TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

November 7, 1983

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of	)	Docket No. 50-390
Tennessee Valley Authority	)	50-391

In response to D. G. Eisenhut's letter to "All Licensees of Operating Reactors, Applicants for Operating License, and Holders of Construction Permits," dated July 8, 1983 which transmitted (Generic Letter 83-28) "Required Actions Based on Generic Implications of Salem ATWS Events," TVA, by my letter to D. G. Eisenhut dated September 6, 1983, requested that an extension to February 29, 1984 be granted for responding to the subject generic letter. By your letter to H. G. Parris dated October 26, 1983, TVA was formally notified that the requested extension would not be granted and that TVA was to submit by November 5, 1983 the information requested by the generic letter. Enclosed is TVA's response.

If you have any questions concerning this matter, please get in touch with D. B. Ellis at FTS 858-2681.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 7th day of November 1983

Paulette N. White
Notary Public
My Commission Expires 9-5-84

B003
1/1

Enclosure
cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
RESPONSE TO GENERIC LETTER 83-28

REQUIRED ACTIONS BASED ON GENERIC
IMPLICATIONS OF SALEM ATWS EVENTS

1.1 Post-Trip Review (Program Description and Procedure)

The Division of Nuclear Power (NUC PR) has delineated the requirements for the reactor scram and turbine trip reports through its division procedures. All operating plants are required to have procedures which as a minimum meet the guidelines setforth in the corporate procedures. The comments contain under the following items as outlined by the Generic Letter describes the program, procedures, and methods used at Sequoyah Nuclear Plant (SQN) to perform a post trip review. Since Watts Bar (WBN) and Bellefonte (BLN) Nuclear Plants are still under constrution, these procedures and programs are either under development or will be developed in the future for those facilities. But their programs should closely follow the program discussed below in accordance with division procedures.

1.1.1 Criteria for Determining the Acceptability of Restart

The plant trip report is completed by the Unit Operator (UO), Assistant Shift Engineer (ASE), or Shift Technical Advisor (STA), following any unscheduled reactor or turbine trip. This procedure provides a step-by-step guidance to assist the user in ensuring that all safety systems actuated and operated correctly. After completion of the report, which includes all pertinent charts such as the trip sequence of events, the report is reviewed by the shift engineer (SE) and STA to verify that all systems operated correctly. Once the SE is satisfied that all systems operated as expected and the root cause of the trip has been determined and corrected, he has the authority to authorize unit restart. This is now documented in the General Operating Instructions. If the root cause cannot be determined or unexpected operations occurred during the trip, additional discussions or investigations by plant personnel and/or plant management will be initiated to resolve the problem and make recommendations to the SE.

1.1.2 The Responsibilities and Authorities of Personnel Who Will Perform the Review and Analysis of These Events

The primary personnel involved in post-trip review are the SE, ASE, UO, and STA. These personnel review the plant parameters and the chain of events that resulted in the trip; however, it is the SE who has the authority for declaring the unit safe for restart after the trip cause is known and a safety review performed. Available to the SE are plant maintenance and engineering sections to assist in any investigation into the trip that the SE may determine necessary.

1.1.3 The Necessary Qualifications and Training for the Responsible Personnel

All personnel involved in the primary role of event assessment are licensed operators by NRC except for the STA. The STA is a degreed engineer who has received plant specific training. All of these personnel have been trained in a systematic safety assessment approach to reactor trips including simulator training. In addition, TVA is also in the process of formally training various management and engineering personnel at the plant in system operations.

1.1.4 <u>The Sources of Plant Information Necessary To Conduct the Review and Analysis.</u>

There are many sources that the Operations personnel have available to use in a post-trip analysis. The present procedure requires the attaching of the charts from steam generator level, feedwater inlet flow and steam flow, nuclear instrumentation, pressurizer pressure, pressurizer level, overpower/over temperature and delta temperature, turbine reference pressure, reactor average temperature, turbine speed/governor valve positon, sequence of events recording, and post-mortem review program recording.

In addition, interviews with personnel who were directly involved with the trip are assimulated with the observations from the UO to provide a narrative discussion of the event in the report.

This combined information allows the primary personnel to accurately reconstruct the event in sufficient detail for a better understanding and complete evaluation of the event.

1.1.5 <u>The Methods and Criteria For Comparing Event Information with Known or Expected Plant Behavior</u>

The reactor trip report provides the necessary step-by-step checklist to verify that operations occurred as expected. Plant behavior is compared to limiting values contained in the technical specifications and expected behavior as described in the final safety analysis report to ensure operation was as expected and within limits. Any deviation is noted in the report and evaluated.

1.1.6 <u>The Criteria For Determining the Need For Independent Assessment of An Event of and Guidelines on the Preservation of Physical Evidence to Support Independent Analysis of the Event</u>

As noted in paragraph 1.1.2, the SE has the responsibility for making the decision as to whether the plant is safe to restart after a trip. Plant management is normally contacted in the event of an trip and is kept cognizant of the event assessment; Therefore, the SE does have the input from an independent group in making his decision, but it still remains the SE's responsibility to determine if it is safe to restart.

As a post-event assessment, the Plant Operations Review Committee (PORC) reviews the trip event, using the trip report and attached information, to concur with the actions and recommendations described in the report. The PORC chairman signs and dates the report to denote it has been reviewed and then transmits it to the plant document control unit for permanent record retention.

Conclusion

We believe that TVA is in compliance with the guidelines outlined in the Generic Letter 83-28 in that systematic assessment procedures do exist and adequately establish a complete evaluation of the event. The primary personnel involved in the assessment are well-trained and-and cognizant of the operation of the plant. In addition, the personnel effectively use the procedures which address post-trip review and assessment to ensure a safe restart of the unit.

1.2 Post-Trip Review - Data and Information Capability

Position

Licensees and applicants shall have or have planned a capability to record, recall, and display data and information to permit diagnosing the causes of unscheduled reactor shutdowns before restart and for ascertaining the proper functioning of safety-related equipment.

Adequate data and information shall be provided to correctly diagnose the cause of unscheduled reactor shutdowns and the proper functioning of safety-related equipment during these events using systematic safety assessment procedures (Action 1.1). The data and information shall be displayed in a form that permits ease of assimilation and analysis by persons trained in the use of systematic safety assessment procedures.

A report shall be prepared which describes and justifies the adequacy of equipment for diagnosing an unscheduled reactor shutdown.

Response

1.2.1 Capability for assessing sequence of events

1. Descriptions of equipment

   Plant computer - Westinghouse PRODAC P2500 computer system

2. Parameters monitored

   See attachment A for listing of parameters. Attachment E contains key symbols.

3. Time discrimination between events

   The order of occurrence is accurate for events occuring four or more milliseconds apart.

4. Format for displaying data and information

   See printout in attachment B.

5. Capability for retention of data and information

The system allows recording of the sequence of status changes of up to 50 register changes of Digital Trip Action (DTA) inputs. Printout occurs when either the number of saved status changes reaches 50 or after one minute has elapsed from the initation of saving cycle time. Printout includes all scanned changes in the order of their occurrence along with associated cycle times. This printout is then available for permanent storage.

6. Power source

The computer is powered from an inverter and backed up by station battery. It is considered non-Class 1E.

1.2.2 Capability for assessing the time history of analog variables needed to determine the cause of unscheduled reactor shutdowns, and the functioning of safety-related equipment.

