



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

January 30, 2018

Mr. Robert S. Bement
Executive Vice President Nuclear/
Chief Nuclear Officer
Arizona Public Service Company
P.O. Box 52034, MS 7602
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION – NRC INTEGRATED
INSPECTION REPORT 05000528/2017004, 05000529/2017004, AND
05000530/2017004

Dear Mr. Bement:

On December 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Palo Verde Nuclear Generating Station Units 1, 2, and 3. On January 11, 2018, the NRC inspectors discussed the results of this inspection with Ms. Maria Lacal and other members of your staff. The results of this inspection are documented in the enclosed report.

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

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement; and the NRC resident inspector at Palo Verde.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

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 05000528/2017004,
05000529/2017004, 05000530/2017004

w/ Attachments:

1. Supplemental Information
2. Information Request for the Radiation
Safety Team Inspection
3. Information Request for the Baseline
Inservice Inspection

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 05000528, 05000529, 05000530

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

Report: 05000528/2017004, 05000529/2017004, and 05000530/2017004

Licensee: Arizona Public Service Company

Facility: Palo Verde Nuclear Generating Station

Location: 5801 South Wintersburg Road
Tonopah, AZ 85354

Dates: October 1 through December 31, 2017

Inspectors: C. Peabody, Senior Resident Inspector
D. Reinert, PhD, Resident Inspector
D. You, Resident Inspector
I. Anchondo, Reactor Inspector
L. Carson, Senior Health Physicist
N. Green, PhD, Health Physicist
S. Hedger, Emergency Preparedness Inspector
B. Larson, Senior Operations Engineer

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

Enclosure

SUMMARY

IR 05000528, 05000529, 05000530/2017004, 10/1/2017 – 12/31/2017; PALO VERDE NUCLEAR GENERATING STATION INTEGRATED INSPECTION REPORT; Post-Maintenance Testing.

The inspection activities described in this report were performed between October 1 and December 31, 2017, by the resident inspectors at Palo Verde Nuclear Generating Station and inspectors from the NRC's Region IV office. One finding of very low safety significance (Green) is documented in this report. The significance of inspection findings is indicated by their color (i.e., Green, greater than Green, White, Yellow, or Red), determined using Inspection Manual Chapter 0609, "Significance Determination Process," dated April 29, 2015. Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. 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," dated July 2016.

Cornerstone: Mitigating Systems

- Green. The inspectors reviewed a self-revealed, non-cited violation of Technical Specification 5.4.1.a "Procedures," for the failure to incorporate vendor service recommendations into the preventive maintenance program. As a result of not incorporating those recommendations, a Class 1E 4kV circuit breaker failed, rendering the Unit 2 spray pond pump B and diesel generator B inoperable. The licensee entered this condition into their corrective action program as Condition Report 17-13171. The licensee will take corrective action to replace all affected Class 1E circuit breaker components installed throughout the station. The licensee will also take corrective actions to address extent of condition by performing a Quality Assurance self-assessment of vendor recommendations reviewed during the 1990s to ensure with reasonable confidence that similar recommendations are not inadvertently being ignored.

Failure to implement or address a vendor recommendation in the preventive maintenance program is a performance deficiency. Specifically, in 1996 the licensee failed to act on General Electric Service Advisory Letter 352.1, recommendation #4, to replace the drive pawl pivot pin assembly to improve reliability. This was contrary to station procedure 30DP-9MP08, "Preventive Maintenance Basis Development," Revision 5, Step A.1.10. This performance deficiency is more than minor and, therefore, a finding because it affected the equipment performance attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, on September 19, 2017, the welded drive pawl pivot pin assembly failed on the Unit 2 spray pond pump B circuit breaker causing an inoperability and unavailability of the spray pond pump B and supported systems; as well as the inoperability of the associated diesel generator. The inspectors performed a significance determination using Inspection Manual Chapter 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," and determined that the finding was of very low safety significance (Green) because the finding did not represent an actual loss of function of a single train for greater than its technical specification allowed outage time. The inspectors concluded that no cross-cutting aspects should be applicable because the performance deficiency is not indicative of current licensee performance. (Section 1R19)

PLANT STATUS

Unit 1 operated at full power for the inspection period with a planned refueling outage from October 7, 2017, through November 6, 2017.

Units 2 and 3 operated at full power for the entire inspection period.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R04 Equipment Alignment (71111.04)

Partial Walk-Down

a. Inspection Scope

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

- November 17, 2017, Unit 3 480 volt essential electric system A
- December 15, 2017, Unit 3 control building ventilation for the Class 1E batteries and the DC equipment rooms
- December 19, 2017, Unit 1 spent fuel pool cooling system

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 three partial system walk-down samples as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

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:

- October 16, 2017, Unit 1 condensate storage tank area

- October 25, 2017, Unit 2 lower cable spreading room, Fire Zone 14
- November 8, 2017, Unit 3 remote shutdown panel B room, Fire Zone 10B
- December 19, 2017, Unit 1 Class 1E 4kV switchgear B room, Fire Zone 5B
- December 28, 2017, Unit 2 Class 1E battery B and D rooms, Fire Zone 8B and 9B

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.

1R08 Inservice Inspection Activities (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>COMPONENT/WELD IDENTIFICATION</u>	<u>EXAMINATION TYPE</u>
Steam Generator	SG-1 Nozzle-to-Vessel Weld 3-101 Report 17-UTE-1046	Ultrasonic
Steam Generator	SG-1 Cold Leg Inner Radius Weld 3-102 Report 17-UTE-1045	Ultrasonic
Steam Generator	SG-to-Nozzle Weld 41-110 Report 17-MT-1006	Magnetic Particle
Feedwater	Pipe-to-Pipe Weld 57-3 Report 17-MT-1007	Magnetic Particle
Steam Generator	SG-1 Nozzle-to-Vessel Weld 3-102 Report 17-UTE-1047	Ultrasonic

The inspectors reviewed records for the following nondestructive examinations:

<u>SYSTEM</u>	<u>COMPONENT/WELD IDENTIFICATION</u>	<u>EXAMINATION TYPE</u>
Steam Generator	SG-to-Nozzle Weld 41-110 Report 17-UTE-1042	Ultrasonic
Feedwater	Pipe-to-Pipe Weld 57-3 Report 17-UTE-1053	Ultrasonic
Reactor Vessel	Bottom Head Area Weld, Cladding	Visual (VT-3)

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 reviewed two indications that were previously examined, and observed whether the licensee evaluated and accepted the indications in accordance with the ASME Code and/or an NRC approved alternative. The inspectors also reviewed the qualifications of all nondestructive examination technicians performing the inspections to determine whether they were current.

