February 27, 2004

NRC-04-025
10 CFR 50.90

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

KEWAUNEE NUCLEAR POWER PLANT
DOCKET 50-305
LICENSE No. DPR-43

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION RELATED TO LICENSE AMENDMENT REQUEST 199 TO THE KEWAUNEE NUCLEAR POWER PLANT TECHNICAL SPECIFICATIONS

REFERENCES:

1. Letter from Thomas Coutu (NMC) to Document Control Deck (NRC), "License Amendment Request 199, "STEAM GENERATOR EDDY CURRENT INSPECTION FREQUENCY EXTENSION," To The Kewaunee Nuclear Power Plant Technical Specifications", dated October 8, 2003.

2. Letter from John G. Lamb (NRC) to Thomas Coutu (NMC), "Kewaunee Nuclear Power Plant - Request For Additional Information For Proposed Amendment Request, "Steam Generator Eddy Current Inspection Frequency Extension" (TAC NO. MC1049)," dated January 26, 2004.

In reference 2, the Nuclear Regulatory Commission (NRC) staff requested additional information concerning the Nuclear Management Company, LLC (NMC) request to modify TS Section 4.2.b.3.a "Inspection Frequency", which would revise the Steam Generator (SG) inspection interval requirements for KNPP to allow a 40-month inspection interval after one SG inspection. (Reference 1). This letter is NMC's response to the NRC's request for additional information (RAI).

Enclosure 1 to this letter contains the questions the NRC staff requested. Enclosure 2 to this letter contains the questions the NRC staff requested with NMC's response.



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As the response does not alter the conclusions reached in NMC's reference 1 submittal, the safety analysis, significant hazards determination, and the environmental considerations statements contained in reference 1 are still applicable and support the changes contained herein. Also, this submittal contains no new commitments.

NMC requests approval of this license amendment request in accordance with the date contained in reference 1. If you have any questions concerning this submittal please contact Mr. Ted Maloney at (920) 388-8863.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on February 27, 2004.

For

Thomas Coutu
Site Vice-President, Kewaunee Nuclear Power Plant
Nuclear Management Company, LLC

TLM

Enclosures

cc: Administrator, Region III, USNRC
Project Manager, Kewaunee Nuclear Power Plant, USNRC
Senior Resident Inspector, Kewaunee Nuclear Power Plant, USNRC
Electric Division, PSCW

ENCLOSURE 1

NUCLEAR MANAGEMENT COMPANY, LLC
KEWAUNEE NUCLEAR PLANT
DOCKET 50-305

**February 27, 2004**

Letter from Thomas Coutu (NMC)

To

Document Control Desk (NRC)

# NRC REQUEST FOR ADDITIONAL INFORMATION

# STEAM GENERATOR EDDY CURRENT INSPECTION FREQUENCY EXTENSION

(Letter from John Lamb (NRC) dated 1/26/04)

(2 PAGES FOLLOW)

REQUEST FOR ADDITIONAL INFORMATION
STEAM GENERATOR EDDY CURRENT INSPECTION FREQUENCY EXTENSION

1. A number of manufacturing related signals were reported during the 2003 inservice inspection and during the preservice inspection. Please compare the 2003 inspection results to the preservice inspection results. Please explain the reason for any change in the signals and discuss any possible effect on tube integrity for the operating interval between inspections. The licensee's response should include, but not be limited to the following:

   a. In Attachment 8 to the licensee's letter dated August 6, 2003, (ML032250165), the licensee indicated that they detected two free-span indications (FSI). These indications either could not be detected in the preservice inspection or showed a change since the preservice inspection. Please, discuss whether the indications are new and/or changing. In addition, please discuss what is causing these indications to develop and/or change (i.e., could these indications affect tube integrity or be more susceptible to corrosion).

   b. In Attachment 8 to the licensee's letter dated August 6, 2003, the licensee indicated that a total of 30 dings (DNG) and 8 dents (DNT) signals were found. Were these indications present since the baseline inspection? If so, have they changed and why? If not, provide details explaining what is causing these indications and what is the possible effect on tube integrity for the operating interval between inspections.

   c. In Attachment 8 to the licensee's letter dated August 6, 2003, the licensee indicated that a total of 2 bulges (BLG) signals on SG B were found. Were these indications present since the preservice inspection? If so, have they changed and why? If not, provide details explaining what is causing these indications and what is the possible effect on tube integrity.

