



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

August 5, 2016

Randall K. Edington
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 05000528/2016002, 05000529/2016002, AND
05000530/2016002**

Dear Mr. Edington:

On June 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Palo Verde Nuclear Generating Station Units 1, 2, and 3. On July 14, 2016, the NRC inspectors discussed the results of this inspection with R. Bement and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented two findings of very low safety significance (Green) in this report. Both of these findings involved violations of NRC requirements.

If you contest the violations or significance of these NCVs, 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 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. Edington

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Sincerely,

/RA/

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

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

Enclosure:
Inspection Report 05000528/2016002,
05000529/2016002, 05000530/2016002
w/ Attachment: Supplemental Information

R. Edington

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w/ Attachment: Supplemental Information

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Letter to Randall Edington from Geoffrey Miller dated August 5, 2016

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION – NRC INTEGRATED
INSPECTION REPORT 05000528/2016002, 05000529/2016002, AND
05000530/2016002

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 05000528, 05000529, 05000530

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

Report: 05000528/2016002, 05000529/2016002, 05000530/2016002

Licensee: Arizona Public Service Company

Facility: Palo Verde Nuclear Generating Station

Location: 5801 South Wintersburg Road
Tonopah, AZ 85354

Dates: April 1 through June 30, 2016

Inspectors: C. Peabody, Senior Resident Inspector
D. Reinert, PhD, Resident Inspector
D. You, Resident Inspector
L. Carson II, Senior Health Physicist
J. Drake, Senior Reactor Inspector
G. Pick, Senior Reactor Inspector
I. Anchondo, Reactor Inspector
N. Greene, PhD, Health Physicist
G. Guerra, Emergency Preparedness Inspector
D. Tailleart, Team Leader, Inspection and Regulatory Improvements
Branch, Office of Nuclear Security and Incident Response

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

SUMMARY

IR 05000528, 529, 530/2016002; 04/01/20106 – 06/30/2016; PALO VERDE NUCLEAR GENERATING STATION INTEGRATED INSPECTION REPORT; Radiological Hazard Assessment and Exposure Controls; In-Plant Airborne Radioactivity Control and Mitigation.

The inspection activities described in this report were performed between April 1 and June 30, 2016, by the resident inspectors at Palo Verde Nuclear Generating Station and inspectors from the NRC's Region IV office and other NRC offices. Two findings of very low safety significance (Green) are documented in this report. Both of these findings involve violations 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: Occupational Radiation Safety

- Green. The inspectors reviewed a Green, self-revealing, non-cited violation of Technical Specification 5.7.2, which was caused by the licensee's failure to control a high radiation area with radiation levels greater than 1 rem per hour in the Unit 1 containment. A radiation protection technician received an unexpected dose rate alarm while conducting surveys on piping in the 87-foot elevation of the 2B reactor coolant pump bay area near a high efficiency particulate air unit in containment. Licensee personnel corrected the error by guarding the area, posting the area, and changing the pre-filters in the adjacent portable a high efficiency particulate air units to reduce the dose rates. This issue was entered into the licensee's corrective action program as Condition Reports 16-06515 and 16-07479.

The inspectors determined that the failure to identify a locked high radiation area through timely surveys and adequate a high efficiency particulate air maintenance procedures that could have revealed changing radiological conditions was a performance deficiency. The performance deficiency was more than minor because it was associated with the Occupational Radiation Safety Cornerstone attribute of program and process (exposure control) and adversely affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation because licensee personnel did not implement barriers intended to prevent workers from receiving unexpected dose. Using Inspection Manual Chapter 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process," dated August 19, 2008, the inspectors determined the violation had very low safety significance (Green) because: (1) it was not an as low as is reasonably achievable finding, (2) there was no overexposure, (3) there was no substantial potential for an overexposure, and (4) the ability to assess dose was not compromised. This finding has a cross-cutting aspect in the human performance area, associated with the resources component, because the licensee leaders failed to ensure that personnel, equipment, and procedures were available and adequate to support nuclear safety. Specifically, the licensee failed to ensure that procedures were adequate to ensure radiation levels around portable high efficiency particulate air units were monitored to evaluate changing radiological conditions in a timely manner such that hazards were appropriately controlled [H.1]. (Section 2RS1)

- Green. The inspectors identified a non-cited violation of 10 CFR 20.1701 due to the licensee's failure to implement adequate processes and engineering controls necessary to reduce airborne radioactivity and prevent internal dose to workers in Unit 1. On April 20, 2016, inspectors identified that procedures and instructions for monitoring high efficiency particulate air ventilation filter unit to prevent worker exposures to radiation and airborne radioactivity were being inadequately implemented. On April 21, 2016, the licensee's inadequate engineering and radiological controls during a high efficiency particulate air operations caused an airborne radioactivity event in containment, resulting in the evacuation of 41 potentially contaminated workers of whom 8 had measurable intakes of radioactive material. The licensee's immediate corrective actions included stopping work in the Unit 1 containment, evacuating workers in containment, assessing workers for external and internal contamination, and investigating the cause and source of the contamination event. This matter was placed in the licensee's corrective action program as Condition Reports 16-06499 and 16-06578 and the licensee initiated a root cause investigation.

The inspectors determined that the failures to implement adequate engineering and radiological controls to reduce airborne radioactivity during a high efficiency particulate air unit operations in accordance with 10 CFR 20.1701 and radiation protection procedures were performance deficiencies. The performance deficiencies were more than minor because they were associated with the Occupational Radiation Safety Cornerstone attribute of program and process (exposure control) and adversely affected the cornerstone objective to ensure the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. This was evident by the Unit 1 containment airborne radioactivity event on April 21, 2016, that resulted in at least eight workers with unplanned intakes. Using Inspection Manual Chapter 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process," dated August 19, 2008, the inspectors determined the finding had very low safety significance (Green) because: (1) it was not an as low as is reasonably achievable planning and controls finding, (2) there was no overexposure, (3) there was no substantial potential for an overexposure, and (4) the ability to assess dose was not compromised. The inspectors concluded that the finding has a cross-cutting aspect in the human performance area, associated with the resources component, because the licensee leaders failed to ensure that personnel, equipment, procedures, and other resources were available and adequate to support nuclear safety. Specifically, procedures and radiation exposure permits failed to have adequate instructions for ensuring a high efficiency particulate air filter loading and dose rates were monitored to prevent overloading, and safe handling of loaded a high efficiency particulate air filters [H.1]. (Section 2RS3)

PLANT STATUS

Unit 1 entered the inspection period at full power and was shutdown for a refueling outage on April 8, 2016. Unit 1 restarted from their refueling outage on May 14, 2016, and returned to full power on May 18, 2016. On May 19-24, 2016, power was reduced to 39 percent to repair a main condenser tube leak. On June 22-25, 2016, power was reduced to 82 percent to repair a heater drain pump discharge valve. Unit 1 operated at full power for the remainder of the inspection period.

Unit 2 operated at full power for the duration of the inspection period.

Unit 3 operated at full power for the duration of the inspection period.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

.1 Summer Readiness for Offsite and Alternate AC Power Systems

a. Inspection Scope

On June 6, 2016, the inspectors completed an inspection of the station's off-site and alternate-ac power systems. The inspectors inspected the material condition of these systems, including transformers and other switchyard equipment to verify that plant features and procedures were appropriate for operation and continued availability of off-site and alternate-ac power systems. The inspectors reviewed outstanding work orders and open condition reports for these systems. The inspectors walked down the switchyard to observe the material condition of equipment providing off-site power sources. The inspectors verified that the licensee's procedures included appropriate measures to monitor and maintain availability and reliability of the off-site and alternate-ac power systems.

These activities constituted one sample of summer readiness of off-site and alternate-ac power systems, as defined in Inspection Procedure 71111.01.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdown

a. Inspection Scope

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

- April 11, 2016, Unit 1, containment purge A
- May 2, 2016, Unit 3, turbine driven auxiliary feedwater pump
- May 4, 2016, Unit 3, diesel generator A
- May 4, 2016, Unit 3, diesel generator B

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 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.

.2 Complete Walkdown

a. Inspection Scope

On May 27, 2016, the inspectors performed a complete system walk-down inspection of the Unit 3 fuel building essential ventilation system. The inspectors reviewed the licensee's procedures and system design information to determine the correct system lineup for the existing plant configuration. The inspectors also reviewed open condition reports, temporary modifications, and other open items tracked by the licensee's operations and engineering departments. The inspectors then visually verified that the system was correctly aligned for the existing plant configuration.

These activities constituted one complete system walk-down sample, 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 five plant areas important to safety:

- April 18, 2016, Unit 2 high pressure safety injection room, fire zone 31B
- April 25, 2016, Unit 3 auxiliary feedwater pump N, fire zone TB-1
- April 26, 2016, Unit 1 containment building SI-651 work area
- May 10, 2016, Unit 3 fuel building 100' elevation, fire zone 27
- June 21, 2016, Unit 1 cable spreading room 140' elevation, fire zone 14

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 five quarterly inspection samples, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

On June 27, 2016, the inspectors completed an inspection of the station's ability to mitigate flooding due to internal causes. After reviewing the licensee's flooding analysis, the inspectors chose a plant area containing risk-significant structures, systems, and components that were susceptible to flooding:

- Unit 3 condensate storage tank tunnel

The inspectors reviewed plant design features and licensee procedures for coping with internal flooding. The inspectors walked down the selected areas to inspect the design features, including the material condition of seals, drains, and flood barriers. The inspectors evaluated whether operator actions credited for flood mitigation could be successfully accomplished.

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

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

On June 7, 2016, the inspectors completed an inspection of the readiness and availability of risk-significant heat exchangers. The inspectors observed the licensee's implementation of biofouling controls for the Unit 2 spray pond. Additionally, the inspectors walked down the Unit 2 train A and B Essential Cooling Water heat exchangers to observe their performance and material condition.

These activities constitute completion of one heat sink performance annual review sample, as defined in Inspection Procedure 71111.07.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08)

The activities described in Subsections 1 through 4 below constitute completion of one inservice inspection sample, as defined in Inspection Procedure 71111.08.

