



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

Enclosure 1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
PLANT SYSTEMS BRANCH
PROPOSED TECHNICAL SPECIFICATIONS
CONTAINMENT PURGE
ZION NUCLEAR POWER STATION, UNITS 1 AND 2
DOCKET NOS. 50-295 and 50-304

1.0 INTRODUCTION

Commonwealth Edison, the owner of the nuclear power plants Zion Units 1 and 2, proposed in a letter to M. Denton dated February 21, 1986, an amendment to Facility Operating License Nos. DPR-39 and DPR-48. The amendment proposed changes to the Technical Specifications (TS) related to vent and purge operations as well as restricting the maximum purge valve position. These changes were in response to an NRC request in a Safety Evaluation Report dated April 3, 1984. Simply stated, the request was to reflect the permissible operation of the purge and vent valves into the TS. The submittal contains the requested changes.

2.0 EVALUATION

The proposed changes related to restrictions in purge and vent operations. Specifically, they include the allowable angle the purge supply and exhaust valves can be opened, the number of valves that can be used at one time, the valve closure time, and the goal for purging time in one year. Each of these changes will be discussed below.

However, before the individual TS changes are discussed, there is one surveillance test that was recommended in the staff SER that was not added to the proposed TS. The staff had recommended the periodic leakage testing of the valves with resilient seals. The frequency was to be once per three months during operating Modes 1 through 4, if the valves were considered to be active.

In response to this request, the licensee indicated that the additional surveillance requirement was not needed for the valves at Zion because the isolation valve seal water system and penetration pressurization system are designed to continuously detect any leakage during plant operation. If leakage is detected, an alarm is sounded in the control room. The staff has reviewed the licensee's justification for not performing the added leakage tests. As part of their justification, the licensee, in the basic Section 3.4 of the TS, indicated that the seal water is introduced at a pressure of 50 psig. This pressure is slightly higher than the peak containment post accident pressure. Further, the seal water system and penetration pressurization system are included in TS Section 3.9.1 and 3.9.2 which includes limiting condition for operation (LCU) and surveillance requirements.

8911020170 891031
PDR ADOCK 05000295
P PDR

Based on the above, the staff concludes that the continuous leakage detection systems now in place at Zion Units 1 and 2 satisfy the requirements of the surveillance leakage tests referenced in the staff's SER. In addition, the current TS on the leakage systems meets the intended purpose of the suggested added TS. Therefore, the staff concurs with the licensee that no additional surveillance testing or added TSs are necessary.

The proposed TS indicating that the purge supply and exhaust valves shall not be opened more than 50 degrees is consistent with the staff's SER dated April 3, 1984. Therefore the staff finds the proposed TS acceptable. The acceptance of the allowable opening angle is based, in part, on the demonstration of acceptable stresses within the valve. An equally important parameter in determining the closure stresses is the closure time. The staff concluded, as documented in the April, 1984 SER, that acceptable closure times range between 5 and 8 seconds. The proposed TS change, in this regard, is to change the surveillance test value from the current 60 seconds to 7 seconds. The revised closure time reflects the acceptable stress analysis and is therefore acceptable.

Another proposed change is to assure that the containment purge valves shall not be open concurrently with the containment vent valves. This operational restriction is consistent with the guidelines set forth in SRP Section 6.2.4 to minimize the number of pathways open at any one time. Based on this compliance with the SRP, the staff finds the operational guidance provided for vent and purge operation acceptable.

An important consideration in the development of an effective program is the selection of a usage factor as well as the reasons for vent and purge operation. The licensee has proposed a goal of 2000 hours per year. This time has been established based upon the licensee's estimate to limit the concentration of radioactive materials in the containment atmosphere to less than 100 times the maximum permissible concentration per 10 CFR 20. After review of the purging criteria, the staff has concluded that the program including the goal established by the licensee is acceptable. However, due to the importance the staff has placed on the need to minimize purging or venting of the containment, the staff believes that additional clarification should be added to the TS to ensure that purging be performed only for safety related reasons. A marked up copy of the appropriate TS page is enclosed which the staff would find acceptable. The licensee has agreed to the staff's proposed markup in a series of telephone conferences. Based on the verbal agreement of the marked up changes, the staff finds the proposed use of the purge and vent systems acceptable.

An additional consideration must be included in the overall evaluation of the purging program, in light of the fact that large diameter valves are being used for time periods greater than 90 hours. For these conditions, SRP Section 6.2.4 indicates that the radiological consequences of a LOCA concurrent with the purge/vent valves assumed open at time zero must be calculated. The analysis should show that 10 CFR Part 100 limits are not exceeded.

Guidance is provided in the SRP concerning the source term to be used for calculating the dose consequences due to the release through the valves until closure. The guide indicates that for valve closure times within five seconds, isolation is assured prior to onset of fuel failure. This has been interpreted by the staff to mean that only the pre-existing iodine spike need to be considered in determining primary coolant activity without the need for further justification. For closure times slightly beyond 5 seconds, the staff has evaluated the merits of assuming no fuel failure on a case by case basis. Consideration has included the transport times necessary to sweep the source from the failed fuel into the reactor coolant, from the fuel pins to the postulated pipe rupture, from the pipe rupture to the nearest pipe inlet of the open purge line, and finally through the duct to the isolation valve. Based on this rationale, the staff has concluded that there will be a substantial time delay between the onset of fuel failure and the actual release of products from the containment as a result of the fuel failure. Additionally, there will be a finite minimum time before initiation of fuel failure can occur. Using the above rationale, the staff has concluded that a more reasonable upper bound of valve closure time for which no source term contribution due to fuel failure can be conservatively assumed is 15 seconds.

Therefore, for the Zion closure time of seven seconds, the staff has concluded that fuel failure need not be considered. Based on the above, the staff has concluded that only the pre-existing iodine spike need be considered.

The licensee has computed the dose consequences considering the above source term. The results show that using a 60 uc/gm equivalent I-131 spike at the time of the accident, the site boundary thyroid dose due to iodine up until valve closure is 52 rem. When added to the containment leakage dose of 123 rem yields a total dose of 175 rem. This is well within 10 CFR 100 requirements of 300 rem.

The staff has performed an independent calculation of the dose contribution due to releases through the purge/vent pathways. The results confirm the licensee's value. Based on this agreement, the staff finds that the dose consequences due to purging operations are acceptable and within 10 CFR 100 limits.

3.0 CONCLUSION

Based on the above evaluation, the staff concludes that the proposed changes to the Zion Units 1 and 2 Technical Specifications for limitation on purge and vent valve operation above cold shutdown are more restrictive than current TSs and consistent with the commitments identified in the staff SER on the same subject. Therefore, the staff finds the proposed changes acceptable.

5520 NAME: Zion TACS 55417/B

SPLB SALP INPUT

Plant Name: Zion Nuclear Generation Stations, Units 1 and 2
SER Subject: Containment Purge and Vent Valve Operation
TAC Nos.: 55417/B

Summary of Review/Inspection Activities

The licensee initially proposed Technical Specification changes for containment purge and vent valve operation needed revision. However, data revisions adequately addressed the concerns.

Narrative Discussion of Licensee Performance - Functional Area

The licensee's approach for resolution of generic concerns related to the demonstration of containment purge and vent valve was viable and sound from a safety standpoint.

Authors: J. Kucrick and C. Li

Date: May 10, 1989