



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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ARLINGTON, TEXAS 76011-4125

October 8, 2010

EA-10-193

Brad Berryman, Vice President, Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - NRC TRIENNIAL FIRE
PROTECTION INSPECTION REPORT 05000313/2010006; 05000368/2010006
AND EXERCISE OF ENFORCEMENT DISCRETION.

Dear Mr. Berryman:

On August 27, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Arkansas Nuclear One Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed in an exit meeting on August 27, 2010, 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 inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents one NRC-identified finding. The finding was evaluated under the risk significance determination process as having very low safety significance (Green).

Additionally, a finding involving 10 CFR 50.48 was identified by the NRC and is a violation of NRC requirements. The inspectors have screened this violation and determined that it warrants enforcement discretion per the Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues and Section 12.01(b) of IMC 0305. (EA-10-193)

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, 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 the NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at

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EA-10-095

- 2 -

<http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room). To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

Neil O'Keefe, Chief
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Division of Reactor Safety

Dockets: 50-313
50-368

Licenses: DPR-51
NPF-6

Enclosure:
NRC Inspection Report 05000313/2010006 and 05000368/2010006
w/Attachment: Supplemental Information

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- 3 -

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket: 50-313; 50-368

License: DPR-51, NPF-6

Report Nos.: 05000313/2010006 and 05000368/2010006

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 9 through August 27, 2010

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SUMMARY OF FINDINGS

IR 05000313/2010006; 05000368/2010006; 8/09/2010 – 8/27/2010; Arkansas Nuclear One, Units 1 and 2: Triennial Fire Protection Inspection.

The report covered a two week triennial fire protection team inspection by specialist inspectors from Region IV. One finding was identified and characterized as a noncited violation. The 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 (SDP) does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

Green. The team identified a finding because the licensee did not include fire protection features in Procedure 1000.120, "ANO Fire Impairment Program," Revision 20. The approved fire protection program required implementing compensatory measures for degraded fire protection systems and features, but the fire impairment implementing procedure addressed only action to identify, document and apply compensatory measures for specific fire protection systems. The team identified that the licensee did not implement compensatory measures for periods when the Appendix R emergency lighting units were placed out of service for maintenance and testing. This finding has been entered into the corrective action program as CR-ANO-C-2010-02205.

Failure to ensure that all of the applicable elements of the approved fire protection program were included in the fire impairment implementing procedure is a performance deficiency. The finding is more than minor because it is associated with the Protection Against External Events attribute of the Mitigating Systems cornerstone since it affected the availability, reliability, and capability of systems that respond to fire events to prevent undesirable consequences. Because this issue relates to fire protection, the team used the guidance of Manual Chapter 0609, Appendix F, Attachment 2, to determine that this fire prevention and administrative control deficiency had a low degradation rating in that it minimally impacted the fire protection program. Based on this, the finding screened as having very low safety significance (Green) during a Phase 1 significance determination. This finding is identified as FIN 05000313; 05000368/2010006-01, Inadequate Compensatory Measures for Out-Of-Service Appendix R Emergency Lights. No cross cutting aspect was associated with this finding because the team determined that this deficiency is not indicative of current performance because this practice existed for longer than three years (Section 1R05.08).

B. Licensee-Identified Violations

None

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R05 Fire Protection (71111.05TTP)

This report presents the results of a triennial fire protection inspection conducted in accordance with NRC Inspection Procedure 71111.05TTP, "Fire Protection-NFPA Transition Period (Triennial)," at Arkansas Nuclear One. The licensee committed to adopt a risk informed fire protection program in accordance with National Fire Protection Association Standard 805 (NFPA-805), "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," but had not yet completed the program transition. The inspection team evaluated the implementation of the approved fire protection program in selected risk-significant areas, with an emphasis on the procedures, equipment, fire barriers, and systems that ensure the post-fire capability to safely shutdown the plant.

Inspection Procedure 71111.05TTP requires the selection of three to five fire areas for review. The inspection team used the fire hazards analysis section of the Arkansas Nuclear One Individual Plant Examination of External Events, the NRC Fire Protection Exemption database, and discussions with the licensee staff to select the following three Unit 2 risk significant fire zones (inspection samples) for review:

2098-C	Core Protection Calculator Room
2109-U	Diesel Corridor
2111-T	Lower South Electrical Penetration Room

The inspection team evaluated the licensee's fire protection program using the applicable requirements, which included plant Technical Specifications, Operating License Conditions 2.C.(8) for Unit 1 and 2.C.(3)(b) for Unit 2, NRC safety evaluations, 10 CFR 50.48, 10 CFR Part 50, Appendix R, and Branch Technical Position 9.5-1. The team also reviewed related documents that included the Final Safety Analysis Report (FSAR); Technical Requirements Manual (TRM); the fire hazards analysis; and the post-fire safe shutdown analysis. Unit 1 was selected for review of the licensee's alternate shutdown methodology.

Specific documents reviewed by the team are listed in the attachment. Three inspection samples were completed.

.01 Protection of Safe Shutdown Capabilities

a. Inspection Scope

The team reviewed the piping and instrumentation diagrams, safe shutdown equipment listings, safe shutdown design basis documents, and the post-fire safe shutdown

analysis to verify that the safe shutdown methodology had properly identified the components and systems necessary to achieve and maintain safe shutdown conditions for equipment in the selected fire areas. The team also reviewed and observed walkdowns of the procedures for achieving and maintaining safe shutdown in the event of a fire to verify that the licensee properly implemented the safe shutdown analysis provisions.