1. Description of equipment

Plant computer - Westinghouse PRODAC P2500 computer system

2. Parameters monitored, sampling rate, and basis for selecting parameters and sampling rate

The following parameters (Group 2) are sampled at a 2.5 second rate.

1. Power range channel 1 (Quad 4) Q
2. Power range channel 2 (Quad 4) Q
3. Power range channel 3 (Quad 4) Q
4. Power range channel 4 (Quad 4) Q
5. TB first stage 1P
6. TB first stage 2P
7. Reactor Coolant TREF
8. Unit Generator Gross MW

All other parameters (Group 1) are listed in attachment C and are sampled at 10-second intervals.

See attachment E for key symbols.

3. Duration of time history

Group 1 points are monitored for 10 seconds both before and after a reactor trip.

Group 2 points are monitored for 2 minutes before trip and 3 minutes after a reactor trip.

4. Format for displaying data including scale of time histories

In the event of a trip, data is printed out for all points. An example of a typical post-trip output is shown in attachment D.

5. Capability for retention of data, information, and physical evidence

Data is not stored on magentic tape. The hardcopy printout is available for storage.

6. Power source

The computer is powered from an inverter and backed up by station battery. It is considered non-Class 1E.

1.2.3 Other data and information is provided to assess the cause of unscheduled reactor shutdowns.

The first out annunciator system provides information to the operator alerting him to the most probable cause of reactor trip. The operator also has strip chart recordings of selected parameters for use in determining causes of reactor trips.

1.2.4 Schedule for any planned changes to existing data and information capability

There are not any planned changes at this time.

2.1 Equipment Classification and Vendor Interface (Reactor Trip System Components)

Presently TVA's Division of Nuclear Power (NUC PR), identifies all components whose functioning is required to trip the reactor as safety-related. These components which include the reactor protection system, the solid state protection system, and all other components whose function is defined as safety-related are now outlined in TVA's Operational Quality Assurance manual as critical systems, structures, or components (CSSC) which is a corporate document. Each individual plant has incorporated the applicable portions of this document into their procedures. In addition, TVA's corporate procedures require all maintenance or modification activities to be documented prior to performing the work. This documentation is then reviewed by the appropriate plant organizations to ensure that it is properly identified as CSSC or non-CSSC and to ensure that the applicable procedures and quality requirements for the idenitified work will be adhered to. Furthermore, NUC PR requires that all procurement documents be identified as pertaining to CSSC or non-CSSC equipment. These procurement documents are reviewed by plant organizations or division central office organizations (depending on their point of origination) to ensure they are properly identified and contain the appropriate and required quality controls and specifications. Depending on the quality grouping, as outlined in division procedures that the procurement documents come under, many of them are also reviewed by other division central office organizations to further ensure that they meet all requirements.

In view of the present division and plant procedures pertaining to safety-related equipment identification, and information handling systems used to control safety-related activities, we believe TVA is in compliance with the NRC staffs position.

TVA's NUC PRs vendor interface program is presently centered around the division's operating experience review (OER) program which was developed to ensure that vendor and other related information would be handled from a systematic approach to continually inform the plants and other cognizant organizations of revisions, modifications, or deficiencies in plant equipment or procedures. The vendor interface program hinges around the original nuclear steam supply system (NSSS) supplier who supplied all reactor trip system components. Any information supplied by the NSSS vendor to the division corporate office is acknowledged upon receipt by the division and forwarded to the OER organization and entered in the system. This information is then forwarded to the cognizant organizations and plants for review, comments, recommendation, or incorporation into plant activities.

The review, comments, or recommendations are documented and returned to the operating experience review group (OERG) normally within 30 days as presently required by the division procedures. Any recommendations are forwarded to the plant for incorporation in plant activities or resolution. This information is tracked and documented by the OERG during the entire process until it has been incorporated or resolved. This documentation is then stored for the life of the plant for further reference.

Conclusion

As previously stated, we believe that TVA's programs properly identify the reactor trip system and related components as safety related. We also believe that TVA adequately controls activities such as maintenance, modification, and procurement on reactor trip system components. In addition, we believe that TVA's operating experience review program has established a comprehensive vendor interface program and ensures that vendor activities are reviewed and incorporated as necessary for the reactor trip system. In conclusion, we believe TVA's program is in compliance with NRC position and recommendations as stated in Generic Letter 83-28.

2.2 EQUIPMENT CLASSIFICATION AND VENDOR INTERFACE (PROGRAMS FOR ALL SAFETY-RELATED COMPONENTS)

Position

Licensees and applicants shall submit, for staff review, a description of their programs for safety-related equipment classification and vendor interface as described below:

2.2.1 For equipment classification, licensees and applicants shall describe their program for ensuring that all components of safety-related systems necessary for accomplishing required safety functions are identified as safety-related on documents, procedures, and information including maintenance, work orders, and replacement parts. This description shall include:

2.2.1.1 The criteria for identifying components as safety-related within systems currently classified as safety-related. This shall not be interpreted to require changes in safety classification at the systems level.

Response

During design and construction, the equipment classifications were identified in various design output documents such as drawings and construction project specifications. This classification was to be identified if the items fell under the requirements of a quality assurance program, not necessarily if it was safety-related.

NUC PR expanded this concept by establishing a Critical Structures Systems and Components (CSSC) list for each nuclear plant. The CSSC defines the scope of applicability of TVA's QA program on operating plants. All activities that could affect CSSC equipment are performed in accordance with QA program requirements. The present criteria, which are a part of our Operational Quality Assurance Manual (OQAM), are used for inclusion of items on the CSSC list are as follows.

I. General Criteria

A. Those items that are necessary to ensure

1. The integrity of the reactor coolant pressure boundary

2. The capability to shut down the reactor and maintain it in a safe condition

3. The capability to prevent or mitigate the consequences of an incident which could result in potential offsite exposures comparable to those specified in 10 CFR Part 100

B. Those items which the CSSC Subcommitte consider should receive the same level of quality assurance coverage as those listed in the general criteria above.

II. Specific Guidelines for Inclusion of Items on the CSSC List

Specific systems, structures, or components should be added to the CSSC list if they perform any of the following safety-related functions.

A. Maintains core reactivity control under emergency conditions including those covered by anticipated transients without scram (scram mechanisms).

B. Instruments and controls which are essential for emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal or are otherwise required for preventing significant release of radioactive material to the environment. Instrumentation and controls that perform an essential secondary function shall be considered safety-related if they are designed primarily to accomplish one of the above functions or where their failure would prevent accomplishing one of the above functions.

This includes those instruments and controls that are designed as safety-related and:

1. Automatically keep the reactor operating within safe region by shutting down the reactor whenever the limits of the region are approached (reactor trip signal instrumentation)

2. Initiate actuation of one or more of the engineered safety features in order to prevent or mitigate damage to the core and water coolant system components and ensure containment integrity (engineered safety features activation system instrumentation)

3. Provide protective interlocks to prevent an operator error which could lead to incidents or events representing limiting plant design cases (permissive and interlock circuits).

4. Indicators and recorders and associated channels which are essential to:

    a. Perform manual safety functions and to perform postaccident monitoring following a reactor trip due to any condition up to and including the design limiting fault (containment pressure indicators).

    b. Maintain the plant in a hot shutdown condition or to proceed to a cold shutdown condition while meeting the limits of the plant's technical specification (system pressure monitor).

    c. Monitor conditions in the reactor core, reactor coolant systems, mainsteam and feedwater systems and containment (auxiliary feedwater flow monitor).

