Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

June 17, 2009
U7-C-STP-NRC-090057

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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Rockville, MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

Attached are responses to NRC staff questions included in Request for Additional Information (RAI) letter number 110, related to Combined License Application (COLA) Part 2, Tier 2, Section 14.2.

The Attachments provide responses to the RAI questions listed below:

RAI 14.02-2
RAI 14.02-3
RAI 14.02-4

The revisions described in our response to these RAI questions have already been incorporated into the Startup Administrative Manual as shown in Revision 2 to Procedure U7-P-SU01-0001, "STP Unit 3 and 4 Startup Administration Manual" (attached). No COLA revisions are required as a result of this response.

There are no commitments in this letter.

If you have any questions regarding these responses, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

D091
NRO

STI 32490478

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 6/17/09

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

gsc

Attachments:

1. Question 14.02-2
2. Question 14.02-3
3. Question 14.02-4
4. U7-P-SU01-0001, "STP Unit 3 and 4 Startup Administration Manual," Revision 2

cc: w/o attachment except*
(paper copy)

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RAI 14.02-2

QUESTION:

RG 1.68, Revision 3, states, "Some preoperational tests completed as part of the Initial Test Program (ITP) cover certain ITAAC completed prior to fuel load. For example, testing performed to demonstrate that safety-related SSCs will perform satisfactorily in service must be conducted under a program that satisfies Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50, and may also satisfy testing required by the ITAAC process." The scope of the ITP, however, is not limited solely to safety-related SSCs. Consequently, this guide specifies the scope of plant SSCs to be tested to satisfy the requirements of GDC 1, "Quality Standards and Records" (as specified in Appendix A to 10 CFR Part 50), as well as the quality assurance criteria set forth in Appendix B to 10 CFR Part 50." In addition, Section II.3.E.v of NUREG-0800 Section 14.2 states that the applicant should include provisions to ensure that retesting required for modifications or maintenance remains in compliance with inspections, tests, analyses, and acceptance criteria requirements.

Based on the information in RG 1.68 and NUREG-0800 above, the staff requests that STP update U7-P-SU01-0001, STP Unit 3&4 Startup Administration Manual (SAM), Revision 1, Page 32, Section 4.6.1.3, Acceptance Criteria, South Texas Project Nuclear Operating Company (STPNOC) to add information to describe the administrative controls necessary to ensure that retesting required for modifications or maintenance remains in compliance with the inspections, tests, analyses and acceptance criteria (ITAAC) requirements.

RESPONSE:

Procedure U7-P-SU01-0001, "STP Unit 3&4 Startup Administration Manual (SAM)," Section 4.5.3.3(b), "Performance of Tests – Test Coordination" has been revised to include the requirement to ensure compliance with ITAAC commitments is maintained, as follows:

4.5.3.3(b) Performance of Tests - Test Coordination

Systems turned over from Construction usually require additional work other than normal testing. This additional work could include incorporation of required design changes, completion of outstanding construction exceptions, repair and/or replacement of damaged equipment, replacement of consumable materials/components, and maintenance of equipment. Additionally, during performance of preoperational testing it may be necessary to return system control to construction to repair or modify the system to correct new problems. To cover these circumstances, a Startup Work Request (SWR) is used by the Preoperational Test Group to request materials services, manpower support and/or job/requests from Construction until the end of the Startup Test Phase of the ITP. This work will be administered by a Startup Administrative Procedure, which will include direction for:

- Means of releasing control of systems and/or components to construction

- Methods for documenting actual work performed and determining impact on testing

- Identification of required testing to restore the system to operability status, and to identify tests to be re-performed based on the impact of work performed

- Prior to fuel load, maintenance or modifications may be performed on structures, systems and components (SSCs) that are the subject of an ITAAC. The maintenance and modification activities, including any post-maintenance or post-modification tests, shall conform to the following provisions in Section 8.1 of NEI 08-01, *Industry Guideline for the ITAAC Closure Process Under 10 CFR Part 52*:

  - The maintenance and modification programs shall ensure that the ITAAC acceptance criteria continue to be met after the maintenance or modification is complete

  - The problem identification and resolution program shall be used to ensure that any identified ITAAC related deficiencies are processed and resolved under that program and ensure that the ITAAC acceptance criteria continue to be met

  - The design/configuration control program shall ensure that changes to SSCs or programs will not alter ITAAC requirements and ensure that ITAAC acceptance criteria continue to be met

- Determinations of operability and availability are properly tracked and authorized.

Performing tests requires a coordinated effort between required test personnel and the responsible Test Director.

STPNOC believes that this location for the additional instruction is more appropriate than the suggested location of Section 4.6.1.3, "Content of Test Procedures - Acceptance Criteria." Procedure U7-P-SU01-0001, "STP Unit 3&4 Startup Administration Manual (SAM)," Revision 2, incorporating this change, is attached. No COLA revisions are required as a result of this response.

RAI 14.02-3

QUESTION:

In U7-P-SU01-0001, STP Unit 3&4 SAM, Page 38, Section 4.8.1, Test Procedure Change Notices (TPCN), under major TPCN, STPNOC must address a 50.59 like process for major TPCNs for Part 52 plants.

In accordance with 50.59(c)(1), a licensee may make changes to test procedures as described in the FSAR without obtaining a license amendment only if, the change to the technical specifications (TS) incorporated in the license is not required, and if the change, test or experiment does not meet any of the criteria in 50.59(c)(2).

For major TPCNs, the staff requests that STPNOC add a requirement to SAM Section 4.8.1 for COLs to evaluate and obtain a license amendment if it is revealed that a major TPCN requires a change to the TS in accordance with 10 CFR 50.59(c)(1) and meets any one of eight criteria in 10 CFR 50.59(c)(2)(i) through (viii).

For additional information on 50.59 like change processes that affect the ABWR, refer to NRC Federal Register Notice (FRN), Licensees, Certifications and Approvals, dated August 28, 2007, Appendix A to Part 52, Rulemaking for the U.S. Advanced Boiling Water Reactor, Section VIII, Processes for Changes and Departures, Sub-sections VIII.5a, VIII.5b, VIII.5.c, VIII.5d, VIII.5e and VIII.5f, Pages 49546 through 49547.

RESPONSE:

Procedure U7-P-SU01-0001, "STP Unit 3&4 Startup Administration Manual (SAM)," Section 4.8.1, "TPCNs," has been revised to include the requirement to evaluate and obtain a license amendment if it is revealed that a major TPCN requires a change to the TS in accordance with 10 CFR 50.59(c)(1) and meets any one of the eight criteria in 10 CFR 50.59(c)(2)(i) through (viii), as follows:

4.8.1 TPCNs

For minor changes to a test procedure, a TPCN may be used.

The intent of the TPCN is to provide a capability to change procedures when a full revision is not justified. These changes can be made with annotations of existing pages or with the addition of supplemental pages. Each sheet must be signed by the Test Director and a licensed SRO (or person authorized by site-specific administrative procedure). Normally, the change should only affect several pages. There are two types of TPCNs.

A minor TPCN addresses changes that do not change intent. Examples of these changes include:

- Correcting obvious typographical errors
- Providing steps for temporary suspension of testing and for documenting steps to be taken to restart testing
- Steps which are re-performed to document testing
- Waive pre-requisites that are obviously not applicable to a given test section
- Provide additional steps/clarifications needed to perform a given step

A major TPCN is one that does change intent. Examples of these changes include:

- To modify the test procedure during its final review
- Change test prerequisites
- Change the procedure testing sequence
- To delete/add test instructions
- To change test acceptance criteria

Major TPCNs must be evaluated or screened to determine if a change to the Technical Specifications is required in accordance with 10 CFR 50.59 (c)(1), or if the TPCN meets any one of the eight criteria in 10 CFR 50.59 (c)(2)(i) through (viii) or any of the criteria in 10 CFR Part 52, Appendix A,VIII.B.5 or 6. If a major TPCN meets the criteria outlined above, a license amendment is required. This process will be covered by a separate plant procedure.

A major TPCN must be reviewed and approved in the same manner as the original procedure. The approval must be obtained prior to implementation.

During the test program, the Test Director will prepare TPCN on procedures for which he is responsible, log the TPCN on a Test Procedure Change Notice Log and process the TPCN for review and approval. Depending on the nature of the TPCN, interruption of associated testing in order to process the TPCN may be required. TPCNs that change the intent of the test or for which the change is not documented in the text of the procedure require interruption of testing for review and approval of the TPCN prior to performance of associated testing. TPCNs that preserve the intent of the test and for which the change is documented in the text of the procedure may be reviewed and approved after performance of associated testing. In either event, TPCNs are implemented in the same manner as test procedures.

Procedure U7-P-SU01-0001, "STP Unit 3&4 Startup Administration Manual (SAM)," Revision 2, incorporating this change, is attached. No COLA revisions are required as a result of this response.

RAI 14.02-4

QUESTION:

RG 1.68, Revision 3, states, "The scope of the ITP is not limited solely to safety-related SSCs. Consequently, this guide specifies the scope of plant SSCs to be tested to satisfy the requirements of GDC 1, "Quality Standards and Records" (as specified in Appendix A to 10 CFR Part 50), as well as the quality assurance criteria set forth in Appendix B to 10 CFR Part 50. While all SSCs important to safety are required to be tested, all of them need not be tested to the same stringent requirements. Specifically, GDC 1 requires, in part, that SSCs important to safety shall be tested to quality standards commensurate with the importance of the safety functions to be performed. A graded approach is also inherent in the testing requirements of Criterion XI of Appendix B to 10 CFR Part 50."

Based on the above information in RG 1.68, the staff found that STPNOC did not address in the Startup Administration Manual (SAM) non-safety-related important to safety SSCs to be included in the preoperational and initial startup test programs (for example, the scope of the reliability assurance program could include non-safety-related SSCs that are important to safety).

The staff requests that STP revise U7-P-SU01-0001, "STP Unit 3&4 Startup Administration Manual," Revision 1, page 47, Section 6.3, "Regulations and Regulatory Requirements," to address non-safety-related SSCs that are important to safety. Examples of non-safety-related SSCs that are important-to-safety include the fire protection system, environmental qualification (EQ) of electrical equipment important to safety, the alternate rod injection system used to mitigate anticipated transients without scram, and non-safety related station blackout power sources (e.g., combustion turbine generators) used to meet the station blackout rule.

The staff also requests that STPNOC add 10 CFR 50.48, 10 CFR 50.49, and 10 CFR 50.62 to U7-P-SU01-0001, Section 6.3.1, "U.S. Code of Federal Regulations (CFR)," as these regulations relate to important to safety SSCs. The list of CFRs above may not be inclusive and the staff requests that STPNOC include any other rules that apply to non-safety-related SSCs that are important to safety.

RESPONSE:

Procedure U7-P-SU01-0001, "STP Unit 3&4 Startup Administration Manual (SAM)," Section 6.3, "Regulation and Regulatory Requirements" has been revised to address non-safety-related SSCs that are important to safety, and Section 6.3.1 has been revised to include reference to 10 CFR 50.48, 10 CFR 50.49, and 10 CFR 50.62. The revised procedural changes are as follows:

6.3 Regulation and Regulatory Requirements

The purpose of the regulatory guides, as related to testing, is to describe scope and depth (administratively and technically) of the ITP acceptable for light-water-cooled nuclear power plants. The basis for these regulatory requirements is provided in 10CFR50 (Section 50.34 and Appendix B). These two items specifically apply to testing of

structures, systems, and components important to safety, i.e., sufficient testing to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. Systems important to safety include non-safety systems that have a safety function credited in the Final Safety Analysis Report or the ABWR Design Control Document. Examples of such non-safety systems include the fire protection system, environmental qualification (EQ) of electrical equipment important to safety, the alternate rod injection system used to mitigate Anticipated Transients Without Scram (ATWS), and non-safety related station blackout power sources (e.g., combustion turbine generators) used to meet the station blackout rule. The following Regulation and Regulatory Requirements are applicable to the ITP for boiling water reactor power plants to the extent specified herein. The applicable date/revision is specified in the ABWR Codes and Standards Database.

