TENNESSEE VALLEY AUTHORITY

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JAN 26 1990

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

Gentlemen:

| | | |
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| In the Matter of | ) | Docket Nos. 50-327 50-390 |
| Tennessee Valley Authority | ) | 50-328 50-391 |
| | | 50-259 |
| | | 50-260 |
| | | 50-296 |

SEQUOYAH (SQN), BROWNS FERRY (BFN), AND WATTS BAR (WBN) NUCLEAR PLANTS - RESPONSE TO GENERIC LETTER (GL) 89-13, SERVICE WATER SYSTEM PROBLEMS AFFECTING SAFETY-RELATED EQUIPMENT

The subject GL required licensees/applicants to ". . . supply information about their respective service water systems to assure the NRC of such compliance with GDC 44, 45, 46, and 10 CFR 50 App. B) and to confirm that the safety functions of their respective service water systems are being met," and provide information on programs of training and maintenance for ensuring proper service water system performance.

This letter provides TVA's response to GL 89-13 for SQN and WBN. The time for the BFN response has been extended by 30 days as discussed with Gerry Gears of NRC Office of Special Projects. Enclosures 1 and 2 provide the responses for SQN and WBN, respectively. Enclosure 3 provides a summary list of commitments made by TVA in this submittal.

If you have any questions, please telephone E. G. McKeown at (615) 751-4888.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

M. J. Ray

M. J. Ray, Manager
Licensing Project Management

Sworn to and subscribed before me
this 26th day of January 1990

Paulette H. White
Notary Public

My Commission Expires 11-4-92

Enclosures
cc: See page 2

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JAN 26 1990

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ENCLOSURE 1

# TVA RESPONSE TO GENERIC LETTER (GL) 89-13
# FOR
# SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

## Action I

"For open-cycle service water systems, implement and maintain an ongoing program of surveillance and control techniques to significantly reduce the incidence of flow blockage problems as a result of biofouling. A program acceptable to the NRC is described in 'Recommended Program to Resolve Generic Issue 51' (Enclosure 1). It should be noted that Enclosure 1 is provided as guidance for an acceptable program. An equally effective program to preclude biofouling would also be acceptable. Initial activities should be completed before plant startup following the first refueling outage beginning 9 months or more after the date of this letter. All activities should be documented and all relevant documentation should be retained in appropriate plant records."

A. Recommended Program A: Generic Issue 51

"The intake structure should be visually inspected, once every refueling cycle, for macroscopic biological fouling organisms (for example, blue mussels at marine plants, American oysters at estuarine plants, and Asiatic clams at freshwater plants), sediment, and corrosion. Inspections should be performed either by scuba divers or by dewatering the intake structure or by other comparable methods. Any fouling accumulations should be removed."

SQN's Response

SQN will develop and implement a continuing program to perform periodic inspections (18-month frequency) of the essential raw cooling water (ERCW) intake structure for biological fouling mechanisms, sediment, and corrosion. The first inspection will take place on Unit 2 during the Unit 2 Cycle 4 refueling outage (fall of 1990). The first inspection for Unit 1 will take place during the Unit 1 Cycle 5 refueling outage (winter of 1992). TVA considers the above measures to be sufficient to satisfy the recommendations of Program A.

B. Recommended Program B: Generic Issue 51

"The service water system should be continuously (for example, during spawning) chlorinated (or equally effectively treated with another biocide) whenever the potential for a macroscopic biological fouling species exists (for example, blue mussels at marine plants, American oysters at estuarine plants, and Asiatic clams at freshwater plants). Chlorination or equally effective treatment is included for freshwater plants without clams because it can help prevent microbiologically influenced corrosion. However, the chlorination (or equally effective) treatment need not be as stringent for plants where the potential for macroscopic biological fouling species does not exist compared to those plants where it does. Precautions should be taken to obey Federal, State, and local environmental regulations regarding the use of biocides."

SQN's Response

Biofouling (i.e., Asiatic clams and algae) and microbiologically induced corrosion (MIC) at SQN are controlled by continuous injection of a biocide (sodium hypochlorite/sodium bromide) into SQN' ERCW supply piping located within the ERCW pumping station. The total residual oxidant is typically maintained between 0.2 and 2 parts per million. TVA considers this concentration to be sufficient for controlling macrofouling in SQN's ERCW system. SQN is also currently monitoring ERCW corrosion rates using test coupons.

