U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/84-15, 50-529/84-12, 50-530/84-07

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, and 3

Inspection at: Palo Verde Construction Site, Wintersburg, Arizona

Inspection conducted: April 9-20, 1984

Inspectors: PPNarbut 6/6/84

P. P. Narbut, Project Inspector — Date Signed

J. T. Burdoin 6/4/84

J. Burdoin, Reactor Inspector — Date Signed

J. R. Ball 6/4/84

J. Ball, Reactor Inspector — Date Signed

Kenneth D. Ivey, Jr. 6/4/84

K. Ivey, Reactor Inspector — Date Signed

PPNarbut for 6/6/84

C. Myers, Reactor Inspector — Date Signed

David B. Pereira 6/4/84

D. Pereira, Reactor Inspector — Date Signed

J. Tatum 6/4/84

J. Tatum, Reactor Inspector — Date Signed

Daniel F. Hollenbach 6/4/84

D. Hollenbach, Reactor Specialist — Date Signed

Approved by: P.P. Narbut for 6-8-84

Tolbert Young, Chief
Reactor Projects Section

Date Signed

Summary:

Inspection on April 9-20, 1984 (Report Nos. 50-528/84-15, 50-529/84-12 and 50-530/84-07

Areas Inspected: Routine unannounced inspection by regional based inspectors of construction activities in Unit 3, with some examinations carried over into Units 2 and 1. The examined activities included as-built conditions and records, reactor coolant pressure boundary piping, reactor vessel internals, safety related components, electrical cables and terminations, and instrumentation cables and terminations. Additionally a preliminary examination of allegations regarding improper documentation was conducted. The inspection involved 646 inspector-hours on site by eight NRC inspectors.

Results: Five violations of NRC requirements and one deviation from a commitment to the NRC were identified. Violations were identified regarding after-the-fact qualification of welders (paragraph 4.a.), regarding improper tagging of nonconforming electrical cable (paragraph 8.a.), regarding lack of full thread engagement on a stud nut for a valve (paragraph 6.b), regarding loose nuts and improper clearance on a heat exchanger (paragraph 6.f.), and regarding improper gap measurement acceptance criteria for reactor vessel shims (paragraph 5.b.2). A deviation was identified regarding failure to require a signature for overall responsibility on the ASME N5 certification forms (paragraph 7.a).

DETAILS

1. Persons Contacted

a. Arizona Public Service Company (APS)

*E. E. Van Brunt, Jr., Vice President, Nuclear Projects Management
*D. B. Fasnacht, Nuclear Construction Manager
*W. E. Ide, Corporate QA Manager
*L. Souza, Acting Startup QA Manager
S. G. Pennick, QA Engineer
P. J. Moore, QA Engineer
N. W. Lossing, QA Engineer
D. Wittas, QA Engineer
D. Holman, QA Engineer
*D. Fowler, Acting Site Construction, QA Manager
*S. Frost, Nuclear Operations Licensing
*A. Harres, Operations Engineering
*L. G. Papasorth, Engineering Manager
*J. R. Bynum, Director Nuclear Operations
*C. N. Russo, Operations QA/QC Manager
G. Irick, QA Engineer
K. Anderson, QA Engineer

b. Bechtel Power Corporation (Bechtel)

*H. D. Foster, Project Quality Control Engineer
*D. R. Hawkinson, Project QA Supervisor
M. Rosen, Lead Quality Control Engineer
*R. Randels, Resident Engineer
*T. Horst, Field Engineering Manager
D. Huber, Project QC Manager
W. Miller, Project Field Engineer

c. Combustion Engineering Inc. (CE)

V. Cresniki, Field Service
L. Croteau, QA/QC
L. Hodsden, Field Service Engineer
C. Arsenault, Field Service Engineer

*Denotes those attending exit meeting, April 20, 1984.

Note: In addition various other engineering, craft and QC personnel were contacted.

2. Licensee Action on Previously Identified Items

No previously identified items were examined during this inspection.

3. Allegations Regarding Improper Documentation

The inspector initiated an examination of allegations received from an anonymous source through the Palo Verde Intervention fund. (File reference: ATS RV-84-A-028) The work on these allegations was not completed and was not discussed with licensee management except as follows:

. At the entrance and exit interviews licensee management was told that the inspector would spend a portion of his time examining allegations regarding improper documentation. No details were discussed.

. As a result of the partial examination of an allegation the inspector identified an improperly resolved nonconformance report regarding after-the-fact welder qualification. This issue is discussed in paragraph 4. of this report.

4. Improper Resolution of Nonconformance Reports Regarding Unqualified Welders

Through interviews conducted for the allegations referred to in paragraph 3 of this report. The inspector discovered an APS Corrective Action Request (CAR) Number C83-153N which addresses welding which was performed by unqualified welders.

The CAR was written as a result of final licensee documentation reviews conducted in preparation for signing ASME code data packages (the N5 Code data report).

The CAR identified five nonconformance reports which properly reported the discovery of unqualified welders performing welds. The identified NCRs were WC-733, WA-753, WC-806, WA-680 and WC-557. The CAR properly took exception to the engineering resolutions to the NCR's which allowed welder requalification after the fact. The CAR properly recommended action to determine the extent of the problem, correct the cases found, to revise procedures to prevent recurrence, and to train personnel to prevent recurrence of improper NCR dispositions.

The types of unqualified welder problems identified were such items as welding a smaller diameter pipe than qualified for, expired qualifications, and not being qualified per the proper welding code for the work performed. The nonconformances noted in the CAR were written in the period from May 12, 1982 to August 31, 1983.

The CAR was closed on the basis of what appears to be improper engineering evaluation and actions.

The engineering evaluation which closed the CAR stated that nonconformance reports were reviewed (90% of all NCR's from June 1978 to August 1983) and no additional NCR's on the subject were found. The CAR engineering evaluation also stated that the NCR engineering resolutions

to qualify welders after-the-fact were valid on the basis that the code is silent on what to do if the code requirements are violated. The engineering response did not implement a procedure change to prevent recurrence (on the basis of the limited number of nonconformances). The engineering response did not consider retraining required.

