PMNorthAnna3COLPEmails Resource

From: Wanda.K.Marshall@dom.com
Sent: Thursday, August 07, 2008 12:41 PM
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Subject: Response to Request for Additional Information Letter No. 012
Attachments: 080708 D ltr. Response to Request for Additional Information Letter No. 012.pdf

Importance: High

cc list:

Please see attached.

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Options

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Dominion®

August 7, 2008

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Serial No. NA3-08-064R
Docket No. 52-017
COL/GY

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER 012

On June 23, 2008, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA). The responses to the following RAIs are provided in Enclosures 1 through 6:

- RAI Question 05.02.05-1 Leak Detection Monitoring
- RAI Question 10.04.05-1 Circulating Water Large Bore Piping Codes and Failures
- RAI Question 10.04.05-2 Flooding Due to Hybrid Cooling Tower Failure
- RAI Question 14.02-2 Additional Site-Specific SSCs or Design Features
- RAI Question 14.02-3 Initial Test Program Administrative Document
- RAI Question 14.02-4 Design Organization Involvement in Design Problems

This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the enclosures.

Please contact Regina Borsh at (804) 273-2247 (regina.borsh@dom.com) if you have questions.

Very truly yours,

Eugene S. Grecheck

COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President-Nuclear Development of Virginia Electric and Power Company (Dominion Virginia Power). He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of the Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 7th day of August, 2008

My registration number is 7173057 and my

Commission expires: August 31, 2012

Wanda K. Marshall

Notary Public

WANDA K. MARSHALL
Notary Public
Commonwealth of Virginia
7173057
My Commission Expires Aug 31, 2012

Enclosures:

1. Response to RAI Letter 012, RAI Question 05.02.05-1.
2. Response to RAI Letter 012, RAI Question 10.04.05-1.
3. Response to RAI Letter 012, RAI Question 10.04.05-2.
4. Response to RAI Letter 012, RAI Question 14.02-2.
5. Response to RAI Letter 012, RAI Question 14.02-3.
6. Response to RAI Letter 012, RAI Question 14.02-4.

Commitments made by this letter:

1. Incorporate proposed changes in a future COLA submission.

cc: U. S. Nuclear Regulatory Commission, Region II
T. A. Kevern, NRC
J. T. Reece, NRC
J. J. Debiec, ODEC
G. A. Zinke, NuStart/Entergy
T. L. Williamson, Entergy
R. Kingston, GEH
K. Ainger, Exelon
P. W. Smith, DTE Energy

ENCLOSURE 1

Response to NRC RAI Letter 012

RAI Question 05.02.05-1

NRC RAI 05.02.05-1

FSAR Section 5.2.5.9, "Leak Detection Monitoring," identifies STD COL 5.2.2-H as follows: "Operators are provided with procedures to determining the identified and unidentified leakage in order to establish whether the leakage rates are within the limits in the Technical Specifications. These procedures assist operators in monitoring, recording, trending, determining the source of leakage, and evaluating potential corrective action. These procedures address the conversion of different parameter indications for identified and unidentified leakage (e.g, sump pump run time, sump level, condensate transfer rate) into common leak rate equivalent (e.g., volumetric or mass flow) and leak rate rate-of-change values. A description of the plant procedures program and implementation milestones are provided in Section 13.5." Staff review identified that this FSAR text differs from the DCD text of STD COL 5.2.2-H (DCD Rev 4 Section 5.2.6) by not referencing Section 5.2.5.9 and by inclusion of reference to "Technical Specifications" and, therefore, appears to inappropriately limit the intended scope of the procedures. In addition, inclusion in FSAR text of the examples "sump pump run time, sump level, and condensate transfer rate" without inclusion of "radioactivity" (DCD Section 5.2.5.9), also appears to inappropriately limit the scope of the procedures.

Please provide the following:

(a) Revise the FSAR to clarify the scope of procedures relative to Technical Specifications (TS). In addition to establishing the leakage rates for the limits in the TS, the operators should be able to use the procedures to identify and monitor the unidentified leakage at a level much lower than the TS limit so that the operator can monitor leakage, evaluate trends, determine the source of leakage, and evaluate potential corrective actions. This level to provide operators an early alert to initiate actions prior to the TS limit should be established as an alarm. The alarm level being established in an approved revision of DCD Tier 2 Section 5.2.5 is acceptable for the COL application.

(b) Confirm the procedure scope addresses the conversion of different parameter indications to include all three detection instrumentation in Technical Specifications LCO 3.3.4.1.and clarify STD COL 5.2.2-H accordingly. The procedures should include indications from 1) the drywell floor drain high conductivity water sump monitoring system, 2) drywell air coolers condensate flow monitoring system, and 3) drywell fission product monitoring system (LCO 3.3.4.1).

Dominion Response

The text that was added in FSAR, Revision 0, Section 5.2.5.9 to address DCD COL Item 5.2-2-H was not intended to limit the scope of the procedures that will be used to detect and monitor Reactor Coolant Pressure Boundary (RCPB) leakage. The procedures will fully address the topics described in Items (a) and (b) of the RAI. Dominion will revise the FSAR to clarify the scope of these procedures, and to be consistent with DCD, Revision 5, Section 5.2.5.

The scope of the procedures that will be developed in response to COL Holder Item 5.2.2-H will include:

- Detecting, monitoring, recording, trending, and determining the sources of RCPB leakage. Examples of parameters that will be monitored are sump pump run time, sump level, condensate transfer rate, and process chemistry/radioactivity.

- Evaluating potential corrective action plans to address leakage.

- Converting different parameter indications for identified and unidentified leakage to common leak rate equivalents (volumetric or mass flow) and leak rate rate-of-change values, including indications from: 1) the drywell floor drain high conductivity water sump monitoring system; 2) the drywell air coolers condensate flow monitoring system; and 3) the drywell fission product monitoring system.

In addition to clarifying the scope of the procedures, the FSAR will also incorporate the ESBWR standard design described in DCD Revision 5, which now includes an alarm that annunciates if a step increase in the unidentified leak rate occurs (reference DCD Section 5.2.5.4).

The standard design and the procedures will enable the operators to monitor leakage at levels well below TS limits, and initiate actions to prevent the plant from exceeding a TS limit.

Proposed COLA Revision

FSAR Section 5.2.5.5 will be revised as indicated in the attached markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

If a different NDE method is used for ISI than was used for PSI, equivalent coverage will be achieved as required by code.

5.2.4.6 System Leakage and Hydrostatic Pressure Tests

Add the following paragraph at the end of this section.

STD SUP 5.2-1

System pressure tests and correlated technical specification requirements are provided in the plant Technical Specifications 3.4.4, "RCS Pressure and Temperature (P/T) Limits," and 3.10.1, "Inservice Leak and Hydrostatic Testing Operation."

5.2.4.11 COL Information for Preservice and Inservice Inspection and Testing Program of Reactor Coolant Pressure Boundary

Replace the first sentence of the first paragraph of this section with the following.

STD COL 5.2-1-H

DCD Section 5.2.4 fully describes the Preservice and Inservice Inspection and Testing Programs for the RCPB. The implementation milestones for the Preservice and Inservice Inspection and Testing Programs are provided in Section 13.4.

Replace DCD Section 5.2.5.9 with the following.

STD COL 5.2-2-H

5.2.5.9 Leak Detection Monitoring

Operators are provided with procedures ~~to determine the identified and unidentified leakage in order to establish whether the leakage rates are within the limits in the Technical Specifications. These procedures assist operators in monitoring, recording, trending, determining the source of leakage, and evaluating potential corrective action. These procedures address the conversion of different parameter indications for identified and unidentified leakage (e.g., sump pump run time, sump level, condensate transfer rate) into common leak rate equivalents (e.g., volumetric or mass flow) and leak rate rate-of-change values. A description of the plant procedures program and implementation milestones are provided in Section 13.5~~ for detecting, monitoring, recording, trending, and determining the sources of reactor coolant pressure boundary leakage. Examples of parameters that are monitored are sump pump run time, sump level, condensate transfer rate, and process chemistry/radioactivity.

The procedures are used for converting different parameter indications for identified and unidentified leakage into common leak rate equivalents (volumetric or mass flow) and leak rate rate-of-change values, including indications from: 1) the drywell floor drain high conductivity water sump monitoring system, 2) the drywell air coolers condensate flow monitoring system, and 3) the drywell fission product monitoring system.

The procedures are used to monitor leakage at levels well below Technical Specifications limits and provide guidance for evaluating potential corrective action plans to prevent the plant from exceeding a Technical Specifications limit.

An unidentified leakage rate-of-change alarm provides an early alert to the operators to initiate corrective actions prior to reaching a Technical Specifications limit.

5.2.6 COL Information

5.2-1-H Preservice and Inservice Inspection Program Plan

STD COL 5.2-1-H This COL Item is addressed in Section 5.2.4 and Section 5.2.4.11.

5.2-2-H Leak Detection Monitoring

STD COL 5.2-2-H This COL Item is addressed in Section 5.2.5.9.

5.3 Reactor Vessel

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

5.3.1.8 COL Information for Reactor Vessel Material Surveillance Program

Replace this section with the following.