Precautions are taken to obey Federal, State, and local environmental regulations regarding the use of biocides. The program results are documented and retained by appropriate plant procedures. TVA considers the above measures to be sufficient to satisfy the recommendation of Program B.

C. Recommended Program C: Generic Issue 51

"Redundant and infrequently used cooling loops should be flushed and flow tested periodically at the maximum design flow to ensure that they are not fouled or clogged. Other components in the service water system should be tested on a regular schedule to ensure that they are not fouled or clogged. Service water cooling loops should be filled with chlorinated or equivalently treated water before layup. Systems that use raw service water as a source, such as some fire protection systems, should also be chlorinated or equally effectively treated before layup to help prevent microbiologically influenced corrosion. Precautions should be taken to obey Federal, State, and local environmental regulations regarding the use of biocides."

SQN's Response

SQN's safety-related cooling loops, with the exception of the containment spray heat exchanger, are normally in service during plant operation. Flow through these loops is verified either by surveillance tests, periodic preventive maintenance (PM) requirements, or periodic operation schedules for running and/or flushing water systems, or by a combination of these. SQN's ERCW motor-operated valves (MOVs), check valves, and pumps are periodically tested in accordance with American Society of Mechanical Engineers (ASME) Section XI Code requirements. In addition, an annual flow balance is performed on SQN's ERCW system to verify that the system provides the required flow to safety-related components and equipment. SQN's containment spray heat exchangers (shell side cooled by ERCW) are maintained in wet layup with demineralized water and a corrosion inhibitor. These heat exchangers are periodically sampled to verify the concentration of the layup solution remains within required limits.

SQN's high-pressure fire protection (HPFP) system uses raw water from the Tennessee River and is treated with hypochlorite twice a year (spring and fall). During the development of SQN's MIC program in 1986, SQN's HPFP system (carbon steel) underwent ultrasonic testing on 13 sections of piping considered to be the most stagnant within this system. No evidence of MIC damage was found. TVA also inspected portions of SQN's HPFP piping in the auxiliary and turbine buildings and found no volume reduction that would prohibit flow. TVA considers the above measures to be sufficient to satisfy the recommendations of Program C.

Action II

"Conduct a test program to verify the heat transfer capability of all safety-related heat exchangers cooled by service water. The total test program should consist of an initial test program and a periodic retest program. Both the initial test program and the periodic retest program should include heat exchangers connected to or cooled by one or more open-cycle systems as defined above. Operating experience and studies indicate that closed-cycle service water systems, such as component cooling systems, have the potential for significant fouling as a consequence of aging-related in-leakage and erosion or corrosion. The need for testing of closed-cycle system heat exchangers has not been considered necessary because of the assumed high quality of existing chemistry control programs. If the adequacy of these chemistry control programs cannot be confirmed over the total operating history of the plant or if during the conduct of the total testing program any unexplained downward trend in heat exchanger performance is identified that cannot be remedied by maintenance of an open-cycle system, it may be necessary to selectively extend the test program and the routine inspection and maintenance program addressed in Action III, below, to the attached closed-cycle systems.

A program acceptable to the NRC for heat exchanger testing is described in 'Program for Testing Heat Transfer Capability' (Enclosure 2). It should be noted that Enclosure 2 is provided as guidance for an acceptable program. An equally effective program to ensure satisfaction of the heat removal requirements of the service water system would also be acceptable.

Testing should be done with necessary and sufficient instrumentation, though the instrumentation need not be permanently installed. The relevant temperatures should be verified to be within design limits. If similar or equivalent tests have not been performed during the past year, the initial tests should be completed before plant startup following the first refueling outage beginning 9 months or more after the date of this letter.

As a part of the initial test program, a licensee or applicant may decide to take corrective action before testing. Tests should be performed for the heat exchangers after the corrective actions are taken to establish baseline data for future monitoring of heat exchanger performance. In the periodic retest program, a licensee or applicant should determine after three tests the best frequency for testing to provide assurance that the equipment will perform the intended safety functions during the intervals between tests. Therefore, in the periodic retest program, to assist that determination, tests should be performed for the heat exchangers before any corrective actions are taken. As in the initial test program, tests should be repeated after any corrective actions are taken to establish baseline data for future monitoring of heat exchanger performance.