During Refueling Outage 1R20, a visual inspection (VT-3), as part of the 10-year inservice inspection of the reactor vessel, identified an indication adjacent to the 180-degree flow baffle support pad. The indication was determined to be 0.7-inches x 0.8-inches x 0.20-inches in depth. The inspectors verified that the indication was acceptable by ASME Code requirements. The licensee's corrosion analysis determined, that within a 15 year interval, the affected area will degrade an additional 0.2765 inches. This is equivalent to 4.25 percent degradation of the wall thickness at the next inservice inspection. Therefore, the requirements of IWB-3520.2(d) of Section XI of the ASME Code are expected to be satisfied prior to the next required inspection. The inspectors concluded that the postulated corrosion rates are conservative and find it appropriate for the licensee to perform the next required inspection on a normally scheduled 10-year inservice inspection with adequate assurance that the structural integrity of the reactor vessel will remain intact.

b. Findings

No findings were identified.

.2 Vessel Upper Head Penetration Inspection Activities

a. Inspection Scope

The inspectors reviewed the results of the licensee's bare metal visual inspection of the Reactor Vessel Upper Head Penetrations to determine whether the licensee identified any evidence of boric acid challenging the structural integrity of the reactor head components and attachments. The inspectors also verified that the required inspection coverage was achieved and limitations were properly recorded. The inspectors reviewed whether the personnel performing the inspection were certified examiners to

their respective nondestructive examination method. During the examination, the licensee identified 14 Control Element Drive Mechanism nozzle penetrations that had been affected by leakage coming from a vent valve above the reactor vessel head at the start of the previous operating cycle. Discounting the apparent source of the leakage, the requirements of ASME Code Case 729-4, "Alternative Examination Requirements for PWR Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1," require the classification of the physical condition of the affected nozzle penetrations as containing a relevant condition. Specifically, Code Case 729-4 requires further interrogation of the relevant condition to verify that the condition is not indicative of possible nozzle leakage. The licensee proceeded to clean the affected nozzle penetrations without any further actions. The inspectors identified that the actions taken by the licensee were not in compliance with the requirements of ASME Code Case N-729-4. Consequently, by letter dated October 26, 2017, the licensee submitted Relief Request RR-57, "Request for Alternative to American Society of Mechanical Engineers Code Case N-729-4 for Replacement Reactor Vessel Closure Head Penetration Nozzles." The NRC granted verbal authorization on November 1, 2017, concluding that the licensee's proposed alternative to perform a bare metal visual examination of 14 nozzle penetrations in accordance with ASME Code Case N-729-4, during the operating cycle 21, will provide reasonable assurance of the structural integrity of the reactor vessel closure head until the next scheduled volumetric or visual examination. At the time of the inspection, the NRC had not yet written a safety evaluation. The licensee documented the condition on the reactor vessel head in Condition Report 2017-14723.

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 procedures 70TI-9ZC01, "Boric Acid Walkdown Leak Detection," Revision 19, and 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 Part 50, Appendix B requirements.

b. Findings

No findings were identified.

.4 Steam Generator Tube Inspection Activities

a. Inspection Scope

No steam generator tube inspection activities were scheduled for Palo Verde, Unit 1, Refueling Outage 1R20.

b. Findings

No findings were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed 18 condition reports 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.

These activities constituted completion of one inservice inspection sample, as defined in Inspection Procedure 71111.08

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

.1 Review of Licensed Operator Requalification

a. Inspection Scope

On November 14, 2017, the inspectors observed a portion of an annual requalification test for licensed operators. The inspectors assessed the performance of the operators and the evaluators' critique of their performance. The inspectors also assessed and the modeling and performance of the simulator during the requalification activities.

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

b. Findings

No findings were identified.

.2 Review of Licensed Operator Performance

a. Inspection Scope

On October 6, 2017, 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 planned reactor shutdown for a refueling outage. The inspectors observed the operators' control of reactivity during the scheduled reactor shutdown.

In addition, the inspectors assessed the operators' adherence to plant procedures, including 40DP-9OP02, "Conduct of Operations," Revision 72, and other operations department policies.

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

b. Findings

No findings were identified.

.3 Annual Review of Regualification Examination Results

a. Inspection Scope

The inspector conducted an in-office review of the annual regualification training program to determine the results of this program.

On December 22, 2017, the licensee informed the inspector of the following Palo Verde Nuclear Generating Station annual operating test results:

- 21 of 21 crews passed the simulator scenario portion of the operating test
- 107 of 107 licensed operators passed the simulator scenario portion of the operating test
- 105 of 107 licensed operators passed the job performance measure portion of the operating test

The two operators that failed the job performance measure portion of the operating test were remediated and successfully passed a retake operating test prior to returning to shift.

The inspector completed one inspection sample of the annual licensed operator regualification program.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

Quality Control

a. Inspection Scope

On November 29, 2017, the inspectors reviewed the licensee's quality control activities through a review of parts installed in fire dampers that were purchased as commercial-grade parts but were dedicated prior to installation in a quality-grade application.

These activities constituted completion of one quality control sample, 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 two 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:

- October 11, 2017, Unit 1 reactor coolant system reduced inventory volume to remove reactor vessel head for refueling
- October 20, 2017, Unit 1 reactor coolant pump 2B motor heavy lift

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 affect the functional capability of mitigating systems:

- October 3, 2017, Unit 1 train A diesel generator trip on high jacket water temperature
- November 21, 2017, Unit 2 auxiliary feedwater pump B motor circuit breaker replacement

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 constituted completion of four 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 four operability determinations that the licensee performed for degraded or nonconforming structures, systems, or components (SSCs):

- October 3, 2017 operability determination of Unit 1 diesel generator A following high jacket water temperature trip during surveillance testing
- October 12, 2017, operability determination of Unit 3 train A spray pond pump following an inservice test
- November 3, 2017, operability determination of Unit 1 reactor vessel stainless steel cladding degradation
- December 21, 2017, operability determination of Unit 1 high pressure safety injection pump A boric acid leakage from pump seals and mini-flow line drain

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

These activities constituted completion of four operability and functionality review samples as defined in Inspection Procedure 71111.15.

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):

- October 4, 2017, Unit 2 Class 1E battery charger C following preventive maintenance
- October 17, 2017, Unit 1 Class 1E circuit breaker to load center 33 following breaker replacement to remove welded driving pall crank assembly
- October 17, 2017, Unit 1 Class 1E circuit breaker to load center 35 following breaker replacement to remove welded driving pall crank assembly

- October 18, 2017, Unit 1 Class 1E battery A discharge test following battery bank replacement
- October 24, 2017, Unit 1 low pressure safety injection pump A inservice test following motor replacement

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

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

b. Findings

Failure to Incorporate Vendor Overhaul Recommendations for Class 1E Medium Voltage Circuit Breaker Preventive Maintenance Program

Introduction. The inspectors reviewed a self-revealed, Green, non-cited violation of Technical Specification 5.4.1.a “Procedures.” for the failure to incorporate vendor service recommendations into the preventive maintenance program. As a result of not incorporating those recommendations, a Class 1E 4kV circuit breaker failed, rendering the Unit 2 spray pond pump B and diesel generator B inoperable.