For each of the selected fire areas, the team reviewed the separation of redundant safe shutdown cables, equipment, and components located within the same fire area. The team also reviewed the licensee's method for meeting the requirements of 10 CFR 50.48; Branch Technical Position 9.5-1, Appendix A; and 10 CFR Part 50, Appendix R, Section III.G. Specifically, the team evaluated whether at least one post-fire safe shutdown success path remained free of fire damage in the event of a fire. In addition, the team verified that the licensee met applicable license commitments.

b. Findings

No findings.

.02 Passive Fire Protection

a. Inspection Scope

The team walked down accessible portions of the selected fire areas to observe the material condition and configuration of the installed fire area boundaries (including walls, fire doors, and fire dampers) and verify that the electrical raceway fire barriers were appropriate for the fire hazards in the area. The team compared the installed configurations to the approved construction details, supporting fire tests, and applicable license commitments.

The team reviewed installation, repair, and qualification records for a sample of penetration seals to ensure the fill material possessed an appropriate fire rating and that the installation met the engineering design. The team also reviewed similar records for the rated fire wraps to ensure the material possessed an appropriate fire rating and that the installation met the engineering design.

b. Findings

No findings.

.03 Active Fire Protection

a. Inspection Scope

The team reviewed the design, maintenance, testing, and operation of the fire detection and suppression systems in the selected fire areas. The team verified the manual and automatic detection and suppression systems were installed, tested, and maintained in

accordance with the National Fire Protection Association code of record or approved deviations, and that each suppression system was appropriate for the hazards in the selected fire areas.

The team performed a walkdown of accessible portions of the detection and suppression systems in the selected fire areas. The team also performed a walkdown of major system support equipment in other areas (e.g., fire pumps and Halon supply system) to assess the material condition of these systems and components.

The team assessed the fire brigade capabilities by reviewing training, qualification, and drill critique records. The team also reviewed pre-fire plans and smoke removal plans for the selected fire areas to determine if appropriate information was provided to fire brigade members and plant operators to identify safe shutdown equipment and instrumentation, and to facilitate suppression of a fire that could impact post-fire safe shutdown capability. In addition, the team inspected fire brigade equipment to determine operational readiness for fire fighting.

The team observed an unannounced fire drill, conducted on August 25, 2010, and the subsequent drill critique using the guidance contained in Inspection Procedure 71111.05AQ, "Fire Protection Annual/Quarterly." The team observed fire brigade members fight a simulated fire in the Old AP&L Warehouse. The team verified that the licensee identified problems, openly discussed them in a self-critical manner at the drill debrief, and identified 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 fire fighting equipment was 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 areas; (7) smoke removal operations; (8) utilization of pre-planned strategies; (9) adherence to the pre-planned drill scenario; and (10) drill objectives.

b. Findings

No findings.

.04 Protection From Damage From Fire Suppression Activities

a. Inspection Scope

The team performed plant walkdowns and document reviews to verify that redundant trains of systems required for hot shutdown, which are located in the same fire area, would not be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. Specifically, the team verified that:

- A fire in one of the selected fire areas would not directly, through production of smoke, heat, or hot gases, cause activation of suppression systems that could

potentially damage all redundant safe shutdown trains.

- A fire in one of the selected fire areas or the inadvertent actuation or rupture of a fire suppression system would not directly cause damage to all redundant trains (e.g., sprinkler-caused flooding of other than the locally affected train).
- Adequate drainage is provided in areas protected by water suppression systems.

b. Findings

No findings.

.05 Alternative Shutdown Capability

a. Inspection Scope

Review of Methodology

The team selected Unit 1 for review of the alternative shutdown capability. The team reviewed the safe shutdown analysis, fire hazards analysis, operating procedures, piping and instrumentation drawings, electrical drawings, the Final Safety Analysis Report, and other supporting documents to verify that hot and cold shutdown could be achieved and maintained for fires in areas where the licensee's post fire safe shutdown strategy relied on manipulating shutdown equipment from outside the control room. The team verified that hot and cold shutdown could be achieved and maintained with or without offsite power available.

The team conducted plant walkdowns to verify that the plant configuration was consistent with the description contained in the safe shutdown procedure and fire hazards analyses. The team focused on ensuring the adequacy of systems selected for reactivity control, reactor coolant makeup, reactor decay heat removal, process monitoring instrumentation, and support systems functions.

The team also verified that the systems and components credited for safe shutdown would remain free from fire damage. Finally, the team verified that the transfer of control from the control room to the alternative shutdown locations would not be affected by fire-induced circuit faults. Specifically, the team verified that electrical isolation from the control room would occur to ensure fire-induced circuit faults would not affect alternative shutdown capabilities.

Review of Operational Implementation

The team verified that licensed and non-licensed operators received training on alternative shutdown procedures. The team also verified that sufficient personnel to perform a safe shutdown were trained and available onsite at all times, exclusive of those assigned as fire brigade members.

The team reviewed the adequacy of the procedures utilized for alternative shutdown and performed an independent walkthrough of the procedure to ensure the adequacy of the procedure. The team also verified that the operators could be reasonably expected to perform specific short-term actions within the time required to maintain plant parameters within specified limits. Some of the short-term actions verified include the restoration of alternating current electrical power, establishing reactor coolant makeup, and establishing decay heat removal.