6.3.1 U. S. Code of Federal Regulations (CFR)

6.3.1.1 10 CFR 20, "Standards for Protection Against Radiation"

6.3.1.2 10 CFR 30, Section 30.53, "Tests"

6.3.1.3 10 CFR 50, Section 50.34, "Contents of Applications: Technical Information"

6.3.1.4 10 CFR 50.48, "Fire Protection"

6.3.1.5 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important To Safety For Nuclear Power Plants"

6.3.1.6 10 CFR 50.62, "Requirements for Reduction of Risk from Anticipated Transients without Scram (ATWS) Events For Light-Water-Cooled Nuclear Power Plants."

6.3.1.7 10 CFR 55a, "Codes and Standards"

6.3.1.8 10 CFR 50.63, "Loss of All Alternating Power"

6.3.1.9 10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants"

6.3.1.10 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants"

6.3.1.11 10 CFR 50, Appendix J, "Primary Containment Leakage Testing for Water Cooled Power Reactors"

6.3.1.12 10 CFR 52.79, "Contents of Application: Technical Information"

6.3.1.13 10 CFR 52, Appendix A, Design Certification Rule for the U. S. Advanced Boiling Water Reactor

Procedure U7-P-SU01-0001, "STP Unit 3&4 Startup Administration Manual (SAM)," Revision 2, incorporating this change, is attached. No COLA revisions are required as a result of this response.

STI: 32482754	**U7-P-SU01-0001**	**Rev. 2**	Page 1 of 57
STP Units 3 & 4 Startup Administrative Manual			
Quality	Non Safety-Related	Usage: **Available**	Effective Date: 06/11/09

L. Arnold	S. Blossom	STP Units 3 & 4 Startup	STP Units 3 & 4 Startup
PREPARER	REVIEWER	USER	COGNIZANT DEPT.

Table of Contents

1.0 Purpose and Scope

1.1 Purpose

The purpose of this document is to provide a written outline of methods and practices for administering the Initial Test Program (ITP) for STP Units 3 & 4. This procedure establishes methods for controlling the start of testing, for performing tests, for preparing and modifying approved procedures, for identifying and correcting test exceptions, and for reviewing and approving test results. This procedure provides the STP Units 3 & 4 Startup Administrative Manual as required by the Combined License (COL) License Information Item 14.2 described in subsection 14.2.13.2 of the STP 3 & 4 Final Safety Analysis Report (FSAR) and subsection 14.2.13.2 of the ABWR Design Control Document (DCD) Tier 2.

1.2 Scope

The scope of this document describes the organizational structure, test personnel qualification, practice and operation of the ITP. The ITP consists of a series of tests categorized as construction testing, preoperational testing and startup testing. The ITP will also include inspections, tests, analyses, and acceptance criteria (ITAAC) that are a requirement of 10 CFR Part 52 and are documented in the ABWR DCD and STP Units 3 & 4 COL. ITAAC may be completed during construction testing and preoperational testing but must be completed and accepted by the NRC before fuel load and startup testing can begin.

Construction Testing commences with the completion of system/component installation and terminates with system turnover for preoperational testing. Construction testing specifics are defined in the appropriate Installation Specifications or in the documentation provided by the major equipment suppliers. Electrical System Test is a part of construction testing for electrical and I&C systems. When all electrical functional testing and instrument calibration is completed for a system, the system is ready for turnover to the Preoperational Test Group for preoperational testing.

Preoperational testing is performed after the system turnover from construction and prior to final turnover to STP and fuel load.

Startup Testing begins with fuel load and includes initial criticality and inspections from zero power to rated power through the warranty run test.

Specific titles and organizational structures are considered typical and may be modified to meet the specific organizational structure used to implement the ITP.

2.0 Definitions

2.1 **ACCEPTANCE** - The process of site Construction and Quality management certifying that construction work is complete for specific system(s) / equipment and taking a responsibility (including care, custody, and control) for the system(s) / equipment. Acceptance includes the Jurisdictional Transfer of work responsibility for specific systems(s) /equipment from the Construction team to the Testing team.

2.2 **ACCEPTANCE CRITERIA** - The performance, physical condition, or analysis result for a structure, system, or component (SSC) or program, which demonstrates that the design requirement/commitment is met.

2.3 **ANALYSIS** - A calculation, mathematical computation, or engineering/technical evaluation. Engineering or technical evaluations could include, but are not limited to, comparisons with operating experience or design of similar structures, systems, or components.

2.4 **AREA** - A building or structure designated for turnover from the Construction team to STP.

2.5 **AS-BUILT** - The physical properties of the structure, system or component (SSC) following the completion of its installation or construction activities at its final location at the plant site.

2.6 **CHECKOUT** - The process of visually inspecting and/or physically testing a component or system to demonstrate its correct installation, arrangement and operation.

2.7 **COMBINED LICENSE (COL)** - A combined construction permit and operating license with conditions for a nuclear power facility, issued under 10 CFR Part 52. See 10 CFR 52.1(a).

2.8 **COMPONENT** - Any single piece of equipment or instrument such as a pump, fan compressor, motor, valve, circuit breaker, or protective relay.

2.9 **CONSTRUCTION ACTIVITIES** - Activities associated with the construction, fabrication, or testing of structures, components, subcomponents, systems, or subsystems either at the construction site or at remote fabrication or testing facilities. Specifically, construction means the activities in paragraph (a) (1) of 10 CFR 50.10, and does not mean the activities in paragraph (a) (2) of 10 CFR 50.10.

2.10 **DIVISION OF RESPONSIBILITY MATRIX** - The document that delineates the responsibilities of the four main project groups: STP, and the Engineering, Procurement and Construction (EPC) contractors.

2.11 **EPC AGREEMENT** - The EPC agreement is the contract between STP and the EPC contractors for the performance of Engineering, Procurement, and Construction activities for the STP Units 3 & 4 Project. The scope contained within this agreement includes implementation of the Initial Test Program (ITP).

2.12 **GUIDELINE** - A document that outlines, describes, or recommends methods and/or steps to be performed to accomplish a given activity.

2.13 **INITIAL OPERATION** - The phase of the testing program when equipment and systems are energized and activated for the first time.

2.14 **INSPECTIONS, TEST, ANALYSES AND ACCEPTANCE CRITERIA (ITAAC)** - Inspections, tests, analyses, and acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a facility that incorporates the design certification has been constructed and will be operated in conformity with the design certification, the provisions of the Act, and the Commission's rules and regulations.

2.15 **INITIAL TEST PROGRAM (ITP)** - The ITP consists of the following distinct phases of testing.

2.15.1 **Construction Test (CT) Phase** - Phase 1 of ITP – Testing performed to demonstrate that components and systems are correctly installed and operational. These tests include, but are not limited to, flushing and cleaning, hydrostatic testing, initial calibration of instrumentation, checks of electrical wiring and equipment, valve testing, and initial energization and operation of equipment and systems. The completion of this phase of testing will assure that systems are ready for preoperational testing.

2.15.2 **Preoperational Test (PT) Phase** - Phase 2 of ITP -Testing performed prior to fuel loading in order to verify that plant systems are capable of operating in a safe and efficient manner compatible with the system design basis. The general objectives of the preoperational test phase are as follows:

- Ensure that design specifications and test acceptance criteria are met
- Provide documentation of the performance and safety of equipment and systems
- Provide baseline test and operating data on equipment and systems for future reference
- Run-in new equipment for a sufficient period so that any design, manufacturing, or installation defects can be detected and corrected

- Ensure that plant systems operate together on an integrated basis to the extent possible
- Give maximum opportunity to the permanent plant operating staff to obtain practical experience in the operation and maintenance of equipment and systems
- Help demonstrate safe and efficient system operating and surveillance testing procedure to the extent possible
- Demonstrate that systems and safety equipment are operational and that it is possible to proceed to fuel loading and into the startup phase
- Ensure that initial inspections and maintenance have been completed for system equipment operation

2.15.3 **Startup Test (ST) Phase** - Phase 3 (Final) of ITP -This phase follows preoperational testing and is subdivided into the following phases:

- Fuel loading and shutdown power level tests
- Testing during nuclear heat up to rated temperature and pressure (approximately 5% power)
- Power testing from 5 to 100% of rated output
- Warranty demonstration

2.16 **JURISDICTIONAL CONTROL** - Responsibility for operation, testing and maintenance of specific equipment, systems(s) or area(s).

2.17 **NORMAL OPERATING CONDITION** - A system is in the "Normal Operating Condition" when normal system-operating parameters have been reached and the design intent has been met.

2.18 **SYSTEM PACKAGE** - A grouping of equipment within the plant configuration that performs a specific process or function. EPC startup personnel define System Packages during the scoping of project P&IDs and electrical drawings (One-Lines). Each system or subsystem is identified by unique scoping designators marked on drawings within the boundaries of each system.

2.19 **TEST INSTRUCTION** - The baseline document for the test procedure. The test instruction establishes the test specification including test purposes, prerequisites, test items, acceptance criteria, abstract procedure and evaluation methods for test results.

2.20 **TEST PROCEDURE CHANGE NOTICE (TPCN)** - A TPCN is used to make changes to test procedures performed during the ITP. Changes could include waiving of test prerequisites, changing test sequence, addition or deletion of test instructions, corrections of acceptance criteria to agree with the latest design documents, correction of procedure errors and resolution of test exceptions.

2.21 **TURNOVER** - The jurisdictional transfer of systems, subsystems or equipment from the Construction to the Testing organization(s) or from the Testing organization to STP. The Construction team maintains work responsibility for all outstanding construction work on all released systems/equipment prior to final turnover to STP. An internal turnover will occur within the construction organization as SSC's transition from the Construction Testing (CT) Phase to the Preoperational Testing (PT) Phase and a final turnover will occur following preoperational testing and prior to fuel load and the Startup Testing (ST) Phase.

2.22 **TURNOVER PACKAGE** - A compilation of project documentation of Construction installation, alignment and operation information including test data assembled to facilitate review and retrieval of system data as required by the EPC Agreement.

3.0 Responsibilities

3.1 Organization Responsibilities

During the Construction Phase, the site construction organization installs and erects plant equipment and performs certain tests referred to as Construction Tests. As Construction Test activities are completed, equipment and systems are turned over to the Engineering, Procurement and Construction (EPC) Test Group for the Preoperational Test Program. Following completion of the Preoperational Testing Phase, systems will be turned over to STP and fuel load and the Startup Test Program will be completed.

The Preoperational/Startup Test Group is comprised of individuals from various organizations including STP personnel, EPC entities, Equipment Vendors, and others, as appropriate. This organization is responsible for planning, executing, overseeing and documenting the activities occurring after the construction test phase. The organizational structure and reporting relationships of the major constituents of the group are described below.