The inspector takes exception to the CAR resolutions on several counts as discussed below:

a. Violation of ASME Code Requirements and NRC Requirements

The licensee committed in the FSAR to perform certain safety work in accordance with the ASME III, Division I Code requirements. This has been previously verified by NRC as implemented in the specifications and procedures for performing work.

Specification Number 13-PM-204, Revision 13 dated February 23, 1984, "Specification for Field Fabrication and Installation of Number Piping Systems" paragraph 2.3, requires that all work be performed in accordance with listed standards and codes. Paragraph 2.3.e lists "ASME Section IX, Welding Qualifications Code Edition and Addenda mandatory at time of qualification."

The 1983 Edition of ASME Section IX, including the Summer 1983 Addenda, Article III provides the code requirements for Welding Performance Qualifications, and Paragraph QW-304 states that "each welder who welds under the rules of this Code shall have passed the mechanical tests prescribed in QW-302 for performance qualifications."

QW-302 provides for qualification by mechanical bend tests or radiography of weld test specimens.

The code does not provide for departures from its requirements even if they have been approved by engineering.

The code does have one limited provision in Paragraph QW 304.1 which provides that a six inch length of the first production weld made by a welder may be used for welder qualification by radiography. However, paragraph 304.2 goes on to state if a production weld which does not require radiography is selected for qualification and it does not meet the test, the welder has failed.

It is the inspectors opinion that these provisions of the code could be applied.

The engineering evaluation provided in CAR C83-153N states that corrective action is not required for after-the-fact welder qualification because the code is silent as to what action must be taken if the requirement for prior qualification is not followed.

None of the five NCR's listed in the CAR show radiography as a required action. All five show after-the-fact qualification.

It is noted that the site engineering disposition which permits after-the-fact welder qualification is in part based on a technical opinion of Bechtel M&QS Department as stated in a letter to the Bechtel Site QA Manager dated February 27, 1984. The letter states in part:

"Inquiry: Can a welder who welds outside his qualified limits (e.g. thickness range), be qualified 'after the fact" and are the welds made by him Code legal?

Response: It is true that the ASME Code (Section III and IX) is vague in addressing this condition. Code Cases and/or Code Interpretations are nonexistent on this subject."...."Since the Code allows testing be done on separate test coupons or on production welds, it would be acceptable to qualify welders "after the fact" without involving any production welds."

The inspectors disagrees that there are no Code Interpretations on the subject.

The inspector's research shows that at least one interpretation published by ASME applies. The Code Interpretation IX-79-02 issued January 3, 1979 states:

"Question: Are there provisions in the ASME Boiler and Pressure Vessel Code to permit performance qualification of a welder after the production welding has been completed?

Reply: There are no provisions in the ASME Boiler and Pressure Vessel Code which recognize qualification of welders or welding operators after completion of the production welding. There are provisions which permit concurrent qualifications of welders or welding operators as provided in Section IX, QW-304 and QW-305."

The failure to meet the provisions of the ASME code as required by Specification 13-PA-204 is considered a violation of NRC requirements. (Violation Number 50-528/84-15-01)

b. Indications of a more widespread incidence of unqualified welders

Through the allegation interviews discussed in paragraph 3, the inspector identified other nonconformances which applied to unqualified welders. Specifically, one additional safety related nonconformance was found in the stated time frame of the engineering study; NCR WA-736 dated April 14, 1983. Additionally, non-safety related nonconformances NCR's WA-293, WA-669, WA-670, WT-683, and WT-786 address unqualified welders.

Additionally the inspector is aware of five safety related NCR's were written in 1984 on the subject of unqualified welders. These were not included in the time frame of engineering's NCR review and therefore do not represent an omission of NCR's by engineering. However, the five 1984 NCR's refer to work performed in the time period of September 22, 1978 to December 30, 1983 indicating that the number of instances of unqualified welders may be greater than was indicated by the five NCR's addressed in the CAR. The 1984 NCR's are WC-908, WA-942, WC-889, WC-875 and WA-841 and were written as a result of either final inspection, walkdown spot checks, or documentation reviews for N5 code data reports. It appears that further review by the licensee would identify other examples. At the exit interview the inspector described the indications of a possibly more widespread administrative problem with the use of unqualified welders (including the NCR missed by the engineering review; WA-736). Licensee management committed to reassess the scope of unqualified welding in their response to the violation for unqualified welders which is described above.

c. Inappropriate Acceptance of Corrective Action

The corrective action, including action to prevent recurrence, which was proposed by engineering was formally accepted by Bechtel QA on April 4, 1984 by signature in the appropriate signature block on the CAR form. Additionally, the acceptance signature on the CAR indicates that Bechtel QA verification of the corrective action is not required.

(1) The inspector considers that the QA acceptance of corrective action was an inappropriate decision based on the NRC findings previously stated. This indicates a weakness in the QA ability to evaluate the appropriateness of proposed corrective actions.

(2) Neither the recommended corrective action by QA nor the engineering response address notification and training of craft and QC regarding the problem of unqualified welders. The engineering response states there is no apparent trend and therefore there is no need to modify the existing program to ensure welds are made by welders who are properly qualified.

The inspector considers this omission of corrective action at the craft and QC level to be an inappropriate decision in that it represents a lost opportunity to take corrective action at the source level of the problem.

A similar craft training issue was discussed in the correspondence dealing with the licensee's corrective actions for the regional construction assessment team (CAT) inspection, report 50-528/83-11 (specifically, the action regarding concrete expansion anchor bolts for conduit supports). The craft training issue will be persued through that correspondence.

Summary

The licensee's procedural requirements for welder qualification are appropriate and, based on past NRC inspection results, ordinarily function properly and provide reasonable controls to ensure qualified welders are utilized to perform work.

The examples of unqualified welders identified do not represent severe departures from qualification requirements, that is, the welders were considered unqualified for their work because such things as their qualifications had lapsed, or they were actively qualified for a process but had used that process on a material thickness beyond that qualified for.

