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

REGION V

Report No. 50-206/78-14

Docket No. 50-206 License No. DPR-13 Safeguards Group

Licensee: Southern California Edison Company

2244 Walnut Grove Avenue

Rosemead, California 91770

Facility Name: San Onofre Unit 1

Inspection at: Camp Pendleton, California

Inspection Conducted: October 10-13 and October 24-27, 1978

Inspectors: D P Haist for — 11-13-78
R. J. Pate, Reactor Inspector (Resident) Date Signed

D P Haist — 11-13-78
D. P. Haist, Reactor Inspector Date Signed

Approved By: R C Haynes — 11-14-78
R. C. Haynes, Chief, Project Section, Reactor Construction and Engineering Support Branch Date Signed

Summary:

Inspection on October 10-13 and October 24-27, 1978 (Report No. 50-206/78-14)

Areas Inspected: Routine, announced inspection of the inservice inspection program, procedures, work in progress, examination records, Babcock and Wilcox Corporation (B&W) audits, and licensee audits of B&W. The inspection involved 85 inspector hours onsite by two NRC inspectors.

Results: One item of noncompliance was identified which involved failure to perform nondestructive examination of vessel closure studs and nuts in accordance with requirements of the applicable ASME Code. (Report Details, Paragraph 3.)

DETAILS

1. Individuals Contacted

a. Southern California Edison Company (SCE)

*H. B. Ray, Manager, QA
*J. M. Curran, Plant Manager
*J. D. Dunn, Project QA Supervisor
*G. W. McDonald, QA/QC Supervisor
*B. L. Curtis, Supervising Engineer
*T. Lee, QA Engineer
*P. H. Penseyres, Nuclear Engineer
*M. P. Short, Assistant Nuclear Engineer

b. Babcock and Wilcox Construction Company

**H. W. Stoppelman, ISI Supervisor
**J. R. Warwick, QA/QC Supervisor

In addition, NDE technicians were contacted during the inspection.

*Denotes those attending the exit interview on 10/13/78 and 10/27/78.
**Denotes those attending the exit interview on 10/27/78.

2. Licensee Action on Previous Inspection Findings

(Closed) Open item (50-206/77-17): Radiograph of Weld 603A (Figure C2.1.47, Main Steam Piping) indicated use of a split backing ring. Licensee had agreed to remove the weld crown in the area of the split ring and examine the weld by shear wave UT.

Records of the 0 and 45 degree UT examinations on Weld 603A were reviewed. UT was limited due to the inner radius of an elbow. Two reportable indications, one from the split backing ring and one from the weld root geometry, were noted on the data sheet. No rejectable indications were noted on the data sheet. This item is closed.

3. Review of Inservice Inspection Procedures

The following inservice inspection procedures were examined for compliance with the requirements of the ASME B&PV Code, Section XI, 1974 Edition through Summer 1975 Addenda.

- o ISI-50, Rev. 6, Surface Conditioning of Welds and Adjacent Base Metal for Nondestructive Examination.
- o ISI-104, Rev. 12, Ultrasonic Examination of Ligaments Between Threaded Holes and of Studs and Bolts 1 Inch and Larger in Diameter.
- o ISI-105, Rev. 6, Ultrasonic Examination of Nuts and Washers.
- o ISI-270, Rev. 4, Wet or Dry Methods of Magnetic Particle Examination of Welds, Studs, Nuts, Bolts, Washers, and Pump Motor Flywheels.
- o ISI-350, Rev. 8, Visual Examination of Welds and Surface Conditions.

The inspector found that the procedure met the applicable code requirements except in the following areas:

a. The ASME B&PV Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, Subarticle IWA-2200, and San Onofre Nuclear Generating Station Inservice Inspection Program (September, 1977), Engineering Procedure S-V-2.10, require that ultrasonic examination be conducted in accordance with the provisions of Appendix I of Section XI. Where Appendix I is not applicable, the provisions of Article 5 of Section V shall apply. Article 5 of Section V, Paragraph T.525.2, Straight Beam Axial Scan Ultrasonic Examination of Bolts and Studs, Subparagraph (b), requires that calibration be established on a test bar of the same nominal composition and diameter as the production part and a minimum of 1/2 of the length, equipped with a 3/8-inch diameter flat bottom hole and that a distance-amplitude-correction (DAC) curve be established by scanning from both ends of the bar.