The Plant Staff consists of onsite STP personnel engaged in day-to-day operation, maintenance, testing, and certain technical activities. During the Preoperational and Startup Test Programs, the Plant Staff will be responsible for compliance with the provisions of the Combined License, and authorization of testing. In addition, the Plant Staff is augmented by the Test Group and assisted by Construction Organization as necessary until the plant is turned over for commercial operation (COD). The organization, responsibilities, and qualification requirements of the Plant Staff are discussed in Section 13.1 of the FSAR.

The general structure of the STP Units 3 & 4 Startup Organizational units is illustrated in Addendum 2. These figures establish reporting relationships, coordination lines, and primary startup interface. This organization may change structurally as STP approaches implementation of the ITP, but function and scope will remain the same.

3.2 Group Responsibilities

The following discussion provides a generic overview of the authority, responsibilities, and degree of participation of the various organizational units involved with the implementation of the ITP. The position title and duty assignment may change as STP approaches the implementation of the ITP.

3.2.1 Qualifications

3.2.1.1 STP will manage implementation of requirements for qualification of the ITP staff. The requirements for education, training, technical background, and experience requirements for the different positions in the startup group will be determined by the STP QAPD and the STP Startup Administrative Manual requirements. The QAPD addresses the need for special skills to attain the required quality. STP shall provide indoctrination and training for personnel performing activities affecting quality as necessary to assure that suitable proficiency is achieved and maintained.

3.2.2 Joint Test Group (JTG)

3.2.2.1 The JTG is an integrated group composed of STP personnel, EPC entities, Equipment Vendors and other startup personnel, as appropriate. Directed by the JTG Leader, the JTG reviews and approves all preoperational test procedures and results.

3.2.2.2 The JTG will be responsible for providing summaries of preoperational test results to the Plant Operations Review Committee (PORC) prior to fuel load. After fuel load, the JTG will provide support functions as necessary to support the Plant General Manager and PORC.

3.2.3 Preoperational/Startup Test Group

3.2.3.1 The Preoperational/Startup Test Group is an integrated group composed of STP personnel, EPC entities, Nuclear Island (NI), Balance of Plant (BOP) and Turbine Island (TI) startup personnel, and all other startup personnel assigned from various organizations and disciplines within and outside the project. The Preoperational/Startup Test Group coordinates jobsite activities and provides technical direction to other organizations or individuals participating in the ITP. The STP Startup Manager provides oversight of the Preoperational/Startup Test Group during the Preoperational Test Phase and directs the activities of the Preoperational/Startup Group during the Startup Test Phase.

3.2.4 EPC Startup Manager

3.2.4.1 The EPC Startup Manager is responsible for the day-to-day activities of the Preoperational/Startup Test Group during the Construction and Preoperational Test Phases. He/she is also responsible for ensuring smooth interface between the STP Plant Staff and the Testing organization(s).

3.2.5 Vice President Engineering and Construction STP Units 3 & 4

3.2.5.1 The Vice President Engineering and Construction STP Units 3 & 4 is responsible, for implementation of the ITP, including plant construction and engineering.

3.2.6 Plant Operations Review Committee (PORC)

3.2.6.1 During the Preoperational Test Phase, the Plant Operations Review Committee (PORC), reporting to the Plant General Manager, performs a review function overseeing the Joint Test Group. After fuel load, the PORC is responsible for review of safety related operating procedures, test procedures, test results and other startup test documents, e.g., other procedures, technical data, etc., as instructed by the Plant General Manager.

3.2.7 STP Startup Manager

3.2.7.1 The Startup Manager, under the direction of the Vice President, Engineering and Construction, is responsible for providing oversight of the day-to-day activities of the Preoperational/Startup Test Group. He/she is also responsible for ensuring smooth interface between the STP Plant Staff and the Testing organization(s). At fuel load and throughout the Startup Test Phase, the STP Startup Manager assumes the responsibilities of the EPC Startup Manager.

3.2.8 Plant Operations Manager

3.2.8.1 The Plant Operations Manager, under the direction of the Plant General Manager, is responsible for the day-to-day activities of the operations staff. He/she is specifically responsible for assignment of responsibilities to Operations Shift Supervisors. He/she coordinates with the Startup Manager during the ITP.

3.2.9 Preoperational/Startup Test Group Leaders

3.2.9.1 Preoperational/Startup Test Group Leaders, under the direction of the Startup Manager, are responsible for the day-to-day activities of assigned System Startup Engineers, Preoperational/ Startup Test Engineers and Test Directors. They are also responsible for signing off the test report approval sheets for JTG approval. Additionally, they are responsible for administratively coordinating the review and approval of test results.

3.2.10 Preoperational/Startup Test Directors

3.2.10.1 Preoperational/Startup Test Directors, under the direction of the Preoperational/Startup Test Group Leaders, have overall responsibility for the preparation and performance of the assigned tests during the ITP. The STP Startup Manager or designee assigns Test Directors from the Preoperational/Startup Test Group or Plant Staff.

3.2.11 System Startup Engineers

3.2.11.1 System Startup Engineers, under the direction of Preoperational/Startup Test Group Leaders, have overall responsibility at the system level for their assigned systems during the test program. The responsibilities of the System Startup Engineers include, but are not limited to, initiating non-conformance reports as described in Section 4.5.3.3.f of this manual, initiation or restoration of temporary modifications and processing work requests for construction assistance, as required.

3.2.12 Quality Assurance Units 3 & 4

3.2.12.1 Provides oversight in accordance with the STP Units 3 & 4 QAPD.

3.2.13 Construction Manager

3.2.13.1 The Construction Manager is responsible for construction of a quality plant to ensure safe and reliable operation of the plant. He/she provides support to the Preoperational/Startup Test Group to ensure an orderly and smooth plant turnover and ITP.

3.2.13.2 After the system turnover for preoperational testing, the Construction Manager has responsibility for maintenance and repair for the system and the equipment. After system turnover to STP, STP Maintenance will have responsibility for maintenance and repair of the system.

3.2.14 Construction Test Engineers

3.2.14.1 Construction Test Engineers, under the direction of Construction Manager, are responsible for completion of construction activities and Construction Testing on their assigned systems. The Construction Test Engineers coordinate startup-related activities with the Preoperational/Startup Test Group during the ITP.

3.2.15 Toshiba Startup Manager

3.2.15.1 A Toshiba Startup Manager will be assigned to the STP Units 3 & 4 Site prior to the beginning of construction testing. The Toshiba Startup Manager or designee represents Toshiba on the JTG and is a technical advisor to the JTG Leader, Construction Manager, Startup Manger and the Plant General Manager. The primary responsibility of the Toshiba Startup Manager will be the planning and coordination of testing and operational activities.

3.2.16 Nuclear Island (NI) Startup Test Supervisor

3.2.16.1 The NI Startup Test Supervisor, under the direction of the Startup Manager or designee, is responsible for the day-to-day activities of the NI Startup Engineers. During the startup test phase, under the direction of the STP Startup Manager, he coordinates with the Operations Shift Supervisors in matters relating to the technical direction, planning and scheduling of the ITP. He/she is also responsible for coordinating with the Construction Manager or the Construction Division Heads.

3.2.17 NI Startup Engineers

3.2.17.1 NI Startup Engineers, under the direction of the NI Startup Test Supervisor, have overall responsibility at the system level for their NI assigned systems during the test program. The responsibilities of the NI Startup Engineers include, but are not limited to, initiating non-conformances as described in Section 4.5.3.3.f of this manual, initiation or restoration of temporary modifications and processing work requests for construction assistance, as required.

3.2.18 Balance of Plant (BOP) Test Supervisor

3.2.18.1 The BOP Test Supervisor, under the direction of the Startup Manager or designee, is responsible for day-to-day activities of the BOP Startup Engineers. He/she coordinates with the Operations Shift Supervisor and with the Construction Manager or the Construction Division Heads.

3.2.19 BOP Startup Engineers

3.2.19.1 BOP Startup Engineers, under the direction of BOP Test Supervisor, have overall responsibility at the system level for their assigned BOP systems during the test program. The responsibilities of the BOP Startup Engineers include, but are not limited to, initiating non-conformances as described in Section 4.5.3.3.f of this manual, initiation or restoration of temporary modifications and processing work requests for construction assistance, as required.

3.2.20 TI (Turbine Island) Vendor Representative

3.2.20.1 The TI Vendor Representative or designee represents the TI Vendor on the JTG and is responsible for the review of turbine generator related procedures for all phases of the test program.

3.2.21 TI Test Supervisor

3.2.21.1 The TI Test Supervisor, under the direction of the Startup Manager, is responsible for day-to-day activities of the TI Startup Engineers. He/she coordinates with the Operations Shift Supervisor and with the Construction Manager or the Construction Division Heads.

3.2.22 TI Startup Engineers

3.2.22.1 TI Startup Engineers under the direction of TI Test Supervisor, have overall responsibility at the system level for their assigned TI systems during the test program. The responsibilities of the TI Startup Engineers include, but are not limited to, initiating non-conformances as described in Section 4.5.3.3.f of this manual, initiation or restoration of temporary modifications and processing work requests for construction assistance, as required.

3.2.23 Electrical System Test Supervisor

3.2.23.1 The Electrical System Test Supervisor, under the direction of the Startup Manager, is responsible for day-to-day activities of the Electrical System Test Engineers. He/she coordinates with the Operations Shift Supervisor and with the Construction Manager or the Construction Division Heads.

3.2.24 Electrical System Test Engineers

3.2.24.1 Electrical System Test Engineers are assigned to perform electrical system tests of electrical systems and equipment, support activities and service during the installation, preoperational and startup tests. Electrical System Test Engineers will perform testing of the power distribution system and all electrical systems, re-assembling of I&C systems, checkout logics, calibration of instrument equipment and individual operation of electrical equipment.

3.2.25 Chemical and Radiochemical Test Supervisor

3.2.25.1 The Chemical and Radiochemical Test Supervisor, under direction of the Startup Manager, is responsible for day-to-day activities of the Chemical and Radiochemical Test Engineers. He/she coordinates with the Operations Shift Supervisor and with the Construction Manager or the Construction Division Heads.

3.2.26 Chemical and Radiochemical Test Engineers

3.2.26.1 Chemical and Radiochemical Test Engineers are assigned to perform the chemical and radiochemical testing of the plant, and administrative control of chemical condition of the plant and systems.

3.3 Post Fuel Load Responsibilities

With the start of fuel load, the STP Startup Manager has the responsibility for providing technical direction of plant startup activities, and the Toshiba Startup Manager has the responsibility for assisting the STP Startup Manager. Prior to fuel load, the NI Startup Test Supervisor and NI Startup Engineers will be on shift to provide technical assistance relating to plant operation and safety. Overall coordination is the responsibility of the Preoperational/Startup Test Group. The NI Startup Test Supervisor and the BOP Startup Test Supervisor will assist the plant staff in integrating and coordinating startup test activities with plant operations. They will also be responsible for the planning and coordination of the ITP.

During the shift, the conduct of the startup tests is the responsibility of the STP Shift Supervisor. Data collection and maintenance of test procedures are the responsibility of the shift Startup Engineers. Technical assistance for activities during the shift is the responsibility of the on shift NI, BOP and TI Startup Engineers. The NI, BOP and TI Startup Engineers and the STP Test Directors/Test Personnel shall make their test requirements known to the STP Shift Supervisor/Shift Engineer. In addition, the NI, BOP and TI Startup Engineers will work with the STP Test Engineers in the analysis of the startup tests.

