

UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 37 TO FACILITY OPERATING LICENSE NO. NPF-11

COMMONWEALTH EDISON COMPANY

LA SALLE COUNTY STATION, UNIT 1

DOCKET NO. 50-373

1.0 INTRODUCTION

In Supplement No. 7 to the LaSalle Safety Evaluation Report, we concluded that interim operation was allowed for La Salle Unit 1 since the licensee committed to replace the two 8-inch and eight 26-inch valves used in containment isolation valves prior to startup after the first refueling. These valves have closure times of 40 seconds which are greater than the 15 seconds approved by the staff. In addition these valves were blocked from opening greater than 50 degrees since these valves were not qualified to close from a complete open position during a design basis accident of loss-of-coolant accident or steam line break, and demonstration of operability is necessary to assure containment isolation. This demonstration of operability is required by Branch Technical Position (BTF), Containment System Branch (CSB), 6-4 and Standard Review Plan 3.10 for these containment purge and vent valves which are not sealed closed during all operational modes.

The vent valves identified as the containment isolation valves in the purge and vent system are as follows:

| Valve Number Unit 1 | Size (Inches) | Function | Location |
|------------------------|------------------------|----------|---------------------|
| 10026 | 26 | Intake | Outside Containment |
| 1V0027 | 26 | Intake | Outside Containment |
| 100029 | 26 | Intake | Outside Containment |
| 100030 | 26 | Intake | Outside Containment |
| 100031 | 26 | Exhaust | Outside Containment |
| 1V0034 | 26 | Exhaust | Outside Containment |
| 100036 | 26 | Exhaust | Outside Containment |
| 100040 | 26 | Exhaust | Outside Containment |
| 100042 | 8 | Intake | Outside Containment |
| 100043 | 8 | Intake | Outside Containment |
| 100032 | 2 | Bypass | Outside Containment |
| 100034 | 2 | Bypass | Outside Containment |
| 1V0047 | 2 | Bypass | Outside Containment |
| 100048 | 2 | Bypass | Outside Containment |
| 100050 | 2 | Bypass | Outside Containment |
| 1V0051 | 2 | Bypass | Outside Containment |
| 1VQ068 | 2 | Bypass | Outside Containment |
| B6040900E PDR ADOC | 2 860402 K 05000373 | | |

PDP

The 8-inch and 26-inch valves are being replaced by Tricentric Butterfly Valves which are manufactured by the Clow Corporation. These valves are equipped with air open-spring close actuators manufactured by Bettis. Model Number NT820-SR3 actuators are installed on the 26-inch valves and NT312-SR3 actuators on the 8-inch valves. Due to their size, operability demonstration of the 2-inch valves is not required, since these 2-inch valves are normally kept closed when the plant is operating.

2.0 EVALUATION

The licensee, in its application dated October 2, 1985, indicated that the two 8-inch and the eight 26-inch vent and purge valves are being replaced by high performance air operated butterfly valves which have closure times of equal or less than 10 seconds. In addition these valves are qualified to close from any position including the full open (90°) pusition.

The purge and vent valves to be installed at LaSalle are qualified by a combination of test and analysis found in Clow Corporation Report No. 7-25-85 entitled "Purge and Vent Operability Qualification Analysis. Tests were initially performed for 12, 24, 48, and 96-inch scale model valves (scaled to 3-inch pipe size) in a straight run of pipe for both choked and unchoked flow conditions to determine the mass flow and aerodynamic torque characteristics. The obtained data were evaluated and subsequently a computer program*, CVAP, was developed using the measured data base to predict flow and torque values for full size valves in a straight run of pipe. To address the concerns regarding the effect that the upstream configuration would have on the dynamic torque characteristics, a second series of model tests and analyses were performed to determine how the aerodynamic torque characteristics of the Clow valves varied with installed piping conditions such as elbows, tees and reducers. The results of these tests and analyses determined that the upstream elbow effects on the torque characteristics diminished significantly at a distance of 4 pipe diameters and were barely detectable at a distance of 8 diameters.

To substantiate the model tests and analysis, a full size 12-inch valve assembly operational test under choked flow conditions was performed. The test results showed that the valve would operate under the choked flow conditions, that mass flows were as predicted, and that use of the CVAP program to predict torques was conservative. The peak measured torque was approximately 65% of the predicted value.

In the analysis and test performed, the following assumptions have been employed to indicate the conservative approach toward demonstrating operability:

*See Attachment 1.

- Containment pressure is at a maximum value and full flow has been developed prior to initiation of valve closure.
- The pressure downstream of the valve is atmospheric.
- Worst case upstream piping configuration (mitered elbow worse than radius elbow) and distance considered.
- Torque coefficients used in the CVAP program are worst case values.
 Scaling of torques to larger size values by the D³ method may be largely conservative as shown by test on 12-inch valve (Vought test).

The methods utilized have been reviewed and are found acceptable to the staff.

