HITACHI

GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

PO Box 780
Wilmington, NC 28402-0780, M/C A-65
USA

T 910 819-6192
F 910 362-6192
rick.kingston@ge.com

Proprietary Notice
This letter forwards proprietary information in accordance with 10CFR2.390. Upon the removal of Enclosure 2, the balance of this letter may be considered non-proprietary.

MFN 09-803

Docket No. 52-010

January 12, 2010

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to NRC Request for Additional Information Letter No. 403 Related to ESBWR Design Certification Application – RAI 7.1-142**

The purpose of this letter is to submit the GEH response to RAI 7.1-142 (Reference 1) for your review and use. This letter is to support NRC review of the GEH application for final design approval and standard design certification of the ESBWR standard plant design pursuant to 10 CFR Part 52.

Enclosure 2 contains proprietary information as defined in 10CFR2.390. The affidavit contained in Enclosure 4 identifies that the information contained in Enclosure 2 has been handled and classified as proprietary to GEH. A non-proprietary version is contained in Enclosure 3.

The affidavit contained in Enclosure 4 identifies that the information contained in Enclosure 2 has been handled and classified as proprietary to GEH. GEH hereby requests that the information of Enclosure 2 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17.

If you have any questions about the information provided here, please let me know.

D068
LIRO

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-796, Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, "Request for Additional Information Letter No. 403 Related to ESBWR Design Certification Application dated December 15, 2009."

Enclosures:

1. Response to NRC Request for Additional Information Letter No. 403 Related to ESBWR Design Certification Application - RAI Number 7.1-142

2. Response to NRC Request for Additional Information Letter No. 403 Related to ESBWR Design Certification Application –DCD and LTR Markups - GEH Proprietary Information

3. Response to NRC Request for Additional Information Letter No. 403 Related to ESBWR Design Certification Application – DCD and LTR Markups – Public Version

4. Affidavit – Larry J. Tucker

cc: AE Cubbage USNRC (with enclosures)
RE Brown GEH/Wilmington (with enclosures)
LJ Tucker GEH/Wilmington (with enclosures)
PM Yandow GEH/Wilmington (with enclosures)

EDRF Section 0000-0111-2789

Enclosure 1

MFN 09-803

Response to NRC Request for

Additional Information Letter No. 403

Related to ESBWR Design Certification Application

RAI Number 7.1-142

NRC RAI 7.1-142

The scope in the following references partially identifies that safety related software-based digital devices are included within the scope of one or more of these licensing topical reports (LTRs). However, the staff finds that as written it is not clear in the intent to include all safety related software-based digital devices. Per teleconference on 12/11/2009, the staff and GEH agreed that a statement to briefly describe in Section 7.1 of DCD Tier 2, Chapter 7, that the scope of the below listed LTRs include all safety related software-based digital devices in the ESBWR design was warranted.

Therefore, the staff requests GEH to add an appropriate statement in DCD Tier 2 Chapter 7 for clarification.

References:

ESBWR Man-Machine Interface System And Human Factors Engineering Implementation Plan LTR NEDE-33217P, Revision 5, Class III, DRF 0000-0048-2821, April 2009

ESBWR - Software Management Program Manual NEDE-33226P, Revision 4, Class III, DRF 0000-0051-3897, May 2009

ESBWR - Software Quality Assurance Program Manual LTR NEDE-33245P, Revision 4, Class III, DRF 0000-0049-7141, July 2009

ESBWR - Cyber Security Program Plan LTR NEDE-33295P, Revision 1, Class III, DRF 0000-0074-4841, July 2009

GEH Response

GEH agrees with the recommendation to clarify the definition of software-based digital devices and to clarify the scope of the listed LTRs to include all safety related software-based digital devices in the ESBWR standard plant design. The term "software-based digital devices" is synonymous with the term "digital computer-based plant process control and monitoring devices, equipment and systems."

Within DCD Section 7 – Instrumentation and Control Systems, the following clarifications were made for software-based digital devices:

- define "digital computer-based plant process control and monitoring devices, equipment and systems",
- identify what types of digital computer-based systems are not within the scope of the project software plans,
- identify what types of digital computer-based systems are within the scope of the project software plans (specifically safety related and RTNSS systems),

- include ESBWR Man-Machine Interface System And Human Factors Engineering Implementation Plan LTR in DCD Section 7B.3 REFERENCES for completeness.

Additionally, conforming changes were made to both the ESBWR - Software Management Program Manual LTR NEDE-33226P and ESBWR - Software Quality Assurance Program Manual LTR NEDE-33245P.

DCD Impact

DCD Tier 2, Sub-section 7B Software Development will be revised as noted in the attached markup.

ESBWR - Software Management Program Manual LTR NEDE-33226P Impact

LTR will be revised as noted in the attached markup.

ESBWR - Software Quality Assurance Program Manual LTR NEDE-33245P Impact

LTR will be revised as noted in the attached markup.

Enclosure 3

MFN 09-803

Response to NRC Request for

Additional Information Letter No. 403

Related to ESBWR Design Certification Application

DCD and LTR Markups

Public Version

7B. SOFTWARE DEVELOPMENT

7B.1 SOFTWARE DEVELOPMENT

The safety-related Distributed Control and Information Systems (Q-DCIS) comprise the platforms that are defined in Table 7B-1. The nonsafety-related Distributed Control and Information Systems (N-DCIS) comprise the network segments that are defined in Table 7B-2. These platforms and network segments comprise systems of integrated software and hardware elements. Software projects are developed for the various platforms and network segments.

A Software Project is defined as a programmatically and technically coherent scope for a collection, grouping or packaging of requirements that follow a structured development lifecycle to produce the desired deliverables. This structured software engineering process includes an overlapping phased execution approach. Each phase of the software development lifecycle is exited by means of a formal review activity to ensure adherence to the project requirements. The scope of a software project is also referred to as a software package. A software package is a collection of components, modules, sub-programs and data objects as well as applicable hardware and supporting documentation that are brought together to form a single application or solution for an instrument or collection of functions within a broader system. The objective is to ensure that the software package represents a completed, integrated set of deliverables that meet the system software requirements and the associated project requirements (e.g.; process compliance, configuration management, documentation, industry standards, regulatory).

