July 30, 1997

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

10 CFR 50.54(f)

Gentleman:

In the Matter of)	Docket Nos.	50-327	50-390
Tennessee Valley Authority)		50-328	50-391
		50-438	50-439

SEQUOYAH NUCLEAR PLANT (SQN), WATTS BAR NUCLEAR PLANT (WBN), AND BELLEFONTE NUCLEAR PLANT (BLN) 120-DAY RESPONSE TO NRC GENERIC LETTER (GL) 97-01, "DEGRADATION OF CONTROL ROD DRIVE MECHANISM (CRDM) NOZZLE AND OTHER VESSEL CLOSURE HEAD PENETRATIONS (VHP)," DATED APRIL 1, 1997

This letter provides TVA's 120-day response to the subject GL which requested information pertaining to CRDMs and other VHPs. In accordance with the GL and TVA's commitment made in our April 30, 1997 letter, TVA has performed the requested actions for SQN and WBN.

TVA is a member of the Westinghouse Owners Group (WOG) which has been working with other utility owners groups, Electric Power Research Institute, and Nuclear Energy Institute in addressing the issues identified in this GL. TVA has participated in the development of the industry integrated inspection program and plans to implement the WOG Inspection Program at SQN and WBN Unit 1.

Enclosures 1 and 2 provide TVA's response to the information requested in the GL for SQN and WBN, respectively. In addition, as committed to in TVA's April 30, 1997, 30-day response to the subject GL, TVA's proposed course of action is to submit a written report to address this GL no later than six months prior to fuel load of each unit at BLN and WBN Unit 2. This schedule is based on the current reduced level of activity and preservation mode at BLN and WBN Unit 2.

A070 1/

If you have questions regarding this response, please contact Terry Knuettel at (423) 751-6673.

Sincerely,

Mark J. Burzynski

Mark J. Burzynski
Manager
Nuclear Licensing

Subscribed to and sworn to before me
this 30th day of July 1997

Paulette H. White

Notary Public

My Commission Expires 3-7-2001

Enclosures
cc (Enclosures):
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cc: Continued on page 3

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT (SQN)
UNITS 1 AND 2

NRC GENERIC LETTER (GL) 97-01, "DEGRADATION OF CONTROL ROD DRIVE MECHANISM (CRDM) NOZZLE AND OTHER VESSEL CLOSURE HEAD PENETRATIONS (VHPs),"
DATED APRIL 1, 1997

INTRODUCTION

GL 97-01 was issued to request licensees to describe their program for ensuring the timely inspection of PWR CRDMs and other closure head penetrations. This response provides SQN's information relative to the information requested by the GL.

Prior to issuance of the GL, SQN worked with the Westinghouse Owners Group (WOG), Electric Power Research Institute (EPRI), and Nuclear Energy Institute (NEI) to understand the operational experience, identify technical issues, cause factors, relative importance, and solutions. One of these tasks was the development of safety evaluations that characterized the initiation of damage, propagation, and consequences. These safety evaluations are contained in WCAP-13565, "Alloy 600 Reactor Vessel Head Adaptor Tube Cracking Safety Evaluation," and are applicable to SQN. The NRC reviewed the safety evaluations and issued a safety evaluation report (SER) to NEI on November 19, 1993. The safety evaluations and the SER establish the basis for SQN's continued operation.

RESPONSE TO NRC REQUESTED INFORMATION

NRC Request:

Within 120 days of the date of this GL, each addressee is requested to provide a written report that includes the following information for its facility:

1. Regarding inspection activities:

    1.1 A description of all inspections of CRDMs and other VHPs performed to the date of this GL, including the results of these inspections.

TVA Response:

The following inspections are performed on or in the vicinity of the reactor vessel head:

- GL 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Boundary Components in PWR Plants," visual inspection of the reactor vessel closure head penetrations and canopy seal welds.
- ISI visual inspection of the attachment weld, as required by Section XI.
- ISI Ultrasonic Test (UT) of the peripheral CRDM housing dissimilar metal butt welds, as required by Section XI.

