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Subject: **Submittal of ABWR Licensing Topical Report (LTR) NEDO-33305 "Advanced Boiling Water Reactor (ABWR) Startup Administrative Manual"**

Reference: Letter MFN 017-97, J. Quirk to NRC, *ABWR Design Control Document, Revision 4*, dated March 28, 1997, Docket No. 52-001

The enclosed Licensing Topical Report (LTR) is submitted for NRC generic review and approval as a Combined Operating License (COL) license information item as required by the current ABWR certified design (referenced), Docket No. 52-001. The regulatory basis for this submittal is discussed below.

This is the third of a number of ABWR-related LTRs GE plans to submit and which have been discussed in South Texas Project 3&4 project meetings with the NRC. In support of the ABWR Design Centered Working Group (DCWG) plans, GE requests a generic review and approval of the subject LTR in advance of any future combined operating license applications (COLA) submittals. Note that the submittal is the result of design detailing performed for ABWRs in the US and in Asia and provides for the generic resolution of a COL license information item, thereby contributing to standardization.

The enclosed LTR provides a response to a COL license information item in Tier 2 section 14.2.13.2 instructing applicants to submit an administrative controls manual for the initial testing program. General Electric believes that all applicants would benefit from following the administrative plan provided in the enclosure and that the NRC can and should provide a generic review and approval of the plan in advance of

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any COLA submittal referencing the USABWR DCD. Future applicants such as STP 3 & 4 could then reference the LTR as a means of meeting their COL information item submittal requirement.

Note that the enclosed LTR refers internally to two additional forthcoming LTRs that have not yet been submitted to the USNRC. NEDO 33310 "ABWR Startup Test Specification" is scheduled for transmittal to the NRC on April 30, 2007. NEDO 33309 "ABWR Pre-Operational Test Specification" is scheduled on June 1, 2007. These describe subsidiary issues to the enclosed administrative plan LTR and need not delay or hinder NRC review.

The enclosure contains no information that GE considers proprietary although full copyright protection applies.

If you have any questions about the information provided here, please contact Steve Stark, project manager - ABWR licensing, at 408-925-1822, or contact me directly.

Sincerely,

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Manager, ABWR Projects

Enclosure: NEDO-33305 "*Advanced Boiling Water Reactor (ABWR) Startup Administrative Manual*" February 2007 – Non-Proprietary

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Nuclear

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Class I
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Revision 0

LICENSING TOPICAL REPORT

Advanced Boiling Water Reactor (ABWR) Startup Administrative Manual

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Revision 0

LICENSING TOPICAL REPORT

Advanced Boiling Water Reactor (ABWR) Startup Administrative Manual

INFORMATION NOTICE

This document, NEDO-33305, Revision 0, contains no proprietary information.

IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT

PLEASE READ CAREFULLY

The information contained in this document is furnished for the purpose of supporting Combined License Applications for, and licensing activities related to, GE ABWR projects in proceedings before the U.S. Nuclear Regulatory Commission. The only undertakings of General Electric Company with respect to information in this document are contained in the contracts between General Electric Company and South Texas Project, and nothing contained in this document will be construed as changing that contract. The use of this information by anyone for any purpose other than that for which it is intended is not authorized; and with respect to **any unauthorized use**, General Electric Company makes no representation or warranty, and assumes no liability as to the completeness, accuracy, or usefulness of the information contained in this document.

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1 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 for the ABWR. This manual 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 LTR provides the ABWR Startup Administrative Manual as required by the COL License Information item 14.2.13.2 in ABWR Design Control Document (Tier 2).

1.2 Scope

This document describes the organizational structure, test personnel qualification, practice and operation of the Initial Test Program. The Initial Test Program consists of a series of tests categorized as Construction Testing, Preoperational Testing and Startup Testing.

Construction Testing commences with the completion of system/component installation and terminates with system turnover to Operations for Preoperational Testing. The specifics of Construction Testing are defined in the appropriate Installation Specifications or in the documentation provided by the major equipment suppliers.

Preoperational Testing is performed after the system turnover from construction and prior to Fuel Loading. The system requirements for the Preoperational Test Program are found in the ABWR Preoperational Test Specification NEDO 33309.

Startup Testing is performed from fuel loading, initial criticality, and inspections from zero power to rated power through warranty run test. The details of the tests are presented in the ABWR Startup Test Specification NEDO 33310.

The information contained in this Startup Administrative Manual provides an acceptable method for administering the Initial Test Program. Specific titles and organizational structures are considered "Typical" and may be modified to meet the COL applicants' specific organizational structure.

2 Applicable Documents

2.1 Supporting and Supplemental Documents

2.1.1 Supporting Documents

Supporting documents in conjunction with those documents listed in Sections 2.2 and 2.3 provide design and licensing requirements.

1. ABWR Codes and Standards Database

2.1.2 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.

2. ABWR Design Control Document/Tier 2, Chapter 14, "Initial Test Program"
3. NEDO 33310, "ABWR Startup Test Specification"
4. NEDO 33309, "ABWR Pre-operational Test Specification"

2.2 Codes and Standards

The following Codes and Standards are applicable to the initial test program 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.

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

2.3 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 Initial Test Program acceptable for light-water-cooled nuclear power plants. The basis of the regulatory guide 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.

The following Regulation and Regulatory Requirements are applicable to the initial test program for boiling water reactor power plants to the extent specified herein. The applicable date/revision is specified in the ABWR Codes and Standards Database.

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

1. 10CFR20, "Standards for Protection Against Radiation"
2. 10CFR30, Section 30.53, "Tests"
3. 10CFR50, Section 50.34, "Contents of Applications: Technical Information"
4. 10CFR50.55a, "Codes and Standards"
5. 10CFR50.63, "Loss of All Alternating Power"
6. 10CFR50. Appendix A, "General Design Criteria for Nuclear Power Plants"

7. 10CFR50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants"

8. 10CFR50, Appendix J, "Primary Containment Leakage Testing for Water Cooled Power Reactors"

9. 10CFR52.79, "Contents of Application: Technical Information"

10. 10CFR 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants"

2.3.2 Nuclear Regulatory Commission (NRC) Regulatory Guides and NUREGs

The applicable revisions of the regulatory guides listed below can be found in FSAR Table 1.8-20 and Chapter 17.

1. Regulatory Guide 1.9, "Selection, Design, Qualification, and Testing of Emergency Diesel-Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Plants"

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

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

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

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

6. Regulatory Guide 1.52, "Design, Testing, and Maintenance Criteria for Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and adsorption Units of Light-Water-Cooled Nuclear Power Plants"

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

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

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

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

11. Regulatory Guide 1.80, "Preoperational Testing of Instrument and Control Air Systems

12. Regulatory Guide 1.95, "Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release

13. Regulatory Guide 1.108, "Periodic Testing of Diesel Generators Used as Onsite Electric Power Systems at Nuclear Power Plants"

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

15. Regulatory Guide 1.128, "Installation, Design and Replacement of Large Lead Storage Batteries for Nuclear Power Plants"

16. Regulatory Guide 1.139, "Guidance for Residual Heat Removal"

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"

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

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

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

21. NUREG 0800, Standard Review Plan, Section 14.2 Initial Plant Test Program Final Safety Analysis Report

3 Startup Organization and Responsibilities

3.1 Organization

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 Test Group for the Preoperational and subsequent Startup Test Programs.