The licensee's system for the identification of welder qualification problems appeared to have functioned properly at the level of properly identifying nonconformances and escalating these to a corrective action request when repetitive NCRs were noted. The licensee's system for correcting the identified problems did not appear to function properly. The engineering evaluation was not in accordance with ASME Code requirements, actions to prevent recurrence appear to require strengthening, and the determination that the number of incidences were isolated seems to be based on a limited review.

5. Reactor Vessel and Internals Examination

a. Objective.

The inspector examined reactor vessel and internals work activities and records to determine if the activities were in accordance with NRC requirements and SAR commitments. By direct observation and independent evaluation of work performance, work in progress and completed work, these activities were examined to determine if work procedures were being followed, installations were in accordance with specifications and procedures, and if QC procedures were being followed.

The inspection consisted of selective examinations of procedures and representative records, interviews with personnel and observations by the inspector. The areas of examination were selected as representative of completed work and work in progress during the period of the inspection. The size of this sampling was controlled by the investigation time required in each area and was not established to provide statistical inference as to the conclusions drawn. However, the extent and depth of the examinations are considered to be sufficient to support the inspector's evaluation of the licensee performance and identification of potential areas of deficiency.

b. Examination Activities

(1) Lifting and Handling Activities

The inspector examined the lifting and handling of the Unit 3 reactor vessel head during removal from the reactor vessel and placement in the laydown area for conformance with procedure SPS-500-651-000. Installation of the core barrel lower support structure assembly of the reactor internals was also examined for conformance with approved procedure SPS-690-650200 C/N 1. The assembly was lifted from its storage area and temporarily installed into the core barrel. This handling was performed in preparation for upper guide structure field modification by CE. All work was observed to be performed per approved procedures. No violations or deviations were identified.

(2) Installed Condition of the Reactor Vessel

The following reference drawings and procedures were reviewed during this examination.

Reference (A) CE Drawing E-14273-321-010, Revision 3, "Reactor Vessel Arrangement and Installation."

Reference (B) WPP/QCI 350.54-2, Revision 7, "Reactor Vessel Installation."

Reference (C) WPP/QCI 350.173-1, Revision 1, "Shim/Expansion Plates for Reactor Vessel Support Columns."

Reference (D) Procedure No. 91HF-IRC01, Revision 0, "RCS Expansion Measurements."

The inspector sampled a number of requirements in the areas of vessel support structures, vessel-to-support-structure fittings, number and location of support structures and mounting pads, holddown devices and shimming devices.

During this inspection of all units, only ten holddown stud,nut and washer assemblies (Items 5, 6, 7, Reference (A)) were observed to be installed in each of the four support pads securing the reactor vessel to the top at the support columns. Reference (A) requires fourteen stud assembles per support pad.

This apparent discrepancy was resolved by review of reference (B) which documented an approved design change to a ten stud pattern as a result of a problem in removing shipping studs from the Unit 2 reactor vessel support pad 1B.

The problem shipping studs in Unit 2 were observed to be cut off and left remaining in the reactor vessel support pad as required by the disposition of NCR N-C-135. In CE letter V-CE-10727 of July 1, 1980, the design change to the 10 stud assembly pattern, CE committed to update the affected documentation within three months of ANPP approval. However, none of affected documents have yet been modified to reflect this design change. The lack of attention to the timely completion of this item will be carried as a followup item. (Followup Item Number 50-528/84-15-02).

The inspector observed that no shim assemblies (Section FF, Reference(A)) were yet installed in any Unit for the reactor vessel lower support. This allows approximately 3 1/2 inch clearance on each side of the reactor vessel shear key and the keyway in the base of the reactor vessel support column. Per Note 9 of Reference (A), installation of the shim assemblies establishes an initial cold clearance of .065 inches and is required prior to precore hot functional testing. Unit I had completed hot functional testing with upper support shims in place but without the lower shims installed per an approved change to the test procedure (TCN #2 of Reference (D)). This resulted in a shear key to keyway gap of about 3 1/2 inches. The acceptance criteria specified for the combined clearances for each lower reactor vessel horizontal support was "A+B>.030 inch "(i.e. the summation of the gaps on each side of a shear key must be greater than .030 inch; reference: Procedure Number 91HF-1RC01, paragraph 2.4.5 and Appendices F, G, H, I, J, K, L, M, O, P, Q, R, S, U). However this criteria was derived from Appendix B, page 6, which specifies a minimum combined clearance of .030 inch when a reactor vessel shear key contacts an installed expansion plate during heatup from an initial miminal cold gap of .065 inch. The installed expansion plates would limit the reactor vessel movement (rotation and translation) to .065 inch (miminal) at any one measurement location thereby preventing any unanalyzed or unanticipated component movement. Since the lower shim assemblies had not been installed prior to hot functional testing (as authorized by TCN #2), the measured gaps were in the order of 3 1/2 inches, resulting in a combined clearance of approximately 7 inches being evaluated against a .030 inch minimum criteria.

Without the lower shim assemblies installed, the specified acceptance criteria could allow reactor vessel movement at the lower supports in excess of .065 inch without termination of the heatup.

This results is an inappropriate quantitative acceptance criteria for controlling reactor vessel movement. This is considered a violation of NRC regulations (Violation 50-528/84-15-03).

As a second example of this violation, the same procedure utilized optional installed probes for displacement measurement of reactor vessel movement during heatup. However, no acceptance criteria for these specific measurements was provided. Rather, the same inappropriate acceptance criteria (A+B>.030) was used. In this case, probe measurements were set at initial arbitrary values of approximately 1/8 to 1/4 inch. Without shims installed or appropriate acceptance criteria for monitored parameters, initial heatup and cooldown could result in inappropriate component movement.

The inspector considers that the review committee personnel reviewing and approving TCN Number 2 which allowed removal of shims did not perform a thorough administrative review of the effects of that action on the detail steps of the procedure.