Description. On September 19, 2017, at 8:35 p.m., Unit 2 control room operators started spray pond pump B for routine pond water chemistry control and optimization. After the pump was started, operators received safety equipment inoperable status alarms for the Unit 2 spray pond pump B circuit breaker. An auxiliary operator responded to the equipment in the field and determined that the closing springs were discharged and, although the charging motor could be heard running, the springs were not charging. If the springs are not charged, the breaker cannot reclose as designed following a loss of offsite power. The licensee declared the affected spray pond pump B inoperable, which also made the associated diesel generator B inoperable for loss of cooling. The failed spray pond pump condition therefore rendered all train B safety equipment unable to respond during a loss of offsite power. The licensee swapped out the Class 1E 4kV GE Magneblast circuit breaker with a spare. The spray pond pump was tested to restore operability to all affected components at 9:27 a.m. on the morning of September 20, 2017. No applicable technical specification action statement completion times were exceeded.

Examination of the failed circuit breaker revealed that the cause of the failure was a mechanical failure of the drive pawl assembly. Specifically, a welded pin that held the assembly in place failed causing the assembly to fall to the bottom of the cabinet. On September 27, 2017, a group of engineers and electricians working on the corrective actions updated the inspectors on their preliminary findings. The licensee determined that the failure that occurred was applicable to recommendation #4 from GE Service Advisory Letter (SAL) 352.1, dated July 7, 1995. The recommendation was to replace the driving pawl crank assembly at the next overhaul opportunity to incorporate a revised driving pawl pivot pin assembly to improve reliability. Further licensee investigation

determined that the basis for the recommendation was 10 CFR Part 21 Report #79015, submitted by the Golden Gate Switchboard Company in 1979. That report detailed a high cycle qualification testing failure of the same welded pin. In response to this event, in November 1979, GE redesigned the driving pawl crank assembly to a mechanical pin connection in order to improve reliability. During this time Palo Verde was procuring breakers for plant construction, which is why the plant had a combination of old and new style breakers. Although they redesigned the driving pawl assembly, GE did not recall the welded pin breakers already delivered, and did not otherwise communicate the vulnerability until the roll-up SAL 352.1 issued in July 1995. The licensee reviewed SAL 352.1 under Adverse Condition Report Disposition Request 9-6-Q583 and, amidst confusion, incorrectly determined SAL 352.1 was merely a roll up of many previous SALs already addressed in the corrective action program. The licensee did not specify a proper evaluation and disposition for recommendation #4. As a result, when the failed breaker was last overhauled in 2004, the welded driving pawl assembly was reused.

The inspectors determined that failure to incorporate vendor recommendations without analysis or basis is a violation of the preventive maintenance program. In 1995, station procedure 30DP-9MP08, "Preventive Maintenance Basis Development," Revision 5, was in effect. Appendix A, Section 1, "PM Basis Evaluation Logic and Approval Process - Research for Recommendations and Requirements," Step A.1.10, requires the licensee to consider recommendations or requirements provided in other pertinent documents including vendor Technical Information Letters. This procedural requirement has not changed noticeably in the last 23 years. Current station procedure 30DP-9MP08, "Preventive Maintenance Program," Revision 28, contains the same guidance in Appendix A, step A.2.10.

Analysis. Failure to implement or otherwise address a vendor recommendation in the preventive maintenance program is a performance deficiency. Specifically, in 1996 the licensee failed to act on GE SAL 352.1, recommendation #4, to replace the drive pawl pivot pin assembly to improve reliability, contrary to station procedure 30DP-9MP08, Revision 5, Step A.1.10. This performance deficiency is more than minor and, therefore, a finding because it affected the equipment performance attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, on September 19, 2017, the welded drive pawl pivot pin assembly failed on the Unit 2 spray pond pump B circuit breaker causing an inoperability and unavailability of the spray pond pump B and supported systems; as well as the inoperability of the associated diesel generator. The inspectors performed a significance determination using Inspection Manual Chapter 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," and determined that the finding was of very low safety significance (Green) because the finding did not represent an actual loss of function of a single train for greater than its technical specification allowed outage time. The inspectors concluded that no cross-cutting aspects should be applicable because the performance deficiency is not indicative of current licensee performance.

Enforcement. Technical Specification 5.4.1.a "Procedures," requires, in part, that the licensee implement procedures recommended by Regulatory Guide 1.33, Revision 2. Regulatory Guide 1.33, Appendix A, Section 9.b, recommends procedures for scheduling preventive maintenance of components that have a specified lifetime. The licensee satisfies these requirements, in part, through procedure 30DP-9MP08, "Preventive Maintenance Basis Development," Revision 5. Procedure 30DP-9MP08,

Step A.1.10, requires the licensee to consider recommendations or requirements provided in other pertinent documents such including vendor technical information letters. Contrary to the above, from October 23, 1996, through September 20, 2017, the licensee did not appropriately consider GE SAL 352.1, a pertinent document, recommendation #4 to replace the drive pawl pivot pin assembly. As a result, on September 19, 2017, a welded drive pawl pivot pin assembly failed causing the loss of Unit 2 spray pond pump train B and supported systems. The licensee entered this condition into their corrective action program as Condition Report 17-13171. The licensee will take corrective action to replace all 45 of the welded drive pawl pivot pin assemblies installed throughout the station. The licensee will also take corrective actions to address extent of condition by performing a Quality Assurance self-assessment of vendor recommendations reviewed during the 1990s to ensure with reasonable confidence that similar recommendations are not inadvertently being ignored. Because this finding is of very low safety significance (Green), and has been entered into the licensee corrective action program, it is being treated as a non-cited violation in accordance with Section 2.3.2.a of the NRC Enforcement Policy, NCV 05000529/2017004-01 "Failure to Incorporate Vendor Overhaul Recommendations for Class 1E Medium Voltage Circuit Breaker Preventive Maintenance Program."

1R20 Refueling and Other Outage Activities (71111.20)

a. Inspection Scope

During the station's Unit 1 refueling outage that concluded on November 7, 2017, 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 reduced-inventory and lowered-inventory activities
- Observation and review of fuel handling activities
- Monitoring of heat-up and startup activities

These activities constituted 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 four 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:

- October 23, 2017, Unit 1 auxiliary feedwater pump B surveillance test

Containment isolation valve surveillance tests:

- October 23, 2017, Unit 1 letdown heat exchanger valve CH-516 (penetration 40)

Other surveillance tests:

- October 31, 2017, Unit 1 pressurizer spray control valve RCE-100F actuator drop test
- November 8, 2017, Unit 3 surveillance test of steam generator 2 downcomer blowdown sample isolation valve SG-223

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.

