Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

JUL 14 1995

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

Gentlemen:

In the Matter of the Application of	)	Docket Nos.	50-390
Tennessee Valley Authority	)		50-391

WATTS BAR NUCLEAR PLANT (WBN) - REVISED RESPONSE TO GENERIC LETTER (GL) 88-14 - INSTRUMENT AIR SUPPLY SYSTEM PROBLEMS AFFECTING SAFETY-RELATED EQUIPMENT

This letter provides a revised response to TVA's letter to NRC dated July 12, 1990, regarding Generic Letter 88-14. The need for a revised response has been previously discussed with the NRC staff via teleconference.

Primarily, a revised response is required since WBN identified additional components that did not have local air system filters as required by the design. These additional components were not discussed in the previous response, but have been added in this revised response. The lack of local air system filters was discovered as a result of reviewing Sequoyah Nuclear Plant's restart lessons learned for generic applicability to WBN.

In addition, WBN has changed the maximum particle size acceptance criterion from three microns, stated in Instrument Society of America Standard S7.3, to 25 microns due to difficulties in sampling for three micron particles. This 25 micron criterion applies only to sampling and not to system design. The system design has not been changed and filters are installed, as described in the enclosures, to remove particles that are three microns or larger. WBN's new 25 micron maximum particle size is more conservative than the 40 micron maximum being proposed by draft standard S7.0, which is intended to replace S7.3.

Enclosure 1 to this letter is the revised response. Vertical lines appear in the right margin to show where revisions have been made.

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JUL 14 1995

Enclosure 2 lists the changes in this response. The two changes discussed above, as well as other minor changes, are listed with an explanation as to why the changes were required.

If you should have any questions, please telephone J. Vorees at (615) 365-8819.

Sincerely,

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2
REVISED RESPONSE TO GENERIC LETTER (GL) 88-14

Action 1 - Verify by test that actual instrument air quality is consistent with the manufacturer's recommendations for individual components served.

TVA RESPONSE

The WBN compressed air system is divided into a Station Control and Service Air System (SCSAS) and a safety-related Auxiliary Control Air System (ACAS). The SCSAS is the normal air supply source for nonsafety-related devices as well as safety-related, air-operated devices located on the SCSAS headers and on the dual-trained ACAS supply headers. During normal operation, air supplied from the SCSAS is reprocessed through the ACAS regenerative desiccant-type dryers and filters while the ACAS air compressors are maintained in standby condition.

The Design Basis Documents (DBD) and component contracts (specifications) for the instrument air components have been reviewed to establish and substantiate the original design basis. The SCSAS and ACAS air quality was previously verified under Preoperational Tests TVA-27A and 27B, respectively, and was re-verified under Preoperational Test Instruction PTI-032-02. The SCSAS and ACAS air dew points were verified in PTI-032-01. The air dryer units for the SCSAS A, B, and C compressors were found to be -35°F, -28°F, and -40°F, respectively. The air dryer units for the ACAS compressors A-A and B-B were found to be -40°F and -53°F, respectively. These results met design requirements. Reviews of safety-related valves as documented in NUREG-1275 found no requirement for filtration below 5 microns in size. The actual SCSAS and ACAS filtration ratings are 3 microns and 0.9 microns for prefilters and afterfilters.

Subsequent to the previous preoperational testing, a rotary screw compressor was added to support condensate demineralizer operation. This compressor has cross connect capability to the SCSAS. Air quality checks downstream of the air dryers and filters have not been performed since installation of this compressor. However, a compressor sump separator and two-stage air purifier is provided for the rotary screw compressor to reduce the lubricant content to one ppm maximum upstream of the SCSAS air dryer and filter trains. Since service air is used for breathing air purposes, TVA's Occupational Hygiene Group (OHG) samples service air every six months for compliance to Occupational Safety and Health Association (OSHA) Standard and Compressed Air and Gas Specification G7.1-1989. An acceptance criteria of 5 mg/m^3 is specified for condensed hydrocarbon and 2 mg/m^3 for particulates. Since these samples are taken upstream of the air dryer and filter trains, it should be indicative of good instrument air quality downstream. High humidity alarms set at two percent relative humidity are also provided for both systems.

A plant technical instruction (TI) was issued to require air quality sampling at remote locations in each of the three ACAS and SCSAS air headers at each unit on a six-month basis. The acceptance criteria reflects Instrument Society of America (ISA) Standard S7.3, "Quality Standard for Instrument Air," recommendations of one ppm maximum

condensed hydrocarbons and zero degrees Fahrenheit dew point at line pressure. The zero degrees Fahrenheit dew point will provide an operating margin between the -40°F dryer specification value and the two percent relative humidity alarm set point.

