ATTACHMENT 2

Letter from Mark L. Marchi (WPSC)

To

Document Control Desk (NRC)

Dated

October 27, 1998

Proposed Amendment 158

Strike Out TS Pages:

TS 4.2-6
TS 4.2-7
TS 4.2-8
TS B4.2-3
TS B4.2-5

Category	Inspection Results
C-1	Less than 5% of the total tubes inspected are degraded tubes, and none of the inspected tubes are defective.
C-2	One or more tubes, but not more than 1% of the total tubes inspected are defective, or between 5% and 10% of the total tubes inspected are degraded tubes.
C-3	More than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective.

NOTE: In all inspections, previously degraded tubes must exhibit significant (>10%) further wall penetrations to be included in the above percentage calculations.

3. Inspection Frequencies

The above required in-service inspections of steam generator tubes shall be performed at the following frequencies:

a. In-service inspections shall be performed at refueling intervals not more than 24 calendar months after the previous inspection. If two consecutive inspections following service under AVT conditions, not including the pre-service inspection, result in all inspection results falling into the C-1 category; or if two consecutive inspections demonstrate that previously observed degradation has not continued and no additional degradation has occurred, the inspection interval may be extended to a maximum of once per 40 months.

b. If the results of the in-service inspection of a steam generator conducted in accordance with Table TS 4.2-2 fall in Category C-3, the inspection frequency shall be increased to at least once per 20 months. The increase in inspection frequency shall apply until a subsequent inspection meets the conditions specified in TS 4.2.b.3.a and the interval can be extended to a 40-month period.

c. Additional, unscheduled in-service inspections shall be performed on each steam generator in accordance with the first sample inspection specified in Table TS 4.2-2 during the shutdown subsequent to any of the following conditions:

   1. Primary-to-secondary tube leaks (not including leaks originating from tube-to-tubesheet welds) in excess of the limits of TS 3.1.d and TS ~~3.4.a.1.C3.4.d~~ or

2. A seismic occurrence greater than the Operating Basis Earthquake, or

3. A loss-of-coolant accident requiring actuation of the engineering safeguards, where the cooldown rate of the Reactor Coolant System exceeded 100°F/hr, or

4. A main steam line or feedwater line break, where the cooldown rate of the Reactor Coolant System exceeded 100°F/hr.

d. If the type of steam generator chemistry treatment is changed significantly, the steam generators shall be inspected at the next outage of sufficient duration following 3 months of power operation since the change.

4. Plugging Limit Criteria

The following criteria apply independently to tube and sleeve wall degradation except as specified in TS 4.2.b.5 for the tube support plate intersections for which voltage-based plugging criteria are applied or for degradation except as specified in TS 4.2.b.6 for tubesheet crevice region in which the F* and EF* criteria is applied.

a. Any tube which, upon inspection, exhibits tube wall degradation of 50% or more shall be plugged or repaired prior to returning the steam generator to service. If significant general tube thinning occurs, this criterion will be reduced to 40% wall degradation. Tube repair shall be in accordance with the methods described in the following:

WCAP-14685, Revision 34, "Laser Welded Repair of Hybrid Expansion Joint Sleeves for Kewaunee Nuclear Power Plant;"

WCAP-14685, Revision 2, Addendum 1, "Laser Welded Repair of Hybrid Expansion Joint Sleeves for Kewaunee Nuclear Power Plant Addendum 1: Evaluation of Weld Repaired HEJ Sleeved Tubes;"

WCAP-11643, "Kewaunee Steam Generator Sleeving Report (Mechanical Sleeves);"

CEN-629-P Revision 2, "Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves;"

CEN-632-P Revision 0, "Repair of Kewaunee Steam Generator Tubes Using a Resleeving Technique;" or

WCAP-13088, Revision 3, "Westinghouse Series 44 and 51 Steam Generator Generic Sleeving Report" including Addendum 1 to Revision 4.

b. Any Westinghouse mechanical hybrid expansion joint (HEJ) sleeve which, upon inspection, exhibits wall degradation of ~~24~~23% or more shall be plugged or repaired prior to returning the steam generator to service. Figure TS 4.2-1 depicts a Westinghouse HEJ sleeve.

c. For disposition of parent tube indications in the upper joint of Westinghouse HEJ sleeved tubes,* as depicted in Figure TS 4.2-1, the following requirements will apply:

1. HEJ sleeved tubes shall be inspected with a non-destructive examination technique capable of locating the bottom of the hardroll upper transition. HEJ sleeved tubes with circumferential parent tube indications located $\geq$ 0.92 inch (plus an allowance for NDE uncertainty) below the bottom of the hardroll upper transition, as measured on the inside of the sleeve, may remain in service.

2. HEJ sleeved tubes with circumferential parent tube indications located < 0.92 inch (plus an allowance for NDE uncertainty) from the bottom of the hardroll upper transition, as measured on the inside of the sleeve, shall be plugged or repaired prior to returning the steam generator to service.

