UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BLVD
ARLINGTON, TEXAS 76011-4511

August 9, 2012

Christopher J. Schwarz, Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
1448 SR 333
Russellville, AR 72802-0967

SUBJECT: ARKANSAS NUCLEAR ONE - NRC INTEGRATED INSPECTION REPORT 05000313/2012003 AND 05000368/2012003

Dear Mr. Schwarz:

On June 30, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Arkansas Nuclear One, Units 1 and 2, facility. The enclosed inspection report documents the inspection results which were discussed on July 24, 2012, with you and other members of your staff.

The inspections 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.

One NRC identified and one self-revealing findings of very low safety significance (Green) were identified during this inspection.

Both of these findings were determined to involve violations of NRC requirements. Additionally, two licensee-identified violations, which were determined to be of very low safety significance, are listed in this report. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Arkansas Nuclear One.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV; and the NRC Resident Inspector at Arkansas Nuclear One.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agency wide Document Access and Management 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/

Donald B. Allen, Chief
Project Branch E
Division of Reactor Projects

Docket Nos.: 50-313, 50-368
License Nos.: DRP-51, NPF-6

Enclosure: Inspection Report 05000313/2012003 and 05000368/2012003
w/ Attachment: Supplemental Information

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|---|---|---|---|---|---|
| SUNSI Rev Compl. | ☑Yes ☐ No | ADAMS | ☑Yes ☐ No | Reviewer Initials | DBA |
| Publicly Avail. | ☑Yes ☐ No | Sensitive | ☐Yes ☑ No | Sens. Type Initials | DBA |

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| SRI:DRP/E | RI:DRP/E | RI:DRP/E | SPE:DRP/E | C:DRS/EB1 | C:DRS/EB2 |
| ASanchez | JRotton | WSchaup | RAzua | TFarnholtz | GMiller |
| | ***/RA via T/*** | ***/RA via E/*** | ***/RA/*** | ***/RA/*** | ***/RA/*** |
| | 7/3/12 | 8/6/12 | 7/31/12 | 8/1/12 | 7/31/12 |
| C:DRS/OB | C:DRS/PSB1 | C:DRS/PSB2 | C:DRS/TSB | BC:DRP/E | |
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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION IV**

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|---|---|
| Docket: | 05000313; 05000368 |
| License: | DPR-51; NPF-6 |
| Report: | 05000313/2012003; 05000368/2012003 |
| Licensee: | Entergy Operations Inc. |
| Facility: | Arkansas Nuclear One, Units 1 and 2 |
| Location: | Junction of Hwy. 64 West and Hwy. 333 South<br>Russellville, Arkansas |
| Dates: | April 1 through June 30, 2012 |
| Inspectors: | A. Sanchez, Senior Resident Inspector<br>J. Rotton, Resident Inspector<br>W. Schaup, Resident Inspector<br>P. Elkmann, Senior Emergency Preparedness Inspector<br>J. Josey, Senior Resident Inspector<br>G. Guerra, CHP, Emergency Preparedness Inspector<br>R. Kumana, Project Engineer |
| Approved By: | Don Allen, Chief, Project Branch E<br>Division of Reactor Projects |

## SUMMARY OF FINDINGS

IR 05000313/2012003; 05000368/2012003; 04/1/2012-06/30/2012, Arkansas Nuclear One, Units 1 and 2, Integrated Resident and Regional Report; Operability Evaluation, Problem Identification and Resolution

The report covered a 3-month period of inspection by resident inspectors and an announced baseline inspection by region-based inspectors. Two Green non-cited violations of significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." The cross-cutting aspect is determined using Inspection Manual Chapter 0310, "Components Within the Cross Cutting Areas." Findings for which the significance determination process 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 4, dated December 2006.

### A. NRC-Identified Findings and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI for failure to take timely corrective action to correct a condition adverse to quality. Specifically, the licensee implemented a compensatory measure for four service water valves in early 2009 to ensure operability, but has not taken permanent corrective actions to correct the condition adverse to quality for two service water cross-connect valves. The licensee has currently scheduled corrective maintenance for the service water valves in September 2012 and the valves are currently operable. The licensee has placed the issue into their corrective action program as Condition Report CR-ANO-2-2012-1126.

  The inspectors determined that the failure to take timely corrective action to correct a condition adverse to quality is a performance deficiency. Specifically, the licensee failed to resolve the degraded condition associated with the splined adaptor for two service water cross-connect valves in the Unit 2 service water intake structure. The performance deficiency is more than minor because it is associated with the Mitigating System Cornerstone attribute of design control and adversely affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences and is therefore a finding. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the finding was determined to be of very low safety significance (Green) because the finding: 1) is not a design or qualification deficiency confirmed not to result in an actual loss of operability or functionality, and did not: 2) represent a loss of system safety function, 3) represent an actual loss of safety function of a single train for greater than its technical specification allowed outage time, 4) represent an actual loss of safety function of one or more non-technical specification trains of equipment designated as risk-significant for greater than 24 hours, and 5) screen as potentially risk significant due to an external event. The

finding was determined to have a cross-cutting aspect in the area of human performance, associated with work control component, in that the licensee failed to plan and coordinate work activities consistent with nuclear safety. Specifically, the licensee failed to adequately coordinate work activities to support long-term equipment reliability by limiting temporary modifications in that these temporary modifications have been installed for longer than three years (over two outages) [H.3(b)]. (Section 1R15)

- Green. The inspectors documented a self-revealing, non-cited violation of 10 CFR Part 50, Appendix B, Criterion VII, Control of Purchased Material, Equipment and Services for the licensee's failure to assure that purchased material conformed to the procurement documents. Specifically, the licensee received, accepted and installed the wrong couplings on the Unit 1 service water pump C resulting in a coupling failure that left the pump inoperable. The licensee rebuilt service water pump C with the correct coupling material. This was documented in Condition Report CR-ANO-1-2012-0864.

  The inspectors determined that the failure to assure that purchased material conformed to the purchase order is a performance deficiency because the licensee failed to perform an adequate receipt inspection then accepted and installed the wrong couplings that subsequently failed. The performance deficiency had the potential to affect the Initiating Events or Mitigating Systems Cornerstones so a regional senior reactor analyst was contacted for assistance. The senior reactor analyst performed a phase 3 analysis and determined the dominant risk affected the Mitigating Systems cornerstone. The performance deficiency is more than minor because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone and adversely affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences and is therefore a finding. The phase 3 analysis determined the majority of the risk resulted from a loss of AC Bus A3 combined with a loss of the turbine-driven emergency feedwater pump. The finding was determined to be of very low safety significance (Green). The finding was determined not to have a cross-cutting aspect because the performance deficiency occurred in 2009 and is not indicative of current plant performance. (Section 4OA2)

## B. Licensee-Identified Violations

Violations of very low safety significance that were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and associated corrective action tracking numbers are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Units 1 and 2 began the period at 100 percent power and remained at 100 percent power for the remainder of the inspection period.

### 1. REACTOR SAFETY

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

### 1R04 Equipment Alignment (71111.04)

Partial Walkdown

a. Inspection Scope

The inspectors performed partial system walkdowns of the following risk-significant systems:

- April 16, 2012, Unit 1 train B emergency feedwater while train A was inoperable for planned maintenance
- April 17, 2012, Unit 2 emergency diesel generator 1 with emergency diesel generator 2 performing a 24 hour endurance run
- June 6, 2012, Unit 2 train B containment spray while train A was out of service for planned maintenance

The inspectors selected these systems based on their risk significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could affect the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, Safety Analysis Report (SAR), technical specification requirements, administrative technical specifications, outstanding work orders, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also inspected accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of three partial system walkdown samples as defined in Inspection Procedure 71111.04-05.

b. Findings

No findings were identified.

