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Writer's Direct Dial Number:

5211-83-206

July 18, 1983

Office of Nuclear Reactor Regulation
Attention: J. F. Stolz, Chief
Operating Reactor Branch #4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Sir:

Three Mile Island Nuclear Station
Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
TMI-1 Steam Generator Repair

Per our phone conversation of July 15, 1983, I am forwarding for your information several documents related to our eddy current test program. In a letter (Attachment A) dated June 23, 1983, to R. Barley, GPUN, R. Marlow of Conam Inspection, GPUN's eddy current testing contractor, expressed concerns about cracks at or below the detection threshold of the 1982 eddy current inspection of the TMI-1 steam generators and about changes in that threshold resulting from kinetic expansion.

As you are aware from our earlier submittals, GPUN has known that small cracks existed below the threshold of detectability, and that they were made more visible by the expansion process. GPUN Topical Report 008, Rev. 2, submitted March 31, 1983, discusses the detection threshold in Chapter IX, and the change in detectability seen as a result of kinetic expansion in Chapter V, pp. 44-45. In our letter to you of June 13, 1983, which reports the completed results of post-repair eddy current testing, we again discuss the changes in the detectability threshold.

On July 15, 1983, we met with Conam Inspection to discuss their concerns, the technical content of the Conam letter, the impact on the June 13 letter (GPUN to NRC), and GPUN Topical Report 008, Rev. 2. A joint memorandum (Attachment B), written to file, documents the final resolution of each concern by GPUN and Conam. The final conclusion is that the conclusion of the safety analysis and the SER prepared by GPUN are valid as written and as submitted.

If you have any further questions in this area, please feel free to contact us.

Sincerely,

P. R. Clark, Executive Vice President

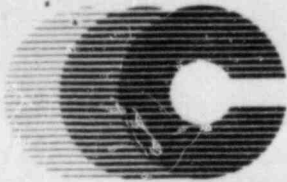
Attachments

CC: Messrs. H. Silver
J. Van Vliet

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**CONAM INSPECTION**

660 South 31st Street
Richmond, California 94804
(415) 233-9668

June 23, 1983

GPU NUCLEAR CORPORATION
P.O. Box 480 - Rt. 441 South
Middletown, Pennsylvania 17057

Attention: Rick Barley

Subject: Eddy Current Tubing Examination at TMI-1

I have a few comments on the past eddy current examinations and the current re-evaluation using the digital data analysis system.

As you know from our prior conversations, the normal differential coil eddy current method is not the best method to locate or evaluate small circumferential I.D. discontinuities like the discontinuities in the tubes at TMI-1. Although we qualified this method to be able to locate the .040" deep .060" long .005" wide calibration notch in a laboratory situation, we could not always be sure of locating the same size flaws in a field examination.

This has been proven by the re-examination after tube expansion. Several small discontinuities were detected that were undetectable prior to expansion. In fact, some of these flaw signals were much larger after expansion than before. Re-evaluation of the data prior to expansion indicated some of these discontinuities were visible by eddy current but were too small to be able to evaluate and some discontinuities were not visible at all using the standard differential method.

It is obvious the best method to locate circumferential discontinuities at this time would be 8x1 absolute. However, the 8x1 method, although excellent for circumferential discontinuities detection, has been very poor for depth evaluation. Also, the examination method is slow and probe wear is high.

Although I.D. depth measurements by any eddy current test method are not going to be perfect, the 8 coil absolute method using the digital data analysis system and a good calibration method appears to give reasonably accurate results; results that would at least allow separation of shallow non-relevant I.D. discontinuities from relevant discontinuities.

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June 23, 1983

GPU NUCLEAR CORPORATION

Attention: Rick Barley

The probe wear problem could possibly be improved if a large scale examination program were to be performed on the TMI-1 steam generators. Zetec has a new design probe on the drawing table that uses a complete shoe made of ceramic material instead of plastic which should have longer life. Unfortunately these probes are going to cost approximately \$500.00 more each and they have not been tested to see how much more wear life is available.

The examination speed cannot really be improved unless these probes could be used and reduce probe replacement time. More important to examination time would be to limit the area of examination to the upper portion of the tubes where the circumferential discontinuities have been found.

My reason for this long dissertation on a method to examine and evaluate the small circumferential type discontinuities at TMI-1 is obvious.

I have a concern, which I have expressed many times, that there are circumferential discontinuities in some of the tubes which were not identified by the differential examination which should be identified and plugged before start-up. There should be no doubt in anyones mind after the results of the limited examinations following the expansion that other tubes could have serious discontinuities which are not identified at this time.

The expansion has obviously increased the volume of the small discontinuities which would allow easier detection using the differential method but even so we could not be sure all reportable or pluggable discontinuities would be identified by the differential method.

In addition, because the expansion has changed the tubes in and near the expanded area, there really will not be any baseline of the tubes as they now stand. This could cause problems in future in-service examinations if discontinuities were found. There could be some concern regarding the cause of these discontinuities and this could also increase the examination program as required by technical specifications and REG. Guide requirements.

Hopefully, without sounding like an eddy current service salesman, my serious recommendation concerning the TMI-1 steam generators would be to examine, as a minimum, using the 8x1 absolute method, 100% of the tubes in both generators from the 14th support thru the new expansion area. This is, in my opinion, the only way we can be reasonably confident all reportable and pluggable discontinuities are identified.