The Preoperational/Startup Test Group is comprised of individuals from various organizations including Construction Contractor, General Electric (GE), Equipment Vendors, Licensee and others. This organization is responsible for planning, executing 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 Licensee 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. The organization, responsibilities, and qualification requirements of the plant Staff are discussed in Section 13.1 of the FSAR.

The general structure of the ABWR Startup Organizational units is illustrated in Figures 1 and 2. These figures establish reporting relationships, coordination lines, and primary startup interface.

3.2 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 Initial Test Program. The position title and duty assignment may vary from project to project based on the specific licensee organization preferences.

Personnel responsible for the development, execution, review and approval of the Initial Test program shall be qualified for their assigned tasks in accordance with the site quality assurance program.

1. Joint Test Group (JTG)

   The Joint Test Group is an integrated group composed of Licensee, Construction Vendor, GE and other startup engineering personnel. Directed by the JTG Leader, the JTG reviews and approves all preoperational test procedures and results.

   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 Manager and PORC.

2. Preoperational/Startup Test Group

   The Preoperational/Startup Test Group is an integrated group composed of Licensee, GE, Balance of Plant (BOP) and Turbine Island (TI) startup engineering personnel, and all other startup personnel assigned from various organizations and disciplines within and outside the Site Project. Directed by the Startup Manager, the Preoperational/Startup Test Group coordinates jobsite activities and also provides technical direction to other organizations or individual participating in the Initial Test Program.

3. Station Superintendent (or Plant Manager or Site VP)

   The Station Superintendent is responsible, for implementation of the Initial Test Program and plant/system operation. Under his direction, the two basic organizational units, i.e., the Plant Staff and the Test Group, jointly conduct the different phases of the Initial Test

Program. In addition to these two basic organizational units, the Plant Operation Review Committee (PORC) will assist the Station Superintendent in reviewing plant operating procedures and test results.

4. Plant Operations Review Committee (PORC)

   The Plant Operations Review Committee (PORC), reporting to the Station Superintendent, performs an independent review function. 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 Station Superintendent.

5. Startup Manager or Assistant Station Superintendent (Test)

   The Startup Manager, under the direction of the Station Superintendent, is responsible for the day-to-day activities of the Preoperational/Startup Test Group. He is also responsible for ensuring smooth interface between Plant Staff, the Startup Administrative Engineer, the Nuclear Steam Supply Systems (NSSS) Startup Test Supervisor, the Balance of Plant (BOP) Test Superintendent, and the Turbine Island (TI) Test Superintendent.

6. Plant Operations Manager

   The Plant Operations Manager, under the direction of the Station Superintendent, is responsible for the day-to-day activities of the operations staff. He is specifically responsible for assignment of responsibilities to shift engineers. He coordinates with the Startup Manager during the initial test program.

7. Startup Administrative Engineer

   The Startup Administrative Engineer, under the direction of the Startup Manager, is responsible for the day-to-day activities of the administrative staff.

8. Preoperational/Startup Test Group Leaders

   The Preoperational/Startup Test Group Leaders, under the direction of the Startup Manager, are responsible for the day-to-day activities of assigned System 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.

9. Preoperational/Startup Test Directors

   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 Initial Test Program. The Station Superintendent or his designee assigns test Directors from the Preoperational/Startup Test Group or Plant Staff.

10. System Engineers

System Engineers, under the direction of Preoperational/Startup Test Group Leaders, have overall responsibility at the system level for the assigned systems during the test program. The responsibilities of the System Engineers include, but are not limited to, initiating non-conformances as described in Section 5.3.3.6 of this procedure, initiation or restoration of temporary modifications and processing startup work requests for construction assistance, as required.

11. Station Quality Division Head

The Station Quality Division Head, under the direction of the Startup Manager, is responsible for implementation of the Startup Quality Control Program as delegated by the Station Superintendent. He is also responsible for the day-to-day quality activities of the Startup Test Group. If a quality activity cannot be resolved between the Station Quality Division Head and the Startup Manager, the Station Quality Division Head shall have access to the Station Superintendent to ensure that such items are promptly and properly resolved.

12. Construction Office Site Manager

The Construction Office Site Manager is responsible for construction of a quality plant to ensure safe and reliable operation of the plant. He provides support to the Preoperational/Startup Test Group to ensure an orderly and smooth plant turnover and initial test program.

13. Construction Office Deputy Site Manager (Test)

The Construction Office Deputy Site Manager (Test) as directed by the Construction Office Site Manager is responsible for supervision and direction of Construction Division Heads. The Construction Office Deputy Site Manager (Test) supervises the Construction Coordinator to assure that finish construction activities are commensurate with the requirements of the test program schedule.

14. Construction Coordinator

The Construction Coordinator, under the direction of the Construction Office Deputy Site Manager, is responsible for coordinating with the Construction Division Heads to assure construction activities and construction testing are completed as scheduled. He tracks and expedites all material, engineering and construction activities as required. He assures that all open turnover exception items are completed on time.

15. Construction Division Heads

Construction Office Division Heads, under the direction of the Construction Office Deputy Site Manager (Test), are responsible for supervision and direction of Construction

Office Engineers and completion of construction activities and construction testing on assigned systems. They coordinate their activities with the Preoperational/Startup Test Group during the test program. In addition, they provide lists of outstanding material, engineering, and construction problems that might affect the system completion and turnover schedule, to the Construction Coordinator for expediting.

16. Construction Test Directors

Construction Test Directors, under the direction of Construction Office Deputy Site Manager (Test), are responsible for completion of construction activities and Construction Testing on the assigned systems. The Construction Test Directors coordinate startup–related activities with the Preoperational/Startup Test Group during the Initial Test Program.

17. Startup Supervisor

The Startup Supervisor, under the direction of the Startup Manager, is responsible for the day-to-day activities of the Startup Test Group Leaders. He coordinates with the Shift Supervisors and with the Construction Coordinator or the Construction Division Heads.

18. Nuclear Engineering Division Head [or Reactor Support Manager]

The Nuclear Engineering Division Head, under the direction of Assistant Superintendent (Operation), assigns licensee engineers to support each specified test of the Initial Test Program. In addition, he is responsible for assisting the review and approval of test results. Upon the completion of each specified test at each plateau, he is responsible for signing off the Startup Test Report Approval Sheets prior to final review and PORC approval.

19. GE Operations Manager

A GE Operations Manager will be assigned to the ABWR Site prior to the beginning of construction testing. The GE Operations Manager or his designee represents GE on the JTG and is a technical advisor to the JTG Leader, Construction Office Site Manager, and the Station Superintendent. His primary responsibility is the planning and coordination of testing and operational activities related to the Nuclear Island (NI) Systems.

20. GE Startup Test Supervisor

The GE Startup Test Supervisor, who reports to the GE Operations Manager, is responsible for the day-to-day activities of the GE Startup Engineers. During the startup test phase, under the direction of the Startup Manager, he coordinates with the Operations Shift Supervisors in matters relating to the technical direction, planning and scheduling of the Initial Test Program. He is also responsible for coordinating with the Construction Coordinator or the Construction Division Heads.

