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

REGION V

Report No. 50-528/79-04
50-529/79-04
50-530/79-02

Docket No. 50-528, 50-529, 50-530 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: June 11-15, 1979

Inspectors: L. E. Vorderbrueggen — 7/23/79
L. E. Vorderbrueggen, Reactor Inspector — Date Signed

for J. H. Eckhardt, Reactor Inspector: L. E. Vorderbrueggen — 7/23/79 — Date Signed

for G. Hernandez, Reactor Inspector: L. E. Vorderbrueggen — 7/23/79 — Date Signed

Approved By: R. T. Dodds — 7/23/79
R. T. Dodds, Chief, Engineering Support Section, Reactor Construction and Engineering Support Branch — Date Signed

Summary:

Inspection of June 11-15, 1979 (Report Nos. 50-528/79-04, 50-529/79-04 and 50-530/79-02)

Areas Inspected: Routine, unannounced inspection of construction activities including: follow-up of open and unresolved items for Units 1 and 2, follow-up of one item of noncomopliance for Unit 2, in-place storage surveillance for Unit 1 reactor vessel, pipe supports and restraints in Unit 1, and base mat installation for Unit 3 reactor building and auxiliary building. The inspection involved 71 inspector hours onsite by three NRC inspectors.

Results: No items of noncompliance or deviations were identified during this inspection.

RV Form 219 (?)

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DETAILS

1. Persons Contacted

Arizona Public Service Company

*E. E. Van Brunt, Jr., Vice Presiden/Project Director
*W. M. Petro, Construction Manager
*R. L. Robb, Manager, Nuclear Services
*J. A. Roedel, Quality Assurance Manager
*L. W. Price, Field Engineering Supervisor
*R. L. Hand, Site Quality Assurance Supervisor
G. Pankonin, Quality Assurance Engineer
R. D. Forrester, Quality Assurance Engineer
N. E. Wibel, Quality Assurance Engineer

Bechtel Power Corporation

*W. J. Stubblefield, Field Construction Manager
*A. K. Priest, Project Field Engineer
*D. R. Hawkinson, Project Quality Assurance Engineer
*L. G. Hinkelman, Manager - Domestic Operations
*J. E. Bayshore, Manager - Quality Assurance
*W. H. Wilson, Project Manager
*W. G. Bingham, Project Engineering Manager
*H. L. Claxton, Construction Specialist
*D. T. Krisha, Quality Assurance Supervisor
J. L. Black, Resident Engineer
C. J. Dun, Assistant Project Field Engineer
W. Leuniz, Construction Superintendent - Boilermakers
T. Horst, Lead Field Engineer - Civil
M. Patterson, Field Engineer - Piping
W. C. Bentley, Civil Engineer
R. M. Rosen, Quality Assurance Engineer
V. F. Duckett, Unit 1 Field Engineer - Mechanical
H. C. Higgins, Assistant Lead Field Engineer - Mechanical
S. Palmrose, Quality Assurance Engineer

Champion, Inc.

P. L. Mallott, Quality Control Supervisor
B. Canavan, Plant Manager

*Denotes those attending exit interview.

2. Construction Status

The licensee reported that as of May 31, 1979, the approximate completion status of Unit 1 was 41.2%, Unit 2 was 15.8%, and Unit 3 was 1.2%. The overall project was considered to be 27.1% complete.

3. Licensee Action on Previous Inspection Findings

a. (Closed) Noncompliance Item (50-529/79-01). Surveyors were using a drawing for construction which was labeled as being incomplete or unapproved.

The inspector examined Bechtel memoranda and procedure WP/P QCI 3.0 which verified that the corrective action described in the licensee's response of June 5, 1979 to the NRC Notice of Violation had been satisfactorily accomplished. This item is closed.

b. (Closed) Unresolved Item (50-528/79-03/01). Assembly techniques and inspection criteria pertaining to the Unit 1 containment dome liner system.

At the request of NRC, a meeting was held on May 11, 1979, in the NRC Region V office with licensee and Bechtel representatives for the purpose of conducting an in-depth technical discussion of this matter. At that meeting, Bechtel presented a summary of fit-up problems which were documented by the Resident Engineer subsequent to the 79-03 NRC inspection. A handout was provided which defined the plate seam locations, and the welding and acceptance status. Polaroid photographs showing typical misfit and stiffener distortion were also displayed. The problems identified and discussed included:

(1) Overlapping of adjacent plates

(2) Wide gaps between adjacent plates (which exceed the root gap criteria)

(3) Vertical gaps between adjacent plates (as much as two inches in one case)

(4) Buckled stiffener plates and angles due to jacking loads

(5) Bent liner plate

(6) Broken tack welds

Bechtel pointed out that the stiffener system functions as the concrete anchorage for the liner plate system and, with the liner plate, acts as the form for subsequent concrete placement.

Sample calculations were presented by Bechtel which demonstrated that the loads being applied for liner segment assembly were well within the allowable stress levels specified in the governing Subsection CC 3720 of ASME Section III, Division 2. The calculations were considered to be conservative because of the physical limitations associated with the construction equipment involved in the assumptions.