Site procedures have been in place since 1988 requiring visual inspections of 50 percent of the head penetrations during each refueling outage as a result of GL 88-05. Results of these inspections to date indicate there has been no evidence of leakage of any head penetration which could be an indication of cracking at SQN.

Section XI of the ASME Boiler and Pressure Vessel Code (B&PV) requires visual inspections (VT-2) of 25 percent of the vessel pressure retaining partial penetration welds during a system leakage test of the reactor coolant system (RCS) during each 10-year inspection interval. The scope of the RCS leakage tests include vessel nozzles, control rod drive nozzles, and instrumentation nozzles. To date, no leakage of the VHPs has been detected by these examinations.

In addition, a leakage test of the RCS is performed during reactor startup following each refueling outage with the system at 100 percent pressure and temperature. A VT-2 examination is performed during this examination that consists of an inspection of the accessible, external surfaces of the pressure boundary and those areas where leakage from the pressure boundary would collect. The VT-2 visual examination for the reactor head area consists of inspecting the areas beneath the reactor vessel where reactor coolant would collect from leaks in the pressure boundary. This method of inspection has been employed since the units began operation. To date, no leakage of the reactor vessel head penetrations have been detected by these examinations.

ASME Section XI B&PV Code Category B-0 also requires volumetric or surface examinations of 10 percent of the peripheral CRDM housing dissimilar metal butt welds during each 10-year inspection interval. At SQN, two welds were UT during the first inspection interval, and the results showed no recordable indications.

NRC Request:

1.2 If a plan has been developed to periodically inspect the CRDM and other VHPs:

a. Provide the schedule for first, and subsequent, inspections of the CRDM and other VHPs, including the technical basis for this schedule.

b. Provide the scope for the CRDM and other VHP inspections, including the total number of penetrations (and how many will be inspected), which penetrations have thermal sleeves, which are spares, and which are instrument or other penetrations.

TVA Response:

TVA is a participant in the WOG/NEI RPV head penetration integrated inspection program and plans to implement this program at SQN. This integrated program includes volumetric inspections of head penetrations that have been performed (see WCAP-14901, "Background and Methodology for Evaluation of Reactor Vessel Closure Head Penetration Integrity for the WOG," Section 1) and additional volumetric inspections that will be performed. NEI's current plans call for two CE-designed plants and two B&W-designed plants to be inspected over the next three years. Additionally, this program includes plans to add Westinghouse-designed plants to the list over the next few months as an integrated industry inspection plan is formulated.

TVA considers the number of plants that have been and are planning to perform inspections, as part of the integrated inspection plan, sufficient to demonstrate the adequacy of the WOG/NEI inspection program.

The need and schedule for reinspection will be based on an evaluation of the inspection results from the WOG integrated inspection program. It is TVA's understanding that the plants performing inspections will keep the NRC staff informed of their future reinspection plans.

NRC Request:

1.3 If a plan has not been developed to periodically inspect the CRDM and other VHPs, provide the analysis that supports why no augmented inspection is necessary.

TVA Response:

Refer to response to 1.2.

NRC Request

1.4 In light of the degradation of CRDM and other VHPs described above, provide the analysis that supports the selected course of action as listed in either 1.2 or 1.3 above. In particular, provide a description of all relevant data and/or tests used to develop crack initiation and crack growth models, the methods and data used to validate these models, the plant-specific inputs to these models, and how these models substantiate the susceptibility evaluation. Also, if an integrated industry inspection program is being relied on, provide a detailed description of this program.

TVA Response

The data, test, and methods that were used to develop the crack initiation and crack growth models on which TVA management's approach for addressing the RPV head penetration cracking issue is based are provided in Sections 2 and 3 of WCAP-14901.