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

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

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

a. Inspection Scope

The inspector performed an in-office review of Palo Verde Nuclear Generating Station's Emergency Plan, Revisions 59 and 60. Revision 59 addressed the implementation of a

revised emergency action level (EAL) scheme approved by the NRC in License Amendment 198 on September 8, 2016. Revision 60 addressed the following changes:

- Revised the hydrogen concentration level used for evaluation of EALs associated with the containment fission product barrier, based on updated information in the licensee's emergency operating procedures
- Revised the description of the Radiation Protection Coordinator in the Technical Support Center to more clearly describe the individual's role and responsibilities
- Updated references to a local support medical facility which recently changed its name
- Completed numerous editorial changes

This revision was compared to its previous revision, to the criteria of NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, to Nuclear Energy Institute Report 99-01, "Emergency Action Level Methodology," Revision 6, and to the standards in 10 CFR 50.47(b) to determine if the revision adequately implemented the requirements of 10 CFR 50.54(q)(3) and 50.54(q)(4). The inspector verified that the revisions did not decrease 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, these revisions are subject to future inspection.

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

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 condition, 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, and control and accountability of sealed radioactive sources.
- Radiological hazards control and work coverage. During walkdowns 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 walkdowns, 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 constitute completion of the seven required samples of radiological hazard assessment and exposure control program, as defined in Inspection Procedure 71124.01.

b. Findings

No findings were identified.

2RS2 Occupational ALARA Planning and Controls (71124.02)

a. Inspection Scope

The inspectors assessed licensee performance with respect to maintaining individual

and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors performed this portion of the attachment during the refueling outage, in order to directly observe the licensee's ALARA process activities including planning, implementation of radiological work controls, execution of work activities, and ALARA review of work-in-progress. During the inspection the inspectors interviewed licensee personnel, reviewed licensee documents, and evaluated licensee performance in the following areas:

- Implementation of ALARA and radiological work controls. The inspectors observed pre-job briefings, reviewed planned radiological administrative, operational, and engineering controls, and compared the planned controls to field activities.
- Radiation worker and radiation protection technician performance during work activities performed in radiation areas, airborne radioactivity areas, or high radiation areas.
- Problem identification and resolution for ALARA and radiological work 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 constitute completion of three samples of the five required samples of occupational ALARA planning and controls program, as defined in Inspection Procedure 71124.02, and completes the inspection.

b. Findings

No findings were identified.

4. **OTHER ACTIVITIES**

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

4OA1 Performance Indicator Verification (71151)

.1 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 March 31, 2016, to September 30, 2017. 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.

.2 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 March 31, 2016, and September 30, 2017, 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, 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 constituted completion of one semiannual trend review sample, as defined in Inspection Procedure 71152.

b. Observations and Assessments

The inspectors reviewed main control room deficiencies and other issues that could potentially challenge operators in performing their duties. The inspectors reviewed the licensee's procedures for identifying, assessing, tracking, and communicating deficiencies associated with main control room instrumentation and controls. Multiple procedures define these processes, including:

- 40DP-9OP15, "Operator Challenges and Discrepancy Tracking"
- 40DP-9OP09, "System Status Control"
- 40DP-9OP33, "Shift Turnover"

The inspectors observed that the licensee appears to be identifying control room deficiencies at an appropriate low threshold. However, the inspectors also noted that the licensee maintains several different mechanisms for tracking control room deficiencies. These tracking mechanisms include:

- Control room discrepancy log
- Lit annunciator log
- Jumpered alarm log
- Operator challenges log
- Temporary note (T-note) database
- Equipment status tag (EST) log
- Control room turnover comments document

The control room turnover comments document is the list most frequently relied upon to communicate deficient conditions from one operating crew to another. However, of the tracking mechanisms listed above, the control room turnover comments document is the least well defined and controlled. According to the Shift Turnover procedure, 40DP-9OP33, items entered in the turnover comments document may include anything of interest to the operating crew. This broad definition permits the standards for incorporating comments to vary slightly from one operating crew to another and has resulted in producing a turnover comments document that largely consists of a very extensive list of minor control room deficiencies. The variable crew priorities and lack of procedural controls do not clearly delineate the prioritization or anticipated resolution date of the individual issues.

The inspectors shared these observations with licensee operations management. The inspectors noted that there was substantial effort during the Unit 1, fall 2017 refueling outage to reduce the backlog of items on the Unit 1 control room deficiencies lists. Also, the inspectors have observed that all turnover comments entries are now accompanied by an associated condition report or corrective maintenance work order number. The licensee has also begun efforts to implement a singular coding and tracking tool within

the existing work management database to ensure that all issues that could potentially challenge operators are being maintained visible and prioritized on a single tracking list.

c. Findings

No findings were identified.

.3 Annual Follow-up of Selected Issues

a. Inspection Scope

The inspectors selected one issue for an in-depth follow-up:

- On November 6, 2017, lubrication laboratory sample analysis

The inspectors assessed the licensee's problem identification threshold and conduct of oil sample analysis. The inspectors verified that the licensee appropriately prioritized the planned corrective actions and that these actions were adequate to addressing any adverse conditions identified in their lubrication analysis.

These activities constituted completion of one annual follow-up sample as defined in Inspection Procedure 71152.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On October 18, 2017, the inspectors presented the inspection results to Mr. Jack Cadogan, 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 October 20, 2017, the inspectors presented the radiation safety inspection results to Mr. Mike McLaughlin, Vice President, Operations Support, 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 November 30, 2017, the inspector conducted a telephonic exit meeting to present the results of the in-office inspection of changes to the licensee's emergency plan and emergency action levels to Ms. Charlotte Shields, Emergency Preparedness Manager, and other members of the licensee staff. The licensee acknowledged the issues presented.

On December 22, 2017, the inspector presented the inspection results to Mr. David Oliver, Regulatory Exam Author, of the results of the licensed operator requalification program inspection. The licensee representative acknowledged the results presented. The inspector asked the licensee whether any materials examined during the inspection should be considered

proprietary. No proprietary information was identified.

