U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION V

Report No. 50-528, 529, 530/77-04

Docket No. 50-528,529,530 License No. CPPR-141,142,143 Safeguards Group _____

Licensee: Arizona Public Service Company

P. O. Box 21666

Phoenix, Arizona 85036

Facility Name: Palo Verde Units 1, 2 and 3

Inspection at: Palo Verde Site, Maricopa County, Arizona

Inspection conducted: August 29 - September 2, 1977

Inspectors: for R. J. Pate, Reactor Inspector — 9/16/77 Date Signed

T. W. Bishop, Reactor Inspector — 9/16/77 Date Signed

_____ — Date Signed

Approved by: G. S. Spencer, Chief, Reactor Construction and Engineering Support Branch — 9/16/77 Date Signed

Summary:

Inspection on 8/29-9/2/77 (Report No. 50-528, 529, 530/77-04)
Areas Inspected: Routine, unannounced inspection of construction operations including: Hot weather concreting procedures and work operations; cadwelding work operations; containment liner alignment procedures, work operations, and quality records; and followup on previous inspection items. The inspection involved 100 inspector-hours on-site by two NRC inspectors.

Results: Of the six areas inspected, no items of noncompliance or deviations were found in four areas; one deficiency was identified in the area of concrete placement (deficiency - failure to document supplemental water additions - paragraph 6); and one deficiency was identified in the area of cadwelding (deficiency - failure to follow prescribed cleaning procedures - paragraph 5).

DETAILS

1. Persons Contacted

Principal Licensee Employees

*E. E. Van Brunt, Vice President, Construction Projects and ANPP Director
*J. A. Roedel, Quality Assurance Manager
*R. L. Robb, ANPP Assistant Project Director
W. M. Petro, ANPP Site Manager
*R. L. Hand, ANPP Site Quality Assurance Manager
R. D. Forrester, Quality Assurance Engineer
D. D. Webster, Quality Assurance Engineer
*B. S. Kaplan, Quality Systems Supervisor

Other Personnel

Bechtel Power Corporation

*C. Betzhold, Project QA Engineer
*C. J. Dun, Assist. Project Field Engineer
*S. R. Abraham, Resident Engineer
*G. J. VanHorn, Licensing Engineer
R. L. Lykens, Lead QC Engineer
M. E. Rosen, Lead QC Engineer
V. E. Matson, Lead Welding QC Engineer
J. Beers, Lead Civil Engineer
W. F. Sturm, QC Engineer
P. Maqbool, QC Engineer
V. Nienstedt, QC Engineer
Mr. Shirk, Foreman
W. Bratton, QC Engineer
A. E. Moore, Lead QC Receiving Engineer

Champion, Inc.

P. Schemanski, Production Superintendent
B. Canavan, QC Engineer
P. Malott, QC Engineer

*denotes those present at the exit interview

2. Licensee Action on Previous Inspection Findings

a. (Closed) Noncompliance (50-528, 529, 530/77-03): Concrete acceptance test compliance classified as non-mandatory, without requirements for engineering review of out-of-specification material. Specifications 13-CM-101 and 13-CM-365 have been revised to require field engineer disposition of nonconforming material. Licensee representatives stated that a nonconformance report (NCR) would be used for documentation in these cases. The NRC inspector reviewed the specific NCR's written on the nonconforming aggregate test reports Nos. 224-0261-1, 224-0261-2, and 224-4342-1. Dispensation of these NCRs appeared to be adequate.

b. (Closed) Noncompliance (50-528, 529, 530/77-03): Unqualified personnel were observed performing cadwelding operations. WPP/QCI No. 56 has been revised (Rev. 4) to clearly identify which cadwelding operations require qualified personnel and which operations do not require qualified personnel. It was noted that the revised document did not require the qualified personnel to accomplish a check of the work performed by unqualified personnel. However, Procedure Change Notice No. 5 for the WPP/QCI was issued on August 30, 1977, during the inspection, to resolve this discrepancy. Cognizant cadweld personnel have been briefed on the requirements specified in WPP/QCI No. 56. All cadwelding operations in progress during the current inspection were being performed by qualified operators. It appears the corrective action taken is sufficient to control the activities of unqualified cadwelders.