2. In Attachment 2 to the licensee's letter dated December 15, 2003, the licensee stated that an evaluation was performed to address the size and location of the specific loose parts that were left in service during the 2003 outage. The licensee also stated that the results from the evaluation of the loose part show that the minimum time to reach the minimum allowable tube wall thickness at uprated power conditions is 43 months. Given the potential uncertainties in the analysis of loose parts, discuss the conservatisms in the analysis and provide a qualitative assessment of the significance of the conservatisms (e.g., could these significantly lengthen the amount of time to reach the minimum allowable wall thickness). For example, were the loose parts left in service in 2003 in the "high flow" regions or were they in the "low flow" regions?

3. Please clarify what will be required by the TS if the next inspection is classified as C-2 or C-3. For example, would NRC approval be required for a 40-month inspection interval? If not, please modify the proposed wording such that if the next inspection is not C-1, NRC approval would be required to continue 40-month inspection intervals.

4. Please provide the following general information concerning your SGs:

   a. Designer/ Manufacturer
   b. Tube manufacturer
   c. Schematic illustrating tube supports including naming conventions
   d. Tubesheet map
   e. Tube pitch (i.e., 1.1-inch triangular)

ENCLOSURE 2

NUCLEAR MANAGEMENT COMPANY, LLC
KEWAUNEE NUCLEAR PLANT
DOCKET 50-305

**February 27, 2004**

Letter from Thomas Coutu (NMC)

To

Document Control Desk (NRC)

NMC's Response to the NRC Staff's

REQUEST FOR ADDITIONAL INFORMATION CONCERNING

LAR 199 STEAM GENERATOR EDDY CURRENT INSPECTION FREQUENCY EXTENSION

TAC MC1049

(10 PAGES FOLLOW)

RESPONSE TO
REQUEST FOR ADDITIONAL INFORMATION
STEAM GENERATOR EDDY CURRENT INSPECTION FREQUENCY EXTENSION
TAC MC1049

1. A number of manufacturing related signals were reported during the 2003 inservice inspection and during the preservice inspection. Please compare the 2003 inspection results to the preservice inspection results. Please explain the reason for any change in the signals and discuss any possible effect on tube integrity for the operating interval between inspections. The licensee's response should include, but not be limited to the following:

   a. In Attachment 8 to the licensee's letter dated August 6, 2003, (ML032250165), the licensee indicated that they detected two free-span indications (FSI). These indications either could not be detected in the preservice inspection or showed a change since the preservice inspection. Please, discuss whether the indications are new and/or changing. In addition, please discuss what is causing these indications to develop and/or change (i.e., could these indications affect tube integrity or be more susceptible to corrosion).

**Response to 1a:**

The two freespan indications (FSI) reported during the inservice inspection are shown in Figures 1 and 2. Both of these indications exhibit a change from the pre-service inspection (PSI) condition. The PSI results are shown in Figures 3 and 4. The PSI data for both of these locations exhibit low level geometric discontinuities which PSI are below the typical recording threshold. The amplitude of the FSI signals reported during the 2003 inservice inspection is commensurate with that of the discontinuities as is demonstrated by Figures 2 and 4. Also, note that the U-bend offset observable in the in-service data is not present in the pre-service data. The rotating probe inspections showed no detectable degradation (Figures 5 and 6). These signals are similar to those observed in Alloy 600 thermally treated (TT) tubing.

The history of the Alloy 600 TT tubing reveals a number of freespan indications that appear to be flaw-like on the bobbin probe and exhibit no degradation or small geometric discontinuities when inspected using a Rotating Pancake Coil (RPC). In the early operational history of Alloy 600 TT tubing, similar signals were reported and tubes were pulled to investigate the cause. No degradation was found. While no strong explanation for the change in the signals was established, it was concluded that they were benign in nature. It was postulated in the tube pull report that the change in the small ding signals is related to the same phenomenon that results in the U-bend offset.

These signals observed during the in-service inspection are considered to be benign in nature. Based upon Alloy 600 TT operating experience, no such indications have exhibited corrosion related degradation and represent no apparent increase in the susceptibility to corrosion over the base material surrounding the indication. They do not affect the integrity of the tube.

