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Subject: **Transmittal of NEDO-33181 Revision 6, NEDO-33260 Revision 5, and NEDO-33289 Revision 2, Related to ESBWR Design Certification Application – Chapter 17**

The purpose of this letter is to formally submit the following documents referenced by ESBWR DCD Revision 6, Chapter 17, Quality Assurance (Ref. 1).

Enclosure 1 contains GE Hitachi Nuclear Energy, "NP-2010 COL Demonstration Project Quality Assurance Plan," NEDO-33181, Revision 6, August 2009.

Enclosure 2 contains GE Hitachi Nuclear Energy, "Quality Assurance Requirements for Suppliers of Equipment and Services to the GEH ESBWR Project," NEDO-33260, Revision 5, April 2008.

Enclosure 3 contains GE Energy Nuclear, "ESBWR Reliability Assurance Program," NEDO-33289, Revision 2, September 2008.

If you have any questions about the information provided, please contact me.

Sincerely,

Richard E. Kingston  
Vice President, ESBWR Licensing

Reference:

1. MFN 09-572, ESBWR Standard Plant Design Certification Application Design Control Document, Revision 6, Tier 1 and Tier 2, dated August 31, 2009

Enclosures:

1. GE Hitachi Nuclear Energy, "NP-2010 COL Demonstration Project Quality Assurance Plan," NEDO-33181, Revision 6, August 2009.
2. GE Hitachi Nuclear Energy, "Quality Assurance Requirements for Suppliers of Equipment and Services to the GEH ESBWR Project," NEDO-33260, Revision 5, April 2008.
3. GE Energy Nuclear, "ESBWR Reliability Assurance Program," NEDO-33289, Revision 2, September 2008.

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**Enclosure 1**

**MFN 10-007**

**GE Hitachi Nuclear Energy, “NP-2010 COL  
Demonstration Project Quality Assurance Plan,”  
NEDO-33181, Revision 6, August 2009.**



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## **GE Hitachi Nuclear Energy**

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NEDO-33181  
Revision 6  
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# **NP-2010 COL DEMONSTRATION PROJECT QUALITY ASSURANCE PROGRAM**

Prepared for:

U.S. Department of Energy  
Cooperative Agreement: DE-FC07-07ID14778

Dominion Nuclear North Anna, LLC  
Cooperative Agreement: DE-FC07-05ID14635

Approved by:

M. Harvey  
Manager, Nuclear Plant Projects Quality

## **IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT**

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### **Acknowledgement**

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## **Statement of Policy and Authority**

It is the policy of the GE Hitachi Nuclear Energy (GEH) / ESBWR Project to achieve and maintain high quality in products and services through timely and effective compliance with all quality requirements.

All managers within GEH and the ESBWR Project with quality related responsibilities have full authority to implement this QA Program within their respective areas of responsibility. Consistent with the contractual work scopes, which impose QA requirements, it is mandatory that all personnel comply with the policies, instructions, and procedures referenced in this document.

The implementation of this Quality Assurance Program has the unqualified endorsement and support of GEH management.



## Introduction

This document describes the NP-2010 COL Demonstration Project Quality Assurance Program, which GE Hitachi Nuclear Energy (GEH), as supplier for ESBWR engineering services, will implement in fulfilling the contractual requirements within the scope of Cooperative Agreements:

DE-FC07-07ID14778                      U.S. Department of Energy

DE-FC07-05ID14635                      Dominion Nuclear North Anna, LLC

The NP-2010 COL Demonstration Project Quality Assurance Program is based on NEDO-11209-04A, GE Nuclear Energy Quality Assurance Program Description (Reference 1) and NEDO-32280, the GE Nuclear Energy ISO-9001 Quality System Description (Reference 2). It will be implemented through GEH procedures.