c. (Closed) Unresolved item (50-528, 529, 530/77-03): The pre-welding inspection of cadwelds appears to have been less than required. WPP/QCI No. 56 has been revised (Rev. 4) to specify one out of every five cadweld operations shall be inspected by a quality control engineer prior to welding. A sampling of cadweld records indicated the 20% pre-weld inspection is being performed.

d. (Closed) Unresolved item (50-528, 529, 530/77-02 and -03): Licensee had not complied with the AISC specification for structural joints using ASTM A-325 or A-490 bolts. The licensee provided calculations establishing that no structural credit was taken for steel at the 51 ft. elevation of the auxiliary building, contending therefore, that the steel was not safety related. The licensee did point out that some of the beams may later be used to support safety related piping, at which time those beams would become safety related. The identification

of which beams would be used for piping support has not been completed. However, to avoid bolting rework at a later date NCR No. C156 was issued for the bolting and all washers were changed to meet specification requirements. Additionally, construction drawings have been revised to reflect the proper bolting materials. The inspector has no further questions on this subject.

e. (Closed) Unresolved item (50-528, 529, 530/77-02 and -03): Licensee has not complied with the requirements of AWS D1.1 for removing arc strikes. Instructions have been issued (Bechtel Memorandum No. P.3.13 of May 27, 1977) to grind and check all arc strikes in accordance with AWS requirements. A sampling of accepted welds verified that this action had been implemented.

f. (Closed) Open item (50-528, 529, 530/77-02 and -03): Concrete does not contain an air entraining admixture, contrary to information provided in the PSAR. Use of an air entraining admixture is not considered mandatory by the Architect/Engineer (Bechtel). Accordingly, a PSAR change (No. F 104) has been prepared and approved to indicate an air entraining admixture may be used.

g. (Closed) Open item (50-528, 529, 530/77-03): No provisions are made in specifications for the conduct of ASTM test No. C87 (Mortar Making Properties), which the PSAR states will be a basis for acceptance of concrete aggregate. The licensee has approved PSAR change No. F115 which clarifies the status of ASTM test No. C87, indicating the test is required only if the aggregate fails ASTM C40 (Organic Impurities). This action is consistent with ASTM requirement for test No. C87.

h. (Closed) Open item (50-528, 529, 530/77-02): Reactor pit liner leak chase channel field welding checklists reference the wrong welding procedure. Field welding checklists (form WR-5A's) for the reactor pit liner have been reviewed and properly corrected by Bechtel quality control engineers. A sampling of the checklist verified this activity had been performed. The inspector has no further questions on this item.

i. (Closed) Open item (50-528, 529, 530/77-03): Engineers Testing Laboratory aggregate testing sieves did not have calibration stickers. The licensee provided the inspector with calibration data for the sieves (series 2A) and has affixed calibration stickers to the sieves.

j. (Closed) Noncompliance (50-528, 529, 530/77-02): Low hydrogen welding rod was issued from one rod room and returned to another rod room, contrary to procedural requirements. The weld rod handling methods have been improved to better implement the procedural requirements. The containers used to issue weld rod have been color coded to identify the issuing rod room. If a container of the wrong color is returned to a rod room, the returned rod is not comingled with other weld rod from that rod room. Also the welders and rod room attendents received additional instruction on required weld rod control. The corrective action taken appeared to be satisfactory.

