



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

November 10, 2016

Robert Bement
Executive Vice President, Nuclear/CNO
Mail Station 7602
Arizona Public Service Company
P.O. Box 52034
Phoenix, AZ 85072-2034

**SUBJECT: PALO VERDE NUCLEAR GENERATING STATION – NRC INTEGRATED
INSPECTION REPORT 05000528/2016003, 05000529/2016003, AND
05000530/2016003, AND INDEPENDENT SPENT FUEL STORAGE
INSTALLATION (ISFSI) INSPECTION REPORT 07200044/2016001**

Dear Mr. Bement:

On September 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Palo Verde Nuclear Generating Station Units 1, 2, and 3. On October 11, 2016, the NRC inspectors discussed the results of this inspection with Ms. M. Lacal 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. The finding involved a violation of NRC requirements. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, 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.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV; and the NRC resident inspector at the Palo Verde Nuclear Generating Station.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 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

R. Bement

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Sincerely,

/RA/

Geoffrey B. Miller, Branch Chief
Project Branch D
Division of Reactor Projects

Docket Nos. 05000528, 529, 530, 07200044
License Nos. NPF 41, NPF 51, NPF 74

Enclosure:

Inspection Report 05000528/2016003,
05000529/2016003, and 05000530/2016003,
and 07200044/2016001
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Project Branch D
Division of Reactor Projects

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Letter to Robert Bement from Geoffrey Miller dated November 10, 2016

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION – NRC INTEGRATED
INSPECTION REPORT 05000528/2016003, 05000529/2016003, AND
05000530/2016003, AND INDEPENDENT SPENT FUEL STORAGE
INSTALLATION (ISFSI) INSPECTION REPORT 07200044/2016001

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 05000528, 05000529, 05000530, 07200044

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

Report: 05000528/2016003, 05000529/2016003, 05000530/2016003, and
07200044/2016001

Licensee: Arizona Public Service Company

Facility: Palo Verde Nuclear Generating Station

Location: 5801 South Wintersburg Road
Tonopah, AZ 85354

Dates: July 1 through September 30, 2016

Inspectors: C. Peabody, Senior Resident Inspector
D. Reinert, PhD, Resident Inspector
D. You, Resident Inspector
L. Brookhart, Senior ISFSI Inspector
G. Guerra, Emergency Preparedness Inspector
J. Reynoso, Resident Inspector

Approved By: Geoffrey B. Miller
Chief, Project Branch D
Division of Reactor Projects

SUMMARY

IR 05000528, 529, 530/2016003, 07200044/2016001; 07/01/20106 – 09/30/2016; PALO VERDE NUCLEAR GENERATING STATION INTEGRATED INSPECTION REPORT; PLANT MODIFICATIONS.

The inspection activities described in this report were performed between July 1 and September 30, 2016, by the resident inspectors at Palo Verde and inspectors from the NRC's Region IV office and other NRC offices. One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red), which is determined using Inspection Manual Chapter 0609, "Significance Determination Process." Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas." Violations of NRC requirements are dispositioned in accordance with the NRC Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

Cornerstone: Initiating Events

- Green. The inspectors identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," because the licensee failed to accomplish activities affecting quality in accordance with documented procedures. Specifically, the inspectors identified multiple examples of design changes performed under the Advanced Work Authorization process which were placed into service prior to the completion of the associated engineering work orders. As an immediate corrective action, the licensee instituted a requirement for the design engineering director to approve all Advance Work Authorizations to ensure the in service point is clearly identified and understood. The licensee entered this issue into the corrective action program as Condition Report 16-09965.

The failure to establish adequate constraints to ensure that final engineering approval of advance work is completed prior to placing modified systems in service was a performance deficiency. This performance deficiency was more than minor, and therefore a finding, because if left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern. Specifically, routinely failing to implement the requirements of the engineering design change advance work authorization process could result in equipment being placed in service without an approved design configuration. In accordance with Inspection Manual Chapter 0609, Significance Determination Process, Attachment 4, "Initial Characterization of Findings," dated June 19, 2012, Table 2, reactor coolant system boundary issues are considered under the Initiating Event Cornerstone. Using Table 3, the inspectors determined the finding pertained to an event or degraded condition while the plant was shutdown and, therefore, used Inspection Manual Chapter 0609, Appendix G "Shutdown Operations Significance Determination Process," dated May 9, 2014, for significance determination. The inspectors reviewed Appendix G, Attachment 1, Exhibit 2, "Initiating Events Screening Questions." The inspectors answered "No" to Question A.1, and found all other questions to be not applicable and therefore concluded that the finding was of very low safety significance (Green). The inspectors determined that this finding had

a human performance crosscutting aspect associated with work management, because the licensee did not coordinate with all affected work groups so that operations personnel understood the constraints prior to placing the modified system back in service [H.5].
(Section 1R18)

PLANT STATUS

Unit 1 entered the inspection period at full power. From July 29-30, 2016, operators reduced power to 12 percent rated thermal power and took the generator offline for planned switchyard equipment repairs. On September 7, 2016, a faulted instrument power bus caused the main pressurizer spray valve to fail open, resulting in a loss of pressurizer pressure control and reactor depressurization. The condition required reactor operators to trip the reactor and secure the reactor coolant pumps in order to regain pressure control. Unit 1 entered a forced outage to repair the pressurizer spray valve as well as the voltage regulator on the instrument power bus. Unit 1 was restarted on September 12, 2016, and returned to full power for the remainder of the inspection period.