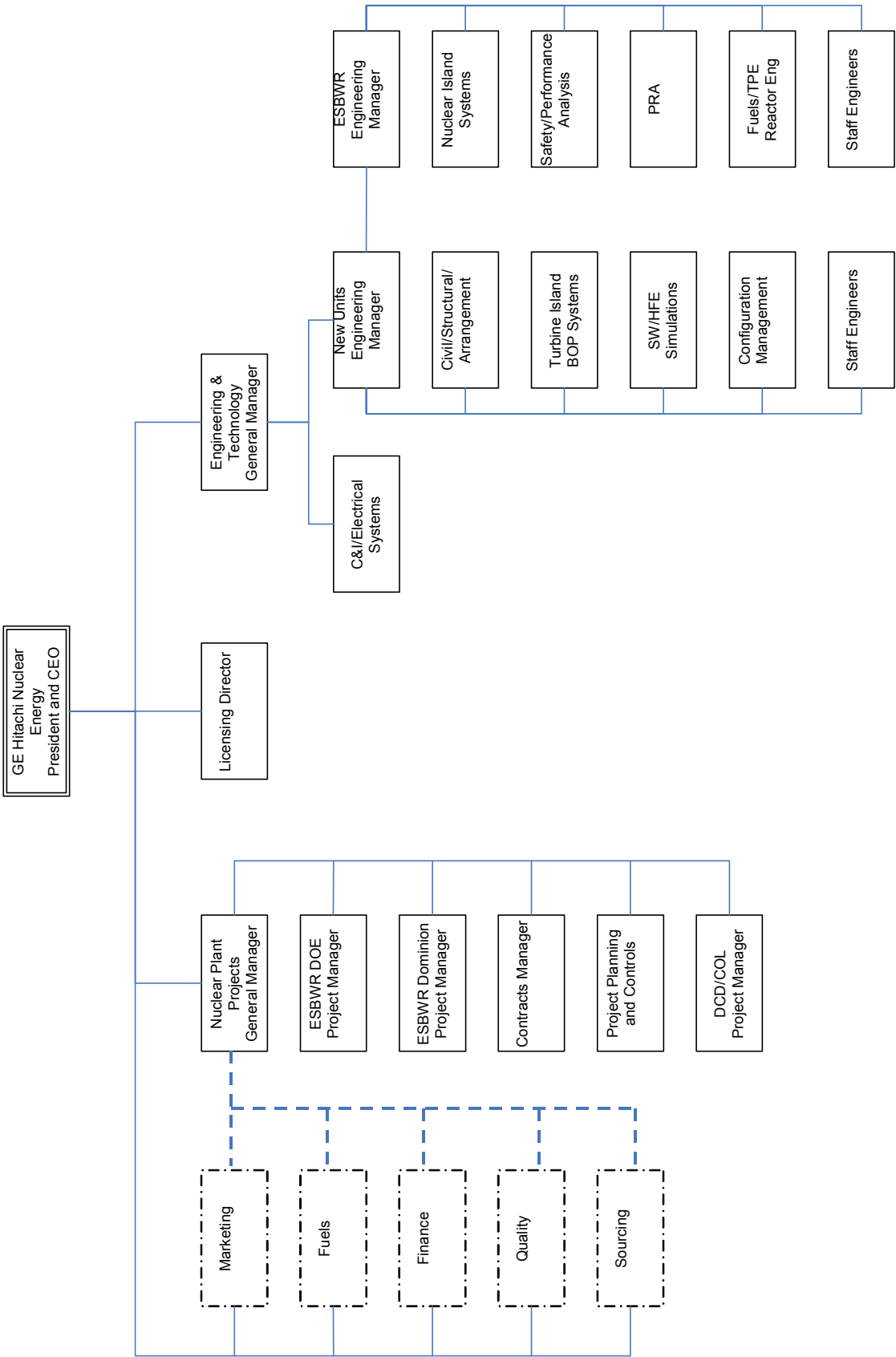
Program effectiveness will be evaluated by an annual performance based audit and supplemental Quality Assurance assessments, at the discretion of the NP-2010 COL Demonstration Project QA Manager.

## 1 Organization

Section 1 of Reference 1 and implementing procedures complies with Criterion I of 10 CFR 50, Appendix B, Section 4.1 of ISO 9001:2000 (applicable to Safety-Related Classification N only, see definitions of **Safety-Related Classification** in Section 2 of this document) and Quality Assurance requirements of the ESBWR Contract.

The GEH COL Demonstration Project Organization is shown in Figure 1.1.

Figure 1.1 – GEH COL Demonstration Project Organization



## 2 Quality Assurance Program

Section 2 of Reference 1 and implementing procedures complies with Criterion II of 10 CFR 50, Appendix B, Section 4.2 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

The GEH QA Program applies to Safety-Related (Class Q), Nonsafety-Related (Class N), and Special (Class S) items, as defined below. The standard GEH QA Program (Reference 1) is accepted by the NRC and is used on all GEH BWR nuclear power plant work. It is in full compliance with 10 CFR 50, Appendix B, ANSI/ASME N45.2, ANSI/ASME N45.2 series standards and applicable NRC Regulatory Guides.