[*Project software plans control the development of each platform and network segment using a software life cycle process. The ESBWR Software Management Program Manual (Reference 7B.3-1) and ESBWR Software Quality Assurance Program Manual (Reference 7B.3-2) provide the bases for developing project software plans and the software life cycle model that will control the software development process. The ESBWR Cyber Security Program Plan (reference 7B.3-3) provides the bases for the project Cyber Security Programs. These software plans and programs comprise the data that define the platform and network segment design processes.*

A software life cycle phase baseline review process regulates the passage of the platform and network segment design from one software life cycle phase to the next. A software life cycle phase baseline review record comprises a software life cycle phase requirements traceability analysis report, a software life cycle phase software safety analysis report, a software life cycle phase verification and validation report, a software life cycle phase cyber security assessment report, a software life cycle configuration management assessment, and a software life cycle phase baseline review team report. Baseline review records exist at the end of each software life cycle phase and conclude that the design process has been followed and that the design elements are adequate to pass through to the next software life cycle phase. The summary baseline review record provides assurance that the project software plans are implemented and producing adequate results at the end of each software life cycle phase. The platform and network segment baseline review record documentation will support closure of ITAAC including Design Acceptance Criteria ITAAC.

A multiple-phase test process, using a series of overlapping tests, confirms that the as-built platform and network segment perform as designed. The Factory Acceptance Test confirms that each part of a platform and network segment performs as designed. The Site Acceptance Test

confirms that the platforms and network segments are capable of operating as shown in the Factory Acceptance Test and operate as designed as an integrated ESBWR instrumentation and control system]*

In support of the above described software development process, the following software design commitments are made:

(1) The platform software plans, network segment software plans, and cyber security programs for each platform software project and network segment software project are developed in accordance with the following design acceptance criteria shown for each software development software life cycle phase plan and cyber security program:

a. Software Management Plan (SMP):

- [*Establish project management activities, which include but are not limited to the following activities:*
  - *Project planning and scheduling*
  - *Project monitoring and control*
  - *Project execution*
  - *Post delivery and closeout*
- *Define the organization and responsibilities of individuals or groups involved in the various design and V&V activities*
- *Define risk management process*
- *Establish the methods and tools for project management*
- *Define financial (budget) responsibilities and controls*
- *Define security (including cyber security) requirements*
- *Define training requirements and qualification of project personnel*]*

b. Software Development Plan (SDP)

- [*Describes the plan for technical project development of the I&C software which performs the monitoring, control, and protection functions for all modes of plant operation*
- *Describes the software development process for each phase of the software product's software life cycle process, i.e., Planning, Requirements, Design, Implementation, Test, Installation, Operations & Maintenance, and Retirement*
- *Establishes the standards, methods, tools, and procedures for the software design and development process*
- *Defines the activities performed for each phase of the software development*
- *Defines how requirements are traced to lower levels of the software life cycle phases from planning phase to test phase*

- *Specifies how the safety-related requirements are documented, evaluated, reviewed, verified, and tested during the design process to minimize unknown, unreliable, and abnormal conditions*
- *Describes the organization and responsibilities of individuals or groups involved in the various V&V and review activities*
- *Addresses metrics that include error tracking, cyber security tracking, and resolution*]*

c. Software Integration Plan

- [*Describes the process for integrating the various software modules together to form single programs*
- *Describes the process for integrating the software module integration result with the hardware and instrumentation*
- *Describes the process for validating the resulting integrated product*
- *Describes the organization and responsibilities of individuals or groups involved in the test activities*
- *Describes software test management (e.g., scheduling, resource planning, security, risks and contingency planning, anomaly, problem reporting, and training needs)*
- *Describes the methods for software testing*
- *Provides the requirements and guidelines necessary to prepare, execute, and document software tests*
- *Defines required software test documentation*
- *Defines measurements and metrics for error tracking and resolution, and assesses the success or failure of the software integration and software test effort*]*

d. Software Installation Plan (SIP)

- [*Describes the software installation process and activities performed during the installation phase*
- *Defines the installation phase activities*
- *Describes the installation procedures*
- *Describes the software installation management. This includes, but is not limited to, scheduling, resource planning, security, risks and contingency planning, anomaly and problem reporting, and training needs*
- *Provides the requirements and guidelines necessary to prepare, execute, and document software installation*]*

e. Software Operation and Maintenance Plan

- [*Defines requirements, methods, and considerations for problem reporting, disposition of change request, backup media maintenance and disaster recovery operations during the Operation and Maintenance Phase*

- *Addresses the activities required to support the licensee during the Operation and Maintenance phase*]*

f. Software Training Plan

- [*Describes the software training activities to be carried out before and during the operation of software products for the plant*
- *Addresses management, implementation and resource characteristics*
- *Defines the requirements and methods used to develop the training program and manual*
- *Defines the training needs of appropriate plant staff, including operators, I&C engineers, and technicians*
- *Defines a general description of the training facilities*
- *Defines the organization supporting the training effort including interfaces and responsibilities*]*

g. Software Quality Assurance Plan (SQAP)

- [*Defines the management organization, techniques, procedures, and methodologies used to assure the delivery of software meets specified requirements*
- *Assures that software development, evaluation, and acceptance standards are implemented, documented, and followed*
- *Assures that the results of software quality reviews and audits will be given to appropriate management within the scope of the SQAPM*
- *Assures that test results adhere to acceptance standards*]*

h. Software Safety Plan (SSP)

- [*Establishes the processes and activities to ensure that the safety concerns of the software products are properly considered during the software development*
- *Describes the roles and responsibilities of the Software Safety Team*
- *Describes the Software Safety Analysis process*
- *Ensures that all system safety-critical requirements have been satisfied by the software life cycle phases*
- *Ensures that additional hazards have not been introduced by the work done during the software life cycle activity*]*

i. Software Verification & Validation Plan (SVVP)

