

UNITED STATES
ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
REGION V
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June 22, 1970

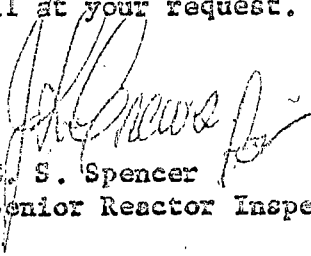
J. P. O'Reilly, Chief
Reactor Inspection and Enforcement Branch
Division of Compliance, Headquarters

SACRAMENTO MUNICIPAL UTILITY DISTRICT (RANCHO SECO)
DOCKET 50-312

Attached is the report of a recent inspection by Mr. Dodds of construction activities at the Rancho Seco site. Two deficiencies were revealed during the inspection, for which a Construction Deficiency Notification was issued on June 18. The deficiencies related to the failure to follow Cadweld splicing procedures (the ends of rebar had not been marked in such a manner as to insure the proper centering of the bar ends within the Cadweld sleeve) and the failure by the contractor (Chicago Bridge and Iron) to exercise proper care and control of low hydrogen welding electrodes. We anticipate prompt and effective action by the licensee on each of the deficiencies.

A caution against the use of Valcoline in the cleaning of heat exchangers, a subject brought to our attention by a recent memorandum from your office, was discussed with the project personnel by Mr. Dodds.

The licensee's evaluation of a weld joint in the penetration for the equipment hatch, the geometry of which is at variance with the code, appears adequate, considering the location of the joint. The variance has been reviewed and approved by the State of California Code Inspector. The condition is highlighted here to bring it to the particular attention of the DRL for information. We are prepared to provide additional detail at your request.


G. S. Spencer
Senior Reactor Inspector

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J. P. O'Reilly

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June 22, 1970

Enclosure:

CO Report 50-312/70-4

by R. T. Dodds dtd 6/22/70

cc: E. G. Case, DRS (3)
P. A. Morris, DRL
R. S. Boyd, DRL (2)
R. C. DeYoung, DRL (2)
D. J. Skovholt, DRL (3)
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L. Kornblith, Jr., CO
Regional Directors, CO

REG files

U. S. ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
REGION V

Report of Inspection

CO Report No. 50-312/70-4

Licensee: Sacramento Municipal Utility District
License No. CPPR-56
Category A

Date of Inspection: May 26-28, 1970

Date of Previous Inspection: March 18-20, 1970

Inspected by:

R. T. Dodds

6/22/70

R. T. Dodds
Reactor Inspector

Reviewed by:

G. S. Spencer for

6/19/70

G. S. Spencer
Senior Reactor Inspector

Proprietary Information:

None

SCOPE

Type of Facility:

Pressurized Water Reactor

Power Level:

2452 Mwt

Location:

Sacramento County, California

Type of Inspection:

Construction Inspection (Containment)

Accompanying Personnel:

G. S. Spencer on May 26, 1970

SUMMARY

Construction Deficiencies - The following construction deficiencies were identified for which a CDN will be sent to the licensee pending review and concurrence by Compliance Headquarters.

1. The structural steel bars being used in the containment vessel concrete walls had not been marked with a permanent line 12 inches from the end of each bar as a reference point to confirm proper centering of the bar ends in Cadweld splices. (Section E.2.)
2. Unused welding electrodes were not returned to the proper storage facilities at the completion of the days work. Some low hydrogen electrodes were observed to be in cold storage rather than heated ovens. (Section G.2.)

Status of Previously Reported Problems - No problems requiring followup action were outstanding following the previous visit.

Other Significant Items

1. Site construction was estimated to be on schedule with 12% completion as of May 29, 1970. The first lift of the containment walls has been placed and about six tiers of the containment liner plate has been welded in place. (Section B.)
2. The licensee is auditing construction activities in accordance with the QA plan. (Section C.)
3. The weights for calibration of batch plant scales had not been serialized. However, no discrepancies regarding the number of weights certified by the state were identified. (Section E.1.)
4. The practices followed for obtaining components for the prestressed concrete were consistent with the appropriate CO PI's. The tendon sheaths were being checked for blockage. (Section F.)
5. A followup review disclosed that welding records and NDT records were being maintained in accordance with policies consistent with the appropriate CO PI's. (Section G.1.)
6. The licensee is basing acceptance of radiographed welds on UW-51 of Section VIII rather than the more lenient requirements of UW-52. (Section G.1.)
7. The policies being followed for the construction of the containment vessel structures and supports appeared to be consistent with the appropriate CO PI's. (Section H.)
8. Start of construction of other class I structures was reviewed (reactor vessel support structure). (Section I.)