STD COL 5.3-2-A The description of the reactor vessel material surveillance program is provided in DCD Section 5.3.1.6. This program description addresses the following areas:

- Basis for selection of material in the program (DCD Section 5.3.1.6.1)
- Number and type of specimens in each capsule (DCD Section 5.3.1.6.1)
- Number of capsules and proposed withdrawal schedule (DCD Section 5.3.1.6.1)

ENCLOSURE 2

Response to NRC RAI Letter 012

RAI Question 10.04.05-1

NRC RAI 10.04.05-1

FSAR Section 10.4.5.2.2, "Component Description," states: "Codes and standards applicable to the CIRC (circulating water system) are in accordance with DCD Section 3.2 with the exception of large bore piping (piping with a nominal diameter of 700 mm (27.6 in) and larger). Large bore CIRC piping is constructed using AWWA (American Water Works Association) standards. The system is designed and constructed in accordance with Quality Group D specification." However, staff review of ESBWR DCD Table 3.2-3 identified that the DCD specifies standard ASME B31.1 for quality group D piping consistent with Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants." In addition, SRP Section 10.4.5, Item III.1, identifies the need to incorporate design provisions that minimize the effect of hydraulic transients upon the functional capability and integrity of the system components. Please clarify the apparent inconsistency with the DCD and describe conformance with the regulatory guidance. In addition, please discuss and confirm that failure of this large bore piping will not affect the intended functions of the safety-related equipment and/or systems.

Dominion Response

(a) Use of AWWA Standard versus ASME B31.1 for CIRC Piping

Upon further review, Dominion determined that it is not necessary to take an exception to DCD Section 3.2 in the FSAR. DCD Section 10.4.5.2.2 specifies that the CIRC is designed and constructed in accordance with Quality Group D specifications. DCD Table 3.2-3 identifies ASME B31.1 as the applicable code for piping in Quality Group D systems. ASME B31.1 states that AWWA standards are an acceptable means to comply with the code for large bore piping. Therefore, the use of AWWA standards for the design and construction of CIRC large bore piping is consistent with DCD Section 3.2 and Regulatory Guide 1.26.

(b) Provisions to Minimize Hydraulic Transients in CIRC

The CIRC system incorporates design provisions that minimize the effect of hydraulic transients upon the functional capability and the integrity of the system components. These design features include slow-stroke motor-operated valves (MOVs), air release valves to fill and keep the system full, vacuum release valves that minimize pressure transients, valve control and interlock features that ensure correct valve line-up prior to pump start, and discharge isolation valves that open and close with pump start and stop signals. These design features conform to SRP Section 10.4.5, Item III.1 guidance.

(c) Impact of failure of CIRC Large Bore Piping

FSAR Section 10.4.5.6 will be revised in response to RAI 10.04.05-2 to clarify that failure of large bore CIRC piping will not adversely impact the intended functions of safety-related equipment or systems.

Proposed COLA Revision

FSAR Section 10.4.5.2.2 will be revised to delete the exception for large bore piping, as indicated in the attached markup.

FSAR Section 10.4.5.2.1 will be revised to describe the provisions in the CIRC system design that minimize the effect of hydraulic transients upon the functional capability and the integrity of the system components, as indicated in the attached markup.

FSAR Section 10.4.5.6 will be revised in response to RAI 10.04.05-2 to clarify that failure of large bore CIRC piping will not adversely impact the intended functions of safety-related equipment or systems. Please refer to the response to RAI 10.04.05-2 for the FSAR markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

10.2.5 COL Information

10.2-1-A Turbine Maintenance and Inspection Program

STD COL 10.2-1-A This COL Item is addressed in Section 10.2.3.6

10.2-2-A Turbine Missile Probability Analysis

STD COL 10.2-2-A This COL Item is addressed in Section 10.2.3.8.

10.3 Turbine Main Steam System

This section of the referenced DCD is incorporated by reference with no departures or supplements.

10.4 Other Features of Steam and Power Conversion System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

10.4.5.2.1 General Description

Replace the text with the following.

NAPS CDI The CIRC is depicted in Figures 10.4-201 through 10.4-203. The CIRC consists of the following components:

- Condenser water boxes, piping, and valves
- Condenser tube cleaning equipment
- Water box drain subsystem
- Four 25 percent capacity pumps and pump discharge valves
- A removable assembly of coarse and fine screens that separate the pump forebay (suction) from the hybrid cooling tower basin
- An array of dry, mechanical draft cooling tower cells arranged in banks
- One combination (hybrid) wet/dry, mechanical draft cooling tower

Table 10.4-3R includes the temperature range of the water delivered by the CIRC pumps to the main condenser.

The CIRC water is normally circulated by four motor-driven pumps through the condenser and back to the cooling towers. Depending on ambient conditions, system configuration, and heat load, one CIRC pump may be taken out of operation with the flow of the remaining three CIRC pumps providing sufficient water for condenser heat removal.

The four pumps are arranged in parallel. Discharge lines combine into two parallel main circulating water supply lines to the main condenser. Each main circulating water supply line connects to a low pressure condenser inlet water box.

Two interconnecting lines are provided between the two main circulating water supply lines. The first interconnecting line is located near the discharge of the circulating water pumps and is used for flow balancing. The second interconnecting line is near the location where the CIRC pipes enter the turbine building and is used as a blowdown point. A motor operated isolation valve is provided on the flow balancing line. Two motor operated valves are located on the blowdown cross-connect line, one on either side of the blowdown line. These valves allow operation of the CIRC with one main circulating water supply line out of service.

The discharge of each pump is fitted with a remotely operated valve. This arrangement permits isolation and maintenance of any one pump while the others remain in operation and minimizes the backward flow through an out-of-service pump.

The CIRC and condenser are designed to permit isolation of half of the three series connected tube bundles to permit repair of leaks and cleaning of water boxes while operating at reduced power.

The CIRC includes water box vents to help fill the condenser water boxes during startup and remove accumulated air and other gases from the water boxes during normal operation. ~~The dry and hybrid cooling towers have air releases and vacuum relief valves located at strategic points to help fill the cooling tower sections, remove accumulated air and other gases during normal operation, and minimize CIRC pressure transients by providing vacuum relief. Each pump discharge is also fitted with an air release valve.~~

The CIRC system incorporates design provisions that minimize the effect of hydraulic transients upon the functional capability and the integrity of the system components. These design features include slow-stroke motor-operated valves (MOVs), air release valves to fill and keep the system full, vacuum release valves that minimize pressure transients, valve control and interlock features that ensure correct valve line-up prior to pump start, and discharge isolation valves that open and close with pump start and stop signals.

Circulating water chemistry is maintained by the Chemical Storage and Transfer System and with blowdown. Circulating water chemical equipment injects the required chemicals into the circulating water pump bay before entering the circulating water pumps.

10.4.5.2.2 **Component Description**

Replace the ~~text~~ last paragraph with the following.

NAPS CDI

~~Codes and standards applicable to the CIRC are listed in DCD Section 3.2 with the exception of large bore piping (piping with a nominal diameter of 700 mm (27.6 in) and larger). Large bore CIRC piping is constructed using AWWA standards. The system is designed and constructed in accordance with Quality Group D specifications.~~

Table 10.4-3R provides reference parameters for the major components of the CIRC.

10.4.5.2.2.1 **CIRC Chemical Injection**

Circulating water chemistry is maintained by the Chemical Storage and Transfer System. Chemical feed equipment injects the required chemicals into the circulating water at the pump bay before water enters the circulating water pumps.

Chemical injection maintains a non-corrosive, non-scale-forming condition and limits the biological film formation that reduces the heat transfer rate in the condenser and cooling towers.

Plant chemistry specifies the required chemicals used within the system. The chemicals can be divided into five categories based upon function: biocide, algaecide, pH adjuster, corrosion inhibitor, and scale inhibitor. The pH adjuster, corrosion inhibitor, and scale inhibitor are metered into the system continuously or as required to maintain proper concentrations. Biocide application frequency may vary with seasons. Algaecide is applied, as necessary, to control algae formation in the cooling towers. Chemicals that are injected in the CIRC include sodium hypochlorite, acid, bromide, dispersants, and non-oxidizing biocides.

Circulating water chemistry is also controlled as required with blowdown.

Chemicals selected are compatible with selected materials or components used in the CIRC.

ENCLOSURE 3

Response to NRC RAI Letter 012

RAI Question 10.04.05-2

NRC RAI 10.04.05-2

FSAR Section 10.4.5.8, "Normal Power Heat Sink," states that site arrangement and cooling tower construction will prevent damage to any Seismic Category 1 or 2 structures, or any safety related structures, systems or components (SSCs) from possible missiles generated by cooling tower mechanical fan failure. However, the FSAR does not specifically address flooding considerations due to hybrid cooling tower failure. SRP Section 10.4.5, "Circulating Water System," Item II.1, identifies the need to provide design provisions to accommodate the effects of discharging water that may result from a failure of a component or piping in the circulating water system. Please provide additional information, consistent with SRP Section 10.4.5, regarding cooling tower failure analysis and its effects on SSCs.

Dominion Response

Failure of a pipe or component in the Circulating Water System (CIRC) hybrid cooling tower or elsewhere in CIRC in the yard would not have an adverse impact on the intended design functions of safety-related SSCs.

For the hybrid cooling tower, the largest components are the two vertical large bore CIRC pipes that connect to the hybrid cooling tower's distribution headers. It is conservatively assumed that these large CIRC underground pipes surface outside the confines of the hybrid cooling tower basin. A postulated rupture of one of these pipes would result in water flow in the area of the yard with the cooling towers. The yard in this area slopes to the west. Water discharged from such a break would flow down to the drainage ditch along the west side of the cooling tower area and drain away from Unit 3 toward Lake Anna.