An example of an alternative action that would be acceptable to the NRC is frequent regular maintenance of a heat exchanger in lieu of testing for upgraded performance of the heat exchanger. This alternative might apply to small heat exchangers, such as lube oil coolers or pump bearing coolers or readily serviceable heat exchangers located in low radiation areas of the facility.

In implementing the continuing program for periodic retesting of safety-related heat exchangers cooled by service water in open-cycle systems, the initial frequency of testing should be at least once each fuel cycle, but after three tests, licensees and applicants should determine the best frequency for testing to provide assurance that the equipment will perform the intended safety functions during the intervals between tests and meet the requirements of GDC 44, 45, and 46. The minimum final testing frequency should be once every 5 years. A summary of the program should be documented, including the schedule for tests, and all relevant documentation should be retained in appropriate plant records."

SQN's Response

TVA will implement a test/inspection program to verify the heat transfer capability of all safety-related heat exchangers cooled by service water. The following is a list of each safety-related heat exchanger and type of program to be used to verify heat transfer capability. Initial testing/inspections for Unit 2 will be completed prior to start-up from the Unit 2 Cycle 4 refueling outage (fall of 1990). The initial tests/inspections for Unit 1 will be completed prior to start-up from the Unit 1 Cycle 5 refueling outage (winter of 1992). A continuing program for periodic retest/inspection will have an initial frequency of at least once every 18 months. After three tests/inspections, TVA plans to evaluate the results and determine the optimum test/inspection frequency to provide assurance that the equipment will perform the intended safety function. The minimum test frequency should not be less than once every five years as recommended in GL 89-13. TVA's test/inspection program and schedule will be documented and retained in appropriate plant records.

A. Component-Cooling Heat Exchangers

These heat exchangers are in the process of being replaced with a plate-type heat exchanger. The test program will apply to the plate-type heat exchangers when installed. Thermal performance testing will be performed to verify heat transfer capability.

B. Engineered Safety Features (ESF) Room Coolers

SQN is developing a program for these air-to-water heat exchangers to verify ERCW flow to meet design requirements. Temperature measurements of air and ERCW will be performed to verify heat transfer capability.

C. Lower Containment Vent Coolers

SQN is developing a program for these air-to-water heat exchangers to verify ERCW flow and air-side flow meet design requirements. Temperature measurements of air and ERCW will be performed to verify heat transfer capability.

D. Containment Spray Heat Exchangers

These heat exchangers are maintained in a layup condition with demineralized water and a corrosion inhibitor. Periodic inspection and maintenance will be performed for biofouling, silt, and corrosion products.

E. Diesel Engine Coolers

These heat exchangers are in service once every month during regularly scheduled surveillance runs of the diesel generators. Diesel engine coolant and lube oil temperatures are recorded and trended. Periodic inspection and maintenance will be performed for biofouling, silt, and corrosion products.

F. Auxiliary Control Air Compressor After-Cooler

Periodic inspection and maintenance will be performed for biofouling, silt, and corrosion products.

G. Condensers for Air-Conditioning Packages (Main Control Room, Shutdown Board Room, and Electric Board Room)

Periodic inspection and maintenance will be performed for biofouling, silt, and corrosion products.

H. Lube Oil Coolers

1. Centrifugal charging and safety injection pumps' lube oil coolers - oil temperatures are recorded and trended in accordance with ASME Section XI pump tests. Periodic inspection and maintenance will be performed for biofouling, silt, and corrosion products.

2. Air-conditioner packages (main control room, shutdown board room, and electric board room) - periodic inspection and maintenance will be performed for biofouling, silt, and corrosion products.

3. ERCW pump motors - periodic inspection and maintenance will be performed for biofouling, silt, and corrosion products.

Safety-related heat exchangers cooled by component cooling system (CCS) will not be included in a testing program. The CCS side of these heat exchangers will be inspected to verify there is no existing significant fouling. Present chemistry programs ensure high water quality for this system.

Action III

"Ensure by establishing a routine inspection and maintenance program for open-cycle service water system piping and components that corrosion, erosion, protective coating failure, silting, and biofouling cannot degrade the performance of the safety-related systems supplied by service water. The maintenance program should have at least the following purposes:

A. To remove excessive accumulations of biofouling agents, corrosion products, and silt;

B. To repair defective protective coatings and corroded service water system piping and components that could adversely affect performance of their intended safety functions.

