



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD
ARLINGTON TX 76011-4511

February 5, 2016

Mr. Randall K. Edington
Executive Vice President Nuclear/CNO
Arizona Public Service Company
P.O. Box 52034, MS 7602
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION – NRC TRIENNIAL FIRE
PROTECTION INSPECTION REPORT 05000528/2015008; 05000529/2015008;
AND 05000530/2015008

Dear Mr. Edington:

On January 15, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Palo Verde Nuclear Generating Station, Units 1, 2, and 3. The NRC discussed the results of this inspection with Mr. D. Mims, Senior Vice President, Regulatory Affairs and Oversight, and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented one finding of very low safety significance (Green) in this report, which involved a violation of NRC requirements. The NRC is treating this violation as a non-cited violation consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violation or significance of the violation in this report, you should provide a written 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, Region IV; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Palo Verde Nuclear Generating Station.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide

R. Edington

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Sincerely,

/RA James F. Drake Acting for/

Gregory E. Werner, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 50-528, 50-529, 50-530
License Nos. NPF-41, NPF-51, NPF-74

Enclosure:
NRC Inspection Report 05000528/2015008,
05000529/2015008, and 05000530/2015008
w/Attachment: Supplemental Information

cc w/encl: Electronic Distribution

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ADAMS ACCESSION NUMBER: ML16036A189

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Letter to Randall K. Edington from Gregory E. Werner, dated February 5, 2016

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION – NRC TRIENNIAL FIRE
PROTECTION INSPECTION REPORT 05000528/2015008; 05000529/2015008;
AND 05000530/2015008

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 05000528, 05000529, 05000530

License: NPF-41, NPF-51, NPF-74

Report Nos.: 05000528/2015008, 05000529/2015008, 05000530/2015008

Licensee: Arizona Public Service Company

Facility: Palo Verde Nuclear Generating Station

Location: 5801 South Wintersburg Road
Tonopah, AZ 85354

Dates: December 14, 2015, through January 15, 2016

Team Leader: G. Pick, Senior Reactor Inspector, Engineering Branch 2

Inspectors: N. Okonkwo, Reactor Inspector, Engineering Branch 2
E. Uribe, Reactor Inspector, Inspection Program and Assessment Team
J. Watkins, Reactor Inspector, Engineering Branch 2

Accompanying Personnel: J. Tice, Project Engineer, Branch D, Division of Reactor Projects

Approved By: Gregory E. Werner
Chief, Engineering Branch 2
Division of Reactor Safety

SUMMARY

IR 05000528/2015008, 05000529/2015008, 05000530/2015008; 12/14/2015 – 01/15/2016; Palo Verde Nuclear Generating Station Units 1, 2, and 3; Triennial Fire Protection Team Inspection.

The report covered a two-week triennial fire protection team inspection by specialist inspectors from Region IV. One finding, which was a non-cited violation, was documented. The significance of inspection findings are indicated by their color (i.e., Green, White, Yellow, or Red) and determined using Inspection Manual Chapter 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

The team identified a Green non-cited violation of License Conditions 2.C.7, 2.C.6, and 2.F for Units 1, 2, and 3, respectively, because the licensee had not established criteria for determining when a fire main loop had degraded and had not properly tested all portions of the fire main loop. Specifically, the licensee had not established a differential pressure that would initiate actions to evaluate the cause for a degradation and the licensee had not determined the flow through individual flow paths in their auxiliary and control buildings. The licensee documented these issues in Condition Reports 15-00513 and 16-00686 and initiated actions to correct the procedure and perform the flow test of the individual loops.

The team identified a performance deficiency related to the procedure used to test their fire main loop. Specifically, the licensee had not established criteria for determining a degraded fire main loop and had not properly tested all portions of the fire main loop. This performance deficiency was more than minor because it was associated with the protection against external factors attribute (fire) and adversely affected the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to test the fire main loops inside the control/auxiliary building separately and failure to establish appropriate acceptance criteria affected the ability to demonstrate the continued capability to deliver adequate flow and pressure to the fire suppression systems.

The finding was screened in accordance with NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," dated June 19, 2012. The inspectors determined that an IMC 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013, review was required as the finding affected the ability to reach and maintain safe shutdown conditions in case of a fire. Using IMC 0609, Appendix F, Attachment 1, "Fire

Protection Significance Determination Process Worksheet,” dated September 20, 2013, the finding was screened as a Green finding of very low safety significance in accordance with Task 1.4.7, “Fire Water Supply,” Question A. The inspectors determined that although the licensee failed to test portions of the fire main system in accordance with code requirements, the inspectors determined that at least 50 percent of required fire water capacity would be available based on the testing is done with only one fire pump in service and there are three available fire pumps. Since these fire main loops inside the control/auxiliary building had not been monitored for pressure changes when flow tested since initial testing and nothing caused the licensee to reevaluate the test, the team determined that this failure did not reflect current performance. (Section 1R05.05.b)

B. Licensee-Identified Violations

None

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R05 Fire Protection (71111.05T)

This report presents the results of a triennial fire protection inspection conducted in accordance with NRC Inspection Procedure 71111.05T, "Fire Protection (Triennial)," at the Palo Verde Nuclear Generating Station. The 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 71111.05T requires the selection of three to five fire areas and one or more mitigating strategies for review. The team used the fire hazards analysis section of the Palo Verde Individual Plant Examination of External Events to select the following four risk-significant fire areas (inspection samples) for review:

<u>Fire Zone</u>	<u>Description</u>
5A	Train A Engineered Safety Features Switchgear Room
9A	Train A Battery Room
10	Remote Shutdown Room A
20	Upper Cable Spreading Room

The team evaluated the licensee's fire protection program using the applicable requirements, which included plant Technical Specifications, Operating License Conditions 2.C.7, 2.C.6, and 2.F, NRC safety evaluations, 10 CFR 50.48, and Branch Technical Position 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants." The team also reviewed related documents that included the Updated Final Safety Analysis Report, Section 9.5; the fire hazards analysis; and the post-fire safe shutdown analysis. Specific documents reviewed by the team are listed in the attachment.

Four fire area inspection samples and two mitigating strategy samples were completed.

.01 Protection of Safe Shutdown Capabilities

a. Inspection Scope

The team reviewed the piping and instrumentation diagrams, safe shutdown equipment list, safe shutdown design basis documents, and the post-fire safe shutdown analysis to verify that the licensee properly identified the components and systems necessary to achieve and maintain safe shutdown conditions for fires in the selected fire areas. The team observed walk downs of the procedures used for achieving and maintaining safe shutdown in the event of a fire to verify that the procedures 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 were identified.

.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 were identified.

.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 automatic detection systems and the manual and automatic 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 walk down of accessible portions of the detection and suppression systems in the selected fire areas. The team also performed a walk down

of major system support equipment in other areas (e.g., fire pumps and Halon supply systems) to assess the material condition of these systems and components. The team reviewed the electric and diesel fire pumps' flow and pressure tests to verify that the pumps met their design requirements. The team also reviewed the Halon and carbon dioxide suppression functional tests to verify that the systems capability met the design requirements.

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 firefighting.

The team observed an unannounced fire drill and subsequent drill critique on January 12, 2016, 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 control building upper cable spreading room cable chase. 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 firefighting techniques; (4) sufficient firefighting 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

Introduction. The team identified a Green non-cited violation of License Conditions 2.C.7, 2.C.6, and 2.F for Units 1, 2, and 3, respectively, because the licensee had not established criteria for determining when a fire main loop had degraded and had not properly tested all portions of the fire main loop. Specifically, the licensee had not established a differential pressure that would initiate actions to evaluate the cause for a degradation and the licensee had not determined the flow through individual flow paths in their auxiliary and control buildings.

