UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

November 5, 2007

Mr. Timothy G. Mitchell
Vice President Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802-0967

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000313/2007008 AND 05000368/2007008

Dear Mr. Mitchell:

On September 21, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed a component design bases inspection at your Arkansas Nuclear One station. The enclosed report documents our inspection findings. The findings were discussed on September 21, 2007, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The team reviewed selected procedures and records, observed activities, and interviewed cognizant plant personnel.

Based on the results of this inspection, the NRC identified one finding that was evaluated under the risk significance determination process. A violation was associated with this finding. The finding was found to have very low safety significance (Green) and the violation associated with this finding is being treated as a noncited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest the noncited violation, or the significance of the violation you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC resident inspector at the Arkansas Nuclear One station.

In accordance with 10 CFR 2.390 of the NRC's Rules of Practice, a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/
William B. Jones, Chief
Engineering Branch 1
Division of Reactor Safety

Dockets: 50-313; 50-368
Licenses: DPR-51; NPF-6

Enclosure:
NRC Inspection Report 05000313/2007008
and 05000368/2007008
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Dockets:	50-313; 50-368
License:	DPR-51; NPF-6
Report:	05000313/2007008 and 05000368/2007008
Licensee:	Entergy Operations, Inc.
Facility:	Arkansas Nuclear One, Units 1 and 2
Location:	Junction of Hwy. 64W and Hwy. 333 South Russellville, Arkansas
Dates:	August 25 through September 21, 2007
Team Leader:	R. Kopriva, Senior Reactor Inspector, Engineering Branch 1
Inspectors:	J. Nadel, Reactor Inspector, Engineering Branch 1 J. Adams, PhD, Reactor Inspector, Engineeering Branch 1 M. Murphy, Senior Operations Inspector
Accompanying Personnel:	P. Wagner, Electrical Engineer, Beckman and Associates S. Speigelman, Mechanical Engineer, Beckman and Associates
Approved By:	William B. Jones, Chief Engineering Branch 1 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000313/2007008 and 05000368/2007008; 08/25/07 - 09/21/07; Arkansas Nuclear One; Component Design Bases Inspection.

The report covers an announced inspection by a team of four regional inspectors, and two contractors. One finding was identified of very low safety significance. The final significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process." 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 3, dated July 2000.

A. NRC-Identified Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for multiple nonconservative errors in a Unit 2 emergency diesel generator fuel oil consumption calculation. The errors were a result of illegible reference data, inconsistently applied methodology, and inadequate calculation reviews, some of which reduced the calculated margin to meeting design bases requirements. The inspectors determined that the failure to establish an adequate design bases emergency diesel generator fuel oil consumption calculation constituted a performance deficiency and a violation. The licensee entered this into their corrective action program as Condition Report ANO-2-2007-01325.

  The inspectors determined that the violation was more than minor because the fuel oil volume required was called into question by the nonconservative errors identified by the NRC and the calculation needed to be performed again using the appropriate reference data. In accordance with Inspection Manual Chapte 0609, "Significance Determination Process," Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," the inspectors conducted a Phase 1 screening and determined the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in loss-of-operability in accordance with Part 9900, Technical Guidance, Operability Determination Process for Operability and Functional Assessment. This issue is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy: Noncited Violation 05000368/2007008-001, Non-conservative Errors in Unit 2 Fuel Oil Consumption Calculation (Section 1R21.b.1).

B. Licensee-Identified Violations

None

REPORT DETAILS

1. REACTOR SAFETY

Inspection of component design bases verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected components and operator actions to perform their design bases functions. As plants age, their design bases may be difficult to determine and important design features may be altered or disabled during modifications. The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems and Barrier Integrity cornerstones for which there are no indicators to measure performance.

1R21 Component Design Bases Inspection (71111.21)

The team selected risk-significant components and operator actions for review using information contained in the licensee's probabilistic risk assessment. In general, this included components and operator actions that had a risk achievement worth factor greater than 2 or a Birnbaum value greater than 1E-6.

a. Inspection Scope

To verify that the selected components would function as required, the team reviewed design bases assumptions, calculations, and procedures. In some instances, the team performed calculations to independently verify the licensee's conclusions. The team also verified that the condition of the components was consistent with the design bases and that the tested capabilities met the required criteria.

The team reviewed maintenance work records, corrective action documents, and industry operating experience records to verify that licensee personnel considered degraded conditions and their impact on the components. For the review of operator actions, the team observed operators during simulator scenarios, as well as during simulated actions in the plant.

The team performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions because of modifications, and margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results; significant corrective actions; repeated maintenance; 10 CFR 50.65(a)1 status; operable, but degraded conditions; NRC resident inspector input of problem equipment; system health reports; industry operating experience; and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in-depth margins.

The inspection procedure requires a review of 15-20 risk-significant and low design margin components, 3-5 relatively high-risk operator actions, and 4-6 operating experience issues. The sample selection for this inspection was 37 components, 7 operator actions, and 7 operating experience issues.

The components selected for review were:

- T-55, reactor building sump
- BW-1 (CL), borated water storage tank outlet
- CS-285 (CL), P-7A and P-7B Recirculation to T-41B
- FW-68A (CL), P-7A/B common minimum recirculation to T-41B
- P-7A, Emergency Feedwater Pump (K-3 turbine driven)
- P-7B, emergency feedwater pump (motor driven)
- P-34B, 'B' loop decay heat removal pump
- P-34A, 'A' loop decay heat removal pump
- FW-13B (CL), emergency feedwater to 'B' once through steam generator check valve
- CV-1277 (CL), 'B' decay heat removal loop discharge to Make-Up Pump P-36C suction
- CV-1276 (CL), 'A' decay heat removal loop discharge to Make-Up Pump P-36A suction
- CV-1406 (CL), Reactor Building Sump Line 'B' outlet valve
- CV-1408 (CL), Borated Water Storage Tank T-3 outlet
- CV-3841 (CL), low pressure injection/Decay Heat Pump Bearing Cooler E-50B inlet valve
- CV-3840 (CL), low pressure injection/Decay Heat Pump Bearing Cooler E-50A inlet
- Pressure-operated relief valve
- Emergency feedwater initiation
- Fuel oil supply and transfer
- Safety-related condensate storage tank

- Safety-related batteries
- Emergency diesel generator fuel oil (chemistry, consumption, etc.)
- Emergency diesel generator fuel oil storage and day tanks (sizing, instrumentation, vortexing, etc.)
- Emergency diesel generator fuel oil transfers pumps (net positive suction head, design inputs, etc.)
- Quality condensate storage tank design modification, instrumentation)
- Low temperature over pressure valves Unit 2 (low temperature over pressure pressure relief valves, low temperature over pressure motor-operated valve stop valves, last 2 years of surveillance test results, etc..)
- Emergency diesel generator heat exchangers (some performance test results, vendor manuals, licensee's Generic Letter 89-13 commitments)
- Reactor coolant pump seal
- Low temperature over pressure relief valves
- Refueling water storage tank
- Refueling water storage tank discharge valve
- Containment sump discharge valve
- High head safety injection pumps
- Low head safety injection pumps
- Residual heat removal heat exchanger
- Containment spray pump
- Safety injection piggyback valve
- Diesel generator fuel oil transfer system

The risk significant operator actions included:

- Scenario 2: Engineered Safeguards Actuation System (reactor coolant system pressure stabilizes less than 150 psig) (Unit 1), Course A1SPGROEOPESAS, Revision 1, dated October 23, 2006.
- Scenario: Station Blackout (Unit 2), Course A2SPG-RO-SBO, Revision 3, dated June 30, 2007.

- Scenario: Control Rod Drive Abnormal Operations (Unit 1), Course A1SPGLOR080101, Revision 0, dated July 30, 2007.

- Scenario: Degraded Power (Unit 1), Course A1SPGLOR080102, Revision 0, dated July 30, 2007.

- Scenario: Emergency Feedwater Initiation and Control (Unannounced Casualties) (Unit 1), Course A1SPGLOR080103l, Revision 0, dated July 27, 2007.

- Scenario: Precise Control (Unannounced Casualties) (Unit 2), Course A2SPGLOR080101, Revision 0, dated July 30, 2007.

- Scenario: Federal Response Plan 1 (Code Safety Functional Recovery) (Unit 2), Course A2SPGLOR080102, Revision 0, dated July 10, 2007.

The operating experience issues were:

- Ultra low sulfur diesel generator fuel oil

- Asiatic clams

- Service water temperature limits

- Information Notice 2006-021: Containment Sump Voiding

- Information Notice 2006-005: Possible Defect in Bussmann KWN-R and KTN-R Fuses

- Information Notice 2007-09: Motor Control Center, Control Power Transformer Sizing Concerns

- Information Notice 2006-031: Inadequate Fault Interrupting Rating of Breakers

b. Findings

.1 Nonconservative Errors in Unit 2 Fuel Oil Consumption Calculation

Introduction: The inspectors identified a noncited violation of 10 CFR Part 50 Appendix B, Criterion III, "Design Control", for Multiple Non-conservative Errors in a Unit 2 Emergency Diesel Generator Fuel Oil Consumption Calculation". Contributing factors to the errors were illegible reference data, inconsistently applied methodology, and inadequate calculation reviews.

