

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/88-28, 50-529/88-27 and 50-530/88-26

Docket Nos. 50-528, 50-529 and 50-530

License Nos. NPF-41, NPF-51 and NPF-74

Licensee: Arizona Nuclear Power Project
P. O. Box 52034
Phoenix, Arizona 85072-2034

Facility Name: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2 and 3

Inspection Conducted: August 15, 1988 through August 19, 1988

Inspector:

J. F. Burdoin
J. F. Burdoin, Project Inspector

9/9/88
Date Signed

Approved by:

S. Richards
S. Richards, Chief, Engineering Section

9/16/88
Date Signed

Summary:

Inspection on August 15, 1988 - August 19, 1988 (Report Nos. 50-528/88-28, 50-529/88-27 and 50-530/88-26)

Areas Inspected: An unannounced inspection by one regional inspector of various vital areas and equipment in the plant, and follow-up of enforcement items, open items, and bulletins/Part 21(s). Inspection Procedures Nos. 71707, 92702, 92701, 92703 and 30703 were used as guidance for the inspection.

Results: No violations or deviations were identified. The licensee's corrective measures for enforcement items and actions on followup items were appropriate, well documented and adequate.

DETAILS

1. Persons Contacted

The below listed technical and supervisory personnel were among those contacted:

Arizona Nuclear Power Project (ANPP)

- B. Albert, Licensing Engineer
- *P. Coffin, Compliance Engineer
- J. Cole, Meteorology Laboratory Foreman
- W. Fernow, Manager, Training
- *Z. Elawar, Nuclear Safety Engineer
- *J. Haynes, Vice President, Nuclear Production
- S. Karimi, Compliance Engineer
- R. Kershaw, Lead I&C Engineer
- D. Larkin, QA Engineer
- *L. Papworth, Director, Quality Assurance
- *W. Quinn, Director, Nuclear Safety and Licensing
- *A. Rogers, Manager, Licensing
- T. Shriver, Compliance Manager
- *E. Sterling, Manager, Engineering

The inspector also talked with other licensee personnel during the course of the inspection.

*Attended the Exit Meeting on August 19, 1988.

2. Area Inspection (71707)

An independent inspection was conducted in the Unit 2 and 3 Control and Auxiliary Buildings. The inspector examined areas and equipment for debris, potential hazards, oil and water leakage, and equipment condition, e.g., oil level, valve position, and electrical connection configuration and cleanliness. The equipment and areas inspected included:

Unit 1

- A. Two 4160/480V switchgear rooms (trains A and B).
- B. Four 125V battery rooms.
- C. Four battery equipment rooms.
- D. Two diesel generator control rooms.
- E. Two diesel generator machine rooms.
- F. Two remote shutdown panel rooms.
- G. Two auxiliary feedwater pump rooms.

Unit 2

- A. Two 4160/480V switchgear rooms (trains A and B).
- B. Four 125V battery rooms.
- C. Four battery equipment rooms.
- D. Two diesel generator control rooms.
- E. Two diesel generator machine rooms.
- F. Two remote shutdown panel rooms.

Housekeeping and equipment status appeared to be acceptable.

No violations or deviations were identified.

3. Followup of Enforcement Items (92702)

During the Safety System Functional Inspection (SSFI) conducted at Palo Verde in January/February 1988, the inspection team identified the following enforcement items.

- A. (Closed) 50-528/88-01-01, Expansion/Surge Tank Pressure Relief Valves

Section III of the ASME Boiler and Pressure Vessel Code, Article ND-7412, requires pressure relief valve capacity to include consideration of a fully open pressure reducing device. The licensee had not considered or made calculations to demonstrate that the relief valves provided for the essential chilled water (EC) expansion tank and the essential cooling water (EW) surge tank are sized to accommodate flows resulting from the failure of the upstream regulating valves in the fully open position.

Discussion

The licensee during discussions with the Architect/Engineer (A/E) verified that the relief valve sizing on EC/EW tanks were established using experience, simple analyses and good engineering judgement. The ASME code in effect at that time required, according to article NA-4410, that measures be provided to assure applicable requirements of the code are properly translated into project specifications and drawings. The code further specified that checking and review be performed and the individuals performing the checking and review be other than those who performed the original design. The engineering procedures used by the A/E were implemented to satisfy these requirements, as evidenced by the appropriate signatures on the applicable data sheets attached to the relief valve procurement specifications. The licensee's engineering department has performed calculations to confirm the capacities of the relief valves on the expansion/surge tanks for the essential chilled water and essential cooling water systems.