Unit 2 operated at full power for the entire inspection period.

Unit 3 entered the inspection period at full power. On September 19, 2016, a protective system hardware failure on the control rod motor generator set sent a false positive trip signal to the reactor power cutback system, resulting in a turbine trip and an automatic power reduction to 45 percent rated thermal power. Operators subsequently shutdown the reactor to perform troubleshooting and repairs offline. The control system was repaired and Unit 3 restarted on September 22, 2016, and returned to full power for the remainder of the inspection period.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R04 Equipment Alignment (71111.04)

Partial Walk-Down

a. Inspection Scope

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

- July 7, 2016, Unit 2 control building essential ventilation system B
- July 20, 2016, Unit 3 low pressure safety injection system A
- July 27, 2016, Unit 2 containment spray system B
- September 28, 2016, Unit 1 4.16kV Class 1E power system A

The inspectors reviewed the licensee's procedures and system design information to determine the correct lineup for the systems. They visually verified that critical portions of the systems or trains were correctly aligned for the existing plant configuration.

These activities constituted four partial system walk-down samples as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Quarterly Inspection

a. Inspection Scope

The inspectors evaluated the licensee's fire protection program for operational status and material condition. The inspectors focused their inspection on six plant areas important to safety:

- July 7, 2016, Unit 2 diesel fuel oil day tank B room, fire area 23B
- July 12, 2016, Unit 1 auxiliary building 100' east corridor, fire area 42C
- July 12, 2016, Unit 1 auxiliary building 100' west corridor, fire area 42D
- July 14, 2016, Unit 3 reactor trip switchgear and control element drive mechanism control room, fire area 54
- August 25, 2016, Unit 2 upper cable spreading room, fire area 20
- August 30, 2016, Unit 3 essential chiller room A, fire area 1

For each area, the inspectors evaluated the fire plan against defined hazards and defense-in-depth features in the licensee's fire protection program. The inspectors evaluated control of transient combustibles and ignition sources, fire detection and suppression systems, manual firefighting equipment and capability, passive fire protection features, and compensatory measures for degraded conditions.

These activities constituted six quarterly inspection samples, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

.2 Annual Inspection

a. Inspection Scope

On September 2, 2016, the inspectors completed their annual evaluation of the licensee's fire brigade performance. This evaluation included observation of an unannounced fire drill for quarterly proficiency on August 29, 2016.

During this drill, the inspectors evaluated the capability of the fire brigade members, the leadership ability of the brigade leader, the brigade's use of turnout gear and fire-fighting equipment, and the effectiveness of the fire brigade's team operation. The inspectors

also reviewed whether the licensee's fire brigade met NRC requirements for training, dedicated size and membership, and equipment.

These activities constituted one annual inspection sample, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

On July 25, 2016, the inspectors completed an inspection of underground bunkers susceptible to flooding. The inspectors selected two underground vaults that contained risk-significant or multiple-train cables whose failure could disable risk-significant equipment:

- Unit 3 spray pond electrical cabling vault (3EZV08BKEM12)
- Unit 3 spray pond electrical cabling vault (3EZYS1NKFM63)

The inspectors observed the material condition of the cables and splices contained in the bunkers and looked for evidence of cable degradation due to water intrusion. The inspectors verified that the cables and vaults met design requirements.

These activities constituted completion of one bunker/manhole sample, as defined in Inspection Procedure 71111.06.

b. Findings

No findings were identified.

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

.1 Review of Licensed Operator Requalification

a. Inspection Scope

On August 2, 2016, the inspectors observed a portion of an evaluated simulator scenario performed by an operating crew. The inspectors assessed the performance of the operators and the evaluators' critique of their performance. The inspectors also assessed the modeling and performance of the simulator during the requalification activities.

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

b. Findings

No findings were identified.

.2 Review of Licensed Operator Performance

a. Inspection Scope

On July 29, 2016, the inspectors observed the performance of on-shift licensed operators in the plant's main control room. At the time of the observations, the plant was in a period of heightened risk due to planned down-power of Unit 1 for switchyard insulator repairs. Additionally, the inspectors observed the operators' performance of the following activities:

- September 12, 2016, Unit 1 reactor startup following forced outage for a stuck-open pressurizer spray valve
- September 19, 2016, Unit 3 response to a turbine trip/reactor power cutback and subsequent shutdown
- September 22, 2016, Unit 3 reactor start up following forced outage for a turbine trip

In addition, the inspectors assessed the operators' adherence to plant procedures, including power operations procedure and other operations department policies.

These activities constituted completion of one quarterly licensed operator performance sample, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed two instances of degraded performance or condition of safety-related structures, systems, and components (SSCs):

- August 11, 2016, Unit 1 high pressure safety injection valve 616, bonnet seal weld leakage
- September 20, 2016, Unit 1 diesel generator B turning gear interlock, this sample included a review of applicable quality control criteria

The inspectors reviewed the extent of condition of possible common cause SSC failures and evaluated the adequacy of the licensee's corrective actions. The inspectors reviewed the licensee's work practices to evaluate whether these may have played a role in the degradation of the SSCs. The inspectors assessed the licensee's characterization of the degradation in accordance with 10 CFR 50.65 (the Maintenance Rule), and verified that the licensee was appropriately tracking degraded performance and conditions in accordance with the Maintenance Rule.