k. (Closed) Noncompliance (50-528, 529, 530/77-02): The maximum concrete lift height of 24 inches was exceeded during the placement of auxiliary building walls. The Bechtel Nonconformance Reports (NCR) No. C-116 and C-103 were reviewed. The subject of NCR C-103, which was written as a result of the NRC inspector's observation of placement No. 1A018-0 for the Auxiliary Building internal walls, was confusing. This NCR appeared to indicate that the lift heights were measured before the lift was vibrated. The NRC inspector explained that the lifts were measured after vibration, not before, and exceeded the 24 inch limit. The corrective action noted on NCR C-103 did not appear to satisfactorily address the problem. However, the licensee did provide supplemental information indicating additional training sessions had been held for the Field Engineers, General Foreman, Foremen, Labors and QC personnel on concrete placement (specifically lift heights). The records indicated the concrete crews had received training on April 21, May 31, June 1, and June 2, 1977. Also the inspector interviewed two members of the concrete crew and two QC personnel and verified that they understood that the 24 inch lift height requirement should not be exceeded. The Licensee stated that NCR C-103 would be supplemented to indicate the additional corrective action taken.

l. (Open) Deviation (50-528, 529, 530/77-02): Contractor welding standard allows low hydrogen covered weld filler material to be out of a holding oven for 12 hours and then reissued after being placed in a holding oven for one hour, contrary to AWS requirements. APS and Bechtel have submitted several documents justifying their position on longer out-of-oven times for low hydrogen covered weld filler material. These documents have been forwarded to IE Headquarters for review. An official NRC position on maximum allowable out-of-oven time has been requested.

m. (Closed) Deviation (50-528, 529, 530/77-02): Contractor concrete specification allows concrete to be moved up to five feet laterally during placement, contrary to ACI guidance. The ACI guidance in this area is not specific as to the maximum lateral movement allowed but does indicate lateral movement should be limited. ACI 304-73, Paragraph 6.1, states "Concrete should be deposited at or near its final position in the placement, eliminating the tendency to segregate when it has to be flowed laterally into place." A meeting was held with APS, Bechtel and their consultants on June 1, 1977 to discuss the lateral movement of concrete and other subjects. During this meeting it was agreed that lateral movement of concrete up to five feet would be satisfactory, if the concrete was moved "in mass" (no segregation is observed).

n. (Closed) Unresolved (50-528, 529, 530/77-03): The periodic inspection of stored weld filler material appeared to have been conducted, but may have been ineffective as damaged weld rod containers were observed. The handling and storage methods for weld rod containers have been improved and procedure WP/P-QCI 12.0 has been revised to include an additional inspection of weld rod containers when they are released from the warehouse. The NRC inspector spot checked the weld rod containers and did not identify any containers with damaged or broken seals.

3. Construction Status

The licensee reported that Unit No. 1 was 15% and Unit No. 2 was 3% complete as of August 23, 1977.

4. Hot Weather Concrete

The NRC Inspection Reports No. 50-528, 529, 530/76-03 and 76-04 for inspections conducted September 21-24, 1976 and December 14-17, 1976 discuss the subject of including the requirements of ACI 305 in the Palo Verde construction procedures. It was the inspector's understanding that the Palo Verde construction procedures were changed to include the requirements of ACI 305. This concern was closed in report No. 76-04 by referencing the changes to specification 13-CM-305 and procedures WP/P-QCI No. 54.0. The referenced paragraphs of the documents read as follows:

13-CM-365, Para. 12.3 Hot Weather Concreting "The specific recommendation of ACI 305 shall be enforced whenever the ambient air temperature is above 85F, except where stricter requirements are stated in this specification."

WP/P-QCI No. 54.0, Para 5.1.1 Post-Placement of Concrete "Hot weather curing shall be accomplished in accordance with ACI-305-72, section 4.4, "Curing and Protection."

A discussion with the Bechtel management personnel indicated that all the requirements of ACI-305 may not be met for Palo Verde. The Licensee stated that, if all requirements of ACI 305 were not included in the construction procedures, that a written notice would be provided to explain which requirements were not included.

5. Cadwelding for Safety Related Concrete Structures

Caldwelding activities in the reactor pit were observed. The activities included cadweld preparation, welding operations, and inspections.