WBN takes exception to the ISA S7.3 maximum particle size acceptance criterion of 3 microns because of difficulties experienced in sampling for 3 micron particles (i.e., sample filter contamination by the filter manufacturing process, contamination during the sample collection process, etc.). WBN has adopted a new acceptance criterion for maximum particle size that is consistent with the Quality Standard for Instrument Air, S7.0, which when issued, is intended to replace ISA S7.3. The ISA S7.0 draft limits particle size to 40 microns, except for pneumatic devices that require less than a 40 micron particle size, in which case additional filtration needs to be evaluated. WBN has conservatively adopted a 25 micron maximum particle size acceptance criterion rather than 40 microns. Although WBN's maximum particle size acceptance criterion has changed, WBN does not anticipate changing the current system filter design requirements. Because many of the filters in these systems are designed to remove particles of more than 3 microns, high quality air will be maintained in these systems.

A review of design drawings and details has been performed to verify that air-operated valves and instrumentation are provided with local filters or filter regulators. The design drawings reviewed indicated that five heating, ventilating, and air conditioning (HVAC) dampers for each unit and a common unit moisture modifier were installed without local filters. These eleven components were field inspected, and it was confirmed that local filters were not installed. Maintenance data, specification data, manufacturers drawings, and manufacturers' recommendations were reviewed, and it was determined that local filters were not required for the five HVAC dampers. The common unit moisture modifier had a filter regulator mounted upstream. The design pressure of the components is greater than that of the Control Air System (CAS), and the solenoid valves are one inch in size. The larger orifice size on the solenoid valves would not be adversely affected by 3 micron particles.

As a result of reviewing Sequoyah restart items for generic applicability to WBN, WBN identified additional control valves that did not have local filters installed per the design. This deficiency was documented under WBN's corrective action program and plant evaluations were performed to determine the extent of condition. The plant evaluations identified a total of 43 control valves, including the five HVAC control valves listed above, without local filters installed. Of this total, three HVAC control valves, in addition to the five HVAC control valves listed above, and ten Radiation Monitoring System control valves were determined to not require the use of local filters. Local filters have been installed on the other 25 control valves.

WBN System Description N3-32-4002, "Compressed Air System," currently states that the air quality of the compressed air system meets ISA S7.3. However, TVA's review in accordance with GL 88-14 has identified that the statement in the system description is inconsistent with the standard's particle size limitation (3 microns) because the SCSAS afterfilter rating is 5 microns. Therefore, it would be possible for particles of desiccant dust larger than 3 microns to exist in the system. In lieu of reviewing the maintenance

history to determine if filtration was adequate, TVA has chosen to replace the existing filters with filters rated for 3 microns. This brings the system in compliance with the system description and ISA Standard S7.3.

Action 2 - Verify that maintenance practices, emergency procedures, and training are adequate to ensure that safety-related equipment will function on loss of instrument air.

TVA RESPONSE

Maintenance Practices

The existing preventive maintenance (PM) program for the ACAS makes provisions for inspecting/replacing filters (afterfilters, prefilters, and inlet filters), changing desiccant as necessary in dryers, replacing soft seats in valves, and replacing diaphragms in pneumatic valve actuators. For the CAS, similar PM procedures exist based on manufacturers' recommendations and maintenance histories.

The PM program implements the guidelines for the performance of basic maintenance activities, such as visual and minor routine inspections, lubrications, adjustments, replacement of parts, or other activities accomplished on a periodic or routine basis.

Periodic maintenance is performed on air dryers to ensure proper operation. Desiccant in air dryers is replaced on a periodic or routine basis.

System filters associated with the compressor packages are also installed and replaced on a periodic or routine basis.

Mechanical maintenance PMs, corresponding Sequoyah PMs, and component information have been further reviewed for prefilters, afterfilters, desiccant, valves, and diaphragms to ensure these components are addressed. Deviations discovered during that investigation have been incorporated in the existing PM program or new PMs were issued. Cleanliness verification levels for the CAS following PM or repairs have been reviewed and found to be consistent with the ACAS. A procedure has been issued to require internal inspection of components suspected of contamination following indication of SCSAS or ACAS contamination due to the presence of water, particulates, or oil in system headers.