These activities constituted completion of two maintenance effectiveness samples, as defined in Inspection Procedure 71111.12.

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed five risk assessments performed by the licensee prior to changes in plant configuration and the risk management actions taken by the licensee in response to elevated risk:

- July 1, 2016, online risk assessment for Unit 3 during pressurizer heater scheduled electrical maintenance
- August 2, 2016, weekly assessment for Unit 2
- August 9, 2016, weekly assessment for Unit 2
- September 14-16, 2016, online risk assessment for Unit 3 during remote shutdown disconnect switch operability test
- September 26, 2016, online risk assessment for Unit 1 during diesel generator B maintenance outage

The inspectors verified that these risk assessments were performed timely and in accordance with the requirements of 10 CFR 50.65 (the Maintenance Rule) and plant procedures. The inspectors reviewed the accuracy and completeness of the licensee's risk assessments and verified that the licensee implemented appropriate risk management actions based on the results of the assessments.

Additionally, on July 29, 2016, the inspectors observed portions of Unit 1 switchyard insulator repair that had the potential to cause an initiating event:

The inspectors verified that the licensee appropriately developed and followed a work plan for these activities. The inspectors verified that the licensee took precautions to minimize the impact of the work activities on unaffected SSCs.

These activities constituted completion of six maintenance risk assessments and emergent work control inspection samples, as defined in Inspection Procedure 71111.13.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

a. Inspection Scope

The inspectors reviewed eight operability determinations and functionality assessments that the licensee performed for degraded or nonconforming SSCs:

- July 10, 2016, functionality assessment of Unit 3 diesel generator A HVAC panel
- July 12, 2016, operability determination of Unit 2 B balance of plant engineered safety features actuation system 15 volt power supply failure
- July 15, 2016, operability determination of Unit 1 loss of audible alarms on boards 6 and 7
- July 29, 2016, operability determination of Unit 1 diesel generator A degraded generator rotor pole
- August 23, 2016, functionality assessment of Unit 1 auxiliary building roof drainage capacity
- August 31, 2016, operability determination of Unit 3 auxiliary feedwater bypass steam supply valve isolation capability
- September 20, 2016, operability determination of Unit 3 incorrect bill of materials justification for replacement reactor coolant system wide range pressure transmitter
- September 27, 2016, operator work around of Unit 2 low pressurizer pressure setpoint in channel A failure to reset to a lower value

The inspectors reviewed the timeliness and technical adequacy of the licensee's evaluations. Where the licensee determined the degraded SSC to be operable or functional, the inspectors verified that the licensee's compensatory measures were appropriate to provide reasonable assurance of operability or functionality. The inspectors verified that the licensee had considered the effect of other degraded conditions on the operability or functionality of the degraded SSC.

The inspectors reviewed operator actions taken or planned to compensate for degraded or nonconforming conditions. The inspectors verified that the licensee effectively managed these operator workarounds to prevent adverse effects on the function of mitigating systems and to minimize their impact on the operators' ability to implement abnormal and emergency operating procedures.

These activities constituted completion of eight operability and functionality review samples, which included one operator work-around sample, as defined in Inspection Procedure 71111.15.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

On September 21, 2016, the inspectors completed a limited review of recent plant design changes performed under the licensee's advance work authorization (AWA) process.

The inspectors reviewed the design and implementation of the modifications. The inspectors verified that work activities involved in implementing the modification did not adversely impact operator actions that may be required in response to an emergency or other unplanned event. The inspectors verified that post-modification testing was adequate to establish the functionality of the SSC as modified.

These activities constituted completion of one sample of permanent modifications, as defined in Inspection Procedure 71111.18.

b. Findings

Introduction. The inspectors identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," because the licensee failed to accomplish activities affecting quality in accordance with station procedures. Specifically, the inspectors identified multiple examples of design changes performed under the Advanced Work Authorization process which were placed into service prior to the completion of the associated engineering work orders.

Description. Palo Verde Procedure 81DP-0EE10, "Design Change Process," describes the licensee's process for controlling, developing, installing, and processing plant design changes. Appendix G of this procedure defines an Advanced Work Authorization (AWA) as a component of the design change process that provides authorization for maintenance to proceed with work activities in the field without issuance of a completely approved design. An AWA is used to allow field work to start while engineering personnel are completing the required engineering documentation. The use of an AWA is beneficial for time sensitive activities, such as emergent repairs to plant equipment during outages. The field work is performed immediately, although the final engineering approved design might require additional changes or rework, before placing the modified equipment back in service.

Procedure 81DP-0EE10 Appendix G requires that the advance field work does not affect any in-service equipment. Furthermore, step G.1.1.4 states that the scope of the AWA must not communicate or interact with any operating structures, system, or components. Step G.1.1.4 lists examples including: no heat transfer, fluid flow, pressure exchange, electrical interaction, or unbounded structural impact. Lastly, step G.1.1.7 requires that the modified systems not be placed back in service until after the approval of the engineering work orders.

The inspectors identified three examples in which the licensee had not developed adequate constraints to ensure that the final engineering approval was complete prior to placing modified components back in service.