Depending on the size and orientation of the break, some discharging water may flow eastward toward a drainage ditch along the east side of the cooling tower area or toward the access road leading to Unit 3. Water reaching the access road would flow into the ditches along the plant access road. The flow-rate in the ditches past the power block area would be less than that considered for the local Probable Maximum Precipitation (PMP) event. Therefore, safety-related SSCs would not be subjected to flooding as a result of a failure of the largest hybrid cooling tower component.

The failure of this vertical large-bore CIRC pipe bounds other failures of piping and components in the CIRC. The remainder of the system is either underground or has a smaller diameter. Failures of these underground and smaller diameter components would have lower flow-rates than a postulated failure of a vertical, above-ground, large-bore CIRC pipe. Also, flow from such failures would be either in the cooling tower area or toward the plant access road ditches and to either the storm water basin or the make-up water intake area.

Failure of the CIRC hybrid cooling tower basin has also been considered. Because the basin is an in-ground structure, the maximum water level elevation in the hybrid cooling tower basin is lower than the elevations of the surrounding areas. This design and the selected location ensure that failure of the basin results in no water discharge to the surface. However, should any discharge occur, the water would flow toward the lake rather than toward the plant. Therefore, cooling tower basin failure would not have an adverse effect on any safety-related SSCs.

Proposed COLA Revision

FSAR Section 10.4.5.6 will be revised as indicated in the attached markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

A condenser tube cleaning subsystem cleans the circulating water side of the main condenser tubes.

Leakage of condensate from the main condenser into the CIRC via a condenser tube leak is not likely during power operation, since the CIRC normally operates at a greater pressure than the shell (condensate) side of the condenser. Analysis of routine CIRC cooling tower grab samples will detect events that could lead to unmonitored, uncontrolled radioactive releases to the environment. This provides the action required by NRC Inspection and Enforcement Bulletin No. 80-10.

10.4.5.5 Instrumentation Applications

Insert the following between the fourth and fifth paragraphs.

NAPS CDI

Level instrumentation provided in the circulating water pump forebay controls makeup flow from the SWS to the pump forebay via the N-DCIS. Level instrumentation in the pump forebay initiates alarms in the main control room on abnormally low or high water level.

Pressure indication is provided on the circulating water pump discharge. Differential pressure instrumentation is provided across the inlet and outlet to the condenser and is used to determine the frequency of operating the condenser tube cleaning system.

Local grab samples are used to periodically test the circulating water quality.

Add the following at the end of this section.

Failure of a pipe or component in the CIRC hybrid cooling tower or elsewhere in CIRC in the yard would not have an adverse impact on the intended design functions of safety-related SSCs.

For the hybrid cooling tower, the largest components are the two vertical large-bore CIRC pipes that connect to the hybrid cooling tower's distribution headers. It is conservatively assumed that these large CIRC underground pipes surface outside the confines of the hybrid cooling tower basin.

A postulated rupture of one of these pipes would result in water flow in the area of the yard with the cooling towers. The yard in this area slopes to the west. Water discharged from such a break would flow down to the drainage ditch along the west side of the cooling tower area and drain away from Unit 3 toward Lake Anna.

Depending on the size and orientation of the break, some discharging water may flow eastward toward a drainage ditch along the east side of the cooling tower area or toward the access road leading to Unit 3. Water reaching the access road would flow into the ditches along the plant access road. The flow-rate in the ditches past the power block area would be less than that considered for the local PMP event. Therefore, safety-related SSCs would not be subjected to flooding as a result of a failure of the largest hybrid cooling tower component.

The failure of this vertical large-bore CIRC pipe bounds other failures of piping and components in the CIRC. The remainder of the system is either underground or has a smaller diameter. Failures of these underground and smaller diameter components would have lower flow-rates than a postulated failure of a vertical, above-ground, large-bore CIRC pipe. Also, flow from such failures would be either in the cooling tower area or toward the plant access road ditches and to either the storm water basin or the make-up water intake area.

Failure of the CIRC hybrid cooling tower basin has also been considered. Because the basin is an in-ground structure, the maximum water level elevation in the hybrid cooling tower basin is lower than the elevations of the surrounding areas. This design and the selected location ensure that failure of the basin results in no water discharge to the surface. However, should any discharge occur, the water would flow toward the lake rather than toward the plant.

10.4.5.8 Normal Power Heat Sink

Replace the text with the following.

NAPS CDI

The cooling tower arrangement includes a dry cooling tower array and a round, wet/dry (hybrid) cooling tower that may operate independently or in series. The towers may be bypassed or partially or fully utilized as required, depending on desired operating configuration, heat load, and ambient conditions.

The dry tower array is arranged in rectangular banks of multiple cells. Each cell includes air cooled heat exchange surfaces, a motor-driven mechanical draft fan, and inlet and outlet isolation valves. The round,

ENCLOSURE 4

Response to NRC RAI Letter 012

RAI Question 14.02-2

NRC RAI 14.02-2

Regulatory Guide 1.68, Section C.I, "Criteria for Selection of Plant Features to be Tested" provides the criteria for selection of plant features to be tested during the initial test program (ITP). FSAR Section 14.2.9, "Site Specific Preoperational and Startup Tests," contains the site-specific ITP testing that may be required for systems, structures, and components (SSCs) outside of the ESBWR design certification. The list of test abstracts includes the following systems: Station Service Water Preoperational Test, Cooling Tower Preoperational Test, Personnel Monitors and Radiation Survey Instruments Preoperational Test, Electrical Switchyard System Preoperational Test, and Cooling Tower Performance Test. Please confirm that there are no additional site specific SSCs and/or design features that meet the criteria RG 1.68 Section C.1. If additional testing is identified, please add such testing to FSAR Section 14.2.

Dominion Response

The criteria in RG 1.68, Section C.1, for the selection of plant features to be tested during the ITP, were reviewed against the site-specific SSCs, design features, and performance capabilities to determine if any additional testing is required. There were no additional site-specific SSCs, design features, or performance capabilities identified that meet these criteria.

Proposed COLA Revision

None

ENCLOSURE 5

Response to NRC RAI Letter 012

RAI Question 14.02-3

NRC RAI 14.02-3

SRP 14.2 and RG 1.206, C.I.XIV identify the need for a COL applicant to include the administrative controls document that governs the development and implementation of the Initial Test Program (ITP). The staff review identified that the application does not include such administrative controls. At public meetings on May 13 and 22, 2008, Dominion and other design-centered working group representatives presented a proposed test program administrative document for staff consideration. Staff review indicates this document is consistent with the guidance provided in SRP Section 14.2. Please formally submit this manual on the North Anna docket as part of the FSAR.

Dominion Response

The referenced test program administrative document will be included as Appendix 14AA of the FSAR as requested. This document conforms to the guidance in SRP Section 14.2 and RG 1.206.

Proposed COLA Revision

FSAR Chapter 14 will be revised as indicated in the attached markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

Chapter 14 Initial Test Program

14.1 Initial Test Program for Preliminary Safety Analysis Reports

This section of the referenced DCD is incorporated by reference with no departures or supplements.

14.2 Initial Plant Test Program for Final Safety Analysis Reports

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

14.2.1.4 Organization and Staffing

Add the following at the end of this section.

NAPS SUP 14.2-1 Section 13.1 provides additional information regarding responsibilities, qualifications, and organization for implementing the pre-operational and startup testing program.

14.2.2.1 Startup Administration Manual

Replace the first two sentences with the following, and delete the last sentence in this section.

STD COL 14.2-1-H A description of the Initial Test Program (ITP) administration is provided in Appendix 14AA. The Startup Administration Manual (SAM) will be developed and made available for review 60 days prior to scheduled start of the preoperational test program.

14.2.2.2 Test Procedures

Replace the last two sentences in this section with the following.

STD COL 14.2-2-H Approved test procedures for satisfying the commitments of this section will be developed and available for review no later than 60 days prior to their intended use for preoperational tests and no later than 60 days prior to scheduled fuel loading for power ascension tests.

STD COL 14.2-1-A

Appendix 14AA Description of Initial Test Program Administration

14AA.1 Summary of Test Program and Objectives

14AA.1.1 Applicability

This appendix provides the requirements to be included in the Startup Administrative Manual (SAM), as discussed in DCD Sections 14.2.2.1 and 14.2.2.3. The information in and referenced in this appendix meets the ITP criteria of NUREG-0800 and is formatted to follow RG 1.206, Section C.I.14.2.

The ITP is applied to structures, systems, and components that perform the functions described in the RG 1.68 evaluation in Section 1.9. The ITP is also applied to other structures, systems, and components that meet any of the following criteria, even if not included in RG 1.68, Appendix A:

- Will be used for shutdown and cool down of the reactor under normal plant conditions, and for maintaining the reactor in a safe condition for an extended shutdown period.
- Will be used for shutdown and cool down of the reactor under transient (infrequent or moderately frequent events) conditions and postulated accident conditions, and for maintaining the reactor in a safe condition for an extended shutdown period following such conditions.
- Will be used to establish conformance with safety limits or limiting conditions for operation that will be included in the facility's Technical Specifications.
- Are classified as engineered safety features or will be relied on to support or ensure the operation of engineered safety features within design limits.
- Are assumed to function, or for which credit is taken, in the accident analysis of the facility, as described in the FSAR.
- Will be used to process, store, control, or limit the release of radioactive materials.

The SAM includes a list of the ESBWR structures, systems, and components to which the ITP is applied.

14AA.1.2 Phases of the Initial Test Program

The ITP (per RG 1.68) has the following five phases:

1. Preoperational Testing
2. Initial Fuel Loading and Pre-Criticality Tests
3. Initial Criticality
4. Low-Power Tests
5. Power Ascension Tests

These phases are described in further detail in DCD Section 14.2 and in Section 14.2, and are referred to collectively as Startup Tests.

