50.55(e) Report

RECEIVED NRC Docket Nos. 50-361/362

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REGION V

August 20, 1981

Mr. R. H. Engelken, Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 North California Boulevard
Walnut Creek, California 94506

RECEIVED SEP 02 1981 U.S. NUCLEAR REGULATORY COMMISSION

Dear Mr. Engelken:

Subject: Docket Nos. 50-361 and 50-362
San Onofre Nuclear Generating Station, Units 2 and 3

In a letter to your office dated July 23, 1981 we identified a condition which we considered potentially reportable in accordance with 10CFR50.55(e). The condition concerns the results of a type test of a pressure relief valve manufactured by Dresser Industries which was conducted under a joint utility test program. The test results indicated that the valve would not meet EPRI screening criteria for operability. San Onofre Units 2 and 3 utilize Dresser Model 31709NA valves as Pressurizer Pressure Relief Valves.

An analysis of the safety implications of this condition is in progress, using the assumptions: (1) that the condition existed in San Onofre Units 2 and 3, and (2) that it had remained uncorrected.

Enclosed are twenty-five (25) copies of an interim report entitled, "Interim Report on Pressurizer Safety Valve Operability Instabilities During Test, San Onofre Nuclear Generating Station, Units 2 and 3." The results of additional tests, analysis and corrective action will be summarized in a final report which will be submitted on or before October 1, 1981.

If you have any questions regarding this report we would be pleased to discuss them with you at your convenience.

Very truly yours,

L. T. Papay

Enclosures
cc: Victor Stello (NRC, Director I&E)
R. J. Pate (NRC, San Onofre Units 2 and 3)

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81-143

INTERIM REPORT ON PRESSURIZER SAFETY VALVE OPERABILITY INSTABILITIES DURING TEST

San Onofre Nuclear Generating Station, Units 2 and 3

INTRODUCTION

This report is submitted pursuant to 10CFR50.55(e). It describes a condition involving operability instabilities of a Dresser Industries spring-loaded safety valve. The valve was being tested as part of the PWR Safety and Relief Valve Test Program being conducted by Electric Power Research Institute (EPRI). This test valve is the same model supplied in the design of San Onofre Units 2 and 3.

This report includes a description of the deficiency, an analysis of the safety implications of the condition, and a summary of the corrective actions being taken. By letter dated July 23, 1981 Southern California Edison confirmed notification to the NRC of this condition which was considered potentially reportable in accordance with 10CFR50.55(e).

BACKGROUND

The condition which is reported here occurred on June 3, 1981, during which a Dresser Industries Model Number 31709NA spring-loaded safety valve was being tested as part of the PWR Safety and Relief Valve Test Program being conducted by EPRI. The test was a saturated steam discharge test with the valve located at the end of a drained loop seal pipe as shown in Figure (1). However, the valve blowdown ring adjustments as received from the factory differed from the manufacturer's recommendations (yielding less blowdown). The test was performed with these settings. A pressure transient averaging approximately 200 psi/sec was initiated from the pretest pressure of 2300 psia causing the safety valve to open at a pressure of 2488 psia. Shortly after opening, the valve began to chatter, oscillating between the full open and full closed positions at a frequency of approximately 36 Hz. Chattering continued for the duration of the valve discharge which lasted 122 seconds. The valve reseated with only minor leakage at approximately 2000 psia. It then reopened for a short period at a pressure of approximately 2150 psia. The valve internals were inspected after the test and found to have substained significant damage including galling of moving surfaces and upsetting of seating surfaces.

Operation as described above is in nonconformance with the 1974 ASME Code safety valve operating requirements (paragraph NB-7614) to which the valve was purchased.(1) Included in the Code requirements are that (a) the valve will operate without chatter (NB-7614.1) and (b) the valve will reseat at a pressure not lower than 5 percent below the valve set pressure (NB-7614.2). The test valve did chatter and did not reseat until approximately 2000 psia, 20 percent below the valve set pressure.

DISCUSSION

The following discussion is responsive to 10CFR50.55(e)(3).

Description of Deficiency

The safety valve operating requirements established by the ASME Code are input assumptions to the plant safety calculations. The licensing analyses may not, therefore, be consistent with the observed valve performance. The increased blowdown characteristics of the test valve if used in the licensing analysis could result in lower reactor coolant pressures and therefore lower core DNB ratios. Moreover, the damage to the valve internal moving surfaces could potentially result in the valve seizing at some open or partially open position if the transient were extended in time beyond that experienced in the EPRI test loop.

Analysis of Safety Implications

The above described safety valve operation violates the ASME Code requirements and is inconsistent with one of the licensing analysis assumptions. FSAR analyses resulting in safety valve actuation assume that the valve closes at a pressure of 2400 psia. Valve closure at 2000 psia may result in reduced core DNB ratios. However, any pressure transient which challenges the pressurizer safety valves at 2500 $\pm$ 25 psi will also actuate reactor trip at 2400 psia $\pm$ 25 psi. Core heat fluxes are therefore reduced to low levels before the safety valve can blow down either to the analyzed pressure of approximately 2400 psia or to the lower pressure experienced in the test. Moreover the test valve did close at a pressure which is well above the safety injection actuation pressure setpoint of about 1800 psia. Therefore increased safety valve blowdown as experienced in the test would not result in either an uncontrolled depressurization of the reactor coolant system or an overcooling of the reactor coolant pressure boundary.

