

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos.: 50-528/87-25, 50-529/87-26, 50-530/87-27

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

License Nos.: NPF-41, NPF-51, and NPF-65

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

Facility Name: Palo Verde Nuclear Generating Station - Units 1, 2, and 3

Inspection at: Palo Verde Site, Wintersburg, Arizona

Inspection Conducted: July 15-24, 1987

Inspector:

R. C. Sorensen
R. C. Sorensen, Reactor Inspector

8/7/87
Date Signed

Approved by:

S. A. Richards
S. A. Richards, Chief
Engineering Section

8/7/87
Date Signed

Summary:

Inspection on July 15-24, 1987 (Report Nos. 50-528/87-25, 50-529/87-26, and 50-530/87-27)

Areas Inspected: Unannounced inspection and followup by a regional based inspector of Inspector Identified Items, License Conditions, TMI Action Plan Items, Deficiency Evaluation Reports (DERs), Licensee Event Reports (LERs), and Corrective Action. NRC Inspection Procedures 25565, 90712, 30703, 92701, 92702, and 92720 were covered during this inspection.

Results: Of the areas inspected, no violations or deviations were identified.

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DETAILS

1. Persons Contacted

Arizona Nuclear Power Project (ANPP)

- *T. Shriver, Compliance Manager
- O. Zeringue, Technical Support Manager
- W. Fernow, Training Manager
- *R. Baron, Compliance Supervisor

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

*Denotes those individuals attending exit meeting of July 24, 1987.

2. Followup of Inspector Identified Items

A. Unit 1

- (1) (Closed) Unresolved Item 50-528/85-31-08: "Check Installation to Verify Design Requirements"

Temporary modification 1-85-DG-0143 wired a strip chart recorder to the "A" diesel generator control panel to provide more accurate readings for testing purposes. However, no consideration was given to the isolation between Class IE control circuits and the recorder. This item remained unresolved pending more information.

A licensee review of this item determined that the recorder had not been installed in accordance with design requirements. However, further analysis determined that the failure of the recorder would not have resulted in the failure of the diesel generator in an emergency start situation.

The licensee has completely rewritten the Temporary Modification Control procedure (73AC-9ZZ05) to provide more management oversight and approval in the installation of temporary modifications (T-mods). Also, more specific technical reviews are to be performed by the system engineer for the installation of temporary modifications. The Temporary Modification Control procedure now directs the system engineer to perform a technical review per 73AC-9ZZ31, "Technical Input and Review." This procedure contains a checklist that causes the system engineer to address very specific criteria of separation and redundancy as well as other numerous pertinent criteria. Also included are reviews for acceptability from the standpoint of various codes and standards. These current review requirements for T-mods are much more stringent than the review requirements that the original T-mods were installed to and should preclude repetition of this type of occurrence. The

inspector found the licensee's actions to be acceptable. This item is closed.

(2) (Closed) Followup Item 50-528/85-18-01: Procedures for Refueling Cavity Water Seal (IEB-84-03)

The inspector had previously found the licensee's actions in response to IEB-84-03, Refueling Cavity Water Seal, to be acceptable with the exception of a seal installation procedure and an emergency procedure for potential seal rupture.

The inspector verified that the licensee has developed and approved a procedure to address a loss of water from the refueling cavity. Procedure 41A0-1ZZ53, "Loss of Refueling Pool Level," instructs the operators during refueling operations how to respond to a rapid loss of water for the refueling cavity due to a seal failure. The objective of the procedure is to maintain water inventory to allow time to place all fuel in a safe location and evacuate personnel from the area. The inspector found this procedure to be acceptable. The inspector also verified that operators had been or are being trained in this procedure.

Also, the licensee developed a detailed seal installation procedure as part of procedure 31MT-9RC01, "Reactor Vessel Disassembly and Assembly." The procedure was thorough and included verification that the refueling cavity water seal to be installed had been modified as required per the appropriate design change package (DCP). Also, the procedure contained three different quality control (QC) holdpoints to verify pressure test integrity, cleanliness of seating surfaces, and lack of scratches or gouges. Finally, it included a pressure test of the inflatable seal tubing.

The inspector found these procedures that addressed the bulletin to be acceptable. This item is closed.