- [*Establishes the V&V tasks for the software designed and developed for software products*
- *Ensures that the developed software meets its specified requirements, performs its intended functions correctly, and does not perform any unintended function*

- *Ensures that the final software product meets the contract requirements, required industry and regulatory standards, and licensing commitments*
- *Ensures that the final software product is correct, complete, accurate, and traceable to requirements specified in the design documents and outputs*]*

j. Software Configuration Management Plan (SCMP)

- [*Establishes the Software Configuration Management activities during the design and development of the software products*
- *Describes the individual with the overall responsibility and authority for the software configuration management and organizations responsible for supporting the software configuration management activities*
- *Defines the software configuration management tasks, including methods, timing, and responsibility for the implementation of design control and design change control*
- *Identifies the tools, procedures, and individuals needed to execute or support each software configuration management task*
- *Identifies the software configuration management required schedule and coordination with the design activities and the Quality tasks described in the SQAPM*]*

k. Software Test Plan (STP)

- [*Prescribes the scope, approach, resources, and schedule of the testing activities associated with the software development process*
- *Identifies the items being tested, the features to be tested, the testing tasks to be performed, the personnel responsible for each task, and the risks associated with this plan*
- *Defines the purpose, format and content for each test document*]*

l. Cyber Security Program

- [*Provides guidance for developing the ESBWR Cyber Security Program Plan for critical digital assets*
- *Provides a framework for managing a cyber security program that includes description of roles and responsibilities, development of policies and procedures, development of cyber security defensive model, evaluation of third party networks, development of a training and awareness program, development of contingency and disaster recovery plans, performance of periodic threat and vulnerability reviews, and preparation of the cyber security assessment report*
- *Provides specific guidance for the implementation of cyber security requirements throughout the life cycle phases of software development*
- *Addresses cyber security quality assurance requirements*
- *Provides requirements for an incident response and recovery plan*]*

(2) Implementation of the software projects for each platform and network segment in accordance with the approved software plans ensures that adequate software products are produced at the conclusion of each software life cycle phase baseline as documented by the following software life cycle phase Summary Baseline Review Records.

a. [*Planning Phase Summary baseline review records are produced for each hardware and software platform or network segment in accordance with the criteria described in the SMPM, Section 5.6.5 (Reference 7B.3-1)*

b. *Requirements Phase Summary baseline review records are produced for each hardware and software platform or network segment in accordance with the criteria described in the SMPM, Section 5.7.12 (Reference 7B.3-1)*

c. *Design Phase Summary baseline review records are produced for each hardware and software platform or network segment in accordance with the criteria described in the SMPM, Section 5.8.3.13 (Reference 7B.3-1)*

d. *Implementation Phase Summary baseline review records are produced for each hardware and software platform or network segment in accordance with the criteria described in the SMPM, Section 5.9.3.10 (Reference 7B.3-1)*

e. *Test Phase Summary baseline review records are produced for each hardware and software platform or network segment in accordance with the criteria described in the SMPM, Section 5.10.9 (Reference 7B.3-1)*]*

(3) A multiple-phase test process performed as part of the installation phase will be used to confirm that each as-built platform or network segment performs in accordance with its defined criteria.

[*Installation Phase Summary baseline review records are produced for each software project in accordance with the criteria described in the SMPM, Subsection 5.11.10 (Reference 7B.3-1). The Installation Phase baseline review will assess:*

- *The results summary report for the Factory Acceptance Test to ensure the Factory Acceptance Test was performed in accordance with the criteria described in the SQAPM, Sections 7.4 and 7.5 (Reference 7B.3-2), and confirms that each part of the as-built software project performs as designed. The Factory Acceptance Test is documented in two parts in accordance with the SQAPM, Section 7.7 (Reference 7B.3-2), such that, a Factory Acceptance Test and a cyber security Factory Acceptance Test will be performed on each platform or network segment.*

- *The Site Acceptance Test and will confirm, using overlapping tests during Site Acceptance Test, that the as-built platforms or network segments, when integrated, are capable of operating as designed as a complete ESBWR instrumentation and control system with sensors and actuators.*]*

Text sections that are bracketed and italicized with an asterisk following the brackets are designated as Tier 2. Prior NRC approval is required to change.

Digital computer-based plant process control and monitoring systems, components, devices, and equipment are those which contain software (including firmware). Plant process control and monitoring software is defined as:

- Software (including firmware) that controls, monitors, interfaces, or communicates with real time operating digital computer-based plant process control and monitoring devices, equipment and systems located within a nuclear power plant. This also includes the software within any other digital equipment of a nuclear power plant, the changes to which after release would constitute a design change.

Other digital computer-based systems that are not plant process control and monitoring systems, components, devices and equipment may contain software (including firmware) but are not within the scope of the software plans. These are:

- Software (including firmware) within plant security equipment (e.g., perimeter intrusion detection processors, CCTV processors, security access computer and intelligent multiplexers, hand geometry and card reader processors, infra-red detection processors, etc.) subject to the requirements of 10 CFR 73.55.
- Communications software (including firmware) such as telephone private and branch exchange switches as well as microprocessor-based public address software.
- Software (including firmware) that is not within the scope of the certified design includes but is not limited to; Health Physics radiological monitoring and access control software, Chemistry laboratory equipment and radiological effluents tracking software, Emergency Planning software for dose assessment or other accident response functions, etc.

The scope of the project software plans listed in Section 7B.3 REFERENCES includes plant process control and monitoring software that is within the scope of the certified design. In particular, the scope of the project software plans includes all plant process control and monitoring software that is safety related or that is designated as RTNSS.

7B.2 TREATMENT OF SYSTEMS DESIGNATED AS RTNSS

Table 19A-2 defines the structures, systems, and components (SSC) that perform significant safety, special event, or post-accident recovery functions that will be subject to additional regulatory oversight under the RTNSS program. The N-DCIS network segment SSC that perform these RTNSS functions are identified Table 7B-2. RTNSS SSC are subject to Maintenance Rule (10 CFR 50.65), the Availability Control Manual (ACM; Chapter 19, Appendix ACM), and verification by the inspections, tests, analyses, and acceptance criteria (ITAAC) in Tier 1. RTNSS SSC follow existing design processes. Thus, the software development process does not distinguish between RTNSS and non-RTNSS SSC. RTNSS SSC are developed using the software classification assigned to the network segment. The SQAPM (reference 7B.3-2) describes software classification.