Direct supervision of the STP operators will be through the STP line of supervision. The STP Shift Supervisor will provide direct instructions and supervision to the STP operators. However, for the sake of efficiency, direct communication between the Startup/Test Engineer and the STP Shift Supervisor/Shift Engineer can be arranged with the agreement of the STP Startup Manager and the NI, BOP and TI Test Supervisors.

3.4 Audits of Compliance with the ITP

Audits of the ITP will be conducted as specified in the STP Units 3 & 4 QAPD.

4.0 Initial Test Program Planning and Scheduling

4.1 Overview

The purposes of ITP is to confirm the design basis and demonstrate, to the extent practicable, that the plant operates and responds to anticipated transients and postulated accidents as designed. In addition, startup testing is used to confirm that the plant warranty specified in the contract and the systems and equipment specification requirements are satisfied. The Startup Test phase consists of three parts.

4.1.1 Initial fuel loading and open vessel testing

4.1.2 Testing during nuclear heatup to rated temperature and pressure (i.e., approximately 5% power)

4.1.3 Power ascension tests from 5 to 100% of rated reactor power

The test items planned during the STP Units 3 & 4 Startup Test phase are described in the STP Units 3 & 4 Startup Test Specification (U7-P-SU01-0002). These tests are subdivided into the following categories:

4.1.4 Core Performance Analysis:

4.1.4.1 Testing performed to:

a. Demonstrate that various core performance parameters are in accordance with design limits and expectations.

b. Confirm proper operation and calibration of reactor instrumentation, for example, Source Range Neutron Monitor Calibration, Power Range Monitor Calibration and Core Flow Sensor Calibration.

4.1.5 Steady State Tests:

4.1.5.1 Testing performed to:

a. Demonstrate expected performance under conditions of normal plant operation at or near rated output for those non-safety related components or systems, for example, Reactor Recirculation System Performance.

b. Collect baseline data for comparison against future plant operation or to assist in future plant design or modification, for example, Loose Parts Monitoring System (LPMS) Baseline Data.

c. Chemical and radiochemical data collection and radiation surveys during steady state operation.

4.1.6 Control System Tuning:

4.1.6.1 Testing performed to:

a. Establish initial running adjustments for non-safety related systems such as Recirculation Flow Control System, Feedwater Control System, and Pressure Control System.

4.1.7 System Transient Tests:

4.1.7.1 Testing performed to:

a. Demonstrate acceptable system and plant response due to transients as a result of abnormal system operation and/or malfunction, for example, Feedwater Pump Trip.

b. Confirm the correctness of operating and surveillance procedures required during normal plant operation, for example, Main Turbine Stop Valve (MSTV) Performance.

4.1.8 Major Plant Transients (including trips):

4.1.8.1 Testing performed to:

a. Confirm that the plant operates and responds to anticipated transients as designed, for example, Turbine Trip and Load Rejection and Reactor Full Isolation.

4.2 Test Plateaus

4.2.1 The Startup Test Program is implemented in five Test Plateaus (or Test Conditions). These Test Plateaus are the plant operating conditions at which required Startup Tests are to be performed. The definitions of Test Plateaus are shown as follows and illustrated on Addendum 3, Sample Power/Flow Operating Map.

	Test Plateau	Power Flow Map Region and Note
1.	Open Vessel (OV)	With the Reactor Pressure Vessel (RPV) head removed, from initiation of fuel loading to cold conditions with a fully loaded core.
2.	Heat-Up (HU)	During nuclear heat-up, from ambient conditions and 0 kPaG (0 psig) to rated temperature and pressure within the RPV, with reactor power typically less than 5% of rated.
3.	Lower Power (LP)	Between 5% and 25% of rated thermal power, with the Reactor Internal Pumps (RIPs) operating within 10% of minimum speed.
4.	Mid Power (MP)	Between approximately 50% and 75% rated thermal power, with the RIPs operating between minimum and rated speeds, with the lower power corner within the capacity of the bypass valves.
5.	High Power (HIP)	Along and just below (+0, -5%) the 100% rated thermal power, from minimum RIP speed to maximum core flow.

4.3 Test Sequence

Testing activities will be integrated with the site master schedule. These activities will include the actual sequencing of testing as well as initial preparation and review of procedures and training activities necessary to support the test program. This information will coordinate testing activities with all affected site organizations. Schedule review and approval, including changes to the schedule, will be performed by the project work organization. The testing schedule will be made available to the NRC by STP prior to actual implementation.

4.3.1 Preoperational Testing Sequence

4.3.1.1 The Level 3 schedule provides detailed sequencing for all preoperational test activities.

4.3.1.2 The schedule sequence for preoperational testing is dependent on many factors. These include construction schedule, manpower availability, availability of supporting equipment etc.

4.3.2 Startup Testing Sequence

4.3.2.1 The Startup Test Program is performed in sequence from Open Vessel testing, Initial Heatup, Low Power, Mid Power and then High Power. The normal recommended sequence of a startup test within a given test plateau is:

a. Core Performance Analysis

b. Control System Tuning

c. Steady-State Tests

d. System Transient Tests

e. Major Plant Transients, including trips

4.3.2.2 Testing at low power and flow levels is generally performed prior to testing at higher power and flow levels.

4.3.2.3 Test prerequisites are specified in each test procedure. These prerequisites must be confirmed prior to test commencement. Upon completion of a given test, a preliminary evaluation will be performed which confirms acceptability for continued testing.

4.3.2.4 Smaller transient changes are performed initially, gradually increasing to larger transient changes. Test results at lower powers will be extrapolated to higher power levels to determine acceptability of performing the test at higher powers. This extrapolation will be included in the analysis section of the lower power procedure. At the completion of the Startup Test Program, a plant capacity warranty test is performed to satisfy the contract warranty and to confirm safe and stable plant operation.

4.4 Startup Test Program Planning

This section discusses Startup Test Program planning from Open Vessel Tests until completion of the test program. This information is provided based on previous plant startup experience and is provided so that lessons learned from these experiences can be applied. In addition, areas have also been identified where increased emphasis on operator training can be beneficial. As part of the preparations for fuel load, a review will be conducted of recent initial test programs and recent operating experience to identify any new lessons learned for incorporation into the test program.

4.4.1 Open Vessel Tests

4.4.1.1 Cold Functional Tests

a. Prior to fuel loading, Cold Functional Tests are performed to assure:

1. Plant systems are available to support fuel loading

2. Shift personnel have operating experience with plant equipment

3. Certain plant Operating and Surveillance Procedures have been exercised and are usable

4. Each operating shift has functioned together to operate the plant systems on an integrated basis

5. Specified plant equipment has been tested and the plant and personnel are ready for fuel loading

4.4.1.2 Typical systems to be included as part of this program are specified in the Level 3 schedule. Testing shall be performed and controlled using plant procedures.

a. Prerequisites for Fuel Loading

1. Complete Preoperational Test Program

Every effort should be made to complete the Preoperational Test Program in its entirety.

Unforeseen circumstances may arise that would prevent the completion of all preoperational testing (including the review and approval of the test results) but that would not necessarily justify the delay of fuel loading. This would necessitate a Test Deferral be initiated, reviewed and approved in accordance with the approved Startup and Licensing procedures. If portions of any preoperational tests are intended to be conducted, or their results approved, after fuel loading, the Test Deferral will include:

A. List each test.

B. State which portions of each test will be delayed until after fuel loading.

C. Provide technical justification for delaying these portions.

D. State when each test will be completed and the results approved.

All of the Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) in the Combined License (COL) must be satisfactorily completed prior to fuel load.

2. Complete Surveillances

If possible, surveillance test procedures should be implemented during the Preoperational Test Program to identify and correct problems with the procedures. All required plant surveillances shall be complete and current. A review of the long term (18 month) surveillances should be performed and if necessary, these surveillances should be scheduled to be re-performed during a planned outage as part of the startup test program. This will allow continued operation following commercial operation.

3. Plant Control System Checkout

   If possible, the plant control systems, e.g., Neutron Monitoring System (NMS), Recirculation Flow Control System (RFC), Feedwater Control System (FWC), etc., should be energized and remain energized to detect component failures for several months prior to fuel load. In addition, the software and hardware of these systems should be tested with the final version of component software.

4. Condenser

   Prior to fuel loading, the condenser should be inspected. This is to assure that the condenser is clean and air tight in order to maintain efficient operation of the condensate demineralizers.

5. Drywell Cooling System

   Prior to fuel loading, evaluation of flow balance of drywell cooling system should be performed based on experience of operation to avoid hot spot or high temperature alarm for drywell hot operation.

6. Radwaste System

   Prior to fuel loading, preoperational testing for the radioactive waste treatment facility shall be complete and the radioactive waste treatment facility shall be ready for use prior to the start of the plant startup test program.

4.5 Conduct of Testing

The following guidance will govern conduct of the ITP. Adherence to the program assures that equipment is testable, the appropriate tests are performed, and the results are satisfactory. Implementation of the test program covers the evolution of events associated with testing, starting with approved test procedures and culminating with endorsement of test results. Conduct of testing includes control of all activities described below:

4.5.1 Distribution and Control of Procedures

The Startup Administrative Manager/Lead is responsible for controlling the master original of approved test procedures and distribution of all copies. When a test procedure has been officially approved for implementation, copies of the approved test procedures will be reproduced. Copies distributed for general information are stamped FOR INFORMATION ONLY on the procedure approval sheet.

Only one Official Test Copy will be issued for a particular test procedure revision. The Official Test Copy will be used to document the test performance, and represents the official record of the test. The only time a second OFFICIAL TEST COPY will be issued is if a procedural revision has occurred.

Because procedures may be approved for implementation well in advance of the scheduled test date, a review of the approved test procedure is required before commencement of testing. The Test Director is responsible for ensuring:

4.5.1.1 Drawing and document revision numbers listed in the reference section of the test procedure agree with the latest revisions.

4.5.1.2 The procedure text reflects any design change(s) made since the procedure was originally approved for implementation in the areas of acceptance criteria, FSAR, Technical Specifications, ITAAC, etc.

4.5.2 Adherence to Procedures and Use of Procedures

Tests will be conducted using the OFFICIAL TEST COPY of the latest revision of the approved test procedures. Documents, drawings, manuals, etc., used for references in conducting a test must be the latest revision, reflect the system as-built condition, and be approved for engineering use.

Procedures, sections or steps, will be performed in sequence. However, an exception to in-sequence performance may be made when it is clearly identified by a note within the applicable procedure as to which section(s) or step(s) may be accomplished out of sequence. When a test document is in error or cannot be followed, it will be changed (or revised) as described in Section 4.8 below before continuing testing.

An important function of the preoperational test procedures will be the documentation of the satisfactory completion of ITAAC as contained in the DCD and COL. All ITAAC must be completed before the NRC will authorize the loading of fuel under 10 CFR Part 52. Each preoperational test procedure that contains ITAAC shall clearly state what the ITAAC requirements are and how verification of the requirements will be achieved. For scheduling purposes, it is critical that ITAAC be designated with the correct number from the DCD and COL.

4.5.3 Performance of Preoperational and Startup Tests

4.5.3.1 Responsibilities and Interface

Construction will provide technical and manpower support to the Preoperational/Startup Test Group as necessary until the plant is turned over for commercial operation. The Preoperational/Startup Test Group is responsible for preparing Startup Work Requests (SWR) discussed in Section 4.5.3.3.b when Construction assistance is required and maintaining a log to document these transactions. The Plant Staff, upon identifying a need for Construction assistance, will coordinate their requirements through the appropriate System Startup Engineer.