**1R05 Fire Protection (71111.05)**

.1 Quarterly Fire Inspection Tours

a. Inspection Scope

The inspectors conducted fire protection walkdowns that were focused on availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- May 1, 2012, Unit 2, Fire Zone FZ-2103, west battery room
- May 24, 2012, Unit 1, Fire Zone FZ-99-M, north switchgear room, and Fire Zone FZ-100-N, south switchgear room
- June 1, 2012, Unit 1, Fire Zone 175-CC, lube oil reserve room
- June 7, 2012, Unit 1, Fire Zone FZ-86-G, north diesel generator room, and Fire Zone FZ-87-H, south diesel generator room

The inspectors reviewed areas to assess if licensee personnel had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant; effectively maintained fire detection and suppression capability; maintained passive fire protection features in good material condition; and had implemented adequate compensatory measures for out of service, degraded or inoperable fire protection equipment, systems, or features, in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to affect equipment that could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Using the documents listed in the attachment, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's corrective action program. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of four quarterly fire-protection inspection samples as defined in Inspection Procedure 71111.05-05.

b. Findings

No findings were identified.

.2 Annual Fire Protection Drill Observation (71111.05A)

a. Inspection Scope

On February 24, 2012, the inspectors observed a fire brigade drill activation for an auxiliary operator callout of a fire in the Unit 1 emergency diesel generator 1 room and the emergency diesel generator shut-off switch could not be reached due to an operator injury. On June 14, 2012, the inspectors also observed a fire brigade drill activation for a fire alarm received in the Unit 2 control room for the motor generator set room. The observations evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that the licensee staff identified deficiencies, openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were (1) proper wearing of turnout gear and self-contained breathing apparatus; (2) proper use and layout of fire hoses; (3) employment of appropriate fire fighting techniques; (4) sufficient firefighting equipment brought to the scene; (5) effectiveness of fire brigade leader communications, command, and control; (6) search for victims and propagation of the fire into other plant areas; (7) smoke removal operations; (8) utilization of preplanned strategies; (9) adherence to the preplanned drill scenario; and (10) drill objectives.

These activities constitute completion of one annual fire-protection inspection sample as defined in Inspection Procedure 71111.05-05.

b. Findings

No findings were identified.

**1R06 Flood Protection Measures (71111.06)**

a. Inspection Scope

The inspectors reviewed the SAR, the flooding analysis, and plant procedures to assess susceptibilities involving internal flooding; reviewed the corrective action program to determine if licensee personnel identified and corrected flooding problems; inspected underground bunkers/manholes to verify the adequacy of sump pumps, level alarm circuits, cable splices subject to submergence, and drainage for bunkers/manholes; and verified that operator actions for coping with flooding can reasonably achieve the desired outcomes. The inspectors also inspected the areas listed below to verify the adequacy of equipment seals located below the flood line, floor and wall penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, and control circuits, and temporary or removable flood barriers. Specific documents reviewed during this inspection are listed in the attachment.

- June 29, 2012, Unit 2, auxiliary building - 335 & 317 foot level: Potential internal flooding of emergency core cooling system rooms due to possible failure of Unit 2 service water instrument line weld failure

These activities constitute completion of one flood protection measures inspection sample as defined in Inspection Procedure 71111.06-05.

b. Findings

No findings were identified.

**1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11)**

.1 Quarterly Review of Licensed Operator Requalification Program

a. Inspection Scope

On June 20, 2012, the inspectors observed a crew of licensed operators on both the Units 1 and 2 plant simulators during requalification testing. The inspectors assessed the following areas:

- Licensed operator performance
- The ability of the licensee to administer the evaluations
- The modeling and performance of the control room simulator
- The quality of post-scenario critiques
- Follow-up actions taken by the licensee for identified discrepancies

These activities constitute completion of one quarterly licensed operator requalification program sample as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

.2 Quarterly Observation of Licensed Operator Performance

a. Inspection Scope

On May 2, 2012, the inspectors observed the performance of on-shift licensed operators in the Unit 1 main control room. At the time of the observations, the plant was in a period of heightened activity due to performance of OP-1105.009, “Control Rod Drive System Operating Procedure,” Revision 41, control rod drive mechanism verification of freedom of movement.

In addition, the inspectors assessed the operators' adherence to plant procedures, including OP-1015, "Conduct of Operations," Revision 90, and other operations department policies.

These activities constitute completion of one quarterly observation of licensed-operator performance sample as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

**1R12 Maintenance Effectiveness (71111.12)**

a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following risk significant system:

- June 28, 2012, Unit 2, auxiliary feedwater system

The inspectors reviewed events such as where ineffective equipment maintenance has resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- Implementing appropriate work practices
- Identifying and addressing common cause failures
- Scoping of systems in accordance with 10 CFR 50.65(b)
- Characterizing system reliability issues for performance
- Charging unavailability for performance
- Trending key parameters for condition monitoring
- Ensuring proper classification in accordance with 10 CFR 50.65(a)(1) or -(a)(2)
- Verifying appropriate performance criteria for structures, systems, and components classified as having an adequate demonstration of performance through preventive maintenance, as described in 10 CFR 50.65(a)(2), or as requiring the establishment of appropriate and adequate goals and corrective actions for systems classified as not having adequate performance, as described in 10 CFR 50.65(a)(1)

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one quarterly maintenance effectiveness sample as defined in Inspection Procedure 71111.12-05.

b. Findings

No findings were identified.

**1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)**

a. Inspection Scope

The inspectors reviewed licensee personnel's evaluation and management of plant risk for the maintenance and emergent work activities affecting risk-significant and safety-related equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- April 18, 2012, Units 1 and 2 during start up transformer 2 outage
- April 27, 2012, loss of the Fort Smith 500kV power line and subsequent troubleshooting and repair activities
- June 4, 2012, Unit 1 during emergent work to repair service water pump C after coupling failure
- June 6, 2012, Unit 2 during planned maintenance on train A containment spray system
- June 19, 2012, Unit 1 during failure of CV-2665, turbine driven emergency feedwater pump train A steam admission valve bypass valve, to close during steam admission valve testing

The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that licensee personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When licensee personnel performed emergent work, the inspectors verified that the licensee personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk

analysis assumptions were valid and applicable requirements were met. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of five maintenance risk assessments and emergent work control inspection samples as defined in Inspection Procedure 71111.13-05.

b. Findings

No findings were identified.

**1R15 Operability Evaluations and Functionality Assessments (71111.15)**

a. Inspection Scope

The inspectors reviewed the following assessments:

- April 13, 2012, Unit 2, core protection calculator channel C trips for points 3 and 4 with no valid trip signal
- April 24, 2012, Unit 2, spent fuel pool fuel handling machine 2H-3 following modifications to enhance the seismic qualification
- May 22, 2012, Unit 2, emergency feedwater actuation system trip test button failure
- May 31, 2012, Unit 2, emergency diesel generator 1 exhaust gasket leak
- June 13, 2012, Unit 2, service water crosstie isolation valves 2CV-1421-2 and 2CV-1422-2

The inspectors selected these operability and functionality assessments based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure technical specification operability was properly justified and to verify the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the technical specifications and SAR to the licensee's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. Additionally, the inspectors reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of five operability evaluations inspection sample(s) as defined in Inspection Procedure 71111.15-05.

b. Findings

Introduction. The inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI for failure to take timely corrective action to correct a condition adverse to quality. Specifically, the licensee implemented a compensatory measure for four service water valves in early 2009 to ensure operability, but has not taken permanent corrective actions to correct the condition adverse to quality for two service water cross-connect valves.