Corrective Actions

The inspector examined the following calculations for sizing the above identified relief valves:

13-JC-EC-A07, "Essential Chilled Water Expansion Tank Valve Sizing Verification" dated February 17, 1988

13-JC-EW-A04, "Essential Cooling Water Surge Tank Relief Valve Capability Analysis" dated February 18, 1988.

The calculations had been checked, reviewed, approved and were properly signed. Both sets of calculations demonstrated the capacities of the pressure relief valves to include the maximum flow realized upon the failure to the fully open position of the pressure reducing valves upstream of the expansion/surge tanks. The two sets of calculations were detailed, thorough, and confirmed that the relief valves were adequately sized.

The licensee, to avoid future violations, maintains that current procedural controls which specify the requirements for the development and documentation of engineering designs establish specific controls which will preclude this type of issue from recurring.

The licensee recognizes that the issue described in the notice of violation is not an isolated case and other design documents exist that may not contain acceptable design documentation under currently accepted standards. As a result, the design engineers have been directed to evaluate each design basis document to ensure it contains the required justification for assumptions used and the necessary supporting calculations. This evaluation will be done on a case by case basis as each design basis document is being utilized for current design work. Further, the A/E quality assurance program included multi-disciplined internal staff and client review meetings to provide assurance that the system designs meet all requirements. As an additional prudent measure, two (2) systems other than those evaluated by the SSFI team will be reviewed.

The review will determine if all necessary documentation to support the design is available and accurate. Based upon the results of the review, additional actions may be instituted if deemed necessary.

The licensee's corrective actions in response to this violation appear to be adequate. This item is closed.

B. (Closed) 50-528/88-01-12, Inadequate 10 CFR 50.59 Evaluation

10 CFR 50.59 requires holders of a license authorizing operation of a utilization facility that makes change in the facility as described in the safety analysis report to maintain records of changes in the facility. These records must include a written safety evaluation which provides the basis for the determination that the change does not involve an unreviewed safety question. TMR No. 1-85-CI-377, Revision 0, dated September 27, 1985, a temporary modification that installed tanks to supply hypochlorite for the emergency spray ponds, was completed with an unacceptable written safety evaluation. The evaluation did not consider the consequences of a seismic event.



Discussion

The Palo Verde original design included provision to produce sodium hypochlorite at the Water Reclamation Facility (WRF) and supply the chemical for the Units' essential spray pond systems. Due to leakage in the underground transfer system piping from the WRF to the spray ponds, local portable tanks (filled by tank truck) were installed at each spray pond until piping repairs could be effected. This installation was done utilizing the existing Temporary Modification procedure. Due to difficulties encountered with implementing the piping repairs the temporary modification remained in place for an extended period. The root cause of this event has been determined to be an inadequate procedure which was in place at the time the temporary modification was installed. The procedure did not contain sufficient guidance to ensure the evaluations would fully consider the potential effects of the installation of temporary modifications.

Corrective Actions

As a result of this finding, the licensee conducted a reevaluation of the temporary modification for the tank installation to ensure that no potentially unreviewed safety questions exist in accordance with 10 CFR 50.59. The results of the evaluation indicated, for the installation of the tanks, that no unreviewed safety question existed. As of this date, the temporary modification for the sodium hypochlorite tanks addressed in this Notice of Violation has been restored and the tanks removed. The tanks remain in place in Units 2 and 3 pending the completion of required work.

The inspector examined completed work order, 00209391 for the removal of the temporary tank which was used to supply hypochlorite to the Unit 1 spray pond. An inspection was made at the spray pond to confirm the tank had been removed. The inspector also confirmed with the licensee that the work orders for removing the temporary tanks from Units 2 and 3 have been prepared and the actual work will be completed in the near future. The inspector also examined the revised and updated procedure 73AC-9ZZ05, "Temporary Modification Control," which appeared to be in order.

The licensee's corrective actions in response to this violation appear to be adequate. This item is closed.

C. (Closed) 50-528/88-01-13, Deficient Air Handling Unit (AHU)

American Air Filter Company Drawing No. MC-134-942G, Revision G, showed access doors installed on the air handling unit for the motor driven auxiliary feedwater pump room. On January 7, 1988, an access door was missing for the motor driven auxiliary feedwater pump room air handling unit.