The team reviewed manual actions to ensure that they had been properly reviewed and approved and that the actions could be implemented in accordance with plant procedures in the time necessary to support the safe shutdown method for each fire area.

The team reviewed periodic surveillance testing of the alternative shutdown transfer capability, including transfer and isolation of instrumentation and control functions, to verify that the tests were adequate to demonstrate the functionality of the alternative shutdown capability.

b. Findings

Introduction. The following violation that affects 10 CFR 50.48 was identified by the NRC and is a violation of NRC requirements. This violation has been screened and determined to warrant enforcement discretion per the Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48).

The team identified that the licensee failed to ensure that the pressurizer level would remain within levels predicted for a loss of normal a.c. power and the reactor coolant system subcooling margin would be maintained during all potential accident scenarios that could result during an alternative shutdown scenario. This violation is an additional example of a previously identified violation of 10 CFR Part 50, Appendix R, Section III.L for an inadequate alternative shutdown analysis, as documented in NRC Inspection Report 2007006, Section 4OA5.3.

Description. The licensee used Calculation 85-E-0086-02, "Manual Action Feasibility Methodology and Common Results," Revision 3, to demonstrate compliance with alternative shutdown requirements and to demonstrate the ability of operators to perform manual actions to achieve post fire safe shutdown. This calculation referenced numerous other calculations as bases for calculating the time available to successfully complete necessary operator manual actions.

The team identified one example where the allowed completion time for the manual actions did not ensure that the licensee met the requirements of 10 CFR Part 50, Appendix R, Section III.L for all alternative shutdown scenarios. Specifically, Calculation 85-E-0086-02, Revision 3, allowed operators more than 50 minutes to restore emergency feedwater during an alternative shutdown scenario where main feedwater was lost and emergency feedwater did not start automatically. Emergency feedwater

was the credited system used for decay heat removal and was not assured to operate automatically in this scenario.

The team noted that the 50 minute time limit was based on Calculation 89-E-0047-20, "ANO-1 PRA Level I Initiating Events and Accident Sequence Analysis Work Package," Revision 1, which concluded that the emergency feedwater system must start within 54 minutes of a station blackout event to prevent the core from being uncovered. The team determined that a success criterion of not uncovering the core exceeded the applicable requirement. Specifically, 10 CFR Part 50, Appendix R, Section III.L, requires that the reactor coolant system process variables be maintained within those predicted for a loss of normal a.c. power during the post fire shutdown for alternative shutdown scenarios.

The inspectors performed a timed walkdown of the alternative shutdown procedure. Using information for manual valve stroke times from Calculation 85-E-0086-02, Revision 3, the inspectors determined that it would take operators approximately 50 minutes to restore the turbine-driven emergency feedwater pump and approximately 100 minutes to restore the motor-driven emergency feedwater pump.

Since the timed walkdown results indicated that the operators may not restore emergency feedwater prior to uncovering the core, the team requested that this scenario be evaluated using the plant simulator to provide a reasonable estimate of the plant response to this transient. The simulator results indicated that the reactor coolant system process variables were not maintained within those for a loss of normal a.c. power during the post fire shutdown. Specifically, the simulator results indicated that the pressurizer level exceeded the indicating band in approximately 36 minutes and the reactor coolant system lost subcooled conditions in approximately 50 minutes. Further, the team noted that the pressurizer electromatic relief valve cycled over 40 times during this scenario.

The inspectors noted that the amount of time estimated to manually stroke the motor-operated valves contained in Calculation 85-E-0086-02 was excessively conservative. Subsequent calculations reduced these estimates from a nominal value of 14 minutes per valve to a valve-specific value that ranged from 2 to 5 minutes. Using the updated values, the inspectors concluded that a more reasonable estimate for the amount of time to restore emergency feedwater was 16 minutes for the turbine-driven pump and 40 minutes for the motor-driven pump. This was consistent with typical restoration times at other plants.

The team concluded that this violation constituted an additional example of a violation previously documented in NRC Inspection Report 2007006, Section 4OA5.3, "Inadequate Alternative Shutdown Analysis," and is not being cited individually. Specifically, Inspection Report 2007006 documented an example where Calculation 85-E-0086-02 was inadequate to demonstrate compliance with the requirements for plant response during alternative shutdown. The team determined that the corrective action addressing that violation would also address this violation, and that the licensee was being timely in their corrective actions.

Analysis. The failure to ensure that the reactor coolant system process variables would be maintained within those predicted for a loss of normal a.c. power during the post fire shutdown for all alternative shutdown scenarios was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

A senior reactor analyst performed a Phase 3 evaluation to bound the risk significance of this finding since it involved an alternative shutdown scenario. The team determined that fires in the control room (CR) and cable spreading room (CSR) were the only fires that could lead to an alternative shutdown scenario. The senior reactor analyst used values from NUREG/CR-6850, "EPRI/RES-RES Fire PRA Methodology for Nuclear Power Facilities," September 2005, for the fire ignition frequencies and non-suppression probabilities. The senior reactor analyst used conditional core damage probabilities from the Individual Plant Examination for External Events. Since the change in core damage frequency was demonstrated to be less than $1E-4$, the senior reactor analyst concluded that the finding was not of high safety significance (Red). Therefore, this finding qualifies for enforcement discretion using the Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48).

The finding did not have a crosscutting aspect since it was not indicative of current performance in that the performance deficiency existed for more than three years.