Description: Emergency diesel generator fuel oil consumption calculations should employ conservative assumptions to show that under worst-case conditions, there remains enough fuel oil storage capacity on site for the emergency diesel generators to fulfill their safety functions.

Arkansas Nuclear One, Unit 2, Calculation 91-E-0107-04, "Emergency Diesel Generator Fuel Oil Consumption," used the original diesel vendor factory test data as input to calculate the highest case consumption rate and the required fuel oil storage margin to meeting all of the safety analysis run time assumptions.

The safety analyses require run times based on 50, 100, and 110 percent diesel load ratings. The vendor “Final Acceptance” test that is used as input to the calculation ran the diesel at all three load ratings and recorded information at each one, including fuel oil consumption rate. The calculation methodology took the consumption rates recorded during the test and corrected them to worst-case scenarios to get a calculated worst-case consumption at each diesel load rating. These values where then used to calculate maximum run times at different ratings, given the various fuel oil volumes available in different safety analysis assumptions.

The vendor test data sheet was recorded by hand on the day of the test, October 26, 1979. The licensee’s official copy of this record is from an electronic system to which the original was either scanned or microfilmed. This test document carried a warning cover sheet indicating that parts of the document have been determined to be illegible and no better copy exists in the official records.

The main inputs to the calculation from the vendor data sheet are the recorded fuel consumption rates in lb/hr at each load rating. The vendor performed multiple runs of the diesel at each of the three load ratings. The calculation author attempted to pick the highest recorded consumption rate for each load rating as the calculation input, which was the most conservative approach. Upon close inspection of the document, it appears that at 50 percent load rating, 835 lb/hr was the highest recorded value. However, inspectors questioned this value because of the poor quality of the document. The licensee was able to obtain an unofficial record of the test data directly from the vendor. Looking at the unofficial copy, one of the 50 percent load rating runs had recorded a consumption of 837 lb/hr, which appeared as 831 lb/hr on the illegible copy. Based on the inspectors review, the 837 lb/hr value is more conservative and should have been used.

The calculation employed a correction factor to the consumption numbers taken from the test data in order to correct for worst-case fuel low heating values. The heating value recorded during the test was 19,678 BTU/hr. Arkansas Nuclear One test the fuel oil for low heating value. The calculation utilized the lowest low heating value the site had recorded in the past 5 years at the time of the calculation (1997) and found it to be 17,847 BTU/lb. The consumption values, at each load rating from the test data, were then multiplied by the ratio of these two heating values, which increased the vendor consumption rates by about 10 percent.

The inspectors reviewed the licensee’s fuel oil testing procedure and noted that although low heating values were recorded for information only, the procedure does place a limit on the range of acceptable values. If the sample result values fall outside this range, the procedure requires a condition report be written. According to the procedural limits, the lowest acceptable low heat value is 17,065 BTU/lb. The NRC inspectors challenged the use of 17,847 BTU/lb as the bounding value in the calculation, given that fuel with a low heating value of 17,065 BTU/lb can be accepted onsite with no action required.

Applying the lower low heating value to the calculation, this nonconservatism results in the original consumption numbers from the test data being increased by a 15 percent correction factor vice the original 10 percent.

This error reduces the calculated diesel run time margins for all scenarios in the calculation. The most sensitive, however, is the calculation of the 7-day safety analysis requirement for a single diesel train (one storage tank, one day tank) to operate at 50 percent rating after a design basis flood event. The original calculation resulted in only a 0.7 percent margin to meeting this 7-day requirement (7.05 days of run time available). Once the data sheet transcription error, which only affects the consumption rate at 50 percent power, was applied along with the proper conservative low heat value; the calculation falls short of the 7-day requirement by almost 4 percent.

In addition, the inspectors identified a third nonconservative number in the calculation when examining the consumption rate listed at 110 percent load. Instead of employing the same methods used at 50 and 100 percent load by taking the largest consumption rate at 110 percent load (1636 lb/hr) from the vendor data sheet, the licensee interpolated a smaller value of 1622 lb/hr from the data. Using the number from the data sheet reduces the margin in most of the calculation results, although no results were challenged in this case.

Also of concern, the licensee has not obtained actual data from recent diesel generator testing for the purposes of confirming that the design bases assumptions remain valid. Engine wear and changes in diesel fuel oil quality over the last 30 years can affect the operating characteristics of the diesel, including fuel oil consumption rates.

When presented with these errors and the questioned ability to meet the safety analyses and design requirements, the licensee began scrutinizing the calculation. Eventually, the licensee found a vendor document from the test runs that called out the 19,678 BTU/lb heating value used in the calculation correction factor as a high heat value. High heating values account for the heat needed to vaporize the water in the fuel oil (heat of vaporization). This heat is not useful to the engine, so typically the heating value of interest is the low heat value, which does not include the heat of vaporization of water. However, the use of the high heat value in the calculation, while not technically correct, does add conservatism. In correcting that conservative error, the licensee used an appropriate low heat value, which reduced the correction factor enough to compensate for the nonconservative errors identified by the NRC. The licensee was able to show that they could still meet the 7-day requirement for a design basis flood.

Analysis: The inspectors determined that the failure to recognize multiple errors in a design bases emergency diesel generator fuel oil consumption calculation constituted a performance deficiency and a violation of 10 CFR Part 50, Appendix B, Criterion III. The violation was more than minor because it required the fuel oil volume calculations to be performed again to assure the accident analysis requirements were met. In accordance with Inspection Manual Chapter 0609, "Significance Determination Process," Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," the inspectors conducted a Phase 1 screening and determined the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in loss-of-operability in accordance with Part 9900, Technical

Guidance, "Operability Determination Process for Operability and Functional Assessment." The licensee entered this finding into the corrective action program as Condition Report ANO-2-2007-01325.

Enforcement: Criterion III of Appendix B to 10 CFR Part 50 requires, in part, that measures shall be established for the identification and control of design interfaces and for coordination among participating design organizations. These measures shall include the establishment of procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces. The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Contrary to the above, as of September 17, 2007, the design control measures taken were not adequate with respect to Calculation 91-E-0107-04, Revision 2, which contained multiple errors that affected the emergency diesel generator fuel oil calculation results, some of which reduced the calculated margin to meeting design bases requirements. This violation is of very low safety significance and has been entered into the licensee's corrective action program as Condition Report ANO-2-2007-01325, and it is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000368/2007008-001, Nonconservative Errors in Unit 2 Fuel Oil Consumption Calculation.

.2 Refueling Water Tank (Unit 2) and Quality Condensate Storage Tank Vortexing

Introduction: The team reviewed the refueling water tank volume and level setpoint calculations, operating procedures, and the transfer to the reactor containment building sump, to determine if sufficient water exists in the tank to support the technical specification requirements. The refueling water tank was also reviewed to determine if sufficient water remains in the refueling water tank following transfer to the containment sump during a loss-of-coolant accident to prevent drawing air into the safety injection and containment spray pumps. The time for automatic transfer was reviewed by the team to determine if adequate water remained in the take to allow for “swap-over” to the containment sump.

The team also reviewed the quality condensate storage tank volume requirement and the tank level during the transfer from the quality condensate storage tank to the service water system by the emergency feedwater system. The team reviewed the calculations for Units 1 and 2 and operating procedures for quality condensate storage tank transfer to determine if adequate water exists during the transfer operation. The team reviewed the calculation of required water level in the tank to facilitate the 30 minute transfer from the quality condensate storage tank to the service water system.

Description: The automatic refueling water tank recirculation actuation system setpoint is documented in Calculation 93-EQ-2001-03. This includes the instrument uncertainty considerations, as well as development of the recirculation actuation system setpoint, primarily to show how safety analysis volumes are achieved. For the refueling water tank, the team found that although sufficient water exists to support the technical specification requirements, Arkansas Nuclear One relies on a vortex suppressor to assure that there will be no air drawn into the safety injection and containment spray pumps prior to swap over. The refueling water tank level that swap over occurs was established based on the use of a vortex suppressor. However, the vortex suppressor does not have either analytical or test data to support its use. A corrective action document was issued by Arkansas Nuclear One to evaluate the design and determine if adequate water level exists. Arkansas Nuclear One prepared an operability evaluation and determined that the plant remains operable in the current condition.