SQN is a participant in the WOG analysis program in which a plant-specific probability analysis using the methodology described in Section 4 of WCAP-14901 has been performed. The plant-specific input parameters to the analysis are provided in Attachment 1. The analysis results will be incorporated into the WOG/NEI integrated inspection program for use in determining the need for a plant-specific inspection. This integrated inspection program includes all three PWR owners groups, EPRI, and NEI who are cooperatively working to compile information on the estimated operating time from January 1, 1997 needed to initiate and propagate a crack 75 percent through wall in a vessel penetration of the vessel heads in the United States. This information will be evaluated by NEI and the other industry groups to determine if an adequate number of plants have been inspected or if additional inspections are needed. NEI projects that this evaluation will be completed and the detailed inspection plans provided to the NRC by the end of 1997.

NRC Request:

2. Provide a description of any resin bead intrusions, as described in IN 96-11, that have exceeded the current EPRI PWR Primary Water Chemistry Guidelines recommendations for primary water sulfate levels, including the following information:

   2.1 Were the intrusions cation, anion, or mixed bed?

   2.2 What were the durations of these intrusions?

   2.3 Does the plant's RCS water chemistry Technical Specifications (TS) follow the EPRI guidelines?

   2.4 Identify any RCS chemistry excursions that exceed the plant administrative limits for the following species: sulfates, chlorides or fluorides, oxygen, boron, and lithium.

   2.5 Identify any conductivity excursions which may be indicative of resin intrusions. Provide a technical assessment of each excursion and any follow-up actions.

   2.6 Provide an assessment of the potential for any of these intrusions to result in a significant increase in the probability for IGA of VHPs and any associated plan for inspections.

TVA Response:

SQN has reviewed the plant historical records to determine if any incident of resin intrusion similar to those which occurred in 1980 and 1981 at the Jose Cabrera (Zorita) plant has occurred at SQN. This data search was structured to identify the resin intrusion events into the primary coolant system with a magnitude greater than 1 ft^3 (30 liters). The threshold of 1 ft^3 was chosen as a conservative lower bound since it represents less than 15 percent of the estimated volume of resin released into the RCS during the two events at Jose Cabrera.

For the period of plant operation prior to the routine analysis for sulfate in reactor coolant, the data search was based on a review of the plant's reactor coolant chemistry records relative to specific conductance of the reactor coolant. For screening purposes, an elevation of a 28 micro siemens/centimeter increment in specific conductance was the value used as an indicator of cation resin intrusion equivalent to a volume of 1 ft^3. Routine analysis for sulfate in reactor coolant was performed for plant operation from 1988 to the present. A sulfate concentration in the range of 15 to 17 ppm peak concentration was used as the indicator of cation resin intrusion. This concentration is approximately equivalent to a volume of 1 ft^3.

2.1 SQN Unit 2 has experienced one resin intrusion event in 1983 from the loss of resin from the cation bed. SQN Unit 1 has never experienced a resin intrusion event.

2.2 The duration of the Unit 2 resin intrusion was less than 72 hours since it was detected at 2330 on December 20, 1983, by resin plugging a reactor coolant filter, and by December 23, 1983, sulfate values returned to below 0.15 ppm. On December 21, 1983, the RCS was analyzed for sulfate to confirm resin intrusion into the system. Sulfate was reported at a peak concentration of 2 ppm. By December 23, 1983, at 0700, the sulfate level had dropped below 0.110 ppm. Based on the measured parameters during the resin intrusion, it was estimated that less than 30 liters (1 ft^3) entered the RCS. Based on the WOG data on the decomposition of 1 ft^3 of cation resin under the RCS conditions, a yield of approximately 15 ppm sulfate would be expected. Therefore, the approximate amount of resin released to SQN Unit 2 RCS during the 1983 event was 4 liters.