9. The taper resulting from the preparation for a weld joining a 3-inch thick body ring to a 0.5-inch thick plate which forms a non pressure retaining portion of the equipment hatch is more abrupt (approximately 3:1 verses 4:1) than that permitted by the ASME B and P.V. Code for Class B vessels. The nonconformance has been reviewed and conditionally approved by the State of California Code Inspector and verbally approved by the Licensee's Engineering Review Board. (Section J.)

Management Interview - The results of the inspection were discussed with Messrs. Raasch, Jackson, Riltz, McMahon, and Vander Knyff. Specific statements by the licensee regarding some of the items discussed were as follows:

1. Radiographs will be taken of a Cadweld splice to see if it is possible to establish the centering of the splices. If this is possible, then, on the basis of statistical sampling, 13 of the 93 splices not yet covered will be radiographed to establish whether or not the splices were correctly centered. If any are found off center, the worst case will be removed and pull tested. If all are "dead center" then no further action will be taken. In the future, all bar ends will be permanently marked to verify centering. (Section E.2.)
2. Corrective action will be demanded of Leavell-Dravo (prime contractor) to ensure that CB&I discharges their responsibility regarding weld electrode control. (Section G.2.)
3. A system will be worked out to serialize the weights used for calibration of the batch plant scales. (Section E.1.)

The inspector stated that the proposed disposition by SMUD regarding the weld joint geometry at the juncture of the equipment hatch barrel and body ring of the hatch would be referred to the DRL for information. It was emphasized by licensee representatives that the weld joint in question was in a non-pressure retaining area. (Section J.)

DETAILS

A. Personnel Contacted

The following personnel were contacted during the inspection:

SMUD

D. Raasch	-	Project Engineer
J. Jackson	-	Quality Assurance Director
J. Hiltz	-	Civil Engineer

Bechtel

J. Vander Knyff	-	Assistant Construction Manager
V. McMahon	-	Project Quality Assurance Engineer
W. Taylor	-	Quality Assurance Engineer
R. Hunter	-	Quality Assurance Engineer
B. Boyd	-	Senior Engineer (Welding)
A. Ericson	-	Concrete Testing Laboratory Supervisor
R. Cutler	-	Manager, Civil Construction

Leaveil-Dravo

W. Steen	-	Project Manager
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Chicago Bridge and Iron (CB&I)

R. Childres	-	Job Foreman
R. Jamison	-	Welding Inspector (Supervisor)

B. Status of Construction

Site construction was estimated to be on schedule with 12% completion as of May 29, 1970. The first lift of the containment building wall has been placed and about six rings of the containment liner plate have been welded in place. The containment building was estimated to be 24% complete. The foundations for major structures were estimated to be 88% complete.

C. QA Audits

The reports of audits since December, 1969 by SMUD and Bechtel QA personnel were reviewed and discussed with Messrs. Jackson and McMahon. Of the thirty plus audits performed by QA personnel, eleven were made by Mr. Jackson. Specific categories of items were audited in accordance with an inspection audit plan that was formulate pursuant to Quality Assurance Procedure No. 19. Correction action had been taken on all discrepancies that were identified during the audits. No items were noted that would warrant action by the AEC.

D. Nonconforming Material Reports

All of the nonconforming material reports that were generated since the previous inspection were reviewed and discussed with Messrs. Jackson and McMahon. Significant items of interest are discussed in the appropriate sections of this report.

E. Containment Concrete

1. Batch Plant Equipment Calibrations (PI 4605.05 b.3.)

A review of the batch plant equipment and concrete testing laboratory records disclosed that all equipment and scales have

been calibrated in accordance with the prescribed schedule. It was noted that the weights being used for the batch plant scales were stenciled with a "70" but were not serialized. The State of California certifications for the weights stated only the number of weights that had been calibrated. Each weight has a nominal weight of 50 pounds. The records showed that all weights at the site, 100 in total, had been certified. Mr. Jackson agreed that the weights should be marked with identification for record purposes, and stated that each would assign a serial number.

2. Rebar Splices

During a tour of the containment building construction area, it was observed that the rebar being used in the containment vessel concrete walls had not been marked with a permanent line 12 inches from the end of each bar as a reference point to confirm the proper centering of the bar ends in the Cadweld splice in accordance with Appendix 5.C. Section 4.0.f. of the PSAR. Apparently, this practice had been discontinued by the splicing crew after placement of the reactor building base mat. When questioned by Mr. McMahon, the steel foreman stated that he thought the 12 inch mark was just an aid until they "got the hang of it". This item was included in a CDN that was sent to the licensee.