Description. The team reviewed the method used by the licensee to test their underground fire loop to ensure that they had flow tested all portions, as required by their licensing basis. The licensee annually tested their fire main loop in accordance with Procedure 14FT-0FP04, "Annual Fire Water Loop Test," Revision 21. The team determined that this test also met the requirements specified in Technical Requirements Manual Surveillance Requirement 3.11.101.16, which requires that the licensee perform a flow test of the fire suppression water system in accordance with Chapter 5, Section 11, of the Fire Protection Handbook, 14th Edition, published by the National Fire Protection Association every 3 years. The team determined that the licensee had

established a test configuration that isolated and established a constant flow through each individual section of their fire main loop and monitored for degrading delta-pressure between the pump discharge and return.

The team compared the test configurations in the procedure to the underground fire main loops detailed in their drawings. The team identified that the flow paths through the turbine building and through the control and auxiliary buildings did not get individually flow tested in the same manner as the other fire main loops located underground. The licensee indicated that they would detect a change in the pressure drop from combined loops located in the turbine or the control/auxiliary buildings and initiate actions to investigate the change in pressure at their fire pump.

In addition, the team determined that the procedure did not list any acceptance criteria for initiating actions for evaluating whether degradation existed. The team determined that their licensing basis specified flow paths through buildings to be treated the same as fire main loops located underground. The team determined that Procedure 14FT-0FP04 did not properly test the fire main loops inside the control/auxiliary buildings consistent with their test method for their underground fire main loops. Further, the procedure failed to specify any acceptance criteria that would indicated a degraded fire loop. The licensee documented these deficiencies in Condition Reports 15-00513 and 16-00686, respectfully.

The team determined that Updated Final Safety Analysis Report, Section 9.5.1.3, specified the primary evaluation of the compliance of the plant design with applicable regulatory and industry standards was presented in Appendix 9B, Fire Protection Evaluation Report. Fire Protection Evaluation Report, Table 9B.3-1, "Comparison of Palo Verde Nuclear Generating Station to Appendix A of NRC Branch Technical Position APCS 9.5-1," Section E.3.(a), "Water Sprinklers and Hose Standpipe Systems," specified that headers inside buildings, when provided, are considered an extension of the fire main loop. Also, Section C.5, "Test and Test Control," specified that the licensee included their testing requirements in their Operations Quality Assurance Plan, Appendix F.1. Section 17.2F.1.3.2.6, "Test and Test Control," specified, in part, "The tests should be performed in accordance with written test procedures; test results should be properly evaluated and acted upon." In addition, Section 17.2F.1.3.2.6.B, specified, in part, for periodic testing, that equipment will properly function and continue to meet design criteria.

Analysis. The team identified a performance deficiency related to the procedure used to test their fire main loop. Specifically, the licensee had not established criteria for determining a degraded fire main loop and had not properly tested all portions of the fire main loop. This performance deficiency was more than minor because it was associated with the protection against external factors attribute (fire) and adversely affected the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to test the fire main loop inside the control/auxiliary building separately and failure to establish appropriate acceptance criteria affected the ability to demonstrate the continued capability to deliver adequate flow and pressure to the fire suppression systems.

The finding was screened in accordance with NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," dated June 19, 2012. The inspectors determined that an IMC 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013, review was required as the finding affected the ability to reach and maintain safe shutdown conditions in case of a fire. Using IMC 0609, Appendix F, Attachment 1, "Fire Protection Significance Determination Process Worksheet," dated September 20, 2013, the finding was screened as a Green finding of very low safety significance in accordance with Task 1.4.7, "Fire Water Supply," Question A. The inspectors determined that although the licensee failed to test portions of the fire main system in accordance with code requirements, the inspectors determined that at least 50 percent of required fire water capacity would be available based on the testing is done with only one fire pump in service and there are three available fire pumps. Since these fire main loops inside the control/auxiliary building had not been monitored for pressure changes when flow tested since initial testing and nothing caused the licensee to reevaluate the test, the team determined that this failure did not reflect current performance.

Enforcement. License Conditions 2.C.7, 2.C.6, and 2.F for Units 1, 2, and 3, respectively, specify that, "APS shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the facility, as supplemented and amended, and as approved in the SER through Supplement 11." Updated Final Safety Analysis Report, Table 9B.3-1, "Comparison of Palo Verde Nuclear Generating Station to Appendix A of NRC Branch Technical Position APCS 9.5-1," Section C.5, "Test and Test Control" specified, that the licensee included their requirements in their Operations Quality Assurance Plan. Operations Quality Assurance Plan, Section 17.2F.1.3.2.6, "Test and Test Control," specified, in part, "The tests should be performed in accordance with written test procedures; test results should be properly evaluated and acted upon." Also, Table 9B.3-1, Section E.3.(a), "Water Sprinklers and Hose Standpipe Systems," specified that headers inside buildings, when provided, are considered an extension of the yard main loop. Technical Requirements Manual, Surveillance Requirement 3.11.101.16 requires that the licensee perform a flow test of the fire suppression water system in accordance with Chapter 5, Section 11, of the Fire Protection Handbook, 14th Edition, published by the National Fire Protection Association. Procedure 14FT-0FP04, "Annual Fire Water Loop Test," provided the guidance for conducting the test. Procedure 14FT-0FP04 identified the purpose of the procedure was to provide monitoring information on the condition of the fire water loops and to detect degrading flow characteristics from one year to the next.

Contrary to the above, from original plant licensing to January 15, 2016, the licensee failed to meet the requirements related to performing a test that established results that could be acted upon and for testing all portions of their fire main loops. Specifically, the licensee (1) did not establish acceptance criteria that identified when the test revealed degradation in the fire main loop and (2) did not test the individual paths inside their control/auxiliary building consistent with their testing of the fire main loop located underground.

Because this violation was of very low safety significance and has been entered into the corrective action program as Condition Reports 15-00513 and 16-00686, and the licensee initiated actions to correct the procedure and perform the flow test, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000528; 05000529; and 05000530/2015008-01, "Inadequate Loop Flow Test Procedure."

.04 Protection from Damage from Fire Suppression Activities

a. Inspection Scope

The team performed plant walk downs 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:

- 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 were identified.

.05 Alternative Shutdown Capability

a. Inspection Scope

Review of Methodology

The team reviewed the safe shutdown analysis, operating procedures, piping and instrumentation drawings, electrical drawings, the Updated Final Safety Analysis Report, and other supporting documents to verify that hot and cold shutdown could be achieved and maintained from outside the control room for fires that require evacuation of the control room, with or without offsite power available.

The team conducted plant walk downs to verify that the plant configuration was consistent with the description contained in the safe shutdown 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 shutdown would remain free from fire damage. Finally, the team verified that the transfer of control from the control room to the alternative shutdown location would not be affected by fire-induced circuit faults (e.g., by the provision of separate fuses and power supplies for alternative shutdown control circuits).

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 on-site at all times, exclusive of those assigned as fire brigade members.

The team performed a timed walk down of the alternative shutdown procedure for Unit 2 with licensed and non-licensed operators to determine the adequacy of the procedure. The team verified that the operators could reasonably be expected to perform specific actions within the time required to maintain plant parameters within specified limits. Time critical actions that were verified included restoring electrical power, establishing control at the remote shutdown and local shutdown panels, establishing reactor coolant makeup, and establishing decay heat removal.

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

b. Findings

No findings were identified.

