

ENCLOSURE 1

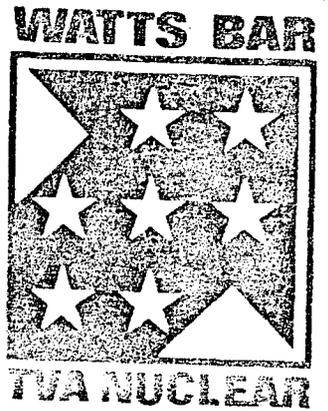
WATTS BAR NUCLEAR PLANT

PRESTART TEST PROGRAM

Corrective Action Program Plan

Revision 1

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WATTS BAR NUCLEAR PLANT
PRESTART TEST
CORRECTIVE ACTION PROGRAM PLAN
REVISION 1

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PRESTART TEST PROGRAM
CORRECTIVE ACTION PROGRAM PLAN

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PRESTART TEST PROGRAM

1.0 INTRODUCTION

The Nuclear Regulatory Commission (NRC) requires nuclear facilities to demonstrate the capability of plant equipment to perform their designed functions prior to the commencement of fuel loading activities. This is accomplished at the Watts Bar Nuclear Plant (WBN) via the Preoperational Test Program, as described in the Final Safety Analysis Report (FSAR), using detailed test instructions. The results of these tests will provide documentary evidence of the ability to perform design functions. The Preoperational Test Program for WBN unit 1 is essentially complete.

Although the test program controls have been questioned in the past by TVA and NRC, and the resolutions of these questions have brought about changes and improvements in test program controls, the technical adequacy of the Preoperational Test Program was not invalidated as a result of changes to the program. This is evidenced by the fact that no major retesting was required to resolve any identified item. The review of the completed test performances by the design organization as a part of the approval process ensures that any technical inadequacies are identified prior to full approval of the test.

Since there have not been any major technical or programmatic deficiencies identified in the Preoperational Test Program, the Preoperational Test Program will be completed in accordance with governing procedures and Chapter 14 of the FSAR. This will fulfill the testing requirements of Regulatory Guide 1.68 (November 1973) for licensing WBN unit 1. Furthermore, the Design Baseline and Verification Program (DBVP) includes a review of the Preoperational Test Program results and yet to be performed test instructions in comparison with the WBN unit 1 design baseline. This review will ensure that the completed program will be consistent with the updated design baseline.

The lengthy delay between the completion of many of the preoperational tests and future plant operations of WBN unit 1 has created conditions that the Preoperational Test Program is not designed to address. These conditions are:

- Plant equipment may have degraded.
- Operating organizations' knowledge about the plant and procedures may have been affected.
- Plant equipment has undergone modifications during this delay, some without being adequately tested. This condition has been addressed by TVA's response to NRC violation 50-390/86-21-01.

In order to clearly and properly address the above conditions, a completely independent test program, the Prestart Test Program, will be established. The principal reason for this program, as stated, is the lengthy delay between the completion of many of the preoperational tests and future plant operations. Attachment 1 is a list of the specific items that form the basis for this CAP.

2.0 OBJECTIVES

To the extent required for fuel loading, the Prestart Test Program will demonstrate the operational capability of WBN unit 1.

3.0 SCOPE

System and component functions associated with each system listed in Table 1 will be tested. The Nuclear Engineering (NE) revised preoperational test scoping documents will be the source for the identification of the system and component functions.

Major tests currently scheduled to be part of the Prestart Test Program include integrated engineered safety features actuation, standby power supply (diesel-generator), containment integrated leak rate and non-nuclear heatup.

4.0 PROGRAM DESCRIPTION

The Prestart Test Program performance will fulfill the requirements of Regulatory Guide 1.68 (November 1973) for the prefuel loading part of the system functional test program with certain defined exclusions. The systems addressed by the Prestart Test Program are listed in Table 1. The Regulatory Guide 1.68 systems and tests excluded from the program and the bases for those exclusions are detailed in Exhibit A.

The system and component functions to be addressed by the program, along with their appropriate testing activities, will undergo extensive pretest and posttest reviews. These reviews will each be documented in formal documentation packages. This will ensure the adequacy and availability of the documentation for the functional testing.