7B.3 REFERENCES

7B.3-1 [*GE Hitachi Nuclear Energy, "ESBWR – Software Management Program Manual," NEDE-33226P, Class III (Proprietary), Revision 4, May 2009, and NEDO-33226, Class I (Non-proprietary), Revision 4, May 2009.*]*

7B.3-2 [*GE Hitachi Nuclear Energy, "ESBWR – Software Quality Assurance Program Manual," NEDE-33245P, Class III (Proprietary), Revision 4, July 2009, and NEDO-33245, Class I (Non-proprietary), Revision 4, July 2009.*]*

7B.3-3 [*GE-Hitachi Nuclear Energy, "ESBWR Cyber Security Program Plan," NEDE-33295P, Class III (Proprietary), Revision 1, July 2009, and NEDO-33295, Class I (Non-proprietary), Revision 1, July 2009.*]*

7B.3-4 [*GE-Hitachi Nuclear Energy, "ESBWR Man-Machine Interface System And Human Factors Engineering Implementation Plan," NEDE-33217P, Revision 5, Class III, April 2009, and NEDO-33217, Revision 5, Class I, April 2009.*]*

References that are bracketed and italicized with an asterisk following the brackets are designated as Tier 2. Prior NRC approval is required to change.

Table 7B-1

Q-DCIS Platforms

Platform	Software Project
Reactor Trip & Isolation System Function Neutron Monitoring System (RTIF-NMS)	RTIF
	NMS
Safety System Logic & Control / Engineered Safety Features (SSLC/ESF) Platform	SSLC/ESF
Independent Control Platform (ICP)	VBIF
	ATWS/SLC
	HP CRD Isolation Bypass Function

Table 7B-2

N-DCIS Network Segments†

GENE (DPS)
PIP A and PIP B
BOP
PCF

†Network segments are described in Subsection 7.1.4.8. RTNSS components of the network segments are identified in parentheses.

Table 7B-3

(Deleted)

Table 7B-4

(Deleted)

Table 7B-5

(Deleted)

Table 7B-6

(Deleted)

Table 7B-7

(Deleted)

Table 7B-8

(Deleted)

HITACHI

GE Hitachi Nuclear Energy

NEDO-33226
Revision 45
Class I
DRF 0000-0051-3897
~~May~~ December 2009

Licensing Topical Report

ESBWR – SOFTWARE MANAGEMENT PROGRAM MANUAL

Copyright 2006, 2009 GE-Hitachi Nuclear Energy Americas LLC

All Rights Reserved

Summary of Changes From previous revision

Item	Location	Change
1	Appendix C, Definitions	Added definition for "Plant Process Control and Monitoring Software" to incorporate changes per RAI 7.1-142.
2	Sub-section 1.1, 1st para.	Deleted "the Digital Computer Based Instrumentation and Controls (I&C) Software" and replaced with "for digital computer-based plant process control and monitoring software" to incorporate changes per RAI 7.1-142.
3	Sub-section 1.2, 1st para.	Added "digital computer-based plant process control and monitoring software, including" to incorporate changes per RAI 7.1-142.
4	Sub-section 1.2, Last para.	Added two phrases; "digital computer-based plant process control and monitoring software. This includes" and "It also includes non-DCIS real time plant systems such as but not limited to local fire protection systems, local programmable logic controllers (PLCs), digital standalone controllers and indicators, inverters and battery chargers, electrical distribution digital protective relays, switchgear instrumentation and circuit breaker controllers, meteorological monitoring systems, digital hygrometers, digital salinity cells, digital pH meters, digital conductivity cells, digital dissolved gas monitors, digital area explosive gas monitors, etc." to incorporate changes per RAI 7.1-142.
5	Sub-section 2.3, 2nd List, GE Hitachi Nuclear Energy Procedures and Policies, Reference Number, 3.k	Added reference "Commercial Grade Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in Accordance with EPRI-TR-106439-1996" to incorporate changes per RAI 7.1-142.
6	Sub-section 2.3, 2nd List, GE Hitachi Nuclear Energy Procedures and Policies, Reference Number, 3.l	Added reference "Qualification of Previously Developed Software" to incorporate changes per RAI 7.1-142.

Item	Location	Change
7	Sub-section 3.1, 1st para.	Added "digital computer-based plant process control and monitoring software, including" to incorporate changes per RAI 7.1-142.
8	Sub-section 5.8.3.5, 1st para.	Added "in accordance with Qualification of Previously Developed Software [2.3(3.l)]" and "for safety-related applications" to incorporate changes per RAI 7.1-142.
89	Sub-section 5.8.3.5, 2nd para.	Added new paragraph: "Applicable portions of Qualification of Previously Developed Software [2.3(3.l)} may be used to evaluate the PDS for applicability in nonsafety-related applications.
910	Sub-section 5.8.3.6, 2nd para.	Added "in accordance with Commercial Grade Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in accordance with EPRI-TR-106439-1996 [2.3(3.k)]" to incorporate changes per RAI 7.1-142.
911	Sub-section 5.8.3.6, 3rd para.	Added new paragraph to state: "Applicable portions of Commercial Grade Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in accordance with EPRI-TR-106439-1996 may be used for guidance in testing or qualifying commercial off the shelf software designated for use in nonsafety-related applications."

1. INTRODUCTION

1.1 OVERVIEW

The Software Management Program Manual (SMPM) governs the design and development activities for ~~the Digital Computer-Based Instrumentation and Controls (I&C) Software~~digital computer-based plant process control and monitoring software. Key planning documents for the I&C design team are contained in this manual.

1.2 PURPOSE AND SCOPE

The purpose of the SMPM is to establish the processes and the technical direction for the planning, design, development and management activities of digital computer-based plant process control and monitoring software, including the Digital Computer-Based I&C Software within the scope of the Man-Machine Interface (MMI) System and Human Factor Engineering (HFE) Implementation Plan (MMIS/HFE IP) [2.1].