.06 Circuit Analysis

a. Inspection Scope

The team reviewed the post-fire safe shutdown analysis to verify that the licensee identified the circuits that may impact the ability to achieve and maintain safe shutdown. The team verified, on a sample basis, that the licensee properly identified the cables for equipment required to achieve and maintain hot shutdown conditions in the event of a fire in the selected fire areas. The team verified that these cables were either adequately protected from the potentially adverse effects of fire damage or were analyzed to show that fire-induced circuit faults (e.g., hot shorts, open circuits, and shorts to ground) would not prevent safe shutdown.

The team's evaluation focused on the cables of selected components from the auxiliary feedwater, chemical volume and control, essential service water, main steam atmospheric vent, and main steam isolation systems. For the sample of components selected, the team reviewed electrical elementary and block diagrams and identified power, control, and instrument cables necessary to support their operation. In addition, the team reviewed cable routing information to verify that fire protection features were in

place as needed to satisfy the separation requirements specified in the fire protection license basis. Specific components reviewed by the team are listed in the attachment.

b. Findings

No findings were identified.

.07 Communications

a. Inspection Scope

The team inspected the contents of designated emergency 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. The team verified the capability of the communication systems to support the operators in the conduct and coordination of their required actions. The team also verified that the design and location of communications equipment such as repeaters and transmitters would not cause a loss of communications during a fire. The team discussed system design, testing, and maintenance with the system engineer.

b. Findings

No findings were identified.

.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 a walk down of the alternative shutdown procedure.

The team verified that the licensee installed emergency lights with an 8-hour capacity, maintained the emergency light batteries in accordance with manufacturer recommendations, and tested and performed maintenance in accordance with plant procedures and industry practices.

b. Findings

No findings were identified.

.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. Using these procedures, the team evaluated whether these components could be repaired in time to bring the plant to cold shutdown within the timeframes specified in their design and licensing bases. The team verified that the repair equipment, components, tools, and materials needed for the repairs were available and accessible on site.

b. Findings

No findings were identified.

.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.

The team reviewed operator manual actions credited for achieving hot shutdown for fires that do not require an alternative shutdown. The team verified that operators could reasonably be expected to perform the actions within the applicable shutdown time requirements. The team reviewed these operator manual actions using the guidance contained in NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," dated October 2007.

b. Findings

No findings were identified.

.11 Review and Documentation of Fire Protection Program Changes

a. Inspection Scope

The team reviewed a sample of fire protection program changes to the approved fire protection program issued since our last inspection in February 2013. The team verified that the changes did not constitute an adverse effect on the ability to safely shutdown.

b. Findings

No findings were identified.

.12 Control of Transient Combustibles and Ignition Sources

a. Inspection Scope

The team reviewed the licensee's approved fire protection program, implementing procedures, and programs for the control of ignition sources and transient combustibles. The team assessed the licensee's effectiveness in preventing fires and in controlling combustible loading within limits established in the fire hazards analysis. The team performed plant walk downs to independently verify that transient combustibles and ignition sources were being properly controlled in accordance with the administrative controls. During this inspection, the team assessed the relationship between the transient combustible controls and the point where the licensee decides to include them in their combustible loading calculations.

b. Findings

No findings were identified.

.13 Alternative Mitigation Strategy Inspection Activities

a. Inspection Scope

The team reviewed the licensee's implementation of guidance and strategies intended to maintain or restore core, containment, and spent fuel pool cooling capabilities under the circumstances associated with the potential loss of large areas of the plant due to explosions or fire as required by 10 CFR 50.54(hh)(2).

The team verified that the licensee maintained and implemented adequate procedures, maintained and tested equipment necessary to properly implement the strategies, and ensured station personnel were knowledgeable and capable of implementing the procedures. The team performed a visual inspection of equipment used to implement the mitigating strategies to ensure the availability and material readiness of the equipment. The strategies selected for this inspection sample included:

- Makeup to the condensate storage tank
- Makeup to the refueling water storage tank

Two mitigating strategy samples were completed.

b. Findings

No findings were identified.

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. The team reviewed the corrective actions proposed and implemented to verify that they were effective in correcting identified deficiencies. The team evaluated the quality of recent engineering evaluations through a review of condition reports, calculations, and other documents during the inspection.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented the inspection results to Mr. D. Mims, Senior Vice President, Regulatory Affairs and Oversight, and other members of the licensee staff at an exit meeting on January 15, 2016. The licensee acknowledged the findings presented.

The team verified that no proprietary information was retained by the team or documented in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

D. Agazzi, Team Leader, Fire Protection
G. Andrews, Director, Nuclear Regulatory Affairs
R. Beamon, Electrician
J. Boothroyd, Section Leader, Engineering, Fire Protection
G. Cameron, Section Leader, Regulatory Affairs and Oversight
D. Code, Team Leader, Fire Protection, Electrical Maintenance
D. Crane, Consulting Engineer, Fire Protection
P. Custodio, Senior Engineer, Fire Protection
D. Dallago, Engineer II, Fire Protection
R. Doyle, Senior Design Engineer
K. Foster, Department Leader, Fire Protection
C. Gallegos, Engineer III, System Engineering
D. Horton, Section Leader Fire Protection
M. Lacal, Vice President, Regulatory Affairs and Oversight
M. Laughlin, General Manager Site Support
B. Lee, Senior Technical Specialist, Fire Protection
J. Lim, Senior Compliance Engineer
N. Lossing, Section Leader, System Engineering
B. Mathieu, Senior Nuclear Auxiliary Operator
M. McGhee, Department Leader, Regulatory Affairs
D. Mims, Senior Vice President, Regulatory Affairs and Oversight
F. Oreshack, Senior Consulting Engineer, Regulatory Affairs and Oversight
W. Parra, Electrician
M. Pryor, Information Technology Field Service Technician
A. Ruiz, Engineer II, Civil Design Engineer
J. Scott, Nuclear Training Instructor, Fire Department
J. Samuels, Electrical Engineer, Fix-it Now Team
D. Sollars, Manager, Unit Operations
C. Thiele, Department Leader, Nuclear Engineering
G. Timothy, Control Room Supervisor
C. Wandell, Consulting Civil Design Engineer

NRC Personnel

C. Peabody, Senior Resident Inspector
D. Reinert, Resident Inspector
D. You, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000528, 05000529, NCV Inadequate Flow Test Procedure (Section 1R05.03-6)
05000530/2015008-01

LIST OF DOCUMENTS REVIEWED

Cable Routing Data Components

2JCHBHV203	2E-CH31-BC-	2E-ZJB-C03
2JCHEFV241	1RM	2E-CH31-BC-1RF
CHB-UV-515	2J-SBB-C02A	

Corrective Action Documents (Condition Reports)

CRAI 3061375	15-12448*	16-00351*	16-00648*
CRAI 3094475	15-12544*	16-00352*	16-00650*
CRAI 3157713	15-12546*	16-00436*	16-00661*
15-06565	15-12562*	16-00498*	16-00683*
15-09924	15-12602*	16-00512*	16-00686*
15-11779*	15-12604*	16-00513*	16-00710*
15-11792*	15-12610*	16-00514*	
15-12345*	15-12612*	16-00530*	
15-12354*	15-12613*	16-00533*	
15-12398*	15-12449*	16-00601*	
15-12405*	15-12659*	16-00607*	
15-12447*	16-00016*	16-00638*	