On January 11, 2018, the inspectors presented the inspection results to Ms. Maria Lacal, Senior Vice President, Regulatory and Oversight, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

J. Cadogan, Senior Vice President, Site Operations
M. Lacal, Senior Vice President, Regulatory and Oversight
M. McLaughlin, Vice President, Operations Support
H. Ridenour, Director, Maintenance
C. Moeller, Director, Technical Support, Radiation Protection/Chemistry
H. Nelson, Director, Projects
M. McGhee, Department Leader, Nuclear Regulatory Affairs
D. Elkinton, Section Leader, Nuclear Regulatory Affairs
M. DiLorenzo, Section Leader, Compliance/ Nuclear Regulatory Affairs
L. Grusecki, Supervisor, Radiation Protection
S. Lantz, Supervisor, Radiation Protection
R. Routolo, Superintendent of Tech Support, Radiation Protection
D. Heckman, Senior Consultant, Nuclear Regulatory Affairs
G. Nelson, Senior Health Physicist, Radiation Protection

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000529-2017004-01 NCV "Failure to incorporate Vendor Overhaul Recommendations for Class 1E Medium Voltage Circuit Breaker Preventive Maintenance Program." (Section 1R19)

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40OP-9HJ01	Control Building HVAC (HJ)	35
40OP-9PH01	Train A 480V Class 1E MCC	14

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	Palo Verde Design Basis Manual – HJ system	18
01-M-HJP-002	Control Building HVAC P&I Diagram	16
01-M-PCP-001	Fuel Pool Cooling and Cleanup Piping and Instrumentation Diagram	33

Section 1R05: Fire Protection

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
14DP-0FP33	Control of Transient Combustibles	28
14FT-9FP09	Halon Cylinder Liquid Level and Pressure	14
14FT-9FP10	Halon Fire Suppression System Functional Test	23
14FT-9FP22	Halon System Inspection	10
33FT-9FP03	Halon Fire Suppression System Damper Functional Test	9

Condition Reports (CRs)

17-16176

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
4938722	Transient Combustible Control Permit Form	9
4934836	Transient Combustible Control Permit Form	9
4935997	Transient Combustible Control Permit Form	9
4960630	Transient Combustible Control Permit Form	9
	Unit 1 Active Fire CCR Listing	December 19, 2017
	Pre-Fire Strategies Manual	25

Section 1R08: Inservice Inspection Activities

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
73TI-9ZZ22	Visual Examination For Leakage – Interval 3	10
73TI-9RC09	Base Metal Visual Examination of Reactor Vessel Upper Head	4
73TI-9ZZ10	Ultrasonic Examination of Welds in Ferretic Components	14
PDI-UT-11	PDI Generic Procedure for Ultrasonic Detection and Sizing of Reactor Pressure Vessel Nozzle-to-Shell Welds and Nozzle Inner Radius PDI-UT-11	0
73TI-9ZZ05	Dry Magnetic Particle Examination	18
70TI-9ZC01	Boric Acid Walkdown Leak Detection	19

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
73DP-9ZC01	Boric Acid Corrosion Control Program	7

Condition Reports (CRs)

17-04781	17-05120	17-05740	17-14080	17-00126
17-04848	17-00732	17-06538	17-07388	16-00499
16-06644	16-07388	16-07780	16-10448	16-14680
16-14309	16-13562	16-12937		

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

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40OP-9ZZ07	Plant Shutdown Mode 1 to Mode 3	40
40OP-9ZZ05	Power Operations	147
40DP-9OP02	Conduct of Operations	72

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Date</u>
	Specific Maneuver Plan: EOC Shutdown 100% to 20%	October 4, 2017
	Licensed Operator Continuing Training Scenario	November 14, 2017
	2017 Annual Operating Test Results	December 22, 2017

Section 1R12: Maintenance EffectivenessProcedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
87DP-0MC39	Commercial Grade Dedication (CGD) Process	0

Condition Reports (CRs)

17-17149	17-15810	17-14939	17-14411	17-13490
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Miscellaneous

Number Title

50061458101001 Purchase Order

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40DP-9AP21	Protected Equipment Scheme	7
31MT-9RC06	Reactor Coolant Pump Disassembly and Assembly	33
31MT-9ZC07	Miscellaneous Containment Building Heavy Loads	38

Condition Reports (CRs)

17-13758 17-12681

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
01-M-DGP-001	P&I Diagram: Control Air Diesel Generator	61
	(6:00am) Outage Control Center Turnover and Risk Assessment	October 11, 2017
Protected Equipment Scheme	Mode 6 Shutdown Cooling B Train In Service, Lowered Inventory	October 11, 2017

Section 1R15: Operability Determinations and Functionality Assessments

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
73ST-9SP01	Essential Spray Pond Pumps – Inservice Test	51a

Condition Reports (CRs)

17-14902	17-14436	17-13758	17-04562	17-13725
12-00095	12-00096	15-12198	12-00248	

Work Orders (WOs)

4789302	3434085	3462021	4079937	4056029
4079936	4056018	4122238		

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
17-1085	Evaluation Report	October 22, 2017
WDI-STD-088	Palo Verde Unit 1	May 27, 2006
U1M13B	Reactor Vessel Visual Inspection Report for Unit #1	June 2006
13-MC-SP-0307	SP/EW System Thermal Performance Design Bases Analysis	9
17-13710-004	Engineering Evaluation	September 30, 2017

Section 1R19: Post-Maintenance Testing

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
IP-ENG-001	Standard Design Process	0
30DP-9MP08	Preventive Maintenance Basis Development	5
30DP-9MP08	Preventive Maintenance Program	28
73ST-9SI14	LPSI Pumps Full Flow Inservice Test	21
32MT-9ZZ52	Battery Charger Preventative Maintenance	33
32ST-9ZZ34	Class 1E Battery Charger 18 Month Surveillance Test	13
73DP-0EE05	Engineering Preventive Maintenance Program	12
32ST-9PK03	Surveillance of Class 2E station Batteries Service Test Discharge	26

Condition Reports (CRs)

17-15551	17-13998	17-13171	17-13874	17-13901
CRDR 80918	CRAI 80920	CRDR 96Q583	17-11936	17-16854

Work Orders (WOs)

4936987	4793505	4775777	4691342	4807242
4793163	17-09071-009			

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
VTD-G080-0716	General Electric Latest Design Configuration: GE Type AM Circuit Breakers and Medium Voltage Switchgear (GE SAL 073-352.1)	1

Section 1R20: Refueling and Other Outage Activities

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
72OP-9RX01	Calculation of Estimated Critical Condition	30
40OP-9ZZ16	RCS Drain Operations	82

Condition Reports (CRs)

16-08132

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	Unit 1 20 th Refueling Outage: Shutdown Risk Assessment	0
	1R20 Outage Summary	

Section 1R22: Surveillance Testing

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40ST-9ZZ13	Containment Isolation Valves	14
73ST-9AF05	Auxiliary Feedwater Pump B – Comprehensive Pump Test	15
36ST-9SA04	ESFAS Train B Subgroup Relay Shutdown Functional Test	27
73ST-9CL01	Containment Leakage Type Band C Testing	45
73ST-9DG02	Class 1E Diesel Generator and Integrated Safeguards Test Train B	29

Condition Reports (CRs)

17-10432 17-16325 17-15268

Work Order (WOs)

4795832 4796060 4795826

Section 1EP4: Emergency Action Level and Emergency Plan Changes

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
16DP-0EP22	Emergency Plan Maintenance	12

Condition Reports (CRs)

17-17218

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	PVNGS Emergency Plan	59, 60
Screening Tracker Number 2017-021S	Screening Evaluation Form, EPlan Revision 60	August 20, 2017
Evaluation Tracking Number: 2017-002E	Effectiveness Evaluation Form, Revision 60 to the PVNGS Emergency Plan	August 18, 2017

