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January 25, 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Ms. E. G. Adensam, Chief
Licensing Branch No. 4

Re: Catawba Nuclear Station
Docket Nos. 50-413 and 50-414

Dear Mr. Denton:

My letter of December 6, 1982 transmitted a meeting summary for a November 3 and 4, 1982 meeting between Duke and the NRC Mechanical Engineering Branch. Item 1 of the meeting summary discussed criteria for jet impingement. The attached examples demonstrate the adequacy of Duke's jet impingement criteria.

Very truly yours,

HAL B. TUCKER

Hal B. Tucker

ROS/php
Attachment

B001

cc: Mr. James P. O'Reilly, Regional Administrator
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ITEM NUMBER 16

FSAR Section 3.6.2.1.1, Page 3.6-11

Duke's present criteria state that no unacceptable interactions occur when a target pipe is hit by jet impingement from a source pipe of equal or smaller nominal pipe size and wall thickness. The NRC's Standard Review Plan, Section 3.6.1, and the American Nuclear Society's Standard ANS 58.2 either state or imply that no unacceptable interaction occurs when a target pipe is impacted by a source pipe of equal or smaller size and wall thickness. Since neither of the aforementioned documents places limits on the system conditions, e.g., temperature, pressure, materials, impact velocity, moment arm or support considerations, the case of impact rather than jet impingement becomes the limiting or more severe condition for the following reasons:

1. The load on the target pipe will be less for the jet impingement case by an amount equal to the source pipe's impacting mass.

2. The maximum jet force is on the broken source pipe and not on any target in the path of the jet. This is true for the following reasons:

   a. The source pipe reacts to the full jet thrust associated with the break.

   b. Any target pipe intercepts only a portion of the jet.

   c. Thermodynamic and drag losses begin immediately upon jet issuance from the broken pipe.

   d. The jet impingement energy will be dissipated due to jet deflection off the target pipe, i.e., the pipe being a cylindrical target only receives the maximum jet load at a single point along its surface the remaining jet loading is deflected by the curved surface at varying angles.

Conversely, by using the present, accepted NRC and ANS criteria for a whipping pipe, if an acceptable interaction is identified when a target pipe of same or larger size and wall thickness is struck by a source pipe, it is assumed that the target pipe arrests the whip from the source pipe. When this occurs the maximum steady state jet force will then be transmitted to the target pipe for the duration of blowdown.

Based upon the foregoing, it is Duke Power Company's position that the loading conditions resulting from pipe whip are more severe than those from pure jet impingement for both impact and steady state conditions. Therefore, the present Duke criteria are conservative and adequate for evaluation of the acceptability or unacceptability of piping as jet impingement targets and consistent with industry practice.

Attached is a study of two examples which demonstrates the acceptability of Duke's position.