(3) At the exit interview, the following unresolved items were discussed with licensee management:

(a) Verification that APS Test Procedure and Bechtel Work Procedures Receive Adequate Documented Design Review by CE

The licensee explained that test procedure (Reference (D)) was prepared based on CE supplied guidelines. While license does submit procedures to CE for review and comment, no specific response is required and no specific CE approval of procedures or changes to procedures is required prior to testing. The same situation applies to Bechtel work procedures. At the exit interview licensee management committed to provide a written description of how CE exercises verifiable design control of work done by Bechtel and APS through test and work procedures. (Unresolved Item Number 50-528/84-15-04)

(b) Verification that the Acceptance Criteria for the Reactor Vessel Lower Support Shim Clearance Used in Reference (D) is Technically Sound and Acceptable

The test procedure acceptance criteria reference D allows contact of a reactor vessel shear key with a shim assembly whereas the installation drawing reference A specifies that a minimum gap is to be maintained at all times. At the exit interview, the licensee committed to provide verification and explanation that the criteria used in referenced (D) were technically sound and acceptable. (Unresolved Item Number 528/84-15-05)

(c) Clarification of the Technical Requirement for Simultaneous Verification Upper and Lower Reactor Vessel Support Shim Clearances. Note 10 of Reference (A) specifies that "all requirements dictated by this drawing must be met simultaneously after completion of installation." However, hot clearances for the upper support shims were verified separately during Reference (D) testing in Unit 1 without the lower support shims assembles installed. Separate rather than simultaneous verification of hot clearances for the lower support shims is intended during additional pre core hot functional testing. (Unresolved Item Number 50-528/84-15-06)

The following problem areas are also considered unresolved items pending further clarification documentation by the licensee:

(d) Void in a Reactor Vessel Support Column Pad

The inspector observed a large surface void, approximately 2" X 1/2" X 1" deep, in the steel reactor vessel support column pad 1B in Unit 1. Documentation identifying the component defect and its disposition was not available at the site (Unresolved Item Number 50-528/84-15-07).

(e) Records vs Hardware Discrepancy

Additional information regarding rework performed on Unit 1-1A reactor vessel support pad per WPP/QCI 54-2, Revision 7, Addendum 3 is required. The inspector observed a discrepancy between the amount of rework actually performed and the amount documented in the completed procedure. Visual examination indicated that only one hole was drilled and plug welded in the support pads whereas the documentation indicated 3 holes had been. (Unresolved Item Number 50-528/84-15-08)

(f) Code Data Sheet Errors

Numerous apparent errors exist in the modified Code Data Sheets prepared in documentation of the rework performed on Unit 1-1A reactor vessel support pad per WPP/QCI 54.2, Revision 7. Clarification of code data sheet preparation requirements and review procedure is required. (Unresolved Item Number 50-528/84-15-09)

(g) Housekeeping in the Reactor Vessel Annulus Area

The inspector observed debris in the area of Unit 1 reactor vessel support columns. The loose items included a coil of plastic tubing in a ventilation duct, a plastic garbage bag with garbage, a hammer, three screwdrivers, a metal plate (approximately 1" X 4" X 8"), several rags and general dirt. The safety concern for housekeeping in this area is that the heavier pieces observed in the area could fall and damage the incore instrument tubing below the reactor vessel and jeoparding the integrity of the primary pressure boundary. Additional information is required regarding the house keeping requirements for this area. (Unresolved Item Number 50-528/84-15-10)

(h) CE Controlled Work on Reactor Vessel Internals

The inspector examined a CE field modification of the upper guide structure (UGS) in Unit 2 for conformance with CE Site Process Sheet SPS-737-65-1000, UGS Upper Flange Machining."

On examination of the site traveler accompanying the work, the inspector questioned the procedural control of the work apparently progressing beyond a QA hold point without the required QA signature. Subsequent discussions with cognizant CE Field Engineering and QA clarified that the rework had not progressed past the hold point and that parallel operations were being performed per the procedure. The inspector concluded that while the required sequencing of operations in the procedure could be clearer no deviation from work procedure control had occurred.

In review of the CE procedure (SPS-737-65-1000), the inspector found several instances of inconsistent tolerancing of the same dimension (drill hole depth CE drawing E-14373-164-849). After identifying the tolerancing discrepancy to the cognizant CE Field Engineer, it was determined that the dimension itself was incorrect. Additionally, the procedure referenced details of the design drawing for a different unit. Additional information on the CE procedure preparation and review process is required to access the adequacy of CE program for control of work per approved procedures. (Unresolved Item Number 50-529/84-12-11)

(c) Site Tours

Daily tours in examination of specific work activities were conducted in the applicable units. During these

tours, the inspector also observed access control activities for personnel and material entry into the reactor vessel area and protective devices in place on the reactor vessel and internals to prevent damage of entry of foreign objects or debris. No violations or deviations were observed.

(d) Conclusions

Work activities by CE and the APS test organization relative to the reactor vessel and internals were examined within the scope of this inspection. In general, the inspector found that procedures were being followed, installations were in accordance with specifications and procedures and that QC procedures were being followed. However, the violation regarding shim gaps and the unresolved items identified indicate a potential weakness in the APS/CE interface in the areas of procedure preparation and review, and documentation of rework. These activities will be examined further in a future inspection.

6. Inspection of Safety-Related Components - Unit 3

Inspection of safety-related components in Unit 3 was conducted to assess whether activities relative to safety-related components are being accomplished in accordance with NRC requirements, SAR commitments and licensee procedures; and also to determine whether inadequacies in completed work, partially completed work or work activities in progress indicate a weakness in management control systems. The components inspected were selected at random and the sampling size was not intended to have statistical significance.

During the conduct of this inspection, the licensee's SAR, applicable receiving inspection documents, local work procedures (WPP/QCI) and vendors' technical requirements were reviewed. Also, an on-site inspection of each component was accomplished. The following documents which were reviewed are generally applicable to all of the components inspected:

13-PM-204	Specification for Fabrication and Installation of Nuclear Systems
WPP/QCI 12.0	Storage Control of Permanent Plant Items
WPP/QCI 202	Piping Systems Installation
WPP/QCI 207	Disassembly and Reassembly of Quality Class "Q", "R" and "S" Valves

Documents that are unique to a given component or type of component which were reviewed are the Material Receiving Reports (MRR's), Operation and Maintenance Instruction Manuals (OMM) and Instruction Maintenance Manuals

(IMM). The OMM and IMM specify vendor requirements for a particular component.

a. Safety Injection Tank 1B Motor Operated Isolation Valve

During hot functional testing in Unit 1, this valve type was discovered to have valve disk galling problems. As a result, the Unit 3 valve, 3-JSIA-UV644, was disassembled in September 1983 to supply repair parts to Unit 1 valves as authorized by Modification Change Notice 55423-P and Start-Up Work Order 22436. Consequently, this valve was in a disassembled condition throughout the course of this inspection.

