Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-16-042

March 11, 2016

10 CFR 50.55a

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
Facility Operating License No. NPF-96
NRC Docket No. 50-391

Subject: **Watts Bar Nuclear Plant Unit 2 - Request for Approval of an Alternative to the Preservice Examination Requirements of American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code for Snubbers (WBN-2/PSI-4)**

Reference:
1. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Inservice Test (IST) Program/Preservice Test (PST) Program, dated May 8, 2014 (ML14133A296)
2. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Preservice Inspection Program and Additional Information, dated June 17, 2010 (ML101680561)

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, "Codes and Standards," paragraph (z)(1), the Tennessee Valley Authority (TVA) is requesting the Nuclear Regulatory Commission (NRC) approval of the enclosed request (WBN-2/PSI-4) for an alternative to the requirements of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code, 2001 Edition through 2003 Addenda, Subsection ISTD, Section ISTD-4110(d), "Preservice Examination Requirements," for the Watts Bar Nuclear Plant (WBN) Unit 2 Class 2 steam generator (SG) snubbers.

The combined WBN Unit 1 and WBN Unit 2 Inservice Test (IST)/Preservice Test (PST) Program 0-TI-100-006, Revision 1, was submitted by TVA to the NRC in Reference 1. As noted in Section 1.5.1 of 0-TI-100-006, Revision 1, the Unit 2 snubbers are included in scope of ASME Section XI for the Preservice Inspection (PSI) period activities. The ASME Section XI PSI code of record for WBN Unit 2 is the 2001 Edition, through 2003 Addenda.

The ASME Section XI PSI program for WBN Unit 2 is performed in accordance with site program number WBN-2 PSI, "Preservice Inspection Program Plan," which was submitted to the NRC in Reference 2. As described in Section 3.4.1.4 of WBN-2 PSI, the requirements of ASME Section XI, Subsection IWF-5000, "Inservice Inspection Requirements for Snubbers," for preservice examination and testing of snubbers are performed using the ASME OM Code, 2001 Edition through 2003 Addenda, Subsection ISTD, "Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-Water Reactor Nuclear Power Plants," in accordance with 10 CFR 50.55a(b)(3)(v).

ASME OM Code Section ISTD-4110 addresses the preservice examination requirements for snubbers and ISTD-4110(d) states, "if applicable, fluid is at the recommended level, and fluid is not leaking from the snubber system."

As described in Enclosure 1, TVA discovered during preservice examinations that five of the 20 WBN Unit 2 SG snubbers have minor fluid leakage, which was documented in the TVA corrective action program (CAP). TVA was successful at eliminating leakage at two of the five snubbers, but three snubbers continue to exhibit minor leakage. Enclosure 1 describes the configuration of the snubbers and the amount and locations of the leakage. The snubber vendor has determined that the type of leakage exhibited by the WBN Unit 2 SG snubbers is not abnormal under the current plant conditions (i.e., Mode 5 Cold Shutdown) and the snubber seal design is such that the sealing characteristics should improve as the plant transitions into normal operating conditions. Enclosure 1 further describes the history of the leakage and repair history of these snubbers along with the previous examinations of the snubbers and their reservoir levels.

Considering the minor nature of the leakage, TVA believes it is not prudent to expend the significant resources necessary to remove, refurbish, reinstall, and reexamine these large snubbers. Furthermore, there is a risk of damaging adjacent snubbers during removal and/or reinstallation of the affected snubbers. Therefore, pursuant to 10 CFR 50.55a(z)(1), TVA is requesting that the inservice examination requirements of ASME OM Code, Subsection ISTD-4233 for fluid level be applied in lieu of the preservice examination requirements of OM Code, Section ISTD-4110(d) during the preservice period. As noted in Enclosure 1, the proposed actions for this alternative request include:

- Periodically monitoring the reservoir fluid level for the snubbers during WBN Unit 2 operation to the first refueling outage that is currently scheduled to begin in October 2017. The initial monitoring frequency is monthly. However, the periodicity of the reservoir fluid level monitoring may be adjusted based on the trend of level change observed in the reservoirs.