(3) (Closed) Followup Item 50-528/85-26-02: Supervisory Review of Quality Work

The inspector had noted that a high differential temperature alarm across a charcoal filter existed on the Control Room B02 panel. However, operations had determined local temperature to be normal. Work Order (WO) 95060 was generated to calibrate the remote temperature instrument loop. The calibration was completed but did not correct the problem. No further work document was generated to correct the problem. The inspector pointed out that the various supervisory and quality reviews of the WO should have generated an additional WO to troubleshoot the instrument loop when the routine calibration did not correct the problem.

The licensee initiated several actions to resolve the inspector's concern. (1) All I&C personnel would be

counselled as to the importance of (a) initiating and documenting WO modifications, and (b) performing a detailed review of work documentation to ensure any unresolved items are properly documented and work initiation documents are written. (2) The Work Order Review Checklist would be revised to improve its effectiveness. (3) An internal review of other WOs would be performed to determine the effectiveness of these actions.

This internal review found no technical or administrative errors in the 20 WOs reviewed. In addition, the inspector reviewed two additional Preventive Maintenance WOs and two Surveillance Test WOs, all of which performed instrument loop calibrations. No problems were identified. The inspector noted that in one WO, a problem was identified with a particular component, brought to the attention of the Work Group Supervisor, and a separate WO was generated to correct the problem. The inspector therefore concluded that the licensee's actions have been effective in resolving this concern.

This item is closed.

- (4) (Closed) Unresolved Item 50-528/85-31-05: Resolution of Station Supervisory Staff Compliance with Technical Specification Review Requirements

Technical Specifications, Section 6.5.2.4, require that individuals responsible for review of proposed plant modifications be members of the station supervisory staff designated by the Plant Manager. It was unclear to the inspector whether Plant Change Package (PCP) policy and program procedures defined how or by whom these required staff supervisory reviews of proposed plant modifications have been performed.

The licensee implemented changes to administrative control procedure 73AC-0ZZ15, "Plant Change Packages." These changes more clearly define who is responsible for providing this Technical Specification required review of proposed plant modifications. A member of the Operations Engineering supervisory staff is required to review and approve the PCP and document this review and approval on the PCP cover page. This review is specifically directed by the procedure to cover the aspects required by the Technical Specifications.

This item is closed.

- (5) (Closed) Followup Item 50-528/86-33-01: Evaluation into Blown Fuse

A blown fuse in the non-class control instruments for narrow range level for Steam Generator #1 ultimately resulted in a



reactor trip on low steam generator level in Unit 1. The circuit board with the blown fuse was replaced and the original board and blown fuse were analyzed for a root cause of failure. The circuit board was replaced per WO 189904. Investigation and evaluation of the blown fuse were performed per Root Cause of Failure (RCF) 87-SF-013, and Engineering Evaluation Request (EER) 87-SF-007.

Extensive testing of the circuit board was performed per WO 99000101 under extreme conditions. It was tested with maximum input and output currents and voltages, minimum resistances, and both ambient and elevated temperatures. No fuse or component failures occurred. Based on this testing, the licensee concluded that the fuse was faulty and failed under normal operating conditions. In addition, no history of generic problems with blown fuses were found.

The licensee appeared to have sufficiently addressed the root cause and generic aspects of the blown fuse.

This item is closed.

(6) (Closed) Followup Item 50-528/86-24-02: Emergency Procedure Diagnostic Adequacy

The inspector had originally reviewed a reactor trip/ESFAS event and had three distinct areas of concern:

a. The licensee's approach to the use of the functional recovery procedure

The inspector questioned if procedure 41RO-1ZZ10, "Functional Recovery Procedure" should have been used by the operators after the inability to answer specific decision blocks in the Diagnostic Flow Chart were recognized. This was implied by the Emergency Operations procedure.