Activities requiring Construction work efforts are performed under applicable tagging procedures, as appropriate. Tagging procedures shall be used for protection of personnel and equipment and for jurisdictional or custodial conditions that have been turned over in accordance with the turnover procedure.

The Preoperational/Startup Test Group has the primary responsibility for conducting tests and documenting the results. The Test group can also be responsible for supervising minor repairs and modifications, changing equipment settings, and disconnecting and reconnecting electrical terminations as stipulated in a specific test procedure. Test Director's may perform independent verification of changes made in accordance with approved test procedures.

4.5.3.2 Measuring and Test Equipment

During the test program, most activities that lead to plant commercial operation involve design value verifications. Measuring and Test Equipment (M&TE) used during these activities will be properly controlled, calibrated, and adjusted at specified intervals to maintain accuracy within necessary limits. M&TE includes portable tools, gauges, instruments, and other measuring and testing devices not permanently installed.

A calibration program will be implemented. For standard M&TE equipment, calibration procedures will be prepared for each type of M&TE calibrated onsite. These procedures must be readily available for use by shop personnel. Calibration intervals will be established by the I&C Division Head for each item of M&TE. However, if the calibration requirement of a particular piece of M&TE is beyond the capabilities or resources of the onsite I&C Group, this M&TE shall be sent to an offsite certified calibration or testing agency. If special test equipment, used only for the initial test program, is necessary, the responsible vendor will provide this equipment with the appropriate calibration documentation.

4.5.3.3 Performance of Tests

During the Construction Test Phase, systems, subsystems, and equipment are completed and turned over from Construction in an orderly and well-coordinated manner. Guidelines will be established in a site specific Startup Administrative Procedure to define the boundary and interface between related system/subsystem and used to generate boundary scope documents, for example, marked up Piping and Instrument Diagrams (P&IDs), Electrical Schematic Diagrams, etc. for scheduling and subsequent development of component and system turnover packages. The System Turnover Procedure will include requirements for the following:

- Documentation of inspections performed by the startup organization (e.g. highlighted drawings showing areas inspected)

- Results of construction testing

- The designated construction-related inspections and tests are completed before preoperational testing begins. Any open items are evaluated for acceptability of commencing preoperational testing.

- Plans are developed and implemented for correction of adverse conditions and open items, and means exist for tracking such conditions and items.

The Startup Manager controls start of testing. The responsible Test Director shall complete the following preliminary test activities prior to performance of the testing specified in the approved procedure.

Because procedures may be approved for implementation well in advance of the scheduled test date, a review of the procedure is required before commencement of testing at each Test Plateau. The Test Director shall verify that reference section drawings and document revision numbers agree with the latest versions and that the procedure text reflects any design changes made since the procedure was approved for implementation.

Test Directors shall also verify that general and specific prerequisites are completed and documented properly prior to signoff in the Official Test Copy of the procedure. General prerequisites may include items, such as:

- All required test apparatus and equipment required for performing the tests is available and calibrated, if applicable.

- Communications systems (temporary or permanent) are available and working.

- Verification that interfacing support systems are operable or in a condition that will satisfy the testing requirements.

- Access control is present in areas where possible hazardous conditions might exist during testing.

- Adequate and qualified test personnel are available to perform the test. Specific test prerequisites are listed in the prerequisite section of the Test Procedure. As required preceding tests are completed and plant operating conditions are satisfied for the testing to be performed.

After completing the procedure review and satisfying test prerequisites, the test can be started. The following paragraphs establish the administrative controls required for test performance.

a. Test Briefing

Test briefings shall be conducted in order to prevent errors and ensure all data is collected.

Prior to commencing an individual test, the Test Director will conduct a test briefing with all required test and support personnel. The Test Director shall:

- Provide an overview of the testing to be performed.
- Verify that test personnel have proper test instrumentation and equipment, spare data sheets, and information copies of the procedure, etc.
- Inform test personnel of specific precautions, equipment limitations, and hazardous conditions during the test to be performed, discuss expected responses and abort criteria (if applicable)
- Identify personnel locations and communication paths.

Additionally, any test procedure which, if performed incorrectly, could produce a scram or unplanned actuation of an engineered safety feature (ESF) must be identified and discussed prior to start of the test.

For testing which occurs over several shifts or days or is being restarted following a test interruption, a test briefing will be conducted prior to the shift or restart of testing, as applicable, and include those elements discussed above as applicable.

b. Test Coordination

Systems turned over from Construction usually require additional work other than normal testing. This additional work could include incorporation of required design changes, completion of outstanding construction exceptions, repair and/or replacement of damaged equipment, replacement of consumable materials/components, and maintenance of equipment. Additionally, during performance of preoperational testing it may be necessary to return system control to construction to repair or modify the system to correct new problems. To cover these circumstances, a Startup Work Request (SWR) is used by the Preoperational Test Group to request materials services, manpower support and/or job/requests from Construction until the end of the Startup Test Phase of the ITP. This work will be administered by a Startup Administrative Procedure, which will include direction for:

- Means of releasing control of systems and/or components to construction
- Methods for documenting actual work performed and determining impact on testing
- Identification of required testing to restore the system to operability status, and to identify tests to be re-performed based on the impact of work performed.

- Prior to fuel load, maintenance or modifications may be performed on structures, systems and components (SSCs) that are the subject of an ITAAC. The maintenance and modification activities, including any post-maintenance or post-modification tests, shall conform to the following provisions in Section 8.1 of NEI 08-01, *Industry Guideline for the ITAAC Closure Process Under 10 CFR Part 52*:

  ◊ The maintenance and modification programs shall ensure that the ITAAC acceptance criteria continue to be met after the maintenance or modification is complete.

  ◊ The problem identification and resolution program shall be used to ensure that any identified ITAAC related deficiencies are processed and resolved under that program and ensure that the ITAAC acceptance criteria continue to be met.

  ◊ The design/configuration control program shall ensure that changes to SSCs or programs will not alter ITAAC requirements and ensure that ITAAC acceptance criteria continue to be met.

- Determinations of operability and availability are properly tracked and authorized.

Performing tests requires a coordinated effort between required test personnel and the responsible Test Director.

During the test, the plant operating staff is responsible for the safe and proper operation of systems and equipment. The Test Director shall coordinate equipment operation and control with Operations. Temporary modifications of plant equipment are necessary in order to facilitate testing during the Preoperational/Startup Test Phase of the ITP. However, these modifications must be clearly identified and documented in accordance with the guidelines and administrative requirements established based on the "Safety Tagging Procedure" to ensure proper restoration and to notify personnel of their existence. Should an unsafe condition arise, the plant operating staff will take whatever action is necessary including, but not limited to, stopping the test in order to restore safe plant conditions and the condition shall be documented in the STP Corrective Action Program.

The Test Director shall inform required test personnel of test progress and significant test results. In addition, test personnel shall inform the Test Director of observed operating conditions, especially any unexpected or potentially hazardous conditions during the test.

c. Test Entries

During the conduct of a specific preoperational/startup test, a Test Chronological Log is maintained by the Test Director, which will become a permanent part of the Test Package as discussed in Section 4.9.2.1. In addition, step verifications and data sheets are completed,

reviewed, signed, and dated by the Test Director or the designated test personnel as they are performed. Verification may be made by the Test Director or required test personnel. This verification requirement plus identification of all data recorded on special forms (e.g. strip charts, computer listings, etc.) shall be attached to the Official Test Copy of the procedure.

All entries in the Official Test Copy must be made in black ink or through the use of computerized form. Pencil entries are not acceptable. If hard copies are used, corrections to erroneous entries are made by striking through (or single lining) the incorrect entry, entering the correct entry nearby, and initialing/dating the change. Test personnel must refrain from entering extraneous information, notes, calculations, etc., within the procedure.

d. Test Procedure Correction

If the Test Director determines that procedure corrections (including changes in test sequence) are required during the conduct of the test, he shall temporarily suspend testing and notify test personnel of the required change. The Test Director then clearly marks up the Official Test Copy of the procedure delineating the required change and initials/dates the correction. A concurrence by a licensed Senior Reactor Operator (SRO) (or person authorized by site-specific administrative procedure) is also required.

For all such corrections, the Test Director prepares and processes a Test Procedure Change Notice (TPCN) as discussed in Section 4.8.1 of this document. Interruption of testing in order to process the TPCN is based on the following criteria, i.e.

- Minor corrections that obviously preserve the intent of the test do not require interruption of testing. The TPCN may be processed subsequent to completion of the associated test.

- Major corrections that change the intent of the test require interruption of testing. The TPCN must be processed prior to the continuation of associated testing.

e. Test Interruptions

For normal test interruptions (i.e., end of shift, holidays, manpower restraints, etc) the Test Director shall notify the plant operating staff of the test interruption and take the required actions to place the system and plant/equipment/system in a safe and stable condition. The Test Director will notify the Preoperational/Startup Test Group Leaders, and take the required actions to ensure testing conditions/ prerequisites are satisfied prior to restart of the test.

There may be occasions when it is not possible to continue a test due to plant conditions or due to technical or procedural problems. If this should occur, the Test Director must carefully consider what actions to take to restart the test since invalidating preceding or subsequent test data or step verification may result. The following options are acceptable:

- If a step or series of steps can be deferred such that the test can continue without invalidating subsequent test steps, the Test Director shall initiate a test exception as discussed in Section 4.5.3.3.f of this manual.

- If a change of the procedure is required to permit continuation of testing, the Test Director shall initiate the change in accordance with the requirements as described in Section 4.8.1 of this manual.

f. Test Deficiency, Discrepancy, Exceptions, and Nonconformance Dispositions

Test deficiencies, discrepancies, exceptions, and nonconformances shall be tracked and resolved as specified in procedures, policies, or instructions in accordance with the STP Units 3 & 4 QAPD.

Prior to the submittal of the test results, the Test Director shall attempt to resolve all problems identified during testing. If a test is approved with an exception or nonconformance, each outstanding exception or nonconformance shall be evaluated in accordance with Section 4.9.2.5 of this document. Test exceptions and nonconformances must be identified as part of the test procedure package.

4.6 Test Procedure and Control

Testing during all phases of the test program is conducted using test procedures to control the conduct of each test. The term "Test Procedure" as used in this document refers to all NI, BOP, and TI scope of preoperational and startup test procedures, which are required to be performed during the ITP. This section describes the contents of a typical Test Procedure and establishes the requirements for the Test Procedure control, which includes preparation, initial review, implementation update, final review and approval, and revision control.

4.6.1 Content of Test Procedures

Test procedures are required to demonstrate the capability of systems, structures, and components to meet safety concerns, performance and design requirements for the nuclear power plant. Test procedures document the required testing and the applicable acceptance criteria for each test.

Test procedures should maximize the use of Plant Operating and Maintenance procedures for the performance of test tasks. This can take the form of referencing a plant procedure to perform a task, or extracting the steps from the plant procedure for use in the Preoperational/Startup test procedure. This should include the use of Emergency Support procedures for verifying appropriate emergency actions.

Step-by-step instructions on how to conduct the applicable test are described and are coordinated with plant procedures wherever applicable in the test procedure. For the purpose of clarity, there are two definitions provided for the test procedures in the following presentation, i.e.

- Test Procedure, which is a test procedure approved for implementation and
- Official Test Copy, which is the copy of the Approved Test Procedure used for documenting the test performance. The Official Test Copy and its associated documentation represent the official record of the test.

Each test procedure includes the following standard format:

4.6.1.1 Purpose

This section identifies the results the specific preoperational/startup test is intended to demonstrate. This is established by stating those systems, subsystems, or components that are included in the test and a series of summarized specific functions to be demonstrated during the test.