Description. On April 18, 2009 the licensee identified four service water and auxiliary cooling water valves (butterfly valves) that the splined adaptor had slid down the valve shaft out of the motor-operated valve gear box. The licensee declared the valves inoperable and installed a temporary modification under engineering change EC-14498. This was a compensatory measure implemented to ensure valve operability. The licensee concluded that the cause of the splined adaptor slipping down the stem was that the splined adaptor was not adequately secured during installation. The licensee further determined that the work orders for the maintenance of these butterfly valves did not contain adequate instructions to secure the splined adaptor to the valve stem. The permanent corrective action to correct the issue and fully restore the valves to an operable condition was to spot drill the location where the set screw was engaging the stem key and to use Loctite to secure the screw.

On June 13, 2012, while on a plant walkdown, the inspectors identified two service water discharge cross-connect valves, 2CV-1421-2 and 2CV-1422-2, still had the compensatory measures, in the form of temporary modifications, installed. Operability was being maintained via these compensatory measures. These two valves are in series and have safety functions to both open and close depending on service water pump configuration. Specifically, these valves serve to align either service water pump 2P-4B or 2P-4C to loop 2 of service water cooling. The compensatory measures were scheduled to be removed and permanent corrective actions implemented by October 2012. At the time of the expected completion of the corrective action, the compensatory measures will have been in place approximately 3-1/2 and 3 years, respectively.

The inspectors determined that the licensee had sufficient opportunities to implement these simple and non-complex corrective actions, but failed to do so in a timely manner. The inspectors discovered that the engineering staff initially attempted to add the work to refueling outage 2R20 in the fall 2009. The scope change request form specifically stated that a corrective action review board had approved the higher tiered apparent cause evaluation that had the corrective actions scheduled to be completed by September 23, 2009. However, this work was deferred and then rescheduled to be performed online during the following fuel cycle, but was deferred again. Following the next Unit 2 outage, 2R21 in spring 2011, the engineering staff again submitted scope change forms to incorporate the corrective action into the Unit 2 refueling outage 2R22 fall 2012, but was again denied because the work could be performed online. The corrective action is currently scheduled for September, 2012, just prior to the 2R22 refueling outage.

Analysis. The inspectors determined that the failure to take timely corrective action to correct a condition adverse to quality is a performance deficiency. Specifically, the licensee failed to resolve the degraded condition associated with the splined adaptor for two service water cross-connect valves in the Unit 2 service water intake structure. The performance deficiency is more than minor because it is associated with the Mitigating System Cornerstone attribute of design control and adversely affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences and is therefore a finding. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the finding was determined to be of very low safety significance (Green) because the finding: 1) is not a design or qualification deficiency confirmed not to result in an actual loss of operability or functionality, and did not: 2) represent a loss of system safety function, 3) represent an actual loss of safety function of a single train for greater than its technical specification allowed outage time, 4) represent an actual loss of safety function of one or more non-technical specification trains of equipment designated as risk-significant for greater than 24 hours, and 5) screen as potentially risk significant due to an external event. The finding was determined to have a cross-cutting aspect in the area of human performance, associated with work control component, in that the licensee failed to plan and coordinate work activities consistent with nuclear safety. Specifically, the licensee failed to adequately coordinate work activities to support long-term equipment reliability by limiting temporary modifications in that these temporary modifications have been installed for longer than three years (over two outages) [H.3(b)].

Enforcement. Title 10 of the CFR, Part 50, Appendix B, Criterion XVI, "Corrective Action," states, in part, "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected." Contrary to the above, the licensee failed to correct a known condition adverse to quality associated with the splined adaptor of two service water cross-connect butterfly valves for over three years. Currently the licensee has a compensatory measure in place to ensure operability of these safety-related valves. Because this finding is of very low safety significance and has been entered into the corrective action program as Condition Report CR-ANO-2-2012-1126, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy:
NCV 05000368/2012003-01, "Failure to Correct a Known Condition Adverse to Quality Associated with Inadequately Secured Splined Adaptors for Service Water Discharge Cross-Connect Valves"

## 1R18 Plant Modifications (71111.18)

Temporary Modifications

a. Inspection Scope

To verify that the safety functions of important safety systems were not degraded, the inspectors reviewed the following temporary modifications:

- June 13, 2012, temporary modification to ensure spline adaptor would remain in place for operability of valves 2CV-1421-2 and 2CV-1422-2

- June 29, 2012, temporary modification to install discharge piping seismic restraint to support replacement of P-6B, diesel driven fire water pump

The inspectors reviewed the temporary modifications and the associated safety-evaluation screening against the system design bases documentation, including the SAR and the technical specifications, and verified that the modification did not adversely affect the system operability/availability. The inspectors also verified that the installation and restoration were consistent with the modification documents and that configuration control was adequate. Additionally, the inspectors verified that the temporary modification was identified on control room drawings, appropriate tags were placed on the affected equipment, and licensee personnel evaluated the combined effects on mitigating systems and the integrity of radiological barriers.

These activities constitute completion of two samples for temporary plant modifications as defined in Inspection Procedure 71111.18-05.

b. Findings

No findings were identified.

**1R19 Post-Maintenance Testing (71111.19)**

a. Inspection Scope

The inspectors reviewed the following post-maintenance activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- May 3, 2012, Unit 1, reactor building sump drain isolation valve CV-4400 following corrective maintenance

- May 24, 2012, Unit 2, service water pump C following maintenance

- June 6, 2012, Unit 2, train A containment spray valves 2CV-5673-1 and 2CV-5612-1 following preventative maintenance

- June 11, 2012, Unit 1, service water pump C after replacing failed pump coupling

- June 22, 2012, Unit 1, reactor spray pump B after oil changeout, lubricate coupling, oil ring inspection, and replacement of leaking Tyco oilers

- June 19, 2012, Unit 2, 2P-7A room cooler service water isolation valve 2CV-1529-2 after motor operator maintenance

The inspectors selected these activities based upon the structure, system, or component's ability to affect risk. The inspectors evaluated these activities for the following (as applicable):

- The effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed
- Acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate

The inspectors evaluated the activities against the technical specifications, the SAR, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with post-maintenance tests to determine whether the licensee was identifying problems and entering them in the corrective action program and that the problems were being corrected commensurate with their importance to safety. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of six post-maintenance testing inspection samples as defined in Inspection Procedure 71111.19-05.

b. Findings

No findings were identified.

**1R22 Surveillance Testing (71111.22)**

a. Inspection Scope

The inspectors reviewed the SAR, procedure requirements, and technical specifications to ensure that the surveillance activities listed below demonstrated that the systems, structures, and/or components tested were capable of performing their intended safety functions. The inspectors either witnessed or reviewed test data to verify that the significant surveillance test attributes were adequate to address the following:

- Preconditioning
- Evaluation of testing impact on the plant
- Acceptance criteria
- Test equipment
- Procedures

- Jumper/lifted lead controls
- Test data
- Testing frequency and method demonstrated technical specification operability
- Test equipment removal
- Restoration of plant systems
- Fulfillment of ASME Code requirements
- Updating of performance indicator data
- Engineering evaluations, root causes, and bases for returning tested systems, structures, and components not meeting the test acceptance criteria were correct
- Reference setting data
- Annunciators and alarms setpoints

The inspectors also verified that licensee personnel identified and implemented any needed corrective actions associated with the surveillance testing.

