



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

July 25, 2002

Carolina Power and Light Company  
ATT.: Mr. J. S. Keenan  
Vice President  
Brunswick Steam Electric Plant  
P. O. Box 10429  
Southport, NC 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED INSPECTION  
REPORT NOS. 50-325/02-02 AND 50-324/02-02

Dear Mr. Keenan:

On June 29, 2002, the NRC completed an inspection at your Brunswick Units 1 and 2 facility. The enclosed report documents the inspection findings which were discussed on July 9 with Mr. Ed O'Neill and other members of your staff.

This 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.

No findings of significance were identified.

In accordance with 10CFR 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/index.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Brian R. Bonser, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Docket Nos.: 50-325, 50-324  
License Nos.: DPR-71, DPR-62

Enclosure: (See page 2)

Enclosure: Inspection Report 50-325/02-02  
and 50-324/02-02  
w/Attachment - Supplemental Information

cc w/encl:

C. J. Gannon, Director  
Site Operations  
Brunswick Steam Electric Plant  
Carolina Power & Light  
Electronic Mail Distribution

W. C. Noll  
Plant Manager  
Brunswick Steam Electric Plant  
Carolina Power & Light Company  
Electronic Mail Distribution

Terry C. Morton, Manager  
Performance Evaluation and  
Regulatory Affairs CPB 7  
Carolina Power & Light Company  
Electronic Mail Distribution

Edward T. O'Neil, Manager  
Regulatory Affairs  
Carolina Power & Light Company  
Brunswick Steam Electric Plant  
Electronic Mail Distribution

Licensing Supervisor  
Carolina Power and Light Company  
Electronic Mail Distribution

William D. Johnson  
Vice President & Corporate Secretary  
Carolina Power and Light Company  
Electronic Mail Distribution

John H. O'Neill, Jr.  
Shaw, Pittman, Potts & Trowbridge  
2300 N. Street, NW  
Washington, DC 20037-1128

Beverly Hall, Acting Director  
Division of Radiation Protection  
N. C. Department of Environment  
and Natural Resources  
Electronic Mail Distribution

Peggy Force  
Assistant Attorney General  
State of North Carolina  
Electronic Mail Distribution

Robert P. Gruber  
Executive Director  
Public Staff NCUC  
4326 Mail Service Center  
Raleigh, NC 27699-4326

Public Service Commission  
State of South Carolina  
P. O. Box 11649  
Columbia, SC 29211

Donald E. Warren  
Brunswick County Board of  
Commissioners  
P. O. Box 249  
Bolivia, NC 28422

Dan E. Summers  
Emergency Management Coordinator  
New Hanover County Department of  
Emergency Management  
P. O. Box 1525  
Wilmington, NC 28402

Distribution w/encl: (See page 3)

CP&L

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Distribution w/encl:  
B. Mozafari  
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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-325, 50-324  
License Nos: DPR-71, DPR-62

Report No: 50-325/02-02, 50-324/02-02

Licensee: Carolina Power and Light Company

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: 8470 River Road SE  
Southport, NC 28461

Dates: March 31 to June 29, 2002

Inspectors: T. Easlick, Senior Resident Inspector  
E. Guthrie, Resident Inspector  
J. Canady, Resident Inspector, North Anna (Sections 1R15,  
1R16, 1R22, 40A1)  
P. VanDoorn, Senior Reactor Inspector (Section 1R07.2)

Approved by: B. Bonser, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000325-02-02, IR 05000324-02-02, on 03/31 - 06/29/2002, Carolina Power and Light Company, Brunswick Steam Electric Plant, Units 1 & 2. Baseline integrated resident inspection report.

The inspection was conducted by the resident inspectors and a senior reactor inspector. No findings of significance were identified during this inspection. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at <http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/index.html>.

