

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

5N 157B Lookout Place

JAN 29 1987

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Attention: Mr. Youngblood:

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

WATTS BAR NUCLEAR PLANT (WBN) - CONFORMANCE TO REGULATORY GUIDE 1.47,
REVISION 0 - BYPASSED AND INOPERABLE STATUS INDICATION SYSTEM (BISI)

On May 20, 1985, the NRC Staff forwarded a copy of the draft license for WBN unit 1. The draft license has a commitment to meet the requirements of NRC Regulatory Guide 1.47, Revision 0 for the Bypassed and Inoperable Status Indication (BISI) System. The enclosed document addresses the functional requirements for the proposed BISI System for WBN. Identical functional requirements for Sequoyah were transmitted in my letter to you of October 31, 1986. We suggest that a meeting to discuss implementation strategies be scheduled after NRC has completed its review of the functional requirements. As discussed in my letter dated June 11, 1986, information regarding the implementation schedule for the BISI System will be provided as part of the WBN Nuclear Performance Plan Volume 4.

If additional information is necessary, please call Bernard Gergos at (615) 365-8827.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. A. Dome
R. Gridley, Director
Nuclear Safety and Licensing

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cc (Enclosure):

U.S. Nuclear Regulatory Commission (2)
Region II
Attn: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

G. G. Zech, Director
TVA Projects
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Mr. Tom Kenyon
Watts Bar Project Manager
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20814

Watts Bar Resident Inspector
Watts Bar Nuclear Plant
P.O. Box 2000
Spring City, Tennessee 37381

ENCLOSURE

FUNCTIONAL REQUIREMENTS DOCUMENT FOR THE BYPASSED AND INOPERABLE STATUS INDICATION (BISI) SYSTEM

1.0 Scope

This document defines the required functional and operational characteristics for the BISI to meet the requirements of NRC Regulatory Guide 1.47, revision 0. Each reactor unit will have a separate BISI. This system does not include the requirements for operating and trip bypasses of the RPS and ESFAS. Those requirements are addressed in the FSAR.

2.0 Purpose

This document describes an approach for the implementation of the NRC Regulatory Guide 1.47, revision 0. Described is the functional requirements for satisfying this guide so as to provide the unit operator high level status information about systems which are actuated by the plant protection system when a safety function has been purposely rendered bypassed or inoperable.

The function of the BISI system is to provide automatic MCR indication of bypassed and deliberately induced abnormal conditions for plant safety systems and the auxiliary or support system(s) that must be operable for the safety systems to perform their safety-related functions. The BISI will supplement plant administrative procedures in keeping the MCR personnel abreast of plant system status.

The primary intent of BISI is to provide a indication that a functional path for each train of a safety system has been purposely rendered in a state which could cause inoperability. The functional path is defined as the process flow path for each train of equipment. In this system, it is assumed that the use of alternate equipment to make up a functional path requires manual operator intervention and is not considered in the functional path definition. The final decision of system operability or inoperability is left to the unit operator to determine per Technical Specifications, since the operator may configure the system to meet Technical Specifications but may not meet the functional path logic.

3.0 BISI Design and Operation

- 3.1 The BISI shall be designed to operate during all normal plant modes of operations including startup, shutdown, standby, refueling, and power operation. The logic to implement the BISI shall be developed for power operations. Process flow path alignment may be different for other modes of operation (e.g. refueling), thus creating abnormal alarms that do not directly relate to the system level alarm (e.g. Tr A AFW). The operating crew will determine the impact of each alarm on the process flow path indication during these modes of operation.

- 3.1.1 The BISI is not required to operate during or after an accident.
- 3.1.2 The BISI will not be designed to safety system criteria and therefore is not to be used to perform functions essential to the health and safety of the public, nor is operator action based solely on BISI indications.
- 3.1.3 All plant systems monitored by BISI will be monitored and alarmed regardless of plant operating mode.
- 3.2 The components monitored to make up the functional path alarm for each plant mode for each system must meet the following conditions:
 - 3.2.1 Could render inoperable a redundant portion of the protection system, systems actuated or controlled by the protection system, and auxiliary or supporting systems that must be operable for the protection system and the systems it actuates to perform their safety-related functions; and
 - 3.2.2 Is expected to be rendered in operable more frequently than once a year; and
 - 3.2.3 Is expected to occur when the affected system is normally required to be operable per Technical Specifications.
- 3.3 Not all equipment and components making up a functional path will require monitoring by BISI to satisfy 3.2 above. Only those components determined to meet all of the above requirements will be monitored.
- 3.4 No component is required to have power available monitored if it fails safe on loss of power or power disconnect.
- 3.5 Component handswitch position (e.g., Pull to Lock) will be monitored on components where the handswitch can block or bypass the actuation system from placing the component in the actuated state.
- 3.6 Combination logic will be used to create the system level "ABNORMAL" such that if any component in a functional path is "ABNORMAL" for plant modes for which it is required, then the path is abnormal. Also, if any supporting function such as cooling water, ventilation, control air, or electric power is lost, then all systems affected by that loss shall be so indicated. See section 5.0 for implementation criteria.

- 3.7 The BISI shall have an audible alarm which shall operate in conjunction with the BISI upper level indication to alert MCR personnel of a new BISI system going into alarm.
- 3.8 The BISI shall provide on demand alarm message displays or printouts of all BISI alarms.
- 3.9 The BISI shall be capable of providing printouts of all BISI alarms for shift turnover or historical logging.
- 3.10 Appropriate electrical and physical isolation from safety-related equipment to the non-safety system shall be provided to meet the requirements identified in the FSAR.
- 4.0 Systems Monitored by BISI

The BISI shall monitor and provide system level alarms of the safety-related portions of the following plant system. Portions of these systems which serve no safety function and can be separated from the safety functions performed by these systems will not be monitored.