Discussion

Following the discovery of the missing access door for the air handling unit, operations performed an initial evaluation of the conditions for operability concerns. The results of this evaluation concluded that the system would remain operable despite the missing panel. This configuration deficiency was subsequently forwarded to the Engineering Evaluations Department for evaluation to determine if any potential adverse effects on the designed ventilation and cooling for the room could exist due to the missing panel. The delay in obtaining a formally documented engineering evaluation was caused by the initial determination that the deficiency would have no adverse effect; and therefore, the decision was made that further evaluations were not necessary. The preliminary engineering evaluation identified concerns over the ability of the essential chilled water system to maintain room conditions within specified limits with the panel missing. As a result, the licensee engineering organizations collaborated to perform testing and analysis that did confirm Operations' original determination. An investigation was conducted to determine the root cause of the panel not being installed; however, a root cause could not be identified.

Corrective Actions

As immediate corrective actions the following measures were taken:

The missing panel was replaced with a panel manufactured at PVNGS. A walkdown was also conducted and no other panels were found missing. Further, testing was conducted to determine actual room temperature with the "B" Auxiliary Feed Pump operating. The test and evaluation were conducted to determine:

1. The cooling capability of the air cooling unit with the access panel missing.
2. If there were any potential safety implications associated with the operation of the auxiliary feed pump with the air handling unit access panel missing and the attendant reduction in cooling capability.

The results of the test and subsequent evaluation have shown:

1. If the access panel was missing the room temperature would remain approximately 6°F below the allowable limit during a Loss of Coolant Accident (LOCA).
2. There would be no degradation of safety related equipment inside the room.

The inspector examined completed work order 00272071 for the replacement repair of the missing access panel (5" x 30½") on the air handling unit. An inspection was also made at the air handling unit and verified that the panel was in place.



The licensee's corrective actions in response to this violation appear to be adequate. This item is closed.

D. (Closed) 50-528/88-01-20, Vital Battery Spacers Missing

Bechtel Drawing No. 13-10407, Revision 2, and Drawing E050-86 depicted the use of plastic spacers between selected battery jars. On January 27, 1988, two spacers were missing from vital battery "A," two spacers were missing from vital battery "D," and three spacers were missing from vital battery "B."

Discussion

The SSFI inspection team identified plastic spacers missing from three of the four vital batteries. An evaluation could not determine why the spacers were removed or establish a probable time frame when they could have been removed.

Corrective Actions

Immediate action was taken to verify seismic qualification of the battery racks with the plastic spacer tubes missing. Results indicate that these tubes provide no seismic capability; nor does their lack degrade, in any way, the seismic rating of the battery and rack assembly. However, a walkdown was conducted of all three units, and work documents were prepared to replace the missing tubes.

The inspector examined completed work order 00277565 for the replacement of missing plastic spacer tubes between battery cells for Unit 1 vital batteries. An inspection was made in Units 1 and 2 and verified that all of the plastic spacer tubes were in place on all four vital batteries for each unit.

The licensee's corrective actions in response to this violation appear to be adequate. This item is closed.

E. (Closed) 50-528/88-01-21, Battery Eyewash Stations

Bechtel calculation isometric Drawing 13-MC-DS-511 provided the main header configuration (up to the work point) for the emergency eyewash stations in the vital battery rooms. On February 6, 1987, the eyewash stations in the vital battery rooms were installed without revising the calculation isometric drawing and the existing configuration was not analyzed for its ability to meet seismic category 9 requirements.

Discussion

The SSFI inspection team noted the eyewash stations were installed in the battery rooms without updating the associated design documents. An investigation was conducted to determine why the design documents were not updated as required during the



installation activities, however, a specific root cause could not be identified.

An Engineering Evaluation was performed to ascertain whether the installation of the eyewash stations met Seismic IX requirements. The analysis showed that the projected pipe stress did not exceed allowable limits when subjected to SSE loading.

In addition, the hanger installations in Unit 1, which represent the worst case, were verified by testing to demonstrate the structural integrity of the supports. Appropriate documents have been submitted to update the as-built documentation as well as the analysis of the configuration.

The inspector examined the following two engineering evaluation requests (EER) initiated to resolve the violation:

- EER 88-DS-001, dated 1/12/88, determine if the as built configuration of the control building Emergency Shower and Eyewash (ESEW)/Domestic Water System (DS) piping meets the seismic category 9 requirements.
- EER 88-DS-002, dated 1/18/88, field test ESEW/DS supports to determine if they can withstand a SSE load of 160 lbs.

The EERs were found to be in order and addressed the concerns of the violation. This item is closed.