.1 Non-destructive Examination Activities and Welding Activities

a. Inspection Scope

The inspectors directly observed the following nondestructive examinations:

<u>System</u>	<u>Weld Identification</u>	<u>Examination Type</u>
Steam Generator	SGE L008-W2	Ultrasonic
Steam Generator	SGE L008-W3	Ultrasonic
Charging	CHE W28	Penetrant
Charging	CHE W29	Penetrant
Reactor Coolant System	1PRCEL046	Visual 3
Reactor Coolant System	1PRCEL036	Visual 3
Feedwater	1PSGE011 Weld 59-24	Magnetic Particle
Feedwater	1PSGE011 Weld 59-25	Magnetic Particle
Steam generator	SGE L008-W6	Radiograph

The inspectors reviewed records for the following nondestructive examinations:

<u>System</u>	<u>Weld Identification</u>	<u>Examination Type</u>
Steam Generator	SGE L008-W2	Radiograph
Steam Generator	SGE L008-W3	Radiograph
Feedwater	1PSEIL223 Weld 11-10/24-1	Penetrant
Safety Injection	Weld 15-9	Penetrant
Safety Injection	UV-651	Visual 3
Essential Cooling Water	EWB-E01-W	Visual 1

<u>System</u>	<u>Weld Identification</u>	<u>Examination Type</u>
Essential Chill Water	ECB-E-1-W	Visual 1

During the review and observation of each examination, the inspectors observed whether activities were performed in accordance with the American Society of Mechanical Engineers (ASME) Code requirements and applicable procedures. The inspectors also reviewed the qualifications of all nondestructive examination technicians performing the inspections to determine whether they were current.

The inspectors directly observed a portion of the following welding activities:

<u>System</u>	<u>Weld Identification</u>	<u>Weld Type</u>
Steam Generator	W-6	Gas Tungsten Arc Welding

The inspectors reviewed whether the welding procedure specifications and the welders had been properly qualified in accordance with ASME Code Section IX requirements. The inspectors also determined whether the essential variables were identified, recorded in the procedure qualification record, and formed the bases for qualification of the welding procedure specifications.

b. Findings

No findings were identified.

.2 Reactor Vessel Upper Head Penetration Inspection Activities

a. Inspection Scope

No inspection of the reactor vessel upper head penetrations was performed in this outage.

b. Findings

No findings were identified.

.3 Boric Acid Corrosion Control Inspection Activities

a. Inspection Scope

The inspectors reviewed the licensee's implementation of its boric acid corrosion control program for monitoring degradation of those systems that could be adversely affected by boric acid corrosion. The inspectors reviewed the documentation associated with the licensee's boric acid corrosion control walk-down as specified in Procedure 73DP-9ZC01, "Boric Acid Corrosion Control Program," Revision 7. The inspectors reviewed whether the visual inspections emphasized locations where boric acid leaks could cause degradation of safety-significant components, and whether engineering evaluation used corrosion rates applicable to the affected components and properly assessed the effects of corrosion induced wastage on structural or pressure

boundary integrity. The inspectors observed whether corrective actions taken were consistent with the ASME Code, and 10 CFR 50, Appendix B requirements.

b. Findings

No findings were identified, there was one unresolved item.

c. Unresolved Item 05000528/2016002-01, "Leakage from Reactor Coolant Pump 2B Discharge Pipe Instrument Nozzle"

Introduction. The inspectors identified an unresolved item for pressure boundary leakage from reactor coolant pump 2B discharge pipe instrument nozzle.

Description. On April 10, 2016, during the Unit 1 Refueling Outage 19, the licensee discovered reactor coolant system pressure boundary leakage at instrument nozzle 1JRCETW0121Y on the 2B reactor coolant pump discharge piping. The leakage was discovered during a planned visual inspection of Unit 1 hot and cold leg nozzles. The leak was not detectable by either the reactor coolant system leak rate procedure or the containment radiation monitor trend reviews while the unit was operating. Additionally, the leak had not been visually detected during the previous refueling outage. The leakage was consistent with a small leak characterized by moderate boric acid accumulation at the leakage site. The licensee determined that the cause of the leakage was primary water stress corrosion cracking of the Alloy 600 instrument nozzle. The licensee corrected the leakage using a mechanical nozzle seal assembly repair method utilizing ASME Code Case N-733, "Mitigation of Flaws in NPS 2 (DN 50) and Smaller Nozzles and Nozzle Partial Penetration Welds in Vessels and Piping by Use of a Mechanical Connection Modification, Section XI, Division 1." The evaluation of the 2B cold leg RTD nozzle leakage is being evaluated by the licensee as part of Palo Verde Action Request 15-01640-012. The inspectors reviewed the circumstances surrounding the discovery of the leak and observed portions of the repair activity during the refueling outage. Once the licensee completes their evaluation, the inspectors will review and complete an inspection to determine if a performance deficiency exists as a result of the nozzle failure.

.4 Steam Generator Tube Inspection Activities

a. Inspection Scope

The inspectors reviewed the steam generator tube eddy current examination scope and expansion criteria to determine whether these criteria met technical specification requirements, Electric Power Research Institute (EPRI) guidelines, and commitments made to the NRC. The inspectors also reviewed whether the inspection scope included areas of degradations that were known to represent potential eddy current test challenges such as the top of tube sheet, tube support plates, and U-bends. The licensee plugged 23 tubes in each steam generator.

Steam Generator Inspection

- Inspectors verified that the number and sizes of steam generator tube flaws/degradation identified was consistent with the licensee's previous outage operational assessment predictions.

- Inspectors verified that steam generator eddy current examination scope and expansion criteria met technical specification requirements.
- Inspectors verified that eddy current probes and equipment configurations used to acquire data from the steam generator tubes were qualified to detect the known/expected types of steam generator tube degradation in accordance with Appendix H, "Performance Demonstration for Eddy Current Examination of EPRI Document 1013706.

The inspectors reviewed the licensee's identification of the following tube degradation mechanisms:

- Mechanical wear at tube support structures

Tube Repair

- The inspectors verified that the licensee implemented repair methods which were consistent with the repair processes allowed in the plant technical specification requirements and determined qualified depth sizing methods were applied to degraded tubes accepted for continued service.

Secondary Side Inspections

- The inspectors reviewed secondary side inspection results and verified the licensee took corrective actions in response to the observed degradation.
- At the time of the inspection, no loose parts or foreign material on the steam generator secondary side were identified or left in place.

b. Findings

No findings were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed 23 Palo Verde action requests which dealt with inservice inspection activities and found the corrective actions for inservice inspection issues were appropriate. From this review the inspectors concluded that the licensee has an appropriate threshold for entering inservice inspection issues into the corrective action program and has procedures that direct a root cause evaluation when necessary. The licensee also has an effective program for applying industry inservice inspection operating experience. Specific documents reviewed during this inspection are listed in the attachment.

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 May 31, 2016, the inspectors observed simulator training for 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 training activities.

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

b. Findings

No findings were identified.

.2 Review of Licensed Operator Performance

a. Inspection Scope

On April 9-10, 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 activity due to a plant shutdown for refueling outage. The inspectors observed the operators' performance of the following activities:

- Plant shutdown briefs, including the pre-job brief, turnover brief, and reactivity maneuver plan brief, reactor trip brief, and plant cooldown brief
- Control rod bank insertions
- Reactor coolant system borations
- Main turbine load reductions
- Manual reactor trip from 30 percent reactor power
- Initiation of reactor cooldown following reactor trip

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

These activities constitute 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 three instances of degraded performance or condition of safety-related structures, systems, and components (SSCs):

- May 3, 2016, Units 1, 2, and 3, emergency lighting charge card unreliability issues due to obsolescence
- May 25, 2016, Unit 1 spent fuel pool cooling heat exchanger unavailability due to inability to complete eddy current testing
- June 28, 2016, Units 1, 2, and 3, essential cooling water system ability to transfer heat from the reactor coolant system to the spray pond system

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 three 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 four 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:

- April 14, 2016, Unit 1 outage daily risk assessment
- May 10, 2016, Unit 1 outage daily risk assessment
- June 20-26, 2016, Unit 1 weekly risk assessment
- June 20-26, 2016, Unit 3 weekly risk assessment

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 result of the assessments.

The inspectors also observed portions of two emergent work activities that had the potential to cause an initiating event or to affect the functional capability of mitigating systems:

- May 17, 2016, Unit 1 diesel generator A emergent troubleshooting work activities following failed surveillance test
- May 20, 2016, Unit 1 downpower for circulating water leak in condenser and startup transformer work

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 structures, systems, and components (SSCs).

These activities constitute 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 six operability determinations and functionality assessments that the licensee performed for degraded or nonconforming structures, systems, or components (SSCs):

- April 4, 2016, Unit 3 operability determination of spray pond conduit bolts
- April 23, 2016, Unit 1 operability determination of pressurizer safety valve pipe stress impact evaluation following a rigging error
- May 18, 2016, Units 1, 2, and 3, operability determination regarding containment radiation monitor surveillance testing validation of technical specification 3.4.16 required safety functions
- May 24, 2016, Unit 1 operability determination of safety injection piping following detection of gas void
- June 1, 2016, Unit 2 operability determination of diesel generator A degraded fuel oil surge tank bolting
- June 26, 2016, station blackout generators 1 and 2 functionality assessment following loss of battery charger

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.

These activities constitute completion of six operability and functionality review samples, as defined in Inspection Procedure 71111.15.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

On May 11, 2016, the inspectors reviewed a permanent modification to Unit 1 shutdown cooling suction isolation valve SI-651.

The inspectors reviewed the design and implementation of the modification. 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 operability of the SSC as modified.