- Performing the evaluation and corrective requirements of ASME OM code ISTD-4270 and ISTD-4280 if reservoir fluid level cannot be maintained above the required minimum level. If at any time the reservoir level is observed to be less than the required minimum level, the condition will be entered into the TVA CAP for operability determination and corrective action.

- TVA will perform the inservice examinations and tests of Subsection ISTD, as required, during the first scheduled refueling outage. This includes visual examination of all 20 SG snubbers in accordance with ISTD-4251.

Enclosure 1 provides a description and assessment of the proposed request for alternative, and the basis as to why the proposed alternative provides an acceptable level of quality and safety in accordance with 10 CFR 50.55a(z)(1). TVA requests NRC approval of this alternative request by April 1, 2016, in order to support the initial electrical generator synchronization currently scheduled for April 4, 2016.

Enclosure 2 provides the new regulatory commitment associated with this submittal. Please address any questions regarding this response to Mr. Gordon Arent at 423-365-2004.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosures:

1. WBN-2/PSI-4 Steam Generator Snubber Preservice Leak Inspections, Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1) Acceptable Level of Quality and Safety

2. List of Commitments

cc (Enclosures):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Watts Bar Nuclear Plant, Unit 1
NRC Senior Resident Inspector - Watts Bar Nuclear Plant, Unit 2
NRR Project Manager - Watts Bar Nuclear Plant

ENCLOSURE 1
TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT UNIT 2
DOCKET NO. 50-391

WBN-2/PSI-4
Steam Generator Snubber Preservice Leak Inspections

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)
Acceptable Level of Quality and Safety

ASME Code Component(s) Affected

Snubber ID	Description	Type	Manufacturer	Model
2-SNUB-001-2SG1A	Steam Generator #1 Snubber A	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG1B	Steam Generator #1 Snubber B	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG1C	Steam Generator #1 Snubber C	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG1D	Steam Generator #1 Snubber D	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG1E	Steam Generator #1 Snubber E	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG2A	Steam Generator #2 Snubber A	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG2B	Steam Generator #2 Snubber B	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG2C	Steam Generator #2 Snubber C	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG2D	Steam Generator #2 Snubber D	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG2E	Steam Generator #2 Snubber E	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG3A	Steam Generator #3 Snubber A	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG3B	Steam Generator #3 Snubber B	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG3C	Steam Generator #3 Snubber C	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG3D	Steam Generator #3 Snubber D	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG3E	Steam Generator #3 Snubber E	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG4A	Steam Generator #4 Snubber A	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG4B	Steam Generator #4 Snubber B	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG4C	Steam Generator #4 Snubber C	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG4D	Steam Generator #4 Snubber D	Hydraulic	Curtiss Wright/PMH	PD14860
2-SNUB-001-2SG4E	Steam Generator #4 Snubber E	Hydraulic	Curtiss Wright/PMH	PD14860

Applicable Code Edition and Addenda

ASME OM Code, 2001 Edition through 2003 Addenda

Applicable Code Requirement

Subsection ISTD, Paragraph ISTD-4110(d) Preservice Examination Requirements

"if applicable, fluid is at the recommended level, and fluid is not leaking from the snubber system."

Reason for Request

The Tennessee Valley Authority (TVA) is requesting relief from the preservice examination requirement of ISTD-4110(d) to verify fluid is at the recommended level, and fluid is not leaking from the snubber system for the Watts Bar Nuclear Plant (WBN) Unit 2, Steam Generator (SG) snubbers.