ASME has accepted the implementation of GEH's QA program as meeting ASME quality requirements when it awarded GEH N-Certificate N-1888 in San Jose, NPT Certificate N-1151 in Wilmington and NA Certificate N-2510 in Wilmington.

Lloyd's Register Quality Assurance has accepted Reference 1 and the GEH Quality Management System Description, NEDO-32280 (Reference 2) as meeting the quality requirements of ISO 9001:2000 (Certificate No. 100503).

The standard GEH QA programs and their implementing procedures will continue to be revised as necessary to meet NRC, ASME and ISO requirements. The project requirements in the Quality Assurance Program are under configuration revision control.

The ESBWR Project uses the Safety-Related Classifications Q, N and S as defined below. This is a classification system used to identify structures, systems, components, parts and technical services. The definitions are as follows:

Safety-Related Classification Q (Safety-Related) – Safety-Related structures, systems, components, parts and technical services that provide safety-related functions necessary to assure:

- a. The integrity of the reactor coolant pressure boundary; or
- b. The capability to shut down the reactor and maintain it in a safe shutdown condition; or
- c. The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to 10CFR Part 50.34(a)(1) or 10CFR Part 100.11 guideline exposures, as applicable.

Safety-Related Classification N (Nonsafety-Related) – The classification of structures, systems, components, parts and technical services, which do not meet the definition of Safety-Related.

Safety-Related Classification S (Special) – The classification of structures, systems, components, parts, and technical services which do not meet the definition of Safety-Related, but are subject to special regulatory requirements (e.g., Seismic Category I equipment or a level of regulatory

imposed Quality Assurance) or Nonsafety-Related structures, systems, components, parts, and technical services, for which 10 CFR 50, Appendix B is not applicable, but are significant contributors to plant safety. Specific program controls applied to Safety-Related Classification S items are described in Section 24.

### **3 Design Control**

Section 3 of Reference 1 and implementing procedures complies with Criterion III of 10 CFR 50, Appendix B, Section 7.3 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

Computer software used to produce or manipulate data, which is used in ESBWR design and analysis, meets the Quality Assurance requirements of Subpart 2.7 of ASME NQA-1-1994.

The GEH ESBWR - Software Quality Assurance Program Manual, NEDE-33245P (Reference 3) describes the Software Quality Assurance activities to be performed during the software life cycle phases of the ESBWR Safety-Related Classification Q and Safety-Related Classification N digital computer-based I&C system.

### **4 Procurement and Installation Document Control**

Section 4 of Reference 1 and implementing procedures complies with Criterion IV of 10 CFR 50, Appendix B, Section 7.4 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

### **5 Instructions, Procedures and Drawings**

Section 5 of Reference 1 and implementing procedures complies with Criterion V of 10 CFR 50, Appendix B, Section 4.2 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

### **6 Document Control**

Section 6 of Reference 1 and implementing procedures complies with Criterion VI of 10 CFR 50, Appendix B, Section 4.2 of ISO-9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

### **7 Control of Purchased Items and Services**

Section 7 of Reference 1 and implementing procedures complies with Criterion VII of 10 CFR 50, Appendix B, Section 7.4 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## **8 Identification and Control of Items**

Section 8 of Reference 1 and implementing procedures complies with Criterion VIII of 10 CFR 50, Appendix B, Section 7.5 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## **9 Control of Special Processes**

Section 9 of Reference 1 and implementing procedures complies with Criterion IX of 10 CFR 50, Appendix B, Section 7.5 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## **10 Inspection**

Section 10 of Reference 1 and implementing procedures complies with Criterion X of 10 CFR 50, Appendix B, Section 7.4 and 8.2 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## **11 Test Control**

Section 11 of Reference 1 and implementing procedures complies with Criterion XI of 10 CFR 50, Appendix B, Section 7.4 and 8.2 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## **12 Control of Measuring and Test Equipment**

Section 12 of Reference 1 and implementing procedures complies with Criterion XII of 10 CFR 50, Appendix B, Section 7.5 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## **13 Handling, Storage, and Shipping**

Section 13 of Reference 1 and implementing procedures complies with Criterion XIII of 10 CFR 50, Appendix B, Section 7.5 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## **14 Inspection, Test, and Operating Status**

Section 14 of Reference 1 and implementing procedures complies with Criterion XIV of 10 CFR 50, Appendix B, Section 7.5.3 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## 15 Control of Nonconforming Items

Section 15 of Reference 1 and implementing procedures complies with Criterion XV of 10 CFR 50, Appendix B, Section 8.3 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## 16 Corrective Action