The quality condensate storage tank level setpoint was established to provide a 30 minute supply of water to facilitate the emergency operating procedure mandated manual transfer of the suction of the emergency feedwater pumps to its alternate supply. The quality condensate storage tank design uses a vortex suppressor to assure that the water level during the transfer to the service water system is adequate. The swap over level was established based on the use of a vortex suppressor. Although the setpoint level is supported by Calculations ANO-1: CALC-90-E-0116-07 Setpoint T.6 and ANO-2: CALC-90-E-0116-01 Setpoint T.18, the vortex suppressor does not have either analytical or test data to support its use. Arkansas Nuclear One issued a corrective action to analyze both vortex suppressors. The NRC will evaluate the adequacy of the refueling water tank and quality condensate storage tank transfer setpoints when the licensee has completed testing and analysis of the vortex suppressers. (URI 05000313; 368/2007008-02;).

Analysis: The NRC will complete a significance determination, if warranted, when closing out the unresolved item.

Enforcement: The NRC will consider enforcement, if necessary, when closing out the unresolved item.

.3 Water Storage Tanks

a. Inspection Scope

The team evaluated the instrumentation associated with various water storage tanks to ensure there was adequate capability (volume, chemical concentration and temperature) to properly fulfill the design provisions stated in the Updated Final Safety Analysis Report and other design commitments for each of the evaluated tanks. The tanks that were reviewed included the Unit 1 borated water storage tank, the Unit 2 refueling water tank and the common qualified condensate water storage tank. The team reviewed the calculations for the instrumentation utilized for level and temperature monitoring related to these storage tanks in order to verify that uncertainties and scaling properties had been properly incorporated into the indication and control circuitry devices. The team also reviewed testing and calibration procedures, including the results of recent testing, for the above tanks to evaluate the performance of the reviewed instrumentation.

b. Findings

No significant findings were identified.

.4 Borated Water Storage Tank Temperature Instrumentation

a. Inspection Scope

During the evaluation of the indication and control systems related to the borated water storage tank, the team noted that the last calibration of the temperature instrumentation had been performed on February 12, 2003. Because this temperature instrumentation is used to verify Unit 1 Technical Specification Surveillance Requirement 3.5.4.1, the team questioned the appropriateness of the long interval since its last calibration. The licensee investigated the calibration history for the borated water storage tank temperature Transmitter TT-1413, and found that the instrument had been removed from the routine, 3-year interval, testing and calibration program on July 20, 2006. The licensee initiated Condition Report ANO-1-2007-02041 to evaluate the cause of the instrument being removed from the routine testing and calibration program and to implement corrective actions.

The team verified that the borated water storage tank level instrumentation and that the comparable Unit 2 refueling water tank level and temperature instrumentation continued to be routinely tested and calibrated. A calibration check of the borated water storage tank temperature transmitter and instrumentation string was completed in accordance with Repetitive Maintenance Task No. 10638 on September 19, 2007. The instrumentation was found to be within acceptable limits.

b. Findings

No significant findings were identified.

.5 Station Batteries

a. Inspection Scope

The team evaluated Units 1 and 2 safety-related station batteries to ensure there was adequate capability to fulfill the design provisions stated in the Updated Final Safety Analysis Reports and other design commitments. The team reviewed the dc voltage requirement calculations for both units to verify that sufficient voltage would be available at the terminals of selected loads to ensure their proper operation.

The team reviewed the testing procedures and the results of recently completed battery capacity tests to verify that the batteries could perform the safety functions described in the Updated Final Safety Analysis Report. The team questioned several portions of the procedures that were implemented on both Units 1 and 2 to verify that the methodology was in accordance with manufacturer recommendations and IEEE-450 guidance. The team also reviewed selected condition reports that had been initiated for problems identified during testing of the station batteries to verify that appropriate actions had been implemented.

The team reviewed the licensee's studies and calculations pertaining to the ability of each unit to cope with a station blackout. The team verified that the licensee's calculations concluded that adequate voltage would be available to perform such functions as 4160V circuit breaker actuations at the end of the station blackout coping period. As part of the station blackout reviews, the team reviewed the offsite power supply system to ensure that an instability on one of the systems (500 or 161 kV) would not result in the loss of the other system. The team also inspected the battery systems for both portions of the switchyard to verify that proper maintenance was being conducted.

b. Findings

No significant findings were identified.

.6 Emergency Diesel Generator Field Flashing

a. Inspection Scope

During a walkdown of the electrical components installed in the facility, the team questioned the function of the small 24V batteries installed in the Unit 2 emergency diesel generator rooms. The team was informed that the batteries (two 12V batteries connected in series) had been installed to provide an emergency source of power for field flashing. The team reviewed the information the licensee had received from the Unit 2 emergency diesel generator vendor stating that 12V would be adequate for field flashing of the Unit 2 emergency diesel generator s.

The team also questioned the field flash requirements for the Unit 1 emergency diesel generator. The team was informed that a test had been conducted that verified residual magnetism was adequate for field flashing of the Unit 1 emergency diesel generators and, therefore, no separate source of power was required. The team reviewed the temporary test procedure and noted that generator voltage levels were achieved without applying a source of field flashing current.

b. Findings

No findings of significance were identified.

.7 Motor-Operated Valve

a. Inspection Scope

The team selected motor-operated valves installed in both units to determine if the valves and their actuators could properly fulfill the design functions discussed in the Updated Final Safety Analysis Report and other design documents. The team selected the containment sump outlet valves from both units, the Unit 1 borated water storage tank outlet valves and the Unit 2 refueling water tank outlet valves.

As part of the evaluation of the motor-operated valves, the team reviewed the degraded voltage analysis and related calculations to ensure that degraded voltage levels had been utilized in the determination of actuator motor torque capabilities.

The team reviewed the schematic diagrams for the selected motor-operated valves to verify that the required actuation and interlock signals had been appropriately incorporated in the circuitry. The team also evaluated the circuitry related to the motor thermal overload protective feature to verify that the feature was in accordance with the licensee's commitments to Regulatory Guide 1.106, "Thermal Overload Protection for Electric Motors on Motor-Operated Valves." Regulatory Position C.1 of Regulatory Guide 1.106 states that the thermal overload feature should be bypassed during accident conditions; Regulatory Position C.2 of the Regulatory Guide states that the trip setpoint of the thermal overload protection devices should be established with all uncertainties resolved in favor of completing the safety-related action. The team determined that Arkansas Nuclear One, Unit 1, was committed to Regulatory Position C.2 of Regulatory Guide 1.106 and that Unit 2 was committed to Regulatory Position C.1 of the Regulatory Guide.

The team verified that the schematic diagrams for the selected Unit 2 motor-operated valves indicated that the thermal overload protection feature was bypassed under accident conditions. The team reviewed the licensee's standards for sizing motor-operated valve thermal overload heaters and noted that the standard referenced the provisions of Regulatory Position C.2 of Regulatory Guide 1.106 as one of the considerations in the motor-operated valve heater selection process. The team evaluated the thermal overload heater size installed in three of the selected Unit 1 motor-operated valves and verified that the installed heater actuation setpoints were higher than the motor amperage recorded during valve testing.

b. Findings

No findings of significance were identified.

.8 Borated Water Storage Tank Volume (Unit 1)

a. Inspection Scope

The team reviewed the borated water storage tank level setpoint calculations and operating procedures for the transfer of flow from the borated water storage tank to the reactor containment building sump to determine if sufficient water exists in the tank to support the technical specification requirements. The tank was also reviewed to determine if sufficient water is in the tank following transfer to prevent drawing air into the safety injection and containment spray pumps. The manual transfer time was reviewed by the team to assure that the operator could meet the swap-over time requirements.

b. Findings

No findings of significance were identified.

.9 Borated Water Storage Tank/Refueling Water Tank Discharge Valves (Units 1 and 2):

a. Inspection Scope:

The team reviewed the borated water storage tank and refueling water tank discharge valves to evaluate if the valves will open in accordance within the time requirements and close during the transfer from the tanks to the containment sump. The team performed the following activities: reviewed corrective actions, interviewed the system engineers for Units 1 and 2 to determine if the valves had operating or maintenance issues, and interviewed the motor-operated valve engineer to determine if the valves had adequate design margin. The valve calculations, corrective actions and inservice test results were reviewed.

b. Findings:

No findings of significance were identified.

.10 Unit 1 and 2 Containment Sump Discharge Valves

a. Inspection Scope:

The team reviewed the containment sump inboard and outboard discharge valves to assure that the valves would function during a emergency core cooling system event. The team reviewed past corrective actions, valve design calculations and test results and interviewed the systems engineers for Units 1 and 2 to determine if the valves had operating or maintenance issues. Particular focus was provided by the team for corrective actions for closing of the Unit 2 valves and bypass leakage. The team reviewed the assumptions for the control room and off-site dose analysis that was used in the corrective action.

b. Findings:

There were no findings of significance identified

.11 High Pressure Safety Injection Pumps (Unit 2)

a. Inspection Scope:

The team reviewed high pressure safety injection pump calculations to assure that flow and net positive suction head margin exists during emergency operations. In addition, the team conducted an interview with the high pressure safety injection system engineer to determine if there are significant maintenance or operational issues that should be reviewed by the team. The team reviewed past seal leakage and bypass flow issues that have been corrected. The team also reviewed the Arkansas Nuclear One corrective actions for regaining net positive suction head margin because of excessive pump flow that resulted from rotor replacement.

b. Findings:

There were no findings of significance identified.