The scope of the SMPM includes software products with Software Class Q, N3, and N2 (See Appendix C for definitions). Nonsafety-related systems are referenced as Software Class N.

The software plans, identified in the MMIS/HFE IP [2.1], and included in the SMPM are:

1. Software Management Plan (SMP) [Section 3.0]
2. Software Development Plan (SDP) [Section 5.0]
3. Software Integration Plan (SIntP) [Section 6.0]
4. Software Installation Plan (SIP) [Section 7.0]
5. Software Operation and Maintenance Plan (SOMP) [Section 8.0]
6. Software Training Plan (STrngP) [Section 9.0]

The Software Quality Assurance Program Manual (SQAPM) [2.3(1.a)] includes the software plans used by Quality Assurance (QA) and the Software Project Engineering (SPE) organizations. The SQAPM governs the same I&C software scope identified in the MMIS/HFE IP [2.1]. The software plans included in the SQAPM are:

1. Software Quality Assurance Plan (SQAP)
2. Software Safety Plan (SSP)
3. Software Verification & Validation Plan (SVVP)
4. Software Configuration Management Plan (SCMP)
5. Software Test Plan (STP)

Together, the SMPM and the SQAPM include the software plans identified in MMIS/HFE IP [2.1] and conform to the guidance provided by NUREG-0800, Standard Review Plan [2.2.1].

The SMPM shall be in force during all phases of the software life cycle process.

The applicable Software Products (software and firmware) covered in the SMPM encompass

digital computer-based plant process control and monitoring software. This includes the I&C systems, as specifically defined in the MMIS/HFE IP [2.1] (Subsection 1.2.4 only), perform the monitoring, control, alarming, and protection functions associated with all modes of plant normal operation (i.e., startup, shutdown, standby, power operation, and refueling) as well as off-normal, emergency, and accident conditions. It also includes non-DCIS real time plant systems such as but not limited to local fire protection systems, local programmable logic controllers (PLCs), digital standalone controllers and indicators, inverters and battery chargers, electrical distribution digital protective relays, switchgear instrumentation and circuit breaker controllers, meteorological monitoring systems, digital hygrometers, digital salinity cells, digital pH meters, digital conductivity cells, digital dissolved gas monitors, digital area explosive gas monitors, etc.

1.3 ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

Acronyms and abbreviations are defined in Appendix B. Definitions for terms used in the SMPM are supplied in Appendix C.

GE Hitachi Nuclear Energy Procedures and Policies		
Reference Number	**Document Title**	**Abstract**
3.f	Nuclear Energy Quality Assurance Audit Requirements	Establishes the requirements and processes for a comprehensive audit program to verify the implementation and effectiveness of the GEH Quality System. The audit program requirements apply to hardware, software and service products and to all personnel who perform quality-related activities on them.
3.g	Reporting of Defects and Noncompliance Under 10CFR Part 21	Defines the requirements and responsibilities within GEH for ensuring compliance with the requirements of Part 21 of Title 10 of the Code of Federal Regulations, i.e., 10CFR21, "Reporting of Defects and Noncompliance".
3.h	Hazardous Business Risk and Safety in GEH Services and Products	Establishes the organizational responsibilities and systems within GEH to ensure that services and products are evaluated and controlled for hazardous business risks, safety, and environmental effects
3.i	Hazardous Business Risk Evaluations and Control	Defines the responsibilities and practices for evaluation of new GEH activities (products, services, projects, or processes) or changes to existing activities, review of proposed commercial applications, and implementation of risk mitigation and controls.
3.j	Nuclear Customer Issue Resolution – Nuclear CIR Tool	Nuclear CIR Tool is a customer issue resolution process and tool that is used to identify, track and respond to any customer questions, complaints, actions, or issues unless it relates to matter that is adverse to quality (requiring a corrective/preventive action) hence which is formally tracked in another system.
3.k	Commercial Grade Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in Accordance with EPRI-TR-106439-1996	Establishes requirements and responsibilities for dedicating commercial off the shelf software designated for use in safety-related applications.

GE Hitachi Nuclear Energy Procedures and Policies		
Reference Number	**Document Title**	**Abstract**
3.1	Qualification of Previously Developed Software	Implements process for certifying the qualification of Previously Developed Software

Reference Number	Document
4.	Electric Power Research Institute (EPRI), "Guidelines on Evaluation and Acceptance of Commercial Grade Digital Equipment in Nuclear Safety Applications," EPRI TR-106439

2.4 ADDITIONAL IEEE STANDARD GUIDANCE

The following IEEE Standards provide additional guidance for the implementation activities. Conformance of the SMPM to these activities has been evaluated. Selected sections/topics from these IEEE Standards are excluded from commitment because they either provide conflicting requirements with other Standards or the level of detail is not appropriate for the SMPM. Clarifications and justifications for such exclusions are provided in Appendix A.

- IEEE-730-2002 - IEEE Standard for Software Quality Assurance Plans
- IEEE-610.12-1990 - IEEE Standard Glossary of Software Engineering Terminology
- IEEE-1016-1998 - IEEE Recommended Practice for Software Design Descriptions
- IEEE-1058.1-1987 - IEEE Standard for Software Project Management Plans
- IEEE 1219-1998 - IEEE Standard for Software Maintenance
- IEEE 1228-1994 - IEEE Standard for Software Safety Plans
- IEEE 12207-1996 - IEEE/EIA Standard for Software Life Cycle Processes

2.5 INTERNATIONAL STANDARDS

- ISO 9001:2000, Quality Management Systems-Requirements

3. SOFTWARE MANAGEMENT PLAN

3.1 PURPOSE AND SCOPE

The Software Management Plan (SMP) establishes the managerial process for the design and development activities of digital computer-based plant process control and monitoring software, including the Digital Computer-Based I&C Software within the scope of the MMIS/HFE IP [2.1]. The purposes of the SMP are to:

- Establish project management activities, which include but are not limited to the following activities:
  - Project planning and scheduling
  - Project monitoring and control
  - Project execution
  - Post delivery and closeout
- Define the organization and responsibilities of individuals or groups involved in the various design and V&V activities
- Define risks management process
- Establish the methods and tools for project management
- Define financial (budget) responsibilities and controls
- Define security (including cyber security) requirements
- Define training requirements and qualification of project personnel

3.2 ORGANIZATION

The organization addresses software management control and ensures that independence is maintained between the design organization and the quality assurance, software safety, and V&V organizations.

