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U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Gentlemen:

Subject: Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Docket No. 50-289
Operating License No. DPR-50
Results from Cycle 12 Refueling (12R) Outage Pulled Tube Examinations

References:

1. GPU Nuclear Letter to NRC dated January 12, 1998 (6L20-98-20004), "Cycle 12 Refueling (12R) Outage Once Through Steam Generator (OTSG) Tube Inspection Report with ASME NIS Data Reports for Inservice Inspections (ISI)."

2. ABB Combustion Engineering Nuclear Operations Report #060-PENG-TR-107, Rev. 00, May 1998, "Comparison of Field and Laboratory ECT Results, Helium Leak Tests and Observations of Three Mile Island Unit 1 Steam Generator Tube Sections."

3. ABB Combustion Engineering Nuclear Operations Report #060-PENG-TR-117, Rev. 00, May 1998, "Leak and Burst Testing of Three Mile Island Unit 1 Steam Generator Tube Sections."

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In our letter which transmitted the results of TMI-1steam generator inspections performed during the Cycle 12 Refueling (12R) Outage (Reference 1), GPU Nuclear committed to provide the results of the pulled tube analyses including laboratory leak and burst testing by June 1, 1998. The purpose of this letter is to fulfill that commitment.

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In October 1997 during the 12R Outage, one tube was pulled from each of TMI-1's two Once Through Steam Generators:

1. Tube A52-34 was chosen to examine the inside diameter (ID) - initiated volumetric eddy current indications which were believed to be remnants of ID degradation (currently inactive) that occurred as a result of a 1981 sodium thiosulfate intrusion event.

II. Tube B91-55 was the only tube out of the 100% bobbin coil tube examination scope that was found to contain axial indications typical of "groove" IGA, a potentially active mechanism at B&W plants.

Table 1 provides a summary of the pulled tube leak and burst test results. Sections were selected for helium leak tests, water leak tests, and burst tests to ensure that the eddy current indications most likely to burst or leak would be tested.

Helium leak tests were conducted on five tubing sections (three from tube A52-34, two from tube B91-55). One tube section (Tube A52-34, Section 18) indicated a small amount of leakage during the preliminary helium test, but did not leak during subsequent tests with water.

Water leak tests were performed on five tube sections: first at 1500 psig (normal operating delta p), then at 2900 psig (MSLB delta p), and again at 4400 psig (3 times normal operating delta p). No leakage was detected during any of these tests up to the highest test pressure, 4400 psig. These tests were conducted with and without an additional axial load applied to obtain the calculated Main Steam Line Break (MSLB) axial tensile load of 1402 lb. at each test pressure[1]. Additional axial load was not applied during the leak test of Section 18 of tube B91-55, because the indications contained in this section were of axial orientation such that the applied tensile axial load would tend to "tighten" the indication and decrease any leakage. Had any leakage been detected during the test of this section, it would have been possible to apply the additional axial tensile load and evaluate the change in leak rate.

Four tubing sections were burst tested. It was not necessary to apply additional load to achieve the MSLB axial tensile load for the burst tests, because the "end cap load" at the burst pressures exceeds the calculated 1402 lb. MSLB axial load by a significant margin. The burst pressures of all of the sections tested were above 10,000 psig. Burst testing was not performed on Section 18 of the B91-55 tube so that the OD indication surface could be preserved for further laboratory work, because this was the only tube found during the 12R Outage examinations with indications typical of "groove" IGA. The structural and leakage integrity of this tube section was established by the water leak tests at 4400 psig.

Water leak tests and burst tests were performed in accordance with a 10CFR50 Appendix B QA program, at room temperature, with additional pressure added for water leak tests to account for the expected difference in material properties between room temperature and normal operating temperatures. The laboratory reports on leak and burst testing have been completed (References 2 and 3) and are available at the TMI site for NRC review.