This program will support the plant licensing activities and provide the following advantages:

- Consistency with the programs currently used for restart of Browns Ferry Nuclear Plant (BFN) and Sequoyah Nuclear Plant (SQN).
- Identification of any equipment degradation by comparison of the test results with the previously obtained baseline data.
- Demonstration of the adequacy of WBN's equipment surveillance and maintenance programs by review and use of these programs in the Prestart Test Program performance.
- Demonstration of the effectiveness of the corrective actions that have been implemented to ensure appropriate, clear, and consistent test program controls.
- Development of formal system-oriented documentation packages that clearly address each applicable design function along with its appropriate and acceptable test results.

A flow chart of the major programmatic activities and their interrelationships is shown in Attachment 2.

The Prestart Test Program will be conducted and audited in accordance with the appropriate plant procedures and will be completed prior to the commencement of fuel loading activities. Attachment 3 is a typical test performance fragnet.

The following is a discussion of each of the program activities:

4.1 Identification of System and Component Functions

During the pretest review process, the system and component level functions to be addressed by the program will be defined. These will be defined principally via revised preoperational test scoping documents for the systems listed in Table 1. These revised scoping documents will be prepared and issued by NE in accordance with the requirements of the WBN DBVP. These documents will also be reviewed by testing personnel to ensure their consistency with the FSAR, Design Criteria, Technical Specifications, and Configuration Control Drawings.

As used by the program, the following definitions of system and/or component functions are applicable:

- System functions are defined as those functions that (1) involve more than one component, (2) demonstrate a system response for accident or normal operation, (3) demonstrate an automatic actuation or interlock, or (4) demonstrate system response time performance.

- Component functions are defined as those functions that involve actions related to a single component within any given system.

A review of each system in Table 1 will be conducted to assure that all of the functions meeting the criteria of Sections 4.1.1, 4.1.2, and 4.1.3 have been defined. Those functions meeting the criteria as defined by 4.1.3 but not included in the revised scoping documents will be added to this program.

4.1.1 Primary Safety Functions

Primary safety functions are those necessary to ensure:

- The integrity of the reactor coolant pressure boundary.
- The capability to shut down the reactor and maintain it in a safe shutdown condition.
- The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposure comparable to the guideline exposures of 10 CFR, Part 100.

4.1.2 Fire Detection and Suppression Functions

Functions that detect or suppress a fire.

4.1.3 Other Functions

- Balance of Plant (BOP) equipment whose failure would directly prevent or cause an actuation of the reactor trip system or the engineered safeguard features actuation system (ESFAS).
- Additional functions, as identified by plant personnel, that are important to plant operation but are not safety related.

4.2 Preparation of the Function Analysis Reports and Function Test Matrices

The pretest reviews will result in the preparation of Function Analysis Reports (FARs) and the initial preparation of the Function Test Matrices (FTMs) for each system.

The system and component functions that are addressed by the program will be input to the FTMs. Each FTM will identify and cross reference each function with the test or tests required to demonstrate its acceptability.

The FARs will include identification of the applicable functions and identification of appropriate testing. Each FAR will include the associated FTM. The FARs will be reviewed then submitted to the Joint Test Group (JTG). Their content, preparation, and maintenance are discussed in detail in Section 7.0.

4.3 JTG Review of the FARs

The JTG is an oversight group, and their responsibilities and makeup are described in Section 6.4. The JTG will be required to review and concur with each FAR prior to commencement of applicable testing activities. This upper-level review will provide added assurance of the identification of technically adequate and consistent testing.

4.4 Preparation of Test Instructions

Existing plant instructions will be used to test as many functions as possible. For those functions for which test instructions do not exist, either new test instructions will be prepared or changes will be made to existing plant instructions. These new instructions or changes will be prepared using existing plant procedures and will be submitted to the JTG for approval.

4.5 Performance of Testing

The performance of testing activities will be in accordance with those details outlined in the applicable FARs. The necessary testing will be completed, as appropriate, through the single or combined performances of various testing mechanisms (e.g., Maintenance Instruction [MI], Preoperational Test Instruction [PTI], Surveillance Instruction [SI], Technical Instruction [TI] and Work Plan [WP]), in accordance with their respective governing procedures.

4.6 Preparation of the Test Analysis Packages

Following completion of the testing activities for each system a Test Analysis Package (TAP) will be prepared. Each TAP will include the successfully completed test instructions, reviews of the tests, and the completed FTM. Each TAP will be reviewed, then submitted for JTG review and concurrence. The content, preparation, and maintenance of the TAPs are discussed in detail in Section 7.0.