C. Provides a barrier for containing reactor coolant within the reactor coolant pressure boundary (reactor coolant piping, valves, and fittings).

D. Cools the reactor core under emergency conditions (residual core heat removal systems).

E. Maintains fuel clad integrity (fuel clad, core power monitoring systems).

F. Provides power, control, logic, indication, and protection to systems or components to enable them to accomplish their safety function (diesel generators, vital ac and dc power).

G. Supports or houses equipment that performs a safety function or protects that safety-related equipment from potential natural phenomena, equipment failure, and manmade hazards (seismic class I containment and structures, fire protection systems).

H. Maintains specified environment (e.g., temperature, pressure humidity, radiation) as required in vital areas to maintain equipment operability and personnel access (control room habitability systems).

I. Supplies cooling water for the purpose of heat removal from the systems and components which provide a safety function (essential component cooling and service water systems).

J. Contains radioactive waste such that its failure could result in the release of radioactive waste to the offsite environments in violation of criteria A.3 (low-level radioactive waste discharge isolation valves).

K. Controls fuel storage to prevent inadvertent criticality (fuel storage racks).

L. Ensures adequate cooling for irradiated fuel in spent fuel storage (spent fuel cooling system).

M. Minimizes the probability of dropping objects on stored fuel (overhead crane).

N. Maintains primary containment as required by the FSAR to meet General Design Criteria 54, 55, 56, and 57 (containment penetrations and associated isolation and boundary valves).

O. Doors and hatches which serve one or more of the following functions for safety-related equipment and areas: (1) pressure confinement, (2) leakage confinement, (3) missile protection, (4) pipe whip and jet impingement barrier, (5) equipment rupture flood protection, (6) natural flood protection, or (7) fire protection.

The items in parentheses are examples of items which would be considered as applicable to the listed guidelines and therefore eligible for inclusion on the CSSC list. These guidelines are continually reviewed and updated by the CSSC Review Committee to include changes in NRC requirements and plant design and safety criteria as they occur.

III. The CSSC list is supplemented by TVA EN DES identified Class 1E equipment and requirements.

2.2.1.2 A description of the information handling system used to identify safety-related components (e.g., computerized equipment list) and the methods used for its development and validation.

Response

The overall development and maintenance of the CSSC list is the responsibility of the CSSC committee. The CSSC committee is a review group comprised of multidisciplined nuclear-experienced engineers and quality assurance representatives. The various technical branches under the oversight of the CSSC committee developed the initial CSSC list and evaluate all changes which are reviewed and approved by the CSSC committee. The CSSC list is issued and controlled manually as part of the OQAM.

2.2.1.3 A description of the process by which station personnel use this information handling system to determine that an activity is safety-related and what procedures for maintenance, surveillance, parts replacement, and other activities defined in the introduction of 10 CFR 50, Appendix B, apply to safety-related components.

Response

Plant activities that could affect equipment on the CSSC list are prescribed by instructions appropriate to the circumstances. These instructions are prepared, reviewed, and approved in accordance with section 6.0 of the plant's technical specifications and the plant QA program.

2.2.1.4 A description of the management controls utilized to verify that the procedures for preparation, validation and routine utilization of the information handling system have been followed.

Response

After licensing, the inplant Quality Engineering Section routinely and independently verifies that the plant instructions appropriately utilize the CSSC list and meet the plant's quality assurance requirements.

The Office of Quality Assurance performs audits of the central office activities and plant activities to verify that the QA requirements are met.

2.2.1.5 A demonstration that appropriate design verification and qualification testing is specified for procurement of safety-related components. The specifications shall include qualification testing for expected safety service conditions and provide support for the licensees' receipt of testing documentation to support the limits of life recommended by the supplier.

Response

Predefined specification for various components and materials have been prepared by various technical branches for items such as ASME code valve parts, pump parts and materials, and class 1E equipment. Also, when original specifications cannot be verified, the technical branches prepare specifications that are used in the procurement process. In addition, TVA prepares and utilizes substitution guides for standardized industry items such as bearings, V belts, capacitors and resistors. The quality assurance program requires that for items that have storage and shelf life, the vendor furnish such information.

The quality assurance program requires that the original design specification or the TVA originated specifications, supplemented by class 1E requirements, are used in procurement of CSSC components. All CSSC procurements are reviewed independently by a quality assurance or quality engineering group.

All items are receipt inspected to ensure that the required contract documentation and requirements are met.

2.2.1.6 Licensees and applicants need only to submit for staff review the equipment classification program for safety-related components. Although not required to be submitted for staff review, your equipment classification program should also include the broader class of structures, systems, and components important to safety required by GDC-1 (defined in 10 CFR Part 50, Appendix A, "General Design Criteria, Introduction").

Response--None Required

2.2.2 For vendor interface, . . . safety-related equipment are provided.

Response

TVA is actively participating in the NUTAC associated with NRC Generic letter 83-28, Section 2.2.2. The results of NUTAC are expected to be available for approval during February 1984. Upon receipt of the NUTAC recommendations, TVA will evaluate and provide a plan for implementation.

3.1 Post-Maintenance Testing (Reactor Trip System Components)

Action

1. Licensees and applicants shall submit the results of their review of test and maintenance procedures and technical specifications to assure that post-maintenance operability testing of safety-related components in the reactor trip system is required to be conducted and that the testing demonstrates that the equipment is capable of performing its safety functions before being returned to service.

Response

Administrative Instruction AI-9.2 at Watts Bar establishes the method and responsibilities necessary to conduct maintenance through the use of a Maintenance Request (MR) form TVA 6436. Maintenance on critical structures, systems, and components (CSSC) equipment (reactor trip system is CSSC) is required to be initiated by this form. AI-9.2 also requires the CSSC MR to refer to or become a PORC-reviewed instruction to perform maintenance or post-maintenance testing whenever the activity is complicated and requires a multi-disciplined technical review. All maintenance and post-maintenance testing is required to be preplanned. These MRs are originated by the person requesting maintenance. The MR planner (cognizant in area of requested maintenance) checks the MR and completes the areas necessary for identifying maintenance including post-maintenance testing.

The Prime computer at Watts Bar is used by the MR planner for identifying post-maintenance testing. The computer contains a listing of reactor trip system instruments and the surveillance instructions (SI) necessary to perform functional testing or calibrations.

Before any maintenance or testing can be performed, Quality Assurance (QA) must review the form to assure that the format and content are in compliance with QA requirements. After post-maintenance testing is completed, the MR must be signed by the section completing the test and the SI covering the test must be listed. Plant Operations must also sign the MR acknowledging that testing is completed. Once the MR is completed, QA must again review it to assure that the format and content are in compliance with QA requirements. The completed SI is also reviewed for accuracy and completeness.

Current reactor trip system functional test procedures do not independently test the uv and the shunt trip function. Procedures will be revised to reflect operability testing of existing equipment before fuel loading.

Based upon our review, Watts Bar's program does require post-maintenance testing and the procedures for this testing require operability before the reactor trip system can be returned to service.

2. Licensees and applicants shall submit the results of their check of vendor and engineering recommendations to ensure that any appropriate test guidance is included in the test and maintenance procedures or the technical specifications, where required.

Response

The Area Plan concept of NUC PR addresses 3.1.2 through its Regulatory Compliance Program. The Regulatory Compliance Program includes the program element entitled Nuclear Experience Review which makes broad-base use of industry experience information. The Reactor Engineering Branch is responsible for ensuring that this information is distributed to the appropriate sections, maintaining files, references, and responses for each item. Nuclear central office and plant staff within the area of their expertise review this information and inform the responsible section as to its applicability. However, the plant, with assistance from central office staffs, has the responsibility for implementing any corrective actions or recommendations.