- During the Spring 2016, Unit 1 refueling outage, a visual inspection by licensee engineers identified evidence of pressure boundary leakage at a reactor coolant

pump cold leg temperature instrument nozzle. The licensee addressed the leakage by installing a mechanical nozzle seal assembly clamp under the AWA process. The reactor coolant system was re-filled prior to the approval of the engineering change documentation.

- During the Spring 2016, Unit 1 refueling outage, the licensee discovered small cracks on the inlet partition plate of the letdown heat exchanger. The licensee used an advanced work authorization to perform a weld repair of the damaged partition plate and then re-filled the heat exchanger in preparation for restart.
- At the start of the Spring 2015, Unit 3 refueling outage, licensee engineers observed evidence of pressure boundary leakage at a reactor coolant pump suction pressure instrument nozzle. The licensee used the AWA process to repair the cracked nozzle with a partial nozzle replacement. The reactor coolant system was re-filled prior to the approval of the engineering work orders.

In each case, contrary to station procedure requirements, the subject plant equipment was placed in service prior to the design being approved by the engineering department. The inspectors reviewed each design change and confirmed that the eventual post-maintenance testing was adequate to demonstrate the operability or functionality of the modified components.

The issue was entered into the licensee's corrective action program as CR 16-09965. The licensee determined that operations personnel did not have a clear understanding of the "in service" terminology used in the 81DP-0EE10 "Design Change Process" procedure. As an interim corrective action, the licensee instituted a requirement for the design engineering director to approve all AWAs to ensure the in service point is clearly identified and understood. The licensee is evaluating additional controls to prevent components modified under the AWA process from prematurely being placed in service prior the approval of the engineering work orders.

Analysis. The inspectors determined that the licensee's failure to establish adequate constraints to ensure that final engineering approval of advance work is completed prior to placing modified systems in service was a performance deficiency. This performance deficiency was more than minor, and therefore a finding, because if left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern. Specifically, routinely failing to implement the requirements of the engineering design change advance work authorization process could result in equipment being placed in service without an approved design configuration. In accordance with Inspection Manual Chapter 0609, Significance Determination Process, Attachment 4, "Initial Characterization of Findings," dated June 19, 2012, Table 2, reactor coolant system boundary issues are considered under the Initiating Event Cornerstone. Using Table 3, the inspectors determined the finding pertained to an event or degraded condition while the plant was in shutdown and, therefore, used Inspection Manual Chapter 0609, Appendix G "Shutdown Operations Significance Determination Process," dated May 9, 2014, for significance determination. The inspectors reviewed Appendix G, Attachment 1, Exhibit 2, "Initiating Events Screening Questions." The inspectors answered "No" to Question A.1, and found all other questions to be not applicable and therefore concluded that the finding was of very low safety significance (Green). The inspectors determined that this finding had a human performance crosscutting aspect associated with work management, because the licensee did not coordinate with all

affected work groups so that operations personnel understood the constraints prior to placing the modified system back in service [H.5].

Enforcement. Title 10 CFR, Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be accomplished in accordance with documented instructions, procedures, or drawings, of a type appropriate to the circumstances. Licensee procedure 81DP-0EE10, "Design Change Process," Revision 39, an Appendix B quality related procedure, provides instructions for implementing advanced work authorization engineering design changes on safety-related plant structures, systems, and components. Procedure 81DP-0EE10, Appendix G, Step G.1.1.7 requires that systems modified under the advanced work authorization process not be placed back into service until after the approval of the engineering work order. Contrary to the above, prior to June 17, 2016, systems modified under the advanced work authorization process were placed back in service prior to the approval of the engineering work order. Specifically, the inspectors identified three examples in which the licensee placed systems modified under the Advance Work Authorization process back in service prior to the approval of the associated engineering work order. The licensee entered this condition into their corrective action program as Condition Report 16-09965. The immediate corrective action taken to restore compliance was to require design engineering director approval prior to the development of all advance work authorizations to ensure the in service point is clearly identified and understood. Because this violation was of very low safety significance and the licensee entered the issue into their corrective action program, this violation was treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000528, 529, 530/2016003-01, "Failure to Follow Advance Work Authorization Procedure."

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed six post-maintenance testing activities that affected risk-significant SSCs:

- August 2, 2016, Unit 1 diesel generator A following degraded generator rotor pole repair
- August 24, 2016, Unit 2 C channel plant protection system post maintenance testing after repairing a cracked card edge connector
- August 30-31, 2016, Unit 3 auxiliary feed water pump AFA-P01, post-maintenance testing of flow control valve HV-33 and feed isolation valve UV-37, following static testing, inspection, and lubrication
- August 31-September 1, 2016, Unit 1 vital 480/120 VAC voltage regulator 1E-PNC-V27, post maintenance testing following replacement of transformers, chokes, and capacitors
- September 9, 2016, Unit 1 repair and testing of pressurizer spray valve (PV-100F)
- September 11, 2016, Unit 1 NN111 electrical transfer switch testing

The inspectors reviewed licensing- and design-basis documents for the SSCs and the maintenance and post-maintenance test procedures. The inspectors observed the performance of the post-maintenance tests to verify that the licensee performed the tests in accordance with approved procedures, satisfied the established acceptance criteria, and restored the operability of the affected SSCs.