In order to more clearly define when the Functional Recovery Procedure is to be used, a change was implemented to the Emergency Operations procedure (41EP-1ZZ01) and the Functional Recovery procedure (41RO-1ZZ10). These changes added instructions "if diagnosis is not possible." In addition, a change was made to the Emergency Procedure Technical Guidelines (40AC-9ZZ10) to define what is meant by "diagnosis not possible."

b. The inconsistency in RCP operation between 41EP-1ZZ01 (Emergency Operations) and 41RO-1ZZ08 (Small Loss of Coolant Accident)

The inspector had noted that the Diagnostic Flow Chart of 41EP-1ZZ01 requires tripping of all RCPs prior to entering



41RO-1ZZ08. However, 41RO-1ZZ08 states that one RCP in each loop should remain running unless subcooling is lost.

To resolve this conflict, the licensee deleted the blocks from the Diagnostic Flow Chart that required tripping all RCPs prior to entering 41RO-1ZZ08.

- c. Followup of the licensee's actions to assist the operators in differentiating between a small break LOCA and an excessive steam demand

The inspector noted that the Diagnostic Flow Chart evaluated the difference between a small break LOCA and an excessive steam demand based on whether an MSIS had occurred. The inspector had questioned whether trending of steam generator pressure should also be considered, enhancing the ability to differentiate between the two events.

The licensee has implemented a change to the Emergency Operations Procedure (41EP-1ZZ01), to stress to operators the importance of trending all plant parameters. In addition, the inspector reviewed a sample of Recovery Operations procedures that showed that trending of certain parameters is conducted during the early stages of an event to ensure that the proper procedure is being used.

Although, the inspector found the licensee's resolution of certain specific aspects of emergency procedures to be acceptable, this crucial area will continue to be reviewed and evaluated as part of routine inspection effort.

This item is closed.

- (7) (Closed) Violation 50-528/86-20-01: Failure to Perform Hourly Fire Patrol in LPSI Pump Room

The fire protection sprinkler system in one LPSI pump room had been declared inoperable when the LPSI pump was required to be operable. Therefore, an hourly fire watch patrol was required by the Technical Specifications to be established in the LPSI pump room. However, fire watch personnel were utilizing video cameras temporarily placed in the LPSI pump room for ALARA considerations to meet the requirements of the hourly patrol, rather than physically enter the room. The following inadequacies were identified with this approach:

- o The fire watch personnel did not utilize the camera properly.
- o Neither Health Physics nor ALARA personnel were consulted concerning the need for the camera.

- ° Fire protection personnel did not use the various methods available to obtain necessary reviews and approvals prior to implementing an alternate method for satisfying a Technical Specification requirement.

The licensee implemented the following corrective actions:

- ° Fire protection personnel were counseled on compliance with established guidance. In addition, fire protection supervision was instructed on the proper methods of obtaining relief from established controls per memorandum from the Fire Protection Supervisor to all Shift Fire Captains dated June 20, 1986.
- ° To ensure that the transportability of this issue was also addressed, the methods of how to obtain (1) relief from established commitments, (2) interpretations of commitments, or (3) clarification of established controls, were disseminated to project personnel via memorandum dated October 31, 1986, from the PVNGS Plant Manager to all PVNGS personnel.

This item is closed.

(8) (Closed) Followup Item 50-528/86-24-03: Post Trip Review Deficiencies

The inspector had identified weaknesses in the licensee's post trip review process. The licensee acknowledged the inspector's comments.

Improvements have been made to the post trip review reporting program. Several changes and revisions have been made to the post trip review reporting procedure, 79AC-9ZZ08. The inspector reviewed this procedure and noted that two of the changes made involved the addition of a Post Trip Evaluation Team (PTET) and a Post Trip Management Review Team (PTMRT). The PTET develops a sequence of events, performs a detailed event analysis, assigns actions to responsible organizations, and develops a schedule for resolution of concerns. The PTMRT reviews and approves the actions of the PTET and approves Mode 2 entry as required.

The inspector reviewed two recent post trip review packages to ensure that procedure 79AC-9ZZ08 was being adhered to. No problems were identified.

This item is therefore considered closed. Although significant improvements have been made by the licensee to the post trip review process, the effectiveness of these improvements will continue to be evaluated as part of the routine inspection program.

(9) (Closed) Violation 50-528/86-24-04: Failure to Include Plant Changes in Annual 50.59 Report

The inspector had identified several instances where several plant changes were not included in the annual 50.59 report as required.

The licensee instituted the following corrective actions:

- a. The annual report would be resubmitted to include all information required by 10 CFR 50.59.