4.6.1.2 Description

This section provides a brief description of the specific preoperational/startup test to be performed.

4.6.1.3 Acceptance Criteria

Acceptance criteria for judgment of plant and system performance are described in this section. Those test criteria that correspond to the Combined License (COL) Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) will be identified in the preoperational test procedure. When test criterion for a preoperational test is not met, the Test Director shall contact the applicable Preoperational Test Group Leader to determine what action to take.

For the Startup Test Program, acceptance criteria are divided into three categories depending on significance of the parameter/function. The following paragraphs describe the degree of each kind of test criterion, and the actions to be taken by the Test Director after an individual test criterion is not satisfied.

a. Level 1 Criteria

Level 1 criteria relate to the values of process variables assigned in the design or analysis of the plant and component systems or associated equipment. Violation of these Level 1 criteria may have plant operational or plant safety implications. Therefore, if a Level 1 test criterion is not satisfied, the plant must be placed in a suitable hold condition that is judged to be satisfactory to safety based on the results of prior testing. Plant operating or test procedures or the Technical Specifications may guide the decision on the direction to be taken. Startup tests compatible with this hold condition may be continued.

Resolution of the problem must be documented and pursued by appropriate equipment adjustments or through engineering support by offsite personnel, if needed. Following resolution, the applicable test portion must be repeated to verify that the Level 1 requirement is ultimately satisfied. A description of the problem resolution shall be included in the report documenting the successful test.

b. Level 2 Criteria

Level 2 criteria are specified either:

1. As key plant, system or equipment performance requirements that are consistent with the plant specification, individual system or equipment design specification values or requirements for the measured response.

2. As the expected plant response predicted by best estimate computer code and the desired trip avoidance margins as applicable to plant malfunction testing.

If all Level 2 criteria requirements in a test are ultimately satisfied, there is no need to document a temporary failure (e.g. during tuning and system adjustment) in the test report; unless there is an educational benefit involved. Following resolution of a nonconformance with a Level 2 criterion, the applicable test portion must be repeated to verify that the Level 2 criterion requirement is satisfied.

If a Level 2 criterion requirement is not satisfied after a reasonable effort, then the cognizant design and engineering organization shall document the results in the Corrective Action Program with a full explanation of their recommendations. In order for the system as a whole to be acceptable, all Level 2 requirements do not necessarily have to be satisfied provided that the overall system performance is evaluated to be acceptable based on engineering's recommendations.

c. Level 3 Criteria

Level 3 criteria are associated with specifications on the expected or desired performance of individual components or inner control loop transient performance. Meeting Level 3 criteria helps assure that overall system and plant response requirements are satisfied. Therefore, Level 3 criteria are to be viewed as highly desirable rather than required to be satisfied. Good engineering judgment is appropriate in the application of these rules.

Since overall system performance is a mathematical function of its individual components, one component whose performance is slightly worse than specified can be accepted provided that a system adjustment elsewhere will positively overcome this small deficiency.

If a Level 3 criterion requirement is not satisfied, the subject component or inner loop shall be analyzed closely. However, if all Level 1 and Level 2 criteria are satisfied, then it is not required to repeat the transient test to satisfy the Level 3 performance requirements. The occurrence of this Level 3 criterion failure shall be documented in the test report.

4.6.2 References

This section lists the documents used during procedure preparation. References are identified by document title, number and revision, as appropriate.

4.6.3 Temporary Installations

This section contains a list of equipment (aside from installed instrumentation) required to perform the test and collect data. Also included are instructions on the location and set-up of the equipment.

4.6.4 Precautions

This section provides forewarning of potentially hazardous conditions, equipment operating limitations, and unusual occurrences pertaining to performance of the test.

4.6.5 Initial Conditions and Prerequisites

This section contains a list of actions that must be completed and plant conditions that must be achieved prior to the start of the test or a specific portion of the test. This includes current system(s) configuration, any modifications necessary prior to the start of the test, and the initial operability and availability requirements of interfacing support systems.

4.6.6 Test Procedure

This section provides the step-by-step instructions required to demonstrate that test acceptance criteria are satisfied and to demonstrate system design intent is satisfied. Test data are normally recorded in the body of the procedure immediately following the steps performed. However, where extensive or repetitive lists of data are required, tables may be used.

4.6.7 Supporting Information

This section contains equations and evaluation methods to be used in the analysis of the obtained data. In addition, this section lists the most pertinent signals to be recorded by the transient recording system.

4.6.8 Analysis and Evaluation

This section outlines the calculations to be performed and provides for an evaluation and summary of the test. In addition, this section documents test deficiencies, exceptions, and additions to the approved procedures.

4.6.9 Figure, Tables, Data Sheets, Evaluation Sheets

This section lists all the Tables, Figures, Data Sheets, Signature Log and Evaluation Sheets. Data and Evaluation sheets will have provisions for signatures, and dates for personnel collecting the data or performing the Evaluation. The Signature log will provide provision for identifying all personnel whose signature or initials appear in the procedure.

4.6.10 Appendices

This section contains additional technical information applicable to the test.

4.7 Preparation, Initial Review, and Approval

4.7.1 The specifics of the test relating to the test methodology, plant prerequisites, initial conditions, test criteria, and. analysis techniques are provided by the cognizant design and engineering organizations in the form of plant, system and component performance, and test specifications.

4.7.2 For test procedures utilizing an Operating, Emergency or Abnormal plant procedure, the applicable plant procedure can be referenced directly or a series of steps from the applicable plant procedure can be extracted, or both, in a way that is optimum to efficiently perform the specified testing. Available information on operation and test experiences of other operating nuclear power reactors shall be factored into the test procedures wherever applicable.

4.7.3 In each test procedure, interfacing support system requirements are specified. Data sheets required by all specified test conditions are also provided. Completion of each procedure step requires a sign-off by the test personnel involved. After or during testing, analysis is performed to determine if all applicable test acceptance criteria are satisfied. These analysis steps must be signed off as being satisfactorily completed prior to proceeding to the next test.

4.7.4 The original draft of each test procedure is prepared by the designated organizations (BOP, NI, TI or other major equipment suppliers) and is subject to a formal review and approval process. Following the initial preparations, test procedure drafts are processed through a formal review and approval cycle.

4.7.5 The procedure draft will also be reviewed by the cognizant design and engineering organization representatives to ensure that the test procedure and acceptance criteria are consistent with the applicable test specification/design document requirements. Review comments are resolved between the procedure writing organization and the cognizant design and engineering organization representatives.

4.7.6 After the initial reviews and inclusion of required changes, preoperational test procedures will be submitted to Joint Test Group (JTG) for review, and startup test procedures will be submitted to the Plant Operations Review Committee (PORC). Test procedures and any comments are sent to the procedure writers for required resolution and updating. Upon satisfactory resolution of comments, the test procedure is upgraded and transmitted to the JTG (preoperational test procedures) or PORC (startup test procedures) for final approval. All approved test procedures shall be made available for the USNRC's review approximately 60 days prior to their intended use and no later than 60 days prior to fuel loading for preoperational testing and approximately 60 days prior to scheduled fuel loading for startup testing. (COL License Information Item 14.2, COM 14.2-3, and COM 14.2-4)

4.7.7 An approved test procedure may be modified in order to complete the specific testing. The Test Director is responsible for preparing and processing changes and therefore submitted to JTG (or PORC for startup test procedures) for review and approval. In addition, changes to the scope or intent of the affected test procedure shall be reviewed and approved by the individuals or groups that perform those functions for the original test procedure.

4.8 Procedure Modifications

Test procedures may require changes following test procedure approval. These changes are made by revising the entire test procedure or processing a Test Procedure Change Notice against the originally approved test procedure.

4.8.1 TPCNs

For minor changes to a test procedure, a TPCN may be used.

The intent of the TPCN is to provide a capability to change procedures when a full revision is not justified. These changes can be made with annotations of existing pages or with the addition of supplemental pages. Each sheet must be signed by the Test Director and a licensed SRO (or person authorized by site-specific administrative procedure). Normally, the change should only affect several pages. There are two types of TPCNs.

A minor TPCN addresses changes that do not change intent. Examples of these changes include:

- Correcting obvious typographical errors
- Providing steps for temporary suspension of testing and for documenting steps to be taken to restart testing
- Steps which are re-performed to document testing
- Waive pre-requisites that are obviously not applicable to a given test section
- Provide additional steps/clarifications needed to perform a given step

A major TPCN is one that does change intent. Examples of these changes include:

- To modify the test procedure during its final review
- Change test prerequisites
- Change the procedure testing sequence
- To delete/add test instructions
- To change test acceptance criteria

Major TPCNs must be evaluated or screened to determine if a change to the Technical Specifications is required in accordance with 10 CFR 50.59 (c)(1) or if the TPCN meets any one of the eight criteria in 10 CFR 50.59 (c)(2)(i) through (viii) or any of the criteria in 10 CFR Part 52, Appendix A.VIII.B.5 or 6. If a major TPCN meets the criteria outlined above, a license amendment is required. This process will be covered by a separate plant procedure.

A major TPCN must be reviewed and approved in the same manner as the original procedure. The approval must be obtained prior to implementation.

During the test program, the Test Director will prepare TPCN on procedures for which he is responsible, log the TPCN on a Test Procedure Change Notice Log and process the TPCN for review and approval. Depending on the nature of the TPCN, interruption of associated testing in order to process the TPCN may be required. TPCNs that change the intent of the test or for which the change is not documented in the text of the procedure require interruption of testing for review and approval of the TPCN prior to performance of associated testing. TPCNs that preserve the intent of the test and for which the change is documented in the text of the procedure may be reviewed and approved after performance of associated testing. In either event, TPCNs are implemented in the same manner as test procedures.

4.8.2 Procedure Revisions

For large or extensive change(s) where TPCN(s) are not practical, a procedure revision is warranted. A procedure may be revised before, or after testing has commenced. This constitutes generation of a new Official Test Copy of the procedure. All previously applicable test data may be referenced or transcribed to the new procedure. Only uncompleted, added or revised steps, or steps affected by the changes need to be performed. Finally, Official Test Copy of latest version of test procedure should be made for official test record.

4.9 Test Results Review and Acceptance

4.9.1 Initial Test Summary Report (Startup Test Only)

Upon completion of each specified startup test at each test plateau, the Test Director evaluates test results and verifies them as acceptable. Then, the Test Director shall complete an initial test summary report for the applicable test as soon as possible after the test is completed. The initial test summary report is a concise write-up indicating when the test was performed, the plant conditions, and an assessment whether acceptance criteria were met. The summary and actual data will be provided to the PORC for preliminary approval of the individual tests and to enable the Plant General Manager to release testing to the next Test Plateau. The approval method for the initial test summary report is defined in Section 4.9.2 of this document.

The format to be used for the initial test summary report is the responsibility of the individual responsible party. A brief description of the suggested content of an initial test summary report is listed below:

4.9.1.1 Abstract

The Abstract is a brief assessment of the performance of the test and whether the acceptance criteria were met.

4.9.1.2 Plant Conditions

This section summarizes the date and time the test was performed, and the operating conditions, including reactor power, core flow, reactor pressure, reactor water level, and test plateau at which the applicable test is performed.

4.9.1.3 Results

This section summarizes the results of the tests referring to the overall acceptance or exceptions to the tests.