Conservative calculations in regard to plate bending criteria, and planar bending of the liner plate system due to jacking loads applied across a complete weld seam near the apex, were also discussed. It was seen that for a maximum outer fiber strain of 3% (ASME Section III, Division 2, Subsection CC 4521.2.1, allows up to 5% before heat treating is required), a minimum bending radius of 5.4 inches is allowed. Bechtel stated that there were no bends in the dome liner plate that were not well in excess of 5.4 inches radius. NRC questioned the effect of stress concentration at the end of a partially completed seam weld when jacking loads are applied in the same direction as the plane of the liner plate. Bechtel stated that such stress concentration is precluded by the assembly techniques i.e., seam tack welding and temporary cross-seam bridging members. In any event, however, the final vacuum box testing of the seams for leak tightness would detect any cracks which would then be repaired, according to Bechtel.

Receiving inspection was also discussed. The supplier performs the dimensional checks in his fabrication shop. Upon arrival at the jobsite, inspection is made for shipping damage only. No dimensional checks are made at that time; however, there are dimensional checks made at the assembly jig. The condition of the received plate was poor at the beginning but has been improving, according to Bechtel.

It was Bechtel's stated intention to perform the following functions in completing the fit-up of the Unit 1 dome liner plate subassemblies:

(1) Replace buckled and damaged stiffeners.

(2) Bend plates back to the required shape.

(3) For overlapping plates, cut the plates back to achieve the required root gap.

(4) For wide gaps, the liner plate is to be buttered to achieve 3/4-inch root gap, and rebeveled for final welding.

(5) A 15-inch template check would be performed.

Also, the Resident Engineer would be closely involved in the follow-up and review of this work and, before final welding to the "dollar plate," he would perform a final acceptance inspection.

With regard to specifically stated concerns of the NRC, the following agreements between the participants were reached:

(1) Specification 13-CM-370 would be revised to include the criteria of 2/3 fy for stresses due to construction loads and for plates bent to a radius of 6-inches or greater. Calculations were to be made to translate the stress into terms which construction can

use, such as, 6-ton come-a-longs at specified spacings. Such information would be included as an attachment to Specification 13-CM-370.

(2) Engineering direction regarding welding sequence is not required. The erection limitations currently in Specification 13-CM-370, and the additional limitations that are planned to be added, are sufficient to assure an installation which is well within the ASME Code stress level boundaries.

(3) The Resident Engineer represents home office engineering and has been involved with the superintendents from the beginning of the erection of the containment building liner plate system. He has been and will continue to be involved with the follow-up of the work and corrective actions, in coordination with the design engineering team in Downey.

(4) Specification 13-CM-370 would be revised within a month. The Resident Engineer would hold a meeting with Construction personnel to familiarize them with the upgraded provisions, and to assure that the points of concern were properly understood. Minutes of the meeting would be issued and kept in the file.

(5) Past records would be reviewed to find NCRs which indicate shipping damage observed during receiving inspection. These NCRs will be evaluated to determine if any plate was bent to radius less than 5.4 inches, thus incurring strains greater than 3%. A final report of this evaluation and resolution is to be provided to the NRC.

(6) Resumption of fit-up and welding work on the Unit 1 dome liner plate system would not occur until the specification changes contemplated in (1) above are implemented, and the indoctrination meeting identified in (4) above was conducted.*

During this inspection, the action taken relative to the commitments made at the May 11th meeting was examined. Changes to Specification 13-CM-370 had been appropriately formalized by Specification Change Notice No. 1687 dated May 14, 1979. Meeting minutes, with a listing of attendees, were on file for the construction personnel indoctrination sessions conducted by the Resident Engineer on May 14 and 15, 1979. Additionally, the Resident Engineer was maintaining a detailed log of his inspection/direction activities involving the Unit 1 dome liner work. The liner plate receiving inspection NCRs had been collected and were undergoing evaluation by Bechtel. The liner work

*These two measures were accomplished and work was resumed with NRC Region V concurrence on May 15, 1979.

in progress on the Unit 1 containment dome was examined by the inspector and appeared to be in accord with the specification requirements; there was no evidence of excessive forces being employed or material distress in any of the components.

In consideration of the remedial action which has been accomplished by the licensee in regard to the erection of the Unit 1 containment dome liner plate system, this issue is considered closed.

c. (Closed) Follow-up Item (50-529/79-03/02). A concern was raised with respect to the identification and repair of cracks in Unit 2 tendon gallery.

At the time of this inspection, Hunts Contracting Company had completed repair of cracks identified by Bechtel's Resident Engineer and documented in NCR No. 1341. The cracks were repaired with epoxy injection in accordance with Specification 13-CF-014. The inspector examined the work performed and discussed with cognizant engineers the criteria used in determining which cracks were repaired and which were accepted "as-is." Based on this and a review of NCR No. 1341, it appeared that the questions raised by the inspector had been adequately answered. This item is closed.

d. (Closed) Open Item (50-529/79-03/03). Wire-cloth sieves at Batch Plant testing laboratory appeared to be out of tolerance.

