

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos.: 50-528/84-30, 50-529/84-24, 50-530/84-16

Docket Nos.: 50-528, 50-529, 50-530 License Nos: CPPR-141, 142, 143

Licensee: Arizona Public Service Company

P. O. Box 21666

Phoenix, Arizona 85036

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

Inspection at: Palo Verde Site, Wintersburg, Arizona

Inspection Conducted: June 4 - August 3, 1984

Inspectors:

DPNacht for 9/20/84  
L. E. Vorderbrueggen, Senior Resident Inspector Date Signed

Approved by:

[Signature] 9/21/84  
L. F. Miller, Chief, Reactor Projects Section 2 Date Signed

Summary:

Inspection on June 4 - August 3, 1984 Report Nos. 50-528/84-30 and 50-529/84-24 and 50-530/84-16).

Areas Inspected: Routine, onsite inspection by the resident construction inspector of activities associated with the following: review of records associated with NSSS modifications in Units 2 and 3; follow-up of licensee corrective action on noncompliance items; follow-up on 50.55(e) items; evaluation of QC Inspector independence; assessment of cathodic protection system adequacy; and general activities in progress throughout the plant site. The inspection involved 166 inspector hours on-site by one NRC inspector.

Results:

No items of noncompliance or deviations were identified.

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DETAILS

1. Persons Contacted

a. Arizona Public Service Company (APS)

# E. E. Van Brunt, Vice President-Nuclear Production  
\*D. B. Karner, Assistant Vice President-Nuclear Production  
\*W. E. Ide, Corporate Quality Assurance Manager  
\*L. A. Souza, Assistant Corporate Quality Assurance Manager  
\*J. R. Bynum, Director Nuclear Construction Manager  
# D. B. Fasnacht, Nuclear Construction Manager  
\*W. F. Quinn, Licensing Manager  
\*W. J. Jump, Startup Program Control Manager  
#\*C. N. Russo, Quality Assurance Audits/Monitoring Manager  
\*R. J. Burgess, Field Engineering Supervisor  
\*E. C. Sterling, Configuration Control Supervisor  
\*S. G. Penick, Quality Assurance Document Review Supervisor  
\*R. J. Kimmel, Transition Engineer  
#\*G. L. Irick, Quality Assurance QS and E Engineer  
# T. J. Bloom, Licensing Engineer  
\*J. E. Smith, Jr., Compliance Engineer  
\*G. J. Volk, Lead Mechanical Engineer  
\*J. L. Gross, Lead Construction Engineer  
\*D. Neal, Senior Fire Protection Engineer

b. Bechtel Construction, Inc. (Bechtel)

\*S. M. Nickell, Project Superintendent  
\*T. L. Mack, Assistant Project Manager  
\*H. H. Weber, Assistant Project Manager  
# D. T. Krishna, Quality Assurance Manager/Projects  
#\*D. R. Hawkinson, Project Quality Assurance Manager  
\*W. A. Miller, Quality Coordinator  
\*P. R. Huber, Project Quality Coordinator  
\*H. D. Foster, Project Quality Control Engineer  
\*J. L. Black, Resident Engineer  
\*T. L. Horst, Project Field Engineer  
\*R. H. Roehn, Lead Quality Assurance Engineer  
H. Guire, Project Quality Assurance Engineer  
M. Rosen, Assistant Project Quality Control Engineer  
H. Mear, Assistant Project Quality Control Engineer  
R. Ruff, Electrical/Instrumentation Quality Control Supervisor  
M. Alexander, Lead Electrical/Instrumentation Field Engineer  
R. J. Gross, Resident Engineering Staff-Electrical  
R. R. Avila, Senior Electrical Designer (L.A. Office)

c. Combustion Engineering, Inc. (CE)

S. Mager, Site Manager  
R. Hicks, Field QA Representative (Avery-Newington)

Other persons contacted during the inspection period included construction craftsmen, inspectors and supervisory personnel.