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

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20)

a. Inspection Scope

During the Unit 1 and Unit 3 short notice maintenance outages that concluded on September 12, 2016, and September 23, 2016, respectively, the inspectors evaluated the licensee's outage activities. The inspectors verified that the licensee considered risk in developing and implementing the outage plan, appropriately managed personnel fatigue, and developed mitigation strategies for losses of key safety functions. This verification included the following:

- Monitoring of shut-down and cool-down activities
- Review of the licensee's troubleshooting plans
- Verification that the licensee maintained defense-in-depth during outage activities
- Monitoring of heat-up and startup activities

These activities constituted completion of two outage activities samples, as defined in Inspection Procedure 71111.20.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed six risk-significant surveillance tests and reviewed test results to verify that these tests adequately demonstrated that the SSCs were capable of performing their safety functions:

In-service tests:

- August 5, 2016, Unit 3 atmospheric dump valve 179 inservice test
- August 15, 2016, Unit 3 high pressure safety injection pump B inservice test
- August 25, 2016, Unit 2 containment spray pump B inservice test
- August 29, 2016, Unit 3 high pressure safety injection pump A inservice test
- September 30, 2016, Unit 3 spray pond manual valve inservice test

Other surveillance tests:

- August 3, 2016, Unit 2 radiation monitoring quarterly functional test A

The inspectors verified that these tests met technical specification requirements, that the licensee performed the tests in accordance with their procedures, and that the results of the test satisfied appropriate acceptance criteria. The inspectors verified that the licensee restored the operability of the affected SSCs following testing.

These activities constituted completion of six surveillance testing inspection samples, as defined in Inspection Procedure 71111.22.

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)

a. Inspection Scope

The inspector performed an in-office review of Palo Verde Emergency Plan, Revision 57. This revision included updates to organizational titles for offsite response organizations, population, and demographic updates to data and tables, and numerous editorial changes.

This revision was compared to its previous revision, to the criteria of NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, and to the standards in 10 CFR 50.47(b) to determine if the revision adequately implemented the requirements of 10 CFR 50.54(q)(3) and 50.54(q)(4). The inspector verified that the revision did not reduce the effectiveness of the emergency plan. This review was not documented in a safety evaluation report and did not constitute approval of licensee-generated changes; therefore, this revision is subject to future inspection.

These activities constitute completion of one emergency action level and emergency plan changes sample as defined in Inspection Procedure 71114.04.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06)

Training Evolution Observation

a. Inspection Scope

On August 2, 2016, the inspectors observed simulator-based licensed operator requalification training that included implementation of the licensee's emergency plan. The inspectors verified that the licensee's emergency classifications, off-site notifications, and protective action recommendations were appropriate and timely.

The inspectors verified that any emergency preparedness weaknesses were appropriately identified by the evaluators and entered into the corrective action program for resolution.

These activities constituted completion of one training observation sample, as defined in Inspection Procedure 71114.06.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

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

4OA1 Performance Indicator Verification (71151)

.1 Reactor Coolant System Specific Activity (BI01)

a. Inspection Scope

The inspectors reviewed the licensee's reactor coolant system chemistry sample analyses for the period of July 1, 2015, through September 30, 2016, to verify the accuracy and completeness of the reported data. The inspectors observed a chemistry technician obtain and analyze a reactor coolant system sample on September 21, 2016. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the reactor coolant system specific activity performance indicator for Units 1, 2, and 3, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified

.2 Reactor Coolant System Total Leakage (BI02)

a. Inspection Scope

The inspectors reviewed the licensee's records of reactor coolant system total leakage for the period of July 1, 2016, through September 30, 2016, to verify the accuracy and completeness of the reported data. The inspectors observed the performance of a reactor coolant system water inventory determination in accordance with station procedure 40ST-9RC02 on August 17, 2016. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the reactor coolant system leakage performance indicator for Units 1, 2, and 3, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152)

Routine Review

a. Inspection Scope

Throughout the inspection period, the inspectors performed daily reviews of items entered into the licensee's corrective action program and periodically attended the licensee's condition report screening meetings. The inspectors verified that licensee personnel were identifying problems at an appropriate threshold and entering these problems into the corrective action program for resolution. The inspectors verified that the licensee developed and implemented corrective actions commensurate with the significance of the problems identified. The inspectors also reviewed the licensee's problem identification and resolution activities during the performance of the other inspection activities documented in this report.

b. Findings

No findings were identified.

4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153)

.1 NRC Event Number 52226: Manual Reactor Trip due to Stuck-Open Pressurizer Spray Valve

On September 7, 2016, at 9:32 p.m., Unit 1 initiated a manual reactor trip due to a stuck-open pressurizer spray valve. Prior to the trip, Unit 1 was at full power and establishing maintenance conditions by transferring a 120 VAC non-class instrument distribution panel to its alternate power supply. The load transfer attempt failed. At that time, control room operators noted that the main spray valve was open and attempted to close the main spray valve in accordance with alarm response procedures. Operators manually tripped the reactor when their attempts to close the main spray valve were unsuccessful. Additionally, operators secured all reactor coolant pumps to terminate spray flow to the pressurizer. No emergency safety features actuations occurred. The offsite power grid was stable. Unit 1 stabilized at normal operating temperature and pressure in Mode 3 with all reactor coolant pumps secured and on natural circulation. Plant pressure was maintained via pressurizer heaters and auxiliary spray.

The inspectors responded to the event to verify that all safety systems responded as expected, no emergency classification was required per the emergency plan, no further Agency response was warranted, and no findings were identified.