- April 16, 2012, Unit 1, observed channel B reactor protection system control rod breaker trip surveillance test
- April 17, 2012, Unit1, observed performance of portions of emergency diesel generator 2, 24-hour endurance surveillance test
- April 17, 2012, Unit 1, observed steam driven emergency feedwater pump P-7A quarterly inservice surveillance test
- May 1, 2012, Unit 2, observed performance of the red, green and black battery weekly surveillance test
- June 21, 2012, Unit 2, steam driven emergency feedwater pump 2P-7A quarterly inservice surveillance test
- June 22, 2012, Unit 2, observed periodic reactor coolant system sampling for chemical analysis surveillance

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of six surveillance testing inspection samples as defined in Inspection Procedure 71111.22-05.

b. Findings

No findings were identified.

**Cornerstone: Emergency Preparedness**

**1EP1 Exercise Evaluation (71114.01)**

a. Inspection Scope

The licensee submitted the proposed exercise objectives and scenario for the 2012 biennial emergency plan exercise to the NRC on February 10, 2012, in accordance with the requirements of Appendix E to Part 50, IV.F.2.b. The inspectors performed an in-office review of the scenario and objectives to determine if the proposed exercise acceptably tested major elements of the license's emergency plan, allowed for demonstration of key emergency preparedness skills, provided a challenging drill environment, avoided the preconditioning of participant responses, and supported the exercise evaluation objectives.

The inspectors observed the emergency plan exercise conducted April 11, 2012, to determine if the exercise tested major elements of the license's emergency plan, allowed for demonstration of key emergency preparedness skills, and avoided preconditioning participant responses. The simulated scenario events were designed to escalate through the emergency classifications from a Notification of Unusual Event to a General Emergency to demonstrate licensee personnel's capability to implement their emergency plan. The scenario simulated,

- Unexpected insertion of a reactor control rod;
- Reactor coolant system leakage into a cooling water system;
- Failures of spent reactor fuel pool cooling pumps;
- An injured plant worker with radioactive contamination;
- An electrical bus failure;
- Failure of an emergency diesel generator;
- A radiological release from a reactor coolant pump seal through a failed containment penetration; and,
- A failed plant electrical transformer.

The inspectors evaluated exercise performance by focusing on the risk-significant activities of event classification, offsite notification, recognition of offsite dose

consequences, and development of protective action recommendations, in the Control Room Simulator and the following dedicated emergency response facilities:

- Technical Support Center
- Operations Support Center
- Emergency Operations Facility

The inspectors also assessed recognition of, and response to, abnormal and emergency plant conditions, the transfer of decision making authority and emergency function responsibilities between facilities, onsite and offsite communications, protection of emergency workers, emergency repair evaluation and capability, and the overall implementation of the emergency plan to protect public health and safety and the environment. The inspectors reviewed the current revision of the facility emergency plan, emergency plan implementing procedures associated with operation of the licensee's emergency response facilities, procedures for the performance of associated emergency functions, and other documents as listed in the attachment to this report.

The inspectors compared the observed exercise performance with the requirements in the facility emergency plan, 10 CFR 50.47(b), 10 CFR Part 50, Appendix E, and with the guidance in the emergency plan implementing procedures and other federal guidance.

The inspectors attended the postexercise critiques in each emergency response facility to evaluate the initial licensee self-assessment of exercise performance. The inspectors also attended a subsequent formal presentation of critique items to plant management. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one sample as defined in Inspection Procedure 71114.01-05.

b. Findings

No findings were identified.

**1EP6 Drill Evaluation (71114.06)**

Training Observations

a. Inspection Scope

The inspectors observed two examination simulator evolutions for licensed operators on June 20, 2012, for Units 1 and 2, which required emergency plan implementation by a licensee operations crew. This evolution was planned to be evaluated and included in performance indicator data regarding drill and exercise performance. The inspectors observed event classification and notification activities performed by the crew. The inspectors also attended the post evolution critique for the scenario. The focus of the inspectors' activities was to note any weaknesses and deficiencies in the crew's

performance and ensure that the licensee evaluators noted the same issues and entered them into the corrective action program. As part of the inspection, the inspectors reviewed the scenario package and other documents listed in the attachment.

These activities constitute completion of two samples as defined in Inspection Procedure 71114.06-05.

b. Findings

No findings were identified.

## 4. OTHER ACTIVITIES

**Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Physical Protection**

### 4OA1 Performance Indicator Verification (71151)

.1 Data Submission Issue

a. Inspection Scope

The inspectors performed a review of the performance indicator data submitted by the licensee for the First Quarter 2012 performance indicators for any obvious inconsistencies prior to its public release in accordance with Inspection Manual Chapter 0608, “Performance Indicator Program.”

This review was performed as part of the inspectors’ normal plant status activities and, as such, did not constitute a separate inspection sample.

b. Findings

No findings were identified.

.2 Reactor Coolant System Specific Activity (BI01)

a. Inspection Scope

The inspectors sampled licensee submittals for the reactor coolant system specific activity performance indicator for Units 1 and 2 for the period from the second quarter 2011 through the first quarter 2012. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, “Regulatory Assessment Performance Indicator Guideline,” Revision 6. The inspectors reviewed the licensee’s reactor coolant system chemistry samples, technical specification requirements, issue reports, event reports, and NRC integrated inspection reports for the period of April 2011 through March 2012 to validate the accuracy of the submittals. The inspectors also reviewed the

licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. In addition to record reviews, the inspectors observed a chemistry technician obtain and analyze a reactor coolant system sample on Unit 2. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of two reactor coolant system specific activity samples as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

.3 Reactor Coolant System Leakage (BI02)

a. Inspection Scope

The inspectors sampled licensee submittals for the reactor coolant system leakage performance indicator for Units 1 and 2 for the period from the second quarter 2011 through the first quarter 2012. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The inspectors reviewed the licensee's operator logs, reactor coolant system leakage tracking data, issue reports, event reports, and NRC integrated inspection reports for the period of April 2011 through March 2012 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of two reactor coolant system leakage samples as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

.4 Drill/Exercise Performance (EP01)

a. Inspection Scope

The inspectors sampled licensee submittals for the Drill and Exercise Performance, performance indicator for the period April 2011 through March 2012. The guidance of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, was used to determine performance indicator definitions and the accuracy of the reported performance indicator data. The inspectors reviewed the licensee's records associated with the performance indicator to verify that the licensee accurately reported the indicator in accordance with relevant procedures and

the Nuclear Energy Institute guidance. Specifically, the inspectors reviewed licensee records and processes including procedural guidance on assessing opportunities for the performance indicator; assessments of performance indicator opportunities during predesignated control room simulator training sessions, performance during the 2012 biennial exercise, and performance during other drills. The specific documents reviewed are described in the attachment to this report.

These activities constitute completion of the drill/exercise performance sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

.5 Emergency Response Organization Drill Participation (EP02)

a. Inspection Scope

The inspectors sampled licensee submittals for the Emergency Response Organization Drill Participation performance indicator for the April 2011 through March 2012. The guidance of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, was used to determine performance indicator definitions and the accuracy of the reported performance indicator data. The inspectors reviewed the licensee's records associated with the performance indicator to verify that the licensee accurately reported the indicator in accordance with relevant procedures and the Nuclear Energy Institute guidance. Specifically, the inspectors reviewed licensee records and processes including procedural guidance on assessing opportunities for the performance indicator, rosters of personnel assigned to key emergency response organization positions, and exercise participation records. The specific documents reviewed are described in the attachment to this report.