A. Inspector Identified Findings

None

B. Licensee Identified Violations

None

## Report Details

Unit 1 began the report period returning to full power operation following a refueling outage. The unit operated at full power with the following exceptions. On April 5 power was reduced to 65 percent for condenser waterbox leak repair and rod improvements. On April 12 power was reduced to 55 percent for power suppression testing following discovery of a fuel leak. On April 17 power was reduced to 60 percent for rod improvement and to repair a main generator hydrogen leak. On May 25 power was reduced to 60 percent for rod improvements. Between June 2 and June 9 the full power thermal limit was increased to 2,755 megawatts as part of the power uprate. On June 28 power was reduced to 52 percent for valve testing.

Unit 2 began the report period operating at full power. On April 17 the unit was shutdown for a six day maintenance outage to remove leaking fuel bundles. On May 31 power was reduced to 60 percent for condenser tube leak repairs. On June 14 power was reduced to 63 percent to repair a condenser tube leak.

### **1. REACTOR SAFETY**

#### **Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity**

##### 1R04 Equipment Alignment

###### a. Inspection Scope

The inspectors reviewed plant documents to determine correct system lineup, and observed equipment to verify that the residual heat removal system (RHR) was correctly aligned while the other train or system was inoperable or out of service. The inspectors verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact mitigating system availability. The inspectors reviewed operating procedure, 1OP-17, Residual Heat Removal System, for the A RHR loop when the B RHR loop was out of service for maintenance.

In addition, the inspectors performed a detailed walkdown, of the Unit 2 Standby Liquid Control (SLC) System, to verify that the system was correctly aligned, and labeled. The power sources and support systems were verified to be available. Review of this system included review of outstanding design issues, maintenance work requests, and temporary modifications. The following documents were reviewed:

- Operating Procedure, 2OP-05, Standby Liquid Control (SLC) System
- Design Basis Document, DBD-05, Standby Liquid Control System
- TS 3.2.7, Standby liquid Control System
- FSAR 9.3.4, Standby Liquid Control System

###### b. Findings

No findings of significance were identified.

## 1R07 Heat Sink Performance

### .1 Annual Review

#### a. Inspection Scope

The inspectors reviewed activities associated with the cleaning and inspection of the 1B reactor building closed cooling water (RBCCW) heat exchanger. The inspectors reviewed the results of the 1B RBCCW inspection conducted in accordance with Preventive Maintenance Procedure 0PM-HX501, Reactor Building Closed Cooling Water Heat Exchangers Preventive Maintenance Procedure. The inspectors also independently observed the heat exchanger condition from the service water tube side. The inspectors reviewed the inspection results to determine whether the inspection frequencies were adequate to detect degradation prior to loss of heat removal capability below design-basis values. The inspectors reviewed Work Order 00147502-01, 1RCC-1B-HX, Heat Exchanger Inspection.

#### b. Findings

No findings of significance were identified.

### .2 Biennial Review

#### a. Inspection Scope

The inspectors reviewed inspection records, work documents, preventive maintenance procedures, and other documentation to ensure that heat exchanger (HX) deficiencies that could mask or degrade performance were identified. Inspection records for risk significant HXs were reviewed which included the RHR HXs, the RHR/core spray room cooler HXs, emergency diesel generator jacket water HXs, and RHR service water pump motor coolers. The inspectors also reviewed nuclear service water (NSW) system crawl through inspection results, chemistry results, the most recent system performance test results, and NSW intake inspection and cleaning records. Corrective maintenance records for selected risk significant valves and selected Action Requests (ARs) were reviewed for potential common cause problems and problems which could affect system performance. The NSW operation procedure was reviewed for appropriate precautions for water hammer. In addition, the inspectors conducted a walk down of most of the NSW system and the major components for both units.

#### b. Findings

No findings of significance were identified.