This program should be established before plant startup following the first refueling outage beginning 9 months after the date of this letter. A description of the program and the results of these maintenance inspections should be documented. All relevant documentation should be retained in appropriate plant records."

SQN's Response

TVA has a routine inspection and maintenance program for SQN's ERCW piping and components to ensure that corrosion, erosion, protective coating failure, silting, and biofouling cannot degrade the performance of the safety-related systems supplied by ERCW. The program results are documented and retained as a plant record. The components of TVA's inspection/maintenance program are as follows:

1. Ultrasonic inspections of select portions of ERCW piping are performed on a periodic basis to check for piping degradation.

2. Periodic inspection and maintenance are performed on all safety-related heat exchangers cooled by ERCW for biofouling, silt, and corrosion products.

3. SQN has experienced cooler coil leakage on three centrifugal charging pump room coolers (1A-A, 1B-B, and 2B-B) that use ERCW as their cooling medium. These coil leaks were identified under SQN's condition adverse to quality (CAQ) program (SQP890605). TVA is currently investigating these problems to determine the mode of failure (i.e., erosion/corrosion) and the root cause (i.e., failure analysis).

Action IV

"Confirm that the service water system will perform its intended function in accordance with the licensing basis for the plant. Reconstitution of the design basis of the system is not intended. This confirmation should include a review of the ability to perform required safety functions in the event of failure of a single active component. To ensure that the as-built system is in accordance with the appropriate licensing basis documentation, this confirmation should include recent (within the past 2 years) system walkdown inspections. This confirmation should be completed before plant startup following the first refueling outage beginning 9 months or more after the date of this letter. Results should be documented and retained in appropriate plant records."

SQN's Response

The ERCW system is designed as a two train system, each train having the capability to provide the required cooling water for safe shutdown of both units. These equipment trains are sufficiently independent to guarantee the availability of at least one train at any time. They are designed with sufficient redundancy, separation, and reliability so that a single active failure will not remove more than one supply header loop per plant (i.e., either Headers 1A and 2A or Headers 1B and 2B will remain in service). The system is designed to support safe shutdown of both units during any of the design basis or external events.

The SQN design baseline and verification program (DBVP) confirmed the adequacy of modifications made (since the issuance of Unit 1 and Unit 2 operating licenses) to systems or portions of systems that must be operable to mitigate Final Safety Analysis Report (FSAR) Chapter 15 events and to provide for safe shutdown of the units. Additionally, the DBVP verified the original design of SQN was in accordance with its licensing basis. This DBVP effort included system walkdowns of safety-related equipment and documentation of problems identified. This walkdown served to identify ERCW system configuration problems and ensured the as-built system is in accordance with the applicable licensing basis documentation. The ERCW system evaluation report summarized the evaluation performed on ERCW. Discrepancies identified by the DBVP have been resolved.

In the fall of 1987, the NRC began an integrated design inspection (IDI) of the ERCW system to evaluate the adequacy of the SQN original design. This was accomplished by performing an in-depth, multidiscipline review of a representative vertical slice of the overall plant design in order that conclusions could be made regarding the adequacy of the TVA design process. The ERCW system was selected for this review since it is (1) a safety-related system designed by TVA, (2) the ERCW system traverses through many of the safety-related plant buildings, and (3) the ERCW system interfaces with other plant systems and components supplied by the nuclear steam supply system vendor or other component vendors and engineering service organizations. The IDI team reviewed calculations, drawings, procurement documents, design change documentation, maintenance requests, and licensee event reports.

The determination of the design adequacy was made by verifying that the design documents correctly and consistently implemented NRC regulations, FSAR licensing commitments, and national industry standards. Deficiencies and observations related to the subject generic letter as identified under the IDI program have been resolved.

Control of biofouling (Asiatic clams, slime, algae, etc.) and MIC in the ERCW system is accomplished by the continuous injection of a chlorine/bromine biocide.

A periodic balance (Surveillance Instruction [SI] 566, "ERCW Flow Verification Test") is performed on the ERCW system. This flow balance verifies the ERCW system provides the required flows to required safety-related components and equipment.

