

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-361/83-30

Docket No. 50-361

License No. NPF-10

Licensee: Southern California Edison Company  
P. O. Box 800  
2244 Walnut Grove Avenue  
Rosemead, California 91770

Facility Name: San Onofre Nuclear Generating Station, Unit 2

Inspection at: San Onofre Site, San Clemente, California

Inspection conducted: August 22-26 and October 31-November 4, 1983

Inspectors: Harvey L. Canter for 4-27-84  
J. H. Eckhardt, Reactor Inspector Date Signed

Approved by: H. L. Canter 4-27-84  
H. L. Canter, Chief, Reactor Projects Date Signed  
Section 3

Summary:

Special Inspection of August 22-26 and October 31-November 4, 1983 (Report No. 50-361/83-30).

Areas Inspected: Special, unannounced inspection by a regional inspector of allegations concerning mechanical shock arrestors. Region V allegation tracking system number RV-83-A-0026. The inspection involved 80 inspector-hours onsite by one NRC inspector.

Results: No items of noncompliance or deviations were identified.

## DETAILS

### 1. Persons Contacted

#### a. Southern California Edison Company

J. Mertens, Station Engineer  
V. Gaw, Quality Assurance Engineer  
D. Schone, Site Quality Assurance Manager  
M. Short, Manager Project Support

#### b. Pacific Scientific

W. S. Wright, Jr., Director of Engineering, Kim-Tech Division

The inspector also talked with SCE Quality Control Inspectors and Pacific Scientific technicians regarding mechanical shock arrestor inspection techniques and construction details.

### 2. Background

On July 20, 1983, Mr. John Mertens, an SCE engineer, wrote a letter to the NRC Regional Administrator (Region V) discussing various concerns he had regarding safety related piping systems, mechanical shock arrestors (snubbers), and other items related to San Onofre Nuclear Generating Station. This allegation is identified in the Region V allegation tracking system as RV-83-A-0026. A copy of this letter is attached as Exhibit A. Prior to sending this letter to the NRC, Mr. Mertens sent a copy of the letter to Mr. W. R. Gould, Chairman of the Board of SCE so that SCE could respond to the concerns. Upon receiving the letter from Mr. Mertens, SCE forwarded the letter to the NRC Region V office to ensure that the NRC was aware of the concerns. SCE responded to Mr. Mertens concerns in letters to him dated July 27, 1983 (Exhibit B), and August 5, 1983 (Exhibit C).

The NRC Region V office reviewed Mr. Mertens' concerns and forwarded four items (numbers 4, 6, 7, and 8) to NRC Headquarters for action; two of the items (numbers 3 and 9) were assigned to the Office of Investigation (OI) for action; and the Region V office accepted responsibility to examine the other items (numbers 1, 2, 5, and 10).

Region V inspectors visited SONGS during the weeks of August 22-26 and October 31-November 4, 1983 to investigate their four items. This report addresses the Region V inspection of items 1, 2, 5, and 10. The other items will be addressed in separate reports by NRR and OI. The items are addressed in order with the concern restated and then a discussion of the NRCs examination and conclusions given.

### 3. Concern Number 1

1. Evidence indicates that Unit 2 operated for 21 months with inoperable snubbers on the safety related main feed water line FW 189 (from March 1981 through February 1982 with six, and from March 1981 through December 1982 with five internally damaged snubbers).

The inspector determined that this concern is basically correct. On March 21, 1981, as part of the pre-core load hot functional test, a feedwater system "waterhammer" test was conducted on SONGS Unit 2 Steam Generator Number E-088 per FSAR Paragraph 14.2.12.72 t.3. This test was conducted in accordance with startup test Procedure 2AA-201-01, "Secondary Feedwater System." The purpose of the test was to ascertain that the auxiliary feedwater system piping and supports did not sustain damage when a "waterhammer" transient was introduced into the system. The initial conditions of the test were that the steam generator be at hot conditions, the main feedwater secured, and the steam generator be drained so that the water level was below the level of the feed ring. The level was to be maintained a sufficiently long time so that the feed ring was also drained. The test then required that the auxiliary feed pumps be started. The acceptance criterion for the test was that no abnormal noise occurred and that no damage was sustained by the feedwater piping or supports.