3. HEJ sleeved tubes with axial parent tube indications located in the parent tube pressure boundary, as depicted in Figure TS 4.2-1, shall be plugged or repaired prior to returning the steam generator to service.

d. Any Combustion Engineering leak tight sleeve which, upon inspection, exhibits wall degradation shall be plugged prior to returning the steam generator to service. This plugging limit applies to the sleeve up to and including the weld region.

e. Any Westinghouse laser welded sleeve which, upon inspection, exhibits wall degradation of ~~25~~23% or more, shall be plugged prior to returning the steam generator to service. This plugging limit applies to the sleeve up to and including the weld.

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*TS 4.2.b.4.c is applicable for operating cycle 23 only.

Technical Specification 4.2.b.4

Steam generator tubes found with less than the minimum wall thickness criteria determined by analysis, as described in WCAP-7832,[1][2] must either be repaired to be kept in service or removed from service by plugging.

Steam generator tube plugging is a common method of preventing primary-to-secondary steam generator tube leakage and has been utilized since the inception of PWR nuclear reactor plants. This method is relatively uncomplicated from a structural/mechanical standpoint as flow is cut off from the affected tube by plugging it in the hot and cold leg faces of the tubesheet.

To determine the basis for the sleeve plugging limit, the minimum sleeve wall thickness was calculated in accordance with the ASME Code and is consistent with Draft Regulatory Guide 1.121 (August 1976).

For the Westinghouse mechanical hybrid expansion joint (HEJ) sleeves, the sleeve plugging limit of ~~24~~23% is applied to the sleeve as shown on Figure TS 4.2-1. The sleeve plugging limits allow for eddy current testing inaccuracies and continued operational degradation per Draft Regulatory Guide 1.121 (August 1976).

Repair by sleeving, or other methods, has been recognized as a viable alternative for isolating unacceptable tube degradation and preventing tube leakage. Sleeving isolates unacceptable degradation and extends the service life of the tube, and the steam generator. Tube repair, by sleeving in accordance with WCAP-11643[3] and WCAP-13088,[4] has been evaluated and analyzed as acceptable. The Westinghouse mechanical ~~hybrid expansion joint (HEJ)~~HEJ sleeve spans the degraded area of the parent tube in the tubesheet region. The sleeves are either 36", 30" or 27" to allow access permitted by channel head bowl geometry. The sleeve is hydraulically expanded and hard rolled into the parent tubing.

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[1]WCAP 7832, "Evaluation of Steam Generator Tube, Tube Sheet, and Divider Plate Under Combined LOCA Plus SSE Conditions."

[2]E. W. James, WPSC, to A. Schwencer, NRC, dated September 6, 1977.

[3]WCAP 11643, "Kewaunee Steam Generator Sleeving Report," Revision 1, November 1988 (Proprietary).

[4]WCAP 13088, Revision 3, "Westinghouse Series 44 and 51 Steam Generator Generic Sleeving Report," January 1994 (Proprietary) including Addendum 1 to Revision 4, June 1998 (Proprietary).

Recent inspection information has indicated a potential for the parent tube behind the upper HEJ region to develop service induced degradation. For parent tube degradation within or below the upper HEJ hardroll lower transition, tube operability can be restored by fusing the sleeve and tube using a laser welding process effectively isolating the degradation below the weld. The laser weld repair is performed similar to the initial installation of laser welded sleeves. The laser repair weld for degraded parent tubes with installed HEJ sleeves has been shown to meet the weld qualification, stress and fatigue requirements of the ASME code. All laser weld repaired HEJ sleeved tubes will receive a post weld stress relief at the weld location and ultrasonic inspection to verify weld quality, in accordance with the process described in WCAP-14685, Revision 34[7] and WCAP-14685, Revision 2, Addendum 1.[8]

Topical CEN-629-P[9] describes three types of Combustion Engineering leak tight sleeves. The first type, the straight tubesheet sleeve, spans the degraded area of the parent tube in the tubesheet crevice region. The sleeve is welded to the parent tube near each end. The second type of sleeve is a full depth tubesheet sleeve which is welded near the sleeve upper end and hard rolled into the tube and tubesheet at the sleeve lower end. A variation on the tubesheet sleeve design is the use of a pre-curved sleeve which allows access to the outer periphery of the tube bundle. The third type of sleeve, the tube support plate sleeve, spans the degraded area of the tube support plate and is installed up to the sixth support plate. This sleeve is welded to the parent tube near each end of the sleeve. CEN-632-P[10] describes the steps required to re-sleeve tubes which have existing HEJ sleeves. This report describes the sleeved/tube preparation, re-sleeve installation and the design of a leak tight full depth tubesheet sleeve that is up to 39 inches in length.

Two types of Westinghouse laser welded sleeves can be installed, tube support plate sleeves and tubesheet sleeves.

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[7]WCAP-14685, Revision 34, "Laser Welded Repair of Hybrid Expansion Joint Sleeves for Kewaunee Nuclear Power Plant," ~~May 1997~~ July 1998 (Proprietary).

[8]WCAP-14685, Revision 2, Addendum 1, "Laser Welded Repair of Hybrid Expansion Joint Sleeves for Kewaunee Nuclear Power Plant Addendum 1: Evaluation of Weld Repaired HEJ Sleeved Tubes," April 1997 (Proprietary).

[9]CEN-629-P Revision 2, "Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves," January 1997.

[10]CEN-632-P Revision 0, "Repair of Kewaunee Steam Generator Tubes Using a Resleeving Technique," April 1997.

ATTACHMENT 3

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To

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