21. GE Startup Engineers

GE Startup Engineers, under the direction of the GE Startup Supervisor, are assigned for shift coverage through the duration of the test program except in case of an extended outage or an extended base loading period as determined by the GE Operations Manager. The assigned GE Startup Engineers are responsible for technical assistance for all activities concerning plant operations, testing, and safety that occur during their shift.

22. GE Instruments and Controls Engineers

The GE Instruments and Controls (I&C) Engineer, under the direction of the GE Operations Manager, are responsible for coordination and direction of the testing of control and instrumentation systems within GE scope of design responsibility. They will provide test program guidance to the Licensee instrument and electrical engineers and technicians.

23. BOP (Balance-of-Plant) Superintendent

A BOP Superintendent will assist in job site technical management. The BOP Superintendent is the technical chief of the authorized representative of BOP vendors in matters related to the job site construction, engineering, preoperation, and plant startup.

24. BOP Test Superintendent

The BOP Test Superintendent, under the direction of the Assistant Superintendent (Test), is responsible for day-to-day activities of the BOP Startup Engineers. He coordinates with the Operations Shift Supervisor and with the Construction Coordinator or the Construction Division Heads.

25. BOP Test Engineers

A staff of BOP Test Engineers, under the direction of BOP Test Superintendent, are assigned to give general advice in areas other than those within the NSSS scope. BOP Startup Engineers will report to the Startup Manager to assist in conducting activities during construction, preoperational and startup phases of testing, such as coordination service, interpreting BOP design drawings and specifications, preparing documents, performing schedule control, assisting in the supervision and inspection of construction work, reviewing construction/installation and field and performance tests, and providing general advice on construction work, construction, preoperational and startup tests.

26. TI (Turbine Island) Superintendent

The TI Superintendent 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.

27. TI Test Superintendent

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

28. TI Test Engineers

    A staff of TI Test Engineers are assigned to provide engineering support activities and services during the installation, preoperational and startup testing of the turbine generator. TI Test Engineers will perform overall adjustment and finalization of the main turbine and generator, and testing of main turbine EHC, turbine main valves, generator and generator auxiliary systems.

With the start of fuel loading, the Startup Manager has the responsibility for providing technical direction of plant operation, and the GE Operations manager has the responsibility for assisting the Startup Manager. Prior to fuel loading, the GE Startup Test Supervisor and GE Startup Engineers will be on shift and assume their shift responsibility for providing technical assistance relating to plant operation and safety. Overall coordination is the responsibility of the Preoperational/Startup Test Group. The GE Startup Test Supervisor and the BOP Startup Test Superintendent 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 Initial Test Program.

During the shift, the conduct of the startup tests is the responsibility of the Licensee 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 Startup Engineers from GE, BOP and TI. The Startup Engineers and the Licensee Test Directors/Test Personnel shall make their test requirements known to the Licensee Shift Supervisor/Shift Engineer. This will be after program coordination and scheduling with the Licensee Operation Division Head, who in turn will arrange with the Licensee Shift Supervisor/Shift Engineer to have the test performed by maneuvering the plant or operating plant equipment. Also, the Startup Engineers will work with the Licensee Test Engineers in the analysis of the startup tests.

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

4 Initial Test Program Planning and Scheduling

4.1 Overview

The purposes of Initial Test Program are 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. Also, 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 is generally subdivided into three parts:

1. Initial fuel loading and open vessel testing
2. Testing during nuclear heatup to rated temperature and pressure (i.e., approximately 5% power)
3. Power ascension tests from 5 to 100% of rated reactor power

Systems to be tested during the Preoperational Test Program are identified in Appendix A of the ABWR Preoperational Test Specification (NEDO 33309).

The test items planned during the ABWR Startup Test phase are described in the ABWR Startup Test Specification (STS, NEDO 33310). These tests are subdivided into following categories:

1. Core Performance Analysis:

   Testing performed to demonstrate that various core performance parameters are in accordance with design limits and expectations, for example, Core Performance.

2. Steady State Tests:

   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.

3. Control System Tuning:

   Testing performed to establish initial running adjustments for non-safety related systems such as Recirculation Flow Control System, Feedwater Control System, and Pressure Control System.

4. System Transient Tests:

   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, MSIV Performance.

5. Major Plant Transients (including trips):

   Testing performed to 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

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 Figure 3, Sample Power/Flow Operating Map.

Test Plateau	Power Flow Map Region and Note
1. Open Vessel (**OV**)	With the 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 KPa 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 RIPs operating within 10% of minimum speed.
4. Mid Power (**MP**)	Between approximately 50% and 75% load lines, with the RIPs operating between minimum and rated speeds, with the lower power corner within the capacity of the bypass valves.
5. High Power (**HP**)	Along and just below (+0, -5%) the 100% power rod line, from minimum RIP speed to rated core flow.

4.3 Test Sequence

4.3.1 Preoperational Testing Sequence

The Preoperational Test Specification provides a recommendation for sequencing for both Nuclear Island and Balance-of-Plant Systems.

The schedule sequence for preoperational testing is dependent on many factors. These include construction schedule, manpower availability, availability of supporting equipment etc. These factors will be input to the master schedule to determine actual sequencing.

4.3.2 Startup Testing Sequence

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:

1. Core Performance Analysis
2. Steady-State Tests
3. Control System Tuning
4. System Transient Tests
5. Major Plant Transients, including trips.

Additionally, testing at low power and flow levels is generally performed prior to testing at higher power and flow levels.

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.

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

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

Typical systems to be included as part of this program are specified in the Preoperational Test Program Specifications (NEDO 33309). Testing shall be performed using plant procedures and controlled and documented by use of checklists. Checklists provide a signoff sheet to assure that each operating shift has received training and experience on specified systems.

4.4.1.2 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) that would not necessarily justify the delay of fuel loading. Under such circumstances, it may be decided to request permission from the NRC to proceed with fuel loading. This would necessitate a Test Deferral be initiated and submitted to the USNRC for approval 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 submittal to the USNRC 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 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) 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. Obtain Necessary Spare Parts

Timely identification and procurement of spare parts should be arranged in order to minimize forced outage time for equipment repair.

4. 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.

5. 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.

6. Drywell Cooling System

Prior to fuel loading, an independent evaluation of the drywell cooling heat loads versus cooling capacity should be performed to identify and correct problems and make potential improvements.

7. Radwaste System

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

4.4.1.3 Fuel Load Planning

During the fuel load, maintenance should be kept on 24 hours shift coverage for possible bridge repairs. To reduce potential delays, refueling bridge surveillance should be started 3 days prior to source assembly. Additionally, the Startup Range Neutron Monitoring System (SRNM) surveillance and the SRNMs/Fuel Loading Chambers (FLC) source check should be performed one week prior to fuel load when the source assembly is completed.

Fuel Loading will be controlled via a Startup Test Procedure (Fuel Load), which will contain specific instructions and guidance to load fuel safely, correctly, and efficiently to the full core size.