Enforcement. Failure to ensure that the alternative shutdown strategy would maintain the reactor coolant system process variables within those predicted for a loss of normal a.c. power was a violation of 10 CFR Part 50, Appendix R, Section III.L.1. Specifically, Calculation 85-E-0086-02 did not demonstrate that decay heat removal could be restored prior to overfilling the pressurizer and losing subcooling.

Because the licensee committed to adopting National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," and has committed to changing their fire protection program license basis to comply with 10 CFR 50.48(c), this violation is eligible for the enforcement discretion described in the Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48). Specifically, the team determined that the licensee: (1) would have identified the subject of the violation, since the "ANO Project Plan for Transition to 10CFR50.48(c) NFPA 805," Revision 3, specifically addressed NRC concerns relative to the operator manual actions addressed in the Safe Shutdown Compliance Assessment; (2) entered these issues into their corrective action program as CR-ANO-C-2006-0048 (original violation) and CR-ANO-C-2010-02295 (issue discussed in this report), and implemented appropriate compensatory measures, including increasing the number of operators performing the safe shutdown procedure and using actual equipment operating time values in their analysis; (3) likely would not have identified this through routine licensee efforts; and (4)

had not committed the error willfully. Further, the team concluded that this finding was not of high safety significance (Red).

Since all the criteria for enforcement discretion were met, the NRC is exercising enforcement discretion for this issue and documenting the issue as an additional example of the violation identified to close Unresolved Item 05000313/2004010-01, Inadequate Alternative Shutdown Analysis, previously documented in NRC Inspection Report 2007006, Section 4OA5.3, (EA-10-193).

.06 Circuit Analysis

This segment of the inspection is suspended for plants in transition to a risk-informed fire protection program in accordance with National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants." Therefore, no evaluations were performed in this area.

.07 Communications

a. Inspection Scope

The team reviewed the adequacy of the communication systems to support plant personnel in the performance of alternative shutdown functions and fire brigade duties. The team evaluated the environmental impacts such as ambient noise levels, coverage patterns, and clarity of reception. The team verified that the design and location of communications equipment such as repeaters, private branch exchanges, and transmitters would not cause a loss of communications during a fire.

The team also verified the contents of designated storage lockers and reviewed the alternative shutdown procedure to verify that portable radio communications and fixed emergency communications systems were available, operable, and adequate for the performance of designated activities.

b. Findings

No findings.

.08 Emergency Lighting

a. Inspection Scope

The team reviewed the portion of the emergency lighting system required for alternative shutdown to verify that it was adequate to support the performance of manual actions required to achieve and maintain hot shutdown conditions and to illuminate access and egress routes to the areas where manual actions would be required. The team evaluated the locations and positioning of the emergency lights during walkthroughs of the alternative shutdown procedure.

The team verified that the licensee installed emergency lights with at least an 8-hour capacity, maintained the emergency battery-operated lights in accordance with manufacturer and industry recommendations, and tested and performed maintenance in accordance with plant procedures and industry practices. The team also reviewed the location of the emergency lights for a sample of areas to determine the adequacy of emergency lighting during control room evacuation events.

b. Findings

Introduction. The team identified a Green finding because the licensee did not include fire protection features in the fire impairment implementing Procedure 1000.120, "ANO Fire Impairment Program," Revision 20. The approved fire protection program stated that procedures existed for implementing compensatory measures for degraded fire protection systems and features, but the fire impairment implementing procedure only addressed compensatory measures for specific fire protection systems. The team identified that the licensee did not implement compensatory measures for periods when the Appendix R emergency lighting units were placed out of service for maintenance and testing.

Description. On August 10, 2010, during a walk down of the Unit 1 alternate shutdown procedure, the team requested information on the maintenance of 8-hour battery operated emergency lights required under Section III.J of Appendix R. The licensee's maintenance practice included performing an 8-hour battery discharge test. When the 8-hour test was completed, the battery was returned to a charging state. During this discharging and recharging process, the emergency light did not meet Section III.J requirements for the battery to be able to energize the lights for 8-hours until the full capacity was restored.

The team reviewed the licensee's fire protection program Procedure OP-1003.014, "ANO Fire Protection Program," Revision 4, which define an impairment as the degradation of a fire protection system or feature that adversely affects the ability of the system or feature to perform its intended function. The team concluded that out-of-service emergency lights constituted an impaired fire protection feature. The licensee's fire protection program stated that procedures have been established to implement required compensatory measures for inoperable fire protection systems and components. However, the licensee's impairment program Procedure, OP 1000.120, "ANO Fire Impairment Program," Revision 20, listed specific systems that were to be covered without covering other fire protection features, such as Appendix R 8-hour battery operated emergency lights.

Analysis. Failure to ensure that all of the applicable elements of the approved fire protection program were included in the fire impairment implementing procedure is a performance deficiency. The finding is more than minor because it is associated with the Protection Against External Events attribute of the Mitigating Systems cornerstone since it affected the availability, reliability, and capability of systems that respond to fire events to prevent undesirable consequences. Specifically, emergency lights were required to support operator manual actions, access, and egress necessary to support

safe shutdown. Because this issue relates to fire protection, the team used the guidance of Manual Chapter 0609, Appendix F, Attachment 2, to determine that this fire prevention and administrative control deficiency had a low degradation rating in that it minimally impacted the fire protection program because only a few batteries were tested at any one time. Based on this, the finding screened as having very low safety significance (Green) during a Phase 1 significance determination. This finding is identified as FIN 05000313; 05000368/2010006-01, Fire Protection Compensatory Measures Did Not Cover All Fire Protection Features.