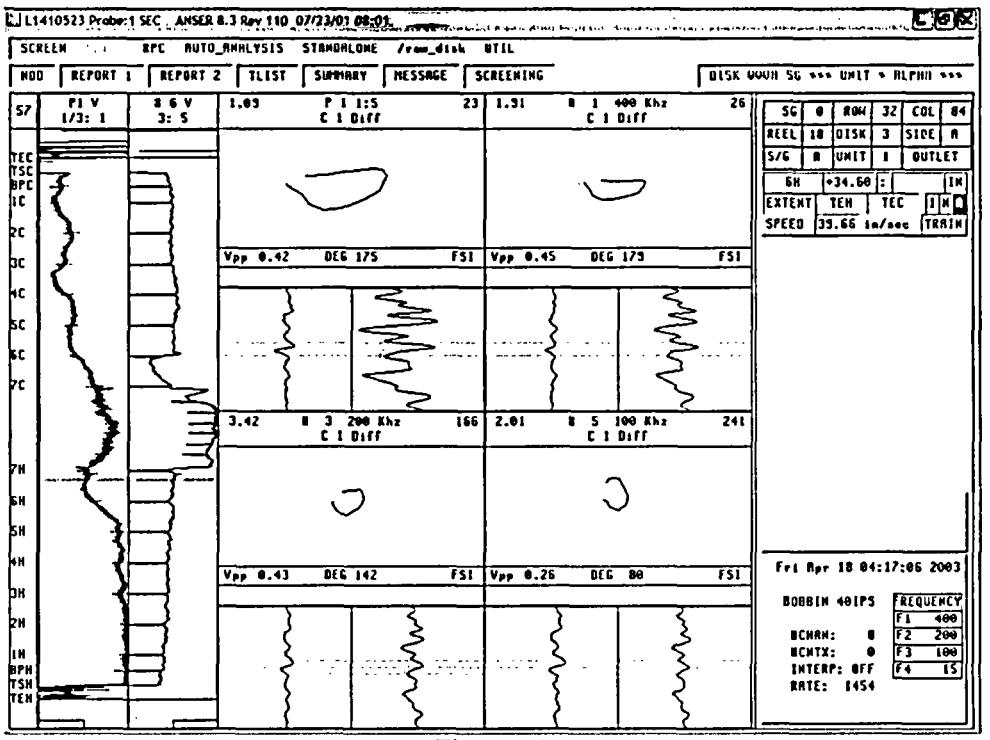



**Figure 1**
SG – A Row 32 Col 84, FSI reported in 1R26.

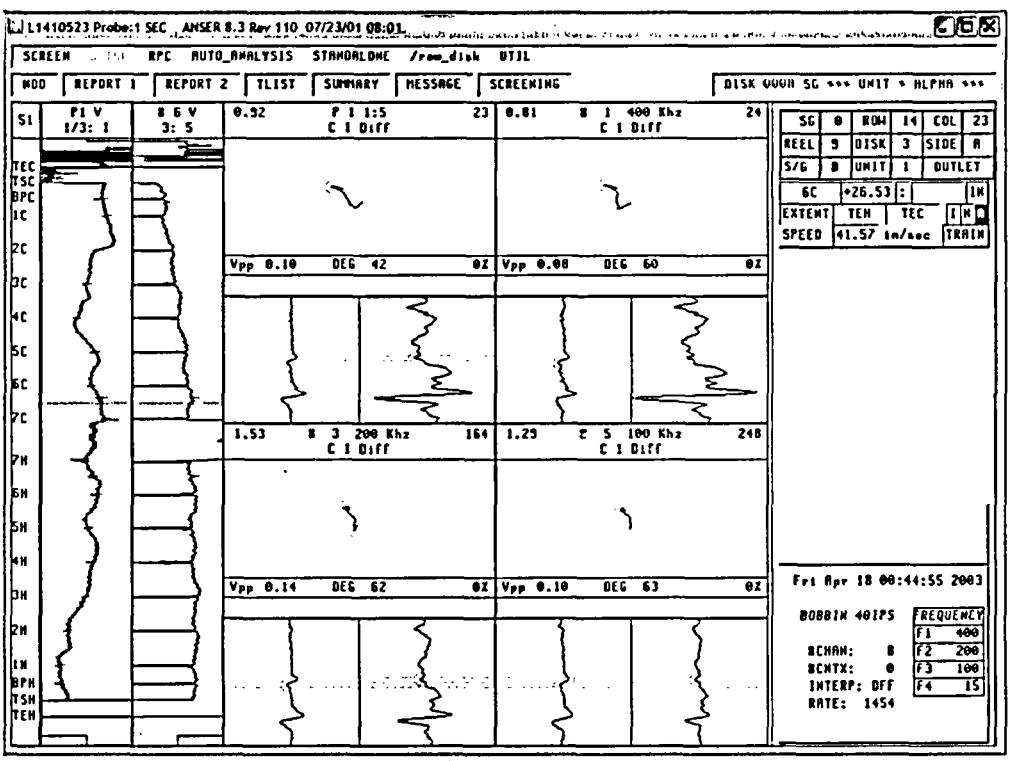



**Figure 2**
SG – B Row 14 Col 23, FSI reported in 1R26.