Core verification follows fuel loading. Setup and pre-checkout of the camera and video equipment with the camera underwater should be performed at least one day before the completion of fuel load.

The equipment necessary for vessel assembly, such as stud tensioner and reactor building crane, should be checked for operability prior to vessel assembly.

4.4.1.4 Closed Vessel

Following core verification, reactor vessel assembly and Control Rod Drive (CRD) friction and scram testing progress concurrently. Nuclear instrument settings should be reviewed before plant startup to ensure that the correct settings have been used.

4.4.1.5 Criticality

During initial criticality, operation of arc or electrical welding equipment in the Reactor and Control Building shall be prohibited in order to avoid noise problems on the Neutron Monitoring Systems and malfunctions of electronic equipment.

The Initial Criticality Startup Test Procedure will provide the necessary controls and instructions for performing initial criticality.

4.4.2 Heatup Testing

During heatup from ambient conditions to rated temperature and pressure, testing is performed and the steam plant is started. Sufficient manpower should be available to conduct efficient testing and correct problems as they occur.

Multi-team efforts and 24 hours coverage by maintenance should be provided for support. In addition, vendor startup representatives should be on site and used to assist with the startup of specialized equipment such as water treatment systems, if needed.

4.4.3 Low Power Test Plateau Testing

During the period of low power operation, systems such as main turbine, generator, and feedwater are placed in service between arrival at rated temperature and pressure and completion of 25% power testing.

During low power operation, each reactor feedwater pump should be operated. This verification assures that all feedwater pumps function with the vendor representative on site to identify and resolve problems. This effort should be performed on all multiple component equipment such as Steam Jet Air Ejectors (SJAEs), condensate pumps, condensate booster pumps, etc. Following subsequent plant shutdown, the main condenser shall be inspected for baffle plate failures, and repairs made if needed.

4.4.4 Mid/High Power Test Plateau Tests

Before extensive mid and high power testing, Instrument and Control (I&C) technicians should check out the moisture separator drain control system calibration and performance. The Startup Test Program during operation at the Mid and High Power Test Plateaus is devoted to dynamic tuning of the plant and determining its reactions to induced problems.

4.4.5 Hot Functional Tests

The Hot Functional Testing starts with the first test performed during Open Vessel Testing and continues through the Mid Power plateau. Systems will be checked out by a combination of the surveillance tests, Startup Test Procedures and plant specific Operating Procedures with the required systems in operation. The master Startup Checklist will be completed and all other necessary documents reviewed and approved.

Tests conducted can be identified as two types, i.e., Startup Tests and specific plant operations which demonstrate satisfactory functioning of equipment. System and equipment performance shall be verified at each heatup test point before proceeding to the next test point. Station Operation Procedures and personnel training and readiness shall also be verified during this period of operation. Integrated system performance shall be verified at rated temperature and pressure at the lowest practical power level to maintain those conditions before proceeding to higher power levels. Ascension to higher power shall not be made until evaluation has proven that the integrated plant and support systems are capable of sustaining the higher power.

Table 1 is a list of tests, checks and signoffs to be performed on systems, which should receive special attention during the startup test program. Data sheets shall be prepared at the site to monitor the performance of each listed system wherever needed. These tests and checks are not intended to replace any of the startup test procedures, although there are portions, which may be conducted simultaneously.

The data taken and special tests performed are for the purpose of verifying that system performance is adequate to proceed to the next startup test point. All plant parameters that are

normally displayed or recorded in the main control room should be closely monitored on a routine basis for indication of abnormal plant or equipment operation and for verifying Technical Specification compliance. In addition, Surveillance Tests shall be conducted in accordance with the plant specific Technical Specification requirements.

4.4.6 Additional Recommendations

Multiple teams should be created specifically to ensure the tests are performed correctly and to minimize the length of Startup Test Program. The first team should be dedicated to performing the tests. The second team should be responsible for starting up the BOP systems while the first test team is still conducting the NSSS tests. The third team should evaluate all test results and provide test reports so that the test teams can continue to the next plateau of tests.

At the beginning of the Startup Test Program, the outage management organization should be in place with adequate planning and scheduling personnel and computer facilities to plan short term and long-term outages.

A Spare Parts Program should be in place to minimize delays during the test program. A computerized system capable of locating parts within the warehouse by plant Master Parts List number and by vendor part nomenclature should be available. Prior to start of testing, maintenance and I&C personnel should be trained and familiar with vendor lists of recommended spare parts and how to obtain them from the warehouse.

At least one engineer or technician should be assigned full time to resolve software and hardware problems associated with the Transient Recording System and Plant Computer System (PCS) core monitoring functions. The PCS software and hardware shall be properly checked out to assure that the system is ready to support the startup test program.

All plant procedures, which could produce a scram if performed incorrectly, will be identified and selected for review prior to the start of test program. If the procedure could cause a scram, the applicable procedure will be highlighted or otherwise marked so that it is obvious, and appropriate care is taken during the conduct of the procedure. All plant operating procedures should be completed prior to and used during the operator-training program as discussed below. A review shall be performed to identify which startup tests shall receive senior licensee management oversight. Test procedures so identified will have this requirement included in the prerequisites.

Operator training on the overall test program shall be conducted before the first system is turned over and prior to the initial phase of startup testing. The training program shall include:

1. Systems to be tested and acceptance criteria review
2. Training by major equipment vendors, e.g., turbine; plant control
3. A review of test program administration

4. Content of test procedures

5. Test sequence

4.5 Startup Test Program Scheduling

The Startup Administrative Engineer, under the direction of the Startup Manager, is responsible for preparing, issuing, and updating test schedules. Test schedules applicable to the ABWR project include the Master Schedule (Level 1) and Integrated Schedule (Level 3). The Master Schedule will provide broad overview of milestones and activities and the Integrated Schedule provides task listing and logic for key activities.

A recommended preoperational test sequence is initially developed and issued by GE (NEDO 33309) and subsequently maintained by the Preoperational/Startup Test Group. The test sequence defines activity logic and duration at a level suitable for planning test activities. The test sequence will be incorporated into the "Integrated Schedule" to provide coordination between all members of the project team.

A startup test sequence will be developed consistent with the guidance in Section 5.3.of this document. The planned shutdown maintenance and repair schedules will also be included. This schedule will be prepared showing the anticipated start and completion dates of each startup test and major startup activity. The schedule will be used to organize and coordinate all startup related activities.

The startup test portion of the Startup Summary Schedule shall begin with Fuel Loading and extend to the 100 hours Guarantee Plant Performance Warranty Run Test.

5 Conduct of Testing

The following guidance will govern conduct of the Initial Test Program. 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:

5.1 Distribution and Control of Procedures

The Startup Administrative Engineer 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. Each copy released is given a control number, which shall also be stamped 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 major procedural revision has occurred.

Because procedures may be approved for implementation weeks or months 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:

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

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, piping changes, etc.

5.2 Adherence to Procedures and Use of Procedures

Tests will be conducted from a 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 6.3 below before continuing testing.

5.3 Performance of Preoperational and Startup Tests

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 5.3.3.2 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 the plant 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.