As a part of this program, Westinghouse Electric Corporation was requested to furnish all technical bulletins and data letters which NUC PR did not have in their files. Most of these safety-related bulletins and data letters have since been reviewed for applicability to test and maintenance procedures. The remaining safety-related bulletins and data letters are being reviewed.

Our Nuclear Experience Review Program does ensure that vendor and engineering recommendations receive the appropriate distribution/review and verifies that test and maintenance procedures contain the appropriate vendor and engineering recommendations.

3. Licensees and applicants shall identify, if applicable, any post-maintenance test requirements in existing technical specifications which can be demonstrated to degrade rather than enhance safety. Appropriate changes to these test requirements, with supporting justification, shall be submitted for staff approval. (Note that action 4.5 discusses online system functional testing.)

Response

At the present time, we cannot identify any post-maintenance testing requirement which degrades rather than enhances safety.

3.2 Post-Maintenance Testing (All Other Safety-Related Components)

Action

1. Licensees and applicants shall submit a report documenting the extending of test and maintenance procedures and technical specifications review to ensure that post-maintenance operability testing of all safety-related equipment is required to be conducted and that the testing demonstrates that the equipment is capable of performing its safety functions before being returned to service.

Response

The Division of Nuclear Power Operational Quality Assurance Manual (OQAM) requires that maintenance instructions shall contain measures to cover the following.

"Upon completion of maintenance on any item of the CSSC list and before release for service, appropriate testing shall be performed to verify operational acceptability. Functional tests or industrial standard tests may be used for this purpose."

The OQAM also requires review of the maintenance request (MR) by the responsible section and the Field Quality Engineering (QE) Section before performance of maintenance on CSSC equipment. Standardized guidelines which include the following are provided for preparation/review of MRs.

1. Specify appropriate post-maintenance testing and, where applicable, reference the proper plant instruction.

2. Consider compliance with plant technical specifications. Specifically:

   a. Will removal of equipment from service for this maintenance violate any limiting conditions for operations?

   b. Are adequate post-maintenance tests (SIs) specified to ensure the equipment's readiness for operation?

3. Provide for return of equipment to normal status as required.

The MR requires that the section responsbile for the performance of the post-maintenance test and also the operations section shall sign to concur that the post-maintenance test was performed and the equipment is ready for return to service.

Based upon our review, the NUC PR program does require post-maintenance testing to demonstrate operability before safety-related components are returned to service. These requirements are implemented at each plant through plant specific instructions.

Administrative Instruction AI-9.1, "Watts Bar Nuclear Plant Maintenance Program," governs the performance of maintenance activities. Within this procedure, the responsibility for determining post-maintenance requirements is defined. AI-3.7, "Maintenance Instructions Preparation, Control, and Use," provides guidance for post-maintenance testing in procedures. AI9.2, "Maintenance Requests and Equipment Maintenance History," identifies those responsible for addressing and/or reviewing post-maintenance testing on the MR, provides guidance on how to address this item, and provides guidance for the preparation/review of MRs.

Action

2. Licensees and applicants shall submit the results of their check of vendor and engineering recommendations to ensure that any appropriate test guidance is included in the test and maintenance procedures or the technical specifications where required.

Response

TVA's philosophy has always been to utilize engineering judgment, operating experience, TVA policy, and industry experience in conjunction with vendor and engineering recommendations to ensure that any appropriate test guidance is included in the test and maintenance procedures or the technical specifications where required.

This is supplemented by a program dealing with the review of operating experience reports. This program establishes a system to ensure the review of operating experience reports to document their applicability to TVA plants, to provide required written responses, and to ensure proper disposition of all applicable items.

Also, in order to comply with IE Bulletin 79-01B and NUREG-0588, class 1E electrical equipment is being reviewed for applicable maintenance instructions required to maintain the environmental qualification of the equipment. This activity will be completed in accordance with the NRC ruling on environmental qualification.

In addition to the above, periodic review of procedures and instructions is required by the OQAM to determine if changes are necessary or desirable. This review is conducted no less frequently than every two years by an individual knowledgeable in the area affected by the procedure/instruction.

It is TVA's opinion that the above programs and philosophy provide sufficient checks and balances to provide reasonable assurance that vendor and engineering recommendations are incorporated as appropriate. Specific information for each plant is given below.

Administrative Instruction, AI-9.1, "Watts Bar Nuclear Plant Maintenance Program," states that "in preparation of preventive maintenance instructions for plant equipment, engineering judgment and operating experience will be used in conjunction with vendor manual recommendations to define the equipment PM requirements." This procedure also describes the program in place for placing items on the PM schedule following tentative transfer of equipment. Administrative Instruction AI3.1, "Plant Instructions - Control and Use," implements the requirement for periodic review of instructions. Standard Practice WB6.3.13, "Nuclear Operations Experience Review Program," implements at the plant level the TVA program for review of operating experience reports within the nuclear industry.

Action

3. Licensees and applicants shall identify, if applicable, any post-maintenance test requirements in existing technical specifications which are perceived to degrade rather than enhance safety. Appropriate changes to these test requirements, with supporting justification, shall be submitted for staff approval.

Response

NOT
It is TVA's philosophy to propose changes in existing technical specifications which are perceived to degrade rather than enhance safety. When items are identified, they will be submitted along with the supporting justification.

Reactor Trip System Reliability

4.1 Vendor-Related Modifications

Watts Bar is supplied with DS-416 breakers. The modifications described in the March 31, 1983 letter from Westinghouse will be implemented at Watts Bar before fuel loading. This was the only vendor-related modification applicable to Watts Bar.

4.2 Reactor Trip System Reliability (Preventive Maintenance and Surveillance Program for Reactor Trip Breakers)

Action

Licensees and applicants shall describe their preventive maintenance and surveillance program to ensure reliable reactor trip breaker operation. The program shall include the following.

1. A planned program of periodic maintenance, including lubrication, housekeeping, and other items recommended by the equipment supplier.

2. Trending of parameters affecting operation and measured during testing to forecast degradation of operability.

3. Life testing of the breakers (including the trip attachments) on an acceptable sample size.

4. Periodic replacement of breakers or components consistent with demonstrated life cycles.

Response

1. Maintenance Instruction (MI) Procedure 99.1 ~~57.2~~ and Technical Specification 3/4.3.1 at Watts Bar govern the programs that are in place for the periodic maintenance of DS-416 reactor trip breakers. A technical standard on reactor trip breakers has been drafted. We expect this standard to be issued by December 15, 1983. Watts Bar's MI 99.1 ~~57.2~~ will be WRITTEN ~~revised~~ to reflect the recommendation in the technical standard on reactor trip breakers by licensing.

2. A program for trending of parameters is recommended in the technical standard on reactor trip breakers. The technical standard states that the program should consist of the following.

   a. The compilation of all maintenance activity records into a historical file.

   b. The use of the Nuclear Plant Reliability Data System for breaker failure data.

   c. An MR system. The MR system is described in section 3.1.1 under response, paragraphs 1-3.

These suggestions will be used at Watts Bar in developing a program for trending of parameters to assess any possibility of performance degradation by licensing.