The periodic performance of SI-566 and the resolution of discrepancies identified by the DBVP and NRC's IDI confirm that the ERCW system is performing its intended function in accordance with the licensing basis for the plant.

The CCS is an intermediate closed-loop system that transfers heat from the safety-related items to the ERCW system. The ERCW system then rejects the heat to the ultimate heat sink. The CCS is not subject to significant sources of contamination and is one in which water chemistry is controlled.

The SQN DBVP verified the adequacy of any modifications made since the issuance of the Unit 1 and Unit 2 operating licenses to systems or portions of systems that must be operable to mitigate FSAR Chapter 15 events and to provide for safe shutdown of the units. Additionally, the DBVP verified the original design of SQN was in accordance with its licensing basis. This DBVP effort included a system walkdown of safety-related equipment and documentation of problems identified. This walkdown served to identify CCS configuration problems and ensured the as-built system is in accordance with the applicable licensing basis documentation. The discrepancies identified by DBVP for SQN's CCS have been resolved.

Action V

"Confirm that maintenance practices, operating and emergency procedures, and training that involves the service water system are adequate to ensure that safety-related equipment cooled by the service water system will function as intended and that operators of this equipment will perform effectively. This confirmation should include recent (within the past 2 years) reviews of practices, procedures, and training modules. The intent of this action is to reduce human errors in the operation, repair, and maintenance of the service water system. This confirmation should be completed before plant startup following the first refueling outage beginning 9 months or more after the date of this letter. Results should be documented and retained in appropriate plant records."

SQN Response

A. Maintenance Practices

SQN's maintenance practices for the ERCW system fall under SQN's PM program. Currently, there are 120 PM instructions that provide inspection requirements for components within this service water system.

Instructional steps within these PMs include inspection for blockage because of corrosion product's sludge and Asiatic clams. Inspection requirements for MIC or other defects that would affect equipment performance are also included in the instructions. These PMs require signoffs by chemistry and metallurgical personnel. Cleanliness inspection signoffs are also required by craft personnel. Based on the instructional requirements contained in SQN's PM program for ERCW, TVA considers these maintenance practices to be adequate for ensuring that these systems will perform their required safety function.

B. Operating and Emergency Procedures

SQN's operating and emergency instructions were reviewed and found to be adequate for ensuring SQN's ERCW system will function as intended and that operators of this equipment will perform effectively. SQN's operating procedures contain periodic inspection of the ERCW traveling screens and strainers. The traveling screens are backwashed four times each week and the ERCW strainers are backwashed three times a week. Under certain accident scenarios, SQN's emergency instructions require the ERCW screens and strainers to undergo continuous, manually operated backwash. This ensures that the ERCW supply is maintained free of debris/sludge under worst-case conditions.

C. Training

TVA conducted a review of 11 applicable lesson plans within SQN's operator training program to ensure these lesson plans include information on biofouling and its effects on safety-related heat exchangers. Following TVA's review, 2 of the 11 lesson plans needed revisions to include information regarding biofouling and possible degradation of safety-related heat exchangers and operator direction to monitor heat exchanger performance. TVA will revise these lesson plans by April 30, 1990.

TVA also conducted a review of the ERCW and CCS lesson plans within SQN's shift technical advisor (STA) training program and the technical staff and management (TS&M) orientation training program. These programs do not specifically address the problem of fouling and the reduced performance of heat exchangers. Both of these training programs will be revised to reflect the problems outlined in GL 89-13 by April 30, 1990.

ENCLOSURE 2

TVA RESPONSE TO GENERIC LETTER (GL) 89-13
FOR
WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2

Recommended Action I:

For open-cycle SWS, implement and maintain an ongoing program of surveillance and control techniques to significantly reduce the incidence of flow blockage problems as a result of biofouling. A program acceptable to the NRC is described in "Recommended Program to Resolve Generic Issue 51." An equally effective program to preclude biofouling would also be acceptable. All activities should be documented and all relevant documentation should be retained in appropriate plant records.

Recommended Program A, Generic Issue 51:

The intake structure should be visually inspected, once-per-refueling cycle, for macroscopic biological fouling organisms (for example, blue mussels at marine plants, American oysters at estuarine plants, and Asiatic clams at freshwater plants), sediment, and corrosion. Inspections should be performed either by scuba divers or by dewatering the intake structure or by other comparable methods. Any fouling accumulations should be removed.