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June 23, 1983

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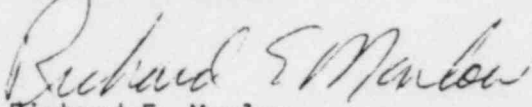
Attention: Rick Barley

We are working with Mark Torbourg trying to develop a better calibration method for the 8x1 that can be used in future examinations. At this time, results are promising and I am sure Mark is keeping you abreast of this progress.

If you have any questions or comments on this letter, please give me a call.

Very truly yours,

CONAM INSPECTION



Richard E. Marlow
Senior Vice President

REM:1ks

cc: Nick Kazansas, GPU, Parsippany



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July 15, 1983

Memo to File

Meeting with Conam Inspection, July 15, 1983

On July 15, 1983, members of Conam Inspection and GPU Nuclear met to review information pertaining to the eddy current examination of the TMI-1 steam generator tubing and the letter from Conam Inspection (Richard Marlow) dated June 23, 1983, Attention: R. Barley, GPUN, relating to that inspection. The attendees of the meeting were:

<u>Name</u>	<u>Organization</u>	<u>Title</u>
R. F. Wilson	GPU Nuclear	Vice President, Technical Functions
N. C. Kazanas	GPU Nuclear	Director, Quality Assurance
B. Creech	Conam Inspection	President
R. E. Marlow	Conam Inspection	Senior Vice President
D. G. Slear	GPU Nuclear	Manager, TMI-1 Engineering Projects
T. J. Patterson	GPU Nuclear	Manager, SPP

The group was joined later in the afternoon by P. R. Clark, Executive Vice President, GPU Nuclear. As a result of the review, the two organizations came to the following conclusions:

1. The detectability of steam generator tube defects as illustrated by Figure IX-1, GPU Nuclear Report 008, is believed correct as stated. It is agreed that this detectability is based on a combination of data from EDM notches, synthetic defects, and metallurgical correlations from service and laboratory introduced circumferential IGS cracks. There is one point of elaboration raised by Conam Inspection which has to do with the eddy current signal when the probe enters a tube support plate or the upper tubesheet, causing some loss of detectability. This characteristic signal interference is typical of all steam generator eddy current examinations. The signal mixing techniques used (based on low gain data) tends to minimize this sensitivity loss.
2. It is expected that future eddy current testing of the steam generators (tubing) will find new signals from discontinuities below the Figure IX-1 level of detectability. This is due to the fact kinetic expansion may increase the detectability of a given size defect (length and depth) even though size is not increased. In addition, signals comparable to the background level are being called as defects. The steam generator inspection with the 0.540 diameter differential probe is nevertheless valid for ID circumferential cracks greater than Figure IX-1 sensitivity thresholds.

3. Conam Inspection will clarify in a letter to GPU Nuclear their meaning of the words "reportable," "pluggable" and "serious" as used in the June 23, 1983, letter. It was understood at the meeting that this is meant to be:

- A. Reportable was used as any discontinuity located by the eddy current examination that is interpreted as greater than 20% through wall and that must be recorded for engineering evaluation and disposition.
- B. Pluggable was used as any discontinuity located by the eddy current examination that is interpreted as greater than 40% through wall.
- C. Serious discontinuities was used as any discontinuity located by the eddy current examination that would be considered as reportable as stated above.

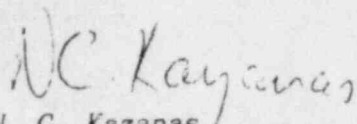
All above definitions were based on Reg. Guide 1.83 and Tech Spec requirements and did not take into consideration the ECT sensitivity curve for IGSAC (Figure IX-1 in GPUNC Topical Report 008, Rev. 2).

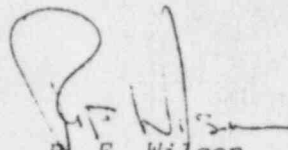
4. Conam Inspection agrees that those items of the June 23, 1983, letter which could be interpreted as rendering a judgement as to safety significance or what should be or should not be plugged was not intended since they have not made a safety evaluation and that they (Conam Inspection) are not technically qualified or knowledgeable in areas necessary to come to these judgements.
5. The 8xl detectability improvement identified in the June 23, 1983, Conam Inspection letter was clarified to be improvements in detectability below the sensitivity limits of Figure IX-1 in GPUN Report 008, Rev. 2.

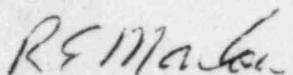
It was noted that the current information available from inspection of the steam generator with absolute probes (i.e., 4xl or 8xl) based on over 3,200 tubes examined already exceeds a 99% correlation between the absolute and differential techniques.

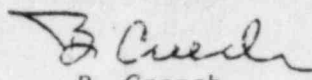
6. The scope, sensitivity and extent of the TMI-1 steam generator (tubing) examination conducted during 1982/83 significantly exceeds that done on any other steam generator in the country, to the best of the knowledge of the meeting attendees.
7. The basic motivation for the June 23, 1983, Conam Inspection letter was to reflect to GPU Nuclear the fact that interpretation and disposition of the reported eddy current signals from future inspections will be more difficult. This is due to newly reported signals originating from discontinuities that were previously below the detection limits of Figure IX-1 as discussed in 2. above.

It is the opinion of the GPU Nuclear attendees at the meeting that (since the eddy current sensitivity and detectability were reaffirmed) the conclusions of the safety analysis and SER prepared by GPU Nuclear are valid as written. (The signature of the Conam representatives below does not attest to this since Conam Inspection cannot render this opinion technically.)


N. C. Kazanas
Director, Quality Assurance
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R. F. Wilson
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