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January 22, 1981

Mr. James G. Keppler, Director
Directorate of Inspection and
Enforcement - Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Zion Units 1 and 2
Steam Generator Snubbers
NRC Docket Nos. 50-295 and 50-304

References (a): October 15, 1980 letter from J. S. Abel to J. G. Keppler

(b): November 20, 1980 letter from J. G. Keppler to C. Reed

Dear Mr. Keppler:

This is to provide additional information regarding the testing of Zion's steam generator snubbers which was reported in reference (a). Attachment A to this letter addresses the comments contained in reference (b).

Please contact this office if there are any further questions.

Very truly yours,

T. R. Tramm
Nuclear Licensing Administrator
Pressurized Water Reactors

Attachment

cc: Zion Resident Office

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Attachment A

Additional Information
Requested by NRC Regarding
Zion Steam Generator Snubbers

The NRC, Region III, has reviewed the report of Unit 2 Steam Generator Snubber testing performed in May, 1980. The NRC considers this report factual, however, several comments were made by the NRC which require clarification. These comments are summarized as follows:

Item 1) Provide more detail describing the stiff spring modification to the valve control block.

Item 2a) Evaluate whether or not a long term system improvement is warranted in lieu of the current control valve block design.

Item 2b) Evaluate the hydraulic fluid "boiling phenomenon" and corrosion effects observed during extended LOCA environmental testing.

Item 2c) Consider external and internal filtering of hydraulic fluid in the steam generator snubber to preclude plugging of the control valve block bleed orifice.

Discussion

Item 1

Testing of the modified steam generator snubbers indicated that bleed rates were consistently low due to control valve bleed port pressure compensators' inadequate spring constant. New springs of like quality with a higher spring constant were installed in all Unit 1 and 2 control valve blocks. The new springs allowed the compensator spool to position and reset consistently, thus maintaining the bleed rate within the snubber's allowable range of 0.116 to 0.6 in/min. Recent static functional testing has proven that the modified control valve block will provide the required bleed rate after lockup under rated design load.

Item 2a

Further investigation of long term system improvements to the control valve block is not warranted. This is due to the consistent satisfactory performance of the modified Unit 2 snubbers to perform their intended function within the tolerances established by the architect-engineer.

In the future, all seal materials installed will be ethylene-propylene material, which has been demonstrated to be an acceptable substitute for molded polyurethane. This may be considered a long term improvement.

Item 2b

Silicone fluids are stable from -122°F to +482°F, therefore Ge Silicone fluid (SF-1154), which is used in all of our hydraulic snubbers, will not boil at 271°F, which is well within the stability range. Silicone is also resistant to oxidation, high temperature, and radiation.

The "boiling phenomenon" occurred after the 10,000 second soak at accident environmental conditions of 271°F and approximately 15 psig, and after several design load functional tests. In other words, the snubber had been subjected to transients beyond actual accident requirements. At this point, a flange seal failed. When the flange seal failed, autoclave steam pressurized the snubber system internals through the flange seal break, and caused a release of the steam via the reservoir and vent to atmosphere. Any corrosion of the control valve internals was due to steam impingement after the flange seal break.

Grade AISI 4140 and 4340 steels, which are the materials used in the S/G Snubbers, are chrome molybdenum, and nickel chrome molybdenum steels. They exhibit high strength, toughness, and provide excellent corrosion resistance under severe service conditions. Corrosion of the snubbers during accident environmental testing was deemed to be minimal, and not of a magnitude to inhibit the normal operation of the units during accident conditions. This fact was demonstrated by the actual testing results.

Item 2c

The obstruction in the bleed port of #21 snubber, which caused bleed rate to decay to zero, was attributed to metal chasings from the new test fixturing and was introduced during initial fitup. Adequate quality control practices in the future should preclude the additon of any foreign particles into the snubber fluid system, thus insuring proper functioning of the control valve block.