The Station Quality Division is responsible for implementation of the Quality Control Program as delegated by the Station Superintendent [or Plant Manager] and inspection of quality-related activities during the Test Program. Prior to the test, the designated QC Inspector identifies the QC Hold Points in the master copies of the test procedures.

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, e.g., startup test instruments prepared by the Startup Test Group as well as those provided by Construction or provided by vendors.

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.

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 are established 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 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 weeks or months 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

1. All required test apparatus and equipment required for performing the tests are available.
2. Communications systems (temporary or permanent) are available and working.
3. Verification that interfacing support systems are operable or in a condition that will satisfy the testing requirements.
4. Access control is present in areas where possible hazardous conditions might exist during testing.
5. Adequate and qualified test personnel are available to perform the test. Specific test prerequisites are listed in the prerequisite section of the Test Procedure.

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.

5.3.3.1 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:

1. Provide an overview of the testing to be performed.
2. Verify that test personnel have proper test instrumentation and equipment, spare data sheets, and information copies of the procedure, etc.
3. 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)
4. Identify personnel locations and communication paths.

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

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

5.3.3.2 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. To cover these circumstances, a Startup Work Request (SWR) is used by Operations to request materials services, manpower support and/or job/requests from Construction until the end of the Startup Test Phase of the Initial Test Program.

Performing tests requires a coordinated effort between required test personnel and the responsible Test Director. The Test Director shall notify the Station Quality Division at least 24 hours in advance of the intended schedule for performance of an upcoming test and confirming QC Hold Points.

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 Initial Test Program. 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 Licensee 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.

5.3.3.3 Test Entries

During the conduct of a specific preoperational/startup test, a Test Chronological Log (Figure 10) is maintained by the Test Director, which will become a permanent part of the Test Package as discussed in Section 7.2.1. 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.

5.3.3.4 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) is also required.

For all such corrections, the Test Director prepares and processes a Test Procedure Change Notice (TPCN) as discussed in Section 6.3.1 of this document. Interruption of testing in order to process the TPCN is based on the following criteria, i.e.

1. 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

2. 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.

5.3.3.5 Test Interruptions

For normal test interruptions (i.e., end of shift, holidays, manning 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. Should this 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 5.3.3.6 of this document

- 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 6.3.1 of this document.

5.3.3.6 Test Deficiency, Discrepancy, Exceptions, and Nonconformance Dispositions

The site Corrective Action Program will provide the requirements for documenting, processing, reviewing and approving closure of all deficiencies, discrepancies exceptions, and nonconformance items identified during the Initial Test Program. The Site Corrective Action program will be described in the Site Quality Assurance Program.

Nonconformances will be defined in the Corrective Action Program but will include those results that do not meet a specific design requirement (e.g. acceptance criteria). When a nonconformance is identified, the responsible design organization will review the nonconformance and identify what corrective action is to be taken. This action should include modifications needed to correct the problem, what retests need to be performed following corrective action and an evaluation as to whether any test previously performed needs to be redone.

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 7.2.4 of this document. Test exceptions and nonconformances must be maintained as part of the test procedure package.

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 Initial Test Program. This section describes the contents of a specific 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.

6.1 The 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. The testing to be performed and the applicable acceptance criteria for each test are documented in test procedures.

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.,

1. Test Procedure, which is a Test Procedure approved for implementation and

2. 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:

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.

2. Description

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

3. Criteria

   Criteria for judgment of plant and system performance are described in the applicable test specification. Criteria for Preoperational testing are provided in the Preoperational Test Specification. Those test criteria that show compliance with the Combined License Inspections Tests, Analyses, and Acceptance Criteria (ITAAC), will be identified in the 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, 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 criterion 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:

(i) 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

(ii) 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, 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. Large deviations from Level 3 performance requirements are not allowable.

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. References

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

5. 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.

6. Precautions

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

7. Initial Conditions

   This section contains a list of actions that must have been 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.

8. 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.

9. 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.

10. 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.

11. Figure, Tables, Data Sheets, Evaluation Sheets

    This section lists all the Tables, Figures, Data Sheets, and Evaluation Sheets.

12. Appendices

This section contains technical discussions applicable to the test.

6.2 Preparation, Initial Review, and Approval

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.

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.

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.

The original draft of each test procedure is prepared by the designated organizations (BOP, GE, 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. The Startup Manager (or his designee) is responsible for coordinating this process and for resolving review comments.

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.

After the initial reviews and inclusion of required changes, Preoperational Test Procedures will be submitted to JTG for review, and Startup Test Procedures are submitted to the 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 for Preoperational Testing and 60 days prior to scheduled fuel loading for Startup Testing. (COL License Information Item 14.2)

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.

6.3 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 (TPCN, Figure 5) against the originally approved test procedure.

6.3.1 TPCNs

For small changes, it is recommended that a TPCN be used. The reasons for issuing a TPCN are as follows:

1. To modify the test procedure during its final review,
2. To waive test prerequisites,
3. To change the procedure testing sequence,
4. To delete/add test instructions,
5. To change test acceptance criteria to agree with latest design documents,
6. To correct procedure errors, and
7. To resolve test exceptions.

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 (Figure 6) 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.

6.3.2 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.

7 Test Results Review and Acceptance

7.1 Quick Look Summary (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 a Quick Look Summary for the applicable test as soon as possible after the test is completed. The Quick Look Summary is a concise form 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 Manager to release testing to the next Test Plateau. The approval method for the Quick Look Summary is defined in Section 7.2 of this document.

The format to be used is the responsibility of the individual responsible party. A recommended format for the Quick Look Summary is shown in Figure 4. Also, a brief description of the content of each section is listed below:

1. Abstract

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

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.

3. Results

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

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.

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 Quick Look Summary.

6. Test Director

   Enter the name of the Test Director who prepares the Quick Look Summary Report.

7.2 Review and Approval of Test Results

7.2.1 Test Package

Upon completion of each specified preoperational/startup test, the responsible Test Director with the assistance from GE Engineers or BOP Test Engineers evaluates the test results and verifies it is acceptable. 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, which includes the Test Chronological Log, all nonconformances issued, all TPCNs 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 Station Quality Division 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 Startup Testing, the Startup Manager reviews the Quick Look Summary for a specified startup test at each test plateau and discusses the startup test results with the Test Director. After signifying his review and acceptance of the Quick Look Summary and associated test exceptions/nonconformances, the Startup Test Group Leader will then submit the Test Package to GE Operations Manager and BOP Superintendent for their concurrence review and approval. The review is then returned to the Startup Manager.

When all Quick Look Summaries for required tests have been received for a test plateau, the following Test Package is assembled:

1. Quick Look Summaries and the associated Startup Test Report Approval Sheets
2. Official Test Copy of the startup test procedure and associated data records
3. All TPCNs issued against the test procedure
4. Test Exception Log
5. All nonconformances issued.

The responsible Test Director shall review the entire Test Package, sign and date the Test Endorsement Record (Figure 09) and forward to the Startup Assistant for processing.

The Startup Assistant will then submit the Test Package to the appropriate (GE/TI/BOP) organization for Review. On return the Administrative Assistant will submit the test Package to the Nuclear Division Head and Station Quality Division for their review. When all reviews are completed, and all comments resolved, the Startup Manager (or his designee) will sign the Endorsement Record and forward to the PORC with his recommendations.

