Docket 50-289

MAY 30 1985

Mr. Marvin I. Lewis
6504 Bradford Terrace
Philadelphia, Pennsylvania 19149

Dear Mr. Lewis:

DISTRIBUTION:

Docket File	JTaylor
NRC PDR w/cy incoming	PPAS (#000575)
L PDR w/cy incoming	GLainas
EDO #000575	HThompson
EDO Reading	JThoma (w/cy of incoming)
HDenton/DEisenhut	RIngram
ORB#4 Reading	ORB#4 Green
OELD	Ticket File
WDircks	GCunningham
TMurley	

I have been asked to respond to your April 16, 1985 letter to the Commissioners regarding the safe operation of the Three Mile Island, Unit 1 (TMI-1) repaired Steam Generators (SG).

In your letter, you request that TMI-1 not be restarted because the NRC and the licensee have made errors and omissions in their analyses of the SG corrosion problems and that these will directly endanger the public health and safety. You state that the patchlike indications which have been identified as Intergranular Attack (IGA) caused by sodium thiosulfate, may instead be concentration cell corrosion. You also note that the observations at TMI-1 better fit concentration cell corrosion than IGA or Intergranular Stress Corrosion Cracking (IGSCC).

Your concern that the TMI-1 sulfur induced IGA of the SG tubes may be related to concentration cell corrosion by some unidentified contaminant is based on some incorrect assumptions.

Regarding your statement that the corrosion is occurring in crevice areas, as we stated in our safety evaluation (NUREG-1019) page 1, paragraph 1, the TMI-1 SG corrosion is on the primary side (ID) of the tubes. The primary side of the tubes does not have crevices. The SG design is discussed in more detail on page 2, section 2 of NUREG-1019. All tube supports, including the upper and lower tube sheets contact the tubes on the outside (OD) of the tubes.

Regarding your statement that there is no physical evidence to suggest the patch like areas were produced by the original thiosulfate contamination, the record clearly documents the presence of IGA prior to November 1984, when eddy current testing (ECT) showed enhanced detectability of IGA patches. In the licensee's technical data report (TDR-341), dated August 27, 1982, IGA on tubes removed from the SG is discussed. The staff motion for summary disposition of joint intervenor contentions, dated February 24, 1984 discusses IGA in TMI-1 SGs on pg. 5. Additionally, the licensee's summary disposition motion, dated February 24, 1984 discusses IGA on pages 58 and 59. Further, a review of ECT data prior to November 1984, showed the presence of IGA.

With regard to the potential safety consequences of the recently identified grain dropout from previously existing patches of IGA, the issue was addressed in our response dated May 17, 1985, to the April 5, 1985 letter from the Union of Concerned Scientists. In the response, we stated that tubes with IGA defects exceeding the plugging limit defined in the plant Technical Specifications have been removed from service by plugging. Any tube degradation smaller than the plugging limit is not expected to rupture or to result in a leak because the defects themselves are not substantially influenced by axial tube stress caused by a cooldown.

The discussion on page 2, paragraph 1 of your letter provides a good text book summary of some factors involved in concentration cell corrosion. However, the factors which need to be considered when making a determination as to the actual type of corrosion that exists in a specific case were not listed. To make a final determination of a specific corrosion mechanism, many factors such as material, environment, physical configuration (such as crevices), and microstructural evidence must be considered.

On a microscopic basis, the patch like degradation at TMI-1 was present and clearly identified as IGA on some of the twenty-one tube sections which were removed from the TMI-1 SG and examined. On the tubes which were examined, grain boundary attack and concurrent grain dropout were visible. Concentration cell corrosion produces localized dissolution of the base metal and is clearly differentiable from the IGA which occurred at TMI-1.

Additional factors considered in determining that the IGA is not progressing include:

1. The licensee has maintained an adequate reactor coolant chemistry control and an effective lay-up procedure to mitigate initiation of new corrosion attack or propagation of existing IGSCC. Further, no contaminants have been identified that would be associated with concentration cell corrosion.

2. Long-term corrosion tests demonstrate that new corrosion would not be expected and propagation of existing IGSCC should not have occurred in the TMI-1 water chemistry conditions in existence since 1983.

3. Periodic, preplanned, ECT of a small number of tubes (approximately 20) containing known IGSCC, at less than the plugging limit, has shown no measurable growth of IGSCC since 1982 when it was originally tested. These tubes are scheduled to be retested, to monitor for growth of IGSCC, every time an ECT is performed.

Regarding your concern that the steps used to control thiosulfate contamination can also cause or promote other corrosion processes, the purpose of the peroxide cleaning of the TMI-1 OTSG tubes and the RCS was to convert intermediate metastable sulfur species, such as the sodium thiosulfate, volatile polysulfur and sulfide into stable non-corrosive sulfate (NUREG-1019,

page 27). No corrosion was found in tests performed before the cleaning in which actual TMI-1 tubing and simulate solutions spiked with concentrations of up to 10 ppm sulfate were used (Licensee's Motion for Summary Disposition of each of TMIA's and Joint Intervenors, Contentions, February 24, 1984, page 100). This is a factor of 100 above the current 0.1 ppm sulfate limit. Your concern that the addition of lithium hydroxide as a base additive at TMI-1 may enhance the potential for galvanic corrosion is not supported by experience. All Pressurized Water Reactors (PWRs) operate with lithium hydroxide as a base additive to the reactor coolant. The concentrations of lithium hydroxide at TMI-1 are not different from other PWRs. No instance of galvanic corrosion due to lithium hydroxide addition has been reported from any PWR. Furthermore, the addition of lithium as a base in the reactor coolant would decrease the propensity for sulfur-induced IGSCC as demonstrated by the staff consultant (NUREG-1019, Attachment 2).

Even if, contrary to the facts, concentration cell corrosion should be taking place by some unknown mechanism, it would not constitute a significant public health and safety issue. Concentration cell corrosion is a slow process when compared to IGSCC. Therefore, the measures taken to ensure public health and safety for the IGSCC which is present would be even more conservative if concentration cell corrosion were active. Further, regardless of the corrosion mechanism, the steam generators have been repaired to their original licensing basis as discussed in more detail in my letter of May 17, 1985, to representatives of the Union of Concerned Scientists.

I hope this letter answers your concerns regarding the corrosion aspects of the TMI-1 steam generators. Please feel free to contact Mr. Conrad McCracken (301-492-8595) of my staff if you want to discuss this subject further.

Sincerely,

Original Signed by
H. R. Denton

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

ORB#4:DL	ORB#4:DL	AD-OR:DL	D:DL	D:NRR	DD:NRR
JThompacf	JStolz	GLainas	HThompson	HDenton	DEisenhut
5/24/85	5/14/85	5/29/85	5/30/85	5/30/85	5/ /85