Section 2RS1: Radiological Hazard Assessment and Exposure Controls

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
75DP-0RP01	RP Program Overview	12
75DP-0RP02	Radioactive Contamination Control	23
75DP-0RP08	Managing Radiological Risk	02
75DP-9RP01	Radiation Exposure and Access Control	21
75RP-0RP01	Radiological Posting and Labeling	35
75RP-9OP02	Control of High Radiation Areas, Locked High Radiation Areas and Very High Radiation Areas	
75RP-9RP02	Radiation Work Permits	31
75RP-9RP07	Radiological Surveys and Air Sampling	30
75RP-9RP10	Conduct of R.P. Operations	36
75RP-9RP26	Radioactive Source Control	17

Condition Reports (CRs)

17-12493	17-06898	16-17695	16-07664	16-06578
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Audits and Self-Assessments

<u>Number</u>	<u>Title</u>	<u>Date</u>
STWO4751131	Radioactive Source Leak Test Surveillance	June 21, 2017
STWO4858806	Radioactive Source Leak Test Surveillance	February 22, 2017
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
	U3R19 2016 Nuclear Assurance Department Outage Oversight Report	November 18, 2016
	Nuclear Assurance Department U2R20 Mid-Outage Report	April 26, 2017
16-6578-008 SA	Self-Assessment: Portable Air Filtration	July 19, 2016
	MTP - Receiving Radioactive Material Assessment	January 12, 2017
	3rd Quarter Integrated Performance Report 2016	January 12, 2017
	2nd Quarter Integrated Performance Report 2016	August 11, 2016
	1st Quarter Integrated Performance Report 2016	June 10, 2016
	1st Quarter Integrated Performance Report 2017	June 22, 2017

Radiation Work Permits

<u>Number</u>	<u>Title</u>	<u>Revision</u>
9-1004	General Tours, Inspections, And Job Planning Walkdowns	04
1-3022	Refueling and Associated Work	07
1-3038	Repair/Replace Core Barrel Support	00
1-3015	Refuel Cavity Decontamination	07
3-3335	Repair Reactor Vessel Seating Surface	01

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-20171012-32	Shutdown HXA Plate & Gasket Removal	October 15, 2017
1-M-20171014-11	Shutdown HXA – Posted Contamination Area	October 14, 2017
1-M-20171014-01	In-Core Instrumentation (ICI)Cutup	October 14, 2017

Radiation Survey Records

<u>Number</u>	<u>Title</u>	<u>Date</u>
1-M-20171015-15	Shutdown HXA FME Plug Inserted	October 15, 2017
1-M-20171014-07	140' Elevation ICI Cutup Area	October 14, 2017
1-M-20171014-14	Fuel Building 140' Elevation Core Offload Survey	October 14, 2017

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
1-17-00482	U1 Containment 140' – ICI Cutup	October 14, 2017
1-17-00556	U1 Aux SDHXA 70' – Camera Inspection/Repair	October 15, 2017
1-17-00501	U1 Containment 140' – Core Offload	October 15, 2017
1-17-00553	U1 Aux SDHXA 70' – Inside Tent	October 16, 2017
1-17-00567	U1 Fuel Bldg. 140' – Spent Fuel Movement	October 16, 2017
1-17-00625	U1 Aux SDHXA 70' – SIAV 660	October 18, 2017

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Date</u>
	Daily Plant Status Package	October 19, 2017
	Radioactive Source Inventory: Units 1, 2, and 3 (SourceTRAX)	October 2017
App. B to 75RP-9OP2	LHRA/VHRA Key Control Inventory for Unit 3	October 19, 2017
	Unit 1 Dry Active Waste Characterization	May 12, 2016
	Unit 2 Dry Active Waste Characterization	May 18, 2017
	Unit 3 Dry Active Waste Characterization	December 20, 2016

Section 2RS2: Occupational ALARA Planning and Controls

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
75DP-0RP03	ALARA Program Overview	06

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
75DP-0RP06	ALARA Committee	07
75DP-0RP08	Managing Radiological Risk	02
75RP-9RP02	Radiation Work Permits	31
75RP-9RP25	Temporary Shielding	14
75TD-9RP02	ALARA Work Planning	11

Condition Reports (CRs)

16-01058	16-05717	16-06578	16-06720	16-06739
16-06758	16-06796	16-06835	16-06886	16-07165
16-07337	16-09138	16-10738	16-10891	16-11032
16-17393	16-17695	17-04885	17-08579	17-08892

Radiation Work Permits and ALARA Review Packages

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1-1515	1R19 Replace 1JSIAUV0651	02
1-1520	1R19 Support Work for Replacing 1JSIAUV0651	01
1-3015	1R20 Refuel Cavity Decontamination	07
1-3022	1R19 Refueling and Associated Work	07
1-3038	1R20 Remove and Replace Core Support Barrel (CSB)	01
1-3306	1R19 Primary Side Steam Generator Maintenance	03
1-3508	1R20 Engineering Inspections and Associated Work	05
2-3306	2R20 Steam Generator Primary Side Maintenance	06
3-3038	3R19 Remove and Replace Core Support Barrel (CSB)	01
9-1035	1R20 Radiography Within the PVNGS Owner Controlled	04

Audits and Self-Assessments

<u>Number</u>	<u>Title</u>	<u>Date</u>
218-04158-RMR	2016 Annual ALARA/Management Evaluation Report	June 23, 2017
16-06578-008	Simple Self-Assessment Report: Portable Air Filtration Program	May 23, 2017
	PVNGS Radiation Protection Department Quarter 1 2016 Assessment Report	June 10, 2016

Audits and Self-Assessments

<u>Number</u>	<u>Title</u>	<u>Date</u>
	PVNGS Radiation Protection Department Quarter 2 2016 Assessment Report	August 11, 2016
	PVNGS Radiation Protection Department Quarter 3 2016 Assessment Report	January 12, 2017
	PVNGS Radiation Protection Department Quarter 1 2017 Assessment Report	June 22, 2017

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Date</u>
	ALARA 5 Year Plan 2015 – 2019	November 7, 2015
	U1R19 Outage Oversight Report	May 4, 2016
	U3R19 Outage Oversight Report	November 18, 2016
	U2R20 Outage Oversight Report	May 8, 2017
	1R20 Outage Daily Update Reports	October 16-19, 2017
	Post Critique for RWP 1-3038, 1R20 Core Support Barrel Move from Rx Vessel to Stand	October 18, 2017

Section 40A1: Performance Indicator Verification

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
75RP-0LC01	Performance Indicator Occupational Radiation Safety Cornerstone	4
75RP-0LC02	Performance Indicator Public Radiation Safety Cornerstone	4

Section 40A2: Problem Identification and Resolution

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
37DP-9MP02	Site Lubrication Laboratory Operation and Test Methods	35
01DP-0AP09	Procedure and Work Instruction Use and Adherence	17
37DP-9MP02	Site Lubrication Laboratory Operation and Test Methods	31
40DP-9OP15	Operator Challenges and Discrepancy Tracking	28
40DP-9OP33	Shift Turnover	35

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
40DP-9OP09	System Status Control	55

Condition Reports (CRs)

17-15042	17-15396	15-08152	16-05965
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**The following items are requested for the
Occupational Radiation Safety Inspection
at Palo Verde
October 16-20, 2017
Integrated Report 2017004**

Inspection areas are listed in the attachments below.