7.2.2 JTG Review and Recommendations

For Preoperational Tests, the Startup Manager (or his designee), assisted by the Station Quality Division, signs and dates the Test Endorsement Record, notifies the JTG Chairman of test completion, and provides copies of the Test Package to the JTG as requested. The JTG chairman 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 Chairman. 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.

7.2.3 PORC Approval or Acceptance

The PORC is responsible for final approval or acceptance of Startup Test results. The PORC will perform an independent 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 to the Plant Manager. The Plant Manager (or his designee) will review the submitted package and sign the Test Endorsement Record signifying his review and acceptance of the testing performed during this specific Test Plateau, and releasing the plant to test at the next Test Plateau in accordance with Section 7.2.5 of this document.

The approved test of each Test Plateau, with or without a Test Exception, then shall be filed in accordance with the plant administrative procedure requirements.

7.2.4 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 as it is discussed in Section 7.2.1. Each outstanding Test Exception will be evaluated and assigned a required completion date on the "Unresolved Exception" section of the "Test Endorsement Record". An example of the "Test Endorsement Record" is also presented in Figure 9. When each outstanding Open Items and/or Test Exception is resolved, the PORC Chairman (for Startup

Tests) or the JTG Leader (Preoperational Tests) will sign/date the "Exception Resolution" section of the Test Endorsement Record. Resolution of any Test Exception shall be performed as described in Section 5.3.3.6 of this document.

7.2.5 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:

1. Commencement of Initial Fuel Loading and Open Vessel Phase testing requires the results of the Preoperational Tests of designated systems be reviewed and approved.

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

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

4. 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 licensee 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 (Figure 8 and 9) shall be completely signed off for each Test Plateau. The completion of startup testing and appropriate signatures on Figures 8 and 9 in a particular test plateau signifies the completion of that test plateau. Once the test package is approved in the JTG meeting, the JTG Leader signs Figures 8 and 9 signifying his review and acceptance of the startup testing performed during this specific test plateau and release the plant to test at the next condition.

Table 1 Hot Functional Testing Items

A. <u>During Heatup From Ambient Temperature And 0 KPaG To Rated Temperature And Pressure:</u>

SYSTEM	MODE OF OPERATION AND HOT FUNCTIONAL TESTS
1. 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.

Table 1 Hot Functional Testing Items (Continued)

SYSTEM	MODE OF OPERATION AND HOT FUNCTIONAL TESTS
6. Turbine Electro-Hydraulic Governor and Protection (EHG&P) and Steam Bypass & Pressure Controls	• Start heatup with controlling regulator set at 1.034 MPaG and by-pass opening jack at 0. • Check that regulator responds to setpoint changes when reactor pressure is greater than 1.034 MPaG. • Check that the interface between the two systems is acceptably compatible.
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. ATIP System	• Make trial traces if flux level permits. • Verify leak tightness and air/nitrogen purge.
11. Reactor Water Cleanup 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 RWCU differential flow indication to verify proper operation.
12. Reactor Recirculation	• In continuous operation per Operating Procedure.

Table 1 Hot Functional Testing Items (Continued)

SYSTEM	MODE OF OPERATION AND HOT FUNCTIONAL TESTS
	• Check that seal recirculation loop temperature recorder indicates the proper temperature increase and cooling.
13. Condensate and Feedwater	• In continuous operation to maintain reactor level. • Start standby feed pump turbine per procedure. • Place in service and remove replaced turbine from service.
14. SRNM, 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. • Place backup regulator in service.
16. Mechanic Vacuum Pump	• Place in service per operating procedure. • Check for proper operation.
17. Steam Jet Air Ejector	• 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 valve in per Operating Procedure. • Observe for seal leakage.
19. Circulating Water	• In continuous operation per Operating Procedure. • Shift modes of system operation. • Check that vacuum of 3.386 to 6.772 kPaA (1 to 2 inches Hga) can be obtained.

B. 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.

Table 1 Hot Functional Testing Items (Continued)

C. During Operation In Mid and High Power Test Plateaus:

At this point, all safety-related equipment and procedures have been checked out by the combination of Cold Functional Tests, Surveillance Tests, Hot Functional Tests, and the Startup Test Procedures performed thus far. The Startup Test Program adequately tests remaining plant performance and operating procedures associated with the production of greater than 30% power to the grid.

D. Hot Functional Test Signoff:

Each of the above tests must be evaluated and demonstrated to be satisfactory before proceeding to the next test point. Where Startup Test Procedures are used, criteria are clearly defined for each test. For the Functional tests, satisfaction of criteria is demonstrated by successful and adequate operation of the particular plant system. The following is an example of a format for signoff of the tests to be performed on systems or equipment:

	Initial/Date	
Control Rod Drive System	**GE**	**LICENSEE Operation Division Head**
1. Checks required are complete.	_____/_____	_____/_____
2. Equipment and system performance is adequate to proceed.	_____/_____	_____/_____
3. Operating Procedures are adequate and procedure change notice written as necessary.	_____/_____	_____/_____
4. All shifts have received adequate training and are capable of operating the plant in a safe manner.	____/____	____/____
	LICENSEE Operation Division Head	LICENSEE Operation Division Head
	SHIFT A	SHIFT B

____/____	____/____
LICENSEE Operation Divison Head	LICENSEE Operation Division Head
SHIFT C	SHIFT D

These items shall be signed by the LICENSEE Operation Division Head and the GE Startup Test Supervisor. By their signatures, they are indicating that the specified system performance and applicable Operating Procedures, to the best of their knowledge, are adequate and are capable of accomplishing their intended functions and supporting subsequent reactor operation at power levels up to 100%. In addition, the LICENSEE

Operation Division Head shall verify by his signature that each shift crew is capable and knowledgeable of operating equipment to the extent required for safe plant operation.