This section describes the following organization functions:

- I&C Design Engineering (I&C)
- Software Project Engineering (SPE)
- Configuration Management Manager (CMM)
- Software Quality Assurance (SQA) Manager
- Project Management Team (PMT), i.e. Project Control
- Training

3.2.1 I&C Design Engineering

The I&C software development organization comprises the GEH I&C Design Engineering, representation from Cyber Security organization and the GEH and non-GEH software products vendor organization. The GEH I&C Design Engineering (I&C) Organization comprises the I&C

-
-]]

5.8.3.4 Software Support Tool Documentation Package

The Software developer shall evaluate the use of software tools in the new design and document their intended use to ensure they are consistent with the SRS and SDD.

5.8.3.5 Application of Previously Developed Software

[[

-
-
-
-
-
-
-
-
-

-
-

]]

5.8.3.6 Commercial Off-The-Shelf Software

[[

-
-
-

Term	Definition
Plant Process Control and Monitoring Software	Software (including firmware) that controls, monitors, interfaces, or communicates with real time operating digital computer-based plant process control and monitoring devices, equipment and systems located within a nuclear power plant. This includes the software within any other digital equipment of a nuclear power plant, the changes to which after release would constitute a design change. Other digital computer-based systems that are not plant process control and monitoring systems, components, devices and equipment may contain software (including firmware) but are not within the scope of the software plans. These are: • Software (including firmware) within plant security equipment (e.g., perimeter intrusion detection processors, CCTV processors, security access computer and intelligent multiplexers, hand geometry and card reader processors, infra-red detection processors, etc.) subject to the requirements of 10 CFR 73.55. • Communications software (including firmware) such as telephone private and branch exchange switches as well as microprocessor-based public address software. • Software (including firmware) that is not within the scope of the certified design includes but is not limited to; Health Physics radiological monitoring and access control software, Chemistry laboratory equipment and radiological effluents tracking software, Emergency Planning software for dose assessment or other accident response functions, etc.
Procedure	A course of action to be taken to perform a given task [IEEE 610.12].
Process	A sequence of steps performed for a given purpose, e.g., the software development process [IEEE 610.12].
Project Management Plan	A document that describes the technical and management approach to be followed for a project. The plan typically describes the work to be done, the resources required, the methods to be used, the procedures to be followed, the schedules to be met, and the way that the project will be organized [IEEE 610.12].
Regression Testing	Selective re-testing of a system or component to verify that modifications have not caused unintended effects and that the system or component still complies with its specified requirements [IEEE 610.12].

HITACHI

GE Hitachi Nuclear Energy

NEDO-33245
Revision ~~4~~5
Class I
DRF 0000-0049-7141
~~July~~ December 2009

Licensing Topical Report

ESBWR – SOFTWARE QUALITY ASSURANCE PROGRAM MANUAL

Copyright 2006, 2009 GE-Hitachi Nuclear Energy Americas LLC

All Rights Reserved

SUMMARY OF CHANGES FROM PREVIOUS REVISION

ITEM	LOCATION	CHANGE
Entire Document		
1.	Entire document	Minor editorial changes for legibility.
Section 1		
2.	Sub-section 1.1, 1st para.	Deleted "I&C system" and replaced with "digital computer-based plant process control and monitoring software" to incorporate changes per RAI 7.1-142.
3.	Sub-section 1.2, Last para.	Added two phrases; "digital computer-based plant process control and monitoring software. This includes" and "It also includes non-DCIS real time plant systems such as but not limited to local fire protection systems, local programmable logic controllers (PLCs), digital standalone controllers and indicators, inverters and battery chargers, electrical distribution digital protective relays, switchgear instrumentation and circuit breaker controllers, meteorological monitoring systems, digital hygrometers, digital salinity cells, digital pH meters, digital conductivity cells, digital dissolved gas monitors, digital area explosive gas monitors, etc." to incorporate changes per RAI 7.1-142.
4.	Sub-section 1.5, 2nd to last para.	Deleted "I&C system" and replaced with "digital computer-based plant process control and monitoring software" to incorporate changes per RAI 7.1-142.
Section 2		
5.	Sub-section 2.3, 2nd List, GE Hitachi Nuclear Energy Procedures and Policies, Reference Number, 2.u	Changed reference from "Dedication of Commercial Grade Items" to "Commercial Grade Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in Accordance with EPRI-TR-106439-1996" to incorporate changes per RAI 7.1-142.
6.	Sub-section 2.3, 2nd List, GE Hitachi Nuclear Energy Procedures and Policies, Reference Number, 2.z	Added new reference "Qualification of Previously Developed Software" to incorporate changes per RAI 7.1-142.
Section 3		

ITEM	LOCATION	CHANGE
7.	Sub-section 3.1, 1st para.	Deleted "I&C system" and replaced with "digital computer-based plant process control and monitoring software" to incorporate changes per RAI 7.1-142.
Section 4		
8.	TBD	Pending.
Section 5		
9.	Sub-section 5.3.9.2. 1st para.	Changed text from "Dedication of Commercial Grade Items" to "Commercial Grade Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in accordance with EPRI-TR-106439-1996" and provided appropriate Sub-section 2.3 Table reference (2.u) to incorporate changes per RAI 7.1-142.
10.	Sub-section 5.3.9.2. 2nd para.	Added new paragraph: "Applicable portions of Commercial Grade Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in accordance with EPRI-TR-106439-1996 may be used for guidance in testing and qualifying commercial off the shelf software designated for use in nonsafety-related applications."
11.	Sub-section 5.3.9.3. 1st para.	Added text "Qualification of Previously Developed Software" and provided appropriate Sub-section 2.3 Table reference (2.z) to incorporate changes per RAI 7.1-142.
12.	Sub-section 5.3.9.3. 2nd para.	Added new paragraph: "Applicable portions of Qualification of Previously Developed Software [2.3(2.z)] may be used to evaluate the PDS for applicability in nonsafety-related applications."
Section 6		
13.	TBD	Pending.
Section 7		
14.	TBD	Pending.
Section 8		
15.	TBD	Pending.