No cross cutting aspect was associated with this finding because the team determined that this deficiency is not indicative of current performance. This programmatic deficiency has existed for longer than three years.

Enforcement. No violation of NRC requirements was identified. Although the fire protection program included both fire protection systems and features, the performance deficiency resulted in not including a clear requirement statement where such a requirement should have existed.

.09 Cold Shutdown Repairs

a. Inspection Scope

The team verified that the licensee identified repairs needed to reach and maintain cold shutdown and had dedicated repair procedures, equipment, and materials to accomplish these repairs. Arkansas Nuclear One Units 1 and 2 use Calculation 85-E-0086-02, "Manual Action Feasibility and Common Results," Revision 3, work orders, and procedural attachments to identify and accomplish any necessary cold shutdown repairs. Using these procedures, work orders, and attachments the team evaluated whether these repairs could be accomplished in time to bring the plant to cold shutdown within the time frames specified in their design and licensing bases. During the review, it was discovered that Work Order 50277838, which provides guidance for repairs of Decay Heat Removal Cooler E-35A Outlet valve CV-1428, had been cancelled. Work Order 50277837, which provides nearly identical guidance on repair of Decay Heat Removal Cooler E-35B Outlet valve CV-1429, an identical valve to CV-1428, was open and available. Either valve may be used in the licensee's cold shutdown procedure. CR-ANO-1-2010-03071 was written to address the closure of Work Order 50278838, and implement steps to ensure the required documentation and materials were available when plant conditions required.

The team verified, through walkdowns, that the repair equipment, components, tools, and materials needed for the repairs were available and accessible on site.

Unit 1 had an exemption to the requirements of 10 CFR 50, Appendix R, Section III.L.1, to achieve cold shutdown within 72 hours without the use of offsite power. Unit 1 is required to achieve cold shutdown within 140 hours, which would provide adequate time to perform cold shutdown repairs.

b. Findings

No findings.

.10 Compensatory Measures

a. Inspection Scope

The team verified that compensatory measures were implemented for out-of-service, degraded, or inoperable fire protection and post-fire safe shutdown equipment, systems, or features (e.g., detection and suppression systems and equipment; passive fire barriers; or pumps, valves, or electrical devices providing safe shutdown functions). The team also verified that the short-term compensatory measures compensated for the degraded function or feature until appropriate corrective action could be taken and that the licensee was effective in returning the equipment to service in a reasonable period of time.

b. Findings

A finding related to compensatory measures is discussed in Section .08, "Emergency Lighting." No additional findings.

.11 B.5.b Inspection Activities

a. Inspection Scope

The team reviewed the licensee's implementation of guidance and strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant due to explosions or fire as required by Section B.5.b of the Interim Compensatory Measures Order, EA-02-026, dated February 25, 2002, and 10 CFR 50.54(hh)(2).

The team reviewed licensee's strategies to verify that they continued to maintain and implement procedures, maintain and test equipment necessary to properly implement the strategies, and ensure station personnel are knowledgeable and capable of implementing the procedures. The team performed a visual inspection of portable equipment used to implement the strategy to ensure availability and material readiness of the equipment, including the adequacy of portable pump trailer hitch attachments, and verify the availability of on-site vehicles capable of towing the portable pump. The team assessed the off-site ability to obtain fuel for the portable pump, and foam used for firefighting efforts. The strategies and procedures selected for this inspection sample include:

- 1203.048 Attachment J Section 12, "Security Event – RWT/BWST (2T-3/T-3) Makeup," Change 12
- 1003.005, "Fire Prevention Inspection," Change 51 – Form 1003.005E

b. Findings

No findings.

4. OTHER ACTIVITIES [OA]

4OA2 Identification and Resolution of Problems

Corrective Actions for Fire Protection Deficiencies

a. Inspection Scope

The team selected a sample of condition reports associated with the licensee's fire protection program to verify that the licensee had an appropriate threshold for identifying deficiencies. In addition the team reviewed the corrective actions proposed and implemented to verify that they were effective in correcting identified deficiencies. The team also evaluated the quality of recent engineering evaluations through a review of condition reports, calculations, and other documents during the inspection.

b. Findings

No findings.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On August 27, 2010, the team presented the inspection results to Mr. Brad Berryman and other members of the licensee staff at an exit meeting. The licensee acknowledged the findings presented.

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

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

R. Beaird	EP&C Manager
B. Berryman	General Manager, Plant Operations
M. Fletcher	Instructor, Fire Protection
M. Giles	Manager, Licensing
R. Hendrix	EP&C, Fire Protection
R. Holeyfield	EP Manager
D. James	Director, Nuclear Safety Assurance
R. Linebarger	EP&C, Fire Protection
S. Pyle	Specialist, Licensing
J. Walker	Engineer, Fire Protection

NRC personnel

C. O'Keefe	Chief, Engineering Branch 2
A. Sanchez	Senior Resident Inspector
J. Josey	Resident Inspector
J. Rotton	Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened and Closed

05000313; 368/2010006-01	NCV	Fire Protection Compensatory Measures Did Not Cover All Fire Protection Features (Section 1R05.08)
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Closed

None

LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
CR	Condition Report
CFR	Code of Federal Regulations
DRS	Division of Reactor Safety
FSAR	Final Safety Analysis Report
NCV	Non-cited Violation
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
PAR	Publicly Available Records
SDP	Significance Determination Process