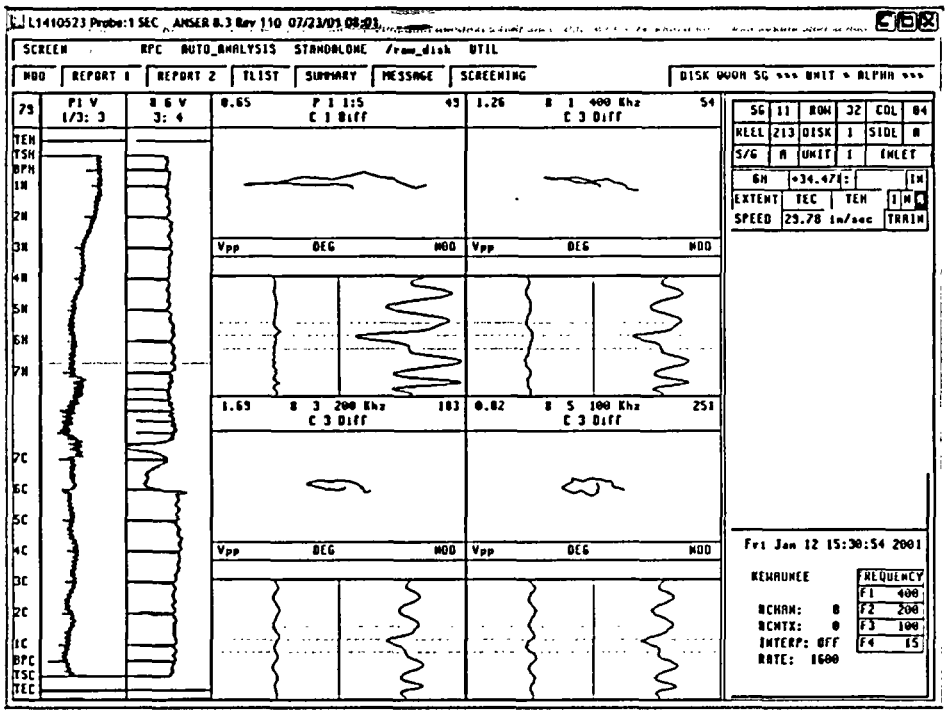


**Figure 3**

SG – A Row 32 Col 84, PSI data for FSI location. A small anomaly in the normal probe motion pattern is indicative of a small, localized geometric discontinuity.