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

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed five post-maintenance testing activities that affected risk-significant structures, systems, or components (SSCs):

- May 13, 2016, Unit 1 post maintenance testing of high pressure injection check valve SIE-V133
- May 24, 2016, Unit 1 control element assembly rod drop testing following assembly replacement
- June 7, 2016, Unit 3 battery charger PK11 relay replacement
- June 10, 2016, station blackout generator 1 testing following replacement of the fuel oil transfer pump
- June 22, 2016, Unit 2 post maintenance testing of auxiliary feedwater B injection valve to steam generator 2 following lubrication and electrical 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 constitute completion of five 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 station's refueling outage that concluded on May 14, 2016, 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:

- Review of the licensee's outage plan prior to the outage
- Review and verification of the licensee's fatigue management activities
- Monitoring of shut-down and cool-down activities
- Verification that the licensee maintained defense-in-depth during outage activities
- Observation and review of fuel handling activities
- Monitoring of heat-up and startup activities

These activities constitute completion of one refueling outage sample, 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 structures, systems, and components (SSCs) were capable of performing their safety functions:

In-service tests:

- June 6, 2016, Unit 2 bypass steam Supply to turbine driven auxiliary feedwater pump DC motor operated valve static test

Containment isolation valve surveillance tests:

- April 26, 2016, Unit 1 high pressure nitrogen supply containment penetration 30

Other surveillance tests:

- May 2, 2016, Unit 1 containment sump calibration
- May 18, 2016, Unit 2 containment atmospheric radioactivity monitor quarterly functional test
- May 27, 2016, Unit 3 fuel building essential ventilation B operability
- June 6, 2016, Unit 1 control element assembly operability

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 constitute completion of six surveillance testing inspection samples, as defined in Inspection Procedure 71111.22

b. Findings

No findings were identified.

1EP2 Alert and Notification System Evaluation (71114.02)

a. Inspection Scope

The inspectors verified the adequacy of the licensee's methods for testing the primary and backup alert and notification system (ANS). The inspectors also reviewed the licensee's program for identifying emergency planning zone locations requiring tone alert radios and for distributing the radios. The inspectors interviewed licensee personnel responsible for the maintenance of the primary and backup ANS and reviewed a sample of corrective action system reports written for ANS problems. The inspectors compared the licensee's alert and notification system testing program with criteria in NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1; FEMA Report REP-10, "Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants"; and the licensee's current FEMA-approved alert and notification system design report, "Palo Verde Nuclear Generating Station FEMA 350 Report," revised July 2014.

These activities constituted completion of one alert and notification system evaluation sample as defined in Inspection Procedure 71114.02.

b. Findings

No findings were identified.

1EP3 Emergency Response Organization Staffing and Augmentation System (71114.03)

a. Inspection Scope

The inspectors verified the licensee's emergency response organization on-shift and augmentation staffing levels were in accordance with the licensee's emergency plan commitments. The inspectors reviewed documentation and discussed with licensee staff the operability of primary and backup systems for augmenting the on-shift emergency response staff to verify the adequacy of the licensee's methods for staffing emergency response facilities, including the licensee's ability to staff pre-planned alternate facilities. The inspectors also reviewed records of emergency response organization augmentation tests and events to determine whether the licensee had maintained a capability to staff emergency response facilities within emergency plan timeliness commitments.

These activities constituted completion of one emergency response organization staffing and augmentation testing sample as defined in Inspection Procedure 71114.03.

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors performed an in-office on-site review of Palo Verde Emergency Plan, Revision 56. This revision included the description of changes to 10 CFR Part 50, Appendix E, related to emergency plan change submittals.

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 inspectors 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 constituted completion of one emergency action level and emergency plan changes sample as defined in Inspection Procedure 71114.04.

b. Findings

No findings were identified.

1EP5 Maintenance of Emergency Preparedness (71114.05)

a. Inspection Scope

The inspectors reviewed the following for the period February 2014 to April 2016:

- After-action reports for emergency classifications and events
- After-action evaluation reports for licensee drills and exercises
- Independent audits and surveillances of the licensee's emergency preparedness program
- Self-assessments of the emergency preparedness program conducted by the licensee
- Licensee evaluations of changes made to the emergency plan and emergency plan implementing procedures
- Drill and exercise performance issues entered into the licensee's corrective action program
- Emergency preparedness program issues entered into the licensee's corrective action program
- Records of evacuation time estimate population evaluation and annual evaluation reviews of the emergency planning zone population
- Maintenance records for equipment supporting the emergency preparedness program
- Emergency response organization and emergency planner training records

The inspectors reviewed summaries of 1,060 corrective action program reports associated with emergency preparedness, and selected 43 to review against program requirements, to determine the licensee's ability to identify, evaluate, and correct problems in accordance with planning standard 10 CFR 50.47(b)(14) and 10 CFR Part 50, Appendix E, Section IV.F. The inspectors verified that the licensee accurately and appropriately identified and corrected emergency preparedness weaknesses during critiques and assessments.

These activities constituted completion of one sample of the maintenance of the licensee's emergency preparedness program as defined in Inspection Procedure 71114.05.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstones: Public Radiation Safety and Occupational Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope

The inspectors evaluated the licensee's performance in assessing the radiological hazards in the workplace associated with licensed activities. The inspectors assessed the licensee's implementation of appropriate radiation monitoring and exposure control measures for both individual and collective exposures. During the inspection, the inspectors interviewed licensee personnel, walked down various areas in the plant, performed independent radiation dose rate measurements, and observed postings and physical controls. The inspectors reviewed licensee performance in the following areas:

- Radiological hazard assessment, including a review of the plant's radiological source terms and associated radiological hazards. The inspectors also reviewed the licensee's radiological survey program to determine whether radiological hazards were properly identified for routine and non-routine activities and assessed for changes in plant operations.
- Instructions to workers including radiation work permit requirements and restrictions, actions for electronic dosimeter alarms, changing radiological conditions, and radioactive material container labeling.
- Contamination and radioactive material control, including release of potentially contaminated material from the radiologically controlled area, radiological survey performance, radiation instrument sensitivities, material control and release criteria, procedural guidance, and control and accountability of sealed radioactive sources.
- Radiological hazards control and work coverage. During walk downs of the facility and job performance observations, the inspectors evaluated ambient radiological conditions, radiological postings, adequacy of radiological controls, radiation protection job coverage, and contamination controls. The inspectors also evaluated dosimetry selection and placement as well as the use of dosimetry in areas with significant dose rate gradients. The inspectors examined the licensee's controls for items stored in the spent fuel pool and evaluated airborne radioactivity controls and monitoring.
- High radiation area and very high radiation area controls. During plant walk downs, the inspectors verified the adequacy of posting and physical controls, including areas of the plant with the potential to become risk-significant high radiation areas.
- Radiation worker performance and radiation protection technician proficiency with respect to radiation protection work requirements. The inspectors determined if workers were aware of significant radiological conditions in their workplace, radiation work permit controls/limits in place, and electronic dosimeter dose and dose rate set points. The inspectors observed radiation protection technician job performance, including the performance of radiation surveys.

- Problem identification and resolution for radiological hazard assessment and exposure controls. The inspectors reviewed audits, self-assessments, and corrective action program documents to verify problems were being identified and properly addressed for resolution.

These activities constituted completion of the seven required samples of radiological hazard assessment and exposure control program, as defined in Inspection Procedure 71124.01.

b. Findings

Introduction. The inspectors reviewed a Green, self-revealing, non-cited violation of Technical Specification 5.7.2, which was caused by the licensee's failure to control a high radiation area with radiation levels greater than 1 rem per hour in the Unit 1 containment.

Description. On April 20, 2016, while performing a pre-job survey to characterize the radiological conditions associated with a valve-repacking job, a radiation protection technician (RPT) received a dose rate alarm on the 87-foot elevation of the containment building in the 2B reactor coolant pump (RCP) bay area. According to his alarming dosimeter, the maximum dose rate encountered by the RPT was 595 millirem per hour. The RPT entered the area on Task 2 of Radiation Exposure Permit (REP)1- 3502, "Valve, Flange, and Pump Maintenance and Inspection." Task 2 of this REP allowed entry into a high radiation area, but did not allow entry into a locked high radiation area (LHRA). This REP also had a dose rate alarm setpoint of 120 millirem per hour.

As the RPT was surveying the piping area around valve 1PRECEV332, he noticed a high-efficiency particulate air (HEPA) unit sitting off by itself near one of the piping structures. The HEPA unit was stationed off the steam generator 2 exhaust. As the RPT leaned toward the HEPA unit, he received the dose rate alarm. The RPT measured the HEPA pre-filter with a survey meter and it read 5 rem per hour on contact and 1.2 rem per hour at 30 centimeters. This was confirmed by a second RPT's independent measurement. As instructed by the REP, the RPT stopped his work and informed RP supervision and the Unit 1 containment desk that LHRA conditions (dose rates greater than 1 rem per hour) were unexpectedly identified in the 2B RCP bay area. The RPT guarded the area until other Palo Verde RPTs took over. These dose rates were documented on Survey 1-M-20160420-38, dated April 20, 2016.

According to the Exposure Evaluation Form from the dose rate alarm and the Unit 1 containment desk and rover logs, as documented in Condition Report (CR) 16-007479, this LHRA condition was identified around 9:46 p.m. (when the dose rate alarm occurred) and documented at 10:14 p.m. on April 20, 2016. The desk logs stated that three radiation protection technicians were briefed to enter the LHRA, in the 1B and 2B reactor coolant pump bay areas of the Unit 1 containment, to change the pre-filters around 10:17 p.m. on April 20, 2016. No log entries confirmed that the licensee had routinely stationed a radiation protection technician or guarded the LHRA until 7:02 p.m. on April 22, 2016. However, verbal discussions indicate that radiation protection coverage occurred prior to this log entry.

Because it is unknown how long the LHRA conditions existed prior to discovery, the inspectors concluded that LHRA conditions existed in the 2B RCP bay area for an

undetermined amount of time. As documented in the logs, the pre-filters on the HEPA unit were changed at 10:05 p.m. on April 22, 2016. The LHRA guards were released shortly after this time. The inspectors concluded that this issue may have been prevented if procedures were implemented to maintain dose rates on the portable HEPA units lower. The licensee had not provided specific instructions to monitor dose rates to allow for timely filter change-outs before the HEPA filters became excessively loaded with radioactivity.

Section 4.4 of licensee procedure 75RP-9OP02, "Control of High Radiation Areas, Locked High Radiation Areas, and Very High Radiation Areas," Revision 27, requires that access controls to locked high radiation areas are maintained by LHRA doors being locked to prevent unauthorized entry or LHRA flashing lights are installed and functioning. The procedure requires physical barriers to provide assurance that the LHRA is secure against unauthorized access that cannot be easily circumvented. As stated above, the NRC inspectors could not confirm the LHRA identified was properly controlled for a period of time.

As immediate corrective actions, the radiation protection technician informed the radiation protection supervision of the issue, radiation protection technicians guarded the LHRA until the HEPA pre-filters were removed, and the LHRA was eventually properly posted and controlled. This issue was entered into the licensee's corrective action program as Condition Reports 16-06515 and 16-07479.