.12 Low Pressure Decay Heat Removal System Piping (Unit 1)

a. Inspection Scope:

The team reviewed the section of piping between the decay heat removal block valves and the inlet check valves to the reactor coolant system. The team determined that the piping is vented on a regular basis to assure that pressure, because of check valve weeping, is maintained at a low level to assure the function of the check valve. The team reviewed the piping valve and pipe rating to assure that the components would function at maximum design pressure.

b. Findings

There were no findings of significance identified

4 OTHER ACTIVITIES

4OA6 Meetings, Including Exit

On September 21, 2007, the team leader presented the preliminary inspection results to Mr. Tim Mitchell, Site Vice-President, and other members of the licensee's staff. The licensee acknowledged the findings during each meeting. While some proprietary information was reviewed during this inspection, no proprietary information was included in this report.

Attachments:
1. Supplemental Information
2. Initial Information Request

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

D. Bentley, Design Engineering Supervisor
B. Berryman, Manager, Operations Unit 1
E. Blackard, Supervisor, Engineering Programs
C. Bregar, Director, Nuclear Safety Assurance
R. Buser, Electrical Design Engineer
J. Browning, Manager, Operations Unit 2
W. Cottingham, EIC Design Engineer
G. Dobbs, Electrical Design Engineering Supervisor
J. Dubbs, Electrical, Instrument and Controls Design Engineeering Supervisor
D. Edgell, Supervisor, System Engineering
J. Hotz, Electrical Design Engineer
D. James, Manager, Licensing
D. McAfee, Electrical Design Engineer
B. Miller, Battery System Engineer
J. Miller, Jr., Manager, System Engineering
T. Mitchell, Vice President, Operations
C. Reasoner, Manager, Engineering Programs and Components
R. Scheide, Licensing Specialist
J. Smith, Jr., Project Manager
F. Van Buskirk, Licensing Specialist
P. Williams, Supervisor, System Engineering
M. Wood, Electrical System Engineer

NRC personnel

W. Jones, Branch Chief, Engineering Branch 1
C. Young, Acting Senior Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000368/2007008-01	NCV	Failure to Correctly Analyze the Consumption Rate of the Emergency Diesel Fuel Oil (Section 1R21.b.1)

Opened

05000313;368/2007008-02	URI	Vortex Issue (Section 1R21.b.2)

LIST OF DOCUMENTS REVIEWED

Condition Reports

ANO-1-2002-01853	ANO-1-2007-01501	ANO-2-2004-00619	ANO-2-2006-00800
ANO-1-2004-01817	ANO-1-2007-01833	ANO-2-2004-01033	ANO-2-2007-01214
ANO-1-2004-01832	ANO-1-2007-01924	ANO-2-2004-02090	ANO-2-2007-01325
ANO-1-2004-01974	ANO-1-2007-02041	ANO-2-2005-00396	ANO-C-2007-01358
ANO-1-2005-00623	ANO-1-2007-02078	ANO-2-2005-00599	ANO-C-2007-01461
ANO-1-2005-01412	ANO-2-2003-01515	ANO-2-2005-00746	ANO-C-2007-01475
ANO-1-2007-00785	ANO-2-2003-01757	ANO-2-2005-01109	ANO-C-2007-01480

Calculations

Number	Title	Revision/Date
PRA-A1-01-001	ANO-1 PSA Level-1 Model 3p0 Summary Report	8/9/06
90-E-0116-07	ANO1EOP Set Point Basis Document, pages 181 thru 193	Rev. 3, Attachment 1 10/11/06
90-E-0116-01	ANO2EOP Set Point Document, pages 163 thru 182	Rev. 12, Attachment 1 Dated 01/24/07
PRA-A2-01-003	ANO-2 PSA Level-1 Model 4p01 Summary Report	Dated 10/19/06
92-E-0078-04	Unit 2 EFW System Pump Performance Requirements	2
92-E-0077-04	Unit 1 EFW System Pump Performance Requirements	1
82-D-2086B-41	Accuracy Analysis for LT-4204, LT-4205, 2LT-0727-1, 2LT-0727-2	4
85-E-0002-01	ANO-1 Diesel Generator #1 and #2 Load Study	15
85-S-00002-01	ANO-2 Diesel Generator #1 (2K4A) and #2 (2K4B) Loading Calculation	15
91-E-0107-03	EDG Day Tank Capacity , 2T-30 A & B	0
91-E-0107-02	2T-57 A&B Capacity (Emergency Fuel Oil Storage Tanks)	1
91-E-0107-04	Emergency Diesel Generator Fuel Oil Consumption - Unit 2	2
91-E-0107-06	EDG Storage Tank T-57A, T57B Capacity Evaluation	1

Number	Title	Revision/Date
91-E-0107-07	ANO-1 EDG Fuel Consumption - Unit 1	0
91-E-0107-08	EDG Minimum Fuel Oil Rating and Maximum Consumption - Unit 1	0
91-E-0107-09	EDG Minimum Fuel Oil Rating and Maximum Consumption - Unit 2	0
91-E-0107-10	ANO 1&2 Common Fuel Limits	1
93-D-6025-01	HPSI Pump Room "C" Pondage Evaluation and Seismic Support Qualification for 2LE-2007-2,	0
00-E-0008-01	Containment Spray Header Fill Time	0
90-E-0100-04	ANO-2 Containment Flood, Maximum and Minimum Levels	3
98-E-0028-R0	Decay Heat Analysis	0
82-D-2086-0532-004	Volume of CST T-41B Requiring Tornado Missile Protection	3
82-2086-60	Design Calculation for T41B	3
92E0078-03	LPSI System Pump Performance Requirements	1
92-E-0077-02	ANO-1-HP System Pump Performance Requirements,	0
92-E-0077-03	ANO-1 LPSI Pump Performance Requirements	0
92-E-0078-02	Unit 2 HPSI System Pump Performance Requirements	3
90-E-0100-03	RST Minimum and Maximum Volume	4
M-3950-3	RWT Capacity Requirements	0
97-E-0212-01	BWST Draindown Analysis	3
981015N101-02	BWST Vortex Breaker Sizing Calculation	0
98-E-0044-01	RWT Drawdown Analysis	3
97-E0008-01	BWST Venting Capability	0

Number	Title	Revision/Date
97-E-0012-01, PSV-1412	FFME Cover Air Gap Calculation	1
3-E-0058-01	HPI NPSH fom the BWST	0
V-2CV-5648-10	MOV Torque Swithc Setpoint	0
V-2CV-5672-10	MOV Torque Switch Setpoints	4
V-CV-1406-10	MOV Torque Switch Setpoints	3
V-2CV-5650-10	MOV Torque Switch Setpoints	6
V-CV-1276-10	MOV Torque Switch Setpoints	5
V-CV-1407-10	MOV Torque Switch Setpoints	8
82-D-2086B-41	Accuracy Analysis for [QCST Instruments]	4
83-D-1153-01	Error and Setpoint Analyses for BWST	4
92-E-0009-01	AC Motor Operated Valve Terminal Voltage	9
92-E-0021-01	Emergency Duty Cycle and Battery Sizing Calculation	9
92-E-0072-10	Hydrogen Evolution of Batteries 2D11, 2D12 and 2D13	0
93-EQ-2001-03	Loop Error, Setpoint, and Time Response Analysis for PPS RWT Level Trip	0
93-R-003-01	Offsite Power System Voltage Re-Evaluation (May ’05)	6
98-E-0044-01	RWT Draindown Analysis	3
01-E-0044-01	QCST Level for Required Tech. Spec. Volume	0
ER-ANO-2005-0210	2D12 Battery 2R17 Performance Test Results	0

Design Bases Documents/ Training Manuals

Number	Title	Revision/Date
ULD-1-SYS-02	Makeup and Purification / High Pressure Safety Injection System	4
ULD-1-SYS-04	Decay Heat Removal / Low Pressure Injection System	5
STM 1-05	System Training Manual, Decay Heat Removal System	14
STM-1-04	System Training Manual, Primary Make-up and Purification	7
ULD-2-SYS-02	High Pressure Safety Injection System	4
ULD-2-SYS-04	Low Pressure Safety Injection and Shutdown Cooling System	4
STM 2-05	System Training Manual, Emergency Core Coolant System	18

