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Quality Assurance Plan,” July 2006**



**GE Energy  
Nuclear**

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**NP-2010 COL DEMONSTRATION PROJECT  
QUALITY ASSURANCE PLAN**

Prepared for:

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

NuStart Energy Development, LLC  
Contract: DE-FC07-05ID14636

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## 1.0 Quality Assurance Scope

This document provides the description of the quality assurance plan scope which GE Energy, Nuclear (GENE), as Supplier for ESBWR engineering services, will implement in fulfilling the contractual requirements within the scope of Contracts:

DE-FC07-05ID14635	Dominion Nuclear North Anna, LLC
DE-FC07-05ID14636	NuStart Energy Development, LLC

These contracts encompass Phase 1 and Phase 2 of the DOE NP-2010 COL (US NRC Construction and Operating License) Demonstration Project.

This issue of the Quality Assurance Plan addresses those activities and elements needed to support the DOE NP-2010 COL Demonstration Project. However, if necessary, the plan will be updated in a timely manner as work scope, interfaces and requirements are further defined.

Refer to Figure 1 for scope of quality assurance by GE. The overall quality assurance responsibilities of GE, as Supplier, will encompass all quality related activities performed by GE as well as those performed by its subcontractors during execution of the Program, including:

- Planning, scheduling
- Engineering and design of: NSSS, Turbine Island, I&C, Plant Civil/Structural works, Systems, Equipment and Components
- Structural, design, safety and performance analyses
- Cost estimation

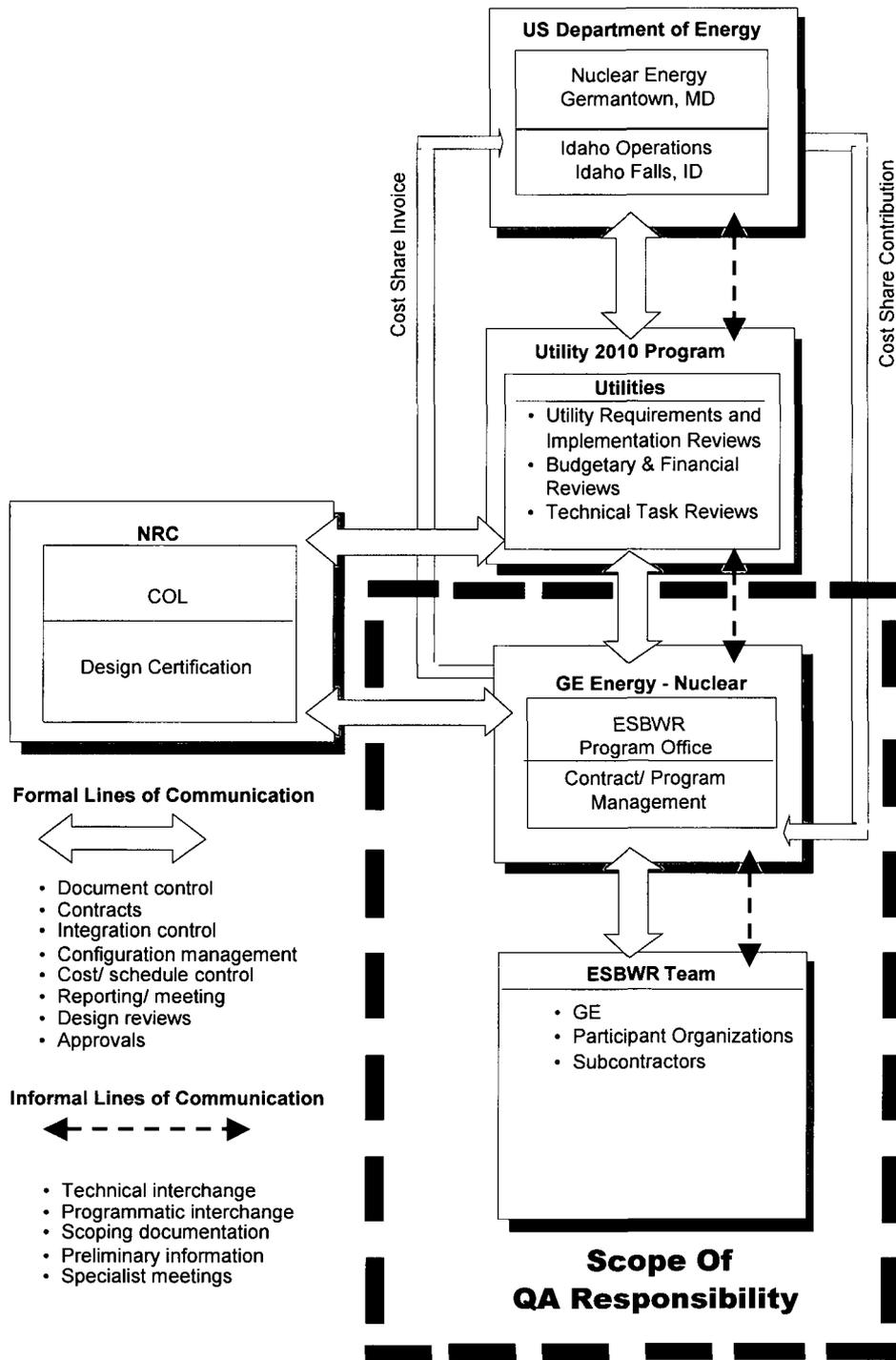


Figure 1 NP-2010 COL Demonstration Project GE QA Scope

## 2.0 GE Quality Assurance System

GE Quality System Hierarchy is illustrated in Figure 2. The hierarchy is shown with GE Company Policy as governing. Below the GE Company Policy are the GE Nuclear Energy Policies and Procedures. Regulations such as 10CFR50 Appendix B, ANSI/ASME NQA-1, and ISO-9001 provide a basic structure of the documented GE quality system and also guide the organization and content of the implementing quality assurance manuals and procedures. In addition, customer requirements further guide the structure of this Quality System and the implementing plans and procedures.

The implementation of this quality management system will assure the quality of the projects and provide a solid foundation for nuclear safety and reliable power generation.