Preservice examination of the 20 SG snubbers identified evidence of leakage on five of the snubbers (i.e., 2-SNUB-001-2SG1B, -2SG1D, -2SG1E, -2SG4A, -2SG4C). TVA performed troubleshooting of these five snubbers with onsite vendor support over the period of several weeks. The initial troubleshooting focused on locating the source of the leakage and performing any repairs that are feasible on installed snubbers (e.g., tightening fittings). These efforts were successful at eliminating leakage on snubbers 2-SNUB-001-2SG1B and -2SG4A. However, three snubbers continue to exhibit minor leakage. Further troubleshooting of the three snubbers (i.e., 2-SNUB-001-2SG1D, -2SG1E, -2SG4C) included wiping off the leakage, subsequent re-examination of the snubbers, and monitoring of the associated hydraulic reservoir levels. TVA has determined that any leakage present is minor. For example, the worst-case snubber exhibits approximately 10 drops per day or less. Snubber 2-SNUB-001-2SG1D is leaking from the mechanical fitting (compression) between the control valve and the tee as well as the mechanical joint (Inconel® Alloy 600 O-ring) between the control valve and the snubber tube. Snubber 2-SNUB-001-2SG1E is leaking from the internal seal plug and 321 stainless steel O-ring. Snubber 2-SNUB-001-2SG4C is leaking from the Tefzel® head and piston seal. See Figure 1 for a diagram depicting the leak locations on these three snubbers (i.e., 2-SNUB-001-2SG1D, -2SG1E, -2SG4C). The vendor has determined the type of leakage exhibited by these three WBN Unit 2 SG snubbers is not abnormal under the current plant conditions (cold) and the snubber seal design is such that the sealing characteristics should improve as the plant transitions into normal operating conditions.

The term "not leaking" as used in ISTD-4110(d) is not defined in Subsection ISTD, and TVA has not identified any OM Code interpretations related to this requirement. As such, even the minor leakage identified on the five SG snubbers may not meet the requirements of ISTD-4110(d) which would require corrective actions be taken in accordance with ISTD-4140 (e.g., repair or replace). Considering the minor nature of the leakage, TVA believes it is not prudent to expend the significant resources necessary to remove, refurbish, reinstall, and reexamine these large snubbers. Furthermore, there is a risk of damaging adjacent snubbers during removal and/or reinstallation of the affected snubbers.

Proposed Alternative and Basis for Use

TVA is requesting that the inservice examination requirements of the OM Code, Section ISTD-4233 for fluid level be applied in lieu of the preservice examination requirements of OM Code, Section ISTD-4110(d) during the preservice period. The proposed alternative is the same requirement that operating plants are obligated to implement for inservice examination of installed snubbers. The inservice examination requirements require verification of adequate reservoir level and do not include a "not leaking" criterion. Therefore, some leakage on installed snubbers, as long as reservoir levels are maintained, is considered an acceptable level of safety and quality.

WBN Unit 2 utilizes 20 total, 12-inch bore, Curtiss Wright/Paul Munroe Hydraulics (PMH) snubbers for dynamic restraint of the SGs. Five snubbers are installed on each SG and work together to support the SG during a seismic event. The snubbers are located inside the SG

enclosures in an area where there are no permanent platforms and radiological conditions limit personnel access during normal power operation. The four snubber fluid reservoirs are located in upper containment on the outside of the SG enclosures and are accessible during normal power operations. See Figure 2, Steam Generator Snubber Locations, for general arrangement of the snubbers and reservoirs.

In the early 1980s, TVA identified potentially defective Tefzel® head and piston seals installed in the WBN Unit 2 SG snubbers. The WBN Unit 2 SG snubbers were returned to the vendor and the defective seals were corrected. As part of WBN Unit 2 construction, the snubbers were again returned to the vendor in 2009 for testing and repair, as necessary. In December 2013, prior to installation, all 20 snubbers passed a seal integrity test by the vendor at WBN. The snubbers were installed in their as-designed location in April 2014 and the four reservoirs subsequently filled to the recommended level. In October 2014, the tubing from the snubbers to the reservoirs was re-worked, which required the four reservoirs to be drained and refilled to the recommended level. The documentation associated with this activity does not specify the levels at which the reservoirs are to be filled. The installation procedure simply stated to fill within the recommended level, which is between the MIN cold and MAX cold marks on the reservoir site glass. It should be noted that the site glass for the reservoirs does not have graduated marking between the MIN cold and MAX cold marks.