3. Life cycle testing of the shunt trip attachment and the undervoltage trip attachment of the reactor trip switchgear is being conducted by Westinghouse Electric Corporation for the Westinghouse Owners Group. This program is aimed toward establishing the service life of these devices and substantiating periodic test requirements with proper maintenance. The test program is scheduled for completion in the second quarter of 1984. Once this information is available, the technical standard on reactor trip breakers will be revised as applicable to incorporate this information.

4. A maintenance program for the periodic replacement of breakers or components consistent with demonstrated life cycles is addressed in the technical standard on reactor trip breakers. The maintenance program will be established after life cycle testing of the shunt trip attachment and the undervoltage trip attachment of the reactor trip switchgear information has been made available by Westinghouse for the Westinghouse Owners Group.

4.3 Automatic Actuation of Shunt Trip Attachments for Westinghouse and B&W Plants

4.5 System Functional Testing

TVA, as a member of the Westinghouse Owners Group (WOG), is working closely with Westinghouse in addressing required actions with respect to automatic actuation of the shunt trip attachment of the reactor trip breaker and the online surveillance requirement. A detailed generic design package for incorporation of an automatic shunt trip feature including provisions for online surveillance has been developed under WOG sponsorship. The complete generic design package of the automatic shunt trip modification was submitted to NRC by letter OG-101 from J. J. Sheppard, Chairman of WOG, dated June 14, 1983.

The generic design package of the automatic shunt trip modification contains a design basis, functional requirements, conceptual design, and addressment of conformance to safety criteria. The design of the system includes hard-wired component installation provisions for online surveillance testing that independently verifies by manual means the operability of the undervoltage trip attachment (UVTA) and the automatic shunt trip on the main reactor trip breakers.

The NRC issued a favorable safety evaluation report on the generic design on August 10, 1983 (letter from D. G. Eisenhut to J. J. Sheppard). The SER lists plant-specific information required for individual plant modifications.

TVA has submitted to NRC proposed modifications to Watts Bar's draft technical specifications concerning the reactor trip system (RTS) instrumentation. These changes are consistent with WCAP 10271 "Evaluation of Surveillance Frequencies and Out-of-Service Times for the Reactor Protection Instrumentation System."

The RTS at Watts Bar is similar to the one at Sequoyah and we expect the same high reliability with Watts Bar's RTS as Sequoyah. In addition, the surveillance requirements delineated in WCAP 10271 are consistent with achieving high reactor trip system availability.

Attachment A

Sequence of Events
Digital Points

F0403D	RCL LO F ABOVE P-8 CAUS RE
F0423D	RCL LO F ABOVE P-7 CAUS RE
F0493D	STM HI F 4 LO PRESS SI CAUS RE
L0406D	STM GEN 1 LO LO L CAUS RE
L0426D	STM GEN 2 LO LO L CAUS RE
L0446D	STM GEN 3 LO LO L CAUS RE
L0466D	STM GEN 4 LO LO L CAUS RE
L0483D	PRESSURIZER HI L AND P7 CAUS RE
N0005D	PWR RNG CH HI Q HI SP CAUS RE
N0010D	PWR RNG CH HI Q LO SP CAUS RE
N0024D	INTERM RNG HI Q CAUS RE
N0029D	PWR RNG CHAN HI Q RATE CAUS RE
N0036D	SOURCE RNG HI Q CAUS RE
P0407D	STM LINE DP LOW P1 SI CAUS RE
P0427D	STM LINE DP LOW P2 SI CAUS RE
P0447D	STM LINE DP LOW P3 SI CAUS RE
P0467D	STM LINE DP LOW P4 SI CAUS RE
P0483D	PRESSURIZER HI P CAUS RE
P0488D	PRESSURIZER LO P AND P7 CAUS RE
P1003D	CONTAINM HI P SI CAUS RE
T0498D	RCL OVERTEMP DT CAUS RE
T0499D	RCL OVERPWR DT CAUS RE
Y0324D	RCP BUS UNDER VOLT AND P7 CAUS RE
Y0004D	REAC MANUAL TR 1 CAUS RE
Y0005D	REAC MANUAL TR 2 CAUS RE
Y0006D	REAC MAIN TR BKR A
Y0007D	REAC MAIN TR BKR B
Y0026D	REAC AUX TR BKR A
Y0027D	REAC AUX TR BKR B
Y0324D	RCP BUS UNDER FRE AND P7 CAUS RE
Y0335D	UNIT ONLINE
Y0336D	RHP ISOL BYPASS VLV
Y0337D	RHP ISOL BYPASS VLV
Y0390D	TB STOP VALVES CL AND P7 CAUS RE
Y0401D	STM GEN 1 LO L AND FW F CAUS RE
Y0421D	STM GEN 2 LO L AND FW F CAUS RE
Y0441D	STM GEN 3 LO L AND FW F CAUS RE
Y0461D	STM GEN 4 LO L AND FW F CAUS RE
Y0480D	PRESSURIZER LO PRESS SI CAUS RE
Y0920D	SFTY INJ SET MANUAL 1 CAUS RE
Y0921D	SFTY INJ SET MANUAL 2 CAUS RE
Y2000D	TB TRIP-COND VACUUM

Y2001D	TB TRIP-HYD FLUID PRESS
Y2003D	TB TRIP-OVERSPEED CAUS RE
Y2004D	TB TRIP-STATOR COOLANT
Y2005D	TB TRIP-BRG OIL LEVEL
Y2007D	TB TRIP-FPT S
Y2008D	TB TRIP-SOL ENERGIZED
Y2009D	TB TRIP-HYD FLUID LEVEL
Y2010D	TB TRIP-VIBRATION
Y2011D	TB TRIP-EH CONTROL PWR
Y2012D	TB TRIP-THRUST BRG WEAR
Y2013D	TB TRIP-BRG OIL PRESS
Y2400D	FPT A TRIP-PMP TB BRG OIL PRESS
Y2401D	STANDBY MAIN FW PMP BRK
Y2402D	FPT A TRIP-THRUST BRG WEAR
Y2403D	FPT A TRIP-SUCTION VALVE
Y2404D	STANDBY MAIN FW PMP TR-SUCT VLV
Y2405D	FPT A TRIP-INJECTION WATER
Y2406D	FPT A TRIP-COND VACUUM
Y2407D	SSPS TB TRIP TRAIN A
Y2408D	BUS DIFFERENTIAL
Y2410D	FPT B TRIP-PMP TB BRG OIL PRESS LOW
Y2412D	FPT B TRIP-THRUST BRG WEAR
Y2413D	FPT B TRIP-SUCTION VALVE
Y2415D	FPT B TRIP-INJECTION WATER
Y2416D	FPT B TRIP-COND VACUUM
Y2417D	SSPS TB TRIP TRAIN B
Y2801D	GEN DIFF
Y2802D	BUS BKR FAILURE
Y2803D	GEN NEG PHASE SEQ
Y2804D	GEN BACKUP AND MN XFMR FDR DIFF
Y2805D	GEN NEUTRAL OVERVOLT
Y2806D	GEN OVERCURRENT
Y2807D	GEN REVERSE POWER
Y2808D	MAIN XFMR DIFF-SWD PRESS
Y2809D	USS XFMR DIFF-PRESS-OC-NEUT-OC
Y2815D	CRD MG SET A
Y2816D	CRD MG SET B
Y2906D	ENVIRON MON SYS
Y2917D	NUC PWR 1 RE TR P9 PART PERM
Y2918D	NUC PWR 2 RE TR P9 PART PERM
Y2919D	NUC PWR 3 RE TR P9 PART PERM
Y2920D	NUC PWR 4 RE TR P9 PART PERM
Y2921D	NUC PWR P9 PERM