Drawings

Number	Title	Revision/Date
M-2204	P&ID Emergency Feedwater	65
M-2202	P&ID Lube Oil, Lube Oil Cooling, Electro/Hydraulic Controls and Main Steam	20
M-2206	P&ID Steam Generator Secondary System	146
M-204	P&ID Emergency Feedwater Storage	16
2HBD-124-11	Pipe Support Details Fuel Oil Storage Tank 2T-57A & 2T-57B Vent Piping	0
2HBD-124-2	Small Pipe Isometric Emergency Diesel Fuel Tank 2T-57A Vent	4
2HBD-124-80	Small Pipe Isometric Fuel Oil Storage Tank 2T-57A & 2T-57B Vent Piping	3
2HBD-89-1	Large Pipe Isometric Emergency Diesel Fuel Oil to 2P-16A Transfer Pump Inlet	10
2HBD-90-1	Large Pipe Isometric Emergency Diesel Fuel Oil to 2T-57B to 2P-16B	11

Number	Title	Revision/Date
2HBD-90-2	Small Pipe Isometric 2P-16B Diesel Fuel Oil Transfer Pump Inlet Piping	4
D901-1R10	Emergency Diesel Fuel Tank 13'X20' Shell	07/29/70
D901-1R4	Emergency Diesel Fuel Tank 13'X20' Shell	07/29/70
D901-2R9	Emergency Diesel Fuel Tank 13'X20' Shell	07/29/70
35720-002-0	CBI- General Plan for Condensate Storage Tank (T-41B) (QCST),	0
35720-036-0	Vortex Breaker for bottom Connection for EFW (QCST)	0
C-46	Field Erected Tank, Borated Water Storage Tank Details (Sheet 2 and 3)	N
M230	P&ID Reactor Coolant System Sh 1	114
M-231 Sh 1	P&ID Make-up and Purification System	109
M-232 Sh 1	P&ID Decay Heat Removal System	102
7-DH-1 Sh 1	Large Pipe Isometric, Decay Heat Removal to Reactor	20
7-DH-2 Sh 1	Large Pipe Isometric Decay Heat Pump Discharge to Reactor	16
7-DH-3 Sh 1	Large Pipe Isometric Decay Heat Removal from Reactor	19
7-DG-4 Sh 1	Large Pipe Isometric Decay Heat Removal from Reactor	23
7-DH-5 Sh 1	Large Pipe Isometric Decay Heat Pump Discharge	9
7-DH-6 Sh 1	Large Pipe Isometric Decay Heat Pump Discharge	24
7-DH-7 Sh 1	Large Pipe Isometric Decay Heat Pump Discharge	10
7-DH-8 Sh 1	Large Pipe Isometric Decay Heat Pump Discharge	13
7-DH-9 Sh 1	Large Pipe Isometric Decay Heat Removal	22

Number	Title	Revision/Date
7-DH-10 Sh 1	Large Pipe Isometric Decay Heat Pump Discharge	21
7-DH-11 Sh 1	Large Pipe Isometric Decay Heat Pump Discharge	21
7-DH-12 Sh 1 and 2	Large Pipe Isometric Eng. Safeguards Pump Suction Header	20
7-DH-13 Sh1	Large Pipe Isometric Decay Heat Pump Suction Headers	12
7-DH-14 Sh 1	Large Pipe Isometric Primary Make-up Pump Suction Header	6
7-DH-15 Sh 1	Large Pipe Isometric Make-up Pipe Suction	9
7-DH-16 Sh 1	Large Pipe Isometric Decay Heat Suction From Reactor to Sump	17
7-DH-17 Sh 1	Large Pipe Isometric Decay Heat Suction From Reactor Building Sump	8
17-MU-17 Sh 1	Large Pipe Isometric Make-up Pipe Suction	9
17-MU-18 Sh 1	Large Pipe Iisometric Make-up Pump Suction	11
17-MU-19 Sh 1	Large Pipe Isometric Make-up Pipe Suction	12
DH-200 Sh 1	Small Pipe Isometric, Decay Heat Pump 34A and P-34B Recirc. Piping	9
DH-202 Sh 1	Small Pipe Isometric, Relief Valve from Reactor Coolant System	7
DH-203 Sh 1	Small Pipe Isometric, HTRS E 35 A and B Drains and Relief valves	7
DH-204 Sh 1	Small Pipe Isometric Press Relief Valves for Decay Heat Removal Pump	3
17-MU-19	Large Pipe Isometricf Make Up Suction	12
M-2232	P&ID Safety Injection System	116
M-2236	P&ID Containment Spray System	92

Number	Title	Revision/Date
2CCB-12-1 Sh 2	Large Pipe Isometric High Pressure Safety Injection Header Loop 1, Rev 4	4
2CCB-70-4 Sh 1	Large Pipe Isometric HPSI Header Loop 1 to Containment Penetration	9
2CCB-71-5 Sh 1	Large Pipe Isometric From HPSI #2 to Reactor Coolant System	9
2DCB-1-1 Sh 1	Large Pipe Isometric HPSI Pump P98A to HPSI Header # 1	15
2DCB-3-2 Sh 1	Large Pipe Isometric HPSI Loop 2	20
2P-89B&C	Discharge Piping	16
2DCB-3-1 Sh 1	Large Pipe Isometric Header	
2DCB-1-2 Sh 1 and 2	Large Pipe Isometric HPSI Number 2 to CV-5016-2 and 2CV-5056-2	11
2DCB-3-2 Sh 2	Large Pipe Isometric High Pressure Safety Injection Header Loop 2	0
2GCB-3-1 Sh 1 and 2	Large Pipe Isometric Low Pressure Safety Injection Pump 2P60A	19
2GCB-32-2 Sh 1	Large Pipe Isometric, LPSI Pump Discharge	6
2GCB-3-3 Sh 1	Large Pipe Isometric LPSI Pump Discharge	12
2GCB-7-1	Large Pipe Isometric LPSI Discharge Header	5
2HCB-24-1 Sh 1	Large Pipe Isometric Refueling Water Tank 2T-3 to Cont Spray Pumps	5
2HCB-24-2 Sh 1	Large Pipe Isometric, Refueling Water Tank 2T-3 to Cont, Spray Pumps	6
2HCB-26-1 Sh 1	Large Pipe Isometric, Containment Spray Pump 2P-35A Supply	15
2HCB-27-1 Sh 12	Large Pipe Isometric Containment Spray Pump 2P-35B, Supply from Control Valve 2CV-5631-2	12
2HCB-13-1 Sh 16	Large Pipe Isometric from containment Spray Pump	16

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2HCB-13-1 Sh 2	Large Pipe Isometric from Cont. Sump to Cont. Spray Pump	2
A2001S01	ANO 500/161 kV Switchyard	20
E-1, Sh.1	ANO1 Station Single Line Diagram	54
E-1, Sh.2	ANO1 Single Line Diagram 500 kV Switchyard	3
E-2, Sh.1	ANO1 Generator System Meter & Relay Diagram	20
E-4, Sh.1	ANO1 Single Line Diagram Main Supply Meter & Relay	26
E-5, Sh.1	ANO1 4160 Volt System Meter & Relay Diagram	25
E-16, Sh.1	ANO1 Single Line Digaram MCC B55 & B56	65
E-17, Sh.1	ANO1 Red Train Vital AC and DC Single Line & Distribution	45
E-17, Sh.1A	ANO1 Green Train Vital AC and DC Single Line & Distribution	10
E-17, Sh.2	ANO1 Single Line & Relay Diagram 125VDC System	2
E-18, Sh.1	ANO1 Single Line Digaram MCC B61 & B62	74
E-19, Sh.2	ANO1 Single Line Digaram MCC B57 & B65	11
E-97, Sh.1	4160V Engineered Safeguard Bus Feeder ACB	24
E-97, Sh.1A	4160V Engineered Safeguard Bus Feeder ACB	8
E-99, Sh.1	4160V Engineered Safeguard Bus A3 Lockout & UV Relays	20
E-99, Sh.1A	4160V Engineered Safeguard Bus A4 Lockout & UV Relays	4
E-100, Sh.1	Diesel Generator DG1 ACB	27
E-100, Sh.1A	Diesel Generator ACB	10

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E-102, Sh.1	Diesel Generator Engine Control Schematic Diagram	29
E-102, Sh.1A	Diesel Generator Engine Control Schematic Diagram	5
E-102, Sh.1B	Diesel Generator Engine Control Schematic Diagram	5
E-108, Sh.2	Diesel Generator #1 Auxiliary Control Schematic Diagram	19
E-138, Sh.1	Generator Protection & Lockout Relays	26
E-182, Sh.1	Reactor Building Sump Block Valve CV-1414	25
E-182, Sh.1A	Reactor Building Sump Block Valve CV-1415	5
E-182, Sh.1B	Reactor Building Sump to Pump P34A	2
E-182, Sh.1C	Reactor Building Sump to Pump P34B	3
E-183, Sh. 1	Decay Heat Cooler Injection Valve CV-101 Schematic	17
E-184, Sh.1	Borated Water to Pump P34A	10
E-184, Sh.1A	Borated Water to Pump P34B	2
E-2001, Sh.1	ANO2 Station Single Line Diagram	30
E-2005, Sh.1	ANO2 Single Line Meter & Relay Diagram 4160 ESF System	29
E-2005, Sh.2	Single Line Meter & Relay Diagram AAC Generator System	1
E-2006, Sh.1	ANO2 Low Voltage Safety Systems Single Line Diagram	42
E-2016, Sh.5	AAC Generator System 480 Volt MCC 2B161	2
E-2016, Sh.6	AAC Generator System 480 Volt MCC 2B16	1
E-2100, Sh.1	Diesel Generator 2DG1 ACB	28
E-2100, Sh.1A	Diesel Generator 2DG1 ACB	7