The inspector reviewed the revised annual report dated November 19, 1986, as well as the 2nd annual 50.59 report dated June 1, 1987. These reports contained significantly more details than the one originally submitted, with over 200 items each, and appeared to meet the requirements of 10 CFR 50.59.

- b. Departmental guidelines would be established which would provide definitive criteria for the preparation of the annual 50.59 report.

The inspector reviewed these guidelines dated February 1, 1987. These instructions were extensive and directed responsible individuals to account for all manner of changes to the plant and procedures that would be required to be reported by 10 CFR 50.59. These guidelines should be helpful in compiling complete 50.59 annual reports in the future.

- c. A review of other required recurring reports would be conducted to ensure compliance with regulatory requirements.
- d. The current guidance used to prepare these other recurring reports would be reviewed and updated as appropriate.

The inspector reviewed documentary evidence of paragraph Nos. c. and d. above and found the licensee's actions to be acceptable.

This item is closed.

(10) (Closed) Unresolved Item 50-528/86-09-01: Design Control Problem - Failed Hanger

On March 13, 1986, the licensee identified a failed strut-type support (1SG-005-H008) installed on a 24-inch main feedwater line in Unit 1. The inspector left this issued unresolved pending the completion of review into the root cause of the original support design control problem.

The root cause of the failure was evaluated by Bechtel and the licensee to have been a lack of consideration of the effects of localized flange bending and thermal displacement of the piping system in the original design of the support. During a review of similar pipe supports, an additional 10 pipe supports were found undersized due to failure to consider the above criteria. These additional undersized supports have been modified in all three units. The inspector reviewed the applicable documentation for the modified supports in Unit 3 and found no deficiencies.

A review by the NRC's Office of Nuclear Reactor Regulation of the licensee's root cause analysis and subsequent correction is documented in Supplement 10 to the Palo Verde SER. NRR found the licensee's conclusions and corrective actions to be acceptable concerning the pipe support design.

In addition, the licensee issued CAR CA85-0252 to address the conformance of Bechtel's design verification program to ANSI N45.2.11. However, this CAR had remained open at the time of the inspector's original review of this item. The inspector has completed review of this CAR in which Bechtel implemented significant improvements to its design verification process. Also, procedures were revised to ensure compliance with the design verification guidelines of ANSI N45.2.11.

This item is closed.

(11) (Closed) Followup Item 50-518/87-01-02: Followup to Ensure Instrument Channels are Channel Checked Prior to Being Declared Operable

The inspector had identified instances where PPS channels were being bypassed for functional checks of the power supplies. While Channel "C" was in bypass, its shiftly channel check surveillance interval expired. Although a channel check was performed when Channel "C" was removed from bypass, it was only because an impending mode change required it, not because its surveillance interval had expired. The licensee apparently had no system in place to account for these types of occurrences.

The licensee committed to issuing night orders and operating procedure revisions to ensure that instrument channels which have been removed from service are channel checked prior to being declared operable.

The inspector reviewed applicable documentation and verified that night orders had been issued to this effect in both Units 1 and 2. Also, procedure 40AC-9ZZ02, "Conduct of Shift Operations," was changed on March 30, 1987, to ensure that channel checking required by the shiftly surveillance test is current on a PPS channel prior to removing it from bypass. It also ensures that following maintenance on a PPS parameter, a



channel check is performed prior to removing the PPS channel from bypass.

The inspector was satisfied with the licensee's actions and this item is closed.

B. Unit 2

(Closed) Followup Item 50-529/86-33-06: Review of QA Program to Assure that Identified Deficiencies Did Not Impact Safety

The inspector's overall concern was that, while the QA program appeared to be effective in identifying deficient conditions and correcting root causes, it did not appear to have assured that the identified deficiencies did not impact safety.

The licensee responded by stating that the Corrective Action Procedure, 6N417.16.00, which is a QA implementing procedure, specifically requires problems to be identified on other plant documents such as NCRs, EERs, and Work Requests. These documents receive a review for effect on plant equipment, and thus, on plant safety.

For Corrective Action Requests (CARs) themselves, a review is conducted to determine if a deficiency is a condition adverse to quality which could create a significant safety hazard as defined by 10 CFR 21.