*Issued as a result of inspection activities

Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
AO-MC-FP-0803	B.5.b Hydraulic Analyses	1
02-MC-FP-0001	Hydraulic Analysis of Fire Protection Water System to Unit 2 Power Block	3
13-CC-ZJ-202	Qualification of Cable Tray Supports – Dwg 13-E-ZJC-040	2
13-EC-PB-0110	Protective Device Coordination: Fire Protection	12
13-EC-PB-0204	AC Equipment Protection (4.16KV and 480V): Class 1E	5
13-MC-EC-51, Sheet 5G	Essential Chilled Water System	5
13-MC-FP-0315	10CFR50 Appendix R Safe Shutdown Equipment List	13

Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
13-MC-FP-0316	10CFR50 Appendix R Manual Action Feasibility	12
13-MC-FP-0317	10CFR50 Appendix R Operational Considerations	9
13-MC-FP-0318	10CFR50 Appendix R III.G/III.L Compliance Assessment	12
13-MC-FP-0320	10 CFR 50 Appendix R Multiple Spurious Operations Analysis	0
13-MC-HJ-0003	Control Building HVAC System (HJ) Heat Load and Equipment Adequacy Calculation	9

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	Chemical and Volume Control System – Overview Drawing	
01-E-CHB-002	Elementary Diagram Chemical and Volume Control System Volume Control Tank Outlet Valve 1J-CHN-UV-501	3 and 10
01-E-HJB-006, Sheet 1	Elementary Diagram HVAC – Control Building System ESF Switchgear Room ESS AHU A and B 1M-HJA-ZO3 and 1M-HJB-ZO3	3
01-E-HJB-006, Sheet 2	Elementary Diagram HVAC – Control Building System ESF Switchgear Room ESS AHU A and B 1M-HJA-ZO3 and 1M-HJB-ZO3	3
01-E-HJB-025, Sheet 1	Elementary Diagram HVAC – Control Building System ESF Equipment Room ESS AHU Fan A 1M-HJB-ZO4	3
01-E-HJB-025, Sheet 2	Elementary Diagram HVAC – Control Building System ESF Equipment Room ESS AHU Fan B 1M-HJB-ZO4	3
01-E-HJF-06, Sheet 1	Control Wiring Diagram HVAC-Control Building System ESF Switchgear Room Essential AHU A 1M-HJA-ZO3	1
01-E-HJF-06, Sheet 2	Control Wiring Diagram HVAC-Control Building System ESF Switchgear Room Essential AHU A 1M-HJA-ZO3	1
01-E-HJF-06, Sheet 3	Control Wiring Diagram HVAC-Control Building System ESF Switchgear Room Essential AHU A 1M-HJA-ZO3	1

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
01-E-HJF-06, Sheet 4	Control Wiring Diagram HVAC-Control Building System ESF Switchgear Room Essential AHU B 1M-HJB-ZO3	1
01-E-HJF-06, Sheet 5	Control Wiring Diagram HVAC-Control Building System ESF Switchgear Room Essential AHU B 1M-HJB-ZO3	1
01-E-HJF-06, Sheet 6	Control Wiring Diagram HVAC-Control Building System ESF Switchgear Room Essential AHU B 1M-HJB-ZO3	1
01-E-HJF-025, Sheet 1	Control Wiring Diagram HVAC-Control Building System ESF Equipment Room Essential AHU Fan A 1M-HJA- ZO4	1
01-E-HJF-025, Sheet 2	Control Wiring Diagram HVAC-Control Building System ESF Equipment Room Essential AHU Fan A 1M-HJA- ZO4	1
01-E-HJF-025, Sheet 3	Control Wiring Diagram HVAC-Control Building System ESF Equipment Room Essential AHU Fan B 1M-HJB- ZO4	1
01-E-HJF-025, Sheet 4	Control Wiring Diagram HVAC-Control Building System ESF Equipment Room Essential AHU Fan B 1M-HJB- ZO4	1
01-E-HJF-025, Sheet 5	Control Wiring Diagram HVAC-Control Building System ESF Equipment Room Essential AHU Fan A 1M-HJA- ZO4	1
01-E-HJF-025, Sheet 6	Control Wiring Diagram HVAC-Control Building System ESF Equipment Room Essential AHU Fan B 1M-HJB- ZO4	1
01-E-SSB-001, Sheet 2	Elementary Diagram Nuclear Sampling System Sample Containment Isolation Valve 1J-SSB-UV-200	9
01-E-SSB-003, Sheet 2	Elementary Diagram Nuclear Sampling System Sample Containment Isolation Valve 1J-SSA-UV-203	9
01-E-ZPL-001, Sheet 1	Power Block Safe Shutdown Emergency Lighting Sheet 1	14
01-E-ZPL-001, Sheet 2	Power Block Safe Shutdown Emergency Lighting Sheet 1	14
01-M-AFP-001	Piping and Instrumentation Diagram – Auxiliary Feedwater System	37

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
01-M-CHP-001	Piping and Instrumentation Diagram – Chemical and Volume Control System	28
01-M-CHP-002, Sheet 1	Piping and Instrumentation Diagram – Chemical and Volume Control System	47
01-M-EWP-001	Piping and Instrumentation Diagram – Essential Cooling Water System	31
01-M-SIP-001	Piping and Instrumentation Diagram – Safety Injection & Shutdown Cooling System	49
01-M-SIP-002	Piping and Instrumentation Diagram – Safety Injection & Shutdown Cooling System	37
A0-M-FPP-001	Piping and Instrumentation Diagram – Fire Protection System	38
A0-M-FPP-005	Piping and Instrumentation Diagram – Fire Protection System	43
01-J-CHE-0A8	Instrument Loop Wiring Diagram Chemical & Volume Control System	2
01-M-FPP-002	Piping and Instrumentation Diagram – Fire Protection System	17
01-M-FPP-003	Piping and Instrumentation Diagram – Fire Protection System	21
01-M-FPP-006	Piping and Instrumentation Diagram – Fire Protection System	16
02-C-ZVC-324	Underground Utilities Unit 2 Power Block Area 5	15
02-E-AFB-001	Elementary Diagram Auxiliary Feedwater System Auxiliary Feedwater Pump 2M-AFB-P01 & Thermocouples	3
02-E-CHB-002	Elementary Diagram Chemical and Volume Control System Volume Control Tank Outlet Valve 2J-CHN-UV-501	7
02-E-CHB-039, Sheet 2	Elementary Diagram Chemical and Volume Control System Regenerative Heat Exchanger To Aux Spray Valve 2J-CHB-HV-203	12

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-E-CHB-048	Elementary Diagram Chemical and Volume Control System Seal Inject Valves to Reactor Coolant Pumps 2J-CHE-FV-241	5
02-E-CHB-072	Elementary Diagram Chemical & Volume Control System RWT Gravity Feed Line To Charging Pump Suction 2J-CHE-HV-536	6
02-E-ECB-001, Sheet 1	Elementary Diagram Essential Chilled Water System Essential Chiller 2M-ECA-EO1	12
02-E-ECB-001, Sheet 2	Elementary Diagram Essential Chilled Water System Essential Chiller 2M-ECB-EO1	12
02-E-ECF-001, Sheet 1	Control Wiring Diagram Essential Chilled Water System Essential Chiller 2M-ECA-EO1	3
02-E-ECF-001, Sheet 2	Control Wiring Diagram Essential Chilled Water System Essential Chiller 2M-ECA-EO1	3
02-E-ECF-001, Sheet 3	Control Wiring Diagram Essential Chilled Water System Essential Chiller 2M-ECA-EO1	3
02-E-ECF-001, Sheet 4	Control Wiring Diagram Essential Chilled Water System Essential Chiller 2M-ECA-EO1	3
02-E-ECF-001, Sheet 5	Control Wiring Diagram Essential Chilled Water System Essential Chiller 2M-ECB-EO1	3
02-E-ECF-001, Sheet 6	Control Wiring Diagram Essential Chilled Water System Essential Chiller 2M-ECB-EO1	3
02-E-ECF-001, Sheet 7	Control Wiring Diagram Essential Chilled Water System Essential Chiller 2M-ECB-EO1	3
02-E-ECF-001, Sheet 8	Control Wiring Diagram Essential Chilled Water System Essential Chiller 2M-ECB-EO1	3
02-E-EWB-001, Sheet 2	Elementary Diagram Essential Cooling Water System Essential Cooling Water Pump B 2M-EWB-PO1	4
02-E-EWF-001, Sheet 1	Control Wiring Diagram Essential Cooling Water System Essential Cooling Water Pump A 2M-EWA-PO1	2