The licensee provided results of tests performed with the sieves in question and a master set of sieves. The tests were performed per ASTM C136-71 and indicated a 0.01 difference in Fineness Modulus between the two tests. Comparison to a master set of sieves is an approved method for certifying working sieves. This item is closed.

4. Unit 1 Polar Crane Support Girders

During an audit of Marathon Steel Company, the fabricator of the polar crane support girders, the licensee found that the continuous 1/2-inch fillet weld which connects the vertical 1 1/2-inch vertical plate to the plate which makes up the top flange of the girder was interrupted at the location of each 3/4-inch thick stiffener plate. This fabrication error was considered by the licensee as potentially reportable under the requirements of 10 CFR 50.55(e); therefore, Bechtel was directed to analyse the situation. The inspector examined Deficiency Evaluation Report No. 79-2, dated April 27, 1979, which documented the cause, the corrective actions taken, and the results of the technical analysis. The analysis indicated that the weld interruption at the stiffener locations would not adversely affect the capability of the girder to perform its intended function.

5. Unit 1 Reactor Vessel Surveillance

The inspector verified that measures for protecting the reactor vessel and maintaining its internal cleanliness were being followed and that the Bechtel Quality Assurance group was performing surveillance in this regard in accordance with the approved program.

6. Unit 3 Concrete Quality Records

The inspector reviewed the quality records (i.e.: preplacement and post-placement inspections, curing cards, batch plant tickets, compressive strength test results, etc.) for Unit 3 concrete placements 3C010 Reactor Pit base mat and 3A004, -5, -6 Auxiliary Building base mat for compliance with WPP/QCI 53.0, Concrete Placement and WPP/QCI 54.0, Concrete Postplacement. No deviations from the applicable acceptance criteria were identified by the inspector.

7. Unit 1 Diesel Generator Foundation

The inspector observed work in progress for the two diesel generator foundations for Unit No. 1. It was determined that the work was being installed in accordance with current specifications and drawings. A review of receipt and inspection records for the foundation anchor bolts disclosed that material certifications were missing for the A449 bolts specified on drawing number 13-C-ZGS-110. Licensee personnel indicated that the material certification would be available for review during the next inspection. This item is open pending review of the material certification. (50-528/79-04/01)

8. Safety Related Pipe Supports and Restraints

a. Review of Quality Assurance Implementing Procedures and Work Procedures

The following pipe support and restraint documents were reviewed to ascertain adequacy of audit program, material control, field change control, inspection, and documentation.

(1) Specification 13-PM-209, "Specification for Nuclear Pipe Supports"

(2) WPP/QCI-201.1, "Nuclear Pipe Hangers and Supports Installation"

No deivations or items of noncompliance were identified.

b. Observation of Work and Work Activities

The following completed and accepted pipe supports installed in Unit 1 auxiliary building were selected for examination:

System	Support Number	Pipe Diameter, in.
Chemical and Volume Control	1CH142H006	20
	1CH320H006	3
Essential Cooling Water	1EW023H024	6
Fuel Pool Cooling and Cleaning	1PC022H012	12
Safety Injection	1SI079H005	10
	1SI105H001	4
	1SI144H005	3
	1SI194H008	18

The supports were all of a fixed design, quality class Q, seismic category 1, and ASME Section III, Class 2 or 3. They were compared with the applicable pipe support assembly drawings to ascertain proper location, welding, pipe clearances, and as-built configuration.

All of the supports appeared satisfactory with the exception of support number 1SI079H005. The weld size for this support was not as specified in the drawing in that one leg of the fillet weld of the pipe saddle to saddle base was only 1/4 inch, whereas the drawspecified a 3/8 inch fillet weld. This weld was a shop weld installed by Pullman Power Products (the piping supplier) and was an ASME Class 2 weld. Other welding on this support (both Pullman and Bechtel field welding) as well as on the other pipe supports examined appeared satisfactory.

This item is considered unresolved pending examination of a larger sample of Pullman welds during a future inspection to determine if a generic problem with fillet weld size exists (50-528/78-04/02).

c. Review of Quality Assurance Records

The Quality Assurance records associated with the pipe supports listed in Paragraph 8.b, above, were reviewed. The records included construction inspection plans for all of the supports examined, and welding and NDE records for the five supports that had ASME welds. All records appeared satisfactory with the exception of the records for support number 13SI144H005. This support assembly included two stainless steel lugs welded to the pipe. The construction inspection plan indicated that the welds for both lugs (weld numbers 2 and 3) had been liquid penetrant tested. However, the LP test report did not indicate that

a LP test had been performed on weld 2. These records had been signed and approved. The licensee indicated that these records would be re-reviewed and a LP test performed on weld 2 if no evidence could be produced to indicate that a LP test had previously been performed. This is considered an open item (50-528/78-04/03).

9. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on June 15, 1979, and summarized the scope and findings of the inspection, including the items discussed in Paragraphs 7 and 8.