As stated above, Tube B91-55 was the only tube found during the TMI-1 12R Outage with axial OD IGA indications typical of "groove" IGA in the upper span. This tube was pulled for the laboratory examinations and was not subjected to in situ pressure testing during the outage. As a result, GPU Nuclear was unable to fully complete its condition monitoring of the TMI-1 generators until the leak testing of this tube was completed. Section 18 of this pulled tube contained the most significant of the axial OD IGA indications on the basis of both field and lab eddy current examinations using several different probes. This tube section was subjected to the laboratory leak

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[1] 1402 lbs. is the B&W Owners Group generic calculated axial tube tensile load for a MSLB applicable to the OTSG plants (other than Oconee).

testing, with no leakage detected at 4400 psig, which provides confirmation that the tube would have maintained its structural and leakage integrity during a hypothetical MSLB accident during TMI-1 Cycle 11, the operating cycle prior to the 12R outage. With the results from the 100% eddy current examination of the tubes in both OTSGs, in-situ pressure testing, other work described in Reference 1, and the leak and burst testing described above, GPU Nuclear concludes that the TMI-1 OTSGs continue to demonstrate adequate tube integrity for the present operating cycle, Cycle 12.

In addition to leak and burst testing, GPU Nuclear has contracted with a laboratory to provide metallurgical analyses including fractographic, metallographic and chemical analyses. GPU Nuclear will submit the results of these analyses when complete. The final reports from the contractor are expected later this year and prior to GPU Nuclear's submittal of Technical Specification Change Requests that will be required to support the TMI-1 Cycle 13 Refueling (13R) OTSG tube examinations.

Sincerely,

MJ Ross for

James W. Langenbach
Vice President and Director, TMI

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Attachment

cc: Administrator, NRC Region I
TMI Senior NRC Resident Inspector
TMI-1 Senior NRC Project Manager

File#97087

Table 1 –Summary of TMI-1 12R Outage Pulled Tube Laboratory Leak Tests

Pulled Tube Section	ECT Indications Within Section*	Leak Test Results		Burst Pressure (psig)
		Helium	Water**	
Tube A52-34, Section 12	ID volumetric indications with: 4 indications detected by field or lab MRPC and not detected by field bobbin	NT	NLD, †	11,200
Tube A52-34, Section 18	ID volumetric indications including those indications with: Deepest field bobbin depth (estimated 50% TW), Largest field MRPC voltage, Largest lab MRPC indication area, Largest lab indication area not detected by field bobbin	Some leakage detected	NLD, †	10,950
Tube A52-34, Section 21	ID volumetric indications including those indications with: Largest field bobbin voltage, Largest field MRPC indication area, Largest field MRPC circumferential length	NLD	NLD, †	10,800
Tube A52-34, Section 22	ID volumetric indications including those indications with: Highest lab and field bobbin phase angle	NLD	NT	NT
Tube A52-34, Section 23	ID volumetric indications including those indications with: Field bobbin depth (estimated 17% TW), Largest area field indication not detected by bobbin, Highest field MRPC axial length	NT	NLD, †	10,800
Tube B91-55, Section 17	OD axial indications including that indication with: Lowest field MRPC phase angle	NLD	NT	NT
Tube B91-55, Section 18	OD axial indications including those indications with: Largest field and lab bobbin voltage, Lowest field and lab bobbin phase angle, Highest field and lab MRPC length, Highest field and lab MRPC voltage, Lowest recorded field MRPC phase angle	NLD	NLD	NT

Symbols and Acronyms

* Note that in Table 1 eddy current indications are compared with other indications in the same pulled tube. (For example, "highest lab MRPC voltage" means that the indication had the highest lab MRPC voltage of the indications in that pulled tube.)

** Water Leak Tests were performed at 1500, 2900, and 4400 psig.

† Leak tests were performed both with and without additional axial load applied to achieve the calculated MSLB axial tensile load.

ID – Inside Diameter
NT – Not Tested
NLD – No Leakage Detected
OD – Outside Diameter
MRPC – Motorized Rotating Pancake Coil
TW – Through Wall