Further, the inspector has reviewed numerous CARs, Quality Monitoring Reports, Part 21 reports and 50.55(e) reports, all of which are generated by Quality Assurance, and each of them addresses, either directly or indirectly, impacts on plant safety.

Finally, procedure 5N404.09.00 requires that for a condition that represents a significant deficiency that is potentially reportable, a Potentially Reportable Occurrence (PRO) be developed which evaluates the condition for its safety impact.

This item is closed.

C. Unit 3

(1) (Closed) Followup Item 50-530/85-08-01: Differences Between Unit 2, 3 and Unit 1 Must Be Analyzed for Appendix R Considerations

This item was initiated as a result of the Region V Appendix R inspection of March 1985. That inspection found the safe shutdown capability of Unit 1 to be acceptable. However, it determined that the differences between Unit 1 and Unit 3 needed to be analyzed by the licensee and submitted to NRR for review to determine the acceptability of the Unit 3 safe shutdown capability.



By letter #ANPP 39788, dated January 22, 1987, the licensee submitted this analysis to NRR for their review in response to this open item. NRR is currently reviewing this analysis.

This item is closed.

(2) (Closed) License Condition #4 from Attachment 1 to the Unit 3 Operating License

The licensee developed a technical specification numbering cross-reference system by memorandum dated March 23, 1987. This memorandum identified which Technical Specifications were incorrectly referenced in Unit 3 procedures, due to the renumbering of Technical Specifications after the deletion of fire protection requirements. This memorandum also identified which Unit 3 procedures were affected, or potentially affected, and was distributed to PVNGS personnel. The inspector reviewed approximately 50% of these procedures to ensure that they had been revised to account for the changes in Technical Specification numbering due to the deletion of fire protection requirements. No deficiencies were identified.

(3) (Closed) Unresolved Item 50-530/87-06-01: Numerous Deficiencies in Controlled-By-User Technical Manuals

The inspector had identified numerous deficiencies in controlled-by-user copies of Technical Manuals in the maintenance areas. These included such deficiencies as wrong revisions, Supplier Document Change Notices (SDCNs) missing, SDCNs included which should have been removed, and portions of Technical Manuals missing. Per procedure 78AC-OZZ03, "Bechtel-Generated Technical/Instruction Manual Control and Distribution," it is the responsibility of the user to update documents in their custody. This apparently was not being consistently done.

As corrective action, the licensee is establishing satellite Drawing and Document Control (DDC) centers in the Work Control Group trailers at all three units. The satellite DDC at Unit 3 is fully established and had been operating for about one month. The Technical Manuals in these areas, as well as other documents such as FSARs and station manual procedures, are controlled copies which are updated by DDC personnel. Maintenance personnel are allowed to check out the Technical Manuals, similar to the way a library functions, for up to five working days. DDC personnel man the satellite during day shift. Maintenance personnel are free to check out Technical Manuals on the back shifts as long as they use the checkout cards.

The inspector found this to be a more orderly and positive way of controlling Technical Manuals that are used in many

instances to perform work on safety-related systems and components.

This item is therefore closed.

(4) (Closed) Unresolved Item 50-530/87-06-02: Temporary Modification (T-Mod) Status Did Not Reflect the Actual Modification in the Unit

The inspector had identified one T-mod in Unit 3 where ten T-mod tags and associated electrical jumpers were indicated as being installed and only nine T-mod tags and jumpers were found installed. The inspector could not previously determine if this was an isolated occurrence or a more pervasive problem, due to time constraints.

The inspector reviewed three additional T-mods in Units 1 and 2 to further assess implementation of the licensee's T-mod program. The T-mods chosen were 1-85-ED-382, 2-87-DG-013, and 1-85-EC-141. The inspector compared what actually existed in the unit with what was reflected in the T-mod documentation. No deficiencies were noted. Therefore, this item is closed.

3. TMI Action Plan Items

(Open) II.K.3.5: Auto Trip of Reactor Coolant Pumps (RCPs)

The inspector reviewed the licensee's response to and resolution of this TMI Action Plan Item. This item had originally directed licensees to automatically trip all reactor coolant pumps in the case of a small break LOCA, until a better approach is found.

Generic Letter 83-10 was subsequently issued which concluded that the need for a RCP trip following a transient or accident should be determined by each licensee on a case-by-case basis, considering the Owners Group input. In response to this, Combustion Engineering issued CEN-268, "Justification of the Trip Two/Leave Two Reactor Coolant Pump Trip Strategy During Transients." This strategy was also incorporated into CEN-152, Revision 2, "Emergency Procedure Guidelines." The licensee has endorsed CEN-152, Revision 2, and modelled their emergency procedures after these guidelines.

The inspector reviewed two representative emergency procedures to verify implementation of the Trip Two/Leave Two RCP strategy of CEN-268. Although this strategy appears to have been implemented, not all of the guidelines of CEN-268 appear to have been followed. The guidance provided for operators to distinguish between a small-break LOCA, in which all RCPs will be tripped, and a Steam Generator Tube Rupture, in which two RCPs should be left running, does not appear to have been implemented.

The inspector will further address this question during a future inspection.

4. Deficiency Evaluation Reports (DERs)(Closed) DER 86-29: Letdown Heat Exchanger Nozzle Crack

During Hot Functional Testing of Unit 3, the licensee discovered a 120° circumferential through-wall crack in the reactor coolant inlet nozzle of the letdown heat exchanger (HX). This HX was manufactured by Richmond Engineering Company (RECO). Of 19 HXs in each unit, only the letdown heat exchangers were manufactured by RECO. The crack was located at the base of a weld.

The crack was determined by the licensee to be the result of a number of contributing factors, as follows:

- ° The orientation of the weld on the inlet nozzle should be 45°-45° angles. However, they were found to be 30°-60° angles with excessive amounts of weld splatter and general sloppiness. This was also noticed on the nozzle welds of the letdown HXs in Units 1 and 2. Although the RECO welds met the code requirements, per all applicable documentation, they were considered sloppy workmanship by the licensee.
- ° A groove or undercut at the base of the weld acted as an initiating flaw in the base metal of the nozzle.
- ° Stresses induced by cleanliness flushing conducted at higher than normal flowrates caused initiation of the crack which propagated to failure.

The sloppy welds were repaired on the letdown HXs in all three units, although only the one in Unit 3 failed. The welds in Unit 3 were repaired per Startup Work Authorization (SWA) 15071. The inspector inspected the repair of the failed weld in Unit 3.

The licensee inspected 18 of 19 HXs in each unit for the existence of similar type problems. According to the licensee, the deficient workmanship discovered on the letdown HXs was not evident in any of the other HXs in all three units.

The licensee's actions were considered by the inspector to be appropriate.

This DER is closed.

5. Licensee Event Reports (LERs)

The following LERs were reviewed and closed. The inspector verified that reporting requirements had been met, root causes had been identified, corrective actions appeared appropriate, generic applicability had been considered, and the LER forms were complete.

LER 2-87-11 - Surveillance Interval Exceeded Due to Missing Pages in Procedure Test Copy

LER 1-87-09 - Spurious CREFAS Due to Radiation Monitoring Pump Cycling

No violations or deviations were identified.

6. Diesel Generator Troubleshooting

The inspector witnessed troubleshooting and problem resolution of the "B" Emergency Diesel Generator in Unit 1. The engine had developed a knocking noise in, or near, the 8R cylinder. Although this did not affect the operability of the diesel, the problem was promptly addressed. The licensee ran the diesel three separate times to pinpoint the location of the noise. The vendor, Cooper Energy Services, was called in to use vibration measuring equipment to help locate the noise. Other participants included the system engineer, QC, the Operations Shift Supervisor, and several electrical maintenance personnel. The troubleshooting was handled in a professional manner and all parties involved appeared to display a genuine concern for locating and correcting the problem.

The noise was pinpointed in the 8R fuel injection ("jerk") pump. The pump appeared to be failing and was replaced. The diesel was subsequently restarted, and demonstrated operable.

No violations or deviations were identified.

7. Exit Meeting

The inspector met with the licensee representatives denoted in paragraph 1 on July 24, 1987. The scope of the inspection and the inspector's findings as noted in this report were discussed.