#Attended Management Meeting on July 13, 1984

#Attended Management Meeting on August 3, 1984

2. License Action on Previous Inspection Findings

a. (Closed) Enforcement Item - Missing Base Frame Bolts in Six Unit 1 Vital 480 Volt Motor Control Centers (50-528/83-34/23)

The inspector reviewed the corrective action identified in Attachment C of the licensee's response letter (ANPP-28749-EEVB/WEI) dated January 31, 1984. The situation was documented on the licensee's Corrective Action Request (CAR) No. C-83-159D dated September 27, 1983 which initiated Bechtel Deficiency Evaluation Report (DER) No. 83-84 dated November 22, 1983. The corrective action included the performance of an engineering analysis of the as-found conditions. This analysis (Calculation No. 13-CC-ZQ-E01, Revision 2) showed that, under all design loadings, the missing bolts would not compromise the structural integrity of the motor control centers, nor would their absence invalidate the seismic qualification of the equipment. The supplier, General Electric Company, reviewed the analysis and concurred with the conclusions. The General Electric drawings, however, were revised to clarify the desired bolting arrangement. Bechtel issued Design Change Packages for each unit to accomplish the work which is scheduled for completion prior to fuel loading in each unit. DER 83-84 also involved a review of the installation and the associated documents pertaining to eighty-three (83) pieces of safety-related equipment in each unit. The results of that review confirmed the proper installation of safety-related equipment. The corrective action also included a revision to Bechtel WPP/QCI 258.0 which now requires prior Engineering approval for the removal of any temporary attachment from installed equipment.

This item is closed.

b. (Closed) Enforcement Items - Nonconforming Conditions Associated with Piping Components, Supports, and Concrete Expansion Anchors - (83-34/01, 02, 03, 04, 06 and 10)

The licensee's corrective actions for these items were identified in Attachment D of their response letter (ANKPP-28749-EEVB/WEI) dated January 31, 1984. The actions included the following:

- 1) Broad scope reinspection programs to identify additional similar discrepancies in areas and systems not included in the limited scope of the NRC inspections.
- 2) Documentation of each identified discrepancy on an NCR for each case-by-case evaluation and rework or other disposition.

- 3) Changes to installation specifications to clarify intended requirements or to provide additional controls.
- 4) WPP/QCI document revisions to clarify or expand requirements.
- 5) Training sessions for Quality Control Inspectors and Field Engineers in specification requirements and the use of weld gages.
- 6) QA Surveillance Program performed on a monthly basis using a selective sampling of QC accepted installations as a continuing assessment of inspection program effectiveness.
- 7) For item 83-34/03, Penetration Sealing subcontractors were required to provide written notification to Bechtel of any spill of penetrant material.
- 8) Establishment of a corrective action reverification program to reconfirm the effectiveness of previous corrective actions applied to selected quality problems. The problems of interest are those that were serious enough to be reported to the NRC (DER's), have a history of recurrence, or may be generic.

The inspector verified that the licensee's stated actions have been accomplished or implemented, as the case may be. These items are closed.

c. (Closed) Enforcement Items - Nonconforming Conditions Associated with Electrical Raceway Identification, Overfill and Circuit Separation - (83-34/11, 12, 13, 14, 15, 16, 21, 24 and 25)

The licensee's corrective actions for these items were also identified in Attachment D of their response letter dated January 31, 1984. Those actions were essentially the same as those enumerated in b) above. Additionally, for item 83-34/12 a change notice to be Safety Analysis Report was issued to provide clarification that the separation criteria do not apply to low energy circuits as they can have no adverse effect on Class 1E cables. Also, for the items related to raceway identification and overfill, the corrective action included a 100% reinspection.

The inspector verified that the licensee's actions have been implemented or completed, as committed. These items are closed.

3. Reactor Coolant System Piping Modifications - Units 2 and 3

All RTD thermowell nozzle replacement work and the removal of the safety injection nozzle thermal sleeves has been satisfactorily completed. The work was accomplished using the same procedures that were used for the work in Unit 1, and under the direction of the same CE specialists and technicians that supervised the Unit 1 work.

The inspector examined the records that pertain to the work. Included were the properly approved procedures and the step-by step "work travelers". The procedures covered welding, acid-etching and nondestructive examination. Material certifications for the ASTM SB-166 Inconel thermowell nozzles and the welding filler metal were also present and were satisfactory. Qualification records for the three welders who performed the welding work were seen to be in order. The records displayed proper QC surveillance and acceptance inspection, and it appeared that work activities were in accordance with ASME Section III requirements.

No items of noncompliance or deviations were identified.