Figure 1 Organizational Chart for Startup Test Interface

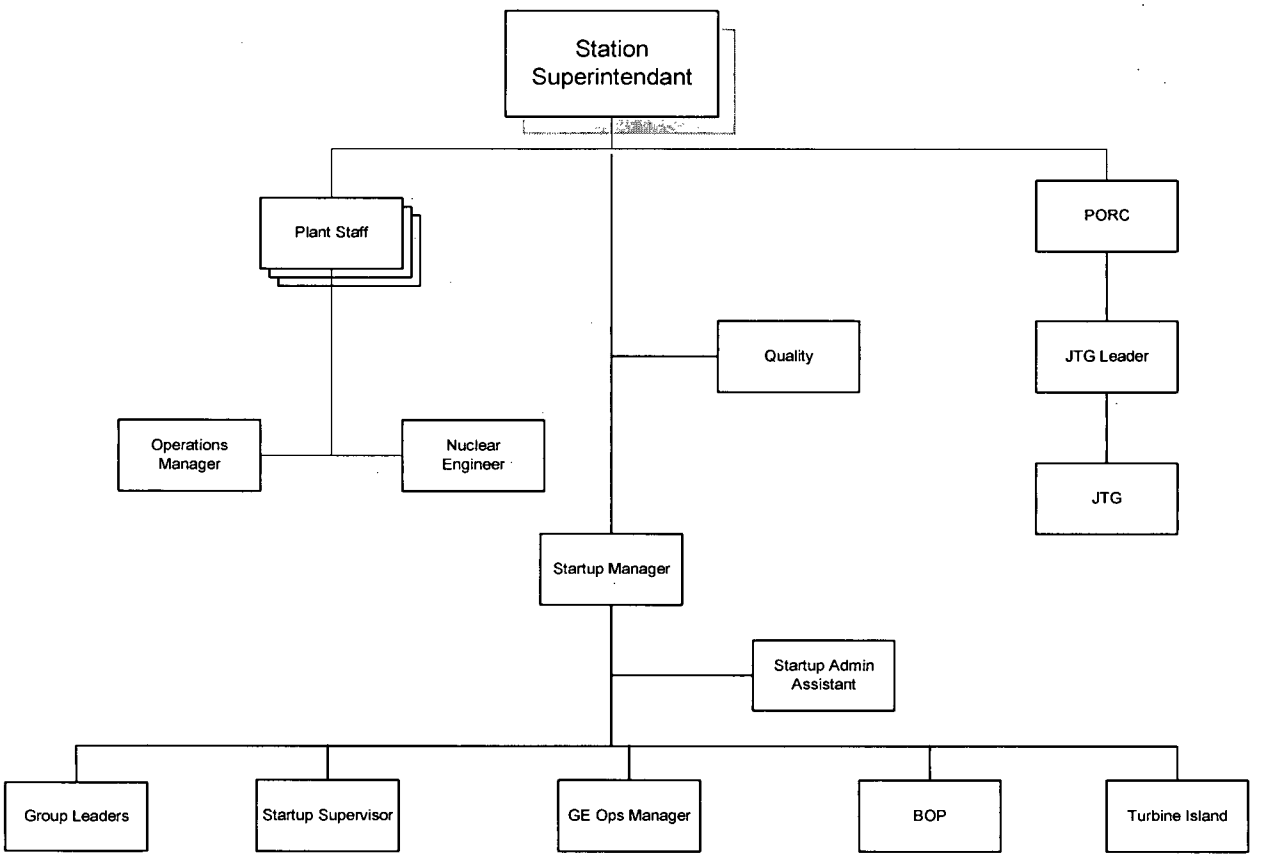
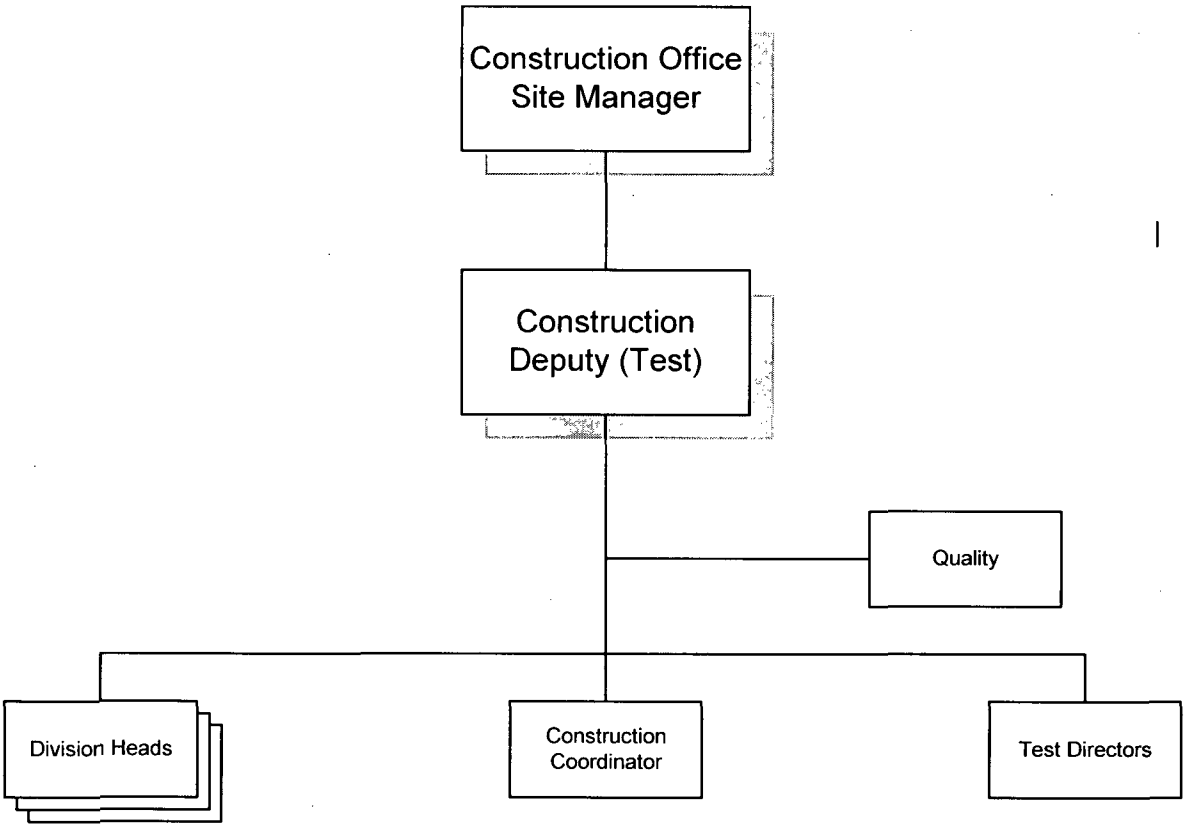