These activities constitute completion of the emergency response organization drill participation sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

.6 Alert and Notification System (EP03)

a. Inspection Scope

The inspectors sampled licensee submittals for the Alert and Notification System performance indicator for the April 2011 through March 2012. The guidance of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, was used to determine performance indicator definitions and the accuracy of the reported performance indicator data. The inspectors reviewed the licensee's records associated with the performance indicator to verify that the licensee

accurately reported the indicator in accordance with relevant procedures and the Nuclear Energy Institute guidance. Specifically, the inspectors reviewed licensee records and processes including procedural guidance on assessing opportunities for the performance indicator and the results of periodic alert notification system operability tests. The specific documents reviewed are described in the attachment to this report.

These activities constitute completion of the alert and notification system sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

## 4OA2 Problem Identification and Resolution (71152)

.1 Routine Review of Identification and Resolution of Problems

a. Inspection Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action program at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. The inspectors reviewed attributes that included the complete and accurate identification of the problem; the timely correction, commensurate with the safety significance; the evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent of condition reviews, and previous occurrences reviews; and the classification, prioritization, focus, and timeliness of corrective actions. Minor issues entered into the licensee's corrective action program because of the inspectors' observations are included in the attached list of documents reviewed.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure, they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

No findings were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of

items entered into the licensee's corrective action program. The inspectors accomplished this through review of the station's daily corrective action documents.

The inspectors performed these daily reviews as part of their daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings were identified.

.3 Selected Issue Follow-up Inspection

a. Inspection Scope

During a review of items entered in the licensee's corrective action program, the inspectors recognized a corrective action item documenting a failure of the Unit 1 service water pump C. The licensee entered the issue into the corrective action program as Condition Report CR-ANO-1-2012-0864. The inspectors reviewed the condition report for impact upon service water system's operability and the high risk significance associated with the loss of one service water pump.

These activities constitute completion of one in-depth problem identification and resolution sample as defined in Inspection Procedure 71152-05.

b. Findings

Introduction: The inspectors documented a Green, self-revealing, non-cited violation of 10 CFR Part 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment and Services" for the licensee's failure to assure that purchased material conformed to the procurement documents. Specifically, the licensee received, accepted and installed the wrong couplings on the Unit 1 service water pump C, resulting in a coupling failure that left the pump inoperable.

Description: On June 2, 2012, Unit 1 control room received a circulating pump motor cooling water flow low alarm for circulating water pumps A and D. It was observed that service water loop pressures for both loops with service water pumps A and C running were reading approximately 37 psig and had been reading approximately 76 psig prior to the alarm. Control room operators entered the abnormal operating procedure for a loss of service water and started service water pump B. Service water loop pressures returned to normal and the alarm cleared. The outside auxiliary operator was sent to investigate the pumps at the service water intake structure and reported that the service water pump C motor was running, with a discharge pressure of 0 psig. While verifying that service water pumps A and B were operating correctly, the operator noted that service water pump C was starting to exhibit abnormal vibration and noise. The control room then secured the C service water pump. This was documented in condition report CR-ANO-1-2012-0864.

During disassembly of service water pump C it was discovered that one of the couplings use to connect the multistage shaft from the motor to the pump impeller had failed, allowing the motor to rotate without rotating the impeller.

The licensee conducted an investigation into the failure of the coupling. The licensee determined that the wrong couplings were sent, accepted and installed on the Unit 1 service water pump C in 2009. The condition only existed on the Unit 1 service water pump C and did not affect pumps A and B. This condition did not affect the Unit 2 pumps which have a similar design but are much larger and use different materials.

A review of the purchase order determined that the licensee had ordered six A582, condition A (Annealed) stainless steel couplings. The site received six couplings from two different lots, four in one lot and two from a different lot. As part of the site receipt inspection and acceptance of the couplings the licensee performed a commercial grade item/service evaluation which included verifying the item ordered had the correct physical and chemical properties.

The licensee had previously determined that tempered stainless steel would not be used for this coupling based on its susceptibility to intergranular stress corrosion cracking in this application and the potential for coupling failure. The ASTM standard stated that for A 582 stainless steel to meet condition A, the maximum Brinell hardness for an annealed condition would be 262. The first certificate of test reviewed by the receipt inspector to verify the physical and chemical properties of the lot of two couplings listed the Brinell hardness in the mechanical properties section as 142, which was within the acceptance range for an annealed condition. The second certificate of test reviewed by the receipt inspector to verify the physical and chemical properties of the lot of four couplings listed the Rockwell hardness in the mechanical properties section as 30. A conversion is required to equate the Rockwell number to the Brinell number. After applying the conversion the Brinell hardness would be approximately 286 which would be above the number for annealed and be in the range for a tempered condition and should have been rejected. The licensee failed to identify that the ordered couplings did not meet the requirements specified in the purchase order. The licensee entered this information into the corrective action program as Condition Report CR-ANO-1-2012-0874.

The licensee completed a rebuild of service water pump C with the correct coupling material and completed post maintenance testing.

A senior reactor analyst performed a Phase 3 analysis. The risk involved the addition of three elements: a one-day period where service water pump C would have failed to run for 24 hours, a 7-day period where service water pump C was non-functional during repair, and a slight increase in the initiating event frequency of a loss of service water. The overall incremental conditional core damage probability (ICCDP) was 7.5E-7. The majority of the risk resulted from a loss of AC Bus A3 combined with a loss of the turbine-driven emergency feedwater pump. External events and large early release were not significant to the result.

Analysis: The inspectors determined that the failure to assure that purchased material conformed to the purchase order is a performance deficiency because the licensee

failed to perform an adequate receipt inspection then accepted and installed the wrong couplings that subsequently failed. The performance deficiency had the potential to affect the Initiating Events or Mitigating Systems Cornerstones so a regional senior reactor analyst was contacted for assistance. The senior reactor analyst performed a phase 3 analysis and determined the dominant risk affected the Mitigating Systems cornerstone. The performance deficiency is more than minor because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone and adversely affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and is therefore a finding. The phase 3 analysis determined the majority of the risk resulted from a loss of AC Bus A3 combined with a loss of the turbine-driven emergency feedwater pump. The finding was determined to be of very low safety significance (Green). The finding was determined not to have a cross-cutting aspect because the performance deficiency occurred in 2009 and is not indicative of current plant performance.

Enforcement: Title 10 of the CFR, Part 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment and Services" states, in part, that "measures shall be established to assure that purchased material, equipment, and services …conform to the procurement documents. These measures shall include provisions, as appropriate, for …objective evidence of quality furnished by the contractor…, and examination of products upon delivery." Contrary to the above, the couplings procured for use on the service water pump did not conform to the requirements of the procurement documents and were not rejected as nonconforming upon receipt inspection and prior to installation. Because this finding is of very low safety significance and has been entered into the corrective action program as Condition Report CR-ANO-1-2012-0864, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000313/2012003-02, "Failure to Install Correct Coupling on Service Water Pump Results in Pump Failure"

.4 Selected Issue Follow-up Inspection

a. Inspection Scope

During a review of items entered in the licensee's corrective action program, the inspectors recognized a corrective action item documenting two spurious trips of emergency feedwater initiation and control (EFIC) cabinet circuit breakers on August 16, 2011 and November 28, 2011. Each instance resulted in Unit 1 entering a TS condition with required actions within 72 hours or shutdown. The licensee entered the issue into the corrective action program as Condition Reports CR-ANO-1-2011-1252, and 3071. The inspectors reviewed the higher tiered apparent cause evaluation and interviewed the system engineer to determine causes and corrective actions.

These activities constitute completion of one in-depth problem identification and resolution sample as defined in Inspection Procedure 71152-05.

b. Findings

No findings were identified.