Number	Title	Revision/Date
E-2100, Sh.2	Diesel Generator ACBs	9
E-2102, Sh.2	Emergency Diesel Generator 2DG1 Start Circuit #1	23
E-2102, Sh.2A	Emergency Diesel Generator 2DG1 Start Circuit #2	4
E-2102, Sh.2B	Emergency Diesel Generator 2DG1 Engine Protective Trips	4
E-2102, Sh.2C	Emergency Diesel Generator 2DG1 Engine Stop Control	4
E-2102, Sh.2D	Emergency Diesel Generator 2DG1 Relay Development	3
E-2216, Sh.1	Containment Sump Recirculation Valve 2CV-5649-1	25

Engineering Responses

Number	Title	Revision/Date
ER-ANO-2002-0528-005	HPSI Pump NPSH Margin Improvement	0
ER-ANO-2000-2804-017	ES1.1 Bearing Housing Replacement (Inboard and out-board) 2P-89C- HPI Pump,	12/3/01
ER-ANO-2003-0528-0000	Unit 2 B HPSI Pump Runout Limits	0
ER-ANO-2005-0228-000	2R17 Emergent - Setup MOV 2CV-5648-2 to Close on limit	0
ER-ANO-2006-0389-000	U2 EFW Alignment to QCST Evaluation	0
ER-ANO-2003-0032-001	Volume of CST T 41-B Tornado Missle Protection	

Manuals

Number	Title	Revision/Date
713.3	Instruction Manual for Decay Heat Removal	3
TD W120.0020	Instruction Book for Motor Equipment for B&W Company (P-P34A Motor)	0
TDB580-0010	Instruction, Operation and Maintenance of Byron Jackson Horizontal Double Bearing Pumps (P36A)	0
TD W120.4160	Motor data for West. 69F40038,69F40054, 69F40055 and 69F0056	0
TD1075.0210	Installation, Operation and Maintenance for Low Pressure Safety Injection Pump (2P-60A Pump)	0
TD1075.0260	Ingersoll-Rand High Pressure Safety Injection Pumps (2P-89A Pump)	0
TD S188.0020	Installation, Operation and Maintenance Instructions, Induction Motors, Integral Horsepower	0
TDS188.0010	Installation, Operation and Maintenance Instructions , Siemens-Allis Induction Motors/Generators, Large Frame Vertical	0
TDS188.0040	Installation, Operation and Maintenance Instructions for Unit 2 High Pressure Safety Pump Motors	0
TD C173.0020	Installation & Operating Instructions for C&D Flooded Cell Standby Battery	4
TD C173.0030	Specifications for C&D LCR Lead Calcium Standby Battery	3

Operating Experience Reports

Number	Title	Revision/Date
IE Bulletin 81-03	Flow Blockage of Cooling Water to Safety System Components by Corbicula SP. (Asiatic Clam) and Mytilus SF. (Mussel)	04/10/81
IN 98-22	Deficiencies Identified During NRC Design Inspections	06/17/98
EN 98-906	Evaluation of IN 98-22	6/16/1998

0CAN058114	IE Bulletin 81-03 - Flow Blockage to Safety System Components by Corbicula & Mytilus	05/22/1981
	ANO Ultra Low Sulphur Deisel Fuel Oil Evaluation	
IN 85-03	Component Failures Caused By Elevated DC Voltages and KTN-R Fuses	
IN 2006-005	Possible Defect in Bussmann KWN-R	
IN 2006-031	Inadequate Fault Interrupting Rating of Breakers	
IN 2007-009	MCC Control Power Transformer Sizing Concerns	

Operator Training Procedures

Number	Title	Revision/Date
Course No. A1SPGROEO PESAS	Scenario 2: ESAS, (RCS pressure stabilizes less than 150 psig) (Unit 1)	1 Dated 10/23/06
EOP 1202.001	Reactor Trip,(Unit 1)	Change 30 Dated 1/4/07
EOP 1202.010	ESAS,(Unit 1)	Change 005-03-0
EOP 1202.002	Loss of Subcooling Margin (Unit 1)	Change 004-02-0
EOP 1203.030	Loss of Service Water,(Unit 1)	Change 016 Pages 10 thru 31
Course No. A2SPG-RO-SBO	Scenario: Station Blackout (Unit 2)	3 Dated 6/30/07
Proc. 2104.029	Service Water System Operations	010
EOP 2203.022	Loss of Service Water	
EOP 2203.008	Natural Emergencies, Section 4 Loss of Lake Dardanelle	13
EOP 2202.001	Standard Post Trip Actions	Change 009
EOP 2202/008	Station Blackout	Change 007-00-0
EOP 2202.010	Standard Attachments, Attachment 25: Load Shedding of Vital Battery Loads	Change 010

Procedures

Number	Title	Revision/Date
EN-DC-195	Margin Management	2
1104.005	Reactor Building Spray System Operation	46
1305.007	Reactor Building Isolation and Miscellaneous Valve Stroke Test	32
1104.033	Reactor Building Ventilation	62
1104.029	Service Water and Auxiliary Cooling System	64
1104.004	Decay Heat Removal Operating Procedure	
2104.029	Service Water System Operations	60
1102.015	Filling and Draining the Fuel Transfer Canal	24
1000.113	Diesel Fuel Monitoring Program	8
1015.002	Decay Heat Removal and low temperature over pressure System Control	29
1015.008	Unit 2 SDC Control	51
1402.066	24 Month Inspection on Unit One Emergency Diesel Generator Engine	02/11/05
1618.035	Sampling and Analyzing Diesel Fuel Oil from Diesel Fuel Oil Transports	8
2304.134	Unit 2 EDG 2K4A Instrumentation Calibration	14
2304.134	Unit 2 EDG 2K4A Instrumentation Calibration	15
2304.134	Unit 2 EDG 2K4A Instrumentation Calibration	16
5010.015-ATT-5	EDG Day Tank Level Instrument Loop Error Calculation - Submittal Sheet	2
5120.010	Unit 1 & Unit 2 MOV Testing	8
EN-DC-195	Nuclear Management Manual	2
1409.769	Unit 1 High Pressure Injection Pump (P-36) Recirc Piping Vibration Test),	0

1104.004	Decay Heat Removal Operating Procedure	76
1104.002	Make-up and Purification System Operation	70
2104.040	LPSI System Operations Procedure	41
2104-039	HPSI System Operation	47
1304.217	Unit 1 CST Level Instrument Calibration, Red Train (QCST)	01
1304.218	Unit 1 CST Level Instrument Calibration, Green (QCST)	00
1307.063	Unit 1 D06 & D07 Battery Surveillance, Supplement 6	04
1307.067	Unit 1 D06 & D07 Battery Surveillance, Supplement 2	07
2203.008	Natural Emergencies	13
2304.194	Unit 2 QCST Level Calibration	04
2304.269	Unit 2 Plant Protective System RWT Instrument Calibration	00
2403.001	Unit 2 Battery 2D11 Performance Test	10
2403.002	Unit 2 Battery 2D12 Performance Test	06
EES-12	Engineering Standard - Motor Operated Valve Electrical Eval.	4
EN-LI-102	Corrective Action Process	10

Work order

Number	Title	Revision/Date
WO 50144905	Perform Quarterly Service Water Pump (P-4A) IAW Procedure 1104.029	02/06/07
WO 51050625	Perform Quarterly Service Water Pump (P-4A) IAW Procedure 1104.029	05/03/07
WO 51082976	Perform Quarterly Service Water Pump (P-4A) IAW Procedure 1104.0	05/18/07

