U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-206/86-13

Docket No. 50-206

License No. DPR-13 Category B

Licensee: Southern California Edison
2244 Walnut Grove Avenue
Rosemead, CA 91770

Facility Name: San Onofre Unit 1

Inspection At: San Clemente, California

Inspection Conducted: March 24 - 28, 1986 (In office) and
April 1 - 10, 1986 (Onsite)

Inspectors: W.J. Wagner for-per telecon 6/3/86 6/4/86
Harry W. Kerch, Lead Reactor Engineer date

W.J. Wagner for-per telecon 6/3/86 6/4/86
Richard H. Harris, Engr. Tech. NDE date

Approved by: W.J. Wagner for-per telecon 6/3/86 6/4/86
James T. Wiggins, Chief, Materials Processes Section, DRS, Region I date

Inspection Summary: Inspection Conducted March 24 through April 10, 1986 (Report No. 50-206/86-13)

Areas Inspected: A special, announced inspection utilizing the NRC Mobile NDE Van to perform nondestructive examination of selected safety related piping, components and structures. Two Region I based inspection personnel assisted by two contracted NDE personnel were utilized during this inspection. The purpose of this inspection was to ascertain the condition of plant material through various NDE techniques. Areas examined were the Main Steam and Feedwater system piping and supports.

Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

Southern California Edison

C. A. Couser, Compliance
D. B. Schone, QA Manager
D. E. Nunn, NGS
M. P. Short, SQI Manager
R. N. Santosuosso, Maintenance
H. E. Morgan, Station Manager
B. Katz, Mgr. O&MS
W. M. Lazear, QA Supervisor
J. A. Mundis, O&MS
R. Retana, QSE
D. Henry, O&MS
R. J. Scott, Consultant
M. A. Wharton, DSM
J. L. Winter, Engineer
H. E. Morgan, SM
S. B. Allman, Manager
J. Madigan, HP
R. L. Erickson, Senior Engineer
M. K. Sullivan, ISEG
O. E. Saio, Building Superintendent
D. C. Stoneopher, QA Manager

Bechtel

H. F. McCluskey, Project Manager
S. R. Schuyler, Project Superintendent
R. M. Reinsch, Project QA
M. J. Dutra, NDE Level III

NRC Region V

R. C. Tang
D. V. Gallagher
R. White
P. Johnson
A. De Angelo

2.0 Purpose of the Inspection

The purpose of this inspection was to perform independent measurements to ascertain and evaluate main steam system and the conditions of A and C lines of the feedwater system at San Onofre 1. These systems were nondestructively examined using various techniques to detect inservice indications which may have been generated by the water hammer event of November 21, 1985. A selected sample of welds and materials was taken from the main steam and feedwater piping for re-examination by the NRC.

During the period of March 24 - 28, 1986 Nondestructive examination procedures were reviewed in the Region I office for completeness and compliance to the licensee's FSAR commitments and to applicable codes, standards and specifications. Subsequently, an onsite independent verification inspection was conducted during the weeks of April 1 through April 10, 1986 using the NRC Mobile Nondestructive Examination (NDE) laboratory. This inspection was conducted by Region I based personnel in conjunction with NRC contracted NDE personnel.

2.1 Nondestructive Examinations

2.1.1 Review of Site Radiographs

The inspector noted that the licensee had radiographed a sample of welds during 1980. Nine of these welds were reviewed by the NRC during this inspection. Because the construction code in effect at the time of construction was ASME I, 1962, there were no nondestructive examination requirements for the particular pipe weld thickness and diameters involved in the licensee's sample. the sample included the following welds:

1-24-3	7-24-4
6-24-4	7-24-4
1-24-1	7-24-5
4-20-5	2-24-1
3-20-5	

These same radiographs were also reviewed by Livermore National Laboratory (LNL) personnel during this inspection period and several radiographic film technical problems were identified during this review. These problems will be reported separately by LNL.

Results: No inservice discontinuities were found.