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-E-EWF-001, Sheet 2	Control Wiring Diagram Essential Cooling Water System Essential Cooling Water Pump A 2M-EWA-PO1	2
02-E-EWF-001, Sheet 3	Control Wiring Diagram Essential Cooling Water System Essential Cooling Water Pump B 2M-EWB-PO1	2
02-E-EWF-001, Sheet 4	Control Wiring Diagram Essential Cooling Water System Essential Cooling Water Pump B 2M-EWB-PO1	2
02-E-HDB-001, Sheet 1	Elementary Diagram HVAC – Diesel Generator Building System Diesel Generator Room Essential Exhaust Fans 2M-HDA-J01 and 2M-HDB-J01	6
02-E-HDB-001, Sheet 2	Elementary Diagram HVAC – Diesel Generator Building System Diesel Generator Room Essential Exhaust Fans 2M-HDA-J01 and 2M-HDB-J01	5, 6, and 8
02-E-HDF-001, Sheet 4	Control Wiring Diagram HVAC – Diesel Generator Building System Diesel Generator Room Essential Exhaust Fan 2M-HDB-J01	4
02-E-HJB-006, Sheet 2	Elementary Diagram HVAC – Control Building System ESF Switchgear Room ESS AHU A and B 2M-HJA-ZO3 and 2M-HJB-ZO3	2
02-E-HJB-023, Sheet 1	Elementary Diagram HVAC – Control Building System Control Building Battery Rooms Essential Exhaust Fans 2M-HJA-J01A, JO1B and 2M-HJB-J01A, JO1B	4
02-E-HJB-023, Sheet 2	Elementary Diagram HVAC-Control Building System Control Building Battery Rooms Essential Exhaust Fans 2M-HJA-J01A, and 2M-HJB-J01A,JO1B	4
02-M-HJP-002	Control Building HVAC Process and Instrumentation Diagram	16
02-E-MAA-002	Unit Single Line Diagram	4
02-E-NCF-001, Sheet 2	Control Wiring Diagram Nuclear Cooling Water System Nuclear Cooling Water Pump A 2M-NCN-P01A	2
02-E-NCF-001, Sheet 3	Control Wiring Diagram Nuclear Cooling Water System Nuclear Water Pump B 2M-NCN-P01B	2

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-E-PBB-002, Sheet 1	Elementary Diagram 4.16KV Class 1E Power System Switchgears 2E-PBA-SO3 and 2E-PBB-SO4 4.16KV Alternate Supply Breakers	9
02-E-PBB-002, Sheet 2	Elementary Diagram 4.16KV Class 1E Power System Switchgears 2E-PBA-SO3 and 2E-PBB-SO4 4.16KV Alternate Supply Breakers	9
02-E-PBB-006,	Elementary Diagram 4.16KV Class 1E and Non-1E Power System ACB Internal Mechanism and Switchgear Space Heaters and Blower Circuits	1
02-E-PBF-001, Sheet 1	Control Wiring Diagram 4.16kv Class 1E Power System Switchgear 2E-PBA-SO3 4.16KV Alternate Supply Breaker	5
02-E-PBF-001, Sheet 2	Control Wiring Diagram 4.16kv Class 1E Power System Switchgear 2E-PBA-SO3 4.16KV Alternate Supply Breaker	5
02-E-PBF-001, Sheet 3	Control Wiring Diagram 4.16kv Class 1E Power System Switchgear 2E-PBA-SO3 4.16KV Alternate Supply Breaker	5
02-E-PBF-001, Sheet 4	Control Wiring Diagram 4.16kv Class 1E Power System Switchgear 2E-PBA-SO3 4.16KV Alternate Supply Breaker	5
02-E-PBF-001, Sheet 5	Control Wiring Diagram 4.16kv Class 1E Power System Switchgear 2E-PBA-SO3 4.16KV Alternate Supply Breaker	5
02-E-PBF-002, Sheet 6	Control Wiring Diagram 4.16kv Class 1E Power System Switchgear 2E-PBB-SO4 4.16KV Alternate Supply Breaker	5
02-E-PBF-002, Sheet 7	Control Wiring Diagram 4.16kv Class 1E Power System Switchgear 2E-PBB-SO4 4.16KV Alternate Supply Breaker	5
02-E-PBF-002, Sheet 8	Control Wiring Diagram 4.16KV Class 1E Power System Switchgear 2E-PBB-SO4 4.16KV Alternate Supply Breaker	5

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-E-PBF-002, Sheet 9	Control Wiring Diagram 4.16KV Class 1E Power System Switchgear 2E-PBB-SO4 4.16KV Alternate Supply Breaker	5
02-E-PBF-002, Sheet 10	Control Wiring Diagram 4.16KV Class 1E Power System Switchgear 2E-PBB-SO4 4.16KV Alternate Supply Breaker	5
02-E-PEB-001, Sheet 1	Elementary Diagram Stand-By Generation System Diesel Generator 2E-PEA-GO1 4.16KV Supply Breaker	13
02-E-PEB-001, Sheet 2	Elementary Diagram Stand-By Generation System Diesel Generator 2E-PEB-GO2 4.16KV Supply Breaker	13
02-E-PGB-003, Sheet 1	Elementary Diagram 480V Class 1E Power System Load Center 2E-PGA-L35 4.16KV Supply Breaker	5
02-E-PGB-003, Sheet 2	Elementary Diagram 480V Class 1E Power System Load Center 2E-PGA-L35 4.16KV Supply Breaker	5
02-E-PEF-001, Sheet 1	Control Wiring Diagram Stand-By Generation System Diesel Generator 2E-PEA-GO1 4.16KV Supply Breaker	6
02-E-PEF-001, Sheet 3	Control Wiring Diagram Stand-By Generation System Diesel Generator 2E-PEB-GO2 4.16KV Supply Breaker	6
02-E-PEF-001, Sheet 4	Control Wiring Diagram Stand-By Generation System Diesel Generator 2E-PEB-GO2 4.16KV Supply Breaker	6
02-E-PGB-003, Sheet 1	Elementary Diagram 480V Class 1E Power System Load Center 2E-PGA-L35 4.16KV Supply Breaker	5
02-E-PGB-003, Sheet 2	Elementary Diagram 480V Class 1E Power System Load Center 2E-PGB-L36 4.16KV Supply Breaker	5
02-E-PGF-003, Sheet 3	Control Wiring Diagram 480V Class 1E Power System Load Center 2E-PGB-L36 4.16KV Supply Breaker	1
02-E-PHA-006	Single Line Diagram 480V Class 1E Power System Motor Control Center 2E-PHB-M36	20
02-E-PHA-007	Single Line Diagram 480V Class 1E Power System Motor Control Center 2E-PHA-M37	13
02-E-PHA-008	Single Line Diagram 480V Class 1E Power System Motor Control Center 2E-PHB-M38	13