From mid June 2015 to early August 2015, WBN Unit 2 underwent hot functional testing (HFT). Thermal movement examinations were performed on all 20 SG snubbers during HFT, with no issues identified. On August 18, 2015, the initial visual examinations were performed. Five snubbers (2-SNUB-001-2SG1B, -2SG1D, -2SG1E, -2SG4A, -2SG4C) were noted as having evidence of leakage and the SG #1 and SG #4 reservoirs were below the MIN cold level. These examination deficiencies were entered into the TVA corrective action program (CAP). The SG #2 and SG #3 reservoirs were found at the recommended level during the August 2015 examination. As a corrective action to the deficiencies noted during the August 2015 visual examinations, the SG #1 and SG #4 reservoirs were refilled to the recommended level on December 16, 2015. No specific level is documented for the December 2015 fill, but the vendor confirmed that the reservoirs were filled to the approximate mid-point between the MIN and MAX cold marks. The reservoir levels were checked again on January 5, 2016 and February 23, 2016. No discernable drop in reservoir level was noted during that period. Reservoir fluid levels were filled to the maximum cold level on February 27, 2016 to provide margin with respect to fluid leakage.

TVA performed troubleshooting of the five snubbers that initially exhibited leakage, with onsite vendor support. The initial troubleshooting focused on locating the source of the leakage and performing any repairs that were feasible on installed snubbers (e.g., tightening fittings). These efforts were successful at eliminating leakage on snubbers 2-SNUB-001-2SG1B and -2SG4A. However, three snubbers continue to exhibit minor leakage.

Once it was determined that the remaining leaks could not be completely eliminated using available materials and repair methods feasible for installed snubbers, the condition was entered into the TVA CAP to document operability for the snubbers experiencing leakage. During normal operation, the pressure in the snubber is low and due only to the head of the fluid in the reservoir. During a dynamic (i.e., seismic) event, the snubber would lock up and the pressure inside the snubber up to the control valve would increase substantially. The tubing and reservoirs upstream of the snubber control valves would remain at the lower pressure. For the leak on 2-SNUB-001-2SG4C, the Tefzel® seal is designed to withstand the high pressure within the snubber during a dynamic event and its sealing capability increases at higher

pressure as the pressure forces the seal's lips against the metallic seating surface. Therefore, any leakage during normal operation would be reduced or eliminated during a dynamic event. For the seal plug leakage on 2-SNUB-001-2SG1E and the control valve to tube leakage on 2-SNUB-001-2SG1D, the snubber vendor determined that the leakage that would be experienced during a seismic event would be a small amount compared to the 0.8 gallons of fluid between the MIN and MAX marks and the 2.4 gallons of fluid below the MIN mark. The control valve to tee fitting leak on 2-SNUB-001-2SG1D is on the low pressure side of the control valve and therefore would not increase during a dynamic event. Therefore, the leaking snubbers will perform their safety function under design basis conditions as long as they are filled with fluid. As such, the operability of the snubbers is maintained.

TVA will periodically monitor the fluid level of the four SG snubber reservoirs during WBN Unit 2 operation until the first refueling outage that is currently scheduled to begin on October 2017. The initial monitoring frequency is monthly. However, the periodicity of the reservoir fluid level monitoring may be adjusted based on the trend of level change observed in the reservoirs. For example, if an increase in rate of fluid level change is detected, then the monitoring frequency will be shortened as appropriate to ensure there is adequate time to refill the reservoir before it reaches the minimum level.

If reservoir fluid level cannot be maintained above the required minimum level, then the associated snubbers will be identified as unacceptable and the requirements of ISTD-4270, "Inservice Examination Failure Evaluation," and ISTD-4280, "Inservice Examination Corrective Action," will be applied. In addition, any time the reservoir level is observed to be less than the required minimum level, the condition will be entered into the TVA CAP for operability determination and corrective action.

During the inservice period, snubbers are in the scope of the Inservice Testing Program developed to meet the requirements of OM Code 2004 Edition through 2006 Addenda. TVA will perform the inservice examinations and tests of Subsection ISTD, as required, during the first scheduled refueling outage. This includes visual examination of all 20 SG snubbers in accordance with ISTD-4251.

As a contingency, TVA is exploring the option of procuring additional snubber(s) to be available for replacement during the first Unit 2 refueling outage, if required.