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(1) These requirements have not changed significantly since 1974. However, the latest ASME Code version does allow blowdown in excess of 5% if the basis is justified.

Relative to the potential for valve seizure at some open position, the transient analysis of the limiting power plant event indicates that pressurizer pressure will be below 2000 psia (the pressure at which the test valve closed) within a timeframe which is much shorter than the discharge time experienced by the test valve. Therefore, it is not expected that the valve would have any greater probability of seizure during a plant transient than that on the EPRI/C-E test facility. Moreover, even if the valve is assumed to stick open this would not result in an inability to shut the plant down safely because the resulting LOCA size would be small and well within the design capabilities of the ECCS.

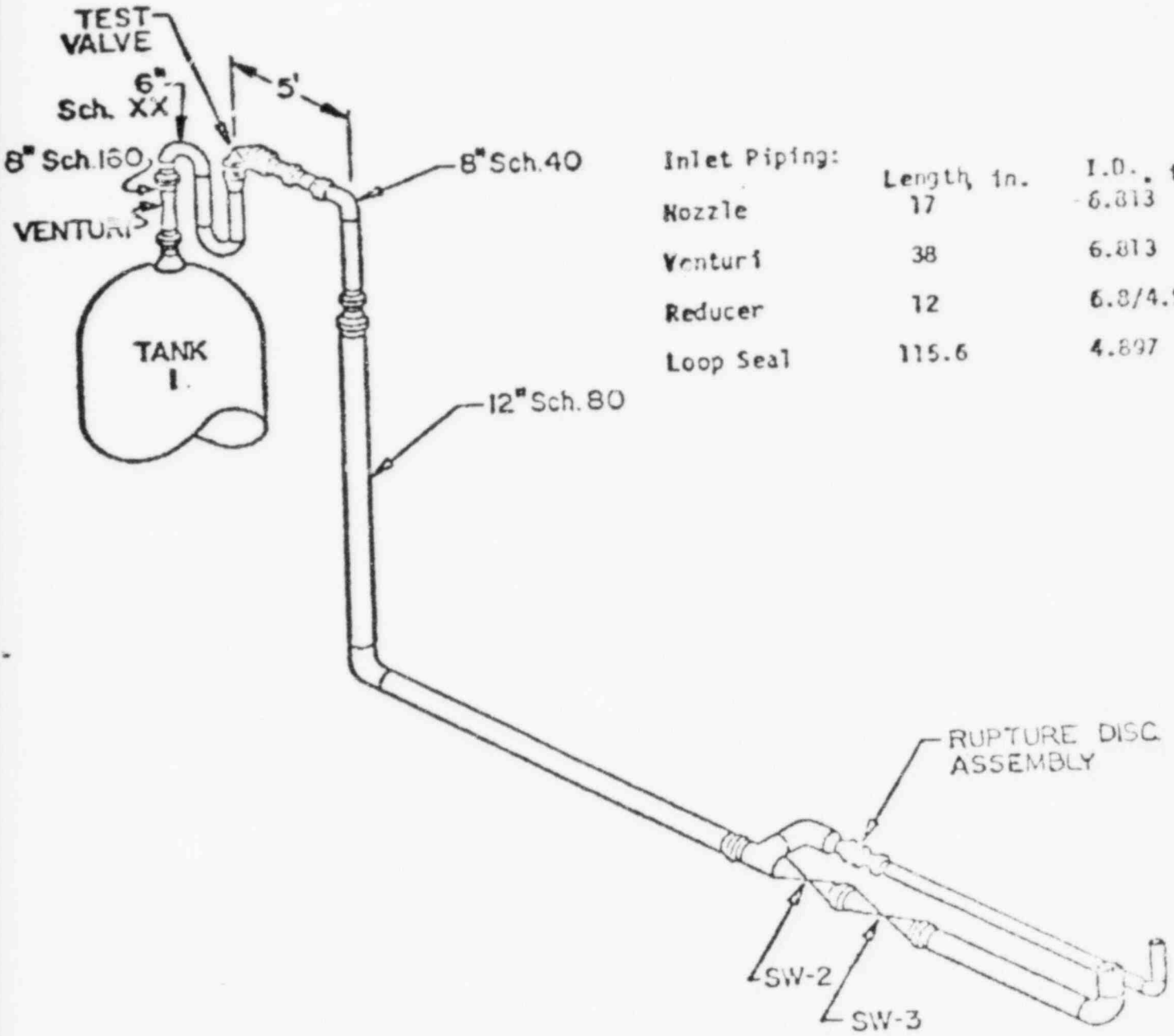
Corrective Action

Parallel efforts are underway to address the subject concern. The safety valve will be retested by EPRI in the near future with both short and long lengths of inlet piping. In these tests the valve blowdown ring settings will be adjusted to optimize the valve operability. These tests will determine the extent of the condition to be addressed. In parallel at San Onofre 2&3, design efforts are underway to facilitate implementation of a piping change if such a change is indicated as a result of the EPRI tests.

The results of tests and final corrective action taken or to be taken will be summarized in a final report which will be submitted on or before October 1, 1981.

FIGURE 1

LOOP SEAL INLET FOR SAFETY VALVES



Inlet Piping:	Length, in.	I.D., in.
Nozzle	17	6.813
Venturi	38	6.813
Reducer	12	6.8/4.9
Loop Seal	115.6	4.897

EPRI TEST CONFIGURATION