4.9.1.4 Exceptions

This section contains a list of exceptions, which are deviations from a test procedure, from expected test results, or from acceptance criteria for which corrective action or resolution is required.

4.9.1.5 Final Resolution

This section summarizes how the Test Exceptions (if any) are to be resolved. The resolution can refer to other written documents (e.g., TPCN), but a copy of the resolution document shall be attached to the initial test summary report.

4.9.1.6 Test Director

Enter the name of the Test Director who prepares the initial test summary report.

4.9.2 Review and Approval of Test Results

4.9.2.1 Test Package

Upon completion of each specified preoperational/startup test, the responsible Test Director with the assistance from Test Engineers evaluates the test results and verifies acceptability. Test discrepancies, deficiencies, open items and/or omissions identified during testing or during review of test results will be documented as Test Exceptions.

For preoperational testing, the Test Director assembles the Test Package, including a Test Chronological Log, all nonconformance reports issued, all Test Exceptions issued, Turnover Exception List, the Open Item List, and the Official Test Copy of the preoperational test procedure and associated data records. The Test Director will also identify which testing completes actions required by the ITAAC as part of this test package. The Preoperational Test Group Leader reviews and discusses the Test Package with the Test Director and then submits it to the STP Quality Manager and Startup Manager for in-depth review of all preoperational test results. Upon completion of this review, the preoperational test results are submitted to the JTG for final review and approval.

For Start-up Testing, the Startup Manager reviews the initial test summary report for a specified startup test at each test plateau and discusses the startup test results with the Test Director. After the Startup Manager completes review and acceptance of the initial test summary report and associated test exceptions/nonconformances, the Startup Test Group Leader will then submit the Test Package to the NI Startup Test Supervisor and BOP Test Supervisor for their concurrence review and approval. The initial test summary report is then returned to the Startup Manager.

When all initial test summary reports for required tests have been received for a test plateau, the following Test Package is assembled:

- Initial test summary reports and the associated Startup Test Report Approval Sheets
- Official Test Copy of the startup test procedure and associated data records
- All TPCNs issued against the test procedure
- Test Exception Log
- All nonconformance reports issued.

The responsible Test Director shall review the entire Test Package, sign and date the Test Endorsement Record and forward to the Startup Assistant for processing.

The Startup Administrative Manager/Lead will then submit the Test Package to the appropriate (NI/TI/BOP) organization for review. On return of the Test Package from the initial review, the Startup Administrative Manager/Lead will submit the Test Package to the Nuclear Division Head and STP Quality Manager for their review. When all reviews are completed, and all comments resolved, the Startup Manager (or designee) will sign the Endorsement Record and forward to the PORC with applicable recommendations.

4.9.2.2 JTG Review and Recommendations

For preoperational tests, the Startup Manager (or designee), assisted by the EPC Quality Manager, signs and dates the Test Endorsement Record, notifies the JTG Leader of test completion, and provides copies of the Test Package to the JTG as requested. The JTG leader will disseminate copies of the Test Package to members responsible for performing in-depth review and evaluating test results.

On return of the Test Package from the JTG, the Preoperational/Startup Test Group Leader discusses any outstanding Test Exceptions with the JTG Leader. If the result of the JTG review indicates that the system or component does not meet design specifications or does not fall within the acceptance criteria, these unsatisfactory test results must be added to the Test Exception Log, and nonconformances issued. If the JTG determines that additional testing is required or that portion(s) of the test must be repeated for any reason, these requirements must also be added to the Test Exception Log accordingly.

4.9.2.3 PORC Approval or Acceptance

The PORC is responsible for final approval or acceptance of Startup Test results. The PORC will perform a review of the test results and make recommendation, in the PORC meeting for approval of the test results. Once the Test Package is approved in the PORC meeting, the PORC Chairman signs and dates the Startup Test Report Approval Sheet and forwards the Test Package to the Plant General Manager. The Plant General Manager (or designee) will review the submitted package and sign the Test Endorsement Record signifying review and acceptance of the testing performed during this specific Test Plateau, and releasing the plant to test at the next Test Plateau.

4.9.2.4 Completed Test Procedures

The ABWR DCD, Tier 2, Section 14.2.6, identifies the minimum requirements for record retention. STP will implement QA program requirements for test records consistent with 10 CFR Part 50, Appendix B, regarding Criterion 17, Quality Assurance Records.

Completed test procedures, both for preoperational testing and startup testing, are records as defined by U7-P-RM02-0001, Unit 3 & 4 Records Management and Document Control. Completed test procedures shall be transmitted to Units 3 & 4 Records Management/Document Control as required by U7-P-RM02-0001.

4.9.2.5 Outstanding Test Exceptions

If a test is approved with discrepancies, deficiencies, and/or open items (e.g., turnover exceptions, nonconformances), each discrepancy, deficiency, and/or open item identified during the test and the review of test results will be documented as a Test Exception, and resolved in accordance with STP procedures.

4.9.2.6 Test Plateau Prerequisites

The Startup Test Program commences with the start of nuclear fuel loading and terminates with the completion of power ascension testing and the performance of warranty tests. The completion of all testing constitutes completion of the Startup Test Program. Commencement of each major test phase of the Startup Test Program requires that the following test procedure review and approval commitments be satisfied:

a. Commencement of Initial Fuel Load and Open Vessel Phase testing requires the results of the preoperational tests of designated systems be reviewed and approved.

b. Commencement of Initial Heatup Phase testing requires the results of the Initial Fuel Loading and Open Vessel Phase testing be reviewed and approved.

c. Commencement of Power Ascension Phase testing requires the results of the Initial Heatup Phase testing be reviewed and approved.

d. Commencement of Warranty tests requires the results of the Power Ascension Phase testing be reviewed and approved.

Prior to the transition to a new testing plateau, the STP management team shall conduct a readiness review in accordance with site practices to ensure that all aspects of plant operation are ready to support testing at the next higher plateau.

The normal sequence of testing during the power ascension testing should be Low Power Plateau →Mid Power Plateau → High Power Plateau. The Startup Test Report Approval Sheet and the Test Endorsement Record shall be completely signed off for each Test Plateau. The completion of startup testing and appropriate signatures on Startup Test Report Approval Sheet and the Test Endorsement Record in a particular test plateau signifies the completion of that test plateau. Once the test package is approved in the PORC meeting, the PORC Chairman signs the Startup Test Report Approval Sheet and the Test Endorsement Record signifying review and acceptance of the startup testing performed during this specific test plateau and release the plant to test at the next condition.

4.9.2.6 A summary of the startup testing will be included in the STP startup report, as discussed in Regulatory Guide 1.16, "Reporting of Operating Information – Appendix A Technical Specifications." This summary will include the following information:

a. A description of the method and objectives for each test

b. A comparison of the applicable test data with the related acceptance criteria, including the systems responses to major plant transients (such as reactor scram and turbine trip)

c. Design and construction related deficiencies discovered during testing, system modifications and corrective actions required for correcting these deficiencies, and the schedule for implementing these modifications and corrective actions according to the site Corrective Action Program

d. Justification for acceptance of systems or components that are not in conformance with design predictions or performance requirements

e. Conclusions regarding system or component adequacy

5.0 Documentation

5.1 Documents generated in accordance with this procedure are processed in accordance with Reference 6.1.2.8.

6.0 References

6.1 Supporting and Supplemental Documents

6.1.1 Supporting Documents

Supporting documents in conjunction with those documents listed in Sections 6.2 and 6.3 provide design and licensing requirements.

6.1.1.1 ABWR Codes and Standards Database

6.1.2 Supplemental Documents

Supplemental documents are those documents that are used in conjunction with this document and may not have been issued at the time of issuance of this startup test plan.

6.1.2.1 ABWR Design Control Document/Tier 2, Chapter 14, Initial Test Program

6.1.2.2 U7-P-SU01-0002, STP Units 3 & 4 Startup Test Specification

6.1.2.3 U7-P-QP01-AQAPM, STP 3 & 4 ASME Quality Assurance Program Manual

6.1.2.4 OQAP, Operations Quality Assurance Plan

6.1.2.5 U7-P-QP01-QAPD, STP 3 & 4 Quality Assurance Program Description

6.1.2.6 Not Used

6.1.2.7 Not Used

6.1.2.8 U7-P-RM02-0001, Unit 3 & 4 Records Management and Document Control

6.1.2.9 U7-P-AD02-0003, ABWR Corrective Action Program

6.2 Codes and Standards

The following Codes and Standards are applicable to the ITP for boiling water reactor power plants to the extent specified herein. The applicable date/revision of the code or standards is specified in the ABWR Codes and Standards Database.

6.2.1 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section III, Rules for Construction of Nuclear Power Plant Components

6.3 Regulation and Regulatory Requirements

The purpose of the regulatory guides, as related to testing, is to describe scope and depth (administratively and technically) of the ITP acceptable for light-water-cooled nuclear power plants. The basis for these regulatory requirements is provided in 10CFR50 (Section 50.34 and Appendix B). These two items specifically apply to testing of structures, systems, and components important to safety, i.e., sufficient testing to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. Systems important to safety include non-safety systems that have a safety function credited in the Final Safety Analysis Report or the ABWR Design Control Document. Examples of such non-safety systems include the fire protection system, environmental qualification (EQ) of electrical equipment important to safety, the alternate rod injection system used to mitigate Anticipated Transients Without Scram (ATWS), and non-safety related station blackout power sources (e.g., combustion turbine generators) used to meet the station blackout rule. The following Regulation and Regulatory Requirements are applicable to the ITP for boiling water reactor power plants to the extent specified herein. The applicable date/revision is specified in the ABWR Codes and Standards Database.

6.3.1 U. S. Code of Federal Regulations (CFR)

6.3.1.1 10 CFR 20, "Standards for Protection Against Radiation"

6.3.1.2 10 CFR 30, Section 30.53, "Tests"

6.3.1.3 10 CFR 50, Section 50.34, "Contents of Applications: Technical Information"

6.3.1.4 10 CFR 50.48, "Fire Protection"

6.3.1.5 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important To Safety For Nuclear Power Plants"

6.3.1.6 10 CFR 50.62, "Requirements for Reduction of Risk from Anticipated Transients Without Scram (ATWS) Events For Light-Water-Cooled Nuclear Power Plants."

6.3.1.7 10 CFR 55a, "Codes and Standards"

6.3.1.8 10 CFR 50.63, "Loss of All Alternating Power"

6.3.1.9 10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants"

6.3.1.10 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants"

6.3.1.11 10 CFR 50, Appendix J, "Primary Containment Leakage Testing for Water Cooled Power Reactors"

6.3.1.12 10 CFR 52.79, "Contents of Application: Technical Information"

6.3.1.13 10 CFR 52, Appendix A, Design Certification Rule for the U. S. Advanced Boiling Water Reactor

6.3.2 Nuclear Regulatory Commission (NRC) Regulatory Guides and NUREGs

The applicable revisions of the regulatory guides listed below can be found in FSAR Table 1.820 and Chapter 17.