F. Containment - Prestressed Concrete

The inspector's review of the implementation of the QA program and QC system to be used for the prestressed concrete materials disclosed that the licensee's QC procedures, work performance procedures and record keeping requirements are consistent with CO's PI 4705.03, .04 and .05 and section 5.1.3.3 and Appendix 5K of the PSAR. Information was available only on the bearing plate assembly and tendon sheathing. The tendon materials will not be ordered for another 6-8 months. Information relating to this construction activity was obtained from discussions with Messrs. Jackson, Hiltz, McMahon and Taylor and from a review that included the following records:

1. Manufacturer's material certifications for bearing plate, trumpets, grease, pipe and tendon sheathing materials.
2. Source inspection data reports.
3. Receiving inspection reports.

Testing of the tendon sheathing for blockage was also discussed. The concrete placement plan requires the sheathing to be visually checked prior to concrete placement, and to be checked for clearance by passing a ball through the sheathing following concrete placement and before the concrete

sets. The report of the first concrete lift for the containment vessel verified that all vertical and horizontal tendon sheaths had been satisfactorily checked for clearance.

G. Containment Liner - Welding

1. Followup Record Review (PI 4805.05)

The inspector's review of records of the welding of the containment vessel liner disclosed that these records were being maintained in a manner consistent with PI 4805.05. Information relating to this construction activity was obtained from discussions with Messrs. Boyd, McMahon and Jackson and from a review that included the following records:

- a. CB&I Field Foremen's Weekly X-Ray Reports
- b. NDT records:
 - (1) Radiographs
 - (2) Vacuum box test results
 - (3) Dye penetrant
- c. Repair Records (Nonconforming Material Reports)
- d. Welding drawings*
- e. Material control records
 - (1) Source inspection reports
 - (2) Shipping certifications
 - (3) Receiving inspection reports

* Information on completed weld drawings includes (1) welder identification, (2) Identification of Bechtel and CB&I inspectors who witnessed tests, and (3) NDT test results.

Section 5.5.1.1 of the PSAR states that radiography will be used as an aid to quality control. While the PSAR requires only 2 percent of the welding be spot examined, the licensee requires that CB&I radiograph 10 percent of the welding.

The PSAR states that the criterion for radiographic technique shall be in accordance with Paragraph UW-51 of Section VIII of the ASME B.&P.V. Code but does not specify the basis for acceptance of the weld. UW-52 of Section VIII deals with spot examination of welded joints and was originally incorporated in the contract for the containment liner. However, the licensee did not feel the requirements of UW-52 for weld acceptance were stringent enough to provide assurance against leakage of the containment liner.

For example, paragraph (c)(3) of UW-52 states that porosity is not a factor in the acceptance of welds not required to be fully radiographed. Therefore, the contract, pursuant to a "Configuration Change Document", was modified to read as follows: "...the criteria for radiographic acceptance of welds is changed from paragraph UW-52, Section VIII of the ASME code, to paragraph UW-51, except that the maximum acceptable length of slag inclusion will not exceed 0.125 inches, whereas the code allows 0.250 inches."

The review of nonconforming material reports disclosed that a number of welds had been repaired pursuant to UW-51 that would not have been required to be repaired had UW-52 been used as the basis for acceptance. However, several welds were passed where porosity was about 5% greater than that allowed by UW-51. In each instance, the Engineering Review Board ruled on the acceptability of the weld in question.

2. Followup Observation of Work (Welding Electrode Control)

An after-hour tour was made around the construction site with Messrs. Jackson and Boyd to check on, among other things, material control of welding electrodes for the containment liner. Several deficiencies were observed during the tour that will be included in the CDN.

- a. About half of a can of low hydrogen E7018 electrodes were in a cold storage bin along with E6010 coated electrodes.
- b. Ten low hydrogen E7018 electrodes were found left out of a heated holding oven in an open can.
- c. Many E6010 coated electrodes (some electrodes in every welder's can that was checked) were found that had not been returned to storage for the night. Half of a can of electrodes was hanging on the opening of the equipment hatch adjacent to a welder's helmet and other equipment.

The above items were in violation of Section 8.4.2 of CB&I's Construction Quality Assurance Program which states with regard to low hydrogen E7018 electrodes that "...Welders will be instructed to remove only enough electrode from the heated storage oven to be used during one shift. Excess electrodes which have been exposed to the atmosphere shall be stored in the holding ovens." Further, the procedures require that care shall be taken to store type E6010 electrodes in a dry, covered storage area.