2.3 SQN TS address dissolved oxygen, fluoride, and chloride and not all of the parameters requested. These values are contained in SQN's TS and are equivalent to the action level 2 values in revision 3 of the EPRI PWR Primary Water Chemistry Guidelines. While not required by TS, SQN Site Standard Practice 13.1, "Conduct of Chemistry," establishes measurement requirements and administrative limits for the desired parameters that meet or exceed the requirements of the EPRI guidelines.

2.4 Sulfates were not routinely analyzed on the RCS prior to 1988. However, both units at SQN were shut down from 1985 until 1988, and sulfates would not have been a proper indicator of resin intrusion under cold shutdown conditions. The parameters that have exceeded administrative limits were dissolved oxygen and lithium. Dissolved oxygen has exceeded administrative limits of 0.1 ppm above 250°F on occasion, but each occurrence was related to initial establishment of conditions during mode changes. In each instance, the administrative dissolved oxygen value was met prior to entry into mode 2. Lithium has exceeded administrative limits during initial startups and mode changes as a result of dilutions associated with boron removal to achieve criticality. Administrative requirements were met as soon as possible (normally within 24 hours) following these dilutions. The data review indicated that there has been no excess lithium on the high side of the modified coordinated lithium/boron band program of pH 6.9 to 7.4.

In summary, although dissolved oxygen and lithium have exceeded administrative limits for short periods during plant startups, actions were taken (e.g., hydrazine was added to reduce dissolved oxygen) to insure that these parameters were returned to within limits as soon as possible. The nature and short duration that the administrative limits were exceeded, will not adversely effect long-term integrity of the RCS.

2.5 Technical evaluation of conductivity data does not indicate any excursions that are related to a potential resin intrusion. The amount of resin intrusion that occurred in December 1983 on Unit 2 was so small that the conductivity was not elevated sufficiently to be considered as a resin intrusion. The highest conductivity value recorded during the event was 23.0 micro S/cm with no change in pH. The theoretical conductivity value calculated for the conditions during the event excluding sulfate was 18.9 micro S/cm. The calculated theoretical conductivity plus the contribution from the measured 2 ppm sulfate resulted in a value of only 22.7 micro S/cm. The measured value is within the statistical deviation of the conductivity measurement and would not be noted as unusual since the conductivity values for the RCS ranged from 17 to 32 micro S/cm during the month. The theoretical conductivity value for these conditions, based on the Zorita experience with a 30 liter cation resin intrusion, would be an increase of approximately 28 micro S/cm over the theoretical 18.9 value. This increase is based on NEI data which indicates that the SQN Unit 2 excursion was significantly less than 30 liters (~ 4 liters) and poses no long-term problems.

2.6 SQN Unit 1 has not experienced a resin intrusion. SQN Unit 2 experienced one resin intrusion event in 1983 in which approximately 4 liters of resin entered the RCS system. Out of specification chemistry conditions persisted for less than 72 hours (e.g., sulfates). This resin intrusion was significantly less than the lower bound of 30 liters which has been identified by NEI and WOG. The resin intrusion was so insignificant that the conductivity was not raised to the point that any concerns related to the resin intrusion were initiated. Corrective actions for this event included a requirement in the SQN Standard Operating Instructions for the reactor coolant filter to be in service at any time a demineralizer is in service. This minimizes the possibility of a recurrence of a resin intrusion. Based on the above facts, it is our position that SQN has a very low probability for circumferential intergranular attack occurring on any of their VHPs.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1

NRC GENERIC LETTER (GL) 97-01, "DEGRADATION OF CONTROL ROD DRIVE MECHANISM (CRDM) NOZZLE AND OTHER VESSEL CLOSURE HEAD PENETRATIONS (VHPs),"
DATED APRIL 1, 1997

INTRODUCTION

GL 97-01 was issued to request licensees to describe their program for insuring the timely inspection of PWR CRDMs and other closure head penetrations. This response provides WBN's information relative to the information requested by the GL.