Response:

WBN will perform a visual inspection, using divers, of the intake structure for Asiatic clams, sediment, and corrosion. Frequency of these inspections will initially be 18 months, or each refueling outage, with the first inspections before fuel loading of Unit 1. Fouling accumulations will be evaluated and removed as necessary.

Recommended Program B, Generic Issue 51:

The SWS should be continuously (for example, during spawning) chlorinated (or equally effectively treated with another biocide) whenever the potential for a macroscopic biological fouling species exists (for example, blue mussels at marine plants, American oysters at estuarine plants, and Asiatic clams at freshwater plants). Chlorination or equally effective treatment is included for freshwater plants without clams because it can help prevent microbiologically influenced corrosion. However, the chlorination (or equally effective) treatment need not be as stringent for plants where the potential for macroscopic biological fouling species does not exist compared to those plants where it does. Precautions should be taken to obey Federal, State, and local environmental regulations regarding the use of biocides.

Response:

(Reference TVA's responses to NRC concerning Bulletin 81-03 dated July 21, 1981 and March 21, 1983.)

Asiatic clams are controlled at WBN by continuous injection of sodium hypochlorite into the intake pumping station (IPS) whenever the temperature of the Tennessee River is above 60°F. Injection of sodium hypochlorite at the IPS simultaneously treats the Raw Cooling Water (RCW), Essential Raw Cooling Water (ERCW), Raw Service Water (RSW), and High Pressure Fire Protection (HPFP) systems. The total residual chlorine (TRC) concentration maintained throughout the various plant SWSs during the chlorination season ranges between 0.1 and 0.3 parts per million (ppm). The chlorination rate has been changed from TVA's original response referenced above. Previously, TRC concentration was 0.6 to 0.8 ppm chlorination rate. However, new studies have shown that chlorinating from 0.1 to 0.3 ppm is adequate to kill the larval clam. This concentration of TRC has been proven sufficient to control the Asiatic clam population in the SWSs. Precautions are taken to obey Federal, State, and local environmental regulations regarding the use of biocides. The program results are documented and retained by appropriate plant procedures. This program satisfies recommendation I.B.

Recommended Program C, Generic Issue 51:

Redundant and infrequently used cooling loops should be flushed and flow tested periodically at the maximum design flow to ensure that they are not fouled or clogged. Other components in the SWS should be tested on a regular schedule to ensure that they are not fouled or clogged.

Response:

WBN's safety-related cooling loops, except the containment spray cooling loops, are periodically used. Flow through these loops is verified either by surveillance test requirements, preventive maintenance requirements, the periodic operational schedules for running or flushing equipment, or by a combination of these. Routine tests provide an indication of whether the other safety-related SWS components are fouled or clogged. Additionally, the performance testing program addressed in Recommended Action II also ensures flow and heat transfer capability of the cooling loops except the containment spray cooling loops.

The containment spray cooling loops are maintained in a layup condition and periodically sampled to verify layup solution concentration, as noted in the Response to Recommended Action II.

Recommended Program C, Generic Issue 51 (Continued):

Service water cooling loops should be filled with chlorinated or equivalently treated water before layup. Systems that use RSW as a source, such as some HPFP, should also be chlorinated or equally effectively treated before layup to help prevent microbiologically influenced corrosion. Precautions should be taken to obey Federal, State, and local environmental regulations regarding the use of biocides.

Response:

The RSW and HPFP systems are normally in service; however, if the need arises to place these systems in layup, the systems are drained and placed in dry layup in accordance with existing site procedures. Dry layup of SWSs is preferred over wet layup with chlorine addition for the following reasons:

1. Dry layup eliminates the possibility for macrofouling and microfouling by removing the necessary aqueous environment.

2. Dry layup reduces electrochemical corrosion.

3. Maintenance activities on dry systems are performed more easily than on wet systems.

Even though the HPFP system is considered in service, the majority of the system usually receives little or no flow. For this reason, WBN procedures require that during the chlorination process the system be flushed at least twice and that a small continuous flow of water be established through the major headers. These activities ensure that the HPFP system continually receives chlorinated water during the clam spawning season.

