

TENNESSEE VALLEY AUTHORITY

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JUL 12 1990

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 Enclosures 3 and 4 of TVA's letter dated February 23, 1989, concerning the subject GL.

The revised response provided in Enclosure 2 of this letter reflects progress to date on actions identified in the original response referenced above and actions that are to be taken as a result of the evaluations performed. These evaluations have determined a more conservative course of action than originally anticipated.

For your convenience, Enclosure 1 identifies the revisions made in the revised response and the justification for those revisions. The commitments listed in Enclosure 4 of the referenced letter have been completed. Enclosure 3 of this submittal provides the discussion area for each previously identified commitment. No new commitments are identified.

If you have any questions, please contact M. C. Bryan at (615) 365-8819.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



E. G. Wallace, Manager  
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Enclosures  
cc: See page 2

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U.S. Nuclear Regulatory Commission

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN)  
GENERIC LETTER (GL) 88-14 REVISED RESPONSE  
REVISION LOG

The revised response to GL 88-14 is required because the results of the evaluations have determined a more conservative course of action than was originally anticipated. Also, progress to date has been reflected in this revision. Listed below are the reasons for the changes.

A. Enclosure 2

1. Action 1

- a. The second paragraph has been revised to be consistent with the filter change as indicated in Item A.1.d below.
- b. The fourth paragraph has been revised to reflect that a plant procedure was issued as previously committed and to revise the acceptance criteria to be in compliance with Instrument Society of America (ISA) standard recommendations.
- c. The fifth paragraph was revised to reflect the results of TVA's review of the five heating, ventilating, and air conditioning (HVAC) dampers per unit and the common unit moisture modifier that drawings indicated did not have an in-line filter.
- d. The last two sentences of the last paragraph have been revised to indicate that TVA has changed the existing filters to meet ISA Standard S7.3 recommendations instead of reviewing the maintenance history and determining if existing filtration is adequate. This is a more conservative approach that should provide greater reliability.

2. Action 2

- a. Reference to Administrative Instruction (AI) and Preventive Maintenance (PM) numbers were deleted. Because of the procedures upgrade program, procedure numbers are subject to change and are irrelevant to this response.
- b. The fifth paragraph, first two sentences, have been revised to reflect that the review of the existing PMs has been completed and deficiencies corrected.
- c. The fifth paragraph, last sentence, has been revised to reflect that the procedure has been issued to require internal inspection of components suspected of contamination.
- d. The paragraph under "Operating Procedures" has been revised to reflect the completed review of the operating procedures and instructions.

## ENCLOSURE 1

## 3. Action 3

- a. The first paragraph has been completely rewritten. It still states that TVA will use the results of its evaluation of the Institute of Nuclear Power Operation (INPO) Significant Operating Experience Review (SOER) 88-01 to determine the design adequacy of safety-related accumulators and their associated check valves. Nuclear Engineering has completed its evaluation of INPO SOER 88-01. The revised paragraph reflects the results of that evaluation and actions that were required.
- b. The third paragraph has been revised to reflect that the safety-related valves supplied by the Station Control and Service Air System (SCSAS) will be tested for both a rapid and gradual loss of air. This is a more conservative approach than reviewing the testing history and testing those that were not originally tested. The test scoping document has been issued providing this requirement.
- c. The fourth paragraph has been revised to reflect that engineering has completed its evaluation on the use of the lubricated condensate demineralizer compressor for control air usage.
- d. The last two paragraphs have been revised to reflect the results of the review of the fail position of safety-related valves and the corrective action taken.

## 4. Action 4

- a. Item 1 has been revised to reflect that an air sampling program has been established.
- b. Item 3 has been revised to reflect that the existing filters have been replaced to meet ISA Standard S7.3 recommendations (see A.1.d above).
- c. Item 5 has been revised to reflect the completion of procedure revisions (see A.3.c above).
- d. Item 7 has been revised to reflect the results of engineering's evaluation of INPO SOER 88-01 (see A.3.a above).
- e. Item 8 has been revised to reflect that the failed position of air-operated valves has been verified.
- f. Item 9 has been revised to reflect that safety-related valves supplied by the SCSAS will be tested to demonstrate proper response to loss of air. A review of the testing history is no longer required because the safety-related valves will be tested (see A.3.b above).