These activities constitute completion of one event follow-up sample, as defined in Inspection Procedure 71153.

.2 Unit 3 Automatic Main Turbine Trip and Subsequent Manual Reactor Trip at Operator Discretion

On September 19, 2016, at 2:34 p.m., Unit 3 experienced a main turbine trip and a subsequent reactor power cutback to approximately 40 percent power. The control room operators carried out actions in accordance with the Load Rejection Abnormal Operating Procedure. The operations crew commenced a controlled reactor down power to approximately 12 percent in accordance with station procedures. At 3:54 p.m. the licensee decided to perform a manual reactor shutdown, and operators initiated a manual trip at 35 percent power. The decision to shutdown was based on the reactor core dynamics that would be expected to occur following a large power change at the end of the operating cycle. The inspectors responded to the Unit 3 control room following the main turbine trip. The inspectors monitored plant parameters and verified the operators' actions were conducted in accordance with station procedures and Technical Specifications.

Following the manual trip, the inspectors verified that all safety systems responded as expected. The inspectors' review determined that no further Agency actions were required, and no findings were identified.

These activities constitute completion of one event follow-up sample, as defined in Inspection Procedure 71153.

40A5 Other Activities

(Closed) Unresolved Item (URI) 07200044/2015001-01, VCT Lifting Brackets Compliance with ANSI N14.6

The licensee operates its ISFSI under a general license as allowed in 10 CFR Part 72. Palo Verde utilizes the NAC, Universal Multi-Purpose Canister System (UMS), approved under Certificate of Compliance No. 1015, Amendment 5 and the NAC UMS Final Safety Analysis Report (FSAR), Revision 10 to load and store spent fuel at their Independent Spent Fuel Storage Installation (ISFSI). To place a loaded cask at the ISFSI, the licensee utilized a Vertical Cask Transporter (VCT) and lift brackets to lift and transport the cask. During Palo Verde's last routine ISFSI inspection conducted on February 22-26, 2015, an Unresolved Item (URI) was identified and documented in NRC ISFSI Inspection Report 05000528/2015007, 05000529/2015007, 05000530/2015007, and 07200044/2015001 (ML15086A433).

The NAC FSAR Table 1.5-1, stated "devices for lifting the systems that are important to safety must comply with American National Standards Institute (ANSI) N14.6." The licensee's annual maintenance records of the VCT lift brackets were reviewed by the inspector during the routine inspection. The licensee's maintenance practices were found to not fully comply with the requirements of ANSI N14.6, Section 6.3.2 for the annual inspection of the lifting devices. The licensee had been performing annual visual inspections, but neither dimensional nor non-destructive examination inspections were being performed. Several of the special lifting devices were discussed in detail in the FSAR, including the transfer cask lift yoke and the lift trunnions. However, the VCT lift brackets were not discussed in the FSAR and it was unclear if the FSAR Table 1.5-1

statement applied to the VCT lift brackets. The FSAR section 8.1.3 allowed a license to utilize a mobile lifting frame (or transporter), when the lift height is limited to 24 inches and the mobile lifting device followed the requirements of Section A5.6.c of the Technical Specifications. The NAC FSAR does not specifically address the type of mobile lifting device or the lift brackets that could be used to lift the cask and transport it to the ISFSI. Use of Palo Verde's VCT and lift brackets were implemented through the licensee's 10 CFR 72.48 and 10 CFR 72.212 evaluation processes. The NRC inspectors opened an URI and conferred with NRC Headquarters Division of Spent Fuel Management (DSFM) for clarification.

After an in-office review and consultation with DSFM staff, the inspectors concluded that annual maintenance of the VCT lift brackets in accordance with the ANSI N14.6 standard was not required. Per the NAC Technical Specification A5.6.c, the VCT lift brackets were only required to be designed in accordance with NUREG 0612, *Control of Heavy Loads, at Nuclear Power Plants*, which invoked the ANSI N14.6 standard. The Technical Specification did not specifically require the lifting brackets to be maintained and inspected in accordance with the NUREG-0612/ANSI N14.6 requirements.

The NRC inspector noted that the VCT lift brackets were visually inspected annually, designed in accordance with the ANSI N14.6 requirements, and were originally load tested prior to first use, in accordance with the standard. The NAC UMS FSAR Section 11.2.4 documented that the Vertical Concrete Cask was analyzed for a 24-inch drop onto a concrete storage pad. The analysis concluded that a 24-inch drop would not result in a breach of the canister, nor result in damage to the canister or concrete cask that would affect the cask systems' design functions. Palo Verde's loading procedures did require the VCT transportation operations to limit the cask's lift height to below 24 inches in accordance with the drop-analysis and Technical Specification Table A5-1 requirements.

The inspectors concluded that no performance deficiency existed. No additional deficiencies were identified during review of this URI.

Unresolved item 07200044/2015001-01 is closed.