   Contrary to these requirements, Procedure ISI-104, Rev. 12, Paragraph 7.1, allows the use of a back reflection calibration technique which does not require the use of a calibration block equipped with calibration reflectors or the establishment of distance-amplitude-correction (DAC) curve for evaluating indications. The licensee has indicated that an attempt will be made to justify the sensitivity of the examinations of RPV closure studs 1-14 and to establish a basis for an alternative examination method in accordance with ASME Section XI, Subsubarticle IWA-2240. The failure to meet the above code requirements is considered to be an item of noncompliance. (50-206/78-14/01)

b. Procedures ISI-104, Rev. 12, and ISI-105, Rev. 6, contain the statement, "Where the configuration of the piece being tested will not permit examination as noted in Section 9, the inspection shall be performed to give the best possible examination." The inspector noted that this statement may be interpreted to allow the examiner to vary procedure variables without the review and approval of the appropriate Level III and licensee personnel.

Licensee representatives stated that this paragraph will be deleted to preclude such latitude. The procedure revision will be reviewed during a subsequent inspection. (50-206/78-14/02)

c. The ASME B&PV Code, Section XI, 1974 Edition, including addenda through Summer, 1975, Table IWB-2500, Category B-G-1, and Table IWB-2600, Item No. B1.8 specifies that surface examination areas shall include vessel closure nuts and threads in base material.

Contrary to these requirements, Procedure ISI-270, Rev. 4, does not specify surface examination of RPV closure nut threaded areas. The licensee's inservice inspection contractor does not presently have a field technique for magnetic particle examination of the RPV closure nuts, and feels that this would be a poor application for liquid penetrant examination. The licensee stated that they plan to develop a procedure and will perform surface examination of the threaded areas of RPV closure nuts 1-14 at the next refueling outage. The failure to perform surface examination of closure nut threaded areas is considered to be an item of noncompliance. (50-206/78-14/03)

d. ASME Section V, Article 5, Paragraph T-522, Ultrasonic Examination of Forgings and Bars, requires that the methods and procedures used for the ultrasonic examination of forgings conform to Recommended Practice SA-388. Recommended Practice SA-388, Paragraph 7.2.2.2, specifies calibration for straight beam examination using flat bottom holes and calibration for angle beam examination (Paragraph 7.3.3) using rectangular or 60 degree V-notch on the inside diameter.

Contrary to these requirements, Procedure ISI-105, Rev. 6, specifies calibration for both straight beam and angle beam examinations using side drilled holes. The licensee's ISI contractor stated that Recommended Practice SA-388 was not used to develop Procedure ISI-105 and that calibration block design is based upon ASME Section V, Article 5, T-530, "Ultrasonic Examination of Welds." The contractor stated that there

is no specific reference in ASME Section XI or Section V to the UT examination of nuts, and that Procedure ISI-105 is based upon Paragraph T-530 because it provides a method of measuring defect size against a reference and allows the use of the referencing code for acceptance criteria. The contractor stated that SA-388 does not provide for measurement of defect size and does not provide acceptance standards, i.e., the purchaser and supplier are to set the acceptance criteria. The inspector questioned this position on the following two points:

(1) SA-388 does provide an amplitude reference line based upon either flat bottom holes or vee or rectangular notches in the reference block.

(2) The validity of using the T-530 weld and heat-affected zone (HAZ) examination technique on forgings, and in conjunction with the forging flaw indication acceptance criteria in ASME XI, Table IWB-3515.1.

This item is unresolved pending interpretation of this code requirement. (50-206/78-14/04)

4. Observation of Work and Work Activities

a. NDE Personnel Qualification Records

NDE qualification records and certifications were examined against the guidelines of SNT-TC-1A for six personnel performing the examinations and one Level III examiner.

No items of noncompliance or deviations were noted.

b. Examination Activities

The following examinations were observed by the inspectors:

(1) Magnetic particle and ultrasonic examination of RPV closure studs.

(2) Magnetic particle and ultrasonic examination of RPV closure nuts.

(3) Visual examination of RPV closure washers.

The inspector noted that 45 degree ultrasonic examination of the RPV closure nuts was being performed in two directions, clockwise and counter clockwise, perpendicular to the axis

of the nut which was not required by Procedure ISI-105, Rev. 6, Paragraph 9.1; rather, the procedure requires angle beam examination in two axial directions only. The licensee stated that the procedure will be revised to reflect angle beam examination in all four directions, which is the contractor's practice. The procedure revision will be reviewed during a subsequent inspection. (50-206/78-14/05).

c. Main Steam Piping Restraint Examinations

The licensee observed a crack in the No. 6-IW1 pipe restraint attachment weld to the main steam line. Inspection access to the weld was limited due to a clamp stitch welded to the pipe restraint. The clamp was removed and the weld crack was repaired and 100% MT performed. No recordable indications were found.