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-E-PKA-001	Main Single Line Diagram 125V DC Class 1E and 120V AC Vital Instrument Power System	6
02-E-PKA-002	Single Line Diagram 125V DC Class 1E Power System DC Control Center 2E-PKA-M41	18
02-E-PKA-003	Single Line Diagram 125V DC Class 1E Power System DC Control Center 2E-PKA-D21	8
02-E-PKA-004	Single Line Diagram 125V DC Class 1E Power System DC Control Center 2E-PKC-M43 and 2E-PKC-D23	11
02-E-PKA-005	Single Line Diagram 125V DC Class 1E Power System DC Control Center 2E-PKB-M42	9
02-E-PKA-006	Single Line Diagram 125V DC Class 1E Power System DC Control Center 2E-PKB-D22	9
02-E-PKA-007	Single Line Diagram 125V DC Class 1E Power System DC Control Center 2E-PKD-M44 and 2E-PKD-D24	12
02-E-PNA-001	Single Line Diagram 125V AC Class 1E Power System Ungrounded Vital Instrument and Control Distribution Panels 2E-PNA-D25 and 2E-PNC-D27	18
02-E-PNA-002	Single Line Diagram 125V AC Class 1E Power System Ungrounded Vital Instrument and Control Distribution Panels 2E-PNB-D26 and 2E-PND-D28	16
02-E-SGB-020	Elementary Diagram Main Steam System Steam Generator No. 2 Line 1 Atmospheric Dump Valve 2J-SGB-HV-185	9
02-E-SGB-022	Elementary Diagram Main Steam System Steam Generator No. 1 Line 2 Atmospheric Dump Valve 2J-SGB-HV-178	7
02-E-SIB-002, Sheet 1	Elementary Diagram Safety Injection and Shutdown Cooling System Low Pressure Safety Injection Pump 2M-SIA-PO1	5
02-E-SIB-002, Sheet 2	Elementary Diagram Safety Injection and Shutdown Cooling System Low Pressure Safety Injection Pump 2M-SIB-PO1	5

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-E-SGF-020, Sheet 1	Control Wiring Diagram Main Steam System Steam Generator No. 2 Line 1 Atmospheric Dump Valve 2J-SGB-HV-185	2
02-E-SGF-020, Sheet 2	Control Wiring Diagram Main Steam System Steam Generator No. 2 Line 1 Atmospheric Dump Valve 2J-SGB-HV-185	2
02-E-SGF-020, Sheet 3	Control Wiring Diagram Main Steam System Steam Generator No. 2 Line 1 Atmospheric Dump Valve 2J-SGB-HV-185	2
02-E-SGF-022, Sheet 1	Control Wiring Diagram Main Steam System Steam Generator No. 1 Line 2 Atmospheric Dump Valve 2J-SGB-HV-178	1
02-E-SGF-022, Sheet 2	Control Wiring Diagram Main Steam System Steam Generator No. 1 Line 2 Atmospheric Dump Valve 2J-SGB-HV-178	1
02-E-SGF-022, Sheet 3	Control Wiring Diagram Main Steam System Steam Generator No. 1 Line 2 Atmospheric Dump Valve 2J-SGB-HV-178	1
02-E-SPB-001, Sheet 2	Elementary Diagram Essential Spray Pond System Essential Spray Pond Pump B 2M-SPB-P01	8
02-E-SSB-001, Sheet 2	Elementary Diagram Nuclear Sampling System Sample Containment Isolation Valve 2J-SSB-UV-200	6 and 7
02-E-SSF-003, Sheet 2	Control Wiring Diagram Nuclear Sampling System Sample Containment Isolation Valve 2J-SSA-UV-203	2
02-E-ZPL-001, Sheet 1	Power Block Safe Shutdown Emergency Lighting Sheet	15
02-E-ZPL-001, Sheet 2	Power Block Safe Shutdown Emergency Lighting Sheet 2	15 and 17
02-E-ZPL-003, Sheet 1	Power Block Safe Shutdown Emergency Lighting Sheet 3	9
02-E-ZPL-003, Sheet 3	Power Block Safe Shutdown Emergency Lighting Sheet 3	9
02-E-ZPL-004, Sheet 4	Power Block Safe Shutdown Emergency Lighting Sheet 4	16

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-J-CHE-0A8	Instrument Loop Wiring Diagram Chemical and Volume Control System	1
02-J-CHL-031	Control Logic Diagram Chemical & Volume Control Sys. RWT Gravity FD to CHRG Pumps Suct Vlv.	3
02-J-QFJ-005	Plant Two-Way Radio System Unit 2 – R.F. Distribution System Cable and Antenna Scheme Diagram	1
02-J-QFJ-009	Plant Two-Way Radio System Containment Antenna System Cable Installation and Termination Details	2
02-J-QFJ-010, Sheet 1	Plant Two-Way Radio System Unit 2 – Control Building Elevation 120'-0", Level 2 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 2	Plant Two-Way Radio System Unit 2 – Control Building Elevation 100'-0", Level 1 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 3	Plant Two-Way Radio System Unit 2 – Control Building Elevation 74'-0", Level A R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 4	Plant Two-Way Radio System Unit 2 – Radwaste Building Elevation 100'-0", Level 1 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 5	Plant Two-Way Radio System Unit 2 – Radwaste Building Elevation 120'-0", Level 2 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 6	Plant Two-Way Radio System Unit 2 – Auxiliary Building Elevation 140'-0", Level 3 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 7	Plant Two-Way Radio System Unit 2 – Auxiliary Building Elevation 120'-0", Level 2 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-J-QFJ-010, Sheet 8	Plant Two-Way Radio System Unit 2 – Auxiliary Building Elevation 100'-0", Level 1 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 9	Plant Two-Way Radio System Unit 2 – Auxiliary Building Elevation 88'-0", Level A R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 10	Plant Two-Way Radio System Unit 2 – Auxiliary Building Elevation 70'-0", Level B R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 11	Plant Two-Way Radio System Unit 2 – Auxiliary Building Elevation 51'-6", Level C R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 12	Plant Two-Way Radio System Unit 2 – Auxiliary Building Elevation 40'-0", Level D R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 13	Plant Two-Way Radio System Unit 2 – Condensate Storage Tunnel Elevation 86'-5", Level D R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 14	Plant Two-Way Radio System Unit 2 – Control Building Elevation 160'-0", Level 4 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 15	Plant Two-Way Radio System Unit 2 – Control Building Elevation 140'-0", Level 3 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 16	Plant Two-Way Radio System Unit 2 – Fuel Building Elevation 120'-0", Level 2 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 17	Plant Two-Way Radio System Unit 2 – Fuel Building Elevation 140'-0", Level 3 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-J-QFJ-010, Sheet 18	Plant Two-Way Radio System Unit 2 – Diesel Generator Building Elevation 131'-0", Level 2 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 19	Plant Two-Way Radio System Unit 2 – R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 20	Plant Two-Way Radio System Unit 2 - Radwaste Building Elevation 140'-0", Level 1 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-J-QFJ-010, Sheet 21	Plant Two-Way Radio System Unit 2 – MSSS Building Elevation 100'-0", Level 1 R.F. Distribution System Equipment Locations, Sections, and Installation Details	1
02-M-FPP-002	Piping and Instrumentation Diagram – Fire Protection System	15
02-M-FPP-003	Piping and Instrumentation Diagram – Fire Protection System	17
02-M-FPP-004	Piping and Instrumentation Diagram – Fire Protection System (CO ₂ System)	8
02-M-FPP-006	Piping and Instrumentation Diagram – Fire Protection System	14
02-M-HJP-002	Control Building HVAC Process and Instrumentation Diagram	16
02-P-FPF-201, Sheet 1	Auxiliary Building Isometric – Fire Protection System Levels A, B, C & D	3
02-P-FPF-201, Sheet 4	Auxiliary Building Isometric – Fire Protection System Levels A, B, C & D	3
02-P-FPF-301, Sheet 1	Control Building Isometric – Fire Protection System Levels A, 1 & 2	2
02-P-FPF-301, Sheet 2	Control Building Isometric – Fire Protection System Levels A, 1 & 2	2
02-P-FPF-302, Sheet 2	Control Building Isometric – Fire Protection System Levels 3 & 4	1