No significant noise occurred during the test and visual inspection of the piping and supports (including visual inspection of the snubbers) did not reveal any damage. This is evidenced in the licensee's test report. Thus, the test was assumed to pass satisfactorily. The hot functional tests continued for several additional days with no problems noted which were related to the "waterhammer" test.

However, on July 14, 1981, the inside of steam generator No. E-088 was inspected for final closeout. During this inspection, the feed ring was found to be partially collapsed and the supports of both the feed ring and distribution box were damaged. This damage was attributed to the feedwater system "waterhammer" test performed on March 21, 1981. It was concluded that the rapid initiation of the cold feedwater flow caused the steam inside the feed ring to condense which created a temporary pressure differential between the inside and outside of the feed ring resulting in the feed ring collapse. This condition was reported to the NRC in accordance with 10 CFR 50.55(e) (report dated August 11, 1981). The feed ring in Unit 2 Steam Generator E-088 as well as the feed ring in the other Unit 2 steam generator and the feed rings in the two Unit 3 steam generators, were replaced with a feed ring of heavier schedule pipe. The "waterhammer" test was reperfomed and successfully passed with no damage to the feed ring. After the damage to the feed ring was discovered on July 14, 1981, the feed water piping and supports (including snubbers) were again visually inspected and no apparent damage was identified. This is evidenced in the licensee's QC inspection report.

On January 25, 1982, during a general visual and freedom of movement inspection of snubbers prior to Unit 2 fuel loading, snubber serial number S/N 2609 installed on pipe support S2-FW-189-H-010 and snubber S/N 390 installed on pipe support S2-FW-189-H-012 of the main feedwater line to steam generator E-088, were found to be damaged. These snubbers, which could not be freely rotated about their axis, were replaced with S/N 4322 and S/N 1145 respectively. The deficiencies were documented on nonconformance reports NCR S023-F-463 and S023-F-462 respectively. Apparently all other snubbers in this system passed the visual and freedom of movement inspection prior to fuel load.

December 9, 1982, (after fuel loading and initial startup) during the piping thermal expansion and vibration verification at the 50% power plateau, the licensee discovered two inoperable snubbers associated with pipe support S2-FW-189-H-013 of the main feedwater line to steam generator E-088. The serial numbers of these damaged snubbers were S/N 2107 and S/N 2113. They were replaced with S/N 268 and S/N 3472 respectively. The deficiencies were documented on nonconformance report number 2-032. Technical Specification Limiting Condition for Operation (LCO) 3.7.6 requires that the snubbers be operable in Modes 1 through 4. The inoperable snubbers were replaced within the 72-hour period required by the LCO Action Statement. The licensee formally informed the NRC of these two inoperable snubbers via a Licensee Event Report (LER 82-165) dated January 7, 1983.

On December 22, 1982, two additional nonconformance reports (NCR 2-068 and NCR 2-069) were written concerning other inoperable snubbers in the main feed line to steam generator E-088. These NCRs resulted from a stroke test of all snubbers associated with the main steam line (the Unit was in Mode 6 at the time). During the stroke test, snubber S/N 2603 associated with pipe support S2-FW-189-H-010 would not stroke; it was "frozen in place" as noted in the Field Inspector's Report. Snubbers S/N 4357 and S/N 4352 associated with pipe support S2-FW-189-H-017 were noted in the Field Inspector's Report as "frozen in place" and "broken, no resistance," respectively. These three snubbers were replaced with the following new snubbers: S/N 2603 replaced with S/N 11077, S/N 4357 replaced with S/N 11086, and S/N 4352 replaced with S/N 11085.

