PDR 7/6/85

Sandia National Laboratories

Albuquerque, New Mexico 87185

May 28, 1987

Mr. M. R. Hum
U. S. Nuclear Regulatory Commission
Materials Engineering Branch
Washington, DC 20555

Subject: Indian Point 2 - Augmented ISI Program for 11-1-87 Refueling Outage

Dear Mr. Hum:

A meeting was attended on April 7, 1987 at NRC Bethesda at which Consolidated Edison gave an oral presentation of the upcoming Inservice Inspection Program for Indian Point Unit 2 reactor vessel. Immediate comments were made at that time as to the adequacy of the inspection plan and Consolidated Edison promised to send the written report of the program to NRC for review and approval in the near future. I have received the written report and after review of the techniques proposed by the licensee for the augmented ISI of the lower shell longitudinal weld at 345 degrees of the reactor vessel, the following comments and conclusions are made.

1. The proposed repeat of the ultrasonic examination with the sizing techniques which were used in the 1984 examination should adequately show that the flaw is either passive and unchanged in its ultrasonic response or that it is active and increasing in size. A certain amount of differences in the ultrasonic response are expected even if the flaw is passive and unchanged due to the variability of transducer fixturing and equipment changes (e.g. using the KB6000 Ultrasonic system instead of the Sonic MK6). These differences should be of a nature that does not significantly influence the calculated size of the flaw in the vessel by the ASME Code Section XI techniques. The proposed increase in resolution of transducer movement of 0.1 inch increments instead of 0.5 inch as used in 1984 will completely characterize the flaw for amplitude response, and this should influence the calculated size only slightly.

2. The alternative ultrasonic delta and pitch catch techniques which were used in the 1984 examination will again be employed. The proposed 1987 examination will produce a very

large data set for these two techniques due to the proposed increased resolution of the transducer movement and this will be a great improvement over the limited data set which was collected in 1984. Along with the improvement in documentation of the tip diffracted delay times by digitizing the waveforms, a more complete analysis of the measurement technique of the tip and base diffracted waves scattered from the flaw should yield an accurate sizing of the maximum through wall depth of the flaw. The accuracy of measuring the delay times will be at least ten times better than those measured in the 1984 examination. Compared with the data taken in 1984, the calculated flaw depth size will also confirm the nature of the flaw as being passive or active as established in 1. above. The length dimension of the flaw can not be determined by this technique.

3. The use of large diameter focused transducers will be implemented in the 1987 examination in the pulse echo, pitch catch, and delta techniques. This data set will produce new results since they were not obtained in 1984. The focused transducers should achieve more reliable results since they improve the signal-to-noise ratio and the resolution of the flaw dimensions by minimizing the beam spread. The flaw depth size as calculated by the 6db drop method should compare with the value calculated from the base and tip diffracted signals. Hopefully, the delta technique using the focused transducers will yield base and tip diffracted signals of improved signal-to-noise ratio that the physical depth size of the flaw will be determined very accurately. The length dimension of the flaw should be improved in accuracy since the effects of beam spread are greatly reduced.

4. All of the waveforms obtained from the techniques which are proposed in 1., 2., and 3., will be digitized at a rate of 100 MHz with 8 bit resolution and stored for analysis. The time and amplitude resolution is more than adequate for any size characterization of the flaw by signal analysis. Very accurate thickness measurements of the vessel wall in the area of the flaw should also be available from the zero degree pulse echo data.

Since the complete set of pulse echo waveforms will be digitized at transducer increments of 0.1 inch over the entire area of the flaw, the pulse echo data set could be processed by the SAFT algorithm. The physical dimensions of the flaw as calculated by the synthetic aperature technique would be the most accurate abtainable for the frequency of the transducers used. The depth size should compare with the size calculated by the tip diffracted waves and the length measurement should compare with that obtained with the focused transducers.

5. The system repeatability and sizing capabilities for all the techniques mentioned above will be demonstrated for validation on machined flaws in a special demonstration block which simulates the vessel wall. The sizing accuracies of techniques 1. and 2. as used in the 1984 examination were previously demonstrated on the same block in 1985. It will be interesting to compare the effects of beam spread on the results of sizing the machined flaws with the new finer resolution system with the large diameter focused transducers.

The tip diffracted wave technique on the demonstration block yielded excellent results in 1985. This data set on the demonstration block should be used to establish the correct incident angle of the beam in the delta technique. The through wall size calculation is somewhat sensitive to this value; e.g., a one degree change in incident angle changes the through wall size calculation by 0.1 inch.

The proposed vessel inservice inspection program as described by Consolidated Edison, should accomplish a complete characterization of the flaw as to geometry and size. The use of the multi-examination techniques should correlate the results between the demonstration block and the indication in the vessel wall so that a clear and reliable determination of the conservative flaw size can be made. It is my opinion that the proposed data collection and recording system and the multi-examination techniques using flat and focused transducers are state-of-the-art, and together they should provide the necessary data to resolve any issues of probable flaw size for the vessel indication.

Sincerely,

John H. Gieske

JHG:jh

WORK ASSIGNMENT 87-1

TITLE: NDE Support On-Call Assistance for Operating Reactors
FIN NO.: A-1316

WORK SCOPE - Indian Point 2 - Evaluation of Flaw Indication in Reactor Vessel

Work Summary

2 Days Traveled and attended a meeting with the licensee, NRC, and consultants in Bethesda on April 6-7, 1987.

4 Days Reviewed the technical report submitted by the licensee which describes the techniques proposed for the augmented ISI of the reactor vessel in November 1987.

The Commission has filed the enclosed "Notice of Withdrawal of Applications for Amendments to Facility Operating Licenses" with the Office of the Federal Register for publication.

Sincerely,

Original signed by:

John A. Zwolinski, Assistant Director
for Projects
TVA Projects Division
Office of Special Projects

Enclosure:
Withdrawal Notice

cc: w/enclosure
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cc:
General Counsel
Tennessee Valley Authority
400 West Summit Hill Drive
E11 B33
Knoxville, Tennessee 37902

Mr. R. L. Gridley
Tennessee Valley Authority
5N 157B Lookout Place
Chattanooga, Tennessee 37402-2801

Mr. H.L. Abercrombie
Tennessee Valley Authority
Sequoyah Nuclear Plant
P.O. Box 2000
Soddy Daisy, Tennessee 37379

Mr. M. R. Harding
Tennessee Valley Authority
Sequoyah Nuclear Plant
P.O. Box 2000
Soddy Daisy, Tennessee 37379

Mr. D.L. Williams
Tennessee Valley Authority
400 West Summit Hill Drive
W10 B85
Knoxville, Tennessee 37902

County Judge
Hamilton County Courthouse
Chattanooga, Tennessee 37402

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta Street, N.W.
Atlanta, Georgia 30323

Resident Inspector/Sequoyah NP
c/o U.S. Nuclear Regulatory Commission
2600 Igou Ferry Road
Soddy Daisy, Tennessee 37379

Mr. Richard King
c/o U.S. GAO
1111 North Shore Drive
Suite 225, Box 194
Knoxville, Tennessee 37919

Tennessee Department of
Public Health
ATTN: Director, Bureau of
Environmental Health Services
Cordell Hull Building
Nashville, Tennessee 37219

Mr. Michael H. Mobley, Director
Division of Radiological Health
T.E.R.R.A. Building
150 9th Avenue North
Nashville, Tennessee 37203