MAIN AND AUXILIARY FEEDWATER (INCLUDE SG ISOLATION)

SAFETY INJECTION

RESIDUAL HEAT REMOVAL

CONTAINMENT SPARY

EMERGENCY GAS TREATMENT

ESSENTIAL RAW COOLING WATER

CHEMICAL AND VOLUME CONTROL

VENTILATING

COMPONENT COOLING

CONTROL AIR (INCLUDING AUXILIARY CONTROL AIR)

STANDBY DIESEL GENERATOR

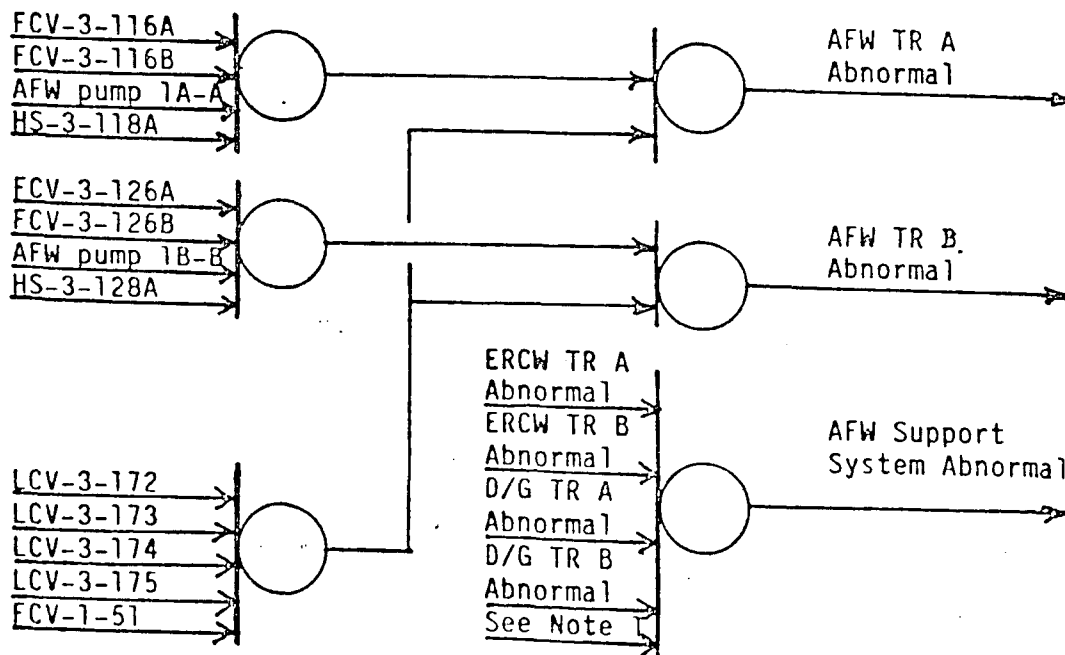
If there are components identified which are not within the above systems but are actuated by the ESFAS to support the operation of the above systems, then these components shall be monitored and alarmed with the system they support.

5.0 Component Level Implementation Criteria

Those components which are selected per the guidelines given in section 3.0 will be monitored for the following conditions:

- 5.1 Status contacts shall continuously monitor the availability of control power and the position of circuit breakers (rack-in or out) of all automatically actuated ESF devices identified in the systems referred to in section 4.0.
- 5.2 Status contacts shall continuously monitor the availability of control power of motor starters of all automatically actuated ESF devices identified in the systems referred to in section 4.0.
- 5.3 Status contacts shall continuously monitor the availability of control power of solenoid valve actuated components if the device requires control power to be available for movement to its safe condition. This applies to all automatically actuated ESF devices identified in the systems referred to in section 4.0.
- 5.4 Status contacts shall continuously monitor the position of handswitches (e.g., Pull To Lock) that can be placed in a state which would yield the systems or components identified in section 4.0 inoperable.
- 5.5 System level logic shall be developed on each train functional path (e.g., AFW TR A) to actuate a system level alarm.

An example is as follows:



Note 1: This diagram is an example of concept. Other plant systems may impact the operation of the AFW system (e.g. control air).

6.0 Display Criteria

6.1 A system level display via the BISI display or indicating lights shall be provided to indicate the status of the systems identified in section 4.0

This system level display or indicating lights shall indicate the status of each systems train functional path as well as the status of any support system that may place the indicated system in an inoperable or bypassed condition. An example is as follows:

Plant System	Functional Path		Support System
	Tr. A	Tr B	
Auxiliary Feedwater System	Normal	Normal	Normal

If an alarm condition exists for the functional path or support system, additional detailed information shall be provided to the operating crew so as to allow determination of the abnormal condition. The information provided shall identify to the operating crew the exact nature of the initiating condition for the abnormal alarm. An example is as follows:

Loss of control power - AFW pump 1A-A

6.2 Alarm Function

Whenever a system abnormal condition exist, an audible alarm shall be generated so as to direct the operators attention to the BISI system display or indicating lights.

The BISI system shall have alarm silence, alarm acknowledge, alarm reset and reflash capability.

6.3 Manual Control

Manual entry capability of each system status shall be provided. This allows the operating crew to provide bypass indication for an event that renders a safety system abnormal but does not automatically operate the system level indicators.

There shall not be any capability to defeat an automatic operation of a system level indicator but the capability shall be provided to inhibit the audible alarm when the plant is in an operating mode (e.g. refueling) where many system and component alarms may be generated. The capability shall be provided to inhibit the audible alarm at the process flow path level (e.g. Tr A AFW).

6.4 Human Factor Requirements

All BISI displays and alarms shall be designed per human factor principles.