.5 Selected Issue Follow-up Inspection

a. Inspection Scope

During a review of items entered in the licensee's corrective action program, the inspectors recognized a corrective action item documenting the loss of automatic control of the start-up and low-load feedwater flow control valves by the integrated control system (ICS) on February 15, 2012. The failure of automatic control placed the unit into a TS condition with required actions within 8 hours or shutdown. The licensee was in the process of requesting a Notice of Enforcement Discretion (NOED) when the the issue was corrected by replacing six integrated control system modules. The NOED request was withdrawn by the licensee. The inspectors reviewed the higher tiered apparent cause evaluation and interviewed the system engineer to determine causes and corrective action.

These activities constitute completion of one in-depth problem identification and resolution sample as defined in Inspection Procedure 71152-05.

b. Findings

No findings were identified.

**4OA3 Followup of Events and Notices of Enforcement Discretion (71153)**

.1 (Closed) LER 05000368/2010002 Completion of a Plant Shutdown Required by Technical Specifications Due to the Inability to Restore an Emergency Diesel Generator to Operable Status within the Allowed Outage Time.

On August 9, 2010, at 0330 CDT, Unit 2 removed one emergency diesel generator from service for planned maintenance and entered the appropriate technical specification statements. Technical Specification 3.8.1 required the diesel to be returned to service within 14 days. Scheduled maintenance on the diesel was not going to be completed within the 14 days so a plant shutdown was initiated on August 23, 2010 to comply with the technical specification. Shutdown was completed on August 23, 2010 at 0443 CDT by entering Mode 3 and the unit entered Mode 4 at 2148 CDT. Additionally, due to deficiencies in the tracking process for technical specification limiting conditions for operations, the licensee failed to meet a more restrictive technical specification limiting condition for operation, Technical Specification 3.4.4, that required the unit to be in Mode 4 within 12 hours (1530 CDT August 23, 2010) after not being able to restore the emergency diesel generator. The issue was entered into the corrective action program as Condition Report CR-ANO-2-2010-1830. A licensee identified non-cited violation will be documented in section 4OA7 of this report. This licensee event report is closed.

.2 (Closed) LER05000313/2010004 Automatic Reactor Protection System Actuation that Resulted in a Reactor Trip Due to Inadequate Procedure Use and Adherence and Workers Acting Independently.

On April 25, 2010, at approximately 2126 CDT, with Arkansas Nuclear One, Unit 1 operating at approximately 19.5 percent thermal power, by heat balance measurement, following 1R22 refueling outage, a reactor protection system actuation during nuclear instrument calibration resulted in a reactor trip. Due to low power reactor physics testing, excore nuclear instrumentation gains had been conservatively set high resulting in a deviation between excore nuclear instrumentation and heat balance power of approximately 11 percent. Based on requirements of station operating procedure OP-1102.004, "Power Operations", Operations personnel requested the Instrumentation & Controls department to perform a nuclear instrumentation calibration of all four channels of the reactor protection system. During performance of the nuclear instrument calibration, a large negative neutron error signal developed resulting in a mismatch between selected power and indicated power which resulted in group 7 control rods withdrawing for 38 seconds. During the rod withdrawal, indicated excore nuclear instrumentation power rose from 30 to 49.55 percent resulting in a high neutron flux trip on reactor protection system channel C and high reactor coolant system pressure trip on reactor protection system channel A, resulting in an automatic reactor trip. The licensee determined the cause for this event to be the failure to appropriately use and adhere to procedures. During the nuclear instrument calibration the integrated control system diamond rod control station was not in manual as required by OP-1104.004. Procedure steps were not performed as written and not read verbatim to the operator as required by procedure guidance. As a result, immediate stand-downs with Operations and Maintenance departments were conducted and additional control room oversight was established. This issue was placed into the licensee's corrective action program as Condition Report CR-ANO-1-2010-2056 and documented as a self revealing non-cited violation in Inspection Report 05000313/2010003. The review of this licensee event report is complete and no additional findings or violations of NRC requirements were identified. This licensee event report is closed.

## 4OA6 Meetings, Including Exit

Exit Meeting Summary

On March 1, 2012, the inspectors discussed their in-office review of the proposed exercise scenario submitted on February 10, 2012, with Mr. R. Holeyfield, Manager, Emergency Preparedness, and other members of the licensee's staff.

On April 13, 2012, the inspectors presented the results of onsite inspection of the biennial emergency preparedness exercise to Mr. C. Schwarz, Site Vice President, and other members of the licensee's staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

On July 24, 2012, the inspectors presented the inspection results to Mr. C. Schwarz, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues

presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

### 4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by the licensee and are violations of NRC requirements which meet the criteria of the NRC Enforcement Policy for being dispositioned as non-cited violations.

1. Unit 2 Technical Specification 3.4.4 limited condition for operation action b states "With the pressurizer inoperable due to an inoperable emergency power supply to the pressurizer heaters, either restore the inoperable emergency power supply as required by Technical Specification 3.8.1.1 action b.3 or be in at least hot shutdown (Mode 4) within 12 hours." Contrary to the above on August 23, 2010 after not being able to restore emergency diesel generator 2 to an operable status, Unit 2 was not in hot shutdown within 12 hours. Specifically, the licensee had completed a shutdown of Unit 2 based upon compliance with Technical Specification 3.8.1.1 action b.3 requiring the unit to be in hot standby within six hours (Mode 3) and be in cold shutdown (Mode 5) within the following 30 hours after not being able to restore emergency diesel generator 2 to an operable status but failed to recognize the need to be in hot shutdown (Mode 4) within 12 hours as required by Technical Specification 3.4.4 action b. The unit was in hot shutdown (Mode 4) in 18 hours and 18 minutes. The performance deficiency of not complying with the limited condition for operation was more than minor because it was associated with the equipment performance attribute and adversely affected the Mitigating System Cornerstone objective to ensure availability, reliability, and capability to respond to initiating events to prevent adverse consequences. Using Manual Chapter 0609, Attachment 0609.04, "Initial Screening and Characterization of Findings," the finding required additional analysis because with emergency diesel generator 2 inoperable the associated pressurizer heaters were unavailable representing an actual loss of safety function of a single train for greater than its technical specification allowed outage time. The resident inspectors received support from the regional senior reactor analyst who performed a phase 3 analysis that determined the finding to be of very low safety significance (Green). The issue was placed into the corrective action program as Condition Report CR-ANO-2-2010-1830.

2. Title 10 of CFR 50.54(q)(2) requires a licensee to follow a plan meeting the requirements of Appendix E. The Arkansas Nuclear One Emergency Plan, Section 3.1.1 required annual retraining of the London Fire Department about site specific emergency response. Contrary to the above, during 2010, annual retraining of the London Fire Department was not performed. This issue is more than minor because it impacts the Emergency Preparedness Cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency, and affects the offsite emergency preparedness cornerstone attribute. The finding is of very low safety significance because it is a failure to comply with NRC requirements and is not a planning standard functional failure or degraded function. This issue has been entered into the licensee's corrective action program as Condition Report CR-ANO-C-2011-01309.