ATTACHMENT B

13:09 SEQUENCE OF EVENTS RECORD. FIRST EVENT AT H13 M07 S51

Y0006D REAC MAIN TR BKR A	TRIP	C 0
Y0006D REAC MAIN TR BKR A	NOT TR	C 601
Y0006D REAC MAIN TR BKR A	TRIP	C1201
Y0006D REAC MAIN TR BKR A	NOT TR	C1800
Y0006D REAC MAIN TR BKR A	TRIP	C2401
Y0006D REAC MAIN TR BKR A	NOT TR	C3001

13:09 END OF SEQUENCE OF EVENTS RECORD

13:09 SEQUENCE OF EVENTS RECORD. FIRST EVENT AT H13 M08 S51

Y0006D REAC MAIN TR BKR A	TRIP	C 0
Y0006D REAC MAIN TR BKR A	NOT TR	C 599
Y0006D REAC MAIN TR BKR A	TRIP	C1201
Y0006D REAC MAIN TR BKR A	NOT TR	C1800
Y0006D REAC MAIN TR BKR A	TRIP	C2400
Y0006D REAC MAIN TR BKR A	NOT TR	C3001
Y0006D REAC MAIN TR BKR A	TRIP	C3599

13:10 END OF SEQUENCE OF EVENTS RECORD

13:11 SEQUENCE OF EVENTS RECORD. FIRST EVENT AT H13 M10 S01

Y0006D REAC MAIN TR BKR A	NOT TR	C 0
Y0006D REAC MAIN TR BKR A	TRIP	C 601
Y0006D REAC MAIN TR BKR A	NOT TR	C1200
Y0006D REAC MAIN TR BKR A	TRIP	C1799
Y0006D REAC MAIN TR BKR A	NOT TR	C2400
Y0006D REAC MAIN TR BKR A	TRIP	C2999
Y0006D REAC MAIN TR BKR A	NOT TR	C3599

13:11 END OF SEQUENCE OF EVENTS RECORD

13:13 SEQUENCE OF EVENTS RECORD. FIRST EVENT AT H13 M11 S11

Y0006D REAC MAIN TR BKR A	TRIP	C 0
Y0006D REAC MAIN TR BKR A	NOT TR	C 599
Y0006D REAC MAIN TR BKR A	TRIP	C1199
Y0006D REAC MAIN TR BKR A	NOT TR	C1[illegible]0
Y0006D REAC MAIN TR BKR A	TRIP	C2400
Y0006D REAC MAIN TR BKR A	NOT TR	C2999

13:1[illegible] END OF SEQUENCE OF EVENTS RECORD

13:1[illegible] SEQUENCE OF EVENTS RECORD. FIRST EVENT AT H13 M12 S11

Y0006D REAC MAIN TR BKR A	TRIP	C 0
Y0006D REAC MAIN TR BKR A	NOT TR	C 599
Y0006D REAC MAIN TR BKR A	TRIP	C1199
Y0006D REAC MAIN TR BKR A	NOT TR	C1800
Y0006D REAC MAIN TR BKR A	TRIP	C2399
Y0006D REAC MAIN TR BKR A	NOT TR	C2998

[illegible] END OF SEQUENCE OF EVENTS RECORD

[illegible] SEQUENCE OF EVENTS RECORD. FIRST EVENT AT H13 M27 S41

Attachment C

Post Trip Analog Points

F0125A	RCP4 SEAL WTR F
F0127A	RCP3 SEAL WTR F
F0129A	RCP2 SEAL WTR F
F0131A	RCP1 SEAL WTR F
F0400A	RCL1 1 F
F0401A	RCL1 2 F
F0402A	RCL1 3 F
F0403A	STM GEN 1 FEED WTR IN 1 F
F0404A	STM GEN 1 FEED WTR IN 2 F
F0405A	STM GEN 1 STM OUT 1 F
F0406A	STM GEN 1 STM OUT 2 F
F0420A	RCL2 1 F
F0421A	RCL2 2 F
F0422A	RCL2 3 F
F0423A	STM GEN 2 FEED WTR IN 1 F
F0424A	STM GEN 2 FEED WTR IN 1 F
F0425A	STM GEN 2 STM OUT 1 F
F0426A	STM GEN 2 STM OUT 2 F
F0440A	RCL 3 1 F
F0441A	RCL 3 2 F
F0442A	RCL 3 3 F
F0443A	STM GEN 3 FEED WTR IN 1 F
F0444A	STM GEN 3 FEED WTR IN 2 F
F0445A	STM GEN 3 STM OUT 1 F
F0446A	STM GEN 3 STM OUT 2 F
F0460A	RCL 4 1 F
F0461A	RCL 4 2 F
F0462A	RCL 4 3 F
F0463A	STM GEN 4 FEED WTR IN 1 F
F0464A	STM GEN 4 FEED WTR IN 2 F
F0465A	STM GEN 4 STM OUT 1 F
F0466A	STM GEN 4 STM OUT 2 F
F0483A	PRESSURIZER SPRAY CONT 1 DEMAND
F0484A	PRESSURIZER SPRAY CONT 2 DEMAND
F2250A	FW PMP 1A DISCH F
F2251A	FW PMP 1B DISCH F
L0400A	STM GEN 1 NAR RNG 1 L
L0401A	STM GEN 1 NAR RNG 2 L
L0402A	STM GEN 1 NAR RNG 3 L
L0403A	STM GEN 1 WIDE RNG L
L0420A	STM GEN 2 NAR RNG 1 L
L0421A	STM GEN 2 NAR RNG 2 L
L0422A	STM GEN 2 NAR RNG 3 L
L0423A	STM GEN 2 WIDE RNG 3 L

L0440A	STM GEN 3 NAR RNG 1 L
L0441A	STM GEN 3 NAR RNG 2 L
L0442A	STM GEN 3 NAR RNG 3 L
L0443A	STM GEN 3 WIDE RNG L
L0460A	STM GEN 4 NAR RNG 1 L
L0461A	STM GEN 4 NAR RNG 2 L
L0462A	STM GEN 4 NAR RNG 3 L
L0463A	STM GEN 4 WIDE RNG L
L0480A	PRESSURIZER 1 L
L0481A	PRESSURIZER 2 L
L0482A	PRESSURIZER 3 L
L0483A	PRESSURIZER LVL CONTROL SP
N0031A	SOURCE RNG DETECTOR 2 LOG Q
N0032A	SOURCE RNG DETECTOR 2 LOG Q
N0035A	INTERM RNG HI DETECTOR 1 LOG Q
N0036A	INTERM RNG HI DETECTOR 2 LOG Q
N0041A	PWR RNG CH1 (QUAD 4) TOP DETECT Q
N0042A	PWR RNG CH1 (QUAD 4) BOT DETECT Q
N0043A	PWR RNG CH2 (QUAD 2) TOP DETECT Q
N0044A	PWR RNG CH2 (QUAD 2) BOT DETECT Q
N0045A	PWR RNG CH3 (QUAD 1) TOP DETECT Q
N0046A	PWR RNG CH3 (QUAD 1) BOT DETECT Q
N0047A	PWR RNG CH4 (QUAD 3) TOP DETECT Q
N0048A	PWR RNG CH4 (QUAD 3) BOT DETECT Q
N0049A	PWR RNG CHANNEL 1 (QUAD 4) Q
N0050A	PWR RNG CHANNEL 2 (QUAD 2) Q
N0051A	PWR RNG CHANNEL 3 (QUAD 1) Q
N0052A	PWR RNG CHANNEL 4 (QUAD 3) Q
P0398A	TB FIRST STAGE 1 P
P0399A	TB FIRST STAGE 2 P
P0400A	STM GEN 1 STM OUT 1 P
P0401A	STM GEN 1 STM OUT 2 P
P0402A	STM GEN 1 STM OUT 3 P
P0420A	STM GEN 2 STM OUT 1 P
P0421A	STM GEN 2 STM OUT 2 P
P0422A	STM GEN 2 STM OUT 3 P
P0440A	STM GEN 3 STM OUT 1 P
P0441A	STM GEN 3 STM OUT 2 P
P0442A	STM GEN 3 STM OUT 3 P
P0460A	STM GEN 4 STM OUT 1 P
P0461A	STM GEN 4 STM OUT 2 P
P0462A	STM GEN 4 STM OUT 3 P
P0480A	PRESSURIZER 1 P
P0481A	PRESSURIZER 2 P
P0482A	PRESSURIZER 3 P
P0483A	PRESSURIZER 4 P
P0496A	STM LINE HDR P
P0498A	RC WIDE RANGE 1 P
P0499A	RC WIDE RANGE 2 P