ENCLOSURE 1

B. Enclosure 3

The commitments in this enclosure have been completed. Each commitment has been revised to reflect the completed status and the appropriate Enclosure 2 discussion area.

## ENCLOSURE 2

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 verified under Preoperational Tests TVA-27A and 27B, respectively. The instrument air dew point was verified to be -40 degrees Fahrenheit or lower, test filters were installed and the air was verified to contain no particles 5 micrometers or larger in size, and test filters were visually inspected to ensure that oil was not present. These results were consistent with design requirements. Reviews of safety-related valves as documented in NUREG-1275 found no requirement for filtration below 5 micrometers in size. The actual SCSAS and ACAS filtration ratings are 3 micrometers and 0.9 micrometers for prefilters and afterfilters. Oil content (condensed hydrocarbon parts per million [ppm]) in the air being discharged from these nonlubricated piston type compressors was not measured.

Subsequent to 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. An acceptance criteria of 5 mg/m<sup>3</sup> is specified for condensed hydrocarbon and 2 mg/m<sup>3</sup> 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 six percent relative humidity are also provided for both systems.

## ENCLOSURE 2

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 3 micrometers maximum particle size, 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 degrees Fahrenheit design value and the six percent relative humidity alarm set point.

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 indicate 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 5 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 micrometer particles.

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 micrometers) because the SCSAS afterfilter rating is 5 micrometers. Therefore, it would be possible for particles of desiccant dust larger than 3 micrometers 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 micrometers. 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 RESPONSEMaintenance 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.

## ENCLOSURE 2

The WBN maintenance program includes a PM program that incorporates vendor recommendations. 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. This is in accordance with manufacturers' recommendations. Desiccant in air dryers is replaced on a scheduled basis in accordance with vendor recommendations.

System filters associated with the compressor packages are also installed and replaced, in accordance with vendor recommendations.

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 and in compliance with vendor maintenance recommendations. 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 yearly 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 is addressed in a technical instruction.

Air system operation maintenance is currently included in continuing training lesson plans for mechanical maintenance craftsmen.

## ENCLOSURE 2

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 reseal. Based on the above, verification of channel 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.

Air-operated valves supplied by the safety-related ACAS were tested under both a gradual and rapid loss of system air pressure in accordance with Regulatory Guide (RG) 1.80 (Preoperational Test TVA-27B).

Safety-related valves supplied by the SCSAS were not similarly tested under Preoperational Test TVA-27A. The preoperational test scoping document has been revised to require testing of the safety-related valves supplied by the SCSAS for both a rapid and gradual loss of air in accordance with RG 1.80 during TVA's Startup and Test Program.

## ENCLOSURE 2

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 air compressor not be used to supply air to the ACAS or the SCSAS. 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 micrometers 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.

ENCLOSURE 2

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 SCSAS will be 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 3

GENERIC LETTER (GL) 88-14  
LIST OF COMMITMENTS

General Note - The commitments below are listed as documented in Enclosure 4 of TVA's letter to NRC dated February 23, 1989. The commitments have been completed. The discussion area in Enclosure 2 of this submittal is noted for each.

1. This item is complete (see Enclosure 2, Action 1 response for discussion).
2. This item is complete (see Enclosure 2, Action 1 response for discussion).
3. This item has been superseded (see Enclosure 2, Action 1 response for discussion).
4. This item is complete (see Enclosure 2, Action 2 response for discussion).
5. This item is complete (see Enclosure 2, Action 2 response for discussion).
6. This item is complete (see Enclosure 2, Action 2, "Operating Procedures," for discussion).
7. The engineering review of INPO SOER 88-01 is complete (see Enclosure 2, Action 3 response for discussion).
8. This item has been revised and completed (see Enclosure 2, Action 3 response).
9. This item is complete (see Enclosure 2, Action 3 response).
10. This item is complete (see Enclosure 2, Action 3 response for discussion).
11. This item is complete (see Enclosure 2, Action 3 response for discussion).