Section 8.5 of the QA manual requires the CB&I Project Welding and QA Supervisor to exercise control over welding materials by, "...Policing work areas once a day to make sure that loose bundles of electrodes are removed."

H. Containment Vessel - Structures and Supports (PI 5400)

The inspector's review of the implementation of the QA program and the QC system for the construction of containment vessel structures and supports (concrete pressure vessel, tendons excepted, and steel liner) per PI 5400 was covered during inspections in October, 1969 (CO Report No. 50-312/59-3) and March, 1970 (CO Report No. 50-316/70-3) and during the current inspection. These reviews along with a followup record review disclosed that the licensee's QC procedures, work performance procedures and record keeping requirements are consistent with CO's PI 5405.03, .04 and .05 and sections 5.1.3, 5.4.3, 5.5.1.1 and Addendums 5C and 5L of the PSAR. Proof and leakage rate testing of the containment structure is currently scheduled for August, 1972. Information was obtained from discussions principally with Messrs. Jackson, McMahon, Boyd, Hiltz, Cutler, Erickson, and Taylor. Items reviewed during the current inspection included:

1. Material certifications (liner plate certifications not available until end of liner construction)
2. Source Inspection Plans
3. Vendor inspection reports
4. Shipping reports
5. Receiving Inspection Plan and Data Reports
6. Weld inspection reports
7. Inspection Data Reports
8. Nonconforming Material Reports

A review of the nonconforming material reports disclosed that a procedure had been developed to correct bent and misaligned liner plates. The procedure was reviewed and approved by the Engineering Review Board. However, any misalignment greater than 3/16" must be reviewed by the Board on a case by case basis. Bulges in liner plate are also handled on a case by case basis.

I. Other Class I Structures

The reactor vessel support structure and the borated water storage tank have been tentatively selected as the other two class I structures to be inspected pursuant to Attachment E of PI 3800/2. Work has commenced on the reactor vessel support structure but the contractor has not yet been selected for the site fabricated Class I pressure vessels.

The inspector's review of the implementation of the QA program and the QC system in use for materials to be used for the reactor vessel support structure disclosed that the licensee's QC procedures and record keeping requirements were consistent with CO's PI 5405.03, .04 and .05.* Information relating to this area of activity was obtained from discussions with Messrs. Taylor, Jackson and McMahon and from a review that included the following records.

1. Source Inspection Acceptance Reports
2. Receiving Inspection Reports
3. Material placement drawings
4. Inspection Data Reports
5. Material Certifications for anchor bolts (certified test reports by Ryerson Testing Laboratory)
6. User hardness tests of anchor bolts
7. Structural drawings and specifications

* There is no significant information relating to the support structure in PSAR.

J. Penetrations (Equipment Access Hatch)

It was observed during the review of the nonconforming material reports that the licensee was considering the acceptance of a variance from Section III, Class B of the ASME B and P.V. Code for the equipment hatch. Specifically, the taper of the 3 inch body ring of the hatch where it is adjoined by welding to the $\frac{1}{2}$ inch hatch barrel is 3.05:1 whereas the code requires the taper to be $\geq 4:1$ (UW-9, Section VIII--incorporated by reference, Article 11, paragraph N-III, Section III). Bechtel, Vernon has been appraised of the deviation as has the State of California Code Inspector. The licensee has proposed acceptance of the nonconformance because, "The particular configuration of concern is out of the area of high stress and not a part of the pressure boundary." While verbal approval has been granted by the Engineering Review Board, the Board has not yet accepted the nonconformance in writing. The State Code Inspector has stated that he will accept this particular item of nonconformance provided the as built drawings and code certification report provide details of the item of nonconformance.

The inspector observes that paragraph 5.2.1 of the PSAR states that all penetrations will be designed and fabricated in accordance with Section III, ASME. Further, Appendix 5H, item 4.3f states, "where different base

metal thicknesses are jointed by welding, the finished joint shall have a taper no steeper than 1:4 between the thick and thin sections."

K. Tours of the Construction Site

Several tours were made around the construction site for the purpose of observing the following items: (Inspection findings are included in other sections of this report)

1. Concrete Batch Plant

Observed batch plant operations and checked weights used to calibrate scales.

2. Containment Vessel

Checked welding of liner and observed weld repairs. Some of the bent liner plates that had been identified by nonconforming material reports were checked.

3. Control of Weld Electrodes

An "after hours" tour was made to check on the control of weld electrodes.

4. Cadweld Splices

Cadweld splices were checked for conformance with procedure specifications contained in the PSAR.