Operating Procedures

The operating procedures for the air systems are System Operating Instructions (SOIs) 32.1, "Control Air System"; 32.2, "Auxiliary Air System"; and 33.1, "Service Air Systems," while Abnormal Operating Instruction (AOI)-10, "Loss of Control Air," contains the current operating procedures, symptoms, and actions required for a loss of control air incident. A list of the WBN air-operated, safety-related components has been prepared and has been reviewed against existing procedures to verify that those components are addressed. The procedures, instructions, and physical plant drawings have been reviewed to ensure that actions are provided with respect to loss of air incident, incident recovery, plant response, manual actions, and unexpected component positioning. Deficiencies identified in those operating instructions have been evaluated, documented, and appropriately corrected.

Training

Operators receive training on AOI-10 on a biennial basis. The training includes operator actions to be taken upon a loss of air.

Maintenance procedures include PMs for service/control air dryers and auxiliary control air dryers. Cleanliness criteria are addressed in a technical instruction.

Plant air system familiarization and maintenance training is conducted in the initial training phase for mechanical maintenance trainees. SOER 88-01 has been included in industry events training and is considered for continuing training on a periodic basis.

Action 3 - Verify that the design of the entire instrument air system, including air or other pneumatic accumulators, is in accordance with its intended function, including verification by test that air-operated, safety-related components will perform as expected in accordance with all design-basis events, including a loss of the normal instrument air system. This design verification should include an analysis of current air-operated component failure positions to verify that they are correct for ensuring required safety functions.

TVA RESPONSE

Institute of Nuclear Power Operation (INPO) Significant Operating Experience Review (SOER) 88-01, "Instrument Air System Failures," recommended that utilities verify that accumulators and associated check valves provided on safety-related equipment are capable of performing their intended function on loss of instrument air. That review was to verify the following:

1. Accumulator capacity is sufficient to operate the associated component for the specified number of cycles, length of time, etc.

2. Check valves on accumulators will fully close in situations including both a rapid and gradual loss of instrument air pressure.

TVA has completed the engineering evaluation of INPO SOER 88-01. This evaluation has concluded that the only safety-related accumulators and associated check valves are those supplied with the auxiliary air compressor package. No credit is taken for the accumulator capacity in mitigating any design basis event, including loss of air. The check valves are spring-loaded channel valves and do not depend on downstream pressure to reseat. Based on the above, verification of check valve seat tightness during a loss-of-air test is not required.

Calculations were performed to ensure that the receiver tanks have sufficient capacity. The receiver tanks were found to be adequately sized to perform their intended function. The air receiver tank pressure is monitored and when the pressure approaches that required to perform its safety function, the compressors are automatically started.

Safety-related air-operated valves supplied by either the safety-related ACAS or nonsafety-related SCSAS have been tested for a gradual loss of system air pressure in accordance with Regulatory Guide (RG) 1.68.3. Safety-related air-operated valves supplied by the

ACAS or SCSAS have been tested for a rapid loss of air on an individual basis within the associated system PTI. This testing is consistent with the exception taken to RG 1.68.3, position C8 in Final Safety Analysis Report Chapter 14.

Engineering has evaluated the use of the lubricated condensate demineralizer air compressor for its ability to supply air within acceptable standards. This evaluation has recommended that the lubricated condensate demineralizer compressor not be used to supply air to the ACAS or the SCSAS. Therefore, the cross connection valve has been locked closed. It can be used to supply air to the service air system but should be done only when required, e.g., during outages. Operations has reviewed and revised operating procedures to govern the use of this compressor.

A review of the failure position of safety-related valves has been performed by engineering. This evaluation verified that each air-operated, safety-related valve failed in the correct position. The review also identified that additional design documents and calculations were required to substantiate the design basis. The system description for the Emergency Gas Treatment System did not match the system drawings. This discrepancy had previously been identified by the Design Baseline and Verification Program. To correct this discrepancy, a design input memorandum was issued to update the system description.

In addition to the above, two nonsafety-related, moisture control valves were also reviewed because of the possibility of affecting a safety-related component (Control Building air handling units). Calculations were performed, and it was determined that the design limits of the Control Building would not be exceeded if a failure of those valves did occur. Therefore, the valves were determined to be acceptable as is. No other changes or revisions were required as a result of this review.

Action 4 - Each licensee/applicant should provide a discussion of their program for maintaining proper instrument air quality.