Tables		
16.	TBD	Pending.
Figures & Appendices		
17.	Appendix C, Terms	Added definition for "Plant Process Control and Monitoring Software" to incorporate changes per RAI 7.1-142.

1. INTRODUCTION

1.1 OVERVIEW

The SQAPM describes the Software Quality Assurance (SQA) activities to be performed during the software life cycle phases of the Nuclear Safety-Related (Quality Class Q) and Nonsafety-Related (Quality Class N3 and N2) digital computer-based ~~I&C system~~ digital computer-based plant process control and monitoring software, hereafter referred to as "software product".

The SQAPM meets the acceptance criteria specified in Chapter 7 of NUREG 0800, Standard Review Plan (SRP) [2.2.1] and Branch Technical Position (BTP) HICB-14 R4, Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems [2.2.1], except where specified in Appendix A.

In addition, the SQAPM meets the requirements specified in the ESBWR Man-Machine Interface System and Human Factors Engineering Implementation Plan (MMIS/HFE IP) [2.1(1)] for a Software Quality Assurance Program Manual (SQAPM) to be prepared.

1.2 PURPOSE AND SCOPE

The purpose of the SQAPM is to:

- Establish an SQA program in full compliance with 10 CFR 50, Appendix A, General Design Criteria for Nuclear Power Plants and IEEE 603 IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations [2.2.4].
- Monitor the software life cycle activities of the software products and to identify the organization responsible for the SQA program and its organizational boundaries.
- Supplement the GE Hitachi Nuclear Energy (GEH) Quality Assurance Program, which is in full compliance with 10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plant and Fuel Processing Plants [2.2.2].

The objectives of the SQA program are to ensure that:

- The design teams comply with:
  - Regulatory-compliant Policies and Procedures (P&Ps) to guide software development
  - The Engineering Operating Procedures (EOPs)
  - The requirements described in this SQAPM
  - The Software Management Program Manual (SMPM) [2.3(1.a)] (hereafter referred to as SMPM)
- The design documentation and design outputs for each software life cycle phase defined in the SMPM [2.3(1.a)] are adequate (i.e., correct and complete).
- The final software products are high quality, acceptable for installation, and ready for reliable operation in a nuclear power plant.

The SQAPM defines the SQA activities, methods, and tools necessary to execute these objectives. The SQAPM also specifies the following:

- Verification and Validation (V&V) activities [Section 5.0, Software V&V Plan (SVVP)]
- Software Safety Analysis (SSA) [(Section 4.0 Software Safety Plan (SSP)]
- Software Configuration Management (SCM) [Section 6.0 Software Configuration Management Plan (SCMP)]
- Software Test Program [Section 7.0 Software Test Plan (STP)]

This SQAPM shall be in force during all phases of the software life cycle.

The applicable software products (software and firmware) covered by this SQAPM encompass digital computer-based plant process control and monitoring software. This includes the I&C systems, as specifically defined in the MMIS/HFE IP [2.1] (Subsection 1.2.4 only), which perform the monitoring, control, and protection functions associated with all modes of ESBWR plant normal operation (i.e., startup, shutdown, standby, power operation, and refueling) as well as off-normal, emergency, and accident conditions. It also includes non-DCIS real time plant systems such as but not limited to local fire protection systems, local programmable logic controllers (PLCs), digital standalone controllers and indicators, inverters and battery chargers, electrical distribution digital protective relays, switchgear instrumentation and circuit breaker controllers, meteorological monitoring systems, digital hygrometers, digital salinity cells, digital pH meters, digital conductivity cells, digital dissolved gas monitors, digital area explosive gas monitors, etc.

1.3 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

Acronyms and abbreviations are defined in Appendix B.

Definitions are provided in Appendix C.

1.4 SOFTWARE DEVELOPED BY VENDORS

Software products developed by GEH vendors shall comply with this SQAPM. If a vendor elects to follow its established SQA program, then the SQA program as defined in the purchase order (Section 3.9, Vendor and Acquired Software Control) shall be reviewed and approved by the SQA Manager to assure compliance with the requirements specified in this SQAPM.

1.5 SOFTWARE CLASSIFICATION

Software shall be assigned the appropriate Software Classification as described in Table 1.5-1.

If the software performs safety-related functions, which are specified per the Safety-related Classification determination process [2.3(2.t)], then it shall be classified as Software Class "Q."

Other software shall be considered nonsafety-related and will be divided into two sub-classes "N3" and "N2." A criticality analysis shall be conducted for nonsafety-related software. If there is a failure mode, which could challenge safety-related systems, then the software shall be classified as "N3."

The remaining Software shall be classified as "N2." This software is nonsafety-related system software whose failure cannot adversely affect a safety-related function.

[[ ]]

Figure 1. Software Class Evaluation Process

[[

-
-
-

]]

GE Hitachi Nuclear Energy Procedures and Policies		
Reference Number	**Document Title**	**Abstract**
2.u	~~Dedication of~~ Commercial Grade ~~Items~~ Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in Accordance with EPRI-TR-106439-1996	Establishes the requirements and responsibilities for dedicating commercial grade ~~items~~ off the shelf software ~~procured~~ designated for use in safety-related applications.
2.v	Corrective Action Process	Specifies the responsibilities for actions to promptly identify, record, and correct Conditions Adverse to Quality to assure that these conditions do not affect the quality of products or services. Defines the requirements and responsibilities for conducting ongoing self assessments, focused self assessments, and internal audits of organizations within GEH.
2.w	Control of Nonconforming Material	Describes the methods by which nonconforming material is documented and controlled at GEH.
2.x	Quality and Technical Training	Defines the roles and responsibilities to assure personnel proficiency in quality and technical related activities. The Quality and Technical Training program: Ensures personnel are trained and proficient in assigned quality and technical tasks. Documents qualifications for technical positions, including minimum education, experience, and any special training requirements. Records training assignments in a centralized controlled training database.
2.z	Qualification of Previously Developed Software	Implements process for certifying the qualification of Previously Developed Software