F. (Closed) 50-528/88-12-03, Steam Generator Water Level Wide Range Taps

During a special inspection conducted at Palo Verde on April 4-8, 1988; the following deviation was identified:

Table 2 of Regulatory Guide 1.97, Revision 2, recommends the range of Wide Range Steam Generator Level instrumentation to be: "From tube sheet to separators." Table 1.8-1 of the FSAR classifies the Wide Range Steam Generator Level instrumentation as category 1 instrumentation with a range of 0 to 100%. Table 1.8-1 states that the instrumentation complies with the recommendations stated in Regulatory Guide 1.97.

Contrary to the above, at the time of the inspection, the Wide Range Steam Generator Level instrumentation had a lower tap approximately 12 feet above the tube sheet and the upper tap approximately 4½ feet above the bottom of the separator. This range is approximately 31 to 112 percent of the range described in the Regulatory Guide.

Discussion

The licensee has reviewed the documentation which incorporated the commitments concerning Regulatory Guide 1.97, Revision 2, compliance into the PVNGS FSAR. This review indicates that the procedural controls were properly implemented; however, a personnel error

occurred during the review of the Steam Generator Level Type D variable range for the verification of the accurate tap location.

In addition, it has been determined that the physical location of the Steam Generator Wide Range Level tap was due to design considerations, specifically, the inability to adequately indicate level in the economizer region due to flow characteristics in this area. Therefore, the tap location is above the economizer region.

Corrective Actions

The licensee has initiated a change to the PVNGS FSAR to modify their commitments to Regulatory Guide 1.97, Revision 2, to take exception to the recommendation concerning the range of the Steam Generator (SG) Wide Range level and to indicate the proper location of the SG Wide Range level taps. This FSAR change will formally document the justification of the location of the taps. The licensee believes this change has no safety significance because adequate margin is provided for level indication of the ultimate heat sink.

The licensee has verified that the design drawings from the vendor reflect the proper locations of the SG Wide Range Level taps. The licensee has also verified that the PVNGS Operations Department is trained that when the SG Wide Range Level reading is 0%, this indicates that approximately one-third tube coverage remains. Operations procedures also reflect that when there is 0% indicated Wide Range level that one-third tube coverage remains. These indicate the Operations personnel are aware of the actual location of the taps.

The inspector examined the following documents to verify the licensee's corrective actions:

- Log No. 3045, Change to FSAR Table 1.8-1
- Procedure, 42EP-2ZZ01, Emergency Operations
- Procedure, 42R0-2ZZ05, Loss of Feedwater

These documents appeared to be in order and to address the subject.

The licensee's corrective actions in response to the deviation appear to be adequate. This item is closed.

G. (Closed) 50-529/87-36-03 Conax Electrical Conduit Seal Assemblies (ECSA)

During the EQ inspection on November 2-6, 1987 the licensee did not adequately document qualification of in-containment transmitters because the installation configuration differed from the qualification test configuration. Specifically, sheath cracks in vertical top entry conduit could permit standing water to collect against the transmitter's Conax cable entrance seal, possibly



violating the seal qualification and thus failing to provide the integrity required for transmitter qualification.

This item was previously reviewed in NRC inspection report 529/88-20, and remained open pending further progress in a new qualification test being conducted by Conax to qualify the ECSAs for post-accident submergence at PVNGS.

The inspector reviewed the status of the new qualification test with the licensee. The test specimen (ECSA) has been in the 200 day post-LOCA submergence test for a period of 130 days. Monitoring for leakage current during this period has been conducted daily. This item is closed.

No violations or deviations were identified.

4. Followup of Unresolved Item(s) (92701)

(Closed) 50-528/88-01-02, No Calculations for the Design Pressures and Temperatures for the Three Systems Reviewed

During the SSFI conducted in January/February 1988, the licensee could find no calculations or documented rationale to substantiate the design pressures and temperatures identified for the safety systems inspected (essential chilled water (EC) system, essential cooling water (EW) system, and essential spray pond (SP) system).

Discussion

The licensee has completed confirming calculations for EC, EW, and SP systems and has identified no discrepancies. The licensee believes, as stated in the inspection report, that this item has no safety significance because the design pressures established for the EC, EW, and SP systems are conservative.

The inspector examined the following calculations for substantiating the design pressures and temperatures for the three systems:

13-MC-EC-252, "Essential Chilled Water System Equipment Sizing"

13-MC-EW-301, "Essential Cooling Water System (EW) Design Pressure/
Temperature Calc."

13-MC-SP-A01, "Essential Spray Pond (SP) Design Pressure/Temperature
Calc."