14AA.1.3 Objectives of Preoperational and Startup Testing

Objectives of Preoperational Testing are in DCD Section 14.2.1.2. Objectives of Startup Testing are in DCD Section 14.2.1.3.

14AA.1.4 Testing of First of a Kind Design Features

First of a kind (FOAK) testing may occur in any of the phases depending on the nature of the testing and required sequencing of the tests. When testing FOAK design features, applicable operating experience from previous test performance on other ESBWR plants is reviewed where available and the ITP modified as needed based on those lessons learned.

14AA.1.5 Credit for Previously Performed Testing of First of a Kind Design Features

In some cases, FOAK testing is required only for the first of a new design or for the first few plants of a standard design. In such cases, credit may be taken for the previously performed tests. A discussion is included in the startup test reports of the results of those tests that are credited.

14AA.2 Organization and Staffing

Administration of the ITP is governed by procedures in the SAM.

14AA.2.1 Organizational Description

The Plant Staff organization is described in Section 13.1. General preoperational responsibilities and a description of preoperational and startup testing are provided in Section 13AA.2. DCD Section 14.2.1.4 provides a description of the Startup Group organization.

The Startup Group has two internal groups: the Preoperational Test Group, which is responsible for conducting and documenting preoperational tests; and the Startup Test Group, which is responsible for conducting and documenting initial startup testing. Both groups consist of personnel drawn from various organizations such as plant staff, construction personnel, GEH, and other contractors, vendors and consultants.

The manager in charge of the Startup Group reports to the plant manager and has the qualifications of Preoperational Testing Supervisor as set forth in Table 13.1-201.

The Preoperational Test Group consists of Preoperational Testing Supervisors (i.e., NSSS, BOP, Electrical, and others, as required), each of whom reports to the manager in charge of the Startup Group. Preoperational Testing Engineers are assigned to this group and report to one of the Preoperational Testing Supervisors. Qualifications of Preoperational Testing Supervisors and Preoperational Testing Engineers are set forth in Table 13.1-201.

The Startup Test Group consists of Startup Testing Supervisors who report to the manager in charge of the Startup Group. Startup Test Engineers are assigned to this group and report directly to one of the Startup Testing Supervisors. Qualifications of Startup Testing Supervisors and Startup Test Engineers are set forth in Table 13.1-201. Figure 14AA-201 illustrates the organizational structure of the Startup Group.

14AA.2.2 **Responsibilities**

The manager in charge of Operations coordinates with the manager in charge of the Startup Group during the ITP to provide operations personnel to coordinate, support, and participate in preoperational testing. The manager in charge of Operations is a voting member of the Joint Test Group (JTG) and the Independent Review Body (IRB). The manager in charge of Operations is responsible for safe operation of the plant and ensuring tests are performed efficiently and effectively.

14AA.2.2.1 **Startup Group Manager**

The manager in charge of the Startup Group is responsible for:

- Staffing within the Startup Group.
- Developing procedures associated with ITP.
- Acting as Chairman of the JTG.
- Acting as an advisor to the IRB for all matters associated with startup testing.
- Managing contracts associated with the ITP.
- Coordinating with station and construction department heads for assignment of staff personnel to accomplish the test program objectives.

14AA.2.2.2 **GEH Resident Site Manager**

The GEH resident site manager is responsible for technical direction during the ITP. Qualifications of the GEH resident site manager are equivalent to the qualifications described in ANSI/ANS-3.1-1993 for a Preoperational Testing Supervisor. Specific responsibilities are:

- Acting as liaison with GEH on testing matters involving GEH-supplied equipment.
- Reviewing preoperational and startup test procedures, with emphasis on the GEH Nuclear Steam Supply System (NSSS).
- Assisting in data reduction, analysis, and evaluation for completed tests.
- Acting as a voting member of JTG.
- Providing administrative support and supervision to GEH onsite personnel involved in the test program.

14AA.2.2.3 **Vendor Site Representative**

A vendor site representative is responsible for technical direction during the preoperational phase of the test program. This position is filled as needed based on the scope of non-GEH supplied equipment that requires preoperational or startup testing. Specific responsibilities are:

- Acting as liaison with vendor on testing matters involving vendor supplied equipment.
- Reviewing preoperational tests with emphasis on vendor-supplied equipment.

- Assisting in data reduction, analysis, and evaluation for preoperational tests.
- Providing administrative support and supervision to vendor onsite personnel involved in the test program.

14AA.2.2.4 **Preoperational Testing Supervisor**

Preoperational Testing Supervisors are responsible for:

- Supervising the Preoperational Testing Engineers assigned to them.
- Coordinating and scheduling test preparation and test activities.
- Acting as voting member of JTG.
- Preparing, reviewing, and performing preoperational test procedures.
- Reviewing preoperational test results and making recommendations based on the results.
- Resolving deficiencies identified during preoperational inspection and test activities.
- Ensuring Preoperational Testing Engineers are not the same personnel who designed or are responsible for satisfactory performance of the system(s) or design features(s) being tested.

14AA.2.2.5 **Startup Testing Supervisor**

Startup Testing Supervisors are responsible for:

- Supervising the Startup Test Engineers assigned to them.
- Coordinating and scheduling test preparation and test activities.
- Coordinating and directing testing for their shift via the Operations Shift Supervisor for all initial startup testing.
- Assisting with preparing, reviewing, and performing startup test procedures.
- Reviewing, analyzing, and evaluating test results and data.
- Assisting in the resolution of deficiencies identified during startup testing activities.
- Coordinating with the planning and scheduling group for initial startup activities.
- Expediting testing progress as necessary to support project schedule.

- Ensuring Startup Test Engineers are not the same personnel who designed or are responsible for satisfactory performance of the system(s) or design features(s) being tested.

14AA.2.2.6 **Preoperational Testing Engineer**

Preoperational Testing Engineers are responsible for:

- Determining the nature and degree of testing required for assigned systems.
- Developing test activity milestones, target dates, and manpower requirements.
- Following construction progress to support test program requirements.
- Ensuring that the required detailed preoperational test procedures are available for review and approval.
- Identifying special or temporary equipment or services needed to support testing.
- Assuring test identification tagging and station tagging are implemented as necessary to support testing and turnover.
- Directing all participating groups during preparation for the execution of assigned tasks.
- Identifying and assisting in the resolution of deficiencies and problems found during the construction and testing of assigned systems and areas.
- Reviewing and evaluating test results and preparing test summaries.

14AA.2.2.7 **Startup Test Engineer**

Startup Test Engineers are responsible for:

- Preparing the required detailed startup test procedures and making them available for review and approval.
- Identifying special or temporary equipment or services needed to support testing.
- Directing all participating groups during preparation for the execution of assigned tasks.
- Identifying and assisting in the resolution of deficiencies found during the construction and testing of assigned systems.
- Reviewing and evaluating the test results and data.

- Coordinating with Operations during the execution of assigned tasks.
- Assisting in the supervision and inspection of Balance of Plant (BOP) work, reviewing installation and performance tests, and providing general advice on startup tests.
- Providing engineering support activities and services during startup turbine generator testing and Main Turbine Electro-Hydraulic Control (EHC) System testing.

14AA.2.2.8 Joint Test Group

The JTG is the primary review and approval organization during the preoperational test phase of the test program and is equivalent to the group referred to in DCD Section 14.2.1.4 as the Startup Controlling Group (SCG). The required JTG quorum is described in an administrative procedure in the SAM. The JTG is responsible for:

- Performing duties delineated in the SAM.
- Reviewing and approving all preoperational test procedures prior to testing.
- Reviewing and approving all major changes or revisions to JTG-approved test procedures.
- Reviewing and approving the overall preoperational test schedule and sequence.
- Reviewing and approving the results of preoperational tests.
- Recommending the disposition of test deficiencies.
- Recommending retests or supplemental tests as required.
- Determining system readiness for turnover to operations.

14AA.2.2.9 Document Control Coordinator

A document control coordinator reports to the manager in charge of the Startup Group and has the qualifications described in ANSI/ANS-3.I-1993 for a Startup Test Engineer. The document control coordinator is responsible for:

- Tracking test procedure changes.
- Reviewing, approving and tracking document changes (including drawings, vendor tech manuals, procedures, design changes, etc.).
- Verifying that the test schedules are up to date with regard to latest testing results.

- Processing final test packages through review and approval by the IRB.

14AA.2.2.10 Independent Review Body

Upon initial fuel load, the IRB assumes responsibility for tasks previously assigned to the JTG. The IRB is responsible for review of all procedures that require a regulatory evaluation under 10 CFR 50.59 and 10 CFR 72.48, as well as all tests and modifications that affect nuclear safety. The IRB is responsible for review of all startup test procedures. The organizational structure, functions, and responsibilities of IRB are described in Appendix 17BB. During the startup test phase, the IRB is advised by the manager in charge of the Startup Group and the GEH resident site manager. The IRB may be addressed by other titles such as Plant Operations Review Committee (PORC), On-site Safety Review Committee, or Plant Safety Review Committee (PSRC).

14AA.2.3 Operating and Technical Staff Participation

Operating and technical staff qualifications and experience requirements are:

- Plant staff qualification and experience requirements are in Chapter 13 and in this appendix.
- Contractor qualification and experience requirements are in this appendix and in approved contractor procedures.
- Vendor staff qualification and experience requirements are in this appendix and in approved vendor procedures.
- Architect Engineer staff qualification and experience requirements are in this appendix and in approved Architect Engineer procedures.