3. SOFTWARE QUALITY ASSURANCE PLAN

3.1 PURPOSE AND SCOPE

The purpose of this Software Quality Assurance Plan (SQAP) is to define the management organization, techniques, procedures, and methodologies used to assure the delivery of software meets specified requirements for ~~the I&C Systems~~ digital computer-based plant process control and monitoring software. The use of this SQAP will help assure the following:

- That software development, evaluation and acceptance standards, are implemented, documented, and followed.
- That the results of software quality reviews and audits will be given to appropriate management within the scope of the SQAPM. This provides feedback as to how the development effort conformed to development standards.
- That test results adhere to acceptance standards in Section 7.0.

3.2 MANAGEMENT ORGANIZATION

3.2.1 Organization

This subsection defines the functional responsibilities and authorities of the Project organizations that are responsible for the quality of the software products.

The Quality organization is responsible for GEH Quality Assurance (QA) program. The Quality organization is a managerially and financially independent organization. The Quality Manager, who reports to the President and CEO of GEH, provides leadership for development and overall coordination of the QA program objectives, including the software quality assurance program. The SQA organization has the overall responsibility for developing and maintaining the SQA program with support from the Software Project Engineering (SPE) organization. The SPE organization is responsible for executing the technical aspects of the SQA program, which includes the following SQA tasks (hereafter referred to as quality tasks):

- Independent Verification and Validation (IV&V) of Software Class Q software
- Software Safety Analysis (SSA)
- Software Configuration Management (SCM)

The SPE organization is technically, managerially, and financially independent from the software products design organization, in conformance with RG 1.168 [2.2.3].

3.2.2 Activities

The following activities are performed throughout the software life cycle phases:

- Independent Verification and Validation (IV&V) of design documentation and outputs for Class Q software specified in the SMPM [2.3(1.a)]
- Verification and Validation (V&V) of design documentation and outputs for Class N3 and N2 software specified in the SMPM [2.3(1.a)]
- Safety analysis of Software Class Q software and Software Class N3 software

5.3.9.2 Commercial Off The Shelf Software

COTS software is software that is commercially available to the public. It is acceptable that COTS software be used in a Software Class Q application if it is qualified and dedicated in accordance with EPRI TR-106439, Guidelines on Evaluation and Acceptance of Commercial Grade Digital Equipment in Nuclear Safety Applications [2.3(4)]. Commercial Grade Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in Accordance with EPRI-TR-106439-1996~~Dedication of Commercial Grade Items~~ [2.3(2.u)] provides additional guidance in dedicating commercial ~~grade items procured~~off the shelf software designated for use in safety-related applications.

Applicable portions of Commercial Grade Dedication of Software and Digital Components with Embedded Software for Use in Safety-Related Instrumentation and Control Applications, in Accordance with EPRI-TR-106439-1996 may be used for guidance in testing or qualifying commercial off the shelf software designated for use in nonsafety-related applications.

[[

-
-
-
-
-

5.3.9.3 Previously Developed Software

[[

-

Term	Definition
Plant Process Control and Monitoring Software	Software (including firmware) that controls, monitors, interfaces, or communicates with real time operating digital computer-based plant process control and monitoring devices, equipment and systems located within a nuclear power plant. This includes the software within any other digital equipment of a nuclear power plant, the changes to which after release would constitute a design change. Other digital computer-based systems that are not plant process control and monitoring systems, components, devices and equipment may contain software (including firmware) but are not within the scope of the software plans. These are: • Software (including firmware) within plant security equipment (e.g., perimeter intrusion detection processors, CCTV processors, security access computer and intelligent multiplexers, hand geometry and card reader processors, infra-red detection processors, etc.) subject to the requirements of 10 CFR 73.55. • Communications software (including firmware) such as telephone private and branch exchange switches as well as microprocessor-based public address software. • Software (including firmware) that is not within the scope of the certified design includes but is not limited to; Health Physics radiological monitoring and access control software, Chemistry laboratory equipment and radiological effluents tracking software, Emergency Planning software for dose assessment or other accident response functions, etc.
Procedure	A course of action to be taken to perform a given task [IEEE 610.12].
Process	A sequence of steps performed for a given purpose, e.g., the software development process [IEEE 610.12].
Project Management Plan	A document that describes the technical and management approach to be followed for a project. The plan typically describes the work to be done, the resources required, the methods to be used, the procedures to be followed, the schedules to be met, and the way that the project will be organized [IEEE 610.12].
Regression Testing	Selective re-testing of a system or component to verify that modifications have not caused unintended effects and that the system or component still complies with its specified requirements [IEEE 610.12].

Enclosure 4

MFN 09-803

Affidavit

GE-Hitachi Nuclear Energy Americas, LLC

AFFIDAVIT

I, **Larry J. Tucker,** state as follows:

(1) I am Manager, ESBWR Engineering, GE-Hitachi Nuclear Energy Americas LLC ("GEH") have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 2 of GEH letter MFN 09-803, Mr. Richard Kingston to Nuclear Regulatory Commission, *"Response to NRC Request for Additional Information Letter No. 403 Related to ESBWR Design Certification Application – RAI 7.1-142"* dated January 12, 2010. The proprietary information is enclosed within double square brackets with a dotted underline. [[This sentence is an example. {3}]] Figures and large equation objects are enclosed in double brackets. The superscript notation {3} refers to Paragraph (3) of the enclosed affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or License, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.790(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a., and (4)b, above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains the process that will be used to qualify batteries to longer duty cycles than previously exist which GEH has developed, and applied to perform this qualification process for the ESBWR.

The development of the testing process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 12th day of January 2010.

Larry J. Tucker

Larry J. Tucker
GE-Hitachi Nuclear Energy Americas LLC