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February 23, 1984

Mr. James G. Keppler
Regional Administrator
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Byron Station Units 1 and 2
Steam Generator Snubber Qualification
IE Inspection Report Nos. 50-454/84-08,
and 50-455/84-06
NRC Docket Nos. 50-454/455

Reference (a): W. S. Little letter to Cordell Reed
dated February 6, 1984

Dear Mr. Keppler:

Reference (a) provided the Commonwealth Edison Company with the Region's concerns relative to steam generator snubber qualification testing performed by the Boeing Company and acknowledges our recent commitment to perform additional snubber testing. The purpose of this letter is to document the Commonwealth Edison Company position in this matter, and to request the Region's written acceptance of the enclosed preliminary specification for testing of these snubbers.

During the teleconference held on January 27, 1984 with Mr. Isa T. Yin of your office, we discussed our intentions of performing additional snubber qualification testing. Mr. Yin was informed that a test specification would be developed encompassing his concerns and would be provided to the Region for comment and ultimate concurrence prior to its being released for bids. Additionally, we emphasized our technical disagreement with Mr. Yin relative to the need for further testing.

For the reasons listed below, we continue to believe that the original snubber stiffness testing performed by the Boeing Company was adequate and that additional testing is not technically justifiable. On January 17, 19 and 20, 1984, we met with Mr. Yin to review his concerns regarding the Byron Station steam generator snubbers. The following addresses each of Mr. Yin's concerns as we understand them.

IFEB 27 1984

Region Concerns:

1. The leakage which was observed at Byron Station may change the characteristics of the snubber, even if corrected. Mr. Yin stated that normally when there is leakage the snubber is replaced and tested. Although the leakage has been corrected at Byron, no testing has been done. (Mr. Yin pointed out that when the snubber is tested for operability, the spring rate can be determined at no extra cost.)

2. The testing performed by the Boeing Company for snubber stiffness was not based on a cyclic test of the entire snubber, including the control valve. A quasi-static structural test combined with a fluid stiffness calculation was performed and this does not conform to the specification.

3. The testing performed for the Byron Station snubbers was not acceptable because calculations, in addition to the tests, had been used to accept snubber stiffness. (Mr. Yin does not accept analysis as a supplement to testing.)

4. Stiffness testing was not completed at loads throughout the load range. Stiffness at OBE, SSE and faulted load levels is required because snubber stiffness is nonlinear and varies with load level.

CECo Response to Concerns:

1. Leakage

The leakage experienced at Byron Station has been repaired and the snubbers are now not experiencing any leakage. Furthermore, the effect of such a leak on snubber stiffness is negligible because the loading rate for both seismic and pipe break loads are so high that leakage, both due to seal and piston bypass, contributes very little to total deflection of the snubber. The repair to stop leakage does not change the seal details and consists only of a change to the thread sealant. A change in sealant will have no effect on snubber stiffness.

2. Adequacy of Testing Completed by the Boeing Company
and
3. The snubber specification requirement is not intended to specify cyclic testing, but rather, it is intended to require impact testing. This and other specification requirements were met by the Boeing Company test program. The snubber stiffness testing performed to meet the specification requirements was based on three separate types of tests. All three methods provided close results, met specification requirements, and are described as follows:

A. The stiffness of the snubber bottomed out in both tension and compression was determined from a test at 900 and 400 kips. This stiffness accounted for play in fittings and results in the same load path as when the snubber is in its hot position with fluid in place. This stiffness was combined in series, with the fluid stiffness which was obtained using the bulk modulus of the fluid at operating temperature.

B. The snubber with control valve was tested both in tension and compression using a drop weight test. Loads above 2400 kips within .005 seconds were obtained both in compression and tension. The snubber stiffness was obtained through correlation of the deflection time history measured from the test with the deflection response of an analytical model including an assumed snubber stiffness and subjected to the measured loads. Because of the relative simplicity of the test set up for the compression case, the stiffness obtained from the analyses are valid, and at 8200 kips/inches are within the specification required range.

The tension stiffness does not correlate well due to the fact that the analytical model used did not accurately represent the more complex load path for the tension test. Due to the good correlation in compression, the additional analytical work required to obtain correlation was deemed unnecessary.

Thus, the drop weight test predictably supports the quasi-static tests.

C. The fluid bulk modulus used in the quasi-static approach described above was verified at 400 and 900 kips using deflections from tests of the snubber with the piston in the hot position, thus making the fluid effective. The bulk modulus used in "A" above compared with the bulk modulus determined from these tests is within 11% in the worst case. Since the fluid stiffness is in series with the snubber structure stiffness, this variation corresponds to 5% difference, which is negligible.

4. Stiffness Testing Required Only at Faulted Load

Stiffness testing was required at faulted load levels because the effect of snubber stiffness variation on total stiffness is small enough to be neglected. The faulted condition is critical for system design due to high load level. Therefore, the stiffness was determined at faulted load levels.

During Mr.Yin's audit, Sargent & Lundy produced reduced cyclic test data provided in the Boeing test report for load levels less than OBE and at various frequencies. The average stiffness obtained was 7000 kips/inch, which is close to the specification required 9000 kips/inch. This demonstrates the validity of the stiffness determination required in the specification. This data was reviewed by Mr. Yin during the inspection.

Notwithstanding the above and our continuing technical disagreement in this matter, enclosed for your immediate review and written concurrence is a copy of the preliminary steam generator snubber test specification. Your immediate attention to this matter is requested.

Very truly yours,

E. Douglas Swartz
Nuclear Licensing Administrator

EDS/rap

Enclosure

cc: I. T. Yin

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CONSULTANT SPECIFICATION 120
TESTING SERVICES FOR STEAM GENERATOR SNUBBERS

PROJECT NO. 4391-00