4.7 JTG Review of the TAPs

The JTG will review and concur with the TAPs following completion of the applicable testing activities. This upper level review will provide added assurance of the identification and completion of technically adequate and consistent testing.

4.8 Plant Review of the TAPs

Following JTG review and concurrence, the TAPs will then be submitted to the Plant Operations Review Committee (PORC) for review and to the Plant Manager for approval.

4.9 Retention of the FARs and TAPs

Following their appropriate reviews and approvals, the FARs and TAPs will be retained as QA records.

4.10 Recurrence Control

As stated, the principal reason for this program is the lengthy delay between the completion of many of the preoperational tests and future plant operations. Therefore, recurrence control is not applicable.

4.11 Licensing Assessment

The Prestart Test Program will be supportive of the licensing of WBN unit 1 since this program, with certain justified exceptions, will also fulfill the prefuel loading portions of the system functional testing described in Regulatory Guide 1.68 (November 1973). This program will be independent of and supplementary to the Preoperational Test Program and will provide documentary evidence of the operational capability of WBN unit 1. The FSAR will be amended to include a description of this program.

5.0 PROGRAM INTERFACES

Revised preoperational test scoping documents are being developed and issued by NE in accordance with the requirements of the DBVP corrective action program. They will be the principal sources for the identification of the applicable system and component functions.

6.0 PROGRAM IMPLEMENTATION

The Prestart Test Program will be conducted formally and audited in accordance with the appropriate plant procedures. The program will be implemented by the Systems Engineering Section, within the WBN Technical Support Organization. The following is a discussion of the key elements in the implementation of the program:

6.1 Procedural Control

All activities associated with the program, including its staffing, administrative and technical oversight, and responsibilities, will be defined and controlled in accordance with either existing or specifically prepared site instructions and/or procedures.

The SI Program will be used to the extent practical to obtain the necessary Prestart Test Program documentation.

6.2 Staffing

The program will be conducted by the Systems Engineering Section, within the WBN Technical Support Organization. The Systems Engineering Section is staffed by experienced test personnel.

The various other plant organizations (e.g., Electrical, Instrumentation, and Mechanical Maintenance, Component Engineering) will provide the personnel, procedures, and equipment to assist in the performance of testing and other activities essential to the success of the Prestart Test Program.

6.3 The WBN Layup Program

When it becomes necessary to remove the applicable plant equipment from its layup configuration prior to testing, the WBN Layup Program personnel will assist, as required, in the identification and implementation of the proper plant procedures to be utilized.

6.4 Program Oversight

The JTG will be established to provide an overall review of the program to ensure the following:

- The results of other programs that affect testing are adequately addressed.
- The scope and depth of the program are acceptable.
- Test instructions are developed as required.
- The performance results of the program-required tests are acceptable.
- Each FAR and TAP is prepared in accordance with program procedures/instructions and adequately supports the program objectives.

This group will be comprised of the following:

- The Chairman (appointed by the Nuclear Site Director).
- An NE representative.
- The NQA Site Quality Manager or designee.

- ° The Nuclear Power (NP) Operations Superintendent or designee.
- ° The NP Systems Engineering Supervisor or Designee.
- ° The NP Technical Support Superintendent or Designee.
- ° The Nuclear Steam Supply System (NSSS) Vendor Representative (optional).

6.5 The WBN Plant Operations Review Committee

The PORC will review the TAPs prior to their submittal for approval by the Plant Manager.

7.0 PROGRAM DOCUMENTATION

The Prestart Test Program will produce the following:

7.1 Identification, Tracking, and Resolution of Deficiencies and Open Items

The identification, tracking, and resolution of any Deficiency (DN) or Open Item (OI) encountered during the performance of the identified test instructions will be in accordance with the applicable procedure governing that instruction. The CAQ program will be used as required.

7.2 Documentation Packages

The program will produce two formal documentation packages to document the accomplishment of its objectives. These packages are described as follows:

7.2.1 Function Analysis Report

Pretest reviews will be performed for each system and component function listed in the FTM. These reviews will be assembled and documented on a system basis in FARs that will include:

- ° Identification of all system and component functions via inclusion of the FTM.
- ° The identification of appropriate testing for all applicable system and component functions.