Plant staff participates in all phases of the ITP. Plant staff groups that participate include but are not limited to: Quality Assurance staff, Quality Control staff, Operations staff, Maintenance staff, Engineering staff, Planning, Scheduling and Outage planning staff, and Work Management staff, including work planners and schedulers. Operations staff participates in preoperational testing as part of gaining experience as described in Appendix 13BB. Refer to Figure 14AA-201 for identification of organizations that have one or more participants in the ITP.

14AA.2.4 **Conflict of Interest**

Members of the Startup Group responsible for formulating and conducting preoperational and startup tests are not the same individuals who designed or are responsible for satisfactory performance of the systems or design features being tested. This does not preclude members of the design organizations from participating in test activities.

14AA.2.5 **Training Requirements**

Training on the overall test program is conducted prior to scheduled preoperational and initial startup testing and as new employees are added to the test groups. A training program for each functional group in the organization is developed, with regard to the scheduled preoperational and startup testing, to ensure that the necessary plant staff is ready for commencement of the ITP. Additional discussion on staff training is found in Section 13.2, Appendices 13AA and 13BB, and Figure 13.1-202. The training program includes:

- Systems to be tested.
- Training by selected major equipment vendors (e.g., turbine, plant control).
- A review of test program administration.
- Content of test procedures, including acceptance criteria review.
- Test sequence.
- Test conduct and closure.

Specific Just-In-Time (JIT) training is conducted for operating crews and other personnel conducting certain startup tests. This JIT training may involve simulator training. Criteria to be considered when determining if JIT is used for a test include complexity of the test and plant response, such as tests that result in plant trips or other transients, or where they may occur. Accredited training program procedures describe the process for determining training topics to be conducted. The intention is to be as well prepared as possible to operate the plant safely.

14AA.3 Test Procedures

14AA.3.1 **Procedure Development**

DCD Sections 14.2.2.2 and 14.2.2.4 provide a general discussion concerning test procedure development and review. Section 13.5

provides detailed requirements for developing, reviewing, and scheduling administrative procedures.

Test procedures are written in accordance with a technical procedure writer's guide. This writer's guide provides for procedure validation. This validation may, in some cases, be through the use of an available plant reference simulator. The suitability of using the simulator to validate a test procedure is evaluated on a case by case basis. It may not be suitable, for example, to use the simulator to validate a procedure whose results are required to validate the simulator modeling.

Test procedures maximize the use of plant operating and maintenance procedures for 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 and startup test procedures. This includes the use of emergency procedures for verifying appropriate emergency actions as described in DCD Section 14.2.5. 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. Test procedures contain cautions, warnings, and notes, using criteria established in the technical procedure writer's guide.

14AA.3.2 Procedure Format and Content Requirements

DCD Section 14.2.8.1 discusses technical information to be provided by GEH and others that form the technical basis for test procedure objectives and acceptance criteria.

Each preoperational and startup test procedure includes the following:

- Cover page

  The cover page provides approval signatures and effective dates (signatures may be maintained on file and may not appear on the cover page). The title and the unit designator water mark appear on the cover page. If the test is considered an infrequently performed test, this would appear on the cover page.

- Table of Contents
- Purpose and Test Objectives Section

  This section identifies the goal of the specific preoperational/startup test. 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. Objectives of the test are stated. Many systems tests are intended to demonstrate that each of several initiating events produces one or more expected responses. These initiating events and the corresponding responses are identified.

- Description Section

  This section describes the power plateau, specific testing activities, operability impacts, systems affected, RPS trips, containment isolation, etc.

- Reference Section

  This section lists documents used to prepare or revise the pre-operational or startup test procedure and any documents used or referred to while performing the procedure.

- Special Tools and Equipment (Temporary Equipment Installations) Section

  This section lists test equipment and special tools not routinely carried, plus any unusual expendable items recommended to perform the procedure. This section also identifies temporary test equipment installations and test equipment instructions.

- Precautions and Limitations Section

  The test procedure highlights and clearly describes any and all precautions needed to ensure a reliable test or the safety of personnel or equipment including termination criteria for the test. Included are any special actions to be taken if the test is terminated at critical points in the test.

- Initial Conditions Section

  This section lists the plant conditions required to perform the test. Example: verify that the plant is operating at the 75 percent (+0, –5 percent) rod line. Each test of the operation of a system requires that certain other activities be performed first (e.g., completion of construction, construction and/or preliminary tests, inspections, and certain other preoperational tests or operations). Where appropriate, instructions are given pertaining to the system configuration, components that should or should not be operating, and other pertinent conditions that might affect the operation of the given system. The preoperational testing procedures include, as appropriate, these specific prerequisites, as illustrated by the following examples:

- Confirm that construction activities associated with the system have been completed and documented.
- Field inspections have been conducted to ensure that the equipment is ready for operation, including inspection for proper fabrication and cleanliness, checkout of wiring continuity and electrical protective devices, adjustment of settings on torque-limiting devices and calibration of instruments, verification that all instrument loops are operable and respond within required response times, and adjustment and settings of temperature controllers and limit switches.
- Confirm that test equipment is operable and properly calibrated.
- Confirm communications systems are functional for conducting the test.
- Access control is in place for personnel safety.
- Support or interface systems are functional.
- Confirm that prerequisite tests are conducted on individual components or subsystems to demonstrate that they meet their functional requirements.

Special environmental conditions are included in this section. Test procedures include provisions to test the equipment under environmental conditions as close as practical to those the equipment will experience in both normal and accident situations. However, many tests are conducted at ambient conditions due to the impracticality of achieving normal and accident conditions during preoperational testing.

- System Testing Section

This section provides detailed step-by-step instructions for each test. To the extent practical, the test procedures use approved normal plant operating procedures. Expected plant result is explicitly or implicitly stated in the instructions through verification or measurement steps. Each procedure requires necessary nonstandard arrangements to be restored to their normal status after the test is completed. Control measures such as jumper logs and check-off lists are specified.

Nonstandard bypasses, valve configurations, and instrument settings are identified and highlighted for return to normal. Nonstandard arrangements are carefully examined to ensure that temporary arrangements do not invalidate the test by interfering with proper testing of the as-built system.

- Data Collection Section

  The test procedures prescribe the data to be collected and the form in which the data are to be recorded. All entries are permanent. The administrative controls include an acceptable method for correcting an entry.

- Acceptance Criteria Section

  The test procedures clearly identify the criteria against which the success or failure of the test is judged, and account for measurement errors and uncertainties. In some cases, these are qualitative criteria. Where applicable, quantitative values with appropriate tolerances are designated as acceptance criteria. This section includes acceptance criteria for judgment of plant and system performance (as described in the applicable test specification). Those test criteria that show compliance with the Combined License ITAAC are identified in this section. When a test criterion for a preoperational test is not met, the Preoperational Testing Engineer documents the failure through the corrective action process and contacts the applicable preoperational test supervisor to determine actions to take (e.g., submitting a work request).

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

  - Level I Criteria: Level I criteria relate to the values of process variables assigned in the design or analysis of the plant and component systems or associated equipment. Violation of these Level I criteria may have plant operational or plant safety implications. If a Level I 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. The Startup Test Engineer notifies the on-shift SRO, (who may declare the equipment inoperable), notifies the Startup Group manager/Startup Testing Supervisor, enters the condition in the corrective action program, and issues work requests as needed. Plant operating or test procedures or the Technical Specifications 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 personnel. Following resolution, the applicable test portion must be repeated to verify that the Level I requirement is ultimately satisfied. A description of the problem resolution shall be included in the report documenting the successful test.

- Level 2 Criteria: Level 2 criteria are specified as key plant performance requirements that are equipment design specification values or requirements for the measured response. The expected plant response is predicted by best estimate computer code and the desired trip avoidance margins. Level 2 failures that occur during tuning and system adjustment must be documented in the test report and following resolution, the applicable test portion must be repeated (retesting could occur at a higher power level with IRB approval) 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 must be satisfied or documentation provided that either modifies Level 2 requirements or changes specific design criteria.
- Level 3 Criteria: Level 3 criteria are associated with specifications on the expected or desired performance of individual control loop components. 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 the 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 I 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 and entered into the corrective action program.

- Follow-on Task Section

  This section includes activities that must be performed to complete the test procedure.

  - Completion Notification

    This section is included to identify persons to be notified that the procedure has been satisfactorily or unsatisfactorily completed.

  - Procedure Reviews

    This section is included to specify required reviews and comments by various personnel.

  - Records Disposition

    Records disposition guidance is described in site-specific procedures.

  - Attachments

    Test procedure attachments provide supporting information and equations and evaluation methods to be used to analyze the obtained data. This attachment lists the signals to be recorded by the data collection equipment. Analysis and evaluation attachments outline the calculations to be performed and provide for an evaluation of the test.

    Upon completion of a given test, a preliminary evaluation is performed which confirms acceptability for continued testing. Smaller transient changes are performed initially, gradually increasing to larger transient changes. Test results at lower powers are extrapolated to higher power levels to determine acceptability of performing the test at higher powers.

  - Documentation of Test Results

    Records identify each observer and/or data recorder participating in the test, as well as the type of observation, identifying numbers of test or measuring equipment, results, acceptability, and action taken to correct any deficiencies. Administrative procedures specify the retention period of test result summaries, and require permanent retention of documented summaries and evaluations.

14AA.3.3 Other Startup Test Procedures

The need for special startup tests may arise due to unplanned conditions. The format and content requirements for preoperational and startup tests apply to these procedures.