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
02-P-ZYA-925	Essential Pipe Tunnel Piping Plan	0
03-E-SSB-001, Sheet 1	Elementary Diagram Nuclear Sampling System Sample Containment ISO Valve 3J-SSB-UV-201	7
03-E-SSB-001, Sheet 2	Elementary Diagram Nuclear Sampling System Sample Containment ISO Valves 3J-SSB-UV-200 and 3J-SSB-UV-201	7
03-E-SSF-001, Sheet 1	Control Wiring Diagram Nuclear Sampling System Sample Containment ISO Valves 3J-SSB-UV-201	2
03-E-SSF-001, Sheet 2	Control Wiring Diagram Nuclear Sampling System Sample Containment ISO Valves 3J-SSB-UV-200	2
03-M-FPP-002	Piping and Instrumentation Diagram – Fire Protection System	13
03-M-FPP-003	Piping and Instrumentation Diagram – Fire Protection System	16
03-M-FPP-006	Piping and Instrumentation Diagram – Fire Protection System	16
13-C-ZVA-011	Fire Protection System General Arrangement	30
13-E-SSB-001, Sheet 2	Elementary Diagram Nuclear Sampling System Sample Containment ISO Valves J-SSB-UV-200	5 and 6
13-E-ZJC-006	Control Building Conduit & Tray Plan at EL. 120 ft ZJ2A – Lower Cable Spreading Room Level 2A	43
13-E-ZJC-013	Control Building Conduit & Tray Plan at EL. 160 ft ZJ4B – Upper Cable Spreading Room Level 4B	15
13-E-ZZS-002, Sheet 1	Terminal Box Details Class 1E	14
13-E-ZZS-002, Sheet 2	Terminal Box Details Class 1E	14
13-M-650-422	Control Building Upper Cable Spreading Room 160' Level – Risers and Sections	12
13-M-650-423	Control Building Upper Cable Spreading Room 160' Level – West Half Detectors	3

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
13-M-650-424	Control Building Upper Cable Spreading Room 160' Level – East Half Detectors	4
13-M-650-450	Auxiliary Building 120' Level – Corridor Zone 52D Sprinklers	13
13-M-650-451	Auxiliary Building 120' Level – Corridor Zone 52D Detectors	7
13-M-650-860	Control Building Lower Cable Spreading Room 120' Level East Half – Sprinklers	5
13-M-650-861	Control Building Lower Cable Spreading Room 120' Level West Half – Sprinklers	7
13-M-650-862	Control Building Lower Cable Spreading Room 120' Level East Half – Detectors	3
13-M-650-863	Control Building Lower Cable Spreading Room 120' Level West Half – Detectors	4
13-M-650-864	Control Building Lower Cable Spreading Room 120' Level – Risers and Sections	8
13-P-FPG-300	Halon-1301 Fire Protection System for Remote Shutdown Rooms Train A and Train B @ 100' Elev – Control Building	3
A-774-8	Palo Verde 500kv Switchyard One Line Diagram Ultimate IN-6W	6
ELE342-0207 Sht. 2	System Interconnect Diagram Load Sequencer/Tester Train B	5
E015-00005	15kV, 3000A, 3P, 3W Tube Type Total Enclosed Bus Duct Cross Section	6
FL-30198-6, Sheet 5L	Low Pressure CO ₂ Fire Extinguishing System Schematic Arrangement	B
M652-00059	Low Pressure CO ₂ Fire Extinguishing System Schematic Arrangement – Detectors Wiring Diagram	13

Letters

<u>Number</u>	<u>Title</u>	<u>Date</u>
101-02493-WFC/JNI	New and Revised Deviations	April 29, 1993
ANPP-30654	Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3	September 26, 1984
ANPP-31101	Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3	November 13, 1984
EA-02-026	Palo Verde Nuclear Generating Station, Units 1, 2, and 3 – Conforming License Amendments to Incorporate the Mitigation Strategies required by Section B.5.b of Order EA-02-026	

Licensing Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
	Safety Evaluation by NRR related to Order No. EA-02-026, Arizona Public Service Company, Palo Verde Nuclear Generating Station, Units 1,2, and 3	August 7, 2007
NUREG-0857	Safety Evaluation Report related to the operation of Palo Verde Nuclear Generating Station, Units 1, 2, and 3	November 1981
NUREG-0857 Supplement No 5	Safety Evaluation Report related to the operation of Palo Verde Nuclear Generating Station, Units 1, 2, and 3	November 1983
NUREG-0857 Supplement No 6	Safety Evaluation Report related to the operation of Palo Verde Nuclear Generating Station, Units 1, 2, and 3	October 1984
NUREG-0857 Supplement No 7	Safety Evaluation Report related to the operation of Palo Verde Nuclear Generating Station, Units 1, 2, and 3	December 1984

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	Annual Training 2014 Attendance	
	Annual Training 2015 Attendance	
	B.5.b Attendance sheets 2013 and 2014	
	Combustible loading calculation results for the fuel handling building	
	Fire Fighter Pre-Employment Experience Information Sheet	
	Combustible loading calculation for long term temporary shielding locations	
	Fire Protection Database Detailed Report	May 19, 1998
	Lead blanket information sheet	
	National Fire Protection Handbook 14 th Edition, Chapter 5, Section 11, Test of Water Supplies	
	Pre-fire strategies for the selected fire areas	
	Radiation shielding material storage container locations and weight	
	Selected Multiple Spurious Operations Notes	
	Temporary radiation shielding package locations in all three units during inspection period	
	Test Report 177: 004641-06	May 9, 2007
	Tungsten infused silicon-based shielding material fact sheet	
	Unit 2 PVNGS Fire Department Severe Accident Mitigation Guidelines Drill "C" Shift	December 8, 2012
	Unit 2 PVNGS Fire Department Severe Accident Mitigation Guidelines Drill, "Training" Shift Summary Report	March 5, 2013
805100	Material Safety Data Sheet for Bruin Vinyl Laminated Fabric	

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
102-06008 TNW/KAR	Palo Verde Nuclear Generating Station Units 1, 2, and 3 and Independent Spent Fuel Storage Installation Twenty-Four Month 10 CFR 50.59, 10 CFR 72.48 and Commitment Change Reports (January 2007-December 2008)	
13-01537-001	Potential Applicability of Unfused DC Ammeter Remote Indication	
13-CN-0211	Design Input Requirements Checklist for temporary radiation shielding	20
13-EC-PB-0110	Protective Device Coordination: Fire Protection Figure 2A	12
13-EC-PB-0110	Protective Device Coordination: Fire Protection Figure 2B	12
13-EC-PB-0204	Figure 10 Overcurrent Protection/Coordination for IFC Relays in Switchgear 1EPBBS04S for AFW Pump Motor MAFBP01	5
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials	2005
Chapter 9.5.1	Updated Final Safety Analysis Report – Fire Protection	
MEE 04480	Component Substitution Evaluation of Ionization Type Smoke Detector Model 1451/B402B by Model CPD-7054D/2-Wire	0
M598-2024-5	Ruskin – 3 hour Fire Damper Installation Instruction	February 11, 1986
NEI 02-03	Guidance for Performing a Regulatory Review of Proposed Changes to the Approved Fire Protection Program	June 17, 2003
NFPA 701	Standard Methods of Fire Tests for Flame Propagation of Textiles and Films	2015 Edition
NPL36-01.001C	Unit 3 PVNGS Fire Department Un-Announced Fire Drill “C” Shift	January 12, 2016
NPL55	Passed Training History by Individual or Unit	