7.2.2 Test Analysis Package

Posttest reviews will be performed for all system and component function tests listed in the FTM. These reviews will be assembled and documented on a system basis in TAPs that will include:

- The completed testing instructions for all identified system and component functions.
- Test reviews that will include documentary evidence of the identification and adequate disposition of all DNs and OIs encountered during the testing activities.

8.0 CONCLUSION

The Prestart Test Program will demonstrate that the applicable WBN plant equipment and personnel required for unit 1 operation have operational capability, and that the plant is ready to commence fuel loading activities. This will be accomplished through test of the identified system and component functions.

The program will provide the following conclusive demonstrations:

- The applicable plant equipment is capable of performing its intended function despite the lengthy delay between the completion of the applicable preoperational tests and actual plant operations.
- The applicable plant equipment that has undergone modifications during this delay has been subjected to adequate postmodification testing.
- The applicable plant equipment has suffered no degradation during this delay.
- The operating organizations are knowledgeable about the plant and procedures and are prepared to operate the facility in a safe manner.

Table 1

SYSTEMS WHOSE FUNCTIONS ARE ADDRESSED BY THE PROGRAM

1	Main Steam System
2	Condensate System
3	Main and Auxiliary Feedwater System
13	Fire Detection System
14	Condensate Demineralizer System
15	Steam Generator Blowdown System
18	Fuel Oil System
24	Raw Cooling Water System
25	Raw Service Water System
26	High Pressure Fire Protection System
30	Ventilation System
31	Air-Conditioning (Cooling-Heating) System
32	Control Air System
33*	Service Air System
37	Gland Seal Water System
39	CO ₂ Storage, Fire Protection, and Purging System
41*	Layup Water Treatment
42*	Chemical Cleaning
43	Sample and Water Quality System
46	Feedwater Control System
47	Electro-Hydraulic Control System
52	System Test Facility (Seismic Instrument Portion)
59*	Demineralized Water & Cask Decontamination System
61	Ice Condenser System

* Containment Isolation Functions only

Table 1

SYSTEMS WHOSE FUNCTIONS ARE ADDRESSED BY THE PROGRAM

62	Chemical and Volume Control System
63	Safety Injection System
65	Emergency Gas Treatment System
67	Essential Raw Cooling Water System
68	Reactor Coolant System
70	Component Cooling System
72	Containment Spray System
74	Residual Heat Removal System
77	Waste Disposal System
78	Spent Fuel Pit Cooling System
79	Fuel Handling Equipment System
81	Primary Makeup Water System
82	Standby Diesel Generator System
83	Hydrogen Recombination System
84	Flood Mode Boration System
86	Diesel Starting Air System
88	Containment Isolation System
90	Radiation Monitoring System
92	Neutron Monitoring System
99	Reactor Protection System
211	6.9kV Shutdown Power
212	480V Shutdown Power
228	Those portions of the Auxiliary Building Lighting System defined by DBVP as being required to mitigate Design Baseline Events
235	120VAC Vital Power
236	125VDC Vital Power
251	Sound Powered Telephones
252	Plant Paging System (Evacuation Alarm Portion)
268	Permanent Hydrogen Mitigation System
271	Containment and Auxiliary Buildings (Reactor Components Handling Systems Only)

Exhibit A

REGULATORY GUIDE 1.68 (NOVEMBER 1973) CLARIFICATIONS AND EXCLUSIONS

NOTE: Paragraph numbers are keyed to the Regulatory Guide paragraph numbers.

Appendix A, "Preoperational and Initial Startup Tests for Water-Cooled Power Reactors"

A. Preoperational Testing

2. Reactivity Control Systems

- b. Standby Liquid Control System Tests. System not applicable to PWR type plant such as Watts Bar with the exception of the Flood Mode Boration System, which is included in the Prestart Test Program.
- c. Automatic Reactor Control System Tests. These tests are to be performed by the Preoperational Test Program after fuel loading and are therefore outside the scope of the Prestart Test Program.
- d. Incore Monitor System Tests. These tests are to be performed by the Preoperational Test Program after fuel loading and are therefore outside the scope of the Prestart Test Program.
- e. Control Rod System Tests. These tests are to be performed by the Preoperational Test Program after fuel loading and are therefore outside the scope of the Prestart Test Program.
- f. Auxiliary Startup Instrumentation Tests. The temporary monitor tests are outside the scope of the Prestart Test Program because they will be performed as part of the startup test program. The permanent neutron monitors are part of the Neutron Monitoring System and are included in the program.