A revision to LER 82-165 was written to the NRC on August 2, 1983 reporting the five inoperable snubbers identified in December, 1982.

The evidence indicates that the seven snubbers were most likely damaged during the feedwater line "waterhammer" test on March 21, 1981. Two of the damaged snubbers were identified January 25, 1982, ten months after the damage occurred. The other five damaged snubbers were identified December 9 and December 22, 1983, approximately twenty-one months after the damage occurred.

#### 4. Concern Number 2

2. Inspections of these snubbers carried out over those periods failed to detect their operability.

The inspector determined that this concern was partially correct. A visual inspection conducted after the feedwater system water hammer test of March 21, 1981, failed to identify any damaged snubbers. When the damaged snubbers were finally discovered, it was determined that the damage was internal, and in general, was not apparent with just an external visual inspection. During the water hammer test, the snubbers apparently experienced loads greater than those to which they were designed to withstand. The damage incurred was to the ball screw shaft. When the snubbers were overloaded, the threads of the ball screw shaft stripped in the area of the torque transfer drum assembly. This damage was not apparent during the visual inspection.

During the January 25 and December 9, 1982 inspection (pre-fuel load and 50 percent power plateau thermal expansion tests inspection respectively), the damaged snubbers were discovered while performing a rotation check or freedom of movement check of the end spherical bearing. Finally, on December 22, 1982, additional damaged snubbers were discovered during performance of a stroke test.

In retrospect, it is obvious that a simple visual inspection and/or freedom of movement check of the end spherical bearing is not adequate for detecting the type of internal damage that these snubbers experienced.

5. Concern Number 5

5. No effective QA program exists for monitoring snubber performance as per Technical Specification page B3/4 7-6, Snubber Basis.

The requirements for monitoring snubber performance are given in Technical Specification Section 3/4.7.6, which discusses methods, frequencies, and acceptance criteria for snubber inspection. Two types of inspection methods, visual and functional tests, are discussed. Periodic visual inspections of the snubbers are required with acceptance criteria of no visible indications of damage or impaired operability. Also, periodic "functional tests" of snubbers are required, either in place or in a bench test. Additionally, the Technical Specification requires that during each refueling for snubbers attached to piping that has experienced potentially damaging transients, that a freedom of movement check such as stroking, be performed. These requirements are implemented by SCE procedures. The inspector considers that the licensee met the requirements of the Technical Specifications as they are presently written. However, the inspector also considers that the Technical Specification requirements should be reexamined regarding the adequacy of snubber inspections, particularly of those attached to piping that has experienced potentially damaging transients. This issue should be addressed by NRR in their report regarding concern number 4.

6. Concern Number 10

10. The original and all copies of NCR S01-P-1308, Rev. 1, were destroyed.

This concern does not involve snubbers. Nonconformance Report NCR S01-P-1308 relates to a San Onofre Unit 1 heat exchanger foundation. Revision 0 of this NCR is dated December 8, 1982. Revision 1 was written to address the operability of the heat exchanger during repairs. In May, 1983, the licensee determined that the heat exchanger could remain in service during repair and thus the revision to the original NCR was not necessary. Revision 1 to the NCR was not validated.

7. Summary

Region V has examined four of Mr. Mertens' concerns. The other six items are being examined by NRR and OI and will be documented separately.

The concerns addressed by Mr. Mertens were generally known to the licensee and documented prior to the time of the allegation and are not considered items of noncompliance. The inspector considers that the licensee followed the inspection requirements for snubbers as given in the Technical Specifications. However, the inspector agrees with Mr. Mertens regarding the apparent inadequacies of the Technical Specification inspection requirements for snubbers, particularly of those attached to piping that has experienced potentially damaging transients. Recommendations regarding Technical Specification changes were forwarded to NRR in September, 1983.

In summary, no items of noncompliance or deviations were identified.