## 1R11 Licensed Operator Requalification

#### a. Inspection Scope

The inspectors observed licensed operator performance during simulator training for cycle 2002-02 with one crew. This observation included emergency operating

procedure and abnormal operating procedure scenarios. The inspectors observed requalification training to verify that the licensee's program ensures safe plant operation by adequately evaluating how well the individual operators and crews have mastered the training objectives, including training on high-risk operator actions. The scenarios tested the operators' ability to respond to a loss of reactor feed water pumps at high power and high power to flow rod lines; and an anticipated transient without scram (ATWS) with the suppression pool temperature approaching the heat capacity temperature limit. The inspectors verified consistent clarity and formality of communication, conservative decision-making by the crew, appropriate use of procedures, proper alarm response, and high-risk reactor turbine gauge board manipulations. Group dynamics and supervisory oversight, including the ability to properly identify and implement appropriate TS actions and regulatory reports and notifications, were observed. The following documents were reviewed:

-LOCT Exam Simulator Scenario, LORX-0200, Drywell Pressure (ECCS) Instrument Failure, Low System Frequency, Loss of Off-Site Power, DG #3 Trip/DG #4 Fail To Auto Start, Core Spray and RHR Logic Failure, Large Line Break in Primary Containment  
-Five simulator individual evaluations.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule (MR) Implementation

a. Inspection Scope

For the equipment issues described below, the inspectors reviewed the licensee's implementation of the Maintenance Rule (10 CFR 50.65) with respect to the characterization of failures, the appropriateness of the associated MR a(1) or a(2) classification, and the appropriateness of either the associated a(2) performance criteria or the associated a(1) goals and corrective actions:

- Expert Panel a(1) System Review, 5/8/02, Repetitive Functional Failures on Fenwal Temperature Switches above TS Limits
- Work Order 223936-01, Perform Applicable Sections of 2MST-SW12Q
- Maintenance Surveillance Test, 2MST-SW12Q, SW Diesel Generator Cooling Water Supply Low Pressure Inst Cal and Functional Test

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

For the following activities, the inspectors reviewed the effectiveness of risk assessments performed prior to changes in plant configuration for maintenance



activities (planned and emergent), and verified that upon unforeseen situations the licensee had taken the necessary steps to plan and control the resultant emergent work activities:

- Emergent Work for Unit 1 Generator Seal Injection  
- BNP Risk Profile Week 15, Schedule Analysis
- Offline to Online Transition  
- BNP Risk Profile Week 16,
- Down Power to 90 percent for Suppression Testing  
- BNP Risk Profile, Week 20, May 21, 2002
- Unit 1, 1-A Cond Pump Check Valve Problem  
- BNP Risk Profile Week 21, May 29, 2002
- Unit 2, Downpower for Leak Check Water Box  
- BNP Risk Profile Week 21, May 29, 2002

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed selected operability evaluations affecting risk significant mitigating systems, listed below, to assess, as appropriate: (1) the technical adequacy of the evaluations; (2) whether continued system operability was warranted; (3) whether other existing degraded conditions were considered as compensating measures; (4) where compensatory measures were involved, whether the compensatory measures were in place, would work as intended, and were appropriately controlled; (5) where continued operability was considered unjustified, the impact on Technical Specification (TS) limiting conditions for operations (LCOs) and the risk significance in accordance with the SDP. These reviews were performed for the following:

- EDG-3, Plant Update, 4/30/02, DG3 Silencer Particle Ejection
- AR 59605, Core Spray Min Flow Valve 2-E21-F0231A  
-Operating Procedure, 2OP-13, Fuel Pool Cooling and Cleanup System  
Operating Procedure
- AR 63376-10, Operability Review for Unit 1 HPCI Improperly Installed Rupture Disc

b. Findings

No findings of significance were identified.

1R16 Operator Work-Aroundsa. Inspection Scope

The inspectors held discussions with the operator work-around (OWA) coordinator and reviewed the OWA database to determine their cumulative effects. The affect of the work-arounds on reliability, availability, and potential mis-operations of the systems involved were reviewed. The inspectors reviewed whether the OWA's on Unit 1 and Unit 2 could increase an initiating event frequency or could affect multiple mitigating systems. The cumulative effects of OWAs on operator correct and timely response to plant transients and accidents were also reviewed by the inspectors.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testinga. Inspection Scope