Section 16 of Reference 1 and implementing procedures complies with Criterion XVI of 10 CFR 50, Appendix B, Section 8.5.2 and 8.5.3 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## 17 Quality Assurance Records

Section 17 of Reference 1 and implementing procedures complies with Criterion XVII of 10 CFR 50, Appendix B, Section 4.2.4 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## 18 Audits

Section 18 of Reference 1 and implementing procedures complies with Criterion XVIII of 10 CFR 50, Appendix B, Section 8.2.2 and 8.2.3 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

## 19 Contract Review

Section 4.3 of Reference 2 and implementing procedures complies with Section 5.2 and 7.2.2 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

Procedures for contract and contract amendment review, and coordination of these activities are established and maintained as part of the GEH Quality Assurance Program. Each proposal, contract or order is reviewed to ensure that:

- a. The requirements are adequately defined and documented;
- b. Any requirements differing from the proposal, contract or order are resolved; and
- c. GEH has the capability to meet contractual or order requirements.

## 20 Control of Customer Supplied Product

Section 4.7 of Reference 2 and implementing procedures complies with Section 7.5.4 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

Customer supplied product shall be properly identified, maintained and stored through the use of established procedures, maintained as part of the GEH Quality Assurance Program.

## 21 Training

Section 4.18 of Reference 2 and implementing procedures complies with Section 6.2.2 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

Procedures for identifying the training needs are established and maintained as part of the GEH Quality Assurance Program. Training for personnel performing activities affecting quality is provided and appropriate records are kept in accordance with GEH procedures.

All GEH personnel on the ESBWR Team shall be indoctrinated and trained in the requirements of this Quality Assurance Program and implementing procedures. Records of this indoctrination and training shall be maintained in accordance with the applicable GEH procedures.

## 22 Servicing

Section 4.19 of Reference 2 and implementing procedures complies with Section 7.5.1 of ISO 9001:2000 (applicable to Safety-Related Classification N only). There is no requirement for servicing of the new plant design for the ESBWR Contract.

## 23 Statistical Techniques

Section 4.20 of Reference 2 and implementing procedures complies with Section 8.2 and 8.4 of ISO 9001:2000 (applicable to Safety-Related Classification N only) and the Quality Assurance requirements of the ESBWR Contract.

Where appropriate, the need for applying statistical techniques required for establishing, controlling and verifying process capability and product characteristics, shall be identified. Documented GEH procedures are established and maintained to implement and control the application of those statistical techniques required for problem solving, root cause determination and continuous improvement / process controls.

## 24 Safety-Related Classification S Controls

### 24.1 Nonsafety-Related SSC Quality Controls

Specific program controls are applied to Nonsafety-Related SSCs, for which 10 CFR 50, Appendix B is not applicable, that are significant contributors to plant safety. The following clarify the applicability of the QA Program to the nonsafety-related SSCs and related activities.



### 24.1.1 Organization

The verification activities described in this part may be performed by the GEH line organization.

### 24.1.2 QA Program

GEH QA requirements of Nonsafety-Related SSCs are contained in this document and appropriate procedures. Suppliers of these SSCs or related services describe the quality controls applied in appropriate procedures; a new or separate QA program is not required.

### 24.1.3 Design Control

GEH shall establish design control measures to ensure that the contractually established design requirements are included in the design. These measures ensure that applicable design inputs are included or correctly translated into the design documents, and deviations from those requirements are controlled. Design verification shall be performed in accordance with GEH internal QA program requirements.

### 24.1.4 Procurement Document Control

Procurement documents for items and services obtained by or for GEH shall include or reference documents describing applicable design bases, design requirements, and other requirements necessary to ensure component performance. The procurement documents are controlled to address deviations from the specified requirements.

### 24.1.5 Instructions, Procedures, and Drawings

GEH shall provide documents such as, but not limited to, written instructions, plant procedures, drawings, vendor technical manuals, and special instructions in work orders, to direct the performance of activities affecting quality. The method of instruction employed shall provide an appropriate degree of guidance to the personnel performing the activity to achieve acceptable functional performance of the SSC.

### 24.1.6 Document Control

GEH shall establish controls for the issuance and change of documents that specify quality requirements or prescribe activities affecting quality to ensure that correct documents are used. These controls include a review and approval of documents, identification of the appropriate revision for use, and measures to preclude the use of superseded or obsolete documents.