TVA RESPONSE

The SCSAS and ACAS has been upgraded as required by the following actions (detailed throughout the response and summarized here) as part of the WBN program for maintaining proper instrument air quality and system operation:

1. An air sampling program has been established and procedurally implemented.

2. Filtration is provided to components that are determined to require local filters as per manufacturers' recommendations.

3. The existing SCSAS afterfilters have been replaced with filters rated for three microns to bring the system into compliance with ISA Standard S7.3 recommendations.

4. The engineering evaluation for the use of the lubricated condensate demineralizer air compressor is complete. The evaluation has recommended that the lubricated condensate demineralizer air compressor not be used to supply air to the ACAS or the SCSAS except where required, e.g., during outages.

The cross connect valve is locked closed.

5. Operations has revised procedures to govern the use of the lubricated condensate demineralizer air compressor.

6. The safety-related component listing is used to evaluate total plant procedural coverage with regard to actions, indications, and fail positions.

7. The design adequacy of pneumatic accumulators and associated check valves has been reviewed as part of TVA's nuclear experience review of INPO SOER 88-01. The check valves have been determined adequate. Calculations have been performed to ensure that the design of the accumulators was adequate.

8. The specified failure position of air-operated valves used in nuclear safety-related application has been verified to be the correct or the preferred fail position.

9. Safety-related valves supplied by the ACAS and SCSAS have been tested to demonstrate proper response to a loss-of-air event under the prestart test for the compressed air system as part of TVA's Startup and Test Program.

ENCLOSURE 2

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2
GENERIC LETTER (GL) 88-14
LIST OF CHANGES IN REVISED RESPONSE

Action 1

1. The second paragraph has been revised to reflect the results of the current preoperational test program. The air dew point values have been added. The statement about not sampling the oil content has been deleted because the oil content was measured in the most recent tests. These preoperational tests had not been completed when the previous response was submitted to the NRC. In addition, particle size has been changed from "micrometer" to "micron" for editorial consistency.

2. The third paragraph has been revised to reflect that the high humidity alarm setpoint has been changed from six to two percent relative humidity. The alarm setpoint has been changed to match the ACAS design dewpoint of 0°F, which is equivalent to 2% relative humidity at 100°F (maximum temperature airstream at the outlet of the aftercoolers).

   The current revision date, 1989, was added for the Compressed Air and Gas Specification G7.1. In addition, particle size has been changed from "micrometer" to "micron" for editorial consistency.

3. The fourth paragraph has been revised and the fifth paragraph added to describe the change in maximum air particle size for sampling from 3 microns to 25 microns. This change does not affect the system design, only the sampling criterion. The change is consistent with the proposed Instrument Society of America draft standard S7.0. In addition, the design temperature of -40°F has been clarified as applying to the air dryer.

4. The sixth paragraph has been changed from "micrometer" to "micron" for editorial consistency.

5. The seventh paragraph has been added to reflect the additional components that were identified as not having local filters per the design. Local filters have been added where required by the design.

6. The eighth paragraph has been changed from "micrometer" to "micron" for editorial consistency.

Action 2

1. The second, third, fourth and fifth paragraphs have been changed to remove reference to compliance with vendor recommendations. WBN has a reliability centered maintenance program which generally conforms to the vendor recommendations, but there are instances where WBN is not in strict compliance. Alternate practices are justified and are generally communicated to the vendor for concurrence.

2. The seventh and ninth paragraphs have been changed to reflect adoption of the "Systematic Approach to Training." The interval of

training on AOI-10 has changed from annual to biennial. Air system training is now performed in initial training instead of continuing training and air system topics are considered for continuing training on an ongoing basis, but may not be included in every continuing training interval.

Action 3

1. The second paragraph has been corrected from "channel" to "check" valve.

2. The fourth paragraph has been changed to reflect WBN's change in commitment to Regulatory Guide 1.68.3, which superseded Regulatory Guide 1.80. In addition, completion of the required preoperational testing is reflected.

3. The fifth paragraph has been supplemented with a statement that the cross connection valve between the lubricated condensate demineralizer air compressor and ACAS and SCSAS is locked closed.

Action 4

1. The third action has been changed from "micrometer" to "micron" for editorial consistency.

2. The fourth action has been supplemented with a statement that the cross connection valve between the lubricated condensate demineralizer air compressor and ACAS and SCSAS is locked closed.

3. The ninth action has been changed to reflect that preoperational testing has been completed for the loss-of-air event for both the ACAS and SCSAS.