Analysis. The inspectors determined that the failure to identify a LHRA through timely surveys and adequate procedures for HEPA unit operations that could have revealed changing radiological conditions was a performance deficiency. The performance deficiency was more than minor because it was associated with the Occupational Radiation Safety Cornerstone attribute of program and process (exposure control) and adversely affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation because licensee personnel did not implement barriers intended to prevent workers from receiving unexpected doses. Using Inspection Manual Chapter 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process," dated August 19, 2008, the inspectors determined the violation had very low safety significance (Green) because: (1) it was not an ALARA finding, (2) there was no overexposure, (3) there was no substantial potential for an overexposure, and (4) the ability to assess dose was not compromised. This finding has a cross-cutting aspect in the human performance area, associated with the resources component, because the licensee leaders failed to ensure that personnel, equipment, and procedures were available and adequate to support nuclear safety. Specifically, the licensee failed to ensure that procedures were adequate to ensure radiation levels around portable HEPA units were monitored to evaluate changing radiological conditions in a timely manner such that hazards were appropriately controlled [H.1].

Enforcement. Technical Specification 5.7.2 states, in part, that individual areas with radiation levels greater than or equal to 1 rem per hour (at 30 centimeters from the radiation source), accessible to personnel, that are located within large areas such as reactor containment, where no enclosure exists for purposes of locking, or that is not continuously guarded, and where no enclosure can be reasonably constructed around the individual area, shall be barricaded and conspicuously posted, and a flashing light shall be activated as a warning device. Contrary to the above, on April 20, 2016, an area with radiation levels greater than 1 rem per hour (at 30 centimeters from the

radiation source), accessible to personnel, located within the Unit 1 reactor containment where no enclosure existed for purposes of locking, was not barricaded and conspicuously posted and a flashing light was not activated as a warning device for the area. Specifically, LHRA controls were not established in the piping area around valve 1PRECEV332 near a HEPA unit in the 2B RCP bay area in the 87-foot elevation of the Unit 1 containment. NRC inspectors concluded this condition existed for an undetermined amount of time before radiation protection established adequate controls. The licensee documented the event in the corrective action program and logged the occurrence in their Unit 1 containment desk logs. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy. The violation was entered into the licensee's corrective action program as CR 16-06515 and 16-07479: NCV 05000528/2016002-02, "Failure to Implement High Radiation Area Controls in an Area with a Dose Rates Greater Than 1 Rem per Hour."

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

a. Inspection Scope

The inspectors evaluated whether the licensee controlled in-plant airborne radioactivity concentrations consistent with ALARA principles and that the use of respiratory protection devices did not pose an undue risk to the wearer. During the inspection, the inspectors interviewed licensee personnel, walked down various areas in the plant, and reviewed licensee performance in the following areas:

- Engineering controls, including the use of permanent and temporary ventilation systems to control airborne radioactivity. The inspectors evaluated installed ventilation systems, including review of procedural guidance, verification the systems were used during high-risk activities, and verification of airflow capacity, flow path, and filter/charcoal unit efficiencies. The inspectors also reviewed the use of temporary ventilation systems used to support work in contaminated areas such as HEPA/charcoal negative pressure units. Additionally, the inspectors evaluated the licensee's airborne monitoring protocols, including verification that alarms and set points were appropriate.
- Use of respiratory protection devices, including an evaluation of the licensee's respiratory protection program for use, storage, maintenance, and quality assurance of NIOSH certified equipment, air quality and quantity for supplied-air devices and self-contained breathing apparatus (SCBA) bottles, qualification and training of personnel, and user performance.
- Self-contained breathing apparatus (SCBA) for emergency use, including the licensee's capability for refilling and transporting SCBA air bottles to and from the control room and operations support center during emergency conditions, hydrostatic testing of SCBA bottles, status of SCBA staged and ready for use in the plant including vision correction, mask sizes, etc., SCBA surveillance and maintenance records, and personnel qualification, training, and readiness.
- Problem identification and resolution for airborne radioactivity control and mitigation. The inspectors reviewed audits, self-assessments, and corrective

action documents to verify problems were being identified and properly addressed for resolution.

These activities constituted completion of the four required samples of in-plant airborne radioactivity control and mitigation program, as defined in Inspection Procedure 71124.03.

b. Findings

Introduction. The inspectors identified a non-cited violation of 10 CFR 20.1701 due to the licensee's failure to implement adequate processes and engineering controls necessary to reduce airborne radioactivity. Subsequently, an airborne event in the Unit 1 containment building resulted of 41 individuals being evacuated from containment, eight of whom had measureable intakes of radioactive material.

Description. On April 20, 2016, the inspectors identified that procedures and instructions for monitoring portable high efficiency particulate air (HEPA) ventilation filters to prevent worker exposures to radiation and airborne radioactivity were not being implemented adequately. On April 21, 2016, the licensee's inadequate engineering and radiological controls during HEPA filtration unit operations caused an airborne radioactivity event in the Unit 1 containment, resulting in the evacuation of 41 potentially contaminated workers.

During the Unit 1 Refueling Outage 19, the inspectors reviewed the licensee's implementation of radiation protection Procedure 75DP-ORP05, Revision 6, "Control of Portable Air Filtration Systems." The inspectors focused on the following parts:

- Section 4.4, Portable Filter System Operational Checks
- Section 4.5, Radiological Controls for Portable Filtration
- Section 5.3, Records
- Appendix A, Portable Filtration Unit Daily Operational Checks

The inspectors reviewed six operational checklists from HEPA units that were in-service during the Unit 1 outage or that had been recently placed in-service during April 2016. The records (Appendix A Checks) reviewed included HEPA filter installations in the following locations:

- Unit 1 steam generator 1 and 2 on the 87-foot elevation
- Unit 1 shutdown heat exchanger on the 70-foot elevation
- Unit 1 hot machine
- Dry active waste process and storage facility

Inspectors noted that licensee radiation protection technicians, generally, had entered the daily HEPA unit differential pressure data on the checklist and initialed this task as an indication that pre-filter and HEPA units were not loaded up, blocked, and had no filter breakthrough. Initials on the checklists were indications that radiation protection technicians (RPTs) had:

- Performed a radiation survey of the filter housing to ensure that general area dose rates are not affected

- Assessed the need for a filter change based on differential pressure and impact on general area dose rates

The inspectors reviewed radiation surveys, contamination surveys, and air sample results associated with HEPA unit operations for the week of April 18-22, 2016. Inspectors found that RPTs had not initialed the daily HEPA unit data checklist on April 20 and April 21 for the HEPA unit located at the Unit 1 steam generator 2 area. Additionally, radiation protection technicians did not initial the daily HEPA unit differential data checklist on April 21 for the HEPA unit located at the Unit 1 steam generator 1 area. These omissions by the radiation protection technicians were not in accordance with Procedure 75DP-0RP05, Section 4.4.

Section 4.5, "Radiological Controls for Portable Filtration," and Subsection 4.5.1 of this procedure stated, "Verify efficiency of the HEPA filter daily when in service by one or more of the following methods:

- Portable air sampling in the affected room or area
- Continuous air sampling in the affected room or area using an AMS-4 or equivalent
- Contamination survey at the discharge of the portable filtration unit"

The inspectors asked how RPTs specifically decided when to change out pre-filter and HEPA filters based on radiation surveys and general area dose rates. Licensee staff explained that RPTs would change the HEPA filter based on the results of their filter checks, surveys, and monitoring. The inspectors noted that none of the radiation exposure permits associated with the Unit 1 steam generators or shutdown heat exchangers provided specific instructions on changing pre-filter and HEPA filters based on radiological conditions. Procedure 75DP-0RP05 was not specific on changing filters based on radiological conditions.

The inspectors examined two radiation and contamination survey records, dated April 20, 2016, that were performed. Survey 1-M-20160420-22 recorded data for the steam generator 1 and steam generator 2 HEPA units at 3:39 p.m. The steam generator 1 pre-filter had a contact reading of 3,500 millirem per hour on contact and a 550 millirem per hour reading at 30 centimeters. The steam generator 1 HEPA filter had a contact radiation reading of 500 millirem per hour and a 30 centimeters reading of 100 millirem per hour. The HEPA filter also had a discharge contamination reading of 5,000 disintegrations per minute. During this same time (3:39 p.m.), the steam generator 2 pre-filter had a contact radiation reading of 2,400 millirem per hour and a 30 centimeters reading of 350 millirem per hour. The steam generator 2 HEPA filter measured 350 millirem per hour on contact and 100 millirem per hour at 30 centimeters. The steam generator 2 HEPA filter had a discharge contamination reading of 50,000 disintegrations per minute. By 10:53 p.m. on April 20, 2016, the steam generator 2 pre-filter and HEPA filter assembly had a contact radiation reading of 5,000 millirem per hour and a 30 centimeters reading of 1,200 millirem per hour.

Licensee supervision explained that it would have been their expectation that the pre-filter and HEPA filter change-outs would have occurred before the discharge contamination levels reached 5,000 dpm and before the radiation levels in the area approached 1,000 millirem per hour. However, radiation protection management acknowledged that Procedure 75DP-0RP05 and radiation exposure permits did not have specific instructions on when pre-filter and HEPA filter change outs were required. Overall, the inspectors determined that the portable filtration unit daily operational check frequencies were insufficient radiological controls. The inspectors concluded that the lack of specific instructions in Procedure 75DP-0RP05 and the radiation exposure permits used to monitor and change out HEPA pre-filters represented a lack of practical processes or other engineering controls necessary to reduce the concentration of radioactive material in air.