Based on the information provided above, the proposed alternative provides an acceptable level of quality and safety and provides reasonable assurance of the operational readiness of the WBN, Unit 2 SG snubbers.

Duration of Proposed Alternative

This request is for the duration of the WBN, Unit 2 Preservice Test period.

Precedents

TVA has not identified any precedents for a similar relief request.

References

None

Figure 1 - SG Snubber Leak Locations

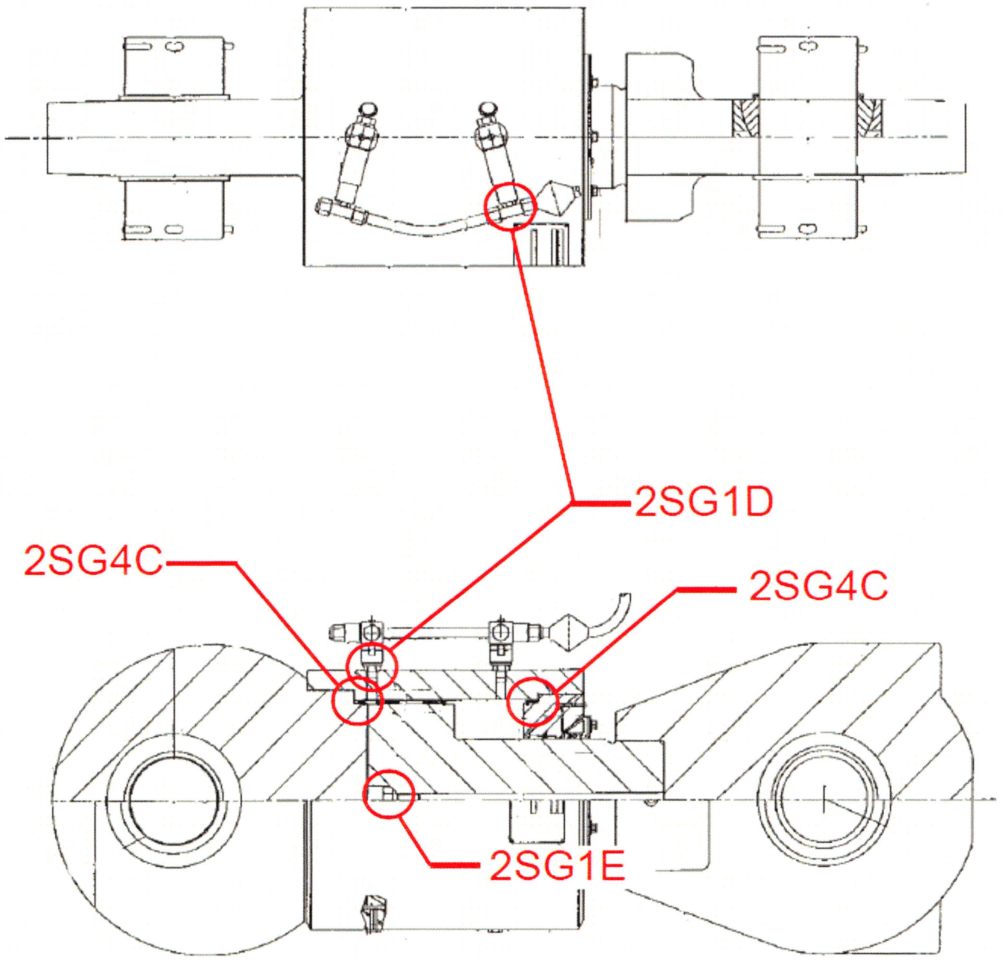
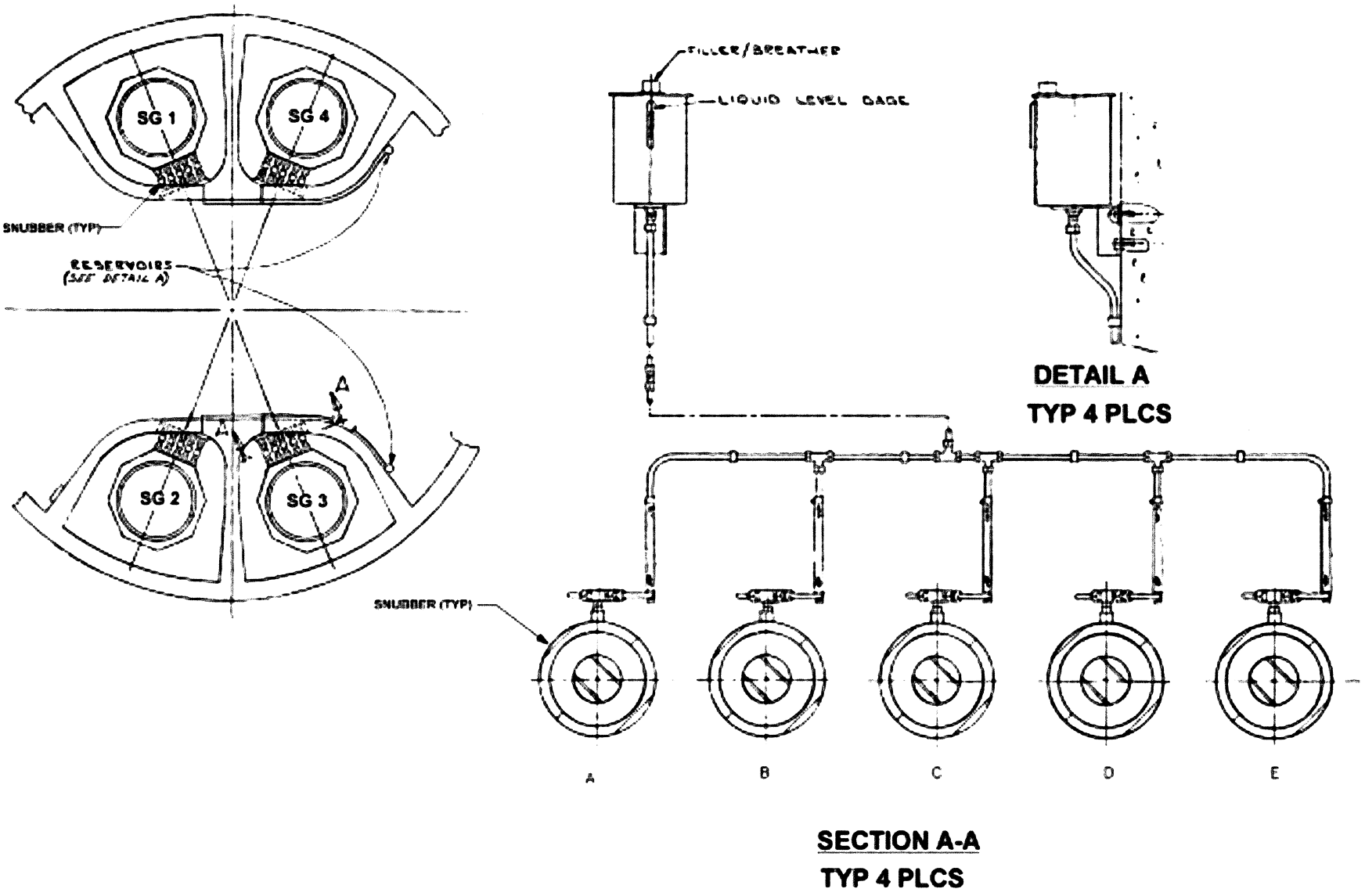


Figure 1 Notes:

1. The circled locations indicate approximate leak locations for the referenced snubber. The snubber IDs are prefixed by 2-SNUB-001-

Figure 2 - Steam Generator Snubber Location/Configuration



ENCLOSURE 2

LIST OF COMMITMENTS

1. TVA will periodically monitor the fluid level of the four SG snubber reservoirs during WBN Unit 2 operation until the first refueling outage. The initial monitoring frequency is monthly. However, the periodicity of the reservoir fluid level monitoring may be adjusted based on the trend of level change observed in the reservoirs.