2.1.2 Radiographic Examination

Seventeen (17) pipe weldments were radiographed using an Iridium 192 source. The technique and procedure used were in accordance with NRC procedure, NDE-5, Rev. 0. The resulting radiographs were evaluated per applicable code requirements. Those weldments listed in Attachment 1 were radiographed to assess material condition.

Results: Five welds which were not among the licensee's 1980 sample were radiographed by the NRC. The NRC inspector identified to licensee personnel at the site, the types of findings determined from the NRC radiographic film. Due to the fact that the licensee did not radiograph these welds, the NRC provided a copy of each weld radiograph that requires further evaluation. Specifically, NRC finding included:

Weld No.	Indication Requiring Evaluation	Radiographic Film Area
MSS-1-13	Porosity	15-30
MSS-2-13	Slag and Porosity	0-15 and 16-30
MSS-2-2	Porosity	30-44 and 44-66
MSS-2-10	Slag	30-45
FWS-2	Linear Indication	8

These items are considered unresolved pending the licensee's evaluation and NRC review. (Unresolved item 50-206/86-13-01).

2.1.3 Thickness Measurements (Material Erosion)

Thickness measurements were taken to detect indication of material erosion on two (2) six foot sections of the feedwater system piping using a Nova D-100 digital thickness gage. Ninety measurements were taken with a low reading of .465 in. and a high of .506 in. The material examined was ASTM A-106 sch. 160 pipe. See Attachment I for complete listing of material checked. Minimum allowable wall thickness was determined by use of ASTM standard pipe size and nominal thickness chart.

In addition to the above thickness measurements, four elbow fittings, one tee section and two valve bodies were measured for thickness. It was determined that on the these items, no area was found to be less than the adjacent pipe material.

Listed below, by component, are high and low readings of thickness for the pipe fittings and valves examined by NRC.

Component/Fitting	High/Low	Weld Pipe	Weld ID/Pipe
Tee/PBP-214	1.920/1.420	1.140/.977	1-11/Line 1 MSS
El./MSS-2	1.058/.988	1.034/.973	2-13/Line 2
El./MSS-1	1.079/1.014	.966/.913	1-13/Line 1
El./FWS-391	.535/.466	.624/.536	391/4/Line 391
El./FWS-391	.512/.464	.661/.505	391-6/Line 391
Valve-MSS-302	2.583/2.474	1.078/1.014	2-9/2
Valve-MSS-301	3.085/2.935	1.088/,942	2-10/2

Results: No violations were identified.

2.1.4 Thickness Measurements (Weldments)

Sixteen (16) pipe weldments and adjacent base materials were examined for wall thickness using a NOVA-D 100 digital thickness gage. Examinations were performed using NRC procedure NDE-11, Rev. 0 and site procedure NDEP-UT-001, Rev. 3. Minimum allowable wall thickness for piping material was determined by use of ASTM standard pipe size and nominal thickness chart.

Results: No violations were identified.

2.1.5 Visual Examination

Twenty-three (23) pipe weldments were visually examined for weld reinforcement, surface condition and overall workmanship per NRC procedure NDE-10, Rev. 0 and site procedure NDEP-VT-001, Rev. 2.

Results: No violations were identified.

2.1.6 Magnetic Particle Examination:

Six (6) 24" pipe weldments on the Main Steam System and five (5) 10" pipe weldments were examined per NRC procedure NDE-6, Rev. 0. In addition to the above examination, two (2) pipe penetration seal welds and two (2) six foot sections of pipe material on the feedwater system were examined by the magnetic particle method.

Results: Two (2) areas adjacent to weldments 2-11 and 2-3 on the main steam line were found to have linear indications that retained magnetic particles. These indications appeared to result from the pipe fabrication process and were not service induced. The licensee was informed of the indications and subsequently these areas were investigated by the licensee and removed by grinding. The inspector had no further concerns with these items.

No violations were identified.

2.1.7 Ultrasonic Examination

Two (2) 24" pipe weldments were ultrasonically examined per NRC procedure NDE-1, Rev. 0 and licensee's procedure NDEP-UT-001, Rev. 3.