Valve 3-JSIA-UV644 was found with the valve body covered but not securely sealed as required by WPP/QCI 202 (paragraph 6.3). The inspector considered this an isolated case since other covered valves in the area were adequately sealed. Enforcement action is therefore not considered warranted in this case.

Several cubic centimeters of particulate matter consisting of dirt, rust and metal filings were left in the valve body after disassembly of the valve. Since work was formally "in-progress" and since cleanliness would have been restored prior to valve reassembly as required by applicable procedures, and because the scheduled systems flush will verify system cleanliness, enforcement action is not considered warranted.

Miscellaneous valve parts (i.e., wedge guide and fasteners) were found stowed inside the valve body. This practice is questionable in terms of maintaining material control, and Arizona Public Service (APS) QA Department issued Corrective Action Report (CAR) C84-052D at the time of the inspector's finding to correct this particular situation. Further investigation revealed that specific material control requirements were not included in local procedures at the time of valve disassembly, but material control requirements have since been included in WPP/QCI 12.0. Because action to prevent recurrence had already been taken by APS and because procedures were not violated at the time of valve disassembly, enforcement action is not considered warranted. The valve Material Receiving Report (MRR 35003) and vendor technical requirements (OMM 2011) were reviewed during the course of this valve inspection. No areas of concern were discovered.

The material galling problem identified in Unit 1 during operational testing of this valve type was examined to determine if a generic material problem exists. The valve in question is a Borg-Warner 14 inch motor operated stainless steel gate valve rated for 1,500 psi. Galling was occurring between the valve disc (wedge) and the wedge guide causing torque limits to be exceeded during valve operation. All Unit 1 valves of this type (total of 4 valves) were disassembled and reworked to correct the galling problem. The licensee and Bechtel Engineering do not consider this to be a generic problem at this time. The galling has been attributed to operating the valves in a dry condition during prerequisite testing. Since the valves in

question are normally locked open during operation, and because any galling problems with Unit 3 valves should be detected during operational testing, additional action at this time is not considered necessary.

No violations or deviations were identified.

b. Safety Injection Tank 1A Check Valve

Valve 3-PSI-EV235 was found to have a bonnet stud nut with less than full thread engagement with its bonnet stud. Further investigation revealed that a minimum thread engagement criteria was not specified in local procedures. ASME Boiler and Pressure Vessel Code, Section III, Division 1, 1974 edition (Winter 1975 Addendum), Subsection NB, paragraph NB-4711 requires that thread engagement be per the design requirements for Class 1 valves. 10 CFR Part 50, Appendix B, Criterion III requires that design basis be included in procedures. The failure to include minimum thread engagement criteria in procedures is considered to be a violation of design control requirements. APS QA Department has issued CAR C84-053D, Nonconformance Report (NCR) PC-8259 and Field Change Request 78.407-P to address this issue. (Enforcement Item Number 50-528/84-15-12)

Additionally, valve 3-PSI-EV235 was found to have two bonnet studs with substantially more thread exposed above their bonnet stud nuts than the other six bonnet studs (which were approximately flush with their bonnet stud nuts). The inspector questioned, therefore, whether these two bonnet studs had sufficient thread engagement into the bonnet. Since detailed dimensional plans of the valves were not available for review, this matter can not be resolved. At the exit interview, licensee management committed to provide detailed information sufficient to allow the inspector to assess whether the two studs in question have acceptable thread engagement with the valve bonnet. The licensee issued CAR C84-053D to obtain the requested information. This is considered an unresolved item. (Unresolved Item Number 50-530/84-07-13)

Review of the valve Material Receiving Report (MRR 39682) indicates that the valve vendor (Borg Warner) certified the assembled valve to ASME Code requirements on October 27, 1978. The valve installation card was signed by Bechtel QC accepting the valve installation as complete on December 4, 1982. OMM 1059 was also reviewed for any technical requirements specified by the vendor. No violations or deviations were discovered as a result of this document review.

Inspection of valve 3-PSI-EV235 has resulted in one violation and one unresolved item.

c. Safety Injection Tank 1B Check Valve

Installation of valve 3-PSI-EV245 was inspected against the vendor technical requirements of OMM 1059 and local procedural

requirements. The valve Material Receiving Report (MRR 35379) was also reviewed.

No violations or deviations were discovered.

d. Pressurizer Spray Valves

Installation of the pressurizer spray valves (3-JRCE-PV100E and 3-JRCE-PV100F) was inspected against the vendor's instruction manual (no number) and local procedural requirements. The Material Receiving Reports (MRR 75299 and 78411) were also reviewed.

No violations or deviations were discovered.

e. Pressurizer Spray By-Pass Valves

Installation of the pressurizer spray by-pass valves (3-PRC-EV236 and 3-PRC-EV237) was inspected against the vendor's instruction manual (IMM-105) and local procedural requirements. The material receiving reports (MRR 48586 and 42178) were also reviewed.

Valve 3-PRC-EV236 was found to have a large grindout area on the downstream nozzle which was radiused and faired in to the adjacent surfaces. This condition was properly documented and accepted on MRR 48586.

No violations or deviations were discovered.

f. Regenerative Heat Exchanger

Installation of the Regenerative Heat Exchanger (3-MCHE-E01) was inspected against the licensee's procedural requirements (WPP/QCI 350.112-3) and plan requirements (13-C-ZCS-576). A random sampling of plan dimensional requirements was also accomplished, and the Regenerative Heat Exchanger Material Receiving Report (MRR 108160) was reviewed.