LIST OF DOCUMENTS REVIEWED

CALCULATIONS

<u>Number</u>	<u>Title</u>	<u>Revision</u>
010149E301-01	Ultra High Frequency Radio Replacement Analysis	0
85-E-0053-48	Individual Plant Examination of External Events/Fire Evaluation for Unit 2	2
85-E-0072-03	Time to Loss of Subcooling or Loss of Pressurizer Liquid Inventory from Plant Trip with No Makeup Available Under Various RCS Leak Path Scenarios	2
85-E-0086-02	Manual Action Feasibility and Common Results	3
85-E-0086-18	Safe Shutdown Equipment List (SSEL) Methodology for ANO-1	1
85-E-0087-23	Safe Shutdown Equipment List (SSEL) Methodology	0
85-E-0115-00	Report on Determination of Minimum Design Objective Received Signal Level for RADIAX Antenna System	1
85-E-0117-00	Radiax System Performance Evaluation	1
89-E-0047-20	ANO-1 PRA Level I Initiating Events and Accident Sequence Analysis Work Package	1
CALC-ANO2-FP-09-00001	ANO Code Compliance Report for NFPA 72E, 1974 Edition, Automatic Fire Detectors	0
CALC-ANO2-FP-09-00003	ANO Unit 2 Code Compliance Report for NFPA 72D, 1975 Edition, Proprietary Protective Signaling Systems	0
CALC-ANO2-FP-09-00004	ANO Unit 2 Code Compliance Report for zone 2098-L, 2109-U and 2136-I. NFPA 15, 1977 Edition, Water Spray Fixed Systems for Fire Protection	0
CALC-ANO2-FP-09-00009	ANO Unit 2 Code Compliance Report for NFPA 13, 1975 Edition, Installation of Sprinkler Systems	0
CALC-ANO2-FP-09-00019	ANO Unit 2 Code Compliance Report for NFPA 12A, Halon 1301 Fire Extinguishing Systems for CPC room (Fire Zone 2098-C)	0

DRAWINGS

<u>Number</u>	<u>Title</u>	<u>Revision</u>
A-2600	Fire Barrier Penetration Seal Details	5
E-199 Sh. 2	Schematic Diagram Reactor Coolant Pressurizer ERV Isolation Valve CV1000	14
E-213 Sh. 1A	Schematic Diagram Primary Makeup Pump P36C Auxiliary Lube Oil Pump P64C	5
E-214 Sh. 1	Schematic Diagram Primary Makeup Pump P36B Auxiliary Lube Oil Pump P64B	18
E-214 Sh. 1A	Schematic Diagram Primary Makeup Pump P36B Auxiliary Lube Oil Pump P64B	3
E-214 Sh. 1B	Schematic Diagram Primary Makeup Pump P36B Auxiliary Lube Oil Pump P64B Manual Transfer Switch B801	0
E-2581 Sheet 12	Connection Schedule Fire and Smoke Detection System HVAC for CPC Room	1
E-2581 Sheet 3	Connection Schedule Fire and Smoke Detection Systems	6
E-2581 Sheet 6	Connection Schedule Fire and Smoke Detection Systems, Cabinet 2C341	1
E-2594 Sheet 2	Schematic Diagram, Electrical Penetration Rooms, Fire Protection System	8
E-2594 Sheet 6	Schematic Diagram, Access Corridors 2104, 2105 and 2109, Elevation 372', Fire Protection System	0
E-2594 Sheet 7	Schematic Diagram, Access Corridor 2139 Elevation 386', Fire Protection System	0
E-2996	Connection Diagram Cabinet 2C341	6
E-2996 Sheet 12	Connection Diagram Panel 2C343-4	1
E-2996 Sheet 7	Connection Diagram Panel 2C343-1	5
E-2996 Sheet 8	Connection Diagram Panel 2C343-2	11
E-2996 Sheet 9	Connection Diagram Panel 2C343-3	11
E-356 Sheet 2	Schematic Diagram Aux. Bldg. Emerg. Diesel Gen. Room Exhaust Fan	5

<u>Number</u>	<u>Title</u>	<u>Revision</u>
E-356 Sheet 2A	Schematic Diagram Aux. Bldg. Emerg. Diesel Gen. Room Exhaust Fan	3
E-356 Sheet 2B	Schematic Diagram Aux. Bldg. Emerg. Diesel Gen. Room Exhaust Fan	3
E-356 Sheet 2C	Schematic Diagram Aux. Bldg. Emerg. Diesel Gen. Room Exhaust Fan	3
FP-2101	Fire Zones Fuel Handling Floor Plan, EL. 404'-0" and 422'-0"	18
FP-2102	Fire Zones Operating Floor Plan, EL. 386'-0"	35
FP-2103	Fire Zones Intermediate Floor Plan, EL. 368'-0" and 372'-0"	30
FP-2104	Fire Zones Ground Floor Plan, EL. 354'-0"	33
FP-2105	Fire Zone Plan Below Grade, EL. 335'-0"	27
FP-2106	Fire Zone Plan at Elev. 317'-0"	16
M-206 Sheet 1	Piping and Instrumentation Diagram Steam Generator Secondary System	128
M-212 Sheet 1	Piping and Instrumentation Diagram Plant Domestic Water Distribution	88
M-212 Sheet 2	Piping and Instrumentation Diagram Plant Domestic Water Distribution	58
M-2206 Sheet 1	Piping and Instrumentation Diagram Steam Generator Secondary System	149
M-2212 Sheet 4	Piping and Instrumentation Diagram Make-Up Water Demineralization System	22
M-2229 Sheet 1	Piping and Instrumentation Diagram Start-Up and Blowdown Demineralizer System	78
M-2231 Sheet 3	Piping and Instrumentation Chemical and Volume Control System	9
M-2440	Functional Description and Logic Diagram, Auxiliary Building Fire Protection System	13
M-2445 Sheet 1	CPC Room #2098C Halon Fire Suppression System	1