At 10:17 p.m. on April 20, 2016, the licensee had an ALARA pre-job meeting to change out the pre-filters to the steam generator 1 and steam generator 2 HEPAs in the Unit 1 containment building, on the 87-foot elevation. Early in the morning of April 21, 2016, the licensee changed out the pre-filters to the steam generator 1 and steam generator 2 HEPA units. However, there were indications of elevated airborne radioactivity in containment. The Unit 1 plant vent radiation monitor RU-143 went into an alarming mode. Simultaneously, several continuous air monitors located in Unit 1 containment went into the alarm mode. The licensee evacuated at least 41 workers from the containment building. Nine workers alarmed the personnel contamination monitors and eight workers were sent to dosimetry for whole body counting. Unit 1 outage work in the containment building was suspended pending an investigation to identify the actual source of the airborne contamination event. The licensee's initial investigation identified the following:

- The source of the radioactivity was the pre-filter HEPA unit at steam generator 2 associated with eddy current testing sludge material overloading
- A radiation protection technician had placed a plastic bag over the Y-connector that later got sucked into the HEPA filter, disabling the unit
- Procedure 75DP-0RP05, Appendix A, "Portable Filtration Unit Daily Operational Checks," failed to identify a reduction in the HEPA unit's performance
- The radiation protection technicians' monitoring of radiological indicators associated with the HEPA unit's operations failed to identify any problems

The inspectors also determined that radiation protection Procedure 75DP-0RP05, Revision 6, "Control of Portable Air Filtration Systems," as written was inadequate. Engineering and radiological controls that the licensee had implemented in accordance with RG 8.8, Section 2(d), and 10 CFR 20.1701 were insufficient to mitigate and control the concentration of radioactive material in air. Pre-filter and HEPA unit checks, monitoring, and surveys were untimely and too infrequent to properly assess HEPA unit performance. The licensee's immediate corrective actions included stopping work in the Unit 1 containment, instructing individuals to report to dosimetry for monitoring and conducting an extensive root cause investigation of the event. The licensee entered this issue into their corrective action program as Condition Reports 16-06099, 16-06578, 16-06593, and 16-06594.

Analysis. The inspectors determined that the failures to implement adequate engineering and radiological controls to reduce airborne radioactivity during HEPA unit operations in accordance with 10 CFR 20.1701 and radiation protection procedures was a performance deficiency. The performance deficiency was more than minor because it was associated with the Occupational Radiation Safety Cornerstone attribute of program and process (exposure control) and adversely affected the cornerstone objective to ensure the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. This was evident by the Unit 1 containment airborne radioactivity event on April 21, 2016, that resulted in at least eight workers with unplanned intakes. Using Inspection Manual Chapter 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process," dated August 19, 2008, the inspectors determined the finding had very low safety significance (Green) because: (1) it was not an ALARA planning and controls finding, (2) there was no overexposure, (3) there was no substantial potential for an overexposure, and (4) the ability to assess dose was not compromised. The inspectors concluded that the finding has a cross-cutting aspect in the human performance area, associated with the resources component, because the licensee leaders failed to ensure that personnel, equipment, procedures, and other resources were available and adequate to support nuclear safety. Specifically, procedures and radiation exposure permits failed to have adequate instructions for ensuring HEPA filter loading and dose rates were monitored to prevent overloading, and safe handling of loaded HEPA filters [H.1].

Enforcement. Title 10 CFR 20.1701 states, in part, that the licensee shall use, to the extent practical, processes or other engineering controls necessary to reduce the concentration of radioactive material in air. Contrary to the above, on April 20, 2016, the licensee failed to use, to the extent practical, processes or other engineering controls necessary to control the concentration of radioactive material in air within the Unit 1 containment building. Specifically, the licensee failed to implement portable HEPA filtration unit daily operational checks, radiological surveys, and timely monitoring processes in order to identify decreased HEPA unit performance in the steam generator 1 and steam generator 2 areas of the Unit 1 containment. Consequently, these failures to use adequate radiological and engineering controls resulted in an airborne radioactivity event on April 21, 2016, in the Unit 1 containment, causing the evacuation of 41 potentially contaminated workers, eight of whom had measurable intakes of radioactive material. . Because the violation is of very low safety significance (Green) and the licensee has entered the issue into their corrective action program, this violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000528/2016002-03, "Inadequate Engineering and Radiological Controls Resulting in a Unit 1 Containment Building Airborne Radioactivity Event with Unplanned Intakes."

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 Mitigating System Performance Index: Emergency AC Power Systems (MS06), High Pressure Injection Systems (MS07), Heat Removal Systems (MS08), Residual Heat Removal Systems (MS09), and Cooling Water Systems (MS10)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of April 1, 2015, through March 31, 2016, to verify the accuracy and completeness of the reported data. 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 mitigating system performance index for emergency ac power systems, high pressure injections systems, heat removal systems, residual heat removal systems, and cooling water systems for units 1, 2, and 3, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.2 Drill/Exercise Performance (EP01)

a. Inspection Scope

The inspectors reviewed the licensee's evaluated exercises and selected drill and training evolutions that occurred between July 2015 and March 2016 to verify the accuracy of the licensee's data for classification, notification, and protective action recommendation (PAR) opportunities. The inspectors reviewed a sample of the licensee's completed classifications, notifications, and PARs to verify their timeliness and accuracy. 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 data reported.

These activities constituted verification of the drill/exercise performance indicator as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.3 Emergency Response Organization Drill Participation (EP02)

a. Inspection Scope

The inspectors reviewed the licensee's records for participation in drill and training evolutions between July 2015 and March 2016 to verify the accuracy of the licensee's data for drill participation opportunities. The inspectors verified that all members of the licensee's emergency response organization (ERO) in the identified key positions had been counted in the reported performance indicator data. The inspectors reviewed the licensee's basis for reporting the percentage of ERO members who participated in a drill. The inspectors reviewed drill attendance records and verified a sample of those reported as participating. 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 data reported.

These activities constituted verification of the emergency response organization drill participation performance indicator as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.4 Alert and Notification System Reliability (EP03)

a. Inspection Scope

The inspectors reviewed the licensee's records of Alert and Notification System tests conducted between July 2015 and March 2016 to verify the accuracy of the licensee's data for siren system testing opportunities. The inspectors reviewed procedural guidance on assessing alert and notification system opportunities and the results of periodic alert and notification system operability tests. 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 data reported.

These activities constituted verification of the alert and notification system reliability performance indicator as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.5 Occupational Exposure Control Effectiveness (OR01)

a. Inspection Scope

The inspectors verified that there were no unplanned exposures or losses of radiological control over locked high radiation areas and very high radiation areas during the period of April 1, 2015, through March 31, 2016. The inspectors reviewed a sample of radiologically controlled area exit transactions showing exposures greater than 100 millirem. 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 occupational exposure control effectiveness performance indicator as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.6 Radiological Effluent Technical Specifications (RETS)/Offsite Dose Calculation Manual (ODCM) Radiological Effluent Occurrences (PR01)

a. Inspection Scope

The inspectors reviewed corrective action program records for liquid or gaseous effluent releases that occurred between April 1, 2015, and March 31, 2016, and were reported to the NRC to verify the performance indicator data. 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 radiological effluent technical specifications (RETS)/offsite dose calculation manual (ODCM) radiological effluent occurrences performance indicator as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

40A2 Problem Identification and Resolution (71152)

.1 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.

.2 Semiannual Trend Review

a. Inspection Scope

The inspectors reviewed the licensee's corrective action program, performance indicators, system health reports, station-wide and departmental performance improvement reports, and other documentation to identify trends that might indicate the existence of a more significant safety issue. The inspectors verified that the licensee was taking corrective actions to address identified adverse trends.

These activities constitute completion of one semiannual trend review sample, as defined in Inspection Procedure 71152.

b. Observations and Assessments

The licensee is currently monitoring five station-wide performance trends that are considered to be adverse to quality.

- Hazard identification and acceptance
- Station program and procedure non-compliances
- Procedural guidance and quality
- Human performance tool usage
- Implementation of corrective actions

With regard to all of these trends, the inspectors concluded that the licensee is identifying, monitoring, and correcting these trend behaviors adequately and effectively. The inspectors also observed that the results of the trend analysis were consistent with station performance indicators.

The inspectors did not identify any additional adverse trends, however inspector observations have contributed to some of the trends identified by the licensee.

c. Findings

No findings were identified.

.3 Annual Follow-up of Selected Issues

a. Inspection Scope

The inspectors selected two issues for an in-depth follow-up:

- From April 4, 2016, through June 3, 2016, during an in-office inspection, the inspectors reviewed the six cyber security issues documented in Inspection Report 05000528; 05000529; 05000530/2013405 for an in-depth follow-up. The inspectors reviewed procedures, digital asset listings, and corrective action documents. The inspectors interviewed personnel involved in implementing the corrective actions.

The inspectors assessed the licensee's cause analyses, extent of condition reviews and compensatory actions. The inspectors verified that the licensee

appropriately prioritized the planned corrective actions and that these actions were appropriate.

- On May 12, 2016, the inspectors reviewed an instance of reactor coolant pressure boundary leakage at the Unit 1 reactor coolant loop 2B cold leg resistance temperature detector nozzle.

The inspectors assessed the licensee's problem identification threshold, cause analyses, extent of condition reviews and compensatory actions. The inspectors verified that the licensee appropriately prioritized the planned corrective actions and that these actions were adequate to correct the condition.

These activities constitute completion of two annual follow-up samples as defined in Inspection Procedure 71152.

b. Findings

No findings were identified.

40A6 Meetings, Including Exit

Exit Meeting Summary

On April 21, 2016, the inspectors presented the inservice inspection results to Mr. R. Bement, Senior Vice President, Site Operations, 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 April 22, 2016, the inspectors presented the radiation safety inspection results to Mr. R. Bement, Senior Vice President, Site Operations, and other members of the licensee staff. The licensee acknowledged the issues presented. In addition, the inspector conducted a telephonic final exit with Mr. M. Laca, Vice President, Regulatory Affairs and Plant Improvement, and other members of staff on June 9, 2016. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

On May 5, 2016, the inspectors presented the results of the on-site inspection of the emergency preparedness program to Mr. R. Bement, Senior Vice President, Site Operations, 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 June 3, 2016, the inspectors presented the inspection results to Mr. R. Bement, Senior Vice President, Site Operations, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors destroyed proprietary information that had been reviewed.