During inspection of the upper Regenerative Heat Exchanger support, one of the outer jam nuts for the upper expansion support was found to be only finger tight and the inner jam nut was found to be out of adjustment as evidenced by the large gap between the support plate welded to the heat exchanger shell and the fixed/slotted support plate. The required gap, calculated through work procedure requirements, is approximately 1/32" while the existing gap was approximately 3/16". The work procedure also requires the outer jam nuts to be torqued to 100 in-lbs. Installation of the Regenerative Heat Exchanger upper support was verified and accepted by Bechtel QC on September 10, 1982, in WPP/QCI 350.112-3.

Failure to install the Regenerative Heat Exchanger upper support in accordance with procedure requirements is considered a violation. Bechtel has issued Nonconformance Report NC-1328 for the noted problem. (Enforcement Item Number 50-530/84-07-14)

Inspection of the Regenerative Heat Exchanger (3-MCHE-301) has resulted in one item of violation.

g. Conclusions

Generally, the procedures and component installations that were reviewed appeared to be adequate, and APS QA department was found to be responsive in resolving problems identified. An area that deserves attention, however, is the failure of the APS QA and Bechtel QC organizations to identify the absense of thread engagement criteria and the failure of Bechtel QC Department to question the bonnet stud standout when verifying installation of valve 3-PSI-EV235. Although procedures are being followed to verify component installation, it appears that QC inspectors do not identify and question aspects of component installation which are not addressed in the procedures.

The technical importance of these oversights will be assessed through the followup of the items identified in this section of this report.

7. Review of As-Builts

a. Procedure Review

The inspector reviewed the site-specific Bechtel Internal Procedures (IP's) and Work Plan Procedures (WPP's) governing the generation and completion of as-built design documents. The procedures were reviewed to determine whether adequate procedures exist to assure that as-built inputs are properly documented and controlled and how changes from the original design are reviewed and approved and incorporated into the design. The following sections from the Palo Verde Bechtel Internal Procedures Manual were reviewed:

(1) Internal Procedure 4.33, Revision 6, "As-Built Records."

(2) Internal Procedure 5.14, Revision 11, "Field Change Request."

(3) Internal Procedure 4.34, Revision 12, "Design Change Package."

The following sections from the Palo Verde Bechtel Work Plan Procedure/Quality Control Inspection Manual were reviewed:

(1) WPP/QCI 5.0, Revision 25, "Nonconforming Materials, Parts and Components."

(2) WPP/QCI 32.0, Revision 8, "Modification Change Notice."

(3) WPP/QCI 26.4, Revision 4, "Preparation of the N-5 Code Action Package."

One deviation was identified by the inspector during the review of WPP/QCI 26.4, Revision 4, "Preparation of the N-5 Code Data Package" and the code data reports prepared per this procedure.

The ASME Boiler and Pressurer Vessel Code, Section III, Division 1, Subsection NA 8416, 1974 Edition through Winter 1975 Addenda requires that "a data report shall be filled out on Form N-5 by the installer and be signed by the installer and the inspector for each piping system (NA-1210) to be stamped with the Code NA symbol." A sample Form N-5 is found in Appendix V of Subarticle NA of the Code. Contrary to this requirement and the interpretation of it provided by the ASME Boiler and Pressure Vessel Committee (Reference Interpretation III-81-42 dated April 13, 1981), it was observed that neither the NA Certification Holder nor the Engineering Certificate holder had signed the N-5 Data Report Form accepting overall responsibility for piping systems (such as serial No. IRC01-4, a component of the reactor coolant pressure boundary) even though the N-5 package for the system had been filed as completed. At the time of this inspection, the licensee indicated that their review was approximately 90% complete. WPP/QCI 26.4, Revision 4 was also found not to require either the installer or engineering organization to sign the N-5 Data Form in the space provided for acceptance of overall responsibility. Interpretation III-81-42 states in part that acceptance of overall responsibility is required to signify that the structural adequacy and construction of a piping system comply with the requirements of Section III, Division 1. Subsequent to discussions between the inspector and the licensee's representative, a procedure change notice was issued to WPP/QCI 26.4 requiring the Field Construction Manager or his designee as the installers representative to sign the N-5 Code Data Report accepting overall system responsibility.

This failure to certify the Code Data Reports as required by the Code constitutes a deviation from the licensee's commitment in Table 5.2-1 of the FSAR that reactor coolant boundary piping shall comply with all of the requirements of the ASME Boiler and Pressure Vessel Code Section III, Division 1, 1974 Edition through Winter 1975 Addenda. (Deviation Item Number 50-528/84-15-15)

Note:

Piping system package IRC01-4 is only provided here as an example package. All other packages reviewed by the inspector likewise had not been signed for overall responsibility.

Record Note:

Although the procedure change stated the reason for the change was to comply with an NRC request, the inspector did not request the change.

b. Observation of Work

Drawings, specifications and modifying documents were selected and compared with the actual installation to determine whether the final design documents reflected the as-built conditions.

(1) Piping Systems

The inspector selected a piping run in Unit 3 and verified that the type, configuration, size and location for the pipe spools, valves, and pipe supports were as indicated in the design drawings and that installation was in conformance with the applicable specification and installation procedures. The following safety related piping run was examined:

System	Insometric Drawing	Hanger Drawings
Turbine Driven Pump Auxiliary Feedwater System	13-P-AFF-132	13-AF-003-H-001 13-AF-003-H-002 13-AF-003-H-003 13-AF-003-H-004 13-AF-003-H-005 13-AF-003-H-006 13-AF-003-H-007 13-AF-003-H-008

The following specification and installation procedures were used in verifying proper installation of the selected piping run:

Bechtel Specification 13-PM-204, Revision 13, "Field Fabrication and Installation of Nuclear Piping Systems."

Bechtel WPP/QCI 201.1, Revision 19, "Pipe Hangers and Supports Installation".

Bechtel WPP/QCI 202.0, Revision 19, "Piping Systems Installation".

Two discrepancies between the as-built configuration and final design documentation were identified. It was found that a two direction plate restraint had been installed instead of the two direction strap restraint specified on pipe support assembly drawing number 13-AF-003-H-001. Specification 13-PM-204 does not contain any provisions for making this substitution. After the inspector identified the discrepancy the licensee issued NCR PC-8252 to document the discrepancy and effect corrective action. Additionally, pipe support assembly drawing number 13-AF-003-H-005 shows the rear bracket orientation with the pin transverse to the run of pipe. The rear bracket was found to have been installed 90 degrees from the design location. Specification 13 PM 204 does not provide for reorientating of rear brackets. NCR PC-8257 was issued to document this discrepancy and effect corrective action as a result of the NRC finding.