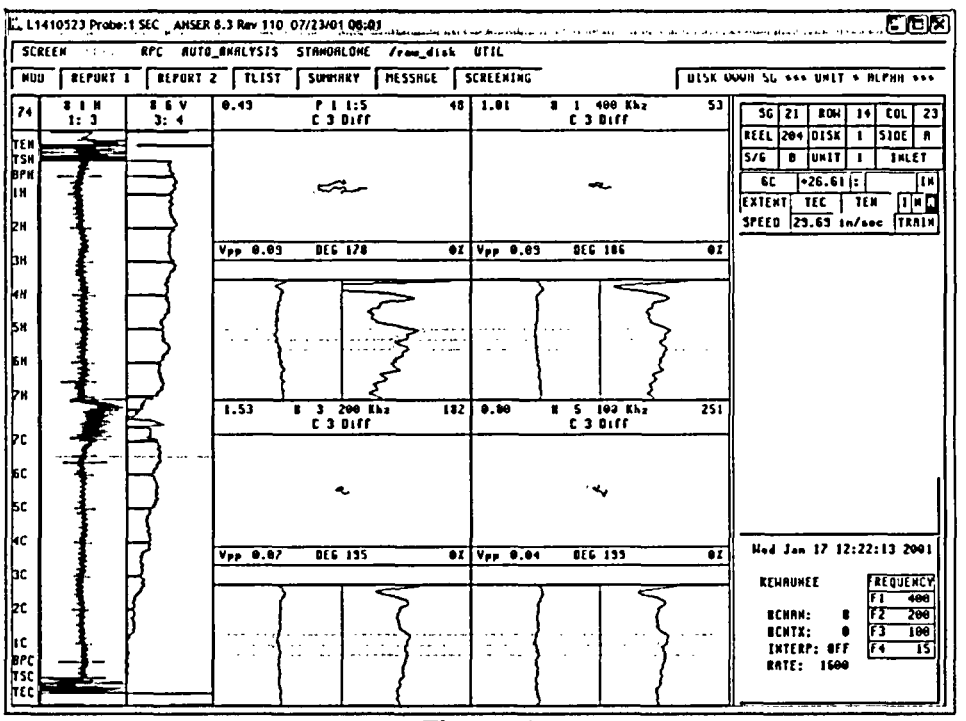


**Figure 4**

SG – B Row 14 Col 23, PSI data for FSI location. A small anomaly in the normal probe motion pattern is indicative of a small, localized geometric discontinuity.

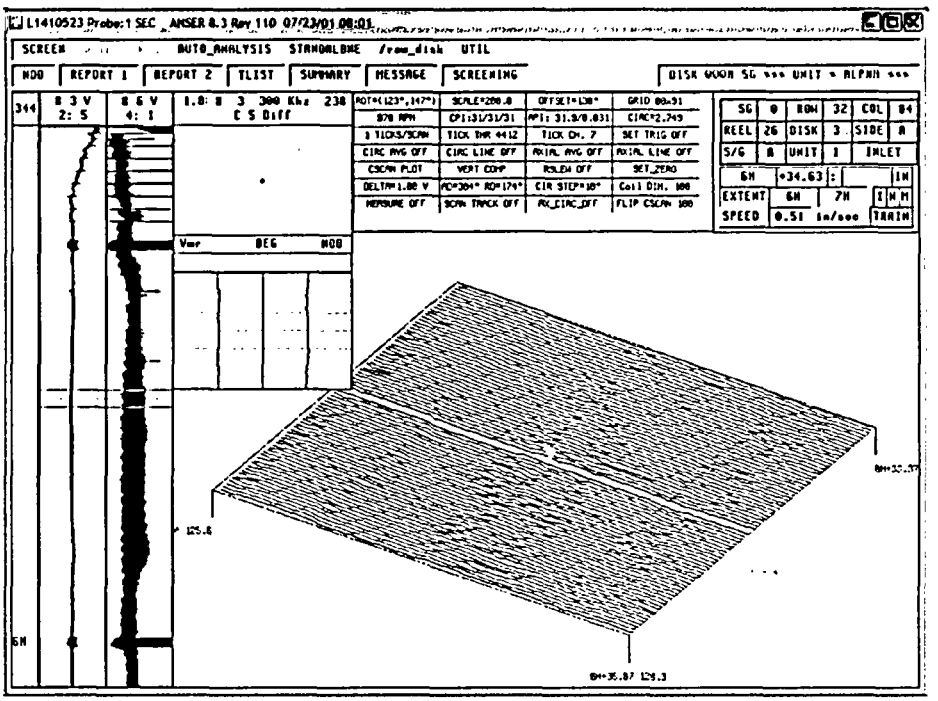


**Figure 5**

SG – A Row 32 Col 84, +Point™ data for FSI location.
No degradation or discontinuity is detectable.