On July 14, 2016, the inspectors presented the inspection results to R. Bement, 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

R. Bement, Senior Vice President, Site Operations
M. Lecal, Senior Vice President of Regulatory and Oversight
J. Cadogan, Vice President, Engineering
C. Kharrl, Plant General Manager for Operations
M. McLaughlin, Plant General Manager of Site Support
D. Vogt, Assistant Plant Manager
H. Ridenour, Director Maintenance
G. Andrews, Director Regulatory Affairs
D. Wheeler, Director Performance Improvement
K. Graham, Director Plant Engineering
K. House, Director Design Engineering
D. Arbuckle, Manager, Unit Operations/Emergency Preparedness
M. McGhee, Department Leader, Nuclear Regulatory Affairs
G. Cameron, Section Leader, Nuclear Regulatory Affairs
H. Lesan, Section Leader, Performance Improvement
G. Jones, Supervisor, Radiation Protection
S. Lantz, Dosimetry Section Leader, Radiation Protection
C. Moeller, Director, Technical Support (Acting)
R. Routolo, Manager, Radiation Protection (Acting)
M. Wagner, Supervisor, ALARA and Radiation Protection
R. Atkisson, Manager, Cyber Security Project
S. Bittner, Senior Engineer and Cyber Security Specialist
A. Swirbul, Section Leader, Cyber Security
J. Bettencourt, Senior Health Physicist, Radiation Protection
M. Cosenza, Manager, Security Programs
T. Dickinson, Unit 3 RMC Supervisor, Radiation Protection
D. Heckman, Senior Consultant, Nuclear Regulatory Affairs
H. Jackson, Health Physicist, Radiation Protection
M. Mahoney, Senior Program Advisor, Nuclear Security Programs
R. Neville, Senior Reactor Engineer
D. Ricks, Senior Reactor Engineer, Special Nuclear Material Custodian
J. Sowers, Department Leader, Nuclear Engineering Design
D. Whitehead, Section Leader, Operations Computer Systems Engineering
R. Carbonneau, Director, Nuclear Assurance
T. Weber, Department Leader, Nuclear Regulatory Affairs
T. Gaffney, Department Leader, Program Engineering
B. Loyd, Department Leader, Maintenance/Welding
D. Naughton, Program Engineering Section Leader
M. Brannin, Engineering Program Owner

NRC Personnel

D. Garmon, Health Physicist, Office of Nuclear Reactor Regulation

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000528/2016002-01 URI Leakage From Reactor Coolant Pump 2B Discharge Pipe Instrument Nozzle

Opened and Closed

05000528/2016002- 02 NCV Failure to Implement High Radiation Area Controls in an Area with a Dose Rates Greater Than 1 rem per Hour

05000528/2016002- 03 NCV Inadequate Engineering and Radiological Controls Resulting in a Unit 1 Containment Building Airborne Radioactivity Event with Unplanned Intakes

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40DP-9OP34	Switchyard Administrative Control	21
40AO-9ZZ25	Energy Control Center Directed Turbine Unloading	12

Section 1R04: Equipment Alignment

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
33MT-9CP01	Venting the Containment in Lower Modes	2
40OP-9HF01	Fuel Building HVAC	28
40ST-9HF02	Train B ESF Pump Room and Fuel Building Ventilation System Operability/Functionality Test	19
40OP-9DG01	Emergency Diesel Generator A	75
40OP-9DG02	Emergency Diesel Generator B	73

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
01-M-HFP-0001	P&I Diagram HVAC – Fuel Building	16
01-M-AFP-0001	P&I Diagram Auxiliary Feedwater System	41

Condition Reports (CRs)

16-05869	12-00082	14-02869	15-07716	16-03684
16-07558				

Work Orders

4748099	4728003
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Section 1R05: Fire Protection

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
14DP-0FP01	Firewatch	12

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	Pre-Fire Strategies Manual	25
	PVNGS Updated FSAR	18

Section 1R06: Flood Protection Measures

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
C2	Design Basis Manual: Hazards Topical	13
13-MC-ZY-598	Condensate Water Storage Tank Tunnel Flooding	0
	PVNGS Updated FSAR	18

Section 1R07: Heat Sink Performance

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
74OP-9SP04	Essential Spray Pond Chemical Addition System Human-Machine Interface Operation	7
40OP-9SP02	Essential Spray Pond (SP) B	50

Section 1R08: Inservice Inspection Activities

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
73DP-9WP04	Welding and Brazing Control	17
73DP-9ZC01	Boric Acid Corrosion Control Program	7
70TI-9ZC01	Boric Acid Walkdown Leak Detection	19
73DP-9XI03	ASME Section XI Inservice Inspection	18
73TI-0ZZ13	Radiographic Examination	18
73TI-9RC01	Steam Generator Eddy Current Examinations	31
73TI-9RC09	Bare Metal Visual Examination of Reactor Vessel Upper Head	4
73TI-9RC10	Bare Metal Visual Examination of Reactor Vessel Bottom Head	4
73TI-9ZZ05	Dry Magnetic Particle Examination	17
73TI-9ZZ07	Liquid Penetrant Examination	16
73TI-9ZZ09	Ultrasonic Examination of Pipe and Vessel Welds	17
73WP-0ZZ07	Welding of Stainless and Nickel Alloys	17
73WP-0ZZ04	Welding Of Carbon And Low Alloy Steels To Stainless And Nickel Alloys	19
73WP-0ZZ05	Welding of Ferritic and Martensitic Steels	14
73WP-0ZZ07	Welding of Stainless and Nickel Alloys	17
73WP-0ZZ20	Visual Inspection of Code Welds	9
81DP-9RC01	PVNGS Steam Generator Management Program	16
01-MS-A134	Unit 1 Cycle 18/19 Operational Assessment Evaluation	1
PDI-UT-1	Generic EPRI Procedure for the Ultrasonic Examination of Ferritic Pipe Welds	E
PDI-UT-2	Generic EPRI Procedure for the Ultrasonic Examination of Austenitic Pipe Welds	F

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
SG-SGMP-14-2	Palo Verde U1R18 Steam Generator Degradation Assessment	March 2014

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
SG-SGMP-16-9-NP	Palo Verde U1R19 Steam Generator Degradation Assessment	March 2016
	Analyst Guidelines Training Manual	19
10407-F103038	Certified Materials Test Report	June 27, 1979
WCAP-15988-NP	Generic Guidance for an Effective Boric Acid Inspection Program for Pressurized Water Reactors	1

Palo Verde Action Requests (PVARs)

14-02955	14-03311	15-01551	15-10358	15-09437
15-10803	15-01253	15-01745	15-01924	15-02475
15-03170	15-05653	15-09217	15-10457	15-10624
15-12565	15-12198	15-12084	15-12157	16-03860
16-01525	16-01634	16-01640	16-01727	16-01728
16-00499	16-01728			

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

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40DP-9OP02	Conduct of Shift Operations	69
40OP-9ZZ05	Power Operations	146
40OP-9ZZ07	Plant Shutdown Mode 1 to Mode 3	40
40OP-9ZZ10	Mode 3 to Mode 5 Operations	69

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
NLR16S030400	Licensed Operator Continuing Training: Control Room Fire	May 31, 2016

Section 1R12: Maintenance Effectiveness

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
	Maintenance Rule expert Panel Meeting AGENDA #584	May 12, 2016
	Palo Verde Maintenance Rule Database	

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
70DP-0MR01	Maintenance Rule	40

Condition Reports (CRs)

16-03010	16-02680
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Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40DP-9AP21	Protected Equipment	7
40ST-9SI07	High Pressure Safety Injection System Alignment Verification	18
31MT-9RC23	Reactor Coolant Pump Sulzer Bingham Seal Replacement	37

Work Orders

4739676	4645509
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Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/</u> <u>Date</u>
	Unit One 19 th Refueling Outage SHUTDOWN RISK ASSESSMENT TEAM REVIEW REPORT	0
	SHUTDOWN SAFETY FUNCTION ASSESSMENT RCS AT/BELOW RV FLANGE	April 14, 2016
	SHUTDOWN SAFETY FUNCTION ASSESSMENT PRESSURIZER MANWAY ON, SDC ENTRY CONDITIONS MET	May 10, 2016
	Scheduler's Evaluation for Unit 1	May 20, 2016

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/ Date</u>
	Palo Verde Operator Logs Unit 1	May 19-21, 2016
	Scheduler's Evaluation for Unit 1	June 23, 2016
	Scheduler's Evaluation for Unit 3	June 20, 2016

Section 1R15: Operability Determinations and Functionality Assessments

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40DP-9OP26	Operations Condition reporting Process and Operability Determination/Functional Assessment	42
40OP-9ST03	Station Blackout Generator 2 Operation	12
40OP-9ST02	Station Blackout Generator 1 Operation	10

Condition Reports (CRs)

16-04066	16-05323	16-05310	16-08688	16-10399
16-08398	16-06429	16-06652	16-09777	16-06669

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/ Date</u>
0115-0043-RPT-001	MPR Evaluation for EDG 2A Surge Tank with Missing Bracket Bolts	May 26, 2016
A0-JN-0359	Station Blackout Generator Obsolescence Upgrade Specification	0
	Unit 1 Operator Logs	June 24-26, 2016

Work Orders

4761703	4610931	4768060
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Section 1R18: Plant Modifications

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
73ST-9XI21	Shutdown Cooling & Miscellaneous SI Valves Inservice Test	36

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
73DP-9ZZ26	Motor Operated Valve (MOV) Testing with Quiklook	3
73ST-9SI03	Leak Test of SI/RCS Pressure Isolation Valves	50

Condition Reports (CRs)

13-00572

Work Orders

4619277 4699840

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Date</u>
S-16-0011	10 CFR 50.59 Screening	April 15, 2016

Section 1R19: Post-Maintenance Testing

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
77ST-9SB22	CEA Drop Time Test	9
40ST-9SF01	CEA Operability Checks	35
40ST-9GT02	Station Blackout Generator 1 Monthly Testing	5
73ST-9SI05	Leak Test of HPSI/LPSI Containment Isolation Check Valve	33
73ST-9XI05	AF & CT Valves – Inservice Test	30
73DP-9ZZ26	Motor Operated Valve (MOV) Testing with Quiklook	3
32MT-9ZZ52	Battery Charger Preventive Maintenance	32
32ST-9ZZ34	Class 1E Battery Charger 18 Month Surveillance Test	13
39MT-9ZZ02	PM or EQ Inspection of the Limitorque SMB/SB/SMC Motor Operated Valve Actuators	33

Work Orders

4597731 4631945 4785965 4616104 4696129
4696101 4629472 4662858

Condition Reports (CRs)