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

Licensee Personnel

B. Byford, Manager, Training
T. Chernivec, Manager, Outages
M. Chisum, General Manager, Plant Operations
R. Crowe, Acting Manager, Security
B. Daiber, Manager, Design Engineering
J. Eichenberger, Manager, Corrective Actions & Assessments
R. Fuller, Manager, Quality Assurance
W. Greeson, Manager, Engineering Programs and Component
R. Holeyfield, Manager, Emergency Preparedness
D. James, Director, Nuclear Safety
K. Jones, Manager, Operations
D. Marvel, Manager, Radiation Protection
J. McCoy, Director, Engineering
N. Mosher, Licensing Specialist
B. Pace, Manager, Planning, Scheduling, and Outage
D. Perkins, Manager, Maintenance
S. Pyle, Manager, Licensing
W. Renz, EOI Director, Emergency Preparedness
C. Schwarz, Site Vice President
T. Sherrill, Manager, Chemistry
P. Williams, Manager, System Engineering

NRC Personnel

A. Sanchez, Senior Resident Inspector
J. Rotton, Resident Inspector
W. Schaup, Resident Inspector

### LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

| | | |
|---|---|---|
| 05000368/2012003-01 | NCV | Failure to Correct a Known Condition Adverse to Quality Associated with Inadequately Secured Splined Adaptors for Service Water Discharge Cross-Connect Valves (Section 1R15) |
| 05000313/2012003-02 | NCV | Failure to Install Correct Coupling on Service Water Pump Results in Pump Failure (Section 4OA2) |

Closed

| | | |
|---|---|---|
| 05000368/2010002 | LER | Completion of a Plant Shutdown Required by Technical Specifications Due to the Inability to Restore an Emergency Diesel Generator to Operable Status within the Allowed Outage Time (Section 4OA3) |
| 05000313/2010004 | LER | Automatic Reactor Protection System Actuation that Resulted in a Reactor Trip Due to Inadequate Procedure Use and Adherence and Workers Acting Independently (Section 4OA3) |

## LIST OF DOCUMENTS REVIEWED

### Section 1R04: Equipment Alignment

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| OP-2104.036 | Unit 2 Emergency Diesel Generator Operations | 80 |
| OP-2104.029 | Unit 2 Service Water System Operations | 84 |
| OP-2104.005 | Containment Spray | 63 |

DRAWINGS

| NUMBER | TITLE | REVISION |
|---|---|---|
| M-2210 | Service Water Sh. 7 | 0 |
| M-2217 | Emergency Diesel Generator and Fuel Oil System Sh. ½ | 63/34 |
| M-2236 | Containment Spray System | 94 |

### Section 1R05: Fire Protection

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| FHA | ANO Fire Hazard Analysis | 13 |
| PFP-U1 | ANO Pre-Fire Plan Unit 1 | 13 |
| PFP-U2 | ANO Pre-Fire Plan Unit 2 | 10 |
| EN-TQ-125 | Fire Brigade Drills | 1 |

MISCELLANEOUS

| NUMBER | TITLE | REVISION |
|---|---|---|
| | Second Quarter Fire Brigade Drill Report | |

CONDITION REPORTS

CR-ANO-C-2012-0993 CR-ANO-C-2012-1121 CR-ANO-C-2012-0941 CR-ANO-C-2012-1120

**Section 1R06: Flood Protection Measures**

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| ULD-0-TOP-17 | ANO Topical Flooding | 0 |

CONDITION REPORT

CR-ANO-2-2012-0412

CALCULATIONS

| NUMBER | TITLE | REVISION |
|---|---|---|
| CALC-92-R-0024-01 | Flooding Evaluation INPO SOER 85-5 | 0 |
| CALC-92-R-0034-01 | Flooding Evaluation INPO SOER 85-5-2$^{nd}$ Iteration | 0 |

**Section 1R11: Licensed Operator Requalification Program**

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| OP-1105.009 | Unit 1 Control Rod Drive System Operating Procedure | 41 |

**Section 1R12: Maintenance Effectiveness**

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| EN-DC-203 | Maintenance Rule Program | 1 |
| EN-DC-204 | Maintenance Rule Scope and Basis | 2 |
| EN-DC-205 | Maintenance Rule Monitoring | 3 |
| EN-DC-206 | Maintenance Rule (a)(1) Process | 1 |

**Section 1R12: Maintenance Effectiveness**

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| OP-2106.006 | Unit 2 Emergency Feedwater System Operations | 81 |

DRAWINGS

| NUMBER | TITLE | REVISION |
|---|---|---|
| M-2204 | Emergency Feedwater SH. 4 | 67 |

MISCELLANEOUS DOCUMENTS

| NUMBER | TITLE | REVISION/ DATE |
|---|---|---|
| Maintenance Rule Database | Unit 2 Emergency Feedwater System | Report date 6/18/2012 |
| System Health Report | Unit 2 Emergency Feedwater System | Report date 6/25/2012 |
| STM 2-19-2 | Unit 2 Emergency Feedwater and Auxiliary Feedwater Systems | 32 |

**Section 1R13: Maintenance Risk Assessment and Emergent Work Controls**

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| COPD-024 | Risk Assessment Guidelines | 35 |
| OP-1107.001 | Unit 1 Electrical System Operations | 87 |
| OP-2107.001 | Unit 2 Electrical System Operation | 92 |
| OP-1106.006 | Unit 1 Emergency Feedwater Operation | 83 |

CONDITION REPORTS

CR-ANO-C-2012-1083 CR-ANO-C-2012-1077 CR-ANO-C-2012-1085
CR-ANO-C-2012-1086

WORK ORDERS

52275268 52265996 52038233
52279056 311922

MISCELLANEOUS DOCUMENTS

| NUMBER | TITLE | DATE |
|---|---|---|
| OPS-151A | Start Up 2 Outage Checklist – Unit 1 – 72 hour TC | 4/13/2012 |
| OPS-151B | Start Up 2 Outage Checklist – Unit 2 – 72 hour TC | 4/13/2012 |

**Section 1R15: Operability Evaluations**

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| EN-OP-104 | Operability Evaluations | 5 |
| OP-2304.102 | Unit 2 High Linear and High Log Power Levels Excore Safety Channel C | 72 |
| OP-2304.090 | Unit 2 Plant Protection System Channel B Cabinet Calibration | 9 |
| EN-LI-101 | 10 CFR 50.59 Evaluations | 9 |

CONDITION REPORTS

| | | |
|---|---|---|
| CR-ANO-2-2012-0707 | CR-ANO-2-2012-0077 | CR-ANO-2-2012-0953 |
| CR-ANO-2-2012-1126 | CR-ANO-C-2010-0329 | CR-ANO-2-2010-0153 |
| CR-ANO-2-2009-0934 | CR-ANO-2-2011-1351 | CR-ANO-2-2011-0383 |
| CR-ANO-2-2010-2256 | | |

MISCELLANEOUS DOCUMENTS

| NUMBER | TITLE | REVISION |
|---|---|---|
| STM 2-67-1 | Excore Nuclear Instrumentation | 10 |
| STM 2-70 | Engineered Safety Features Actuation System | 18 |
| ULD-2-SYS-10 | ANO Unit 2 Service Water System | 11 |
| NQ-2010-007 | Quality Assurance Audit Report QA-04-2010-ANO-1 Engineering (Design Control) | |
| EC-18947 | Splined Adaptor Retainer Collar for 2CV-1422-2 | |
| EC-14498 | Splined Adaptor Retainer Collar for 2CV-1425-1, 2CV-1421-2, 2CV-1400-1 | |

**Section 1R18: Plant Modifications**

| NUMBER | TITLE | REVISION |
|---|---|---|
| OP-2402.094 | Maintenance of Tricentric Butterfly Valves | 8 |
| EN-DC-115 | Engineering Change Process | 12 |
| EN-DC-136 | Temporary Modifications | 7 |

