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May 2, 1986
ST-HL-AE-1656
File No.: N3.8.10, G9.07

Mr. Vincent S. Noonan, Project Director
PWR Project Directorate #5
U. S. Nuclear Regulatory Commission
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Revision to FSAR Section 3.6 - Two Phase Jet Criteria

Dear Mr. Noonan:

The South Texas Project (STP) has reviewed NUREG/CR-2913, "Two-Phase Jet Loads" with respect to the effect of target distance from a postulated high energy line break (HELB). NUREG/CR-2913 provides a methodology for calculating HELB fluid jet loads on targets located at various distances from jet sources for different fluid properties. The results presented in the NUREG show that, for steam or subcooled liquid jets that flash at the break, the loads from such breaks decrease rapidly as a function of increasing distance from the break to the target. This phenomenon is the basis for development of screening criteria that have been used on an NTOL plant.

The STP has implemented screening criteria on jet length that limits interactions from high pressure steam or subcooled liquid that flashes at the break as set forth in the attachment to this letter. The criteria will be applied to steam and feedwater piping lines connecting to the steam generators and piping connected to the Reactor Coolant System main loop piping or the pressurizer. The criteria are not applicable to non-flashing liquid jets such as those from the SI accumulator discharge or CVCS charging pump discharge. These criteria are consistent with those used on Commonwealth Edison's Byron Unit 1 and accepted by the NRC in Supplement 6 to the Bryon Safety Evaluation Report (SER).

The enclosed marked-up page of the STP FSAR will be incorporated into a future FSAR amendment.

Implementation of these screening criteria will not change the South Texas Project (STP) equipment qualification design bases as reflected in FSAR Section 3.11 and 3.11.N.

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If you should have any questions on this matter, please contact Mr. M. E. Powell at (713) 993-1328.

Very truly yours,

M. R. Wisenburg
Manager, Nuclear Licensing

MEP/yd

Attachment: Annotated Revisions to FSAR Section 3.6.1.1 (2 Pages)

L1/NRC/n

cc:

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Revised 12/2/85

In general, whipping ends from a pipe break are restrained so that plastic hinge formation is not allowed to occur. Where a plastic hinge could be formed, the effects are evaluated. Pipe whip restraints are provided wherever postulated pipe breaks could impair the ability of any essential system or component to perform its intended safety functions listed in Section 3.6.1.1.

11. The calculation of thrust and jet impingement forces considers any line restrictions (e.g., flow limiter) between the pressure source and break location and the absence of energy reservoirs, as applicable.

12. Initial pipe break events were not assumed to occur in pump and valve bodies because of their greater wall thickness and their usual location in the low stress portions of the piping systems.

13. Where a system consisting of piping, restraints, and supporting structures is so complex that the assumption of planar motion is neither conservative nor realistic, the zone of whip influence is conservatively enlarged to a region approaching a sphere with a radius equal to the distance between the breakpoint and the first restraint. In lieu of this assumption a more detailed elastoplastic analysis is performed.

14. No loss of pressure boundary integrity is assumed from jet impingement, regardless of pressure, when the ruptured pipe has a diameter and wall thickness less than those of the impinged piping. For essential piping, jet impingement loads are evaluated regardless of the ratio of impinged and postulated broken pipe sizes. 40 50 Q210.23N

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15.

3.6.1.2 Description. Systems, components, and equipment required to perform the essential functions are reviewed to ensure conformance with the design bases and to determine their susceptibility to the failure effects. The break and crack locations are determined in accordance with Section 3.6.2. Figure 3.6.1-1 shows the high-energy pipe break locations, break types, and preliminary restraint locations.

A design comparison to NRC BTP ASB 3-1 and MEB 3-1 is provided in Tables 3.6.1-2 and 3.6.1-3.

Pressure response analyses are performed for subcompartments containing high-energy piping. For a detailed discussion of the pipe breaks selected and pressure results, refer to Section 6.2.1 for selected subcompartments inside the Containment and to Appendix 3.6A for selected subcompartments outside the Containment. Effects of both internal reactor pressure vessel asymmetric pressurization loads and asymmetric compartment pressurization loads inside Containment are addressed in Section 6.2.1. The analytical methods used for pressure response analysis are in accordance with Reference 3.6-2. 53 53

There are no high-energy lines in the proximity of the control room; therefore, there are no effects upon the habitability of the control room resulting from postulated pipe breaks. Further discussion of the control room habitability systems is provided in Section 6.4.

Attachment
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Insert 1

15. Components impacted by jets from breaks in piping containing high pressure (870 to 2465 psia) steam or subcooled liquid that flashes at the break, such as piping connected to the steam generators or reactor coolant loops, shall be evaluated as follows:

    A. Unprotected components within 10 diameters (ID) of the broken pipe are assumed to fail. Specific jet loads are calculated and evaluated only when failure of the component, when combined with a single active failure, could adversely affect safe shutdown capability.

    B. Unprotected components beyond 10 diameters (ID) of the broken pipe are considered undamaged by the jet without further analysis.