3524906 3540904 4510957

Section 1R20: Refueling and Other Outage Activities

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/ Date</u>
40ST-9ZZ09	Containment Cleanliness Inspection	24
NAD 2016-004	Nuclear Assurance Department Audit Report of Outage and Maintenance Activities	June 24, 2016

Condition Reports (CRs)

16-06652	16-08048	16-07996	16-07925	16-07922
16-05756				

Section 1R22: Surveillance Testing

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
73ST-9CL01	Containment Leakage Type B and C Testing	44
36ST-9RC03	Containment Building Sump Level Probe Calibration	0
40ST-9SF01	CEA Operability Checks	35
40ST-9HF02	Train B ESF Pump Room and Fuel Building Ventilation System Operability/Functionality Test	19
73ST-9AF02	Auxiliary Feedwater A – Inservice Test	56
74ST-9SQ01	Train B Radiation Monitoring Quarterly Functional Test	12

Condition Reports (CRs)

16-06388	16-06287	15-01848	16-09310	16-09377
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Work Orders

4616093	4701095	4622586	4611074	4597740
4667103	4610992			

Section 1EP2: Alert and Notification System Testing

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision/ Date</u>
	Revised Alert and Notification System FEMA 350 Report	July 2014
	Siren Operating Manual	November 2015

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
16DP-0EP29	Public Information	5
16DP-0EP37	Prompt Notification System	5
	Maricopa County Department of Emergency Management Letter from H. Andrade to D. Crozier regarding testing of tone alert radios	October 16, 2015
	Maricopa County Department of Emergency Management Letter to 10-mile EPZ residents regarding mailing of 2015 Assistance Request Survey (and copy of survey)	
	PVNGS Letter to 10-mile EPZ residents regarding mailing of 2016 Palo Verde Public Safety Calendar	December 2015
	DEX Telephone Directory Community Pages, Greater Southwest Valley, Palo Verde Emergency Plan, 2015 Version	
	2015 Annual Communications Testing (Form EP-0742)	

Section 1EP3: Emergency Response Organization Staffing and Augmentation System

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
16DP-0EP23	Emergency Preparedness Drill/Exercise Administration	9
16DP-0EP34	Emergency Response Organization	2
	Fukushima Response NEI 12-01 Phase 2 Staffing Assessment Report	May 1, 2014
EP-0904	ERO/ERF Activation and Operation	4

Drills/Test

<u>Number</u>	<u>Title</u>	<u>Date</u>
090-05097	Emergency Preparedness Augmentation Drill Report	First Quarter 2014
9631-02755	Emergency Preparedness Augmentation Drill Report	Second Quarter 2014
0240-02760	Emergency Preparedness Augmentation Drill Report	Third Quarter 2014
0240-02761	Emergency Preparedness Augmentation Drill Report	Fourth Quarter 2014

Drills/Test

<u>Number</u>	<u>Title</u>	<u>Date</u>
0240-02768	Emergency Preparedness Augmentation Drill Report	First Quarter 2015
0240-02769	Emergency Preparedness Augmentation Drill Report	Second Quarter 2015
0240-02774	Emergency Preparedness Augmentation Drill Report	Third Quarter 2015
0240-02778	Emergency Preparedness Augmentation Drill Report	Fourth Quarter 2015
0240-02784	Emergency Preparedness Augmentation Drill Report	First Quarter 2016
240-02753	2014 Assembly/Accountability/Search & Rescue Drill Report	May 15, 2014
240-02779	2015 Assembly and Accountability Drill Report	December 17, 2015

Section 1EP4: Emergency Action Level and Emergency Plan Changes

Procedures

<u>Number</u>	<u>Title</u>
Form EP-0812	Effectiveness Evaluation #2015-005E for Revision 55 to the PVNGS Emergency Plan

Section 1EP5: Maintenance of Emergency Preparedness

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	PVNGS Emergency Plan	56
16DP-0EP20	Conduct of Emergency Preparedness Operation	20
16DP-0EP22	Emergency Plan Maintenance	11
16DP-0EP24	Emergency Response Facility Functionality Evaluation	5
16DP-0EP25	Emergency Preparedness Training Program Description	14
16DP-0EP27	Emergency Preparedness Equipment Testing	9
16DP-0EP31	Emergency Preparedness Equipment Out of Service	7
16EP-0BD02	Alternate Facility Activation and Guidance	0
EP-0903	Accident Assessment	3

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EP-0904	ERO/ERF Activation and Operation	4
EP-0905	Protective Actions	7

Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
240-02788	2016 Contaminated Injury/Health Physics Drill Report	April 22, 2016
240-02764	2014 Health Physics Drill Report (NOV)	December 9, 2014
090- 05105	2014 On-site Contaminated Injury/Health Physics Drill Report	March 14, 2014
240-02773	2015 Contaminated Injury/Health Physics Drill Report	July 24, 2015
240-02782	2015 Health Physics Drill Report (December)	December 23, 2015
090-05104	2014 Environs Drill Report	April 10, 2014
DSR 16CJY006	NAD Daily Summary Report: Contamination Control during the Contaminated Injury Drill	April 4, 2016
DSR 16BEA002-005	NAD Daily Summary Report: Contaminated Injury Drill 3/24/2016	March 25, 2016
2014-009	Nuclear Assurance Department (NAD) Audit Plan and Report; Emergency Preparedness	October 30, 2014
2015-010	Nuclear Assurance Department (NAD) Audit Plan and Report; Emergency Preparedness	November 24, 2015
4552939	Formal Department Self-Assessment Report	November 21, 2014
4628454	Emergency Preparedness Self-Assessment Report	February 27, 2015
14-04015-003	Formal Department Self-Assessment Report	July 24, 2015
	Updated Review of PVNGS Emergency Plan 2015 Letters of Agreement	
	KLD Engineering Memo, "Palo Verde Annual Population Update – 2013"	December 11, 2013
	KLD Engineering Memo, "Palo Verde Annual Population Update – 2014"	December 10, 2014
	KLD Engineering Memo, "Palo Verde Annual Population Update – 2015"	December 9, 2015

Condition Reports (CRs)

4497644	4498518	4498984	4499880	4499935
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Condition Reports (CRs)

4499936	4499961	4499975	4500335	4500734
4502828	4503218	4505703	4506659	4508048
4511563	4512791	4523337	4531539	4539821
4556017	4558724	4578090	4578420	4582857
A-15-04155	A-15-10907	15-03167	15-04164	15-04341
15-05255	15-07950	15-08028	15-08191	15-12036
2-16-05781	16-00840	16-01811	16-04968	16-05469
16-01817	16-05867	16-07481	16-07482	16-07485
16-07562	16-07568	16-07569		

Section 2RS1: Radiological Hazard Assessment and Exposure Controls

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
75DP-0RP01	RP Program Overview	11
75DP-0RP02	Radioactive Contamination Control	21
75DP-9RP01	Radiation Exposure and Access Control	20
75RP-0RP01	Radiological Posting and Labeling	33
75RP-9OP02	Control of High Radiation Areas, Locked High Radiation Areas and Very High Radiation Areas	27
75RP-9RP02	Radiation Exposure Permits	29
75RP-9RP07	Radiological Surveys and Air Sampling	25
75RP-9RP25	Temporary Shielding	14
75RP-9RP26	Radioactive Source Control	16

Audits, Self-Assessments, and Surveillances

<u>Number</u>	<u>Title</u>	<u>Date</u>
WO4574191	Radioactive Source Leak Test Surveillance	January 20, 2016
2014-007	Nuclear Assurance Department (NAD) Audit Plan and Report – Radiation Protection	October 3, 2014
	PVNGS Integrated Performance Assessment Report – Radiation Protection 1 st Quarter 2015	May 14, 2015
IER L2 11-41	Simple Self-Assessment: Unplanned Personnel Exposures from Highly Radioactive In-Core Components	June 30, 2015

Condition Reports

15-01879	15-02040	15-02495	15-03224	15-03576
15-04386	15-05272	15-05685	15-07216	15-08920
15-10728	15-12641	16-06135	16-06497	16-06499
16-06515				

Radiation Exposure Permits

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1-1515	Replace 1JSIAUV0651	0
1-3022	Refueling and Associated Work	5
1-3306	Primary Side Steam Generator Maintenance	3
1-3310	Steam Generator Secondary Side Maintenance	4
1-3502	Valve, Flange, and Pump Maintenance and Inspection	5
1-3530	Valve and Flange Maintenance	3
3-3015	Refuel Cavity Decontamination	5
3-3306	Primary Side Steam Generator Maintenance	6
3-3335	Repair Reactor Vessel Seating Surface	1

Radiation Survey Records

<u>Number</u>	<u>Title</u>	<u>Date</u>
1-M-20160408-12	C080 Elevation Overview – Containment	April 8, 2016
1-M-20160409-3	C100 Elevation Overview – Containment	April 9, 2016
1-M-20160411-15	C090 Elevation Overview with Lines and Valves	April 11, 2016
3-M-20160412-4	A140 Elevation Overview – Auxiliary	April 12, 2016
3-M-20160412-5	A140 Chem Hot Lab, I&C Hot Shop, Utility Closet	April 12, 2016
3-M-20160412-7	R100 RW Truck Bay – Low Level Storage Area	April 12, 2016
1-M-20160420-36	C-SG2 Letdown Delay Coils – Containment	April 20, 2016
1-M-20160420-38	C-SG2 087 Elevation Overview – Containment	April 20, 2016
2-M-20160418-1	A140 Elevation Overview – Auxiliary	April 18, 2016
2-M-20160421-2	R100 RW Truck Bay – Low Level Storage Area	April 21, 2016

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
	Radioactive Source Inventory: Units 1, 2, and 3 (SourceTRAX)	April 18, 2016
	Daily Plant Status Package	April 19 to 22, 2016
App. B to 75RP-9OP2	LHRA/VHRA Key Control Inventory for Unit 1	April 20, 2016

Section 2RS3: In-Plant Airborne Radioactivity Control and Mitigation

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
01DP-01S08	PVNGS Respiratory Protection Equipment Usage	19
01DP-01S10	PVNGS Respiratory Protection Program	12
14FT-9FP78	Respiratory Equipment Inspection and Repair	0
75DP-0RP01	RP Program Overview	11
75DP-0RP05	Control of Portable Air Filtration Systems	6
75DP-0RP06	Managing Radiological Risk	2
75RP-9RP02	Radiation Exposure Permits	29
75RP-9RP03	Bioassay Analysis	10
75RP-9RP05	Contamination Dose Evaluation	7
75RP-9RP07	Radiological Surveys and Air Sampling	25