6.3.2.1 Regulatory Guide 1.9, "Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants"

6.3.2.2 Regulatory Guide 1.16, "Reporting of Operating Information Appendix A Technical Specifications"

6.3.2.3 Regulatory Guide 1.20, "Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing"

6.3.2.4 Regulatory Guide 1.30, "Quality Assurance Requirements for Installation, Inspection and Testing of Instrumentation and Electrical Equipment (Safety Guide 30)

6.3.2.5 Regulatory Guide 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants

6.3.2.6 Regulatory Guide 1.41, "Preoperational Testing of Redundant Onsite Electric Power Systems to Verify Proper Load Group Assignments"

6.3.2.7 Regulatory Guide 1.52, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants"

6.3.2.8 Regulatory Guide 1.56, "Maintenance of Water Purity in Boiling Water Reactors"

6.3.2.9 Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants

6.3.2.10 Regulatory Guide 1.68.1, "Preoperational and Initial Startup Testing of Feedwater and Condensate Systems for Boiling Water Reactor Power Plants"

6.3.2.11 Regulatory Guide 1.68.2, "Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants"

6.3.2.12 Regulatory Guide 1.68.3, "Preoperational Testing of Instrument and Control Air Systems

6.3.2.13 Regulatory Guide 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release"

6.3.2.14 Regulatory Guide 1.116, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems

6.3.2.15 Regulatory Guide 1.128, "Installation Design and Installation of Vented Lead-Acid Storage Batteries for Nuclear Power Plants"

6.3.2.16 Regulatory Guide 1.139, "Guidance for Residual Heat Removal"

6.3.2.17 Regulatory Guide 1.140, "Design Testing and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light Water-Cooled Nuclear Power Plants"

6.3.2.18 Regulatory Guide 1.152, "Criteria for Digital Computers in Safety Systems of Nuclear Power Plants"

6.3.2.19 Regulatory Guide 1.168, "Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants"

6.3.2.20 Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)"

6.3.2.21 NUREG 0800, Standard Review Plan, Section 14.2 Initial Plant Test Program - Design Certification and New License Applicants

7.0 Support Documents

Addendum 1 - Hot Functional Testing Items

Addendum 2 - Organizational Chart for Startup Test Interface

Addendum 3 - Sample Power/Flow Operating Map

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NOTE:
The information included in this table is an example of testing that will be performed during Hot Functional Testing but is not intended to be all-inclusive.

1) During Heatup From Ambient Temperature And 0 KPaG (0 psi) To Rated Temperature And Pressure

System	Mode of Operation and Hot Functional Tests
1. Control Rod Drive (CRD) System	• In continuous normal operation • Check each fully withdrawn CRD for coupling as it is withdrawn. • Observe for proper position indication. • Record data patterns.
2. Drywell Leakage Detection System	• Monitor sump pump integrators and determine leak rates. • Check time delays on the sump pump run and sump pump out times, and adjust if necessary. • Determine identified and unidentified leakage rates at 3.447 and 6.343 MPaG (500 and 920 psig).
3. Drywell Temperature and Drywell Cooling	• Both should be in continuous operation per Operating Procedure. • Monitor drywell and steam tunnel temperatures to check for adequacy of cooling, hot spots, steam leaks, etc.
4. Area and Process Radiation Monitors	• In continuous operation. • Check for proper responses and expected readings as power levels are increased.
5. Ventilation System	• In continuous operation. • Check that steam tunnel temperature is within temperature limits at rated temperature and pressure. • Verify proper operation of leakage detection systems. • Observe area temperatures for abnormal increase that could indicate a steam leak.
6. Turbine Electro-Hydraulic Governor and Protection (EHG&P) and Steam Bypass & Pressure Controls	• Start heatup with controlling regulator set at 1.034 MPaG (150 psig) and by-pass opening jack at in depressurization. • Check that regulator responds to setpoint changes when reactor pressure is greater than 1.034 MPaG (150 psig).
7. Rod Worth Minimizer	• In continuous operation • Verify proper operation as rods are withdrawn.
8. Main Steam Relief Valves	• Record the discharge throat thermocouple (TC) and pressure readings from recorder and determine that the valves do not have seat leakage.

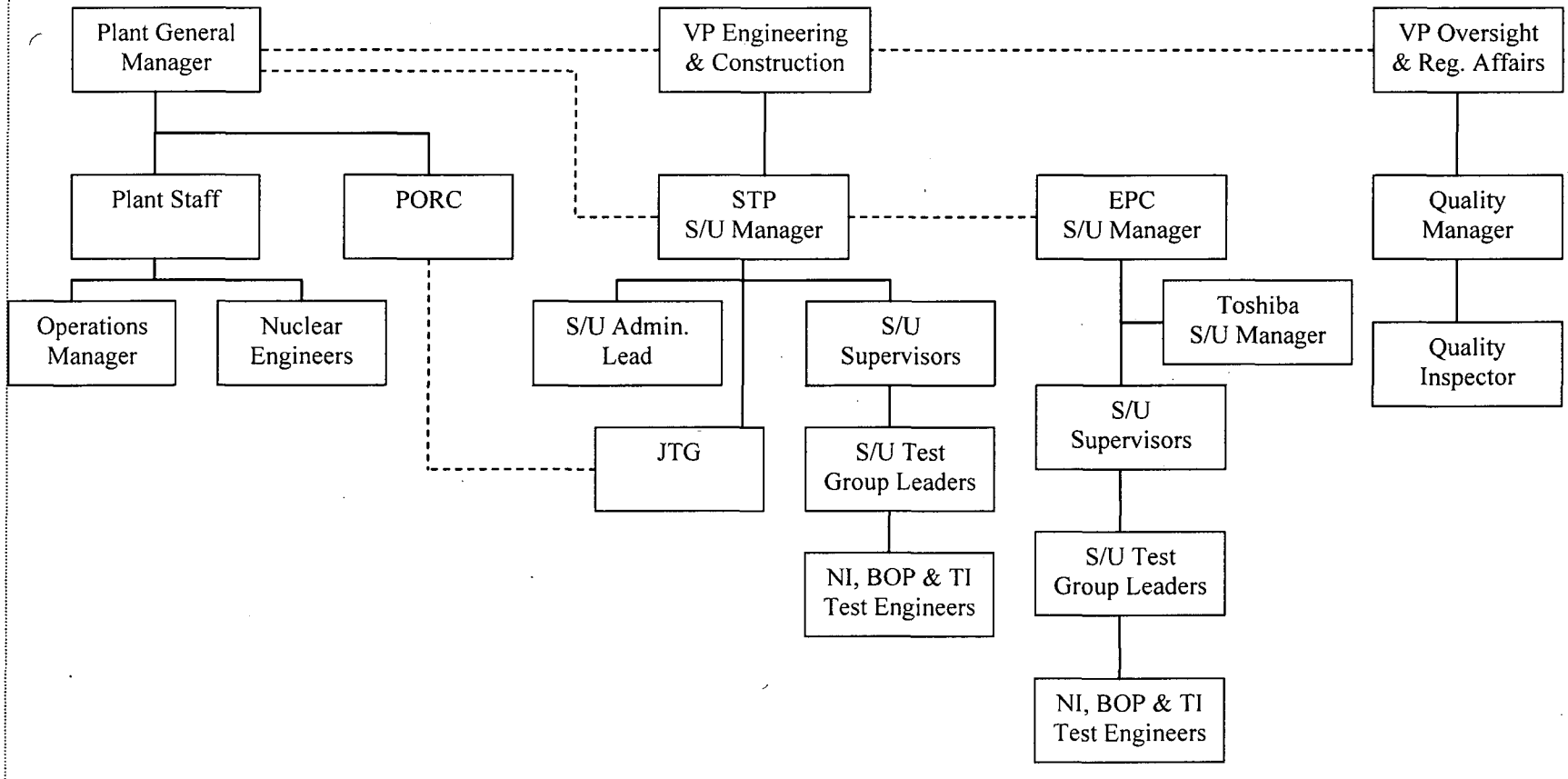
9.	Condensate Demineralizer System	• Verify performance of system to adequately control water quality by watching closely for crud buildup and observing that water quality stays within limits. • Check (if applicable) demineralizer bypass valves not in AUTO.
10.	Automated Traversing Incore Probe (ATIP) System	• Make trial traces if flux level permits. • Verify leak tightness and air/nitrogen purge.
11.	Reactor Water Cleanup (CUW) System	• In continuous operation at approximately 50% to 100% flow. • Place cleanup recirculation pumps in operation at pressure and operate in all modes. • Watch reactor water quality closely to comply with water quality specification. • Check that system valves are positioned properly. • Reject reactor water back to condenser and radwaste to check reject valve for proper operation. • Monitor CUW differential flow indication to verify proper operation.
12.	Reactor Recirculation	• In continuous operation per Operating Procedure. • Check that RIP Motor Cooling temperature recorder indicates the proper temperature increase and cooling.
13.	Condensate and Feedwater	• In continuous operation to maintain reactor level. • Start standby feed pump per procedure. • Place in service and remove replaced from service.
14.	Startup Range Neutron Monitoring (SRNM), Average Power Range Monitor (APRM)	• In continuous operation • Check proper operation/indication. • Verify proper overlap.
15.	Turbine Sealing	• Place in continuous operation per Operating Procedure. • Check that seal steam regulator controls seal pressure system controllers function. • Place backup system in service.
16.	Mechanic Vacuum Pump	• Place in service per operating procedure. • Check for proper operation.
17.	Steam Jet Air Ejector (SJAE)	• Place in service per operating procedure • Place backup air ejector in service per operating procedure.

18. Reactor Vessel Temperature and Head Leak Detection	• Should be in continuous service. • Temperature shall be controlled such that vessel temperature differentials are within limits. • Head seal leak detection shall be valved in per Operating Procedure. • Observe for seal leakage
19. Circulating Water	• In continuous operation per Operating Procedure. • Check that vacuum of 3.386 to 6.772 kPaA (1 to 2 inches HGa) can be obtained.
20. Drywell Inspection	• Verify thermal expansion of piping. • Verify interference of piping and supports. • Verify flange bolts have not loosened during heatup. • Check for small leakage in drywell. • Confirm proper operation of equipment in the drywell. • Perform as built measuring of equipment in hot condition. • Check flow meters in drywell.

1) After Increase From Rated Temperature to Low Power Plateau:

System	Mode of Operation and Hot Functional Tests
1. Turbine Generator	• Place turbine generator in operation and perform the following checks, which are not part of the formal Startup Test Program. • Verify procedure for turbine warm-up and roll to 1800 rpm. • Perform the turbine generator no-load tests. • Check turbine vibration at critical speeds and 1800 rpm. • Verify proper operation of stator cooling system. • Verify proper operation of generator seal oil system. • Verify operator familiarization with turbine generator instrumentation and controls, both local and remote. • Verify oil flow indication at each bearing inspection spout. • Verify that expansion is satisfactory. • Perform turbine over speed-checks.

2.	Feedwater Heater Controls	• Put feedwater heaters in service and establish level control. • Observe feedwater temperature increasing. • Inspect feedwater line and feedwater pump casing to assure thermal expansion has not opened flanges or affected mechanical seal operation.
3.	RBCW System	• Check temperature of cooled component. • Readjust as necessary to maintain proper temperature in component specified in the Operating Procedures.
4.	RCIC System	• Confirm proper operation in normal pressure condition. • Confirm proper operation of reactor injection.
5.	CRD System	• Confirm full motion of control rod. • Check scram timing in single pair rod scram test.


Plant General Manager
VP Engineering & Construction
VP Oversight & Reg. Affairs
Plant Staff
PORC
STP S/U Manager
EPC S/U Manager
Quality Manager
Operations Manager
Nuclear Engineers
S/U Admin. Lead
S/U Supervisors
Toshiba S/U Manager
Quality Inspector
JTG
S/U Test Group Leaders
S/U Supervisors
NI, BOP & TI Test Engineers
S/U Test Group Leaders
NI, BOP & TI Test Engineers

Specific Information to be provided in Final Safety Analysis Report