4. Power Conversion Systems

The system expansion and restraint checks will be included in the hot functional testing portion of the Prestart Test Program for the main steam and feedwater process lines only.

- h. Makeup Water and Chemical Treatment Systems. These systems are currently in operation and are therefore not included in the Prestart Test Program. The condensate demineralizer system is included in the Prestart Test Program because it is a full flow type system inline with the condensate system.

Exhibit A

REGULATORY GUIDE 1.68 (NOVEMBER 1973) CLARIFICATIONS AND EXCLUSIONS
(continued)

5. Auxiliary Systems

- d. Vent and Drain Systems Tests. The heater drains and vents system cannot be tested until after fuel loading. The reactor coolant system drains and vents are included in the Prestart Test Program.
- j. Ventilation System Tests. The turbine building portion of the ventilation system is not included because it is presently in operation.
- l. Emergency Condenser Tests. This system does not exist at Watts Bar.
- o. Shield Cooling System Tests. This system does not exist at Watts Bar.

6. Electrical System

- a. Normal Distribution Tests. These systems are presently in normal operation with the exception of some of the load supply breakers. The load supply breakers are functionally tested when their loads are tested by the Prestart Test Program.
- d. Communication System Tests. The plant telephone system including the dedicated lines is presently in operation and is therefore not included in the Prestart Test Program. The sound powered telephone system tests and the evacuation signal demonstrations are included in the program.

7. Containment System

- a. Containment Tests. The integrated leak rate test, containment isolation valve tests, and containment penetration individual leak rate tests are included in the Prestart Test Program. The overpressure test is not included because it is an installation test and not a functional test. Watts Bar does not have containment vacuum breakers.

10. Fuel Storage and Handling Systems

- a. Spent Fuel Pit Cooling System Tests. Those portions and functions that can be tested without introducing water into the pit are included in the Prestart Test Program. Because new fuel is presently stored in the pit, water cannot be introduced into the pit without contaminating the new fuel. Spent fuel pit cooling system tests will be conducted after fuel loading but before spent fuel is placed in the pit.

Exhibit A

REGULATORY GUIDE 1.68 (NOVEMBER 1973) CLARIFICATIONS AND EXCLUSIONS
(continued)

- c. Operability and Leak Tests of Sectionalizing Devices in the Fuel Storage Pool and Refueling Canal. The sectionalizing devices in the Spent Fuel Pit will be tested after fuel loading but before spent fuel is placed in the pool.
12. Radiation Protection System
- b. Personnel Monitor and Survey Instrument Tests. These tests are included in an administrative program administered by Radiological Control and are therefore not included in the Prestart Test Program.
 - c. Laboratory Equipment Tests. These tests are also included in an administrative program administered by Radiological Control and are therefore not included in the Prestart Test Program.
- B. Precritical Tests - After Fuel Loading. Post-fuel loading tests are not within the scope of the Prestart Test Program.
- C. Low-Power Tests. Post-fuel loading tests are not within the scope of the Prestart Test Program.
- D. Power-Ascension Tests. Post-fuel loading tests are not within the scope of the Prestart Test Program.

Appendix C. "Preparation of Procedures"

A. Preoperational Test Procedures

1. Prerequisites

- a. Walkdowns will be performed to assure that the equipment or system to be tested is ready for operation. However, the walkdowns will only include a visual inspection of the equipment; wiring continuity and electrical protective devices will not be checked nor will any adjustments be made on devices such as limit switches, torque switches, or controllers.
- c. Prerequisite functional tests of individual components will not be done. Component functional testing will be done as part of the associated system testing. Component functional testing will be limited to those component functions that are interactive with the associated system.

Exhibit A

REGULATORY GUIDE 1.68 (NOVEMBER 1973) CLARIFICATIONS AND EXCLUSIONS
(continued)

Valves

Containment isolation valves will be checked for leakage and stroke times. Other valves will be operated as necessary to place the associated system in the various modes of operation for testing.

Pumps

Vibration and pressure-flow characteristics will be checked as a part of the testing of the associated system.

Motors

Vibration of motors will be checked. However, rotation checks, thermal overload protection checks, lubrication checks, megger or hi-pot checks, and supply voltage checks are considered installation testing and are not included in the Prestart Test Program.