Prior to issuance of the GL, WBN worked with the Westinghouse Owners Group (WOG), Electric Power Research Institute (EPRI), and Nuclear Energy Institute (NEI) to understand the operational experience, identify technical issues, cause factors, relative importance, and solutions. One of these tasks was the development of safety evaluations that characterized the initiation of damage, propagation, and consequences. These safety evaluation are contained in WCAP-13565, "Alloy 600 Reactor Vessel Head Adaptor Tube Cracking Safety Evaluation," and are applicable to WBN. The NRC reviewed the safety evaluations and issued a safety evaluation report (SER) to NEI on November 19, 1993. The safety evaluations and the SER establish the basis for WBN's continued operation.

RESPONSE TO NRC REQUESTED INFORMATION

NRC Request:

Within 120 days of the date of this GL, each addressee is requested to provide a written report that includes the following information for its facility:

1. Regarding inspection activities:

    1.1 A description of all inspections of CRDMs and other VHPs performed to the date of this GL, including the results of these inspections.

TVA Response:

TVA has not performed any inspections to date of the CRDMs and other VHPs for WBN Unit 1 since WBN is currently in the first operating cycle. However, prior to startup of Unit 1, the NRC staff requested TVA to perform liquid penetrant inspections on a sample of CRDM pressure housing to the reactor head welds on one of the WBN reactor heads. The

Unit 2 vessel head was selected because of accessibility and to prevent interference with the Unit 1 construction activities for fuel load. Eight CRDM housings were selected for inspection. This inspection did not find any evidence of cracking. The inspection results were documented in a letter to the NRC dated October 20, 1993.

WBN Unit 1 current inspection programs include performing the following inspections on or in the vicinity of the reactor vessel head at the specified frequency:

- GL 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Boundary Components in PWR Plants," visual inspection of the reactor vessel closure head penetrations and canopy seal welds.
- ISI visual inspection of the attachment weld, as required by Section XI.
- ISI Ultrasonic Test (UT) of the peripheral CRDM housing dissimilar metal butt welds, as required by Section XI.

Site procedures are in place that require visual inspections of the head penetrations during each refueling outage as a result of GL 88-05. TVA plans to perform the first inspection during the upcoming refueling outage in the fall of 1997.

Section XI of the ASME Boiler and Pressure Vessel Code (B&PV) requires visual inspections (VT-2) of 25 percent of the vessel pressure retaining partial penetration welds during a system leakage test of the Reactor Coolant System (RCS) during each 10-year inspection interval. The scope of the RCS leakage tests include vessel nozzles, control rod drive nozzles, and instrumentation nozzles. TVA plans to perform the first inspection during the third period of the first 10-year inspection interval.

In addition, a leakage test of the RCS is performed during reactor startup following each refueling outage with the system at 100 percent pressure and temperature. A VT-2 examination is performed during this examination that consists of an inspection of the accessible, external surfaces of the pressure boundary and those areas where leakage from the pressure boundary would collect. The VT-2 visual examination for the reactor head area consists of inspecting the areas beneath the reactor vessel where reactor coolant would collect from leaks in the pressure boundary. TVA plans to perform the first inspection during the upcoming refueling outage in the fall of 1997.

ASME Section XI B&PV Code Category B-0 also requires volumetric or surface examinations of 10 percent of the peripheral CRDM housing dissimilar metal butt welds during each 10-year inspection interval. TVA plans to either perform a UT or a liquid penetrant test on two welds during the third period of the first 10-year inspection interval.

NRC Request:

1.2 If a plan has been developed to periodically inspect the CRDM and other VHPs:

a. Provide the schedule for first, and subsequent, inspections of the CRDM and other VHPs, including the technical basis for this schedule.

b. Provide the scope for the CRDM and other VHP inspections, including the total number of penetrations (and how many will be inspected), which penetrations have thermal sleeves, which are spares, and which are instrument or other penetrations.