P1000A	CONTAINMENT 1 P
P1001A	CONTAINMENT 2 P
P1002A	CONTAINMENT 3 P
P1003A	CONTAINMENT 4 P
P2263A	COND ZONE A BACKPRESSURE
P2264A	COND ZONE B BACKPRESSURE
P2265A	COND ZONE C BACKPRESSURE
P2273A	FEEDWATER HTRS 1 OUTLET HDR Q
Q0340A	UNIT GENERATOR GROSS MW
T0400A	RCL1 1 TAVG
T0403A	RCL1 1 DT
T0406A	RCL1 WIDE RNG COLD LEG T
T0407A	RCL1 OVERPWR DT 1 SP
T0410A	RCL1 OVERTEMP DT 1 SP
T0412A	RCP1 STATOR WINDING PH C T
T0418A	STM GEN 1 FEED WTR IN T
T0419A	RCL1 WIDE RNG HOT LEG T
T0420A	RCL2 1 TAVG
T0423A	RCL2 1 DT
T0426A	RCL2 WIDE RNG COLD LEG T
T0427A	RCL2 OVERPWR DT 1 SP
T0430A	RCL2 OVERTEMP DT 1 SP
T0432A	RCP2 STATOR WINDING PH C T
T0438A	STM GEN 2 FEED WTR IN T
T0439A	RCL2 WIDE RNG HOT LEG T
T0440A	RCL3 1 TAVG
T0443A	RCL3 1 DT
T0446A	RCL3 WIDE RNG COLD LEG T
T0447A	RCL3 OVERPWR DT 1 SP
T0450A	RCL3 OVERTEMP DT 1 SP
T0452A	RCP3 STATOR WINDING PH C T
T0458A	STM GEN 3 FEED WTR IN T
T0459A	RCL3 WIDE RNG HOT LEG T
T0460A	RCL4 1 TAVG
T0463A	RCL4 1 DT
T0466A	RCL4 WIDE RNG COLD LEG T
T0467A	RCL4 OVERPWR DT 1 SP
T0470A	RCL4 OVERTEMP DT 1 SP
T0472A	RCL4 STATUR WINDING PH C T
T0478A	STM GEN 4 FEED WTR IN T
T0479A	RCL4 WIDE RNG HOT LEG T
T0481A	PRESSURIZER STM T
T0496A	RC TREF
T0497A	RCL HIGHEST DT (AUCTIONEER)
T0499A	RCL HIGHEST TAVG (AUCTIONEER)

RKG:VD
10/27/83

B4300A.VD

ATT[redacted]HMENT D
Page 1 of 4

14:23 TRIP REVIEW STARTED DATE: 10/17/74 TRIP TIME 14:20:26.0

TIME	POWER RANGE CHAN Q N0049A	N0050A	N0051A	N0052A
20:17.2	100.0	100.0	100.0	100.0
20:19.7	100.0	100.0	100.0	100.0
20:22.2	100.0	100.0	100.0	100.0
20:24.7	100.0	100.0	100.0	100.0
20:27.2	100.0	100.0	100.0	100.0
20:29.7	100.0	100.0	100.0	100.0
20:32.2	100.0	100.0	100.0	100.0
20:34.7	100.0	100.0	100.0	100.0

TIME	GR MW U0340A	1ST ST P P0398A	P0399A	TREF T0496A
20:17.2	555.0	51.7	51.7	303.0
20:19.7	555.0	51.7	51.7	303.0
20:22.2	595.0	51.7	51.7	303.0
20:24.7	595.0	51.7	51.7	303.0
20:27.2	595.0	51.7	51.7	303.0
20:29.7	595.0	51.7	51.7	303.0
20:32.2	595.0	51.7	51.7	303.0
20:34.7	595.0	51.7	51.7	303.0

TIME	POWER RANGE CHAN Q N0049A	N0050A	N0051A	N0052A	N0041A	POWER RANGE TOP N0043A	N0045A	N0047A	N0042A	POWER RANGE BOT N0044A	N0046A	N0048A
18:29.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
18:39.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
18:49.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
18:59.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
19:09.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
19:19.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
19:29.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
19:39.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
19:49.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
19:59.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
20:09.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
20:19.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
20:29.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
20:39.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
20:49.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
20:59.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
21:09.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
21:19.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
21:29.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
21:39.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
21:49.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
21:59.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
22:09.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
22:19.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
22:29.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
22:39.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
22:49.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
22:59.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
23:09.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
23:19.7	100.0	100.0	100.0	100.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

TIME	SOURCE RNG N0031A	N0032A	INTERM RNG N0035A	N0036A	GR MW U0340A	1ST ST P P0398A	P0399A	TREF T0496A
18:29.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
18:39.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
18:49.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
18:59.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
19:09.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
19:19.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
19:29.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
19:39.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
19:49.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
19:59.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
20:09.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
20:19.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
20:29.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
20:39.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
20:49.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
20:59.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
21:09.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
21:19.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
21:29.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
21:39.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
21:49.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
21:59.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
22:09.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
22:19.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
22:29.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
22:39.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
22:49.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
22:59.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
23:09.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0
23:19.7	31.0	32.0	535.000	536.000	595.0	51.7	51.7	303.0

FIGURE 3-8a: POST TRIP

TIME	RCL 1 TAVG T0400A	RCL 1 TAVG T0401A	RCL 2 TAVG T0420A	RCL 2 TAVG T0421A	HI TAV T0499A	RCL 1 DT T0403A	RCL 1 DT T0404A	RCL 2 DT T0423A	RCL 2 DT T0424A	HI DT T0497A	T COLD (WR) T0406A	T COLD (WR) T0426A	T HOT T0419A	T HOT T0439A
18:31.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
18:41.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
18:51.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
19:01.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
19:11.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
19:21.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
19:31.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
19:41.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
19:51.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
20:01.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
20:11.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
20:21.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
20:31.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
20:41.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
20:51.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
21:01.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
21:11.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
21:21.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
21:31.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
21:41.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
21:51.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
22:01.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
22:11.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
22:21.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
22:31.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
22:41.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
22:51.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
23:01.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
23:11.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7
23:21.4	S 301.3	S 301.3	S 301.3	S 301.3	S 302.7	S 100.0	S 100.0	S 100.0	S 100.0	S 100.0	S 282.2	S 282.2	S 320.7	S 320.7