WORK ORDERS

141056	50241720	52190135	00200067
00157232	50269533	52191689	00206509
00158064	51658129	52192967	52024430
00158114	51670384	52198288	52025883
00162525	51684168	52199734	52027102
00196989	51693181	00198146	

CONDITION REPORTS (CR-ANO)

1-2008-01498	1-2010-03071*	C-2010-02201*	C-2008-00912	C-2009-01221
1-2008-01906	C-2007-01234	C-2010-01580	2-2008-01847	2-2009-00143
1-2009-00254	C-2004-00459	1-2010-03020*	C-2010-02180*	C-2010-00975
1-2010-00404	C-2010-00563	C-2010-00621	C-2010-00658	C-2010-02180*
2-2009-02406	1-2010-00492*	C-2007-01564	C-2009-02692	C-2010-02205*
C-2007-01719	1-2007-01818	C-2009-00558	C-2009-00166	C-2008-02650
C-2008-01303	C-2008-01620	C-2008-01689	C-2008-01950	LO-LAR-2006-00159
C-2008-02305	2-2007-01512	C-2007-01646	C-2010-00497	C-2010-02325*
C-2009-00119	C-2009-00335	C-2009-00336	C-2009-00415	C-2010-02295*
C-2009-00157	1-2010-03116*	C-2010-02202*	C-2008-01761	
C-2009-00336	C-2010-01576	1-2010-03112*	C-2010-02182*	
C-2009-00991	C-2009-00992	C-2009-00994	C-2009-01074	
C-2009-01242	C-2009-01257	C-2009-01576	C-2010-02189*	
C-2010-00960	C-2010-02200*	C-2010-02209*	C-2007-01646	
C-2010-01176	C-2010-01239	C-2010-01276	C-2010-02180*	

*Issued as a result of inspection activities.

PROCEDURES

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1003.005E	B.5.b Area Inspection	10
ASCBT-EP-A0083	Severe Accident Management Guidelines Overview	5
OP-5010.022	Fire Barrier Penetration Log Control	002
OP-1003.014	ANO Fire Protection Program	004
EN-DC-330	Fire Protection Program	0
EN-DC-204	Maintenance Rule Scope and Basis	2
EN-DC-179	Preparation of Fire Protection Engineering Evaluations	3
EN-DC-161	Control of Combustibles	4
EN-DC-127	Control of Hot Work and Ignition Sources	7
EN-TQ-125	Fire Brigade Drills	1
EN-DC-128	Fire Protection Impact Reviews	4
EN-DC-329	Engineering Programs Control and Oversight	2
EN-OP-104	Operability Determination Process	4
EN-LI-102	Corrective Action Process	15
TD R411.0040	Instructions for Ruskin IBD23 Curtain Type Fire Damper 3 Hour Rating	0
1000.018	Housekeeping	029
1000.120	ANO Fire Impairment Program	020
1003.002	Insurance Impairment Reporting	004
1003.005	Fire Prevention Inspection	010
1003.014	ANO Fire Protection Program	4
1015.004A	Alternate Shutdown Design Bases Document	6
1015.007	Fire Brigade Organization and Responsibilities	020
1063.020	Fire Brigade Training Program	015
1104.032	Fire Protection Systems	62
1203.002	Alternate Shutdown	19

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1203.002	Alternate Shutdown	20
1203.013	Natural Circulation Cooldown	018
1203.048	Security Event	12
1304.025	Fire System Instrumentation Calibration	016
1305.016	Safe Shutdown Instrumentation and Equipment Periodic Testing	20
1306.027	Unit 1 K-5 Diesel Fire Pump Engine Surveillance Inspection	022
1307.001	Unit 1 and 2 Diesel Fire Pump Battery Banks	022
1307.004	Diesel Fire Pump Engine (K-5) Biannual Surveillance	007-04-0
1411.019	Diesel Fire Pump Engine Lubrication and Inspection	004-00-0
2104.032	Unit 2 Fire Protection System Operations	029
2203.009	Fire Protection System Annunciator Corrective Action	023
2203.030	Remote Shutdown	11
2203.034	Fire or Explosion	10
2203.049	Fires in Areas Affecting Safe Shutdown	008
2306.023	Unit 2 Fire Damper Surveillance Test	006
2306.025	Unit 2 Fire Door Inspection Procedure	009
2307.012	Unit 2 Fire Detection Instrumentation Operability	036
2307.036	CPC Room # 2098C Fire Protection Test	009
2307.041	Unit 2 1-Hour Cable Fire Wrap Inspection	03
2307.042	Unit 2 3-Hour Fire Wrap And Fire Retardant Coating Surveillance	01
2405.016	Unit 2 Penetration Fire Barrier Visual Inspection	015
6030.101	Installation of Penetration Seals	004-06

ENGINEERING REQUESTS

<u>Number</u>	<u>Title</u>	<u>Revision</u>
ER-ANO-2005-0443-029	High / Low Pressure Interface Determination	
010149E301	Adequacy of Portable Radios During an Alternate Shutdown Scenario	0
ANO-ER-03-013	Manual Stroke Time for Various MOVs for Alternate Shutdown Means	0