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
NPF55C000102	Course NPF 5502 – B.5.b Strategies for the Fire Department, Initial	February 24, 2010
NPL55C000101	Course NPF 5501 – B.5.b Strategies for the Fire Department	February 24, 2010
PV-EO123, Ver. 14	Palo Verde Design Inputs Requirements Checklist (design modifications per NEI 06-12, Revision 2, B.5.b Mitigation Strategies)	January 11, 2007
Regulatory Guide 1.36	Nonmetallic Thermal Insulation for Austenitic Stainless Steel	1
	SGS US Testing Company Report 177: 004641-06	April 27, 2007
S-12-0130	10CFR50.59 Screening/Evaluation for temporary radiation shielding	0
SMEE 04063	Simplified Material Equivalency Evaluation for AJFPNE72**INSTRU	September 8, 2009
T3.11	Fire Protection Section of the Technical Requirements Manual	62
TexTest Report 1249065	Silflex Shielding	February 14, 2012

Modifications

<u>Number</u>	<u>Title</u>	<u>Revision</u>
DCR ZA-1529	Enhance AS valve ASN-V24 and ASN-V88 accessibility	0
DMWO 4123934	RCP Control Cables (MSO)	0
DMWO 4579596	DC Motor Control Cable Fuse Protection, Appendix R Issue	0
DWO 4373928	Re-Wire Control circuit for Prober Isolation and control, Appendix R Issue	1
EDC 2011-00255	Add Long Term Shielding Packages to Combustible Loading Calculation	0

Modifications

<u>Number</u>	<u>Title</u>	<u>Revision</u>
RC-1628	Rewire Control Circuits for Proper Isolation – Appendix R Issue	1

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40AO-9ZZ19	Control Room Fire	31
14DP-0FP20	Fire Department Repetitive Task Program	20
14DP-0FP01	Firewatch	12
14DP-0FP02	Fire System Impairments and Notifications	20
14DP-0FP09	Conduct of Fire Shift Operations	28
14DP-0FP09-02	Radio Use Administrative Guideline	0
14DP-0FP09-03	Emergency Response and Incident Investigation Administrative Guideline	0
14DP-0FP09-04	Fire Fighting Operations in the Start-Up and SRP Switchyards Administrative Guideline	0
14DP-0FP09-06	Equipment Out-Of-Service Tagging Administrative Guideline	0
14DP-0FP11	Emergency Medical Response	14
14DP-0FP20	Fire Department Repetitive Task Program	20
14DP-0FP23	Smoke Removal – Plant Stairwells	4
14DP-0FP32	Emergency Notification and Response	35
14DP-0FP33	Control of Transient Combustibles	26
14DP-0FP36	Hot Work Permit	20
14DP-0FP37	PVNGS Fire Department Incident Command System	11
14DP-0FP38	Fire Protection Test Program	13

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<u>Number</u>	<u>Title</u>	<u>Revision</u>
14DP-0FP43	Fire Protection Program Responsibilities, Authorities, and Management Expectations	0
14DP-0FP44	Fire Protection Test Program Requirement	2
14DP-0TR01	Fire Department Training Program Description	20
14FT-0FP04	Annual Fire Water Loop Test	0 and 21
14FT-9FP06	Fire Equipment Locker and Emergency Equipment Cabinet Inspection	23
14FT-9FP07	CO2 Suppression System Storage Tank Level and Pressure	6
14FT-9FP72	Quarterly Fire Department SAMG Equipment Inspection	9
14MT-9BD99	FLEX Equipment Storage Monthly Walk Down	6
30DP-0WM12	Housekeeping	21
32FT-9QD01	Exide Emergency Lighting System 8 Hour Fire Protection Service Test for QDN-F01	15
32FT-9QD02	Exide Emergency Lighting System 8 Hour Fire Protection Service Test for QDN-F02	14
32FT-9QD03	Annual Fire Protection Test for 1,2, 3E-QDN-N03	12
32FT-9QD04	Annual Fire Protection Test for 1,2, 3E-QDN-N04	14
32FT-9QD05	Holophane Emergency Lighting System 8 Hour Verification Testing for 1,2, 3EQDNN05	2
32FT-9QD05	Annual Fire Protection Test for 1,2, 3E-QDN-N05	14
32FT-9QD06	Holophane Emergency Lighting System 8 Hour Verification Testing for 1,2, 3EQDNN06	2
32FT-9QD07	Annual Fire Protection Test for 1,2, 3E-QDN-N07	11
32FT-9QD08	Annual Fire Protection Test for 1,2, 3E-QDN-N08	12
32FT-9QD20	Appendix R Emergency Lighting Fixture Battery Discharge Test (Wall Mounted Types KE, KF, and KG)	12

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<u>Number</u>	<u>Title</u>	<u>Revision</u>
32FT-9QF01	PVNGS Two-Way Radio System, UPS Battery Test	3
38FT-9FP02	Fire Protection System Monthly Diesel Fire Pump Battery Test	13
40DP-9ZZ04	Time Critical Action (TCA) Program	12
40DP-9ZZ19	Operational Considerations Due to Plant Fire	29
40EP-9EO10	Standard Appendices	91
40ST-9ZZ20	Remote Shutdown Disconnect Switch and Control Circuit Operability – Modes 3, 4, 5, 6 or Defueled	28
40ST-9ZZ25	Remote Shutdown Disconnect Switch and Control Circuit Operability – All Modes	9
79IS-9ZZ05	Appendix 12 – Makeup to RWT	16 and 17
73ST-9AF04	Auxiliary Feedwater Pump A – Comprehensive Pump Test	21
PR-0904	Fire Protection	0
WRLA-8ZZ08	WRF Process Operating Parameters	30
WROP-8FP01	Fire Protection Chemical Treatment System Operating Procedure	7

Specifications

<u>Number</u>	<u>Title</u>	<u>Revision</u>
13-AC-ZZ-0200	Penetration Seal Qualifications	13
13-CN-0211	Installation Specification for Radiation Shielding Packages	21
13-CN-380	Installation Specification for Seismic Category IX and Non-Seismic Scaffolding	23

Vendor Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
13-VTD-M455-0257	Motorola Incorporated DGT 9000 Local Extended Digital Deskset Radio Service Software Instruction Manual (Publication Number 68P80310B59-A)	0
13-VTD-E155-001	Electroswitch Corporation General Specifications for Rotary Switches and Auxiliary Relays for Utility Applications (Pub. # ESC-STD-1000)	September 30, 1992
13-VTD-E155-005	Electroswitch Corporation Instrument and Control Switches for Power Industry and Heavy Industrial Applications (Pub. # 24-1)	November 25, 1992
13-VTD-E155-004	Electroswitch Corporation Series 24 Instrument and Control Switches	July 31, 1992

Work Orders

4373928	4443443	4496358	4568748
4399425	4443961	4526237	4569342
4422102	4448121	4530718	4579596
4422103	4451911	4540363	4727253
4422296	4491205	4541012	
4443199	4491218	4553109	
4443442	4491219	4558267	