Figure 2 ABWR Construction Test Organization



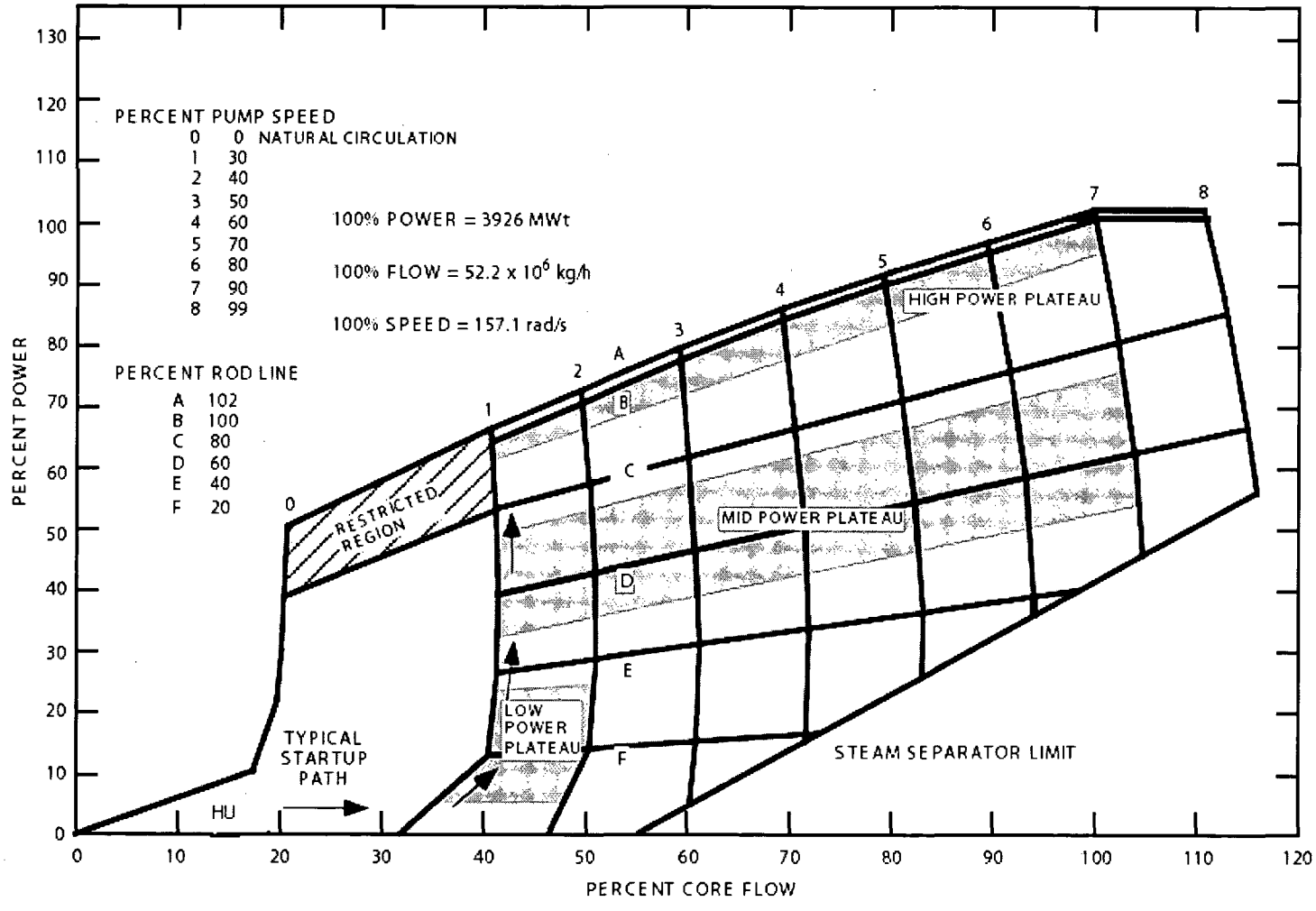


Figure 3 Sample Power/Flow Operating Map

Specific Information to be provided in Final Safety Analysis Report

Figure 4 Quick Look Summary

TEST # _____ TITLE: _____

1. **Abstract:**

2. **Plant Conditions:**

   Date/Time:

   Reactor Power, MWt:

   Core Flow, T/Hr:

   Reactor Pressure, MPaG:

   Reactor Water Level, cm:

3. **Results:**

4. **Exceptions:**

5. **Final Resolution:**

6. **Test Director:**
7. **BOP Test Superintendent:**
8. **GE Operations Manager:**

Figure 5 Test Procedure Change Notice

TEST PROCEDURE CHANGE NOTICE		
STATION	UNIT NO	SHEET___ OF ___
PROCEDURE TITLE	PROCEDURE NUMBER / REVISION	TPN NO.
REASON FOR TPN		
AFFECTED STEPS		
CHANGE REQUIRED:		
PREPARED BY _____ / _____ SIGNATURE DATE	ASSOCIATED TESTING COMPLETED BY _____ / _____ SIGNATURE DATE	
TPN REVIEWED AND APPROVED FOR IMPLEMENTATION	STARTUP MANAGER	
	PORC CHAIRMAN	
	JTG LEADER	
RESULTS OF TPN REVIEWED AND APPROVED	STARTUP MANAGER	
	PORC CHAIRMAN	
	JTG LEADER	

Figure 5 Test Procedure Change Notice (Continued)

TEST PROCEDURE CHANGE NOTICE CONTINUATION SHEET		
STATION	UNIT NO	SHEET___ OF ___
PROCEDURE TITLE	PROCEDURE NUMBER / REVISION	TPN NO.
CHANGE REQUIRED		

Figure 6 Test Procedure Change Notice Log

TEST PROCEDURE CHANGE NOTICE LOG		
STATION	UNIT NO	SHEET ___ OF ____
PROCEDURE TITLE	PROCEDURE NUMBER / REVISION	

TPN NUMBER	PREPARED BY/DATE	DESCRIPTION OF TPN / REMARK

Figure 7 Test Exception Log

TEST EXCEPTION LOG					
STATION			UNIT NO	SHEET ____ OF ____	
PROCEDURE TITLE		PROCEDURE NUMBER/REVISION			
EXCEPTION NUMBER	EXCEPTION STEP(S)	EXCEPTION DESCRIPTION	ASSOCIATED DOCUMENTS	RESOLUTION	
				TEST ENGINEER	DATE

Figure 8 Startup Test Report Approval Sheet

STARTUP TEST REPORT
APPROVAL SHEET
FOR
TEST PLATEAU: _____

A. Startup Tests:

Attachment #	STR #	TITLE

B. Approval:

1. **All tests required at the above Test Plateau have been satisfactorily completed or exceptions, if any, are satisfactorily resolved (see attached sheet).**
2. **Testing may proceed to the next test plateau of the startup test program.**

APPROVED BY:

_____ / _____ _____ / _____
GE Startup Supervisor / Date **LICENSEE Nuclear Division / Date**

_____ / _____ _____ / _____
GE Operations Manager / Date **LICENSEE Station Quality Division / Date**

_____ / _____
PORC Chairman / Date

_____ / _____
Plant Manger / Date

Figure 9 Startup Test Endorsement Record

TEST ENDORSEMENT RECORD

STATION	UNIT NO	SHEET ___ OF ___

PROCEDURE TITLE	PROCEDURE NUMBER/REVISION

TEST COMPLETION,

THIS TEST HAS BEEN COMPLETED AND THE TEST PACKAGE IS IN ORDER

TEST DIRECTOR _____ / _____
SIGNATURE DATE

Nuclear Division Head _____ / _____
SIGNATURE DATE

Station Quality Group _____ / _____
SIGNATURE DATE

REVIEW AND APPROVAL OF TEST RESULTS:

THE RESULTS OF THIS TEST HAVE BEEN REVIEWED AND FOUND ACCEPTABLE. UNRESOLVED EXCEPTIONS, IF ANY, ARE LISTED BELOW,

Startup Manager _____ / _____
SIGNATURE DATE

PORC CHAIRMAN _____ / _____
SIGNATURE DATE

Plant Manager _____ / _____
SIGNATURE DATE

UNRESOLVED EXCEPTIONS		EXCEPTION RESOLUTION	
EXCEPTION NO.	REQUIRED COMPLETION DATE	PORC CHAIRMAN	JTG LEADER
1.		1.	
2.		2.	
3.		3.	
4.		4.	
5.		5.	
6.		6.	
7.		7.	
8.		8.	

COMMENTS:

Figure 10 Test Chronological Log

TEST CHRONOLOGICAL LOG			
PLANT		UNIT NO.	SHEET OF
PROCEDURE TITLE		PROCEDURE NO./REVISION	
DATE	ENTERED BY	ENTRY	