The above calculations had been checked, reviewed, approved and properly signed. The calculations demonstrated/verified the following design pressures and temperatures for three systems inspected:

<u>System</u>	<u>Design/Operating (Max.) Pressures</u>	<u>Design/Operating Temperatures</u>
EC	*150/122 PSI	120°/45-57°F
EW	*150/130 PSI	200°/135°F
SP	150/100 PSI	150°/110°F

*Does not apply to expansion/surge tanks.

The three sets of calculations were detailed, thorough, and confirmed that the design pressures established for the EC, EW, and SP systems are conservative. This item is closed.

No violations or deviations were identified.

5. Follow-up of NRC Bulletin(s) and Part 21(s) (92703)

A. Administrative Closure of NRC Bulletins

With the implementation of new reactor inspection (core) program as outlined in the draft of the revised inspection manual chapter 2515, NRC bulletins are no longer required to be tracked on the "outstanding items report". Only those NRC bulletins for which a temporary instruction has been issued, will be required to be identified and tracked on the "outstanding items report". To this end, the following identified NRC bulletins for the three plants at Palo Verde are removed from the "outstanding items report".

<u>ITEM NUMBER</u>	<u>DESCRIPTIVE TITLE</u>
IB-88-01 IE BULLETIN	DEFECTS IN WESTINGHOUSE CIRCUIT BREAKERS
IB-88-02 IE BULLETIN	RAPIDLY PROPAGATING FATIGUE CRACKS IN S/G TUBES
IB-88-03 IE BULLETIN	INADEQUATE LATCH ENGAGEMENT IN HFA TYPE LATCHING RELAYS
IB-88-04 IE BULLETIN	POTENTIAL SAFETY RELATED PUMP LOSS
IB-88-05 IE BULLETIN	NONCONFORMING MATERIALS SUPPLIED BY PIPING SUPPLIES INC. & WEST JERSEY MANUFACTURING COMPANY
IB-88-08 IE BULLETIN	THERMAL STRESSES IN PIPING CONNECTED TO REACTOR COOLANT SYSTEMS

To remove the above listed NRC bulletins from the outstanding items report, they are hereby closed.



B. (Closed) 87-17P, 10 CFR Part 21 Report, Cooper Energy Services - Failure of an Agastat General Purpose Relay - Emergency D-G

A telephone report on July 14, 1987 by the licensee to Region V followed by written report RER-QSE-87-12 dated July 17, 1987 identified a deficiency relating to Unit 2 "A" diesel generator relay contacts.

The Unit 2, train A diesel generator (D-G) was started on a simulated SIAS/AFAS/LOP (emergency mode start) while performing surveillance test 73ST-2DG01. The Diesel Generator failed to meet the Technical Specification requirements for frequency (59.7 - 61.2 HZ), with a frequency of 59.5 HZ. The problem was identified as oxidized contacts on an Agastat general purpose relay, model KSV-20T.

The short term corrective action is to periodically burnish the contacts of the Agastat relays in the affected circuitry. This was performed on Unit 1 by work orders (WO) 211465 and 211458, on Unit 2 by WO 211481 and WO 210506, and on Unit 3 by WO 212833 and WO 211410. The emergency mode start test has been performed again, successfully meeting the Technical Specification requirements. Work orders will be issued to start the Diesel Generators in the emergency mode every 6 months, and reburnish the contacts, as necessary.

The long term corrective action is a design change to replace the subject Agastat relays with a hermetically sealed relay with bifurcated contacts, or another substitute, that is less susceptible to corrosion related resistance buildup (Plant Change Request #87-13-DG-007).

The inspector examined the following documentation for achieving the short and long term corrective measures described above.

ISM-DG-009, Site Modification Unit 1 dated 8/3/87
 W.O. 244234, Work Order Unit 1 train A D-G.
 W.O. 245757, Work Order Unit 1 train B D-G.
 W.O. 245800, Work Order Unit 2 train A D-G.
 W.O. 245790, Work Order Unit 2 train B D-G.
 ST-87-1522, QA/QC Monitoring Report

These documents appear to be in order with proper signature endorsements and dates for authorization of design, installation, quality assurance/quality control and completion of the work.

The long term corrective measures of replacing the agastat relays with hermetically sealed contacts have been completed for Units 1 and 2. The long term corrective measure will be accomplished on Unit 3 during the first convenient plant outage. In the interim, the short term measures are in effect. This item is closed.

No violations or deviations were identified.



6. Exit Meeting

The inspector conducted an exit meeting on August 19, 1988, with Mr. J. G. Haynes and other members of the staff as indicated in paragraph 1. During this meeting, the inspector summarized the scope of the inspection activities and reviewed the inspection findings as described in this report. The licensee acknowledged the concerns identified in the report.