Prior to these findings, a project quality audit conducted by Bechtel QA (as a direct result of the Unit 1 CAT findings) identified the need for reinspection of pipe hangers and supports in Units 2 and 3. (Reference CAR 62-5-84-10 dated March 27, 1984). In as much as the licensee was committed to under taking a reinspection program but had not completed the planned work in Unit 3 before this inspection, the discrepancies found are not considered to constitute an additional violation. The effectiveness of the licensee's pipe support reinspection program for Unit 3 will be examined during a subsequent inspection (Followup Item Number 50-530/84-07-16)

During review of quality records for the selected piping run, the inspector also found two valve installation cards had been misfiled. Since such errors in filing would likely be discovered and corrected during preparation of the Code Data Report, in accordance with existing licensee procedures, these instances were not judged to constitute either a violation or a deviation. The licensee did, however, institute corrective action to determine if these were more than isolated occurances. (Reference: CAR C84-050D dated April 17, 1984)

In addition, six design change packages were reviewed by the inspector. These were: DCP's ISJ-AF-025, 2SJ-AF-025 and 3CJ-AF-025 involving replacement of auxiliary feedwater control valves made of carbon steel with stainless steel valves and DCP's 1SM-AF-040, 2SM-AF-040, and 3CM-AF-040 involving relocation of auxiliary feedwater pump dischange pressure taps. Of these changes, work associated with four of the DCP's, 1SJ-AF-025, 2SJ-AF-025, 1SM-AF-040, and 2SM-AF-040, was completed or in progress. The inspector examined hardware changes made in Unit 2 per DCP's 2SJ-AF-025 and 2SM-AF-040.

No deviations or items of noncompliance were identified.

(2) Structural Steel

Two seismic Category I structural steel assemblies in Unit 3 were selected and compared to the as-built design documents.

For each assembly the inspector verified the type, size and configuration of the steel and the type and location of the connections.

The first assembly examined was in the auxiliary feedwater pump room which is in the Main Steam Support Structure. This assembly, located between the 80' and the 88' 11" elevations, identified on Drawing Number 13-C-ZCS-710, and detailed in Section B on Drawing Number 13-C-ZCS-711, was found to conform to the design documents.

The second assembly, located in the Control Building at the 120' elevation and identified on Drawing Number 13-C-ZJS-510 and NA/FCR 2480-C, was also found to conform to the design documents.

No violations were identified.

Supporting documents used for this portion of the inspection were:

a) WPP/QCI 58.0, Revision 13, "Erection of Structrual and Miscellaneous Steel".

b) WPP/QCI 58.1, Revision 5, "Field Fabrication of Structural Steel, Embedded, Metals and Miscellaneous Steel".

c) Specification Number 13-CM-320, "Installation Specification for Erection of Structural and Miscellaneous Steel.

c. Conclusions

The portions of the licensee's program that were examined for documenting the as-built condition of piping systems and structural steel appears to be adequate. The documentation reviewed by the inspector was found to be completed and accurate in reflecting the as-built condition of the plant with the exception noted in the area of pipe hangers and supports. The licensee is, however, actively involved in instituting corrective action in this area.

8. Electrical Cables and Terminations - Unit 3

a. The power and control cables in Unit 3 listed below were inspected to determine if the licensee's installation satisfies the construction criteria committed-to in the FSAR. The following construction attributes were inspected: Storage conditions, issuing control, identification, separation, routing, size and types of cables, terminations, tray fill and raceway identification and grounding. Additionally the QC records for cable issuing, installation and terminations were examined.

Power Cables	Control Cables
3EPN01AC1KA	3ESP01BC1RB
3ESI03AC1CA	3ESP01AC1RB
3EEW01BC1CA	3EEW01AC1RA
3ESI14DC1FA	3ESP01AC1RA
3ESI14CC1FA	3ESP01BC1RC
3ESI1SAC1KA	3EEW01AC1RF
3ESI19AC1KA	3EEW01AC1RG
3ESI18AC1KA	3ESP01BG1RA
3ESI24AC1KA	3EEW01AC1RC
3ESI06BC1KA	3EEW01AC1RB
3ESI05AC2KA	

The above represents a small sample of the following totals of cables in Unit 3: Approximately 4,500, 480 volt power cables and approximately 86,000 480/120 volt control cables. The sample is not intended to be statistically significant.

While accompanying the NRC during the inspection of terminations in Motor Control Center (MCC) 35, the licensee found two leads (size 10) where the insulation was improperly crimped under the termination lugs. They documented this condition on noncompliance NCR EA-4367 and identified the terminations with "Hold Tags".

While inspecting the cable storage and issuing area, the NRC inspector found that five reels (numbers A781-0004, A771-0037(2), A374-0001, and 82E-0018) of safety grade cable were stored in the nonconforming materials segregated storage area. These reels of cable were not identified with "Hold Tags" nor had nonconformance reports been prepared to document their status as is required by "Work Plan Procedure/Quality Control Instruction" (WPPQCI) Number 5.0 for "Nonconforming Materials Parts and Components".

The failure to perform work in accordance with approved procedures is considered to be a violation. (Enforcement Item Number 50-530/84-07-17)

b. Area Inspection

A tour was made of the following areas in Unit 3:

a) Wrap-A-Round area elevation 100' which house motor control centers M34, M36 and M38.

b) Wrap-A-Round area elevation 120' which house motor control centers M33, M35 and M37.

c) Diesel generators 3M-D6A-H01 and 3M-D6B-H01 areas.

No violations of NRC requirements were identified.

9. Instrument Cables and Terminations - Unit 3

The inspector examined instrument cables important to safety. Cables were selected in the reactor protection system, in the engineered safety features system and in the normal plant control system as listed below:

a. Reactor Protection System

(1) 3ESA03BC1R0 - Main Steam Isolation Valve Actuation Signal - Channel B.

