PSE&G

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Robert L. Mittl
General Manager - Licensing and Environment

July 31, 1981

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. Frank J. Miraglia, Chief
Licensing Branch 3
Division of Licensing

Gentlemen:

CONTAINMENT PURGE AND PRESSURE-VACUUM RELIEF VALVES
UNIT NO. 2
SALEM NUCLEAR GENERATING STATION
DOCKET NO. 50-311

As requested by your June 18, 1981 letter, PSE&G hereby submits, in the enclosure to this letter, additional information relating to the long-term operability of the containment purge and pressure-vacuum relief valves.

Should you have any questions in this regard, do not hesitate to contact us.

Very truly yours,

RL Mittl

CC: Mr. Leif Norrholm
Senior Resident Inspector

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SALEM GENERATING STATION
NO. 2 UNIT
CONTAINMENT PURGE AND PRESSURE-VACUUM RELIEF VALVES
ADDITIONAL INFORMATION TO SUPPLEMENT NOV. 8, 1979 SUBMITTAL

Ten (10) inch Pressure Relief Butterfly Valves

1. The peak containment pressure predicted for the DBA-LOCA is 43.2 psig.

1.a The maximum Tech. Spec. closure requirement for these valves is two (2) seconds.

1.b It is estimated that the valves will start to close in about one to two seconds after the incident at which time the containment pressure is calculated to be 10 to 14 psig. The valves have a closure time of two seconds or less, therefore, the valve should be fully closed in three to four seconds after the incident. At that time, the containment pressure is calculated to be 18 to 24 psig.

2. The seating torque requirement of 1390 in-lbs includes both bearing friction and seating resistance of the liner.

3. The coefficient value of 76.2 $\frac{\text{in-lb.}}{\text{psi}}$ used to calculate dynamic torque was established by the manufacturer using extrapolation of test results.

The adequacy of this coefficient value was reviewed with regard to the installation configuration of the valve.

There are no elbows upstream of the valve inside the containment. Therefore, there is no effect on the coefficient value.

There is an elbow immediately upstream of the valve outside the containment. The elbow is in the same plane as the piping downstream of the valve. The elbow immediately upstream of the butterfly valve will skew the turbulent pressure profile so that there is an increase in pressure along the outer wall and a decrease in pressure along the inner wall. Depending on the installation, the effect will be to either increase or decrease the torque to open the valve. The amount of increase or decrease has not been quantified by the manufacturer. However, the manufacturer's experience has been that this effect is neglible and does not present a deleterious condition to valve operation.

4. The Bettis actuator used is equipped with a limit stop in the open position. The required torque loads will be imposed on the shaft by the pressure drop across the vane. If the required torque (tending to close the valve) exceeds the maximum output of the actuator, then the valve will begin to close. The maximum torque that can be seen is the actuator output. With a 47 psid, maximum torque on the shaft is the dynamic load (76.2 x 47). However, for the 60 psig case, the required torque exceeds the maximum output of the actuator. Although this condition causes the vane to close, it also limits the maximum torque seen by the shaft to that of the maximum actuator output.

Ten (10) inch Pressure Relief Butterfly valves additional questions

1. There are no other electrical components, other than solenoid valves which are required to be activated in order for the system to be operable when required.

2. The accumulator system is not seismically designed to the plant requirements. However, as indicated in the original data submittal, there is sufficient torque available without air assistance to close the valve.

3.1 The solenoid valves on the valve located inside the containment have been seismically and environmentally qualified. They are replacement solenoids for the solenoids originally furnished with the valves.

The solenoid valves on the valve located outside the containment were originally furnished with the valves and have been seismically qualified only. This valve would function properly if the location of the incident which caused a harsh environmental condition was inside the containment. There is presently a commitment to replace these solenoid valves with fully qualified solenoid valves before June 30, 1982. See attachment No. 1 which is Basis 17 of environmental qualification report dated Dec. 1, 1980.

The environmentally qualified solenoid valves (ASCO NP series) were tested in accordance with IEEE 323-1974. Tests were performed on components of generically equivalent designs.

3.2 The valve actuators and originally furnished solenoids were seismically qualified only. The qualification was accomplished by testing components of identical design. A seismic test report, Acton Laboratories No. 11262, on a test performed for Masoneilan is attached. See attachment No. 2.

3.3 There are no other electrical components required to be activated in order for the system to be operable when required.

4.a The valve assembly was seismically qualified by test. A seismic test report, Acton Laboratories No. 11262, on a test performed for Masoneilan is attached. See attachment No. 2.

4.b A review of the margins of safety (previously submitted) for the possible failure mode of the valve shows adequate strength to withstand concurrent loading by both LOCA and Seismic events. The most critical element is the shear pins when subjected to actuator seating load. A seismic event should not increase the loading on the pins because the vane is being supported by the liner when sealed.

4.b (Cont'd)

An operability requirement was part of the seismic test. The valve operated properly before, during, and after the simulated seismic event.

5. A preventative maintenance program has been established and is being followed for the solenoid valves which have been environmentally qualified. Originally, no recommended maintenance procedures for the valve or actuator were provided by the valve manufacturer. Corrective maintenance is done on the valves and actuators as required based on periodic testing results.

6. The in-service testing is presently being conducted per Salem Technical Specifications, sections 4.6.3.1, 4.6.3.2, 4.6.3.3, 4.6.3.4 and 4.6.3.5 (see attachment No. 3). This testing follows paragraph 1WV-3400 of the ASME section XI code.

36.0 Inch Purge Butterfly Valve

1. The manufacturer has not specified a valve seat design life. Valve seat replacement is based on the leak rate testing results.

2. The in-service testing is presently being conducted per the Salem Technical Specification sections 4.6.3.1, 4.6.3.2, 4.6.3.3, 4.6.3.4 and 4.6.3.5 (see attachment No. 3). This testing follows paragraph 1WV-3400 of the ASME section XI code.

Basis No. 17

Deficiency: Documentation Insufficient (Containment Isolation Solenoids Outside the Containment)

Justification:

The solenoid valves must only operate for a very short period of time. They deenergize in order to close their respective containment isolation valve. Operability is based on a failure analysis performed by Westinghouse (NS-CE-755) which indicates that the failure mode of this type of solenoid valve is in the closed (fail safe) position thereby assuring isolation valve closure. These solenoids are located in enclosures which provide thermal protection and minimize thermal rise transients.

The outside containment isolation valves' solenoids function to provide control for closing the redundant isolation valves during accidents inside containment. The outside isolation valves' solenoids are not subjected to the containment environment. The valves could be exposed to harsh environments caused by high energy line breaks in the penetration area. These breaks, however, do not require complete containment isolation.

The postulated breaks in question are small steam breaks; steam generator blowdown and steam feed to auxiliary feedwater pump turbine. Following the postulated break, temperatures do not exceed 200°F until after ten minutes. Selected lines for isolation may be required and operability should occur within this time span.

Existing information indicates that these valves would close in the environment caused by high-energy line breaks, and that any subsequent failure would tend to keep the valve closed. Because of this, and the protection afforded by the solenoid valve enclosures, we conclude that the valves would remain in the safe position.

This case has been classified as a Group II.3 item (II.3.A).

Corrective Action:

These solenoid valves will be replaced with qualified devices prior to June 30, 1982. The installation schedule will be accelerated as equipment becomes available and plant operating conditions permit installation.