14AA.3.4 Test Procedure Changes

If it is determined that procedure corrections (including changes in test sequence) are required before or during the conduct of the test, the test engineer suspends testing and notifies operations and test personnel of the required change. For all such corrections, the test engineer prepares and processes a procedure change request as delineated in a site-specific procedure for processing procedure changes. Revisions are classified into two categories based on the intent of the change. The intent of a procedure is the specific task or goal that is to be accomplished by the procedure.

Intent changes are changes to:

- Purpose.
- Initial conditions (or prerequisites).
- Acceptance criteria or tolerances.
- Scaling or setpoints.
- The method for meeting a commitment identified in the procedure.
- Step verification (independent or concurrent).
- System/component as-left condition(s).
- Reactivity management (changes that impact the operator's ability to monitor, control, or manipulate the reactor).
- Add or delete a subsection.
- Decrease personnel safety or fire protection effectiveness.
- Delete, relocate, or add a hold point.
- Caution or warning statements.
- Startup test procedure testing sequence.

Non-intent changes and revisions do not change the intent of the procedure (e.g., typographical error corrections).

Procedure changes that change the intent of the procedure receive the same level of review and approval as the original procedure. Review and approval requirements for procedure changes that do not change the intent are established in administrative procedures in the SAM. Timely notification of the NRC is made when procedures are changed that have been sent to the NRC.

14AA.4 Conduct of the Initial Test Program

14AA.4.1 Administrative Controls

ITP conduct is described in DCD Section 14.2.2.3. The SAM governs the ITP and will be issued no later than 60 days prior to the beginning of the pre-operational phase. Testing during all phases of the test program is conducted using approved test procedures.

14AA.4.2 Procedure Verification

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 engineer is responsible for ensuring:

- Drawing and document revision numbers listed in the reference section of the test procedure agree with the latest revisions.
- 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.
- Any new Operating Experience lessons learned (since preparation of the procedure) are incorporated into individual test procedures.

Procedures require signoff of verification for prerequisites and instruction steps. This signoff includes identification of the person doing the signoff and the date and time of completion.

Test engineers maintain chronological logs of test status to facilitate turnover and aid in maintaining operational configuration control. These logs become part of the test documentation.

There is a documented turnover process to ensure that test status and equipment configuration are known when personnel transfer responsibilities, such as during a shift change.

Test briefings are conducted for each test in accordance with administrative procedures. When a shift change occurs before test completion, another briefing occurs before resumption or continuation of the test.

Data collected is marked or identified with test, date, and person collecting data. This data becomes part of the test documentation.

The plant corrective action program is used to document all deficiencies, discrepancies, exceptions, nonconformances and failures (collectively known as test exceptions) identified in the ITP. The corrective action documentation becomes part of the test documentation. GEH and/or other design organizations participate in the resolution of design-related problems that result in, or contribute to, a failure to meet test acceptance criteria.

The plant manager approves proceeding from one test phase to the next during the ITP. Approvals are documented in an overall ITP governance document.

Administrative procedures detail the test documentation review and approval. Review and approval of test documentation includes the test engineer, testing supervisor, Startup Group manager, GEH site representative or appropriate vendor, and JTG or IRB. Final approval is by the plant manager.

Plant readiness reviews are conducted to assure that the plant staff and equipment are ready to proceed to the next test phase or plateau.

14AA.4.3 **Work Control**

The Startup Group is responsible for preparing work requests when Construction organization assistance is required. Work requests are issued in accordance with a site-specific procedure governing the work management process. The plant staff, upon identifying a need for Construction organization assistance, coordinates their requirements through the appropriate Startup Test Engineer.

Activities requiring Construction organization work efforts are performed under the plant tagging procedures. Tagging requests are governed by a site-specific procedure for equipment clearance. 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 Startup Group is responsible for supervising minor repairs and modifications, changing equipment settings, and disconnecting and reconnecting electrical terminations as stipulated in a specific test procedure. Startup Test Engineers may perform independent verification of changes made in accordance with approved test procedures.

14AA.4.4 Measuring and Test Equipment (M&TE)

During the preoperational test program, as well as the startup test program, most activities that lead to plant commercial operation involve design value verifications. M&TE used during these activities are properly controlled, calibrated, and adjusted at specified intervals to maintain accuracy within necessary limits. M&TE is governed by a site-specific procedure for control of M&TE. M&TE includes portable tools, gauges, instruments, and other measuring and testing devices not permanently installed, for example, startup test instruments prepared by the Preoperational Test Group as well as those provided by the Construction organization or by vendors.

A calibration program is implemented. For standard M&TE equipment, calibration procedures are prepared for each type of M&TE calibrated onsite. Calibration intervals are established 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 plant staff, this M&TE is sent to an offsite certified calibration or testing agency. If special test equipment is necessary only for the ITP, the responsible vendor provides this equipment with the appropriate calibration documentation.

14AA.4.5 System Turnover

During the construction phase, systems, subsystems, and equipment are completed and turned over in an orderly and well-coordinated manner. Guidelines are established to define the boundary and interface between related system/subsystem and are used to generate boundary scope documents; for example, marked-up piping and instrument diagrams (P&IDs), electrical schematic diagrams, for scheduling and subsequent development of component and system turnover packages. The system turnover process includes requirements for the following:

- Documenting inspections performed by the construction organization (e.g., highlighted drawings showing areas inspected).
- Documenting results of construction testing.

- Determining the construction-related inspections and tests that need to be completed before preoperational testing begins. Any open items are evaluated for acceptability of commencing preoperational testing.
- Developing and implementing plans for correcting adverse conditions and open items, and means for tracking such conditions and items.
- Verifying completeness of construction and documentation of incomplete items.

14AA.4.6 **Preoperational Testing**

During preoperational testing, it may be necessary to return system control to Construction organization to repair or modify the system or to correct new problems. Administrative procedures include direction for:

- Means of releasing control of systems and or components to construction.
- Methods used for documenting actual work performed and determining impact on testing.
- Identification of required testing to restore the system to operability/functionality/availability status, and to identify tests to be re-performed based on the impact of the work performed.
- Authorizing and tracking operability and unavailability determinations.
- Verifying retests stay in compliance with ITAAC.

14AA.4.7 **Startup Testing**

The startup testing program is based on increasing power in discrete steps. Major testing is performed at discrete power levels as described in DCD Section 14.2.7. The first tests during power ascension testing that verify movements and expansion of equipment are in accordance with design, and are conducted at a power level as low as practical (approximately 5 percent).

The governing power ascension test plan requires the following operations to be performed at appropriate steps in the power-ascension test phase:

- Conduct any tests that are scheduled at the test condition or power plateau.
- Confirm core performance parameters (core power distribution) are within expectations.

- Determine reactor power by heat balance, calibrate nuclear instruments accordingly, and confirm the existence of adequate instrumentation overlap between the startup range and power range detectors.
- Reset high-flux trips, just prior to ascending to the next level, to a value no greater than 20 percent beyond the power of the next level unless Technical Specification limits are more restrictive.
- Perform general surveys of plant systems and equipment to confirm that they are operating within expected values.
- Check for unexpected radioactivity in process systems and effluents.
- Perform reactor coolant leak checks.
- Review the completed testing program at each plateau; perform preliminary evaluations, including extrapolation core performance parameters for the next power level; and obtain the required management approvals before ascending to the next power level or test condition.

Upon completion of a given test, a preliminary evaluation is performed that confirms acceptability for continued testing. Smaller transient changes are performed initially, gradually increasing to larger transient changes. Test results at lower powers are extrapolated to higher power levels to determine acceptability of performing the test at higher powers. This extrapolation is included in the analysis section of the lower power procedure.

Surveillance test procedures may be used to document portions of tests, and ITP tests or portions of tests may be used to satisfy Technical Specifications surveillance requirements in accordance with administrative procedures. At Startup Test Program completion, a plant capacity warranty test is performed to satisfy the contract warranty and to confirm safe and stable plant operation.

14AA.4.8 **Conduct of Modifications during the Initial Test Program**

Temporary modifications may be required to conduct certain tests. These modifications are documented in the test procedure. The test procedures contain restoration steps and retesting required to confirm satisfactory restoration to required configuration. Modifications may be performed by the Construction organization or the plant staff processes prior to NRC issuance of the 10 CFR 52.103g finding. If the modification invalidates a previously completed ITAAC, then that ITAAC is re-performed. Each modification is reviewed to determine the scope of post-modification testing that is to be performed. Testing is conducted and documented to ensure that preoperational testing and ITAAC remain valid. Modifications made following NRC issuance of the 10 CFR 52.103g finding are in accordance with plant staff processes and meet license conditions. Modifications that require change of ITAAC require NRC approval of the ITAAC change.

14AA.4.9 Conduct of Maintenance during the Initial Test Program

All corrective or preventive maintenance activities are reviewed to determine the scope of post-maintenance testing to be performed. Prior to NRC issuance of the 10 CFR 52.103g finding, post-maintenance testing is conducted and documented to ensure that associated preoperational testing and ITAAC remain valid. Maintenance performed following NRC issuance of the 10 CFR 52.103g finding is in accordance with plant staff processes and meets license conditions.

14AA.4.10 Audits

A comprehensive system of planned and periodic audits is carried out to verify compliance with the ITP in accordance with the Quality Assurance Program Description. Follow-up actions, including re-audit of deficient areas, are taken where indicated.

14AA.5 Review, Evaluation and Approval of Test Results

14AA.5.1 Review and Approval Responsibilities

The reactor vendor is responsible for reviewing and approving the results of all tests of supplied equipment. Architect Engineer representatives review and approve the results of all tests of supplied equipment. Other vendors' representatives review and approve the results of all tests of supplied equipment. Plant staff review and approval responsibilities are in Section 14AA.2. Final approval of individual test completion is by the plant manager after approval by the JTG or IRB.