The examination performed during this inspection was a manual contact ultrasonic scan in the shear mode, using a 45° angle beam search unit. The ultrasonic equipment used was a Sonic Mark I flaw detector, calibrated in accordance with NRC procedure NDE-1, Rev. 0. A Distance Amplitude Correction (DAC) Curve was established using the licensee's calibration block (S/N SCE-009) for 24" sch 60 piping. All instrument settings were as near as practical to those used during the original examination performed by licensee site personnel.

Results: No recordable indications were observed during this examination.

No violations were identified.

2.1.8 Hanger Examination

Site hanger drawings were requested by the inspector on several occasions. A licensee representative informed the inspector that it would require several days to provide these hanger drawings and these drawings may not have the weld details required for this inspection. The NRC then inspected the hangers without the aid of the drawings.

Nine pipe hangers in the main steam and feedwater lines were visually examined for any movement, cracking around the concrete area, loose or broken members and general conditions of welded areas. General workmanship quality was reviewed. See Attachment I for hangers inspected.

Results: No violations were identified.

2.2 Review of Procedures

The following procedures were reviewed for compliance with NRC and code requirements.

2.2.1 Southern California Edison

Procedure	Title
NDEP-UT-001, Rev. 3	Ultrasonic Examination for piping welds/base metal
NDEP-UT-002, Rev. 2	Ultrasonic Examinations for determining Embed Anchor bolt length
NDEP-UT-003, Rev. 1	Ultrasonic Examinations wall thickness measurement of plate, pipe forgings and castings
NDEP-UT-004, Rev. 0	Ultrasonic wall thickness measurement using the USL-38 Ultrasonic Instrument

NDEP-MT-001, Rev. 4	Magnetic Particle Examination
NDEP-PT-001, Rev. 1	Liquid Penetrant Examination
NDEP-PT-002, Rev. 0	Liquid Penetrant Exam. - Fluorescent Method
NDEP-PT-003, Rev. 0	Liquid Penetrant Examination
NDEP-VT-001, Rev. 2	Visual Examination Procedures VT-2, ASME Section XI
NDEP-VT-002, Rev. 1	Visual Examination Procedure, VT-1, VT-3, VT-4
NDEP-VT-003, Rev. 0	Examination of Air Tanks

2.2.2 Mobile Inspection Service, Inc. Procedures

MISI-RT-1, Rev. 1 Radiographic Examination

2.2.3 Bechtel Power Corp. Procedures

MT (DRY) ASME/ANSI Rev. 0, Magnetic Particle Examination

PT (SR) ASME/ANSI, Rev. 0, Liquid Penetrant Examination

RT-XG-2, Rev. 2, Radiographic Examination

Results: Procedure RT-XG-2, did not contain any reference of year and addendum of the code used as a basis for acceptance criteria. This was dicussed with the licensee representative and he agreed to the required changes. This item is considered unresolved pending procedure changes and NRC review. Unresolved item 50-206/86-13-02.

3. Attachments

Attachment No. 1 is a tabulation of specific items examined and the results achieved.

4. Unresolved Items

An unresolved item is a matter for which more information is necessary to determine whether the item is acceptable, a violation or deviation. Unresolved items are contained in paragraphs 2.1.2 and 2.2.3.

5. Exit Interview

The inspector met with the licensee's representatives (denoted in paragraph 1) at the conclusion of the inspection. The inspector summarized the scope and findings of this inspection. No written materials were given to the licensee during this inspection.