TIME	RCL 1 OP DT T0407A	RCL 1 OP DT T0408A	RCL 2 OP DT T0427A	RCL 2 OP DT T0428A	RCL 1 OT DT T0410A	RCL 1 OT DT T0411A	RCL 2 OT DT T0430A	RCL 2 OT DT T0431A
18:31.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
18:41.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
18:51.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
19:01.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
19:11.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
19:21.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
19:31.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
19:41.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
19:51.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
20:01.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
20:11.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
20:21.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
20:31.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
20:41.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
20:51.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
21:01.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
21:11.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
21:21.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
21:31.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
21:41.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
21:51.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
22:01.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
22:11.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
22:21.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
22:31.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
22:41.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
22:51.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
23:01.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
23:11.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0
23:21.4	S 96.0	S 96.0	S 96.0	S 96.0	S 99.0	S 99.0	S 101.0	S 101.0

TIME	STEAM FLOW F0405A	STEAM FLOW F0406A	STEAM FLOW F0425A	STEAM FLOW F0426A	FEEDWATER FLOW F0403A	FEEDWATER FLOW F0404A	FEEDWATER FLOW F0423A	FEEDWATER FLOW F0424A
18:31.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
18:41.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
18:51.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
19:01.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
19:11.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
19:21.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
19:31.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
19:41.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
19:51.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
20:01.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
20:11.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
20:21.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
20:31.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
20:41.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
20:51.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
21:01.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
21:11.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
21:21.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
21:31.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
21:41.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
21:51.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
22:01.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
22:11.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
22:21.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
22:31.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
22:41.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
22:51.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
23:01.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
23:11.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2
23:21.4	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2	S 473.2

FIGURE [illegible]-8b: POST TRIP

ATTACHMENT D
Page 3 of 4

TIME	SG 1 STM P P0400A	P0401A	P0402A	SG 2 STM P P0420A	P0421A	P0422A
18:31.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
18:41.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
18:51.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
19:01.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
19:11.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
19:21.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
19:31.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
19:41.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
19:51.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
20:01.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
20:11.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
20:21.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
20:31.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
20:41.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
20:51.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
21:01.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
21:11.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
21:21.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
21:31.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
21:41.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
21:51.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
22:01.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
22:11.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
22:21.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
22:31.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
22:41.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
22:51.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
23:01.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
23:11.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4
23:21.5	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4	S 54.4

TIME	SG 1 LEVEL L0400A	L0401A	L0402A	L0403A	SG 2 LEVEL L0420A	L0421A	L0422A	L0423A
18:31.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
18:41.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
18:51.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
19:01.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
19:11.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
19:21.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
19:31.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
19:41.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
19:51.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
20:01.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
20:11.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
20:21.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
20:31.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
20:41.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
20:51.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
21:01.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
21:11.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
21:21.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
21:31.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
21:41.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
21:51.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
22:01.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
22:11.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
22:21.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
22:31.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
22:41.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
22:51.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
23:01.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
23:11.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2
23:21.5	S 50.0	S 51.0	S 52.0	S 45.1	S 53.0	S 54.0	S 55.0	S 45.2

TIME	PZR LEVEL L0480A	L0481A	L0482A	P L SP L0483A	PZR PRESSURE P0480A	P0481A	P0482A	P0483A	STM T T0481A
18:31.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
18:41.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
18:51.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
19:01.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
19:11.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
19:21.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
19:31.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
19:41.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
19:51.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
20:01.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
20:11.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
20:21.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
20:31.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
20:41.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
20:51.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
21:01.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
21:11.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
21:21.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
21:31.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
21:41.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
21:51.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
22:01.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
22:11.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 346.0	
22:21.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
22:31.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
22:41.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
22:51.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
23:01.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
23:11.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0
23:21.5	S 43.0	S 43.0	S 43.0	S 46.0	S 155.0	S 155.0	S 155.0	S 155.0	S 346.0

FIGURE 3-8c: POST TRIP

ATTACHMENT D
page 4 of 4

(W)

TIME	ACL 1 FLOW F0400A	F0401A	F0402A	ACL 2 FLOW F0420A	F0421A	F0422A	SYS P P0499A	CONTAINMENT P P1000A	P1001A	P1002A	RCP SEAL DP P0131A	P0129A
18:31.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
18:41.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
18:51.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
19:01.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
19:11.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
19:21.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
19:31.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
19:41.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
19:51.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
20:01.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
20:11.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
20:21.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
20:31.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
20:41.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
20:51.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
21:01.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
21:11.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
21:21.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
21:31.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
21:41.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
21:51.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
22:01.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
22:11.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
22:21.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
22:31.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
22:41.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
22:51.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
23:01.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
23:11.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0
23:21.5	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 100.0	$ 154.0	$ 0.00	$ 0.01	$ 0.02	$ 131.0	$ 129.0

TIME	SG FW INT TC418A	TC438A	HDR P P0496A
18:31.5	$ 223.3	$ 223.3	$ 54.4
18:41.5	$ 223.3	$ 223.3	$ 54.4
18:51.5	$ 223.3	$ 223.3	$ 54.4
19:01.5	$ 223.3	$ 223.3	$ 54.4
19:11.5	$ 223.3	$ 223.3	$ 54.4
19:21.5	$ 223.3	$ 223.3	$ 54.4
19:31.5	$ 223.3	$ 223.3	$ 54.4
19:41.5	$ 223.3	$ 223.3	$ 54.4
19:51.5	$ 223.3	$ 223.3	$ 54.4
20:01.5	$ 223.3	$ 223.3	$ 54.4
20:11.5	$ 223.3	$ 223.3	$ 54.4
20:21.5	$ 223.3	$ 223.3	$ 54.4
20:31.5	$ 223.3	$ 223.3	$ 54.4
20:41.5	$ 223.3	$ 223.3	$ 54.4
20:51.5	$ 223.3	$ 223.3	$ 54.4
21:01.5	$ 223.3	$ 223.3	$ 54.4
21:11.5	$ 223.3	$ 223.3	$ 54.4
21:21.5	$ 223.3	$ 223.3	$ 54.4
21:31.5	$ 223.3	$ 223.3	$ 54.4
21:41.5	$ 223.3	$ 223.3	$ 54.4
21:51.5	$ 223.3	$ 223.3	$ 54.4
22:01.5	$ 223.3	$ 223.3	$ 54.4
22:11.5	$ 223.3	$ 223.3	$ 54.4
22:21.5	$ 223.3	$ 223.3	$ 54.4
22:31.5	$ 223.3	$ 223.3	$ 54.4
22:41.5	$ 223.3	$ 223.3	$ 54.4
22:51.5	$ 223.3	$ 223.3	$ 54.4
23:01.5	$ 223.3	$ 223.3	$ 54.4
23:11.5	$ 223.3	$ 223.3	$ 54.4
23:21.5	$ 223.3	$ 223.3	$ 54.4

14:24 TRIP REVIEW FINISHED

FIGURE 3-8d: POST TRIP

TPS166

Attachment E

Key Symbols

D - Delta
F - Flow
L - Level
P - Pressure
T - Temperature
Q - Flux
CAUS RE - Causing reactor trip
RCL - Reactor coolant loop
RCP - Reactor coolant pump
TB - Turbine
RHP - Residual heat removal pump
FPT - Feedpump turbine
SSPS - Solid-state protection system
CRD - Control rod drive
MG - Motor generator
XFMR - Transformer