14AA.5.2 Technical Evaluation

Each completed test package is reviewed by technically qualified personnel to confirm satisfactory demonstration of plant, system or component performance and compliance with design and license criteria.

14AA.6 Test Records

Records retention requirements are in DCD Section 14.2.2.5 and in the Quality Assurance Program Description.

14AA.6.1 Startup Test Reports

Startup test reports are generated describing and summarizing the completion of tests performed during the ITP. A startup report is required per RG 1.16 at the earliest of: 1) 9 months following initial criticality, 2) 90 days after completion of the ITP, or 3) 90 days after start of commercial operations. If one report does not cover all three events, then supplemental reports are submitted every three months until all three events are completed. These reports:

- Address each ITP test described in the FSAR.
- Provide a general description of measured values of operating conditions or characteristics obtained from the ITP as compared to design or specification values.
- Describe any corrective actions that were required to achieve satisfactory operation.
- Include any other information required to be reported by license conditions due to regulatory guide commitments.

14AA.7 Test Program Conformance with Regulatory Guides

Section 1.9 provides the evaluation of ITP conformance with the following RGs:

- RG 1.30, "Quality Assurance Requirements for Installation, Inspection and Testing of Instrumentation and Electrical Equipment (Safety Guide 30)."
- RG 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants."
- RG 1.68, "Initial Test Program For Water-Cooled Nuclear Power Plants."
- RG 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room during a Postulated Hazardous Chemical Release."
- RG 1.116, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems."
- RG 1.139, "Guidance for Residual Heat Removal."

- RG 1.152, "Criteria for Digital Computers in Safety Systems of Nuclear Power Plants."
- RG 1.168, "Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants."

These RGs contain guidance that is included in the content of test procedures.

14AA.8 Utilization of Operating Experience

Administrative procedures provide methodologies for evaluating and initiating action for operating experience information (OE). DCD Section 14.2.4 describes the general use of operating experience by GEH in the development of the ITP.

14AA.8.1 Sources and Types of Information Reviewed for ITP Development

Multiple sources of operating experience were reviewed to develop this description of the ITP administration program. These included:

- INPO Operating Experience Reports.
- INPO 06-001, "Operating Experience."
- INPO 06-001 Addendum.
- INPO 07-003, "INPO/ Utility Benchmarking for New Plant Deployment."
- INPO 07-003 Addendum.
- INPO 86-023, "Guidelines for Nuclear Power Construction Projects."
- INPO 94-005, "Standard Operation Support of Nuclear Plants."
- INPO 94-03, "Review of Commercial Nuclear Power Industry Standardization Experience."
- INPO Document AP-909, "Construction of Standard Nuclear Plants."
- INPO NX-1067, "Browns Ferry Nuclear Plant Unit I Restart Operational Readiness Lessons Learned."
- NRC RG 1.68, "Initial Test Programs For Water-Cooled Nuclear Power Plants."
- SER 24-85, "Xenon Tilt Oscillation Following Control Rod Insertion Test (05-24-1985)."

- SER 29-86, "Inadvertent Rapid Cooldown and Depressurization During a Remote Shutdown Test (08-12-1986)."
- SOER 87-01, "Core Damaging Accident Following an Improperly Conducted Test (03-06-1987)."
- SOER 91-01, "Conduct of Infrequently Performed Tests or Evolutions."

14AA.8.2 Conclusions from Review

The following conclusions are a result of the OE review conducted to develop this ITP administration program description:

- The test procedures should provide guidance as to the expected plant response and instructions concerning what conditions warrant aborting the test. Errors and problems with the procedures should be anticipated. A means for prompt but controlled approval of changes to test procedures is needed. Critical test procedures should provide specific criteria for test termination and specific steps to ensure termination is conducted in a safe and orderly manner. Providing procedural guidance for aborting the test could prevent delays in plant restoration. Conservative guidance for actions to be taken should be included in the procedures.
- Plant simulators may prove useful in preparing for special tests and verifying procedures.
- Appropriate component/system operability should be verified prior to critical tests.
- The need to perform physics tests that can produce severe power tilts should be evaluated, particularly if tests at other similar reactors have provided sufficient data to verify the adequacy of the nuclear physics analysis.
- Implement compensatory measures in accordance with guidance for infrequently performed tests or evolutions where appropriate.

14AA.8.3 Summary of Test Program Features Influenced by the Review

The conclusions from the preceding section were incorporated in Sections 14AA.3.1 and 14AA.3.2.

14AA.8.4 Use of OE during Test Procedure Preparation

Administrative procedures require review of recent internal and external operating experience when preparing test procedures.

14AA.8.5 Use of OE during Conduct of ITP

Administrative procedures require discussion of operating experience when performing pre-job briefs immediately prior to the conduct of a test.

14AA.9 Trial Use of Plant Operating Procedures and Emergency Procedures

14AA.9.1 Use of Plant Procedures during Initial Test Program

Whenever practical, plant procedures are used to perform system and component operation during the conduct of a test.

14AA.9.2 Operator Training and Participation during Certain Initial Tests (TMI Action Plan Item I.G.1, NUREG-0737)

The objectives of operator participation are to increase the capability of shift crews to operate facilities in a safe and competent manner by assuring that training for plant changes and off-normal events is conducted.

The major objective of TMI Action Plan Task I.G.1 was to use the preoperational and startup test programs as a training exercise for operating crews. NUREG-0933 contains a discussion of the proposed actions and the conclusions made. NUREG-0800, Section 14 was revised to address the original issue of this action item. NUREG-0933 discusses three anticipated operational occurrences applicable to the ESBWR. These are pressure controller failed high, pressure controller failed low, and stuck-open safety/relief valve. These events are addressed in the abnormal operating procedures. Operators receive training on them as part of their initial training. Operators participate in preoperational and startup testing.

Operators are trained on the specifics of the ITP schedule, administrative requirements and tests. Specific JIT training is conducted for selected startup tests.

The ITP may result in discovery of acceptable plant or system response differing from expected response. Test results are reviewed to identify these differences and the training for operators is changed to reflect them. Training is conducted as soon as is practicable in accordance with training procedures.

14AA.10 Initial Fuel Loading and Initial Criticality

14AA.10.1 Prerequisites for Fuel Loading

- Preoperational tests are completed or justification is documented and approved for test exceptions and tests that have not been performed.
- All ITAAC are complete and the NRC has issued 10 CFR 52.103g declaration.
- Technical Specifications required for fuel load are met.
- License Conditions are met to allow fuel load.
- Licensed operators are stationed in the control room and for supervision of core alterations.
- Composition, duties, and emergency procedure responsibilities of the fuel handling crew are specified.
- Persons are technically qualified in accordance with plant procedures.
- Radiation monitors, nuclear instrumentation, manual initiation, and other devices are tested and verified to be operable to actuate the building evacuation alarm and ventilation control.
- Status of each system required for fuel loading is specified.
- Inspections of fuel and control rods are complete and all identified issues with installed fuel and control rods are resolved.
- Nuclear instruments are calibrated, operable and properly located (source-fuel-detector geometry). One operating channel has audible indication or annunciation in the control room.
- A response check of nuclear instruments to a neutron source consistent with the Technical Specifications surveillance frequency for source range nuclear instruments in the refueling mode is complete.
- Required status of containment is specified and met.
- Required status of the reactor vessel is specified and met. Components are either in place or out of the vessel, as specified, to be capable of receiving fuel.
- Vessel water level is established, and the minimum level for fuel loading and unloading is specified.
- The standby liquid control system is operable.

- Fuel handling equipment is confirmed functional and operable through surveillance and other tests, including dry runs.
- The status of protection systems, interlocks, mode switches, alarms, and radiation protection equipment is prescribed and verified.
- Water quality is established within prescribed limits.

14AA.10.2 Fuel Loading Procedure Details

The fuel loading procedure includes instructions or information for the following areas:

- Loading sequence and pattern for fuel, control rods, and other components, with guidance regarding fuel addition increments so that the reactivity worth of added individual fuel assemblies becomes less as the core is assembled.
- Maintenance of a display for indicating the status of the core and fuel pool, as well as appropriate records of core loading.
- Proper seating and orientation of fuel and components (the procedure specifies a visual check of each assembly in each core position).
- Functional testing of each control rod immediately following fuel loading.
- Nuclear instrumentation and neutron source requirements for monitoring subcritical multiplication, including source or detector relocation and normalization of count rate after relocation.
- Flux monitoring, including counting times and frequencies and rules for plotting inverse multiplication and interpreting plots (the counting period for count rates is specified, and an inverse multiplication plot is maintained).
- The expected subcritical multiplication behavior.
- The minimum shutdown margin is proved periodically during loading and at the completion of loading. Shutdown margin verifications do not involve planned approach to criticality using nonstandard rod patterns or with operational interlocks bypassed.
- Actions (especially those pertaining to flux monitoring) for periods when fuel loading is interrupted.
- Maintenance of continuous voice communication between the control room and loading station.

- Minimum crew required to load fuel (the procedure requires the presence of at least two persons at any location where fuel handling is taking place, and a senior reactor operator with no other concurrent duties be in charge).
- Crew work time limits per 10 CFR 26 are in effect.
- Approvals required for changing the procedure.