MISCELLANEOUS

| NUMBER | TITLE | REVISION |
|---|---|---|
| EC-37052 | Install temporary support to maintain seismic qualification of firewater pipe during replacement of P-6B diesel driven fire water pump (near safety related MODs for P-4B service water pump) | 0 |
| SPEC-ANO-M-2410 | Technical Specifications for Installation, Modification, Inspection, and Documentation of Piping Systems and Pipe Supports | 5 |
| EC-18947 | Splined Adaptor Retainer Collar for 2CV-1422-2 | 0 |
| EC-14498 | Splined Adaptor Retainer Collar for 2CV-1425-1, 2CV-1421-2, 2CV-1400-1 | 0 |

WORK ORDERS

261920-22 217125 270011

CONDITION REPORTS

CR-ANO-1-2012-0995 CR-ANO-2-2012-1126 CR-ANO-2-2011-1351

**Section 1R19: Post-Maintenance Testing**

PROCEUDRE

| NUMBER | TITLE | REVISION |
|---|---|---|
| EN-MA-101 | Fundamentals of Maintenance | 9 |
| EN-WM-102 | Work Implementation and Closeout | 6 |
| EN-WM-105 | Planning | 9 |
| EN-WM-107 | Post Maintenance Testing | 3 |
| OP-2104.029 | Unit 2 Service Water System Operations | 84 |

**Section 1R19: Post-Maintenance Testing**

PROCEUDRE

| NUMBER | TITLE | REVISION |
|---|---|---|
| OP-1104.029 | Unit 1 Service Water and Auxiliary Cooling System | 96 |
| OP-1104.005 | Unit 1 Reactor Building Spray System Operation | 64 |
| OP-2106.006 | Unit 2 Emergency Feedwater System Operation | 81 |
| OP-2104.005 | Containment Spray | 63 |

WORK ORDERS

| | | |
|---|---|---|
| 52319323 | 52351036 | 52351047 |
| 52318887 | 52351017 | 31426202 |
| 31418701 | | |

CONDITION REPORTS

| | | |
|---|---|---|
| CR-ANO-2-2012-0899 | CR-ANO-2-2012-0904 | CR-ANO-1-2012-0723 |

**Section 1R22: Surveillance Testing**

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| OP-2104.036 | Unit 2 Emergency Diesel Generator Operations | 80 |
| OP-2403.022 | Unit 2 2D13 Quarterly Surveillance | 11 |
| OP-1304.126 | Unit 1 RPS-B/CRD Breaker Trip Test | 23 |
| OP-2307.016 | Unit 2 2D11, 2D12 and 2D13 Battery Pilot Cell Test | 18 |
| OP-2106.006 | Unit 2 Emergency Feedwater System Operation | 81 |
| OP-1106.006 | Emergency Feedwater Pump Operation | 83 |
| EN-MA-188 | Foreign Material Exclusion | 8 |

CONDITION REPORTS

| | | |
|---|---|---|
| CR-ANO-2-2012-0728 | CR-ANO-2-2012-0729 | CR-ANO-2-2012-0904 |
| CR-ANO-2-2012-0819 | CR-ANO-2-2012-1264 | CR-ANO-1-2012-0629 |
| CR-ANO-1-2012-0756 | | |

WORK ORDERS

| | | |
|---|---|---|
| 52344614 | 52342058 | 52342007 |

**Section 1EP1: Exercise Evaluation**

| NUMBER | TITLE | REVISION |
|---|---|---|
| | Arkansas Nuclear One Emergency Plan | 35 |
| EN-EP-306 | Drills and Exercises | 2 |
| EN-EP-308 | Emergency Planning Critiques | 1 |
| EPIP 1903.010 | Emergency Action Level Classification | 44 |
| EPIP 1903.011 | Emergency Response/Notifications | 42 |
| EPIP 1903.023 | Personnel Emergency | 41 |
| EPIP 1903.030 | Evacuation | 29 |
| EPIP 1903.033 | Protective Action Guidelines for Rescue/Repair and Damage Control Teams | 22 |
| EPIP 1903.035 | Administration of Potassium Iodide | 14 |
| EPIP 1903.043 | Duties of the Emergency Radiation Team | 20 |
| EPIP 1903.064 | Emergency Response Facility – Control Room | 10 |
| EPIP 1903.065 | Emergency Response Facility – Technical Support Center | 24 |
| EPIP 1903.066 | Emergency Response Facility – Operations Support Center | 20 |
| EPIP 1903.067 | Emergency Response Facility – Emergency Operations Facility | 28 |
| EPIP 1904.002 | Offsite Dose Projections – RDACS Computer Method | 35 |

CONDITION REPORTS (CORRECTIVE ACTION DOCUMENTS)

| | | |
|---|---|---|
| CR-ANO-C-2011-01309 | CR-ANO-C-2011-00455 | CR-ANO-C-2012-00484 |
| CR-ANO-C-2011-03370 | CR-ANO-C-2012-01504 | CR-ANO-C-2011-03252 |
| CR-ANO-C-2012-00677 | CR-ANO-C-2012-00470 | CR-ANO-C-2012-00486 |
| CR-ANO-C-2011-03370 | CR-ANO-C-2011-02855 | |

**Section 1EP6: Drill Evaluation**

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| OP-1903.011 | Emergency Response/Notifications | 42 |

MISCELLANEOUS

| NUMBER | TITLE | REVISION |
|---|---|---|
| DEP # 26 and 29 | Drill Exercise & Actual Event Performance (DEP) Evaluation Form | |

**Section 4OA1: Performance Indicator Verification**

PROCEDURES

| NUMBER | TITLE | REVISION |
|---|---|---|
| EN-LI-114 | Performance Indicator Process | 5 |
| EN-FAP-EP-005 | Fleet Administrative Procedure Emergency Preparedness Performance Indicators | 0 |
| EP-019 | Emergency Planning Performance Indicators | 0 |
| OP-1607.001 | Reactor Coolant Sampling System | 19 |
| OP-2607.001 | Unit 2 Reactor Coolant System Sampling | 19 |
| OP-1604.012 | Iodine Dose Equivalent (IDE) and Xenon Dose Equivalent (DEX) Determinations | 11 |

**Section 4OA2: Identification and Resolution of Problems**

PROCEUDRE

| NUMBER | TITLE | REVISION |
|---|---|---|
| EN-LI-102 | Corrective Action Process | 16 |
| OP-1402.061 | Disassembly, Inspection and Reassembly of the Unit 1 Service Water Pumps | 17 |

CONDITION REPORTS

| | | |
|---|---|---|
| CR-ANO-1-2008-1033 | CR-ANO-1-2008-1355 | CR-ANO-1-2012-0874 |
| CR-ANO-1-2012-0267 | CR-ANO-1-2012-0870 | CR-ANO-1-2012-0875 |
| CR-ANO-1-2012-0273 | CR-ANO-1-2012-0867 | CR-ANO-1-2012-0902 |
| CR-ANO-1-2012-0864 | CR-ANO-1-2012-0899 | CR-ANO-1-2012-3071 |
| CR-ANO-1-2012-0866 | CR-ANO-1-2012-0270 | CR-ANO-1-2011-1252 |
| CR-ANO-1-2012-0822 | | |

WORK ORDERS

00172129

MISCELLANEOUS DOCUMENTS

| NUMBER | TITLE | DATE |
|---|---|---|
| LER PNP-2011-066 | Licensee Event Report 2011-005, Service Water Pump Shaft Coupling Failure – Palisades Nuclear Plant | 10/03/2011 |
| ASTM A582/ A 582M | Standard Specification for Free Machining Stainless Steel Bars | |
| PO: 10233698 | Coupling Shaft Stainless Steel A582, 416 Condition A | 4/09/2009 |
| QC-ANO-000282235 | Receipt Inspection Acceptance for PO: 10233698 | 5/06/2009 |