All cadwelding operations observed were being performed by qualified personnel. It was noted, that one of the size No. 11 reinforcing steel bars had not been properly cleaned prior to placement in the cadweld fixture, as evidenced by a light coat of rust on the bar end. Other bars, which had already been fit and wired in place, were removed and reinspected. A total of five No. 11 rebars were found to have inadequate cleaning. Each of these bars was subsequently recleaned with a hand wire brush prior to refitting and cadwelding. Bechtel representatives indicated that the lack of rebar cleaning may have been due to a communications problem at a shift change. It was also noted that the cadweld cleaning operations have not been performed in accordance with the Erico procedure No. RB10M974 "Cadweld Rebar Splicing", as required by WPP/QCI No. 56. Contrary to the Erico procedures, which requires rebar to be heated with a "rose bud" tipped torch to burn away foreign matter before wire brushing, the observed practice was to heat the bar after wire brushing. In addition, the Erico procedure requires the bar ends be wiped with a clean, dry rag to remove any dust following hand wire brushing. Contrary to this requirement, no wiping of hand brushed bars was performed.

Failure to perform the required rebar cleaning operations in accordance with the specified procedures is contrary to the requirements of the PSAR (Section 17) and 10CFR50, Appendix B (Criteria V) which require activites affecting guality to be accomplished in accordance with documented instructions and procedures.

6. Concrete Placement for Safety Related Structures

a. Observation of Work Activities

Concrete placement activities were observed for the Unit 1 Auxiliary Building 72 ft. elevation floor (Nos. 1A034, 1A039, and west half of 1A061) and the Unit 2 Auxiliary Building basement (Nos. ZA004 through ZA006). The activities inspected included placement preparation, concrete mixing, transporting, placement, consolidation, field testing and curing. During the placements two conditions were noted which were contrary

to the requirements of ASTM specification C94-74 as committed in the PSAR (Section 3.8). ASTM C94 requires concrete to be deposited before the delivery truck drum has revolved 300 revolutions. An inspection of the truck revolution counters revealed three trucks during the Unit 1 placement and one truck during the Unit 2 placement which had drum revolution counts in excess of the allowed maximum revolutions. It was evident from examination of the recorded batch-to-delivery times (five to 15 minutes) that the concrete was fresh and that the drivers had failed to reset their counters at the time of loading. In addition, ASTM C94 requires supplemental water additions to be recorded on the delivery ticket before unloading concrete at the site. Contrary to this requirement, a four gallon water addition was made to one truck during the Unit I placement without being recorded on the ticket prior to unloading. Discussions with licensee's contractor representatives established that the responsibility for recording supplemental water additions had not been clearly established. To prevent the recurrence of this type of discrepancy change No. 1 to WPP/QCI 53.0 rev.5 was issued during the inspection, requiring the field engineer to record water additions.

b. Review of Quality Records

The quality records concerning placement prepartion, concrete delivery, and testing for the Unit I Auxiliary Building placement No. 1A037/1A039/ and west half of 1A061 were examined. It was noted that six of the computer generated concrete delivery tickets indicated a mixing time less than the minimum required mixing time of 45 seconds. Each of the tickets had been hand corrected by the cognizant quality control engineer (QCE) to indicate a 45 second mix period. Discussions with the QCE established that the correction of the records was based on personal observation of the mixing period. It was pointed out to the NRC inspector that the automated batch plant controls are purposely set at or very near the 45 second minimum mixing period to achieve maximum productivity. However, recognizing the need to achieve high productivity, a concern does exist regarding the possibility of a compromise of concrete mix uniformity due to marginal equipment setting. This item remains open pending licensee review of the mixing period settings.

The computer generated concrete delivery tickets also indicate the amount of constituents used in making each batch of concrete. It was noted that the standard form indicates the recorded quantities of admixtures are in units of tenths-of-an-ounce. Actual additions, however, were verified to be ten times the

amount indicated on the ticket (consistent with mix design requirements). This item is open pending licensee action to correct these concrete quality records.