14AA.10.3 Fuel Loading Procedure Limitations and Actions

The fuel loading procedure includes the following limits and instructions:

- Established criteria for stopping fuel loading. Some circumstances that might warrant this are unexpected subcritical multiplication behavior, loss of communications between the control room and fuel loading station, inoperable source-range detector, and inoperability of the emergency boration system.
- Established criteria for emergency boron injection.
- Established criteria for containment evacuation.
- Actions to be performed in the event of fuel damage.
- Actions to be performed and/or approvals to be obtained before routine loading may resume after one of the above limitations has been reached or invoked.

14AA.10.4 Initial Criticality Procedure Requirements

The format and content requirements for preoperational tests apply to the initial criticality procedure. Plant operations are in accordance with plant operating procedures to the maximum extent possible. This procedure includes steps to ensure that the startup proceeds in a deliberate and orderly manner, changes in reactivity are continuously monitored, and inverse multiplication plots are maintained and interpreted.

The initial criticality procedure includes the following requirements:

- A critical rod position is predicted so that any anomalies may be noted and evaluated.
- All systems needed for startup are aligned and in proper operation.
- The standby liquid control system is operable.
- Procedural, license and Technical Specification requirements are met for initial criticality.

- Nuclear instruments are calibrated. A neutron count rate (of at least one-half count per second) should register on neutron monitoring channels before the startup begins, and the signal-to-noise ratio should be known to be greater than two. A conservative startup rate limit (no shorter than approximately a 30-second period) is established.

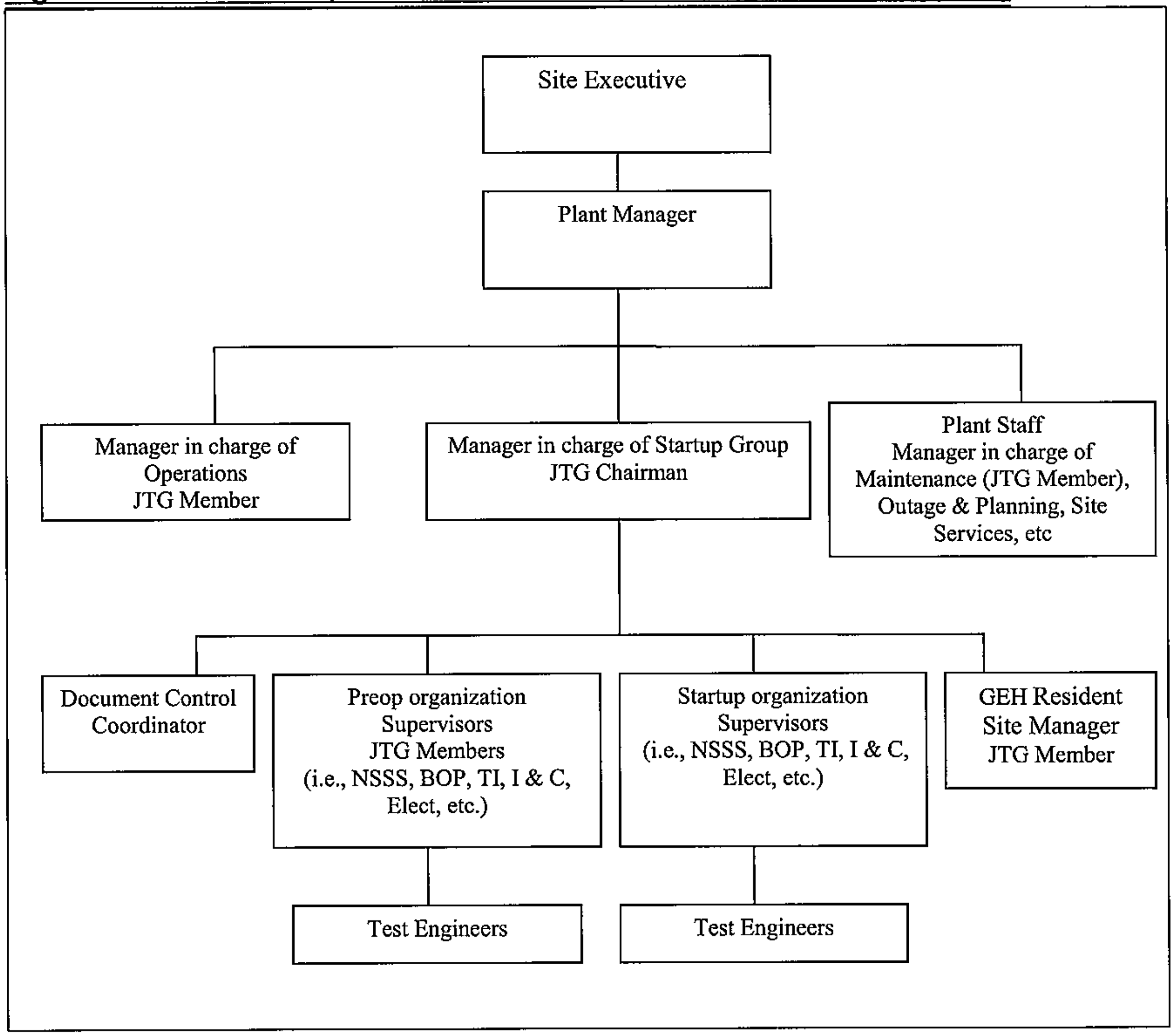
14AA.11 Plant Procedure Development Schedule

The milestone schedule for developing plant operating procedures is presented in Table 13.5-202 and discussed in Section 13.5.2.1. The operating and emergency procedures are available prior to start of licensed operator training and, therefore, are available for use during the ITP. Required or desired procedure changes may be identified during their use. Administrative procedures describe the process for revising plant operating procedures.

14AA.12 Individual Test Descriptions

Individual test descriptions can be found in DCD Section 14.2.8 and in Section 14.2.9.

Figure 14AA-201 Preoperational and Startup Test Organization (Typical)



ENCLOSURE 6

Response to NRC RAI Letter 012

RAI Question Number 14.02-4

NRC RAI 14.02-4

SRP Section 14.2 paragraph II.3.F, "Review, Evaluation, and Approval of Test Results," states that the COL applicant should develop procedures to control the review, evaluation, and approval of test results for each phase of the test program and Regulatory Guide 1.16 addresses startup test reports. FSAR Subsection 14.2.2.5, "Test Records," states "Startup test reports are prepared in accordance with RG 1.16." Staff review indicates Subsection 14.2.2.5 does not include provisions that ensure design organizations participate in the resolution of design-related problems that result in, or contribute to, a failure to meet test acceptance criteria. Please revise Subsection 14.2.2.5 to include such provisions.

Dominion Response:

The description of the Initial Test Program (ITP) administration will be included as Appendix 14AA of the FSAR, as requested by RAI 14.02-3. Appendix 14AA, Section 14AA.4.2 includes provisions to ensure that design organizations participate in resolution of design-related problems that result in, or contribute to, a failure to meet test acceptance criteria.

Proposed COLA Revision

FSAR Chapter 14 will be revised to incorporate Appendix 14AA in response to RAI 14.02-3. Section 14AA.4.2, which addresses this RAI, is attached.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

Procedure changes that change the intent of the procedure receive the same level of review and approval as the original procedure. Review and approval requirements for procedure changes that do not change the intent are established in administrative procedures in the SAM. Timely notification of the NRC is made when procedures are changed that have been sent to the NRC.

14AA.4 Conduct of the Initial Test Program

14AA.4.1 Administrative Controls

ITP conduct is described in DCD Section 14.2.2.3. The SAM governs the ITP and will be issued no later than 60 days prior to the beginning of the pre-operational phase. Testing during all phases of the test program is conducted using approved test procedures.

14AA.4.2 Procedure Verification

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 engineer is responsible for ensuring:

- Drawing and document revision numbers listed in the reference section of the test procedure agree with the latest revisions.
- 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.
- Any new Operating Experience lessons learned (since preparation of the procedure) are incorporated into individual test procedures.

Procedures require signoff of verification for prerequisites and instruction steps. This signoff includes identification of the person doing the signoff and the date and time of completion.

Test engineers maintain chronological logs of test status to facilitate turnover and aid in maintaining operational configuration control. These logs become part of the test documentation.

There is a documented turnover process to ensure that test status and equipment configuration are known when personnel transfer responsibilities, such as during a shift change.

Test briefings are conducted for each test in accordance with administrative procedures. When a shift change occurs before test completion, another briefing occurs before resumption or continuation of the test.

Data collected is marked or identified with test, date, and person collecting data. This data becomes part of the test documentation.

The plant corrective action program is used to document all deficiencies, discrepancies, exceptions, nonconformances and failures (collectively known as test exceptions) identified in the ITP. The corrective action documentation becomes part of the test documentation. GEH and/or other design organizations participate in the resolution of design-related problems that result in, or contribute to, a failure to meet test acceptance criteria.

The plant manager approves proceeding from one test phase to the next during the ITP. Approvals are documented in an overall ITP governance document.

Administrative procedures detail the test documentation review and approval. Review and approval of test documentation includes the test engineer, testing supervisor, Startup Group manager, GEH site representative or appropriate vendor, and JTG or IRB. Final approval is by the plant manager.

Plant readiness reviews are conducted to assure that the plant staff and equipment are ready to proceed to the next test phase or plateau.

14AA.4.3 **Work Control**

The Startup Group is responsible for preparing work requests when Construction organization assistance is required. Work requests are issued in accordance with a site-specific procedure governing the work management process. The plant staff, upon identifying a need for Construction organization assistance, coordinates their requirements through the appropriate Startup Test Engineer.

Activities requiring Construction organization work efforts are performed under the plant tagging procedures. Tagging requests are governed by a site-specific procedure for equipment clearance. 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.