Precautions are taken to obey Federal, State, and local environmental regulations regarding the use of biocides. Layup of systems is documented and retained by appropriate plant procedures.

Recommended Program D, Generic Issue 51:

Samples of water and substrate should be collected annually to determine if Asiatic clams have populated the water source. Water and substrate sampling is only necessary at freshwater plants that have not previously detected the presence of Asiatic clams in their source water bodies. If Asiatic clams are detected, utilities may discontinue this sampling activity if desired, and the chlorination (or equally effective) treatment program should be modified to be in agreement with paragraph B of Enclosure 1 to the GL above.

Response:

This recommendation does not apply. Watts Bar is a freshwater plant and has previously detected the presence of Asiatic clams in the source water.

Recommended Action II:

Conduct a test program to verify the heat transfer capability of all safety-related heat exchangers cooled by service water. A program acceptable to the NRC for heat exchanger testing is described in "Program for Testing Heat Transfer Capability" (Enclosure 2 to the GL).

Response:

WBN has an existing program for heat exchanger performance testing. This program will be revised to ensure that either the steps in Enclosure 2 of GL 89-13 or an equally effective course of action to satisfy the heat removal requirements of the SWS are implemented. This program, including initial performance testing, will be implemented during performance of the prestart test program to support fuel load.

Recommended Action II (Continued):

The need for testing of closed-cycle system heat exchangers has not been considered necessary, because of the assumed high quality of existing chemistry control programs. If the adequacy of these chemistry control programs cannot be confirmed over the total operating history of the plant, or if during the conduct of the total testing program any unexplained downward trend in heat exchanger performance is identified that cannot be remedied by maintenance of an open-cycle system, it may be necessary to selectively extend the test program and the routine inspection and maintenance program addressed in Recommended Action III, below, to the attached closed-cycle systems.

Response:

The Component Cooling System (CCS) at WBN has been under a chemical treatment program since 1979. In 1984, the copper-nickel CCS heat exchanger tubes were replaced with AL-6X stainless steel tubes. The replacement was due to a combination of chloride-pitting of the copper-nickel tubes and not having the necessary system flow-rate required for the service water side of the copper-nickel tubes. The chemistry controls of CCS have been adequate and WBN has not experienced any problems, other than the service water side of the heat exchanger tubes, over the operating history of the system.

The service water (shell) side of the containment spray heat exchangers has been filled with demineralized water and with hydrazine and ammonia added for corrosion control since 1981. The layup solution is routinely monitored to verify layup solution concentrations. The containment spray side of the heat exchangers is governed by the chemistry controls applicable to primary grade water. These chemistry controls are considered adequate to ensure long-term availability of these heat exchangers. Additionally, WBN plans to eddy current test these heat exchangers as discussed in the response to Recommended Action III.

Recommended Action III:

Ensure by establishing a routine inspection and maintenance program for open-cycle SWS piping and components that corrosion, erosion, protective coating failure, silting, and biofouling cannot degrade the performance of the safety-related systems supplied by service water. The maintenance program should have at least the following purposes:

A. To remove excessive accumulations of biofouling agents, corrosion products, and silt;

B. To repair defective protective coatings and corroded SWS piping and components that could adversely affect performance of their intended safety functions.

A description of the program and the results of these maintenance inspections should be documented. All relevant documentation should be retained in appropriate plant records.

Response:

The following routine inspections and maintenance are performed:

1. ERCW pumps are periodically disassembled, cleaned, and inspected.

2. ERCW traveling water screens are periodically inspected.

3. ERCW piping is periodically monitored for wall thinning by ultrasonic testing at key locations.

4. A sample of mortar lined piping submersed in the Tennessee River is periodically inspected for indications of mortar degradation.

5. Piping/mechanical components are inspected for corrosion and mortar fragments, and for mortar degradation of lined piping whenever the system is breached.

Corrosion, erosion, protective coating failure, silting, and biofouling detected by the above inspections are evaluated and appropriate action taken. The programs governing these inspections are contained in plant procedures. Results are documented and retained in plant records.

The following will be incorporated into the existing program.

1. Inspection of ERCW strainers on a periodic basis to verify strainer media is intact and to inspect for biofouling, silt, and corrosion products.

2. Inspection of ERCW pump motor-thrust bearing cooling coils on a periodic basis for biofouling, silt, and corrosion products.