(2) 3ESA03BC1R0 - Auxiliary Feedwater Actuation Signal-1.

(3) 3ERC68CC1XB - Pressurizer Pressure Channel C-PT-105.

b. Engineered Safety Features System

(1) 3EHC61BC2XB - HVAC Containment Pressure PT-352B.

(2) 3ESG62CC1XB - Steam Generator Number 1 Pressure -PT-1013C.

(3) 3ESG70CC1XB - Steam Generator Number 1 Level-LT-1114C.

(4) 3ESG69BC1XB - Steam Generator Number 1 Level-LT-1114B.

(5) 3ESG69BC2XB - Steam Generator Number 2 Level-LT-1124B.

c. Normal Plant Control System

(1) 3ECH24AC1RD - Charging Pump Pressure Number 1 Suction -PSL-216.

(2) 3ESA03BC1RT - Auxiliary Feedwater Regulating Valve Control.

(3) 3ESG08BC1RB - Main Control Panel Steam Geneator Number 1 MSIV.

(4) 3ESG08BC1RC - Steam Generator Number 1 MSIV Bypass Valve Control.

(5) 3ECH24AC1RA - Charging Pump Number 1-M-CHA-P01 Controls.

(6) 3ECH24AC1RE - Charging Pump Number 1-M-CHA-P01 Controls.

d. Power Supply System

(1) 3EPN01AC2FM - Distribution Power 120VAC.

(2) 3ESI01AC1RH - 4160V Alternate Power Supply for Bus EPBAS03.

(3) 3ESI01AC1RB - 4160V Alternate Power Supply for Bus EPBAS03.

The inspector examined work in progress, partially completed work completed work relative to the cables selected above, including terminations and associated devices which contribute directly to the electrical continuity of the circuit. The inspector ascertained whether requirements of applicable specifications, work performance procedures and inspection (QC) procedures were being accomplished in storage, handling and identification use of specified material and installation.

The installation of the 17 safety related instrument cables from the Reactor Protection System, Engineered Safety Features System, Plant Control System, and Power Supply System were inspected and reviewed for conformance with the following QC procedures:

(1) WPP/QCI-251.0, "Raceway Installation".

(2) WPP/QCI-254.0, "Cable Installation".

(3) WPP/QCI-255.0, "Cable Terminations".

The inspection of cable raceway installation included examination of location, routing, separation, identification, grounding, supports, and raceway loading. The cable installation was inspected for storage, handling, identification, size and type of cable, terminations, and work performance.

A detailed review of the installation records for the 17 instrument cables was performed. The cable records review included cable installation cards, and cable termination cards. A detailed review of 9 cable receipt inspection records was performed.

No items of noncompliance or deviations were identified.

10. Unit 3 Reactor Coolant Pressure Boundary Piping

a. Material Storage.

The warehouse storage of safety related equipment used in the Reactor Coolant Pressure Boundary was examined for compliance to the licensee's receiving and storage procedures. All valves had end caps to prevent entry of foreign material. The snubbers stored outside were off the ground and covered to prevent damage from dust and rain. The procedures used to receive, inspect, store, and issue safety-related equipment are WPP/QCI 4.0, Revision 22 "Receiving Inspection" and WPP/QCI 120.0, Revision 17, "Storage Control of Permanent Plant Items". The inspector examined a sample of records for compliance with procedural requirements. Specifically the indicated records for the following equipment were examined:

Item	P.O. Number	M.R.R. Number
Valve	221C Item 4	-
Fitting	P47308572-2	-
Valve	221C Item 49	-
Snubber	13-PM-209B	156739
R.V. O-ring	9330764	149915

b. Procedures

The following piping installation documents were reviewed to familiarize the inspector with the licensee's methods of implementing SAR commitments:

WPP/QCI 101.0, Revision 23, "Welding Control".

WPP/QCI 100.0, Revision 17, "Weld Filler Metal Control".

WPP/QCI 202.0, Revision 18, "Piping Systems Installation".

Specification 13-PM-204, Revision 13, "Specification for Field Fabrication and Installation of Nuclear Piping Systems".

c. Observation of Work

Piping installation and welding related activities were observed in Unit 3. These observations included pipe cleanliness, fitup, tack welding, grinding, and purging. The inspector observed the work in progress as well as the QC verification of the work. The following is a list of the activities observed by the inspector:

Drawing Number	Pipe Size	Weld Number	Activity
E-65473-742-006	30 inch	NA	Grinding RTD sleeve
13-J-01D-129	3/8 inch	NA	Bending in Field
13-P-SGF-122	2 inch	W00B	Clean check after fitup and and tack weld

13-P-RCF-149	3/4 inch	W00A	SG penetration grinding, cleaning and fitup and welding.
13-P-OHF-223	1 inch	W00A	QC clean check before tack weld

During the examination a QC inspector identified an improper weld rod stub in the weld rod pouch of the welder working on weld Number W00B on drawing 13-P-SGF-122. The QC inspector was checking the joint after it was tack welded when he discovered the improper stub. The work was promptly stopped and tagged. NCR Number WC961 was issued. Also CIP Number WFCM-1 was issued to survey the rod room for additional discrepancies. No discrepancies were found in the rod room. The licensee representative stated that the tack weld would be cut out and redone in accordance with the disposition of the nonconformance report. No followup action is considered warranted regarding this event since it was adequately documented and dispositioned. The inspector has no reason to believe that this was other than an isolated event.

No items of noncompliance or deviations were observed.

d. Qualification Records

The inspector reviewed the qualification records for two welders and three QC inspectors. Welders qualifications were reviewed for compliance with Specification WQ-1 and ASME Section IX. The QC inspectors qualifications were reviewed for compliance with ANSI N45.2.6 and ASME Section III.

The qualification records were found to be in order.

11. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations or deviations. Unresolved items disclosed during this inspection are discussed in Paragraphs 5.b.3), 5.b.4 and 6.b.

12. Exit Interview

The inspectors, met with the licensee management representatives denoted in paragraph 1 on April 20, 1984. The scope of the inspections and the inspector's findings as noted in this report were discussed.