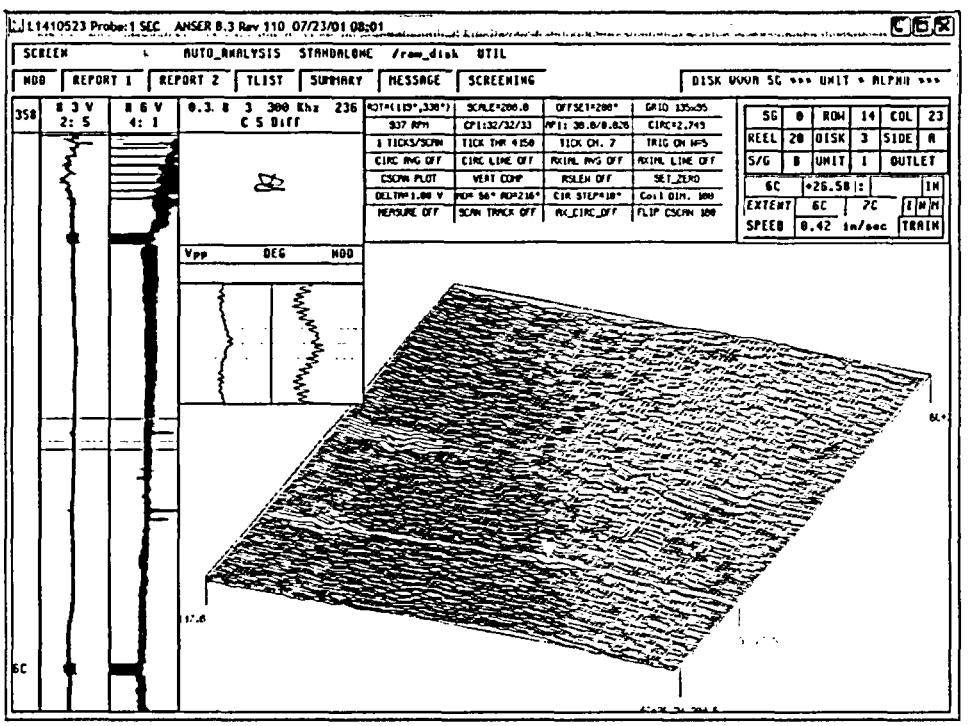


**Figure 6**

SG – B Row 14 Col 23, +Point™ data for FSI location. No degradation is detectable, but a very small, localized geometric discontinuity can be observed.

b. In Attachment 8 to the licensee's letter dated August 6, 2003, the licensee indicated that a total of 30 dings (DNG) and 8 dents (DNT) signals were found. Were these indications present since the baseline inspection? If so, have they changed and why? If not, provide details explaining what is causing these indications and what is the possible effect on tube integrity for the operating interval between inspections.

**Response to 1b:**

The letter dated August 6, 2003 (NRC-03-082) Attachment 8, section 3.0 "Possible Loose Parts" section, lists a total of 30 DNG indications; 10 in SG-A and 20 in SG-B. Dings are signals that were reported in the pre-service examination data; dents represent a tube condition that was not present during the pre-service examination.

All dents and dings greater than 5 volts peak-to-peak were inspected using a rotating probe and were found to be without any degradation.

All ding signals reported in Refueling Outage 26 (1R26) were compared to those reported in the pre-service examination. None were found to have changed. These dings were a result of the steam generator manufacturing processes and, based upon the corrosion properties of Alloy 690 and experience with similar manufacturing related dings in Alloy 600 and Alloy 690 thermally treated tubing, are not expected to have an effect on tube integrity over the operating interval between inspections.

The dent signals reported are new signals, i.e., induced subsequent to the pre-service inspection, and are located in peripheral tubes above the top of tubesheet in SG-A. The 8 reported indications affect 7 tubes. One tube, R37 C19 has two dents reported in close proximity to one another. These dents are most likely due to the impact of one or more foreign objects. Foreign Object Search and Retrieval (FOSAR) identified no foreign objects at the reported dent locations. It is, therefore, assumed that the objects were either removed from the SG, moved to a lower flow field, or simply disintegrated and became part of the sludge pile. With no objects identified and considering the possibilities, little or no additional damage is expected. As with the small dings, these dents are not expected to have an effect on tube integrity over the operating interval between inspections.

GEO (geometry change) signals are, as stated in the letter dated August 6, 2003 (NRC-03-082) Attachment 8, indicative of a small geometric irregularity at or near the expansion. Similar signals have been noted in full depth expansions in other plants. Such signals have been rigorously investigated in the past by pulled tubes and complimentary volumetric testing techniques (ultrasonics) for Alloy 600TT tubing. The signal source was confirmed as being a small, localized geometric anomaly in the expansion. These are noted during the top of tubesheet rotating probe examination. As there are no comparative baseline data, these irregularities are noted during their first in-service examination and tracked from that point forward. As with the small dings, these small expansion anomalies are not expected to have an effect on tube integrity over the operating interval between inspections.