TVA Response:

TVA is a participant in the WOG/NEI RPV head penetration integrated inspection program and plans to implement this program for WBN Unit 1. This integrated program includes volumetric inspections of head penetrations that have been performed (see WCAP-14901, "Background and Methodology for Evaluation of Reactor Vessel Closure Head Penetration Integrity for the WOG," Section 1) and additional volumetric inspections that will be performed. NEI's current plans call for two CE-designed plants and two B&W-designed plants to be inspected over the next three years. Additionally, this program includes plans to add Westinghouse-designed plants to the list over the next few months as an integrated industry inspection plan is formulated.

TVA considers the number of plants that have been and are planning to perform inspections, as part of the integrated inspection plan, sufficient to demonstrate the adequacy of the WOG/NEI inspection program.

The need and schedule for reinspection will be based on an evaluation of the inspection results from the WOG integrated inspection program. It is TVA's understanding that the plants performing inspections will keep the NRC staff informed of their future reinspection plans.

NRC Request:

1.3 If a plan has not been developed to periodically inspect the CRDM and other VHPs, provide the analysis that supports why no augmented inspection is necessary.

TVA Response:

Refer to response to 1.2.

NRC Request

1.4 In light of the degradation of CRDM and other VHPs described above, provide the analysis that supports the selected course of action as listed in either 1.2 or 1.3 above. In particular, provide a description of all

relevant data and/or tests used to develop crack initiation and crack growth models, the methods and data used to validate these models, the plant-specific inputs to these models, and how these models substantiate the susceptibility evaluation. Also, if an integrated industry inspection program is being relied on, provide a detailed description of this program.

TVA Response

The data, test, and methods that were used to develop the crack initiation and crack growth models on which TVA management's approach for addressing the RPV head penetration cracking issue is based are provided in Sections 2 and 3 of WCAP-14901.

WBN is a participant in the WOG analysis program in which a plant-specific probability analysis using the methodology described in Section 4 of WCAP-14901 has been performed. The plant specific input parameters to the analysis are provided in Attachment 2. The analysis results will be incorporated into the WOG/NEI integrated inspection program for use in determining the need for a plant-specific inspection. This integrated inspection program includes all three PWR owners groups, EPRI, and NEI who are cooperatively working to compile information on the estimated operating time from January 1, 1997 needed to initiate and propagate a crack 75 percent through wall in a vessel penetration of the vessel heads in the United States. This information will be evaluated by NEI and the other industry groups to determine if an adequate number of plants have been inspected or if additional inspections are needed. NEI projects that this evaluation will be completed and the detailed inspection plans provided to the NRC by the end of 1997.

NRC Request:

2. Provide a description of any resin bead intrusions, as described in IN 96-11, that have exceeded the current EPRI PWR Primary Water Chemistry Guidelines recommendations for primary water sulfate levels, including the following information:

   2.1 Were the intrusions cation, anion, or mixed bed?

   2.2 What were the durations of these intrusions?

   2.3 Does the plant's RCS water chemistry Technical Specifications (TS) follow the EPRI guidelines?

   2.4 Identify any RCS chemistry excursions that exceed the plant administrative limits for the following species: sulfates, chlorides or fluorides, oxygen, boron, and lithium.

2.5 Identify any conductivity excursions which may be indicative of resin intrusions. Provide a technical assessment of each excursion and any follow-up actions.

2.6 Provide an assessment of the potential for any of these intrusions to result in a significant increase in the probability for IGA of VHPs and any associated plan for inspections.

TVA Response:

WBN has reviewed the plant historical records to determine if any incident of resin intrusion similar to those which occurred in 1980 and 1981 at the Jose Cabrera (Zorita) plant has occurred at WBN. This data search is structured to identify resin intrusion events into the primary coolant system with a magnitude greater than 1 ft^3 (30 liters). The threshold of 1 ft^3 was chosen as a conservative lower bound since it represents less than 15 percent of the estimated volume of resin released into the RCS during the two events at Jose Cabrera.