WO 51000557	Unit 1 Sluice Gate and Service Water Bay Cleaning and Inspection	04/12/06
WO 50684335	Unit 1 Sluice Gate and Service Water Bay Cleaning and Inspection	01/19/05
WO 51001771	Unit 1 Sluice Gate and Service Water Bay Cleaning and Inspection	05/16/06
WO 50613238	Perform The 18M EFW SW Suction Piping Flush/Full Stroke of Service Water	07/12/04
WO 50985465	Perform The 18M EFW SW Suction Piping Flush/Full Stroke of Service Water	06/08/05
WO 51031177	Perform The 18M EFW SW Suction Piping Flush/Full Stroke of Service Water	06/16/07
WO 51042447	Perform the 18 Month Refueling Service Water Flow Test iaw 1309.013	07/31/07
WO 50985057	Perform the 18 Month Refueling Service Water Flow Test iaw 1309.013	06/08/05
WO 50684129	Perform the 18 Month Refueling Service Water Flow Test iaw 1309.013	12/11/03
WO 51087306	Perform Quarterly Reactor Building Spray Pump (P-35B) Test iaw Procedure 1104.005 Sup 5	08/02/07
WO 51028470	Perform Quarterly Reactor Building Spray Pump (P-35B) Test iaw Procedure 1104.005 Sup 5	05/10/07
WO 51048156	Perform Quarterly Reactor Building Spray Pump (P-35B) Test iaw Procedure 1104.005 Sup 5	02/21/07
WO 51083085	Perform Quarterly Reactor Building Isolation & Misc Valve Stroke Test iaw Procedure 1305.007 SUP 1	05/22/07
WO 51031066	Perform Quarterly Reactor Building Isolation & Misc Valve Stroke Test iaw Procedure 1305.007 SUP 1	06/15/07
WO 51051346	Perform Quarterly Reactor Building Cooling Units VCC-2C/2D Flow Test and Stroke Test iaw Procedure 1104.033 Sup 5	05/04/07

WO 51084257	Perform Quarterly Reactor Building Cooling Units VCC-2C/2D Flow Test and Stroke Test iaw Procedure 1104.033 Sup 5	06/21/07
WO 51054407	Perform Quarterly Reactor Building Cooling Units VCC-2A/2B Flow Test and Stroke Test iaw Procedure 1104.033 Sup 6	05/17/07
WO 51021516	Perform Quarterly Reactor Building Cooling Units VCC-2A/2B Flow Test and Stroke Test iaw Procedure 1104.033 Sup 6	02/21/07
WO 51087310	Perform Quarterly Reactor Building Cooling Units VCC-2A/2B Flow Test and Stroke Test iaw Procedure 1104.033 Sup 6	08/2/07
WO 51050625	Perform Quarterly Service Water Pump (P-4A) Test iaw Procedure 1104.029 Sup 1	05/31/07
WO 51082976	Perform Quarterly Service Water Pump (P-4A) Test iaw Procedure 1104.029 Sup 2	05/18/07
WO 51098572	Perform Quarterly Service Water Pump (P-4A) Test iaw Procedure 1104.029 Sup 2	07/08/07
WO 51047645	Perform Quarterly Service Water Pump (P-4A) Test iaw Procedure 1104.029 Sup 2	02/21/07
WO 51086032	Perform Quarterly Service Water Pump (P-4B) Test iaw Procedure 1104.029 Sup 2	08/02/07
WO 51053013	Perform Quarterly Service Water Pump (P-4B) Test iaw Procedure 1104.029 Sup 2	05/16/07
WO 51047645	Perform Quarterly Service Water Pump (P-4B) Test iaw Procedure 1104.029 Sup 2	02/21/07
WO 51049492	Perform Quarterly Service Water Pump (P-4C) Test iaw Procedure 1104.029 Sup 3	03/21/07
WO 51055613	Perform Quarterly Service Water Pump (P-4C) Test iaw Procedure 1104.029 Sup 3	05/18/07
WO 51088682	Perform Quarterly Service Water Pump (P-4C) Test iaw Procedure 1104.029 Sup 3	08/22/07
WO 51083130	Perform the Quarterly Service Water Valve Stroke Test Procedure 2104.029, Sup 2	07/27/07

WO 51037613	Perform the Quarterly Service Water Valve Stroke Test Procedure 2104.029, Sup 2	10/10/06
WO 51044341	Perform the Quarterly Service Water Valve Stroke Test Procedure 2104.029, Sup 2	01/30/07
WO 51050725	Perform the Quarterly Service Water Valve Stroke Test Procedure 2104.029, Sup 2	01/20/07
WO 51044345	[Both Red and Green Train Work] Perform the Quarterly Emergency Feedwater Valve Stroke Testing iaw 2106.06 Supplement 3	01/30/07
WO 51050730	[Both Red and Green Train Work] Perform the Quarterly Emergency Feedwater Valve Stroke Testing iaw 2106.06 Supplement 3	01/21/07
WO 51083135	[Both Red and Green Train Work] Perform the Quarterly Emergency Feedwater Valve Stroke Testing iaw 2106.06 Supplement 3	07/27/07
WO 51042528	[Both Red and Green Train Work] Perform the Quarterly Containment Isolation Valve Stroke Testing iaw 2105.05 Supplement 1	01/24/07
WO 51049470	[Both Red and Green Train Work] Perform the Quarterly Containment Isolation Valve Stroke Testing iaw 2105.05 Supplement 1	02/10/07
WO 51055601	[Both Red and Green Train Work] Perform the Quarterly Containment Isolation Valve Stroke Testing iaw 2105.05 Supplement 1	05/24/07
WO51088671	[Both Red and Green Train Work] Perform the Quarterly Containment Isolation Valve Stroke Testing iaw 2105.05 Supplement 1	08/01/07
WO 50259409	Perform the Quarterly, Cold Shutdown Valve Test IAW Procedure 2306.06 Sup 1	11/21/03
WO 51008323	Perform the Quarterly, Cold Shutdown Valve Test iaw Procedure 2306.06 Sup 1	01/30/07
WO 51031065	Perform the Refueling Reactor Building Isolation & Misc Valve Stroke Test iaw Procedure 1305.007 Sup 2	06/15/07

WO 50572552	Perform the Refueling Reactor Building Isolation & Misc Valve Stroke Test iaw Procedure 1305.007 Sup 2	11/25/03
WO 51047025	Perform Quarterly LPI Pump (P-34A) Test, CV-1433 Open / Closed Stroke Test, DH-14A, DH-13A, DH-17 Closure Verification, and CV-1432 Fail Safe Closed Test iaw Procedure 1104.004, Sup 1.	02/16/07
WO 51086030	Perform Quarterly LPI Pump (P-34A) Test, CV-1433 Open / Closed Stroke Test, DH-14A, DH-13A, DH-17 Closure Verification, and CV-1432 Fail Safe Closed Test iaw Procedure 1104.004, Sup 1	08/02/07
WO 51053011	Perform Quarterly LPI Pump (P-34A) Test, CV-1433 Open / Closed Stroke Test, DH-14A, DH-13A, DH-17 Closure Verification, and CV-1432 Fail Safe Closed Test iaw Procedure 1104.004, Sup 1	05/16/07
WO 51050724	Perform the Service Water Pump 2P-4A Quarterly Test iaw Procedure 2104.029, Sup. 1A	01/04/07
WO 51083129	Perform the Service Water Pump 2P-4A Quarterly Test iaw Procedure 2104.029, Sup. 1A	07/27/07
WO 51049603	Perform the Service Water Pump 2P-4B Quarterly Test iaw Procedure 2104.029, Sup. 1B	02/14/07
WO 51055684	Perform the Service Water Pump 2P-4B Quarterly Test iaw Procedure 2104.029, Sup. 1B	05/30/07
WO 51088761	Perform the Service Water Pump 2P-4B Quarterly Test iaw Procedure 2104.029, Sup. 1B	08/06/07
WO 51047718	Perform the Service Water Pump 2P-4C Quarterly Test iaw Procedure 2104.029, Sup. 1C	02/10/07
WO 51053858	Perform the Service Water Pump 2P-4C Quarterly Test iaw Procedure 2104.029, Sup. 1C	05/24/07
WO 51086711	Perform the Service Water Pump 2P-4C Quarterly Test iaw Procedure 2104.029, Sup. 1C	05/31/07
WO 50967821	[Both Red and Green Train Work] Perform the 18 Month, Integrated Engineering Safeguard Test iaw Procedure 2305.001	12/11/04

WO 51015746	[Both Red and Green Train Work] Perform the 18 Month, Integrated Engineering Safeguard Test iaw Procedure 2305.001	01/30/07
WO 50276380	[Both Red and Green Train Work] Perform the 18 Month, Integrated Engineering Safeguard Test iaw Procedure 2305.001	01/28/04
WO 50967810	[Both Red and Green Train Work] Perform the 18 Month, Integrated Engineering Safety Features Test iaw Procedure 2305.003	12/11/04
WO 51086613	Perform Quarterly (P7A) Steam Driven EFW Pump Test iaw Procedure 1106.006 Sup. 12	08/02/07
WO 51048166	Perform Quarterly (P7A) Steam Driven EFW Pump Test iaw Procedure 1106.006 Sup. 12	02/21/07
WO 51087924	Perform Quarterly (P7B) Motor Driven EFW Pump Test iaw Procedure 1106.006 Sup. 11	08/02/07
WO 51049500	Perform Quarterly (P7B) Motor Driven EFW Pump Test iaw Procedure 1106.006 Sup. 11	03/21/07
WO 51201976	Emergency Feedwater System Operations	08/21/07
WO 51086726	Emergency Feedwater System Operations	05/29/07
WO 51050729	Emergency Feedwater System Operations	02/03/07
WO 51083134	Emergency Feedwater System Operations	04/17/07
WO 51098668	Emergency Feedwater System Operations	07/11/07
WO 50265192	Calibrate BWST Temperature Transmitter	02/11/03
WO 50339531	Clean, Inspect and Calibrate 2TT-5675 [RWT Temperature]	04/21/04
WO 50379719	Calibrate BWST Temperature Transmitter	11/22/99
WO 50412604	Calibrate BWST Temperature Transmitter	09/19/01
WO 50976340	Clean, Inspect and Calibrate 2TT-5675 [RWT Temperature]	09/27/05
WO 51020065	Clean, Inspect and Calibrate 2TT-5675 [RWT Temperature]	03/15/07