MISCELLANEOUS DOCUMENTS

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
SAR Appendix 9B	Arkansas Nuclear One Fire Hazards Analysis	11
	ANO-1 Alternate Shutdown Procedure 1203.002 Basis Document	19
	ANO-1 Alternate Shutdown Procedure 1203.002 Basis Document	20
	HALE Skid and Trailer Installation, Operation and Service Maintenance Manual	
0CAN010701	Response Providing Information Regarding Implementation Details for the Phase 2 and 3 Mitigation Strategies Arkansas Nuclear One – Units 1 and 2	1/10/2007
0CAN028304	Hot to Cold Shutdown Scenario for Loss of Offsite Power - Exemption Request Details from Appendix R Compliance Submittal	2/11/1983
0CAN060702	Additional Information Regarding B.5.b Mitigation Strategies	6/15/ 2007
0CAN078202	Results of Appendix R Compliance Review	7/01/1982
0CAN088404	Results of Reanalysis Against NRC Clarification/Interpretation of Appendix R to 10CFR50	8/15/1984
0CAN10060701	Updated Schedule of Completion of App. R Related Items	6/13/2007

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
0CAN108508	Results of Reanalysis Against NRC Clarification/Interpretation of Appendix R to 10CFR50 - Supplemental Information	8/30/1985
0CAN108608	Appendix R Exemption Requests- Additional Information	10/20/1986
0CAN108710	Request for Exemption to Section III.G.2 of Appendix R for new safety-grade condensate storage tank (QCST)	10/29/1987
0CAN118104	Arkansas Nuclear One – Units 1 and 2 Emergency Lighting	11/16/1981
0CAN118210	Request for Additional Information to Appendix R Compliance Submittal	11/11/1982
0CAN128104	Arkansas Nuclear One – Units 1 and 2 Emergency Lighting	12/22/1981
0CAN128215	Response to Draft Safety Evaluation of Appendix R Compliance Submittal	12/28/1982
0CNA028214	Response to Exemption Request	2/17/1982
0CNA038328	Appendix R Exemptions	3/22/1983
0CNA058316	APPENDIX R TO 10 CFR 50, ITEMS III.G.3 AND III.L	5/13/1983
0CNA088508	Results of Reanalysis Against NRC Clarification/Interpretation of Appendix R to 10CFR50 - Supplemental Information	8/30/1985
1CNA058303	Appendix R, Section III.L Exemption for ANO Unit 1	5/11/1983
1CNA108806	Appendix R, Section III.G.2 and III.O Exemptions for ANO Unit 1	10/26/1988
2098-C	Pre-Fire Plan Fire Zone 2098-C	1
2109-U	Pre-Fire Plan Fire Zone 2109-U	3
2111-T	Pre-Fire Plan Fire Zone 2111-T	2
2CNA069701	Appendix R, Section III.O Exemptions for ANO Unit 2	6/14/1997
2CNA108802	Appendix R Exemptions for ANO Unit 2	10/26/1988

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
2CNA109902	Appendix R, Section III.G.2 Exemptions for ANO Unit 2	10/01/1999
3-APLW	Pre-fire Plan – Old AP&L Warehouse	1
91-7186	Plant Engineering Action Request	3/19/1991
ANO-2 TRM 3.3.6.1	Fire Detection system Instrumentation	31
ANO-2 TRM 3.7.1.1	Fire Suppression Water System	33
ANO-2 TRM 3.7.1.2	Fire Suppression Sprinkler System	38
ANO-2 TRM 3.7.1.3	CPC Room Halon System	31
ANO-2 TRM 3.7.1.4	Fire Hose Stations	33
ANO-2 TRM 3.7.1.5	Fire Barriers	41
COPD-024	Risk Assessment Guidelines	033
Lesson Plan A2FOLOR1005FASS	Fires Affecting Safe Shutdown	2
LO-ALO-2009-00051	ANO Fire Protection Focused Self Assessment	3/12/2010
QA-2009-ANO-009	ANO Quality Assurance Follow-up Surveillance of January 2009 Fire Protection Audit	8/27/2009
QA-9-2009-ANO-1	Quality Assurance Audit Report – Fire Protection	2/26/2009
SAR Appendix 9A Amendment 22	Fire Protection Program (Unit 1)	
SAR Appendix 9A Amendment 21	Fire Protection Program (Unit 2)	
SAR Section 9.5.1 Amendment 21	Fire Protection System (Unit 2)	
SAR Section 9.8 Amendment 22	Fire Protection System (Unit 1)	
STM 1-04	Primary Makeup and Purification	9
STM 1-19	Feedwater System	11
STM 1-27	Emergency Feedwater System	12
STM 1-32	Electrical Distribution	36
STM 1-42	Service & Auxiliary Cooling Water	19

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
STM 1-60	Fire Protection System	8
TD G080.0200	Instructions for General Electric CR2940 Push-Button and Signal Station	2
TDE353 0020	Installation, Operation, and Maintenance for Model B-200 Emergency Lighting Unit	2
TDE353 0040	Catalog for Exide Electronics Emergency Lighting	1
TDG499X0030	Installation, Operating Instructions for GNB Technologies MSB Marathon & Sprinter Batteries, Model – M12V30, M12V40, M12V70, M12V90 & M6V180	0