For screening purposes, an elevation of a 28 micro siemens/centimeter increment in specific conductance was the value used as an indicator of cation resin intrusion equivalent to a volume of 1 ft^3. Routine analysis for sulfate in reactor coolant has been performed for plant operation from the last hot functional (1995) to the present. A sulfate concentration in the range of 15 to 17 ppm peak concentration was used as the indicator of cation resin intrusion. This concentration is approximately equivalent to a volume of 1 ft^3.

2.1 WBN has not experienced resin intrusions.

2.2 Not applicable.

2.3 WBN TS do not address the Chemistry parameters requested because WBN TS are structured in accordance with the guidance provided in NUREG 1431, Revision 1, "Standard Technical Specifications, Westinghouse Plants." However, the WBN Technical Requirements Manual follows the EPRI (Rev. 3) guidelines for dissolved oxygen, chloride, and fluoride action level 2 values. In addition, the WBN Chemistry Manual for system specifications establishes administrative limits for the desired parameters which are consistent with the EPRI guidelines.

2.4 The only RCS parameter that has exceeded the administrative control band limit is lithium. In each case, the cause of the out-of-limits condition has been due to a change in reactor coolant temperature associated with a reactor power change. Administrative requirements were met as soon as possible (normally

within 24 hours) following these dilutions. RCS lithium has not exceeded WBN's administrative maximum limit of 3 ppm.

In summary, lithium has exceeded administrative limits for short periods during plant transients and actions were taken to insure that these parameters were returned to within limits as soon as possible. The nature and short duration that the administrative limits were exceeded will not adversely effect long-term integrity of the RCS.

2.5 WBN has not experienced any conductivity excursions indicative of a resin intrusion.

2.6 WBN System Operating Instructions require the reactor coolant filter to be in service at any time a demineralizer is in service. This minimizes the possibility of a resin intrusion. Based on the fact that WBN has not had a esin intrusion, TVA considers that WBN has a very low probability for circumferential intergranular attack occurring in any of its VHPs.

ATTACHMENT 1

1	74, 75, 78	547°F	47.0	41.4	43.7
3	66 thru 68	547°F	43.8	41.4	43.7
5	70, 71	547°F	43.8	38.1	75.1
7	65	547°F	42.8	38.4	55.0

1	74 thru 78	547°F	47.0	36.8	57.5
3	62 thru 65	547°F	42.8	39.5	58.7

ATTACHMENT 2

[illegible]	[illegible] No.	Temp	[illegible]	[illegible]	[illegible]
1	76 thru 78	560°F	47.0	38.8	61.0
[illegible]	[illegible]	560°F	[illegible]	[illegible]	[illegible]
3	67 & 68	560°F	43.8	38.8	61.0
[illegible]	[illegible]	560°F	[illegible]	[illegible]	[illegible]
5	70, 71	560°F	43.8	40.7	53.4
[illegible]	72	560°F	[illegible]	[illegible]	[illegible]
7	65	560°F	42.8	38.8	61.0
[illegible]	62	560°F	42.8	[illegible]	[illegible]
9	63 & 64	560°F	42.8	40.7	53.4
10	58 thru 61	560°F	37.4	[illegible]	[illegible]
11	54 thru 56	560°F	37.4	44.5	50.2
12	57	560°F	37.4	[illegible]	[illegible]
13	51	560°F	35.2	38.8	61.0
14	50, 52, 53	560°F	[illegible]	[illegible]	[illegible]
15	47	560°F	34.1	38.8	61.0
16	42, 44, 45, 48, 49	560°F	34.1	44.5	[illegible]
17	43, 46	560°F	34.1	40.7	53.4
18	39 thru 41	560°F	32.9	38.8	[illegible]
19	38	560°F	32.9	40.7	53.4
20	32, 35 thru 37	560°F	29.3	[illegible]	[illegible]
21	31 & 34	560°F	29.3	44.5	50.2
[illegible]	33	560°F	29.3	[illegible]	[illegible]
23	30	560°F	29.3	40.7	53.4