Condition Reports

15-02312	15-02567	15-02820	15-02839	15-03557
15-06704	15-10590	15-10809	15-10997	15-12458
15-12798	16-03411			

Radiation Exposure Permits

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1-3003	Reactor Vessel Head (RVH) O-Ring Maintenance and Flange Inspection	3
2-3509	Contamination Control Outage Tasks	5
3-3306	Primary Side Steam Generator Maintenance	6

Radiation Exposure Permits

<u>Number</u>	<u>Title</u>	<u>Revision</u>
9-1021	LR Evaporator & BAC System Maintenance	3
9-1105	Fuel Handling	1

Radiation Survey Records/Air Samples

<u>Number</u>	<u>Title</u>	<u>Date</u>
1-16-00302	U1 Containment 114' – Cavity	April 9, 2016
1-16-00312	U1 Containment 114' – Cavity	April 10, 2016
1-16-00313	U1 Containment 114' – Cavity	April 10, 2016
1-16-00314	U1 Containment 140' – Cavity East	April 10, 2016

Section 40A1: Performance Indicator Verification

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
16DP-0EP19	Performance Indicator Emergency Preparedness Cornerstone	17
75RP-0LC01	Performance Indicator Occupational Radiation Safety Cornerstone	4
75RP-0LC02	Performance Indicator Public Radiation Safety Cornerstone	4

Condition Reports (CRs)

15-02333	15-10580	4658975	4659013	4661343
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Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	MSPI Derivation Reports	March 2016
	MSPI Margin Reports	March 2016
13-NS-C075	Palo Verde MSPI Bases Document	9

Section 40A2: Problem Identification and Resolution

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
22DP-0AC06	PVNGS Critical Digital Asset (CDA) Management	0

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
22DP-0AC08	Ongoing Monitoring and Maintenance	0
22DP-0SK01	Removable Media and Portable Device Management	0

Condition Reports (CRs)

16-05630	16-05825	16-06020	16-06644
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Condition Report Action Items (CRAI)

4377923	4377925	4377944	4377945	4377948
4377950	4377952	4377963	4377965	4377972
4377979	4377982	4377985	4377987	4379077
4379777	4412641	4412649	4412655	4412660
4412662	4412664	4412665	4413217	4426490
4426491	4429257	4432885	4432887	4432891
4432942	4433285	4433694	4433703	4433704
4434078	4434366	4434372	4434374	4434375
4434378	4434380	4434381	4434386	4434389
4440674	4442909	4450965	4458694	

Condition Report Disposition Requests (CRDR)

4369105	4390377	4397465	4397613	4426282
4426283	4426284	4426697	4426857	4427054
4427103	4427105			

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/ Date</u>
	Cyber Security Training Program Descriptions	4
	Ongoing Monitoring and Assessment Report for Target Set Critical Digital Assets (TSCDAs)	
	Test Protocol for Data Diode	
CSA42C000103	Critical Digital Asset Technical Training – Maintenance Level Two	0
CSA42C000104	Critical Digital Asset Technical Training - Maintenance	0
DEC-00309	Refueling Water Tank Digital Equipment Modification	0
DEC-00423	OWL Computing Technologies – Data Dual Diode Cards	0

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/</u> <u>Date</u>
SA# NON 15-08255	Site Trend Roll Up Report January to June 2015	September 30, 2015
SA# NON 16-09231	Site Trend Roll Up Report July to December 2015	June 21,2016
	Operations Department Performance Improvement Roll Up Report – 1 st Quarter 2016	
	Engineering Department Performance Improvement Roll Up Report – 1st Quarter 2016	
	Maintenance Department Performance Improvement Roll Up Report – 1 st Quarter 2016	
	Radiation Protection Department Performance Improvement Roll Up Report – 1 st Quarter 2016	
	Emergency Preparedness Department Performance Improvement Roll Up Report – 1 st Quarter 2016	
	Security Department Performance Improvement Roll Up Report – 1 st Quarter 2016	

Palo Verde Action Requests (PVAR)

4366520	4389082	4395854	4396448	4418384
4426010	4426018	4426019	4426022	4426023
4426259	4426488	4426492	4426730	4426735
4427054	4439082			

Work Order

0004443787

**The following items are requested for the
Occupational Radiation Safety Inspection
at Palo Verde Nuclear Station
April 18 – 22, 2016
Integrated Report 2016002**

Inspection areas are listed in the attachments below.

Please provide the requested information on or before **April 8, 2016**

Please submit this information using the same lettering system as below. For example, all contacts and phone numbers for Inspection Procedure 71124.01 should be in a file/folder titled "1- A," applicable organization charts in file/folder "1- B," etc.

If information is placed on *ims.certrec.com*, please ensure the inspection exit date entered is at least 30 days later than the onsite inspection dates, so the inspectors will have access to the information while writing the report.

In addition to the corrective action document lists provided for each inspection procedure listed below, please provide updated lists of corrective action documents at the entrance meeting. The dates for these lists should range from the end dates of the original lists to the day of the entrance meeting.

If more than one inspection procedure is to be conducted and the information requests appear to be redundant, there is no need to provide duplicate copies. Enter a note explaining in which file the information can be found.

If you have any questions or comments, please contact Louis Carson at (817) 200-1221, Louis.Carson@nrc.gov or Natasha Greene at (817)200-1154, Natasha.Greene@nrc.gov

PAPERWORK REDUCTION ACT STATEMENT

This letter does not contain new or amended information collection requirements subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). Existing information collection requirements were approved by the Office of Management and Budget, control number 3150-0011.

1. Radiological Hazard Assessment and Exposure Controls (71124.01) and Performance Indicator Verification (71151)

Date of Last Inspection: **April 14, 2015**

- A. List of contacts and telephone numbers for the Radiation Protection Organization Staff and Technicians
- B. Applicable organization charts
- C. Audits, self-assessments, and LERs written since date of last inspection, related to this inspection area
- D. Procedure indexes for the radiation protection procedures
- E. Please provide specific procedures related to the following areas noted below. Additional Specific Procedures may be requested by number after the inspector reviews the procedure indexes.
 - 1. Radiation Protection Program Description
 - 2. Radiation Protection Conduct of Operations
 - 3. Personnel Dosimetry Program
 - 4. Posting of Radiological Areas
 - 5. High Radiation Area Controls
 - 6. RCA Access Controls and Radworker Instructions
 - 7. Conduct of Radiological Surveys
 - 8. Radioactive Source Inventory and Control
 - 9. Declared Pregnant Worker Program
- F. List of corrective action documents (including corporate and subtiered systems) since date of last inspection
 - 1. Initiated by the radiation protection organization
 - 2. Assigned to the radiation protection organization

NOTE: The lists should indicate the significance level of each issue and the search criteria used. Please provide in document formats which are "searchable" so that the inspector can perform word searches.

If not covered above, a summary of corrective action documents since date of last inspection involving unmonitored releases, unplanned releases, or releases in which any dose limit or administrative dose limit was exceeded (for Public Radiation Safety Performance Indicator verification in accordance with IP 71151)

- G. List of radiologically significant work activities scheduled to be conducted during the inspection period (If the inspection is scheduled during an outage, please also include a list of work activities greater than 1 rem, scheduled during the outage with the dose estimate for the work activity.)
- H. List of active radiation work permits

- I. Radioactive source inventory list
 - 1. All radioactive sources that are required to be leak tested
 - 2. All radioactive sources that meet the 10 CFR Part 20, Appendix E, Category 2 and above threshold. Please indicate the radioisotope, initial and current activity (w/assay date), and storage location for each applicable source.
- J. The last two leak test results for the radioactive sources inventoried and required to be leak tested. If applicable, specifically provide a list of all radioactive source(s) that have failed its leak test within the last two years
- K. A current listing of any non-fuel items stored within your pools, and if available, their appropriate dose rates (Contact / @ 30cm)
- L. Computer printout of radiological controlled area entries greater than 100 millirems since the previous inspection to the current inspection entrance date. The printout should include the date of entry, some form of worker identification, the radiation work permit used by the worker, dose accrued by the worker, and the electronic dosimeter dose alarm setpoint used during the entry (for Occupational Radiation Safety Performance Indicator verification in accordance with IP 71151).

2. In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

Date of Last Inspection: **October 31, 2014**

- A. List of contacts and telephone numbers for the following areas:
 - 1. Respiratory Protection Program
 - 2. Self-contained breathing apparatus
- B. Applicable organization charts
- C. Copies of audits, self-assessments, vendor or NUPIC audits for contractor support (SCBA), and LERs, written since date of last inspection related to:
 - 1. Installed air filtration systems
 - 2. Self-contained breathing apparatuses
- D. Procedure index for:
 - 1. Use and operation of continuous air monitors
 - 2. Use and operation of temporary air filtration units
 - 3. Respiratory protection
- E. Please provide specific procedures related to the following areas noted below. Additional Specific Procedures may be requested by number after the inspector reviews the procedure indexes.
 - 1. Respiratory protection program
 - 2. Use of self-contained breathing apparatuses
 - 3. Air quality testing for SCBAs
 - 4. Use of installed plant systems, such as containment purge, spent fuel pool ventilation, and auxiliary building ventilation

- F. A summary list of corrective action documents (including corporate and subtiered systems) written since date of last inspection, related to the Airborne Monitoring program including:
1. Continuous air monitors
 2. Self-contained breathing apparatuses
 3. Respiratory protection program

NOTE: The lists should indicate the significance level of each issue and the search criteria used. Please provide in document formats which are “searchable” so that the inspector can perform word searches.

- G. List of SCBA qualified personnel - reactor operators and emergency response personnel
- H. Inspection records for SCBAs staged in the plant for use since date of last inspection.
- I. SCBA training and qualification records for control room operators, shift supervisors, STAs, and OSC personnel for the last year.
A selection of personnel may be asked to demonstrate proficiency in donning, doffing, and performance of functionality check for respiratory devices
- J. List of respirators (available for use) by type (APR, SCBA, PAPR, etc.), manufacturer, and model.