7. Reactor Containment Liner Plate Alignment Verifications

a. Quality Assurance Implementing Procedures

The liner plate alignment related portions of the following specifications and quality control instructions were examined with discrepancies noted as indicated below.

(1) Bechtel Specification 13-CM-370 (Rev. 1), "Erecting the Containment Building Liner Plate System": Attachment C-5 to the specification refers to the use of a 15 inch curved template, whereas paragraph 19.4.4.1 of the specification requires a 15 ft. curved template; Attachment C-1 refers to springline radius variations of 1/4 inch, whereas paragraph 19.4.1.2 requires a more liberal 1/2 inch diametrical variation. It appears that C-1 assumes an equal radial division of the allowed variation.

(2) WPP/QCI 61.0 (Rev. 0) "Containment Liner Plate Installation": Task No. 3 of exhibit 61.0-1A refers to the radius check of a single plate section, whereas the inspection instruction for the task, given in Appendix I, requires a radius check of single plate sections and checks across two welded plate sections.

(3) WPP/QCI 61.1 (Rev. 3), "Containment Pit Liner and Floor Plate Installation": No provisions are made for an inspection of the post welding misalignment of butt welded plates as required by paragraph 19.4.4.5 of specification 13-CM-370. See paragraph 7.c of this report for a related item.

b. Observation of Work and Work Activities

In-progress containment liner plate alignment activities were observed for work being performed on the 10 ft. plate sections of the cylinder wall. In addition, independent measurements were performed on the deviation-from-vertical alignment of the reactor pit liner. Fifteen measurements were taken in each of two randomly selected vertical sections of the pit liner. No anomolies were identified from either the work observations or the independent measurements.

c. Review of Quality Records

Vertical liner plate alignment records were examined. It was noted that the records for the vertical butt welded liner of the reactor pit did not indicate an inspection had been performed to verify misalignments of the completed joints were within 10% of plate thickness or 1/16 inch (whichever is greater), as required by specification 13-CM-370 and the PSAR (Section 3.8.1.6.6.3). These welds are now covered with leak chase channeling, inhibiting performance of this inspection at this date. It is noted that some of the reactor pit liner was welded while the Palo Verde project was still committed to ASME Boiler and Pressure Vessel Code Section III, Division 2, which also requires a post-weld alignment inspection of welded joints (paragraph cc-4523.2). This item is unresolved pending further licensee investigation into the apparent lack of inspection. No other anomolies were identified during the records examination.

8. Welding Inspections

The welding inspection records (Form WR-5B) for welding the reactor pit liner plate were reviewed. The records reviewed appeared to be properly completed. However, no WR-5B was at the work location for the containment emergency sump. The QC Engineer responsible for entering the inspection data on the WR-5B had recorded the appropriate data on a piece of scratch paper. Investigation by the Constructor indicated that the WR-5B had not been initiated and there were no procedural requirements for the initiation of this form. The licensee stated that this was an oversight due to the WR-5B being a new form and initiated a change to procedure WP/P-QCI 101 Rev. 5 to require the WR-5B be at the work station before welding operations were started. The approved procedure change, PCN No. 1, was reviewed and found satisfactory.

9. Containment Basemat Concrete

The licensee identified that voids had been found in the containment basemat concrete. The voids were under the thickened plates around the top of the reactor pit. Air had been trapped under the plates during placement, causing the voids. The largest void had maximum dimensions of 16 feet long, by 5 feet wide, by 2.5 feet deep. The licensee determined that the problem was not reportable under 10CFR50.55(e), but agreed to submit a report consistent with the requirements of 10CFR50.55(e) due to the possible generic application of the corrective action to prevent reoccurance.

10. Unresolved Items

One unresolved item, reactor pit liner post-welding alignment check (paragraph 7), was identified during the current inspection.

11. Exit Interview

The inspectors met with the licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on September 2, 1977. The inspectors summarized the scope of the inspection and the findings. The items of possible enforcement action were itemized. The licensee representatives stated that action would be initiated on the findings identified.