### 24.1.7 Control of Purchased Items and Services

GEH shall establish measures, such as inspection of items or documents upon receipt or acceptance testing, to ensure that all purchased items and services conform to appropriate procurement documents. Suppliers of these SSCs or

related services shall be qualified in accordance with GEH internal QA program requirements.

#### 24.1.8 Identification and Control of Purchased Items

GEH shall establish measures where necessary, to identify purchased items and preserve their functional performance capability. Storage controls take into account appropriate environmental, maintenance, or shelf life restrictions for the items.

#### 24.1.9 Control of Special Processes

GEH shall establish process and procedure controls for special processes, including welding, heat treating, and nondestructive testing. These controls are based on applicable codes, standards, specifications, criteria, or other special requirements for the special process.

#### 24.1.10 Inspection

GEH shall establish documented instructions to ensure necessary inspections are performed to verify conformance of an item or activity to specified requirements or to verify that activities are satisfactorily accomplished. These inspections may be performed by personnel in the line organization through the GEH independent verification (IV) / simultaneous verification (SV) process that utilizes knowledgeable personnel to perform the verification function.

#### 24.1.11 Test Control

GEH shall establish measures to identify required testing that demonstrates that equipment conforms to design requirements. These tests are performed in accordance with test instructions or procedures. The test results are recorded, and authorized individuals evaluate the results to ensure that test requirements are met.

#### 24.1.12 Control of Measuring and Test Equipment (M&TE)

GEH shall establish measures to control M&TE use, and calibration and adjustment at specific intervals or prior to use.

#### 24.1.13 Handling, Storage, and Shipping

GEH shall establish measures to control the handling, storage, cleaning, packaging, shipping, and preservation of items to prevent damage or loss and to minimize deterioration. These measures include appropriate marking or labels, and identification of any special storage or handling requirements.

#### 24.1.14 Inspection, Test, and Operating Status

GEH shall establish measures to identify items that have satisfactorily passed required tests and inspections and to indicate the status of inspections, test, and operability as appropriate.

#### 24.1.15 Control of Nonconforming Items

GEH shall establish measures to identify and control items that do not conform to specified requirements to prevent their inadvertent installation or use.

#### 24.1.16 Corrective Action

GEH shall establish measures to ensure that failures, malfunctions, deficiencies, deviations, defective components, and nonconformances are properly identified, reported, and corrected.

#### 24.1.17 Records

GEH shall establish measures to ensure records are prepared and maintained to furnish evidence that the above requirements for design, procurement, document control, inspection, and test activities have been met.

#### 24.1.18 Audits

GEH shall establish measures for line management to periodically review and document the adequacy of the process and take any necessary corrective action. Audits independent of line management are not required. Line management is responsible for determining whether reviews conducted by line management or audits conducted by any organization independent of line management are appropriate. If performed, audits are conducted and documented to verify compliance with design and procurement documents, instructions, procedures, drawings, and inspection and test activities.

### 24.2 Nonsafety-Related SSCs Credited for Regulated Events

The following criteria apply to fire protection (10 CFR 50.48), anticipated transients without scram (ATWS) (10 CFR 50.62), and the station blackout (SBO) (10 CFR 50.63) SSCs that are not safety-related.

GEH shall implement quality requirements to the fire protection system in accordance with Regulatory Position 1.7, "Quality Assurance," in Regulatory Guide 1.189, "Fire Protection for Operating Nuclear Power Plants."

GEH shall implement quality requirements to ATWS equipment in accordance with Generic Letter 85-06, "Quality Assurance Guidance for ATWS Equipment That Is Not Safety Related."

GEH shall implement quality requirements to SBO equipment in accordance with Regulatory Position 3.5, "Quality Assurance and Specific Guidance for SBO Equipment That Is Not Safety Related," and Appendix A, "Quality Assurance Guidance for Non-Safety Systems and Equipment," in Regulatory Guide 1.155, "Station Blackout."

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## 24.3 Other Quality Controls

Compliance to other Regulatory Guides and Standards and their respective revisions, including exceptions, alternatives and clarifications are addressed in the appropriate Design Control Document (DCD) sections and in DCD Table 17.0-1 (Reference 4).

## 25 References

1. NEDO-11209-04A, GE Nuclear Energy Quality Assurance Program Description.
2. NEDO-32280, GE Nuclear Energy ISO-9001 Quality System Description.
3. NEDE-33245P, ESBWR - Software Quality Assurance Program Manual.
4. 26A6642BW, ESBWR Design Control Document, Chapter 17 Quality Assurance.