3. Establish eddy current baseline data for the component cooling water, diesel generator, and containment spray heat exchangers, and establish a schedule for periodic eddy current testing.

4. Specify in procedures and instructions that an evaluation be performed whenever the ERCW system is breached and biofouling agents, corrosion products, silt and mortar fragments are found.

Recommended Action IV:

Confirm that the SWS will perform its intended function in accordance with the licensing basis for the plant. Reconstitution of the design basis of the system is not intended. This confirmation should include a review of the ability to perform required safety functions in the event of failure of a single active component. To ensure that the as-built system is in accordance with the appropriate licensing basis documentation, this confirmation should include recent (within the past two years) system walkdown inspections. Results should be documented and retained in appropriate plant records.

Response:

The following programs are currently being implemented for WBN:

- Design Baseline and Verification Program (DBVP)
- Hanger and Analysis Update Program (HAAUP)
- Vertical Slice Review (VSR)
- Review of Sequoyah Nuclear Plant (SQN), Independent Design Inspection (IDI) Deficiencies.

The ERCW and the CCS are included in each of the above programs. Completion of these programs will confirm that the ERCW and CCS will perform their intended functions in accordance with the licensing basis for the plant, that they are able to perform their required safety functions in the event of failure of a single component, and that the as-built system is in accordance with appropriate licensing basis documentation. These programs will be completed to support licensing of WBN. Program results are to be documented, evaluated, and retained in plant records.

Recommended Action V:

Confirm that maintenance practices, operating and emergency procedures, and training that involves the SWS are adequate to ensure that safety-related equipment cooled by the SWS will function as intended and that operators of this equipment will perform effectively. This confirmation should include recent (within the past two years) reviews of practices, procedures, and training modules. The intent of this action is to reduce human errors in the operation, repair, and maintenance of the service water system. Results should be documented and retained in appropriate plant records.

Response:

Maintenance Practices

Maintenance practices involving the ERCW and CCS are in accordance with the site quality assurance (QA) plan and Section XI of the ASME Boiler and Pressure Vessel Code. These systems are maintained as safety-related/quality-related systems, including implementation of corrective and preventive maintenance activities in accordance with Plant Operations Review Committee (PORC)-approved procedures. Maintenance activities and associated inspections are documented and retained in plant records as specified by the QA plan.

Operating and Emergency Procedures

Operating and emergency procedures are fully adequate to ensure that safety-related equipment cooled by the SWS will function as intended.

Training

Operator and Shift Technical Advisor Lesson Plans for training on the open and closed cooling water systems are adequate to ensure that operators of this equipment perform effectively. The Maintenance Training Module and Technical Staff and Manager's Lesson Plan that involves the open and closed cooling water systems will be revised to ensure that participants are made aware of biofouling problems, where the problems are likely to occur, and the importance of identifying and correcting the problems with respect to plant safety.

ENCLOSURE 3

TVA RESPONSE TO GENERIC LETTER (GL) 89-13
SUMMARY LIST OF COMMITMENTS

SQN

1. SQN will develop and implement a continuing program to perform periodic inspections (18-month frequency) of the ERCW intake structure for biological fouling mechanisms, sediment, and corrosion. The first inspection will take place on Unit 2 during the Unit 2 Cycle 4 refueling outage. The first inspection for Unit 1 will take place during the Unit 1 Cycle 5 refueling outage.

2. SQN will implement a continuing test/inspection program (18-month frequency) to verify the heat transfer capability of the safety-related heat exchangers listed in Enclosure 1. Initial testing/inspection for Unit 2 will be completed prior to start-up from the Unit 2 Cycle 4 refueling outage. The initial testing/inspection for Unit 1 will be completed prior to start-up from the Unit 1 Cycle 5 refueling outage.

3. TVA will revise Lesson Plans OPL271C026 and OPL271C027 within SQN's operator training program to include information on biofouling and its effects on safety-related heat exchangers. These lesson plans will be revised by April 30, 1990.

4. TVA will revise Lesson Plans EGT200.032 and EGT200.035 within SQN's STA training program and Lesson Plan EGT202.702 within SQN's TS&M orientation training program to include information on biofouling and its effects on safety-related heat exchangers. These lesson plans will be revised by April 30, 1990.