For the work orders listed below, the inspectors reviewed the post-maintenance test procedure and witnessed the testing and/or reviewed test records to determine whether the scope of testing adequately verified that the work performed was completed correctly; and whether the test demonstrated that the affected equipment was capable of performing it's intended function and was operable in accordance with TS:

- W/O 0019912, 2-DG1- ENG, Replace the 5-8 right bank and 5-8 left bank cylinder heads
- W/O 00231477, 2-C41-F029A, Safety Relief Valve Leak OPT-06.1 , SLC System Operating Test
- W/O 00174864, 1-SW-1A-NUC-PMP, Pump Repacking
- W/O 00239718, 2-DSA-DG2-CMP-1, Intercooler, Starting Air Compressor OPM-CMP503, Maintenance Instruction for Worthington Air Compressor

b. Findings

No findings of significance were identified.

## 1R20 Refueling and Outage Activities

### a. Inspection Scope

The inspectors evaluated Unit 2 outage activities to ensure that the licensee considered risk in developing outage schedules; adhered to administrative risk reduction methodologies developed to control plant configuration; developed mitigation strategies to losses of key safety functions; and adhered to operating license and TS requirements that ensure defense-in-depth. The following specific areas were reviewed:

- Review of Outage Plan. Prior to the outage, the inspectors reviewed the licensee's outage risk control plan, attended the risk briefings, and verified that the licensee appropriately considered risk, industry experience and previous site specific problems. The inspectors reviewed the licensee's contingency actions for losses of key safety functions and to verify that the licensee maintained key safety function status and controls continuously throughout the outage. The inspectors reviewed the Unit 2 outage risk assessment, B215M1 Refueling Outage Safe Shutdown Risk Assessment.
- Monitoring of Shutdown Activities. The inspectors reviewed the TS cooldown restrictions to verify that they were met in accordance with Periodic Test 2PT-01.7, Heatup/Cooldown Monitoring, and reviewed Special Process Procedure 0SPP-RPV501, Reactor Vessel Disassembly.
- Outage Configuration Management. The inspectors verified that the licensee maintained defense-in-depth commensurate with the outage risk control plan for key safety functions and applicable TS when risk significant equipment was removed from service. The inspectors verified that configuration changes due to emergent work and unexpected conditions were controlled in accordance with the outage risk control plan. The inspectors verified that control room operators were cognizant of plant configuration. The inspectors reviewed Administrative Procedure 0AP-022, BNP Outage Risk Management.
- Inventory Control. The inspectors reviewed flow paths, configurations, and alternative means for inventory addition to verify they were consistent and maintained with the outage risk plan. The inspectors reviewed reactor vessel inventory controls to verify they were adequate to prevent inventory loss.
- Reactivity Control. The inspectors reviewed reactivity control to verify that proper control was maintained in accordance with the TS. Potential reactivity changes were identified in the outage risk plan and were reviewed to verify proper controls.
- Refueling Activities The inspectors reviewed fuel handling operations to verify they were performed in accordance with TS and fuel handling procedures. The inspectors reviewed the position of the fuel bundles for the entire core to verify they were in the correct position and orientation. The inspectors observed several fuel handling moves in the vessel area and spent fuel pool area. The following documents were reviewed:

- General Plant Operating Procedure 0GP-06, Cold Shutdown to Refueling (Head Unbolted)
- Fuel Handling Procedure 0FH-11N, Control Rod Shuffle
- Fuel Handling Procedure 0FH-11, Refueling
- Special Process Procedure 0SPP-RPV502, Reactor Vessel Reassembly
- Engineering Procedure 0ENP-24.13, Core Verification

- Monitoring of Heatup and Startup Activities. The inspectors reviewed TS, license conditions, commitments, and administrative procedure prerequisites for mode changes to verify they were met and met for changing plant configurations. The inspectors performed a walkdown of primary containment prior to reactor startup to verify that debris had not been left which could affect performance of the containment torus. The inspectors observed reactor startup, the approach to criticality, and major portions of the power ascension. The following documents were reviewed:

- General Plant Operating Procedure 0GP-02, Approach to Criticality and Pressurization of the Reactor
- General Plant Operating Procedure 0GP-03, Unit Startup and Synchronization
- General Plant Operating Procedure 0GP-04, Increasing Turbine Load to Rated Power
- Administrative Instruction 0AI-127, Primary Containment Inspection and Closeout

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors examined the procedures and/or witnessed testing, and reviewed test records against the Updated Final Safety Analysis Report and TS to determine whether the scope of testing adequately demonstrated that the affected equipment was capable of performing its intended function and was operable in accordance with TS. The following tests and associated documents were reviewed:

- Unit 2, Periodic Test, 0PT-12.2C, No. 3 Diesel Generator Monthly Load Test
  - Operator Log, 06/23/02
  - Technical Specifications LCO 3.8.1, Condition D
  - Updated Final Safety Analysis Report, Section 8.3
- Unit 1, Inservice Testing, Periodic Test
  - 0PT-08.2.2b, LPCI, RHR System Operability Test, Loop B

b. Findings

No findings of significance were identified.

## 1R23 Temporary Plant Modifications

### a. Inspection Scope

The inspectors reviewed the following temporary modifications to determine whether the modification was properly installed, the modification did not affect system operability, drawings and procedures were appropriately updated, and post-modification testing was satisfactorily performed:

- PCHG-DESG Engineering Change, Condensate Pumps Setpoint/Auto-start Logic Change, EC 49319R0
- PCHG-DESG, Engineering Change, EC 49294R0, Unit 2 Steam Leak into DWED System
- Operating Instruction, 1OI-03.2, Control Operator Daily Surveillance Report, Rev 74
- TCHG-DESG, Engineering Change, EC 49792R0, 1-SW-V382 Valve Replacement

### b. Findings

No findings of significance were identified.

## 4 **OTHER ACTIVITIES**

### 4OA1 Performance Indicator (PI) Verification

#### a. Inspection Scope

The inspectors reviewed the PI data submitted in April 2002 to the NRC since the last verification inspection was performed. A sample of the plant records and data was reviewed and compared to the reported data to check for the accuracy of the performance indicators. The licensee's corrective action program records were also reviewed to determine if any problems with the collection of PI data had occurred. The inspectors reviewed the following PIs for the period from April 2001 to March 2002:

- Unplanned Power Changes per 7,000 Critical Hours
- Safety System Unavailability, Emergency AC Power
- Safety System Unavailability, High Pressure Injection System (HPCI)

The following documents were reviewed:

- Control Room operating logs
- NRC Inspection Reports issued during the review period
- Licensee's data bases for the PIs listed above
- Nuclear Generating Group Standard Procedure REG-NGGC-0009, NRC Performance Indicator
- NEI 99-02 Regulatory Assessment Performance Indicator Guideline

b. Findings

No findings of significance were identified.

4OA3 Event Follow-up

(Closed) Licensee Event Report (LER) 50-324/2001-001-00, "EHC System Malfunction Results in Specified System Actuations". This LER reported a generator/turbine trip which occurred on February 23, 2001. This LER was reviewed and no findings of significance were identified as described in Section 1R14.3 of NRC Inspection Report 50-324,325/00-06. This licensee's corrective action document associated with the investigation of this trip is AR28731.

4OA6 Meetings, including ExitExit Meeting Summary

The inspection results were presented to Mr. E. O'Neill, and other plant staff at the conclusion of the inspection on July 9. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

**SUPPLEMENTAL INFORMATION**

**PARTIAL LIST OF PERSONS CONTACTED**

**Licensee**

A. Brittain, Manager Security  
D. DiCello, Manager Regulatory Affairs  
N. Gannon, Director of Site Operations  
J. Gawron, Training Manager  
W. Dorman, Manager Nuclear Assessment  
J. Keenan, Site Vice President  
E. O'Neill, Manager Site Support Services  
J. Franke, Manager Brunswick Engineering Support Section  
W. Noll, Plant General Manager  
E. Quidley, Manager Maintenance  
H. Wall, Manager Outage and Scheduling  
M. Williams, Interim Manager Operations