Piping and Vessels

Clearance of obstructions and support adjustments will be checked by thermal expansion testing. Hydrostatic tests, checks for proper cleaning, flushing, layup, bolt torque, insulation, filling, and venting are not included in the Prestart Test Program since these are installation type tests performed during construction, not system or component functional tests.

Instrumentation and Control

Proper operation of interlock prohibits and permissives will be checked by either system manipulation (preferred) or by simulation of conditions requiring interlock initiation. Circuit breaker operation testing, voltage checks, calibration, and trip settings are construction tests and are therefore excluded from the Prestart Test Program. Bus transfers on the emergency power busses will be tested.

4. Environmental Conditions

The plant will be operated in hot functional conditions which will simulate the environmental conditions of normal operations as near as practical. The simulation of accident environmental conditions is not practical and is not included in the Prestart Test Program.

Exhibit A

REGULATORY GUIDE 1.68 (NOVEMBER 1973) CLARIFICATIONS AND EXCLUSIONS
(continued)

- B. Fuel Loading
- C. Startup-to-Critical Procedures
- D. Power Ascension Procedures

The Prestart Test Program concludes prior to fuel loading. These requirements are therefore not applicable to the Prestart Test Program.

Attachment 1

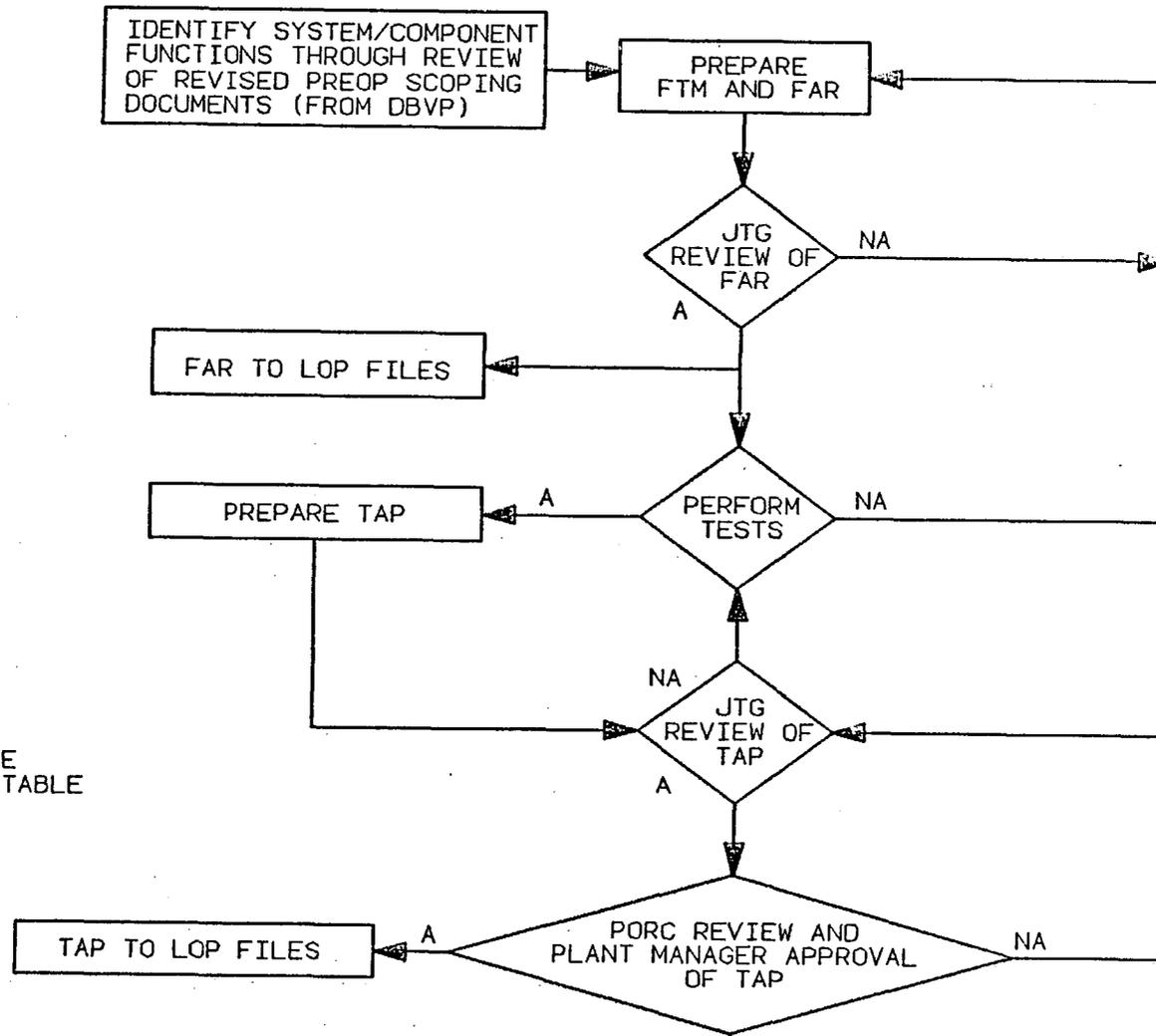
BASIS FOR CAP

The lengthy delay between the completion of many of the preoperational tests and future plant operations of WBN unit 1 as explained in Section 1.0.

NRC concerns raised in Kenneth P. Barr's letter to S. A. White dated February 3, 1988.

ATTACHMENT 2

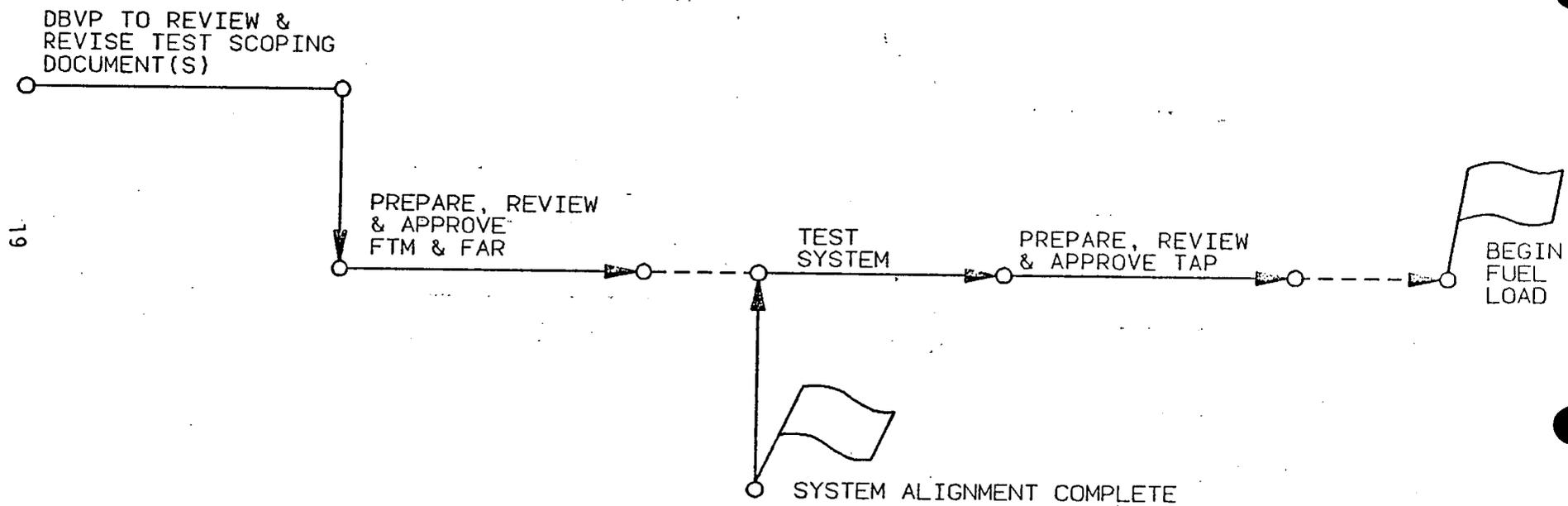
FLOW CHART



NOTE: A = ACCEPTABLE
NA = NOT ACCEPTABLE

PRESTART TEST PROGRAM WATTS BAR NUCLEAR PLANT

ATTACHMENT 3 FRAGNET



ABOVE DIAGRAM TYPICAL FOR A SYSTEM.
PROGRAM INCLUDES MANY SYSTEMS.

ENCLOSURE 2

For the Watts Bar Nuclear Plant, TVA commits to:

- ° The Prestart Test Program will demonstrate the operational capability of WBN unit 1 for fuel loading.
- ° The FSAR will be amended to include a description of this program.