In accordance with Subsubarticle IWC-2430 of ASME Section XI, the licensee selected another horizontal, integrally-welded support of the same design for examination (No. 6-IW5). Again, inspection access was limited due to a clamp stitch welded to the pipe restraint. The inspector questioned the purpose of the clamp stitch welds which appear to serve no structural purpose and stated that MT examination of the weld and HAZ on restraint No. 6-IW5 would be required to meet IWC-2430. The licensee removed the clamp and performed MT of 100% of the restraint weld and HAZ. No recordable indications were found.

The licensee could not ascertain the structural necessity of the clamp stitch welds which are not shown on the construction drawings. The licensee stated that the clamp stitch welds will not be considered cause for limited examination.

d. Feedwater Piping Restraints

The feedwater piping restraint No. 1-S-SW-393-1&2 was examined by the inspector. This restraint consists of two snubbers connected by a clamp to a stub tube which is welded to the feedwater pipe. It was noted that several clamp-to-stub tube stitch welds were cracked. This condition was reported to the licensee and the welds were repaired. All similar restraint connections on the feedwater and steam lines were inspected by the licensee and three other feedwater line restraints were found to have a similar condition. These welds were also repaired.

The licensee reviewed the service history of the feedwater line and concluded that the most probable cause of the cracked welds on the pipe clamps was water hammer occurring prior to 1974.

Since that time, several hardware and procedure changes were instituted to prevent water hammer in the feedwater line. The inspector reviewed the actions taken and had no questions.

Construction drawings of the restraints were reviewed and did not require the stub tube to clamp stitch welds. As with the main steam line restraints, the licensee stated that the clamp stitch welds will not be considered cause for limited inservice inspection.

5. Audits

The preliminary results of a B&W audit conducted on October 6, 1978, were reviewed. The audit scope, planning and findings were in accordance with B&W QA Manual Quality Control Administrative Procedure No. 9A-153, Rev. 2. The formal audit report is required within 30 days following the audit with response to the audit findings required within 30 days. The preliminary audit findings did not affect the current examinations.

The results of the September 28, October 2, and October 10, 1978, audits, conducted by SCE of B&W organization, personnel qualifications, control of measuring and test equipment, and document control were reviewed for conformance with the SONGS 1 QA Manual, Chapter 18, Rev. 4. The audit scope and planning were satisfactory. There were no audit findings. The audits were scheduled to cover critical areas at the appropriate time. The scope and planning were reviewed for an audit of quality assurance records that is in progress and were found to be consistent with requirements of the QA Manual.

6. Inservice Inspection Records

The current Inservice Inspection Plan (Outage No. 6), dated 9/13/78, was reviewed against the requirements of ASME Section XI and the licensee's overall inservice inspection program and was found to meet those requirements. The nondestructive examination (NDE) records for the following welds/components were reviewed.

a. *Figure B.2.1.1 - Pressurizer Circumferential Weld #1C (UT)

b. Figure B.2.1.7 - Pressurizer Longitudinal Weld #1L (UT)

c. Figure B.3.3.1 - Steam Generator A inlet nozzle to safe end weld #A-6 (UT, PT)

d. Figure B.4.1.13 - Reactor coolant system loop A cold leg to steam generator A inlet safe end weld #A-5 (UT, PT)

e. Figure B.4.5.2 - Reactor coolant system loop A hot leg pipe to elbow weld #A-4 (UT)

f. Figure B.1.8.1 - RPV Closure Studs 1-14 (UT, MT)

g. Figure B.1.8.3 - RPV Closure Nuts 1-14 (UT, MT)

h. Figure B.1.10.1 - RPV Closure washers 1-14 (VIS)

*The figure numbers are from the B&W Inservice Inspection Plan for Outage #6. These numbers are consistent with the Item Number from Table IWB-2600 of ASME Section XI.

Records reviewed were complete with equipment data, equipment calibration data including instrument linearity checks and transducer beam spread measurements, evaluation data, preliminary disposition of findings, and identification of NDE materials.

The inspector noted that in many cases of limited UT examinations, qualitative statements such as: "No exam on nozzle due to nozzle configuration," "Limited exam on safe end due to two tapers," and "Entire examination area has areas with loss of contact due to surface roughness," are made on the data sheet. The inspector noted that it is difficult to determine the actual examination coverage, which scan was limited, and whether or not the examiner investigated any other means to examine the area of concern. Limited definition of examination coverage could present problems when comparing data against previous examinations and when reporting limited examinations. The licensee stated that more definition of limited scan areas will be required in the future. This item will be reviewed during a subsequent inspection. (50-206/78-14/06)

7. Exit Interview

The inspectors met with the licensee at the conclusion of the October 10-13, 1978, inspection and again at the conclusion of the October 24-27, 1978, inspection. The inspectors summarized the purpose, extent, and findings of the inspection.