**NRC**

B. Bonser, Chief, Reactor Projects Branch 4

**ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

None

Opened and Closed During This Inspection

None

Closed

50-324/2001-001-00	LER	EHC System Malfunction Results in Specified System Actuations (Section 4OA3).
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Discussed

None

## LIST OF DOCUMENTS REVIEWED

### Procedures (1RO7)

- OENP-2704, Administrative Control of NRC Generic Letter 89-13 Requirements
- OPM-ACU500, Inspection and Cleaning of the RHR/Core Spray Room Cooler Air Filters and Coolers
- OMST-DG500R, Emergency Diesel Generators 24 Month Inspection
- OPM-HX503, RHR Service Water Booster Pump Motor Heat Exchanger Inspection
- OPM-STU500, Service Water Intake Structure Inspection and Cleaning
- OAI-81, Water Chemistry Guidelines
- OE&RC-3212, Service/Circulating Water Chlorine Sampling
- 1OP-43, Service Water System Operating Procedure

### Inspection and Test Records (1RO7)

- Service Water Generic Letter 89-13 Documentation Sheet dated 04/11/02
- Service Water Generic Letter 89-13 Documentation Sheet dated 03/22/01
- Service Water Safety Related Heat Exchanger Cleaning/Inspection Data Sheets for 1A Core Spray Room Cooler dated 03/13/02, 1B Core Spray Room Cooler dated 04/29/98, 1A RHR Room Cooler dated 03/15/02, 1B RHR Room Cooler dated 03/15/02, 1A RHR SW Pump Motor Cooler dated 07/19/01, 1B RHR SW Pump Motor Cooler dated 06/21/01, 1C RHR SW Pump Motor Cooler dated 07/19/01, 1D RHR SW Pump Motor Cooler dated 12/07/01, Diesel Generator 3 dated 08/23/01, Diesel Generator 4 dated 06/04/01, 2A Core Spray Room Cooler dated 02/28/01, 2B Core Spray Room Cooler dated 03/11/01, 2A RHR Room Cooler dated 03/01/01, 2B RHR Room Cooler dated 03/11/01, 2A RHR SW Pump Motor Cooler dated 01/02/02, 2B RHR SW Pump Motor Cooler dated 05/23/01, 2C RHR SW Pump Motor Cooler dated 01/02/02, 2D RHR SW Pump Motor Cooler dated 05/23/01
- Crawl Through Service Water Inspection Report for B Loop dated 03/22/01
- Crawl Through Service Water Inspection Report for A Loop dated 03/20/02
- Calculation Number 1SW-0096, Service Water Hydraulic Performance Test Results (1PT24.6.4) dated 03/31/02

### Maintenance Work Order Documents (1RO7)

- 109533, Unit 1 DG #1 Service Water Inlet Valve
- 129318, 1-SW-V679 Supply to DG #1 Valve is Leaking
- 167772, Perform the Unit 2 SW and SCW Pump Bay Silt and Biofouling Cleaning and Inspection



- 195414, Valve 2-SW-V679 Leaking
- 197958, Valve 1-SW-V138 Failed Stroke Time
- 30505, Valve 2-SW-V137 Inlet Threaded Connection Leaking
- 30963, Motor Operator Has Hardened Grease
- 99AIEC1, Valve 1-SW-V105 Leaks By Seat
- 99ABEX1, Valve 1-SW-V106 Does Not Fully Open Under Differential Pressure
- 99AANZ1, Valve 2-SW-V679 Leaks Past Seat

Action Requests (1RO7)

- 26401, Pressure Switches Found Out Of Tolerance
- 26603, 2C Trash Rack Was Discovered Moved Away From Intake Structure
- 32181, Valve 1-SW-V101 Maintenance Rule Functional Failure
- 51795, FSAR Outdated Regarding Service Water Line Breaks
- 52273, Evaluate Diversion Structure Fouling
- 52405, Valve 1-SW-V138 Failed Stroke Time
- 54376, Valves 1&2-SW-V679 Leak By Significantly