WO 51046780	Calibrate BWST Red Train Level Transmitter		01/18/07
WO 51085186	Calibrate BWST Red Train Level Transmitter		07/10/07
WO 51011020	ESF Floor Drain Calibration		0
WO 25307	WO 51013867	WO 51052594	WO 51056204
WO 25465	WO 51015227	WO 51053302	WO 51083127
WO 30612	WO 51015228	WO 51053304	WO 51084341
WO 30614	WO 51032671	WO 51053842	WO 51085476
WO 50966046	WO 51033509	WO 51055037	WO 51086611
WO 50968270	WO 51049985	WO 51055038	WO 51088019
WO 50968271	WO 51050630	WO 51055468	WO 51097689
WO 50986709	WO 51051347	WO 51056203	WO 51097689
WO 51013866			

Miscellaneous Documents

Number	Title	Revision/Date
ULD-1-SYS-12	Arkansas Nuclear One Upper Level Document ANO Unit 1 Emergency Feedwater System	7
STM 1-27	Arkansas Nuclear One Unit 1 System Training Manual Emergency Feedwater System	12
ULD-2-SYS-12	Arkansas Nuclear One Upper Level Document ANO Unit 2 Emergency Feedwater System	9
STM 2-19-2	Arkansas Nuclear One Unit 2 System Training Manual Emergency Feedwater and Auxiliary Feedwater Systems	27
ULD-1-SYS-10	Arkansas Nuclear One Upper Level Document ANO Unit 1 Service Water System	14
STM 1-42	Arkansas Nuclear One Unit 1 System Training Manual Service and Auxiliary Cooling Water	15
ULD-2-SYS-10	Arkansas Nuclear One Upper Level Document ANO Unit 2 Service Water System	11
ER-ANO-2004-	Redundant Source of Makeup Water to ANO-1	

0283-000	Spent Fuel Pool	
ULD-1-SYS-9	ANO Unit 1 Engineered Safeguards Actuation System (ESAS)	2
Form 1015.015	Shift Turnover Checklist - Above 280 F Unit 1	09/12/07
Form 1015.015	Shift Turnover Checklist - Above 280 F Unit 1	09/11/07
1CNA119903	Arkansas Nuclear One, Unit No. 1 RE: completion of the Emergency Cooling Pond Licensing Basis Review (TAC M4948)	11/19/99
EAR 92-625	2K3 Low Pressure Steam Supply Concerns	06/17/92
	Fairbanks Morse Colt Test Report - Final Acceptance	10/29/79
	Fairbanks Morse Colt Test Report - Full Power	10/26/79
	Fairbanks Morse Colt Test Report - Full Power Re-run	10/27/79
	10 Year Data Plots - Fuel Oil Sample Results	08/13/97 to 09/12/07
	Response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment	01/26/90
1-EDG Fuel Tank (57A)	API Gravity Fuel Oil Sample Results	08/1397 to 09/12/07
1-EDG Fuel Tank (57B)	API Gravity Fuel Oil Sample Results	08/13/97 to 09/12/07
2-EDG Fuel Tank (2T-57B)	API Gravity Fuel Oil Sample Results	08/13/97 to 09/12/07
2-EDG Fuel Tank (2T-57A)	API Gravity Fuel Oil Sample Results	08/13/97 to 09/12/07
2E-63A	PC ET Test Results	
2E-20A	PC ET Test Results	
2E-64A	PC ET Test Results	

2E20B	PC ET Test Results	
2E63B	PC ET Test Results	
2E64B	PC ET Test Results	
ANIN-910911-131	Conversation Memorandum	09/11/91
D 4057-88	ASTM Standard Practice for manual Sampling of Petroleum and Petroleum Products	
D 975 - 81	ASTM Standard Specification for Diesel Fuel Oils	
ER-ANO-2006-0389-000	U2 EFW Alignment to QCST Evaluation	2
Job Order # 00949732	Diesel Oil Storage Tank (T-25) Cleaning	06/06/96
TD E147.0020	Maintenance Manual Turbocharged Engine	8
TD F010.0090	Service Information Letter for Fairbanks Morse Model 38D 8-1/8 x 10 OP	12
TD A310.0060	Information for ITT Standard Heat Exchangers, CPK Series	0
TD A31O.OO3O	Operating Instructions and Parts List Type CP & CPR Exchangers	0
TD F010.0220	Instructions for Fairbanks Morse Opposed Piston Diesel Stationary Model 38TD8 1/8	3
TD F010.0020	Emergency Diesel Plant Operating Instructions	6
TD F010.0030	Instructions Diesel Stationary Model 38TD-1/8	7
TD E147.0010	Operating Manual Stationary Power Generating Units (AB20 Generators) Power Take-Off Units	0
TD F010.0230	Marketing Information Letter for Fairbanks Morse Parts and Service Operation	0
TD Y021.0030	Care and Maintenance Instructions Young Radiator Company Charge Air Coolers Intercoolers and Aftercoolers	0

51-5000239-00	Interim BWOG Report on HPI/MU Nozzle Cracking	06/05/97
A-EP-2005-003	ANO MOV Program Status Report	2
	P36A, B and C Acceptable Performance Trend Curves	09/07
	Neenah Foundry Co., Inlet Grate Capacities for Gutter Flow and Ponded Water	
ANO1-NE-006-0003	ANO-1 Cycle Safety Analysis Groundrules, 1	
ANO2-NE-07-0001	Arkansas Nuclear One Unit 2 Cycle 20 Ground Rules,	
	Transmission/Nuclear Reliability Upgrades Presentation	07/29/06
IEEE Std. 450	Recommended Practices for Maintenance, Testing and Replacement of Large Lead Acid Storage Batteries	1975 and 2002 Editions

The team provided the following information request in writing to the licensee prior to the inspection.

Initial Information Request
Component Design Basis Inspection (71111.21)
Arkansas Nuclear One Station

Please provide the following information in order to support the NRC's component design basis inspection effort at your facility. If there are problems obtaining any of this information, please call the Team Leader, Ronald Kopriva at (817) 860-8104 to discuss alternate arrangements. We would like to have the information ready when we arrive on site for the "bag-man" portion of the inspection on August 6, 2007.

We prefer, but it's not required, that the information be provided electronically and in a searchable format, such as Adobe, Word, Word Perfect, or Excel. Other licensee's have found that providing the information on a CD is effective and efficient.

1. The risk ranking of components from your site specific probabilistic safety analysis sorted by Risk Achievement Worth and by Birnbaum Importance.

2. A list of your top 500 cutsets from your probabilistic safety analysis.

3. Risk ranking of operator actions from you site specific probabilistic safety analysis sorted by Risk Achievement Worth. Provide copies of your human reliability worksheets for these items (you may limit this list to the 100 most risk significant actions).

4. If you have an external events or fire probabilistic safety analysis model, provide the information requested in Items 1 and 2 for external events and fire.

5. Any pre-existing evaluation or list of components and calculations with low design margins (i.e. pumps closest to the design limit for flow or pressure, diesel generators close to design required output, heat exchangers close to rated design heat removal etc.)

6. For the last two years, a list of operating experience evaluations, modifications and corrective actions sorted by component or system. A one line, or short, description is acceptable.

7. A list of any common-cause failures of components in the last 5 years at your facility.

8. A list of Maintenance Rule functions.

9. A list of your Maintenance Rule a(1) components.

10. A list of your current temporary modifications.

11. A current list of "operator work arounds."

12. Piping and instrument drawings for your emergency core cooling systems, emergency diesel generators and off-site power supplies. At this time, only the mechanical piping drawings are needed for the emergency core cooling systems and the emergency diesel generators.

In addition to the above, if available electronically, please provide a copy of each of the following on CD.

1. Final/Updated Safety Analysis Reports

2. Technical Specifications

3. Design Bases Documents for the emergency core cooling systems (including auxiliary feedwater), emergency diesel generators and off-site power supplies

4. System descriptions or operator training manuals for the emergency core cooling systems, emergency diesel generators and off-site power supply systems

Thank you for your cooperation in these matters.