Additionally, it is noted that there are three signals reported as FSH. They have characteristics that are like a short manufacturing burnish mark (MBM) and are detectable on both differential and absolute channels. These signals have shown no change from the PSI to the first ISI. As with the other benign signals, these signals represent no apparent increase in the susceptibility to corrosion over the base material surrounding the indication. They do not affect the integrity of the tube.

c. In Attachment 8 to the licensee's letter dated August 6, 2003, the licensee indicated that a total of 2 bulges (BLG) signals on SG B were found. Were these indications present since the preservice inspection? If so, have they changed and why? If not, provide details explaining what is causing these indications and what is the possible effect on tube integrity.

**Response to 1c:**

The bulges reported in SG-B were present in the pre-service inspection and have not exhibited change. Rotating probe examinations show the bulges to be symmetrical with no degradation in that region and are comparable with those performed during the pre-service inspection. The indications are due to an anomaly in the manufacturing and represent, based upon the eddy current results, a small region with an increase in expansion diameter over the nominal. This anomaly was identified in the manufacturing of the steam generators, and the condition was reviewed and accepted as not being a concern relative to the corrosion performance of the material.

2. In Attachment 2 to the licensee's letter dated December 15, 2003, the licensee stated that an evaluation was performed to address the size and location of the specific loose parts that were left in service during the 2003 outage. The licensee also stated that the results from the evaluation of the loose part show that the minimum time to reach the minimum allowable tube wall thickness at uprated power conditions is 43 months. Given the potential uncertainties in the analysis of loose parts, discuss the conservatisms in the analysis and provide a qualitative assessment of the significance of the conservatisms (e.g., could these significantly lengthen the amount of time to reach the minimum allowable wall thickness). For example, were the loose parts left in service in 2003 in the "high flow" regions or were they in the "low flow" regions?

**Response to 2:**

The following are the assumptions used in the analysis in the NRC question above.

1) The object is assumed to either (note the analysis considers both options):

   1a) Remain stationary - When the objects are assumed to be stationary the objects do not move from that location for the entire period of time. All wear occurs on the tube(s) in contact with the object. This will result in deeper wear depths.

   - Or -

   1b) Move - When the objects are assumed to move, the velocity of the objects are defined to be the same as the fluid velocity outside the tube bundle. No credit is taken for reduction of the object's velocity due to impacting of the various secondary side components.

2) The object is assumed to be present at the location where the secondary side cross flow fluid velocities and the turbulent amplitudes of tube vibration are largest (this is a peripheral location).

3) The object is located on a 'sludge' pile 6 inches deep. Although a significant sludge pile has not been reported, the analysis has assumed that the object will be located at this distance above the tube sheet. This will result in larger amplitudes of tube vibration and will produce shorter wear times.

4) The tubes are assumed to have a pre-existing 20% throughwall wear scar. Although it has been reported that there is no degradation of the tubes in the region near the loose objects it is conservative to assume that there is pre-existing tube wear at the contact sites.

5) Since the material type is unknown the largest wear coefficient obtained from previous material wear tests was used.

6) The object only wears a single tube. With all the work rate concentrated on a single tube, a reduced wear time will result.

7) The loose part is assumed to be oriented such that a "corner" contact is made with the tube. If corner contact is the case, it is unlikely to remain in that orientation in the flow field.

The wear time of 3.59 years (43 months ) is based on the assumptions stated above.

With no initial wear assumed, the wear time is equal to 3.95 years (47 months).

For other orientations of loose part to tube contact (rectangular contact or cylindrical contact), the wear time is greater than 10 years.

The wear time of 3.59 years based on the conservative assumptions above is considered very conservative in assumed wear rate based on worst case location, material, orientation, and time in position. All assumptions if revised would result in a longer wear time.

3. Please clarify what will be required by the TS if the next inspection is classified as C-2 or C-3. For example, would NRC approval be required for a 40-month inspection interval? If not, please modify the proposed wording such that if the next inspection is not C-1, NRC approval would be required to continue 40-month inspection intervals.

**Response to 3:**

The exception only applies to extension of the current inspection interval. NRC approval would be required for a forty month inspection interval following the next exam if the results are not category C-1.

