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 AUTH. NAME AUTH. AFFILIATION
 PAPAY, L.T. Southern California Edison Co.
 RECIP. NAME RECIPIENT AFFILIATION
 ENGELKEN, R.H. Region 5, San Francisco, Office of the Director

SUBJECT: Final deficiency rpt, originally submitted 801022, re low pressure safety injection valve failure. Valve manufacturer modified valve design to eliminate flow induced vibration. Other target Rock globe valves have guided valve discs.

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November 18, 1980

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 94596

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 October 22, 1980, we identified a condition which we consider reportable in accordance with 10CFR50.55(e). The condition involves the failure of a valve stem and valve seat cracking in Target Rock 8" globe valves used in the Low Pressure Safety Injection System.

Enclosed in accordance with 10CFR50.55(e) are twenty-five (25) copies of a Final Report entitled, "Final Report on Low Pressure Safety Injection Valve Failure, San Onofre Nuclear Generating Station, Units 2 and 3."

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

Very truly yours,



Enclosures

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

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FINAL REPORT ON LOW PRESSURE SAFETY INJECTION VALVE FAILURE

San Onofre Nuclear Generating Station, Units 2 and 3

INTRODUCTION

This report is submitted pursuant to 10CFR50.55(e)(3). It describes a condition involving failure of the 8-inch, globe type Low Pressure Safety Injection (LPSI) valves which were manufactured by Target Rock Corporation of East Farmingdale, New York and furnished to the Project by Combustion Engineering Company of Windsor, Connecticut. Four (4) of these valves are utilized in each Unit. The failure occurred during preoperational testing of the reactor coolant system. This report includes a description of the deficiency, an analysis of the safety implications of the condition, and a summary of the corrective actions taken to date. By letter dated October 22, 1980, Edison confirmed notification to the NRC of this condition which was considered reportable in accordance with 10CFR50.55(e).

BACKGROUND

The condition which is reported here was discovered subsequent to completion of the cold hydrostatic test of the primary reactor coolant system. During the first hydrostatic testing sequence on September 16, 1980, a problem was encountered with maintaining the test pressure. It was determined that the stem of one of the LPSI valves, which were being used under special test conditions as the hydrostatic test boundary, had lifted approximately .025 inches. This was attributed to the Limitorque valve operator. The valve operator was replaced, a special device was installed to augment the operator for the test condition, and the hydrostatic test was successfully concluded. The condition of the valve operator is considered to be not directly related to the failure of the valves which is reported here. It is under evaluation as a separate condition and will be appropriately reported if that evaluation determines it to be a significant deficiency.

On October 2, 1980 while testing the shutdown cooling system, LPSI valve 2HV9325 was being opened while LPSI valve 2HV9331 was being closed. The objective was to maintain constant flow while switching to another loop. It was observed that the flow suddenly dropped by 1000 gpm. Movement of the 2HV9325 valve stem in

either direction produced no change in flow. Investigation revealed that the valve stem on 2HV9325 could be moved several inches further into the valve body than on any other similar valve. Disassembly revealed that the valve stem was broken at the circumferential groove for the retaining ring which attaches the disc to the stem; disc and stem had separated. Further inspection revealed radial cracks in the valve seat, scoring of the disc below the seating surface, and cracks in the backseat insert weld. LPSI valves 2HV9328 and 2HV9331 were also disassembled. No broken stems were found. One valve had radial cracks in the valve seat; both exhibited scoring of the valve disc below the seating surface. LPSI valve 2HV9322 has not yet been disassembled.

DISCUSSION

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

Description of Deficiency

By analysis of the failure conditions and exhibited condition of the valve parts, Target Rock and Combustion Engineering personnel concluded that the cause of stem failure was fatigue due to excessive flow-induced vibration while the valve was in a partially open position. Cracks in the valve seat and backseat weld and scoring of the valve disc below the seating surface may have resulted from impact of the vibrating disc on the seat. This conclusion is strengthened by previous experience of the valve manufacturer in the resolution of similar conditions in smaller valves of this type. Further analysis of the failed valve parts and comparison of data from previous analysis will be made for verification of the cause of failure.

Analysis of Safety Implications

If this deficiency had gone uncorrected a common mode failure of more than 2 LPSI valves could have reduced LPSI flow to values less than those used in the Final Safety Analysis Report and could have prevented adequate core cooling.

Corrective Action

The valve manufacturer has modified the valve design to eliminate flow induced vibration by providing a disc which is guided by the seat in the partially opened position. All 8-inch LPSI valves will be returned to the valve manufacturer for inspection, rework, modification and testing.

The other Target Rock globe valves which are used on the Project (2-inch High Pressure Safety Injection and 3-inch Hot Leg Injection) have fully guided valve discs and, therefore, are not subject to this type of failure.