Please provide the requested information on or before **September 26, 2017**.

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 or Louis.Carson@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: 4/18/2016

- 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 4/18/2016, related to this inspection area
- D. Procedure indexes for the radiation protection procedures
- E. Please provide procedures related to the following areas noted below. Additional procedures may be requested by number after the inspector reviews the procedure indexes.
 - 1. Radiation Protection Program
 - 2. Radiation Protection Conduct of Operations, if not included in #1.
 - 3. Personnel Dosimetry
 - 4. Posting of Radiological Areas
 - 5. High Radiation Area Controls
 - 6. RCA Access Controls and Radiation Worker Instructions
 - 7. Conduct of Radiological Surveys
 - 8. Radioactive Source Inventory and Control
- F. List of corrective action documents (including corporate and sub-tiered systems) since 4/18/2016.
 - a. Initiated by the radiation protection organization
 - b. 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.

- 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 all radioactive sources that are required to be leak tested. Indicate which sources are 10 CFR Part 20, Appendix E, Category 1 or Category 2. 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 Category 1 or 2 radioactive sources and any other radioactive source(s) that have failed its leak test within the last two years

- K. A list of any non-fuel items stored in the spent fuel pools, and if available, their appropriate dose rates (Contact / @ 30cm)
- L. A list of radiological controlled area entries greater than 100 millirem since April 18, 2016. The list 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 set-point used during the entry (for Occupational Radiation Safety Performance Indicator verification in accordance with IP 71151).

2. Occupational ALARA Planning and Controls (71124.02)

Date of Last Inspection: 1/19/2016

- A. List of contacts and telephone numbers for ALARA program personnel
- B. Applicable organization charts
- C. Copies of audits, self-assessments, and LERs, written since 1/19/2016, focusing on ALARA
- D. Procedure index for ALARA Program
- 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. ALARA Program
 - 2. ALARA Planning
 - 3. ALARA Committee
 - 4. Radiation Work Permit Preparation
- F. A summary list of corrective action documents (including corporate and sub-tiered systems) written since 1/19/2016, related to the ALARA program, including exceeding RWP Dose Estimates.

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 work activities greater than 1 rem, since date of last inspection, Including original dose estimates and actual doses accrued.
- H. Site dose totals and 3-year rolling averages for the past 3 years (based on dose of record)
- I. Outline of source term reduction strategy
- J. If available, provide a copy of the ALARA outage report for the most recently completed outages for each unit
- K. Please provide your most recent Annual ALARA Report

**Information Request August 28, 2017
Notification of Inspection and Request for Information
Palo Verde Nuclear Generating Station, Unit 1
NRC Inspection Report 05000528/2017004**

INSERVICE INSPECTION DOCUMENT REQUEST

Inspection Dates: October 16-October 27, 2017

Inspector: Isaac Anchondo, Reactor Inspector

A. Information Requested for the In-Office Preparation Week

The following information should be sent to the Region IV office in hard copy or electronic format (ims.certrec.com preferred), in care of Isaac Anchondo, by October 6, 2017, to facilitate the selection of specific items that will be reviewed during the onsite inspection weeks. The inspector will select specific items from the information requested below and then request from your staff additional documents needed during the onsite inspection week (Section B of this enclosure). We ask that the specific items selected from the lists be available and ready for review on the first day of inspection. Please provide requested documentation electronically if possible. If requested documents are large and only hard copy formats are available, please inform the inspector, and provide subject documentation during the first day of the onsite inspection.

If you have any questions regarding this information request, please call the inspector as soon as possible.

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 31500011. The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid Office of Management and Budget control number.

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

On October 16, 2017, a reactor inspector from the Nuclear Regulatory Commission's (NRC) Region IV office will perform the baseline inservice inspection at Palo Verde Nuclear Generating Station (PVNGS), Unit 1, using NRC Inspection Procedure 71111.08, "Inservice Inspection Activities." Experience has shown that this inspection is a resource intensive inspection both for the NRC inspectors and your staff. The date of this inspection may change dependent on the outage schedule you provide. In order to minimize the impact to your onsite resources and to ensure a productive inspection, we have enclosed a request for documents needed for this inspection. These documents have been divided into two groups. The first group (Section A of the enclosure) identified information to be provided prior to the inspection to ensure that the inspector is adequately prepared. The second group (Section B of the enclosure) identifies the information the inspector will need upon arrival at the site. It is important that all of these documents are up to date and complete in order to minimize the number of additional documents requested during the preparation and/or the onsite portions of the inspection. We have discussed the schedule for these inspection activities with your staff and understand that our regulatory contact for this inspection will be Mr. Del Elkinton of your licensing organization. The tentative inspection schedule is as follows:

Preparation week: October 2-6, 2017

Onsite weeks: October 10-18, 2017

Our inspection dates are subject to change based on your updated schedule of outage activities. If there are any questions about this inspection or the material requested, please contact the lead inspector Isaac Anchondo at 817-200-1152.

([mail to: Isaac.Anchondo@nrc.gov](mailto:Isaac.Anchondo@nrc.gov)).

A.1 ISI/Welding Programs and Schedule Information

a) A detailed schedule (including preliminary dates) of:

- i. Nondestructive examinations planned for ASME Code Class Components including containment, performed as part of your ASME Section XI, risk informed (if applicable), and augmented inservice inspection programs during the upcoming outage.
- ii. Examinations planned for Alloy 82/182/600 components that are not included in the Section XI scope (if applicable).
- iii. Examinations planned as part of your boric acid corrosion control program (mode 3 walk downs, bolted connection walk downs, etc.).
- iv. Welding activities that are scheduled to be completed during the upcoming outage (ASME Class 1, 2, or 3 structures, systems, or components). Include the weld identification number, description of weld, category, class, type of exam and procedure number, and date of examination.

b) A copy of ASME Section XI, Code Relief Requests and associated NRC safety evaluations applicable to the examinations identified above.

- i. A list of ASME Code Cases currently being used to include the system and/or component the Code Case is being applied to.