4. Please provide the following general information concerning your SGs:

   a. Designer/ Manufacturer
   b. Tube manufacturer
   c. Schematic illustrating tube supports including naming conventions
   d. Tubesheet map
   e. Tube pitch (i.e., 1.1-inch triangular)

**Response to 4a:**

The Kewaunee steam generators are Model 54F designed by Westinghouse Electric Company and fabricated by Ansaldo Energia

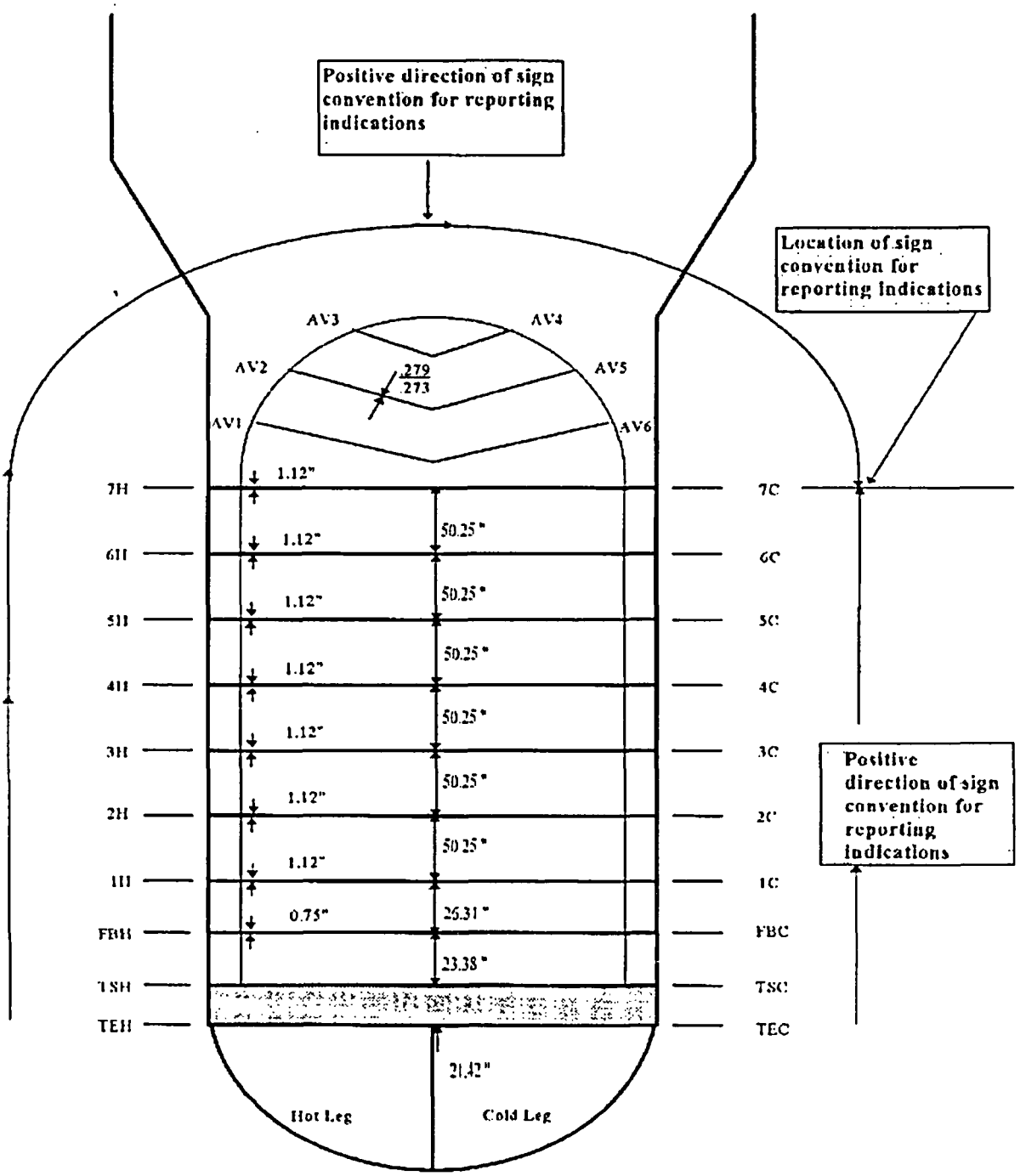
**Response to 4b:**

The Kewaunee steam generator tubing was manufactured by Valinox Nucleaire.

**Response to 4e:**

The Kewaunee tube pitch is 1.225" square.

**Response to 4c:**



**Response to 4d:**

SERIES 54F STEAM GENERATOR