40A6 Meetings, Including Exit

Exit Meeting Summary

On August 25, 2016, the inspectors conducted a telephonic exit meeting to present the results of the in-office review of Unresolved Item URI 07200044/2015001-01 to Mr. M. McGhee, Regulatory Affairs Department Leader, and other members of the licensee's staff. The licensee acknowledged the information presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

On September 21, 2016, the inspector presented the results of the in-office inspection of the emergency preparedness plan change, to Mr. R. Davis, Director, Nuclear Security and Emergency Preparedness, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

On October 11, 2016, the inspectors presented the inspection results to Ms. M. Lacal and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

J. Cadogan, Sr. Vice President of Nuclear Operations
M. Lacal, Sr. Vice President of Regulatory and Oversight
B. Rash, Vice President, Engineering
C. Kharri, Plant General Manager for Operations
M. McLaughlin, Plant General Manager of Site Support
H. Ridenour, Director Maintenance
G. Andrews, Director Regulatory Affairs
R. Davis, Director, Nuclear Security and Emergency Preparedness
D. Wheeler, Director Performance Improvement
K. Graham, Director Plant Engineering
K. House, Director Design Engineering
C. Moeller, Director, Technical Support (Acting)
J. Fearn, Manager, Emergency Preparedness
R. Routolo, Manager, Radiation Protection (Acting)
M. McGhee, Department Leader, Nuclear Regulatory Affairs
M. Radspinner, Department Leader, System Engineering
B. Hansen, Department Leader, ISFSI Engineering
D. Elkinton, Section Leader, Compliance

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000528,529,530/ NCV Failure to Follow Advance Work Authorization Procedure
2016003-01 (Section 1R18)

Closed

07200044/2015001-01 URI VCT Lift Brackets Compliance with ANSI N14.6 (Section 4OA5)

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40ST-9SI13	LPSI and CS System and Alignment Verification	33

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
13-E-PBA-001	4.16kV Class 1E Power System Switchgear	15
13-P-ZJC-0310	Control Building – Level A HVAC Hanger Plan Between El. 74'-0" & 100'-0"	10
13-M-HJP-0003	P&I Diagram Control Building HVAC	1

Condition Reports (CRs)

16-12020

Miscellaneous

<u>Title</u>	<u>Revision</u>
Design Basis Manual: Safety Injection System	38

Section 1R05: Fire Protection

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
14FT-9FP65	Appendix R / FTS Fire Barrier Surveillance	13
40DP-9ZZ19	Operational Considerations Due to Plant Fire	30
40EP-9EO01	Standard Post Trip Actions	21
33FT-9FP01	Appendix R and Technical Requirements Manual Fire Damper Surveillance	11

Miscellaneous

<u>Title</u>	<u>Revision/Date</u>
PVNGS Pre-Fire Strategies Manual	25
Palo Verde Safety Evaluation Report Supplement 6	October 1984
PVNGS Un-Announced Back Shift Fire Drill "B" Shift	August 29, 2016

Condition Reports (CRs)

16-11143	16-13464	15-06025	3839785	4369959
4207273	2731514			

Section 1R06: Flood Protection Measures

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
13-E-ZVU-008	Underground Electrical Duct Layout Plot Plan Sheet 3	41

Section 1R11: Licensed Operator Requalification Program and Licensed Operator Performance

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40OP-9ZZ07	Plant Shutdown Mode 1 to Mode 3	40
40OP-9ZZ05	Power Operations	146
40OP-9ZZ03	Reactor Start up	63
40AO-9ZZ14	Loss of Non-Class Instrument or Control Power	29
40EP-9EO01	Standard Post Trip Actions	21
40EP-9EO07	Loss of Offsite Power/ Loss of Forced Circulation	29

Condition Reports (CRs)

16-14219	16-14213	16-14217
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Miscellaneous

<u>Title</u>	<u>Revision</u>
Standard Maneuver Plan: 50 EFPD 100 percent to 12 percent	0

Section 1R12: Maintenance Effectiveness

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
12DP-0MC46	Receipt Inspection	12
30DP-9MC01	Staging and Control of Maintenance Materials	25
73ST-9XI33	HPSI Pump and Check Valve Full Flow Test	59

Condition Reports (CRs)

16-08291	16-08361	16-07589
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Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
45001717	Safety Related Certificate of Conformance	June 18, 2013
45002595	Safety Related Certificate of Conformance	April 24, 2013
45002595	Safety Related Certificate of Conformance	August 22, 2015
	Level 3 Evaluation Report for 16-08291-005	June 15, 2016
2010-00503	Engineering Document Change	0
	Unit 1 Operator Logs	May 18, 2016

Work Orders (WOs)

245042	2663388	4625030	4567727	3214680
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Section 1R13: Maintenance Risk Assessments and Emergent Work ControlProcedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40DP-9AP21	Protected Equipment	7
02DP-9RS01	Operational Risk Management	1
40ST-9ZZ25	Online Remote Shutdown Disconnect Switch Operability Test	00
70DP-0RA05	Assessment and Management of Risk when Performing Maintenance in Modes 1 and 2	22

Work Orders (WOs)

4547594	4795385	4646803	4636221
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Miscellaneous

<u>Title</u>	<u>Date</u>
Scheduler's Evaluation for PV Unit 2	July 29, 2016
Scheduler's Evaluation for PV Unit 1	July 29, 2016
Scheduler's Evaluation for Palo Verde Unit 3	July 1, 2016
Scheduler's Evaluation for Palo Verde Unit 1	September 26, 2016

Miscellaneous

Title

PVNGS Updated FSAR Appendix 5C

Date

June 2015

Section 1R15: Operability Determinations and Functionality Assessments

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40AL-9HD01	Diesel Generator HVAC Alarm Response Procedure Panel HDN-E01	13
40OP-9HD01	Diesel Generator A Building HVAC	10
EP-0901	Classifications	9
40AO-9ZZ12	Degraded Electrical Power	68
40DP-9OP26	Operations Condition Reporting Process and Operability Determination/Functional Assessment	41