Review of the stress analysis (using the ANSYS finite element computer program) for the critical parts of the valve assembly reveals ample margin between the code allowables and the projected values. The elements considered in the Qualification Report, Design Report, and the Structural Analysis Report are summarized in Tables 1 and 2. An additional conservatism in the analysis is the 45 psid pressure assumed across the valve.

The Bettis actuators are shown in the submittal to have a maximum spring torque at 90° full open positive. For valve VQ031, the aerodynamic torques for the first 3° to 5° from full open resist closure. However, for all valves a positive torque margin exists i.e., actuator torque delivered is greater than any of the forces resisting closure.

In addition, these new Clow valves do not contain resilient seals; and therefore, the once per 92 days leakage surveillance is no longer required. Also, since these valves are air-operated no thermal overload bypass functions are required.

In view of the above, the staff finds the information submitted has demonstrated the ability of the valves to close against the buildup of containment pressure in the event of a design basis accident. Therefore, Technical Specifications 3.6.1.8, 4.6.1.8 and associated basis 3/4.6.1.8 can be revised to remove the 50° limit on valve opening. In addition, Technical Specification 4.6.1.8.2 is deleted and Technical Specification 3.8.3.3 is revised to delete these valves from Table 3.8.3.3-1 since these valves do not contain resilient seals and are air operated.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes in surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (50 FR 43023) on October 23, 1985. No public comments were received, and the state of Illinois did not have any comments.

We have concluded, based on the consideration discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: J. Lombardo, PWEB

Dated: APk 0 . Set

Attachment 1

Using model test data, dynamic torques are calculated by a computer program, Clow Valve malysis Program (CVAP), developed for use in predicting valve operating characteristics. In the computer program, mass flow rates are predicted by standard equations for flow through an ideal converging nozzle adjusted with coefficients developed in the tests. Torques are predicted on the basis of the equation:

 $T = C_T \Delta P D_V^3$

where:

T = predicted aerodynamic torque (in-lb) C_T = torque coefficient developed in model tests ΔP = pressure differential across the valve (lb-in²) D_V = nominal valve diameter (in).

The power of three used in the equation and the CVAP program is a derived value obtained by use of the equations for a general control volume. A test performed on a full size 12-inch valve indicated that torques were approximately 65% of the values obtained for the same valve from the CVAP program, thus demonstrating additional conservatism in the analysis.

| Location | Material | Allowable Stress (psi) ¹ | Stress Value (psi) |
|---|---------------------------------------|--|-----------------------|
| Valve Body | SA 516 GR.70 | 17500 | 6703 |
| Disc | SA 516 GR.70 | 17500 | 3540 |
| Drive Shaft | SA 564 Type 630 H-1100 | 34500 | 3044 |
| Operator Adapter Plate | SA 516 GR.70 | 31500 ² 34200 ³ | 29120 |
| Adapter Plate Bolts (7 g) | SA 193 GR.B7 | 25000 | 29120 σr. 20736 τ |
| Cover Plate | SA 516 GR.70 | 17500 | 5807 |
| Cover Plate Bolts | SA 193 GR.B7 | 25000 | 12276 σn 172 τ |
| ¹ Per ASME Section seismic load). ² Per ASME, Sectio ³ Evaluated Agains | III, Table n III, Subs t .9 gy. | s I-7.1 - I-7.3 (for ection NC, Article N | 7.0 g C3520. |

Table 1. Summary of Allowable Stresses, 26-inch Valve (Loads per Generic Report)

...

| Location | Material | Allowable Stress (psi) ¹ | Stress Value (psi) 7088 |
|-----------------------------|------------------------------|--|-------------------------------|
| Valve Body | SA 516 GR.70 | 17500 | |
| Disc | SA 516 GR.70 | 17500 | 6767 |
| Drive Shaft | SA 564 Type 630 H-1100 | 34550 | 27610 |
| Operator Adapter Plate | SA 516 GR.70 | 1 (ASME "S") = 17500 | 2718 om |
| | | 1.5 (ASME "S") = 26250 | 25313 om+t |
| Adapter Plate Bolts (7g) | SA 193 GR.67 | 25000 | 55374 σN 20602 τ |
| Cover Plate | SA 516 GR.70 | 17500 | 30 |
| Cover Plate Bolts | SA 193 GR.B7 | 25000 | 4195 JN 172 T |

Table 2. Summary of Allowable Stresses, 8-inch Valve (Loads per Generic Report)

¹Per ASME Section III, Tables I-7.1 - I-7.3 (for 7.0 g seismic load).

²Although the stresses for the adaptor plate bolts shown in column four of the table are higher than the allowable stress values shown in column three, the bolt stresses are within the ASME Code limits as specified in ASME Section III, Appendix XVII, Subarticle 2460. The allowable bolt stresses per Appendix XVII are based on the ultimate tensile strength of the material as shown in Appendix I, Table I-7.3. The ultimate tensile strength of SA 193 GR.B7 material is 125,000 psi as compared to a 25,000 psi allowable stress.