- c) A list of nondestructive examination reports which have identified recordable or rejectable indications on any ASME Code Class components since the beginning of the last refueling outage. This should include the previous Section XI pressure test(s) conducted during start up and any evaluations associated with the results of the pressure tests.
- d) A list including a brief description (e.g., system, code class, weld category, nondestructive examination performed) associated with the repair/replacement activities of any ASME Code Class component since the beginning of the last outage and/or planned this refueling outage.
- e) If reactor vessel weld examinations required by the ASME Code are scheduled to occur during the upcoming outage, provide a detailed description of the welds to be examined and the extent of the planned examination. Please also provide applicable procedures that will be used to conduct these examinations.
- g) Copy of any 10 CFR Part 21 reports applicable to structures, systems, or components within the scope of Section XI of the ASME Code that have been identified since the beginning of the last refueling outage.
- h) A list of any temporary non-code repairs in service (e.g., pinhole leaks).
- i) Please provide copies of the most recent self-assessments for the inservice inspection, welding, and Alloy 600 programs.
- j) Copy of the procedures for welding techniques, and NDE that will be used during the outage.

A.2 Reactor Pressure Vessel Head

- a) Provide a detailed scope of the planned bare metal visual examinations (e.g., volume coverage, limitations, etc.) of the vessel upper head penetrations and/or any nonvisual nondestructive examination of the reactor vessel head including the examination procedures to be used.
 - i. Provide the records recording the extent of inspection for each penetration nozzle including documents which resolved interference or masking issues that confirm that the extent of examination meets 10 CFR 50.55a(g)(6)(ii)(D).
- b) Copy of current calculations for EDY, and RIY as defined in Code Case N-729-1 that establish the volumetric and visual inspection frequency for the reactor vessel head and J-groove welds.

A.3 Boric Acid Corrosion Control Program

- a) Copy of the procedures that govern the scope, equipment and implementation of the inspections required to identify boric acid leakage and the procedures for boric acid leakage/corrosion evaluation.

- b) Please provide a list of leaks (including code class of the components) that have been identified since the last refueling outage and associated corrective action documentation. If during the last cycle, the unit was shut down, please provide documentation of containment walk down inspections performed as part of the boric acid corrosion control program.

A.4 Additional Information Related to all Inservice Inspection Activities

- a) A list with a brief description of inservice inspection, and boric acid corrosion control program (e.g., condition reports) entered into your corrective action program since the beginning of the last refueling outage. For example, a list based upon data base searches using key words related to piping such as: inservice inspection, ASME Code, Section XI, NDE, cracks, wear, thinning, leakage, rust, corrosion, boric acid, or errors in piping examinations.
- b) Provide training (e.g. Scaffolding, Fall Protection, FME, Confined Space) if they are required for the activities described in A.1 through A.4.
- c) Please provide names and phone numbers for the following program leads:

Inservice inspection (examination, planning)
Containment exams
Reactor pressure vessel head exams
Snubbers and supports
Repair and replacement program
Licensing
Site welding engineer
Boric acid corrosion control program
Steam generator inspection activities (site lead and vendor contact)

B. Information to be Provided Onsite to the Inspector(s) at the Entrance Meeting (October 16, 2017):

B.1 Inservice Inspection / Welding Programs and Schedule Information

- a) Updated schedules for inservice inspection/nondestructive examination activities, including steam generator tube inspections, planned welding activities, and schedule showing contingency repair plans, if available.
- b) For ASME Code Class welds selected by the inspector from the lists provided from section A of this enclosure, please provide copies of the following documentation for each subject weld:
 - i. Weld data sheet (traveler).
 - ii. Weld configuration and system location.
 - iii. Applicable Code Edition and Addenda for weldment.
 - iv. Applicable Code Edition and Addenda for welding procedures.

- v. Applicable welding procedures used to fabricate the welds.
 - vi. Copies of procedure qualification records (PQRs) supporting the weld procedures from B.1.b.v.
 - vii. Copies of welder's performance qualification records (WPQ).
 - viii. Copies of the nonconformance reports for the selected welds (If applicable).
 - ix. Radiographs of the selected welds and access to equipment to allow viewing radiographs (if radiographic testing was performed).
 - x. Copies of the preservice examination records for the selected welds.
 - xi. Readily accessible copies of nondestructive examination personnel qualifications records for reviewing.
- c) For the inservice inspection related corrective action issues selected by the inspectors from section A of this enclosure, provide a copy of the corrective actions and supporting documentation.
 - d) For the nondestructive examination reports with relevant conditions on ASME Code Class components selected by the inspectors from Section A above, provide a copy of the examination records, examiner qualification records, and associated corrective action documents.
 - e) A copy of (or ready access to) most current revision of the inservice inspection program manual and plan for the current interval.
 - f) For the nondestructive examinations selected by the inspectors from Section A of this enclosure, provide a copy of the nondestructive examination procedures used to perform the examinations (including calibration and flaw characterization/sizing procedures). For ultrasonic examination procedures qualified in accordance with ASME Code, Section XI, Appendix VIII, provide documentation supporting the procedure qualification (e.g. the EPRI performance demonstration qualification summary sheets). Also, include qualification documentation of the specific equipment to be used (e.g., ultrasonic unit, cables, and transducers including serial numbers) and nondestructive examination personnel qualification records.

B.2 Reactor Pressure Vessel Head (RPVH)

- a) Provide drawings showing the following (if performing any RPVH inspection activities):
 - i. RPVH and control rod drive mechanism nozzle configurations.
 - ii. RPVH insulation configuration.

Note: The drawings listed above should include fabrication drawings for the nozzle attachment welds as applicable.

- b) Copy of volumetric, surface and visual examination records for the prior inspection of the reactor vessel head and head penetration J-groove welds.

B.3 Boric Acid Corrosion Control Program

- a) Please provide boric acid walk down inspection results, an updated list of boric acid leaks identified so far this outage, associated corrective action documentation, and overall status of planned boric acid inspections.
- b) Please provide any engineering evaluations completed for boric acid leaks identified since the end of the last refueling outage. Please include a status of corrective actions to repair and/or clean these boric acid leaks. Please identify specifically which known leaks, if any, have remained in service or will remain in service as active leaks.

B.4 Codes and Standards

- a) Ready access to (i.e., copies provided to the inspector(s) for use during the inspection at the onsite inspection location, or room number and location where available):
 - i. Applicable Editions of the ASME Code (Sections V, IX, and XI) for the inservice inspection program and the repair/replacement program.
- b) Copy of the performance demonstration initiative (PDI) generic procedures with the latest applicable revisions that support site qualified ultrasonic examinations of piping welds and components (e.g., PDI-UT-1, PDI-UT-2, PDI-UT-3, PDI-UT-10, etc.).
- c) Boric Acid Corrosion Guidebook Revision 1 – EPRI Technical Report 1000975.

PALO VERDE NUCLEAR GENERATING STATION – NRC INTEGRATED INSPECTION
REPORT 05000528/2017004, 05000529/2017004, AND 05000530/2017004 DATED
JANUARY 30, 2018

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