Condition Reports (CRs)

16-11083	16-11331	16-11114	16-14854	16-12381
16-13679	16-11253	16-15181	16-14866	16-11848
12-00750	4238728	4238661	4255561	16-05869
15-01586	4638324	4258590	16-09020	4213439

Work Orders (WOs)

3137382	372736	371655	4739911	4648850
373379	4799146	4258590	4238278	3952605
4280912	4643640	4540247		

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
03-M-HDP-0001	P&I Diagram HVAC Generator Building	5
03-E-HDB-0001	Elementary Diagram HVAC-Diesel Generator Building – Essential Exhaust Fans	4
M598-00798	Wiring Diagram – Local Control Panel 14-J-HDN-E01	8
M598-01605	Honeywell-Wiring and Mounting Detail of Diesel Generator HVAC Instruments	10

Miscellaneous

Title

Date

Palo Verde Unit 1 Operator Logs	July 15, 2016
Palo Verde Technical Specifications	May 11, 2016
Palo Verde Unit 2 Operator Logs	July 12, 2016
Palo Verde Unit 3 Operator Logs	August 2, 2016

Section 1R18: Plant Modifications

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
81DP-0EE10	Design Change Process	39
40DP-9OP23	Technical Specification Condition Record SWMS Procedure	10

Condition Reports (CRs)

16-09965

Work Orders (WOs)

4736314	4769794	4641913	4765479	4766776
4767632	4709483			

Section 1R19: Post-Maintenance Testing

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
73DP-9ZZ12	Motor Operated Valve (MOV) Program	11
30DP-9WP04	Post-Maintenance Testing Development	18
73ST-9XI05	AF and CT Valves – In-service Test	30
36ST-9SB02	PPS Bistable Trip Units Functional Test	47
36ST-9SB67	CPC Input Loop C Calibration	0
40ST-9DG01	Diesel Generator A Test	45

Condition Reports (CRs)

16-13831	16-12750	16-13711	16-14219	16-14213
16-14220				

Work Orders (WOs)

4662209	4620309	4662207	4211126	4659048
4659061	4689126	246290	4814072	4634243

Miscellaneous

<u>Number</u>	<u>Title</u>
13-NS-C088	Mission Time for Operability Determinations

Section 1R20: Refueling and Other Outage ActivitiesProcedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40OP-9ZZ03	Reactor Start up	63
40AO-9ZZ14	Loss of Non-Class Instrument or Control Power	29
40EP-9EO01	Standard Post Trip Actions	21
40EP-9EO07	Loss of Offsite Power/ Loss of Forced Circulation	29

Condition Reports (CRs)

16-14219	16-14220	16-14255
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Section 1R22: Surveillance TestingProcedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
74ST-9SQ10	Train A Radiation Monitoring Quarterly Functional Test Procedure	1
73ST-9SI06	Containment Spray Pumps and Check Valves – Inservice Test	41
73ST-9SI10	HPSI Pumps Miniflow – Inservice Test	51
73ST-9XI20	ADVs – Inservice Test	44
73ST-9XI44	Exercising Manual Spray Pond Valves – Inservice Test	3

Condition Reports (CRs)

16-12313

Work Orders (WOs)

4622819	4638929	4639093	4639022
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Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40OP-9SA01	Temporary Approved Procedure Action	30

Section 1EP4: Emergency Action Level and Emergency Plan Changes

Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
102-07328-JF/WDP	PVNGS Emergency Plan, Revision 57	September 1, 2016

Section 1EP6: Drill Evaluation

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
SES-O-050K-05	Licensed Operator Continuing Training – Simulator Evaluated Scenario	August 18, 2015
EP-09-01	Classifications	9

Condition Reports (CRs)

16-12029

Section 4OA1: Performance Indicator Verification

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40DP-0LC01	RCS Activity Performance Indicator	6
74OP-9SS01	Primary Sampling Instructions	40
40ST-9RC02	ERFDADS (Preferred) Calculation of RCS Water Inventory	54

Condition Reports (CRs)

16-13137

Miscellaneous

Title

NRC Public Website Performance Indicators for Palo Verde

Section 40A3: Follow-up of Events and Notices of Enforcement Discretion

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40OP-9ZZ05	Power Operations	146
40OP-9ZZ03	Reactor Start up	63
40AO-9ZZ14	Loss of Non-Class Instrument or Control Power	29
40EP-9EO01	Standard Post Trip Actions	21
40EP-9EO07	Loss of Offsite Power/ Loss of Forced Circulation	29
40AO-9ZZ08	Load Rejection	31

Condition Reports (CRs)

16-14219 16-14213 16-14217 16-14791

Work Orders (WOs)

16-14791-003

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	Plant Transient Review Assessment, Unit 3	September 19, 2016

Section 40A5: Other Activities

Condition Reports

CRDR 4639273

10 CFR 72.48 Screens/Evaluations

72.48 S-02-011

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
NA	PVNGS ISFSI 72.212 Evaluation Report	Rev. 11

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
NA	Certificate of Compliance 72-1015 NAC International Inc., NAC-UMS System	Amendment 5
NA	NAC International FSAR for the UMS Cask System	Rev. 10
A0-CN-0012	Cask Transporter	Rev. 0