ATTACHMENT 1

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WELD NO. Line/ISO	ALLOY ANAL.	FERRITE	THICK	M.T.	R.T.	U.T.	P. T.	HARDNESS	VISUAL	REMARKS
1-9	N/A	N/A	ACC	ACC	ACC	N/A	N/A	N/A	ACC	24" C/S MSS
1-10	"	"	ACC	ACC	ACC	"	"	"	ACC	24" C/S MSS
2-3	"	"	N/A	ACC	ACC	"	"	"	ACC	24" C/S MSS
2-9	N/A	N/A	ACC	ACC	ACC	N/A	N/A	N/A	ACC	24" C/S MSS
2-10	"	"	ACC	ACC	*	"	"	"	ACC	*See unresolved item No. 50-206/86-13-01
2-11	"	"	N/A	ACC	ACC	"	"	"	ACC	24" C/S MSS
2-4	N/A	N/A	ACC	N/A	N/A	N/A	N/A	N/A	ACC	24" C/S MSS
2-5	"	"	ACC	N/A	N/A	"	"	"	ACC	24" C/S MSS
(Z) 392-6	"	"	ACC	ACC	*	"	"	"	ACC	*See unresolved item No. 50-206/86-13-01 10" C/S FWS
(MA) 392-7	N/A	N/A	ACC	ACC	ACC	N/A	N/A	N/A	ACC	10" C/S FWS
393-4	"	"	N/A	ACC	ACC	"	"	"	ACC	"
393-9	"	"	N/A	ACC	ACC	"	"	"	ACC	10" C/S FWS
393-10	N/A	N/A	N/A	ACC	ACC	N/A	N/A	N/A	ACC	"
393-2	"	"	ACC	N/A	N/A	"	"	"	ACC	"
393-3	"	"	ACC	N/A	N/A	"	"	"	ACC	10" C/S FWS
391-4	N/A	N/A	ACC	N/A	ACC	N/A	N/A	N/A	ACC	"
391-5	"	"	ACC	N/A	ACC	"	"	"	ACC	"

ATTACHMENT 1

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WELD NO. Line/ISO	ALLOY ANAL.	FERRITE	THICK	M.T.	R.T.	U.T.	P. T.	HARDNESS	VISUAL	REMARKS
2-2	N/A	N/A	ACC	N/A	*	N/A	N/A	N/A	ACC	*See unresolved item 50-206/86-13-01 24" C/S MSS
2-12	N/A	N/A	ACC	N/A	ACC	"	"	"	ACC	24" C/S MSS
2-13	N/A	N/A	ACC	N/A	*	ACC	"	"	ACC	*See unresolved item 50-216/86-13-01 24" C/S MSS
1-13	N/A	N/A	ACC	N/A	*	ACC	N/A	N/A	ACC	*See unresolved item 50-206/86-13-01 24" C/S MSS
C-3B	N/A	N/A	N/A	ACC	N/A	N/A	"	"	ACC	Pipe Penetration
C-3C	N/A	N/A	N/A	ACC	N/A	N/A	"	"	ACC	Pipe Penetration
MSS-301 334531	N/A	N/A	** ACC	N/A	N/A	N/A	N/A	N/A	N/A	Valve Body Thick. Meas.
H-00F	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ACC	Hanger Inspection
H-00J	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ACC	Hanger Inspection
H-009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ACC	Hanger Inspection
H-015	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ACC	Hanger Inspection
H-30B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ACC	Hanger Inspection
H-00C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ACC	Hanger Inspection
H-00D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ACC	Hanger Inspection
H-00E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ACC	Hanger Inspection
H-00L	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ACC	Hanger Inspection
Line 391	N/A	N/A	** ACC	ACC	N/A	N/A	N/A	N/A	N/A	MT & Thick meas. between hangers H00E & H00F 6' section of pipe

ATTACHMENT 1

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WELD NO. Line/ISO	ALLOY ANAL.	FERRITE	THICK	M.T.	R.T.	U.T.	P. T.	HARDNESS	VISUAL	REMARKS
Line 391	N/A	N/A	** ACC	ACC	N/A	N/A	N/A	N/A	N/A	MT & Thick meas. between hangers H00F & H00J 6' section of pipe
Line 391	N/A	N/A	** ACC	N/A	N/A	N/A	N/A	N/A	N/A	Thick. meas. on elbow between welds 391-4 & 391-5
Line 1 MSS Line 2 MSS	N/A	N/A	** ACC	N/A	N/A	N/A	N/A	N/A	N/A	Elbow (1-13 & 2-13) Thick measurements
PBP-214 Line 2	N/A	N/A	** ACC	N/A	N/A	N/A	N/A	N/A	N/A	TEE Thick Measurements

**Denotes thickness measurement taken on material other than pipe weldment areas.