Lube Oil Pump Revised Operation
96DCR007 Seal Injection Filter Valve Replacement RCS Leak Calculations, dated February 23, 1996
98DCR048 Replacement of Centrifugal Charging Lube Oil Switches, dated May 7, 2001
00DCR0013 Manual Transfer to Cold Leg Recirculation Timing
02DCR002 Valve Stem Leak-off Abandonment, dated January 30, 2002
02DCR008 Reduced ECCS Pump Head Requirements, dated May 5, 2002
98MMOD582 Positive Displacement Charging Pump Enhancements, dated April 24, 1998
98MMOD643 Charging Pump Flow Scaling and Uncertainties, dated September 25, 1998
99MMOD507 Chemical Mixing Tank CS-TK-2 Piping Modifications, dated March 17, 2000
99MMOD551 Swing Check Valves CS-V-200&209 Body/Cover Stud Torque Values, dated April 26, 1999
00MMOD517 Pipe Support M/S 391-SG-02 Modification, dated March 6, 2000
01MMOD513 Permanent Removal of SI System Pipe Snubber, dated March 21, 2001

Work Orders and Task Requests

0227861, Train A Safety Injection Test
0229985, ECCS Valve Verification
0232275, In-situ Field Verification of Critical Lube Oil Pressure Switches (OE 4.5)
0233066, Weekly Borated Water Source Evaluation
0238271, Vibration Monitoring on CS-P-2A - Detect Pump Shaft Cracking
01C3899, Inboard and Outboard Seal Package Leakage (CS-P-2A)
01C2159, Implement DN 14 on 1CS-LC-112E, Spring Pack and Limit Switch Control
01B8760, Inspect Oil Cooler for Flow Induced Corrosion, dated January 2, 2002
01B8761, Inspect Oil Cooler for Flow Induced Corrosion, dated February 6, 2002
01C2426, 1-SI-V-113 RV Change per DCR-01-0016, dated April 18, 2002
01C2427, 1-SI-V-101 RV Change per DCR-01-0016, dated April 18, 2002
01C2428, 1-SI-V-76 RV Change per DCR-01-0016,dated April 18, 2002
99C6838, 1-SI-V-45 Failed Setpoint Seat Leakage Test, dated April 23, 2002

202902, Testing and Inspection of Oil Cooler, dated January 1, 2002
Repetitive Task # 1ECCSET 065
Repetitive Task # 1ECCSOT007, Operability Test of Charging Pump A at Design Flow

Other Documents

Westinghouse Letter # CWS-NAH-1649 to Mr. J. DeVincentis, Seabrook Project Manager, Volume Control Tank Level Control System, dated 23 April 1982

Westinghouse Letter # NAH-95-562, April 11, 1995, to Mr. M. Feerick Senior Buyer Seabrook, Transmittal of Charging Pump Lube Oil Pump Operating Recommendations

Flowserve to Westinghouse Letter, January 26, 2003, Flowserve's review of the acceptable void fraction for the inlet conditions to the Seabrook Safety Injection pumps

NAH-91-3805, Westinghouse to Public Service Company of New Hampshire (Mr. C. Heckscher), Emergency Core Cooling System Pump Runout Limit Issues, dated October 1, 1991

W-PWR P.O. 546-AAV-2369650-BPE, Safety Injection Pump (1-SI-P-6A, 1-SI-P-6B) Operation and Maintenance Manual, Dresser Industries Incorporated, Pacific Pumps Division, Updated through February 26, 2002.

Standing Operating Order # SOO-03-001, Upgrade of CBS-V8 &14 Position Indication

CS vibration alarm status reports run February 26, 2003

NAH/NCH-282, Chemical and Volume Control System, Westinghouse Electric

Primary NSO Log of CS-P-2A Lube Oil Filter Outlet Pressure

Plant Engineering Action Plan Register, All CS Entries and Plant Issue List

Detailed Systems Text, Chemical and Volume Control System, Rev. 6

Instrument Classification Evaluation Form, Tag # SI-FI-968, SI Minimum Flow

AR 98020029, Evaluation of IN 98-40: Design Deficiencies Can Lead To Reduced ECCS Pump Net Positive Suction Head During Design-Basis Accidents," June 22, 1999

System Health Report, Safety Injection (SI) System Performance Report Post OR08, dated July 19, 2002

TP-7, Moderate Energy Line Break Study, Rev. 5

WCAP-11916, Loss of RHRS Cooling while the RCS is Partially Filled, Rev. 0

WCAP-14192, Centrifugal Charging Pump Shaft Failure Investigation Phase 1, January 1995

USNRC Generic Letter 96-01, “Testing of Safety-Related Circuits” and the licensee response letter (NYN-97058) dated May 22, 1997.

LIST OF ACRONYMS USED

CCP	Centrifugal Charging Pump
CFR	Code of Federal Regulations
CR	Condition Report
CS	Charging System
DCR	Design Change Request
ECCS	Emergency Core Cooling System
EOP	Emergency Operating Procedure
IST	In-service Testing
LOCA	Loss-of-Coolant Accident
NRC	Nuclear Regulatory Commission
RTS	Reactor Trip System
RWST	Refueling Water Storage Tank
SDP	Significance Determination Process
SE	Safety Evaluation
SI	Safety Injection
SSC	System, Structures, or Components
SSPS	Solid State Protection System
TS	Technical Specification
UE&C	United Engineers & Constructors
UFSAR	Updated Final Safety Analysis Report