#### 4. Cathodic Protection System - All Units

NRC concerns about corrosion of underground piping prompted a review by the inspector of the plant Cathodic Protection System. The Bechtel design criteria and system description documents were examined, as were the installation drawings and details. The system is designated as non-safety related quality Class S, seismic category III. It is intended to provide protection from electrolytic corrosion for buried piping and tanks, exterior surfaces of tank bottoms in contact with the earth, and the reinforcing steel in the foundations of the containment buildings. The buried piping material includes copper, stainless steel, ductile iron, cast iron, carbon steel and large diameter reinforced concrete cylinder pipe. In accordance with normal industrial practice, only the carbon steel pipe is coated and wrapped for corrosion protection. Buried carbon steel tanks (e.g., diesel oil storage tanks) have a shop applied, thick organic exterior coating for corrosion protection. The original design specific 47 rectifiers and deep anode beds located throughout the 3 - unit power-block, and was based on the following Codes and Standards:

- . National Fire Protection Association (NFPA) Code 70-1975
- . National Association of Corrosion Engineers (NACE) Standard RP-01-69-1972
- . American National Standards Institute (ANSI) Standard C1-1975

The design of the system was also based upon chemical and electrical resistivity analyses of the plant soil performed by licensee consultants in the 1975 - 77 time frame. Construction of the system was completed, energized, and turned over by Bechtel to licensee Operations in November 1982 and it has been in operation since that time. As operational experience was gained and system performance parameters were analyzed in the subsequent few months, it became apparent to the licensee that the system had insufficient capacity and coverage to provide the desired protection. Potential measurements on pipe lines in various locations in the plant indicated unexpectedly large voltage attenuation due to shielding of the pipes by concrete foundations duct banks, and other pipes. Also, large addition in the amount of buried bar copper cable for the perimeter grounding loop, and in the number of ground grid connections, significantly increased the leakage current demand on the system rectifiers. In order to resolve this problem, an expansion of the system was designed by Bechtel and is presently being installed. The work is covered by Design Change Packages (DCP) QH-005 and QH-006, and

has been subcontracted to Goudy Engineering Company, a firm certified by NACE. The additions to the system include deep anode beds, intermediate depth anode beds, shallow/distributed anode beds, along with rectifier banks to energize them. Conservative allowances have been provided in the added electrical capacity to enable further expansion in the future. Bechtel also engaged the services of an independent consultant, who is a recognized expert in cathodic protection, to assess the adequacy of the expended system. His findings were positive and his final report included suggestions for balancing, operating and maintaining the system when it is completed.

Based on the foregoing information, the inspector has concluded that the cathodic protection system should be adequate to accomplish its intended corrosion protection function.

#### 5. All Units - Construction Quality Control Inspection

Because of the paramount importance of independence of the part of individuals performing final acceptance of construction work, the inspector reviewed that aspect of the licensee's quality control system. Contractors and subcontractors performing safety related work have been required by the licensee to provide a formal work inspection process that is performed by qualified individuals that have no involvement in or responsibility for work installation. This has generally been accomplished by a separate inspection group which reports to the individual (Owner or Manager) who has overall responsibility for completion of the total scope of the work contract. The vast majority of construction work at Palo Verde is performed by Bechtel, and their quality control inspection group has the independency arrangement described above. Each individual is first indoctrinated in the codes, standards and procedures that relate to his work, and is then provided the training, if required, for qualifying and being certified in his specialty area(s). Certification records are maintained for each inspector, and periodic performance evaluations are performed by inspection supervision. All inspections are performed using approved procedures and/or checklists and are appropriately documented. The inspectors have no involvement with the construction craft foreman and superintendents, and their accept/reject criteria are established for them in the design documents. Tools and instruments used by the inspectors are calibrated by the separate group but the inspector has the freedom to question, at any time, the suitability or proper operation of a tool or device he may be using for inspection. The inspectors initiate nonconformance reports (NCR's) for unacceptable work and affix a "hold-tag" to the affected item to stop further work. The inspectors subsequently reinspect the item to verify the acceptability of the identified disposition. All NCR's must have QA validation and must be closed. If, prior to QA validation, the inspector concludes that he has written an NCR in error, only he can close it by noting in block No. 17 on the NCR that it was written in error, and he must include a brief description of the reason and sign and date the entry. After an NCR has been validated by QA and it is subsequently determined that the nonconforming condition did not exist, it can only be invalidated by QA; an "Invalidate" stamp is used and the reason is entered with the QA engineer's signature and date.

The NRC inspector held private discussions with several QC inspectors to solicit their comments about their independence and authority. Each individual stated that he had never been pressured to make a dishonest decision, nor had he ever experienced any intimidating threats. (It is a stated policy of Bechtel management that intimidation of QC inspectors is cause for immediate dismissal.) Each inspector stated that he had no time constraints imposed on his work and that he was totally free to make independent decisions regarding the completion status of the work he was inspecting and its acceptability. Each individual believed that he had the full support of management, and that the QC inspection function at the Palo Verde site is highly respected and considered to be making a substantial contribution to cost savings as well as to safety.

The NRC inspector concluded that the QC inspectors at Palo Verde were sufficiently independent, were qualified, and have the necessary authority to identify problems, control further installation of nonconforming items, and to verify implementation of identified solutions.

6. Review of 50.55(e) Items - All Units

During this reporting period, the inspector reviewed and closed out the 18 items tabulated below which the licensee had identified to the NRC as having potential 50.55(e) reportability significance. Each item was documented on a Deficiency Evaluation Report (DER) as required by the licensee's procedure. The DER describes the discrepant condition, identifies supporting documents and the corrective action to be taken, and is the basis for the licensee's report to the NRC. For each of the items, the records indicate that the licensee's evaluations were thorough and that satisfactory corrective action had been completed or had been arranged. The items marked with an asterisk (\*) in the tabulation were judged by the licensee to be reportable under the 50.55(e) criteria and have been satisfactorily reported; the others were considered not reportable. The inspector concurs with the licensee's conclusions.

<u>DER NO.</u>	<u>SUBJECT</u>
83-55	Thermal Sleeve Missing from 14-inch Safety Injection Nozzle in RC Cold Leg 1A Following Hot Functional Test - Unit 1
*83-66	Damaged Internal Components - Bingham-Wilamette Auxiliary Feedwater Pumps - Unit 1
*83-69	Posi-Seal Valves Mispositioned During Installation - Unit 1
*83-71	Cracked Capstan Springs on Pacific Scientific Mechanical Shock Suppressors - All Units

- 83-72 Undersize Structural Steel Welds Identified by NRC CAT Inspection - Unit 1
- 83-74 Undersize Welds on Pipe Supports in Auxiliary Building - Unit 1
- 83-75 Improperly Torqued Bolts - Foxboro Control Panel Filler Assemblies - Unit 1
- 83-77 Honeycombed Concrete in Containment Dome Final Placement - Unit 2
- 83-84 Floor Frame Assembly Bolts Missing from 480-Volt Motor Control Centers - Unit 1
- 84-2 Rust and Oxidation on Internals of Borg-Warner Check Valves - All Units
- 83-5 Tools and Debris Found in Reactor Vessel Upper Guide Structure - Unit 2
- \*84-7 Failure to Complete Corrective Action on Two Previously Dispositioned DER's - Units 2 and 3
- 84-11 Oil Contaminated Conduit Used for Reactor Vessel Internals Instrumentation - Unit 1
- 84-14 Valve and Flange Bolts/Nuts Different From Piping Material Classification Requirements - All Units
- 84-17 Oversized Dimensions on Reactor Vessel Core Shroud Panels - Unit 3
- 84-19 Improper Replacement of Blind Flanges Removed for Testing Purposes - Unit 1
- \*84-23 Flow Vibration Damage to Auxiliary Feedwater Pump Recirculation Valve - Unit 1
- \*84-31 Potential Flooding of MSSS Auxiliary Feedwater Pump Rooms from Unsealed Floor Penetrations at 100-ft. Elevation - All Units

No items of noncompliance or deviations were identified.

#### 7. Inspection Tours of Plant Site

At various times during this inspection period, the inspector toured the plant site in order to observed general housekeeping conditions, care and preservation of equipment, handling of components, tagging and identification of material, absence of welding electrode stubs lying around the various work areas, presence of caps over pipe openings not being worked on, and presence of cribbing under stored equipment.

No items of noncompliance or deviations were identified.



8. Management Meeting

On July 13 and August 3, 1984, the inspector met with the licensee and Bechtel representatives identified in Paragraph 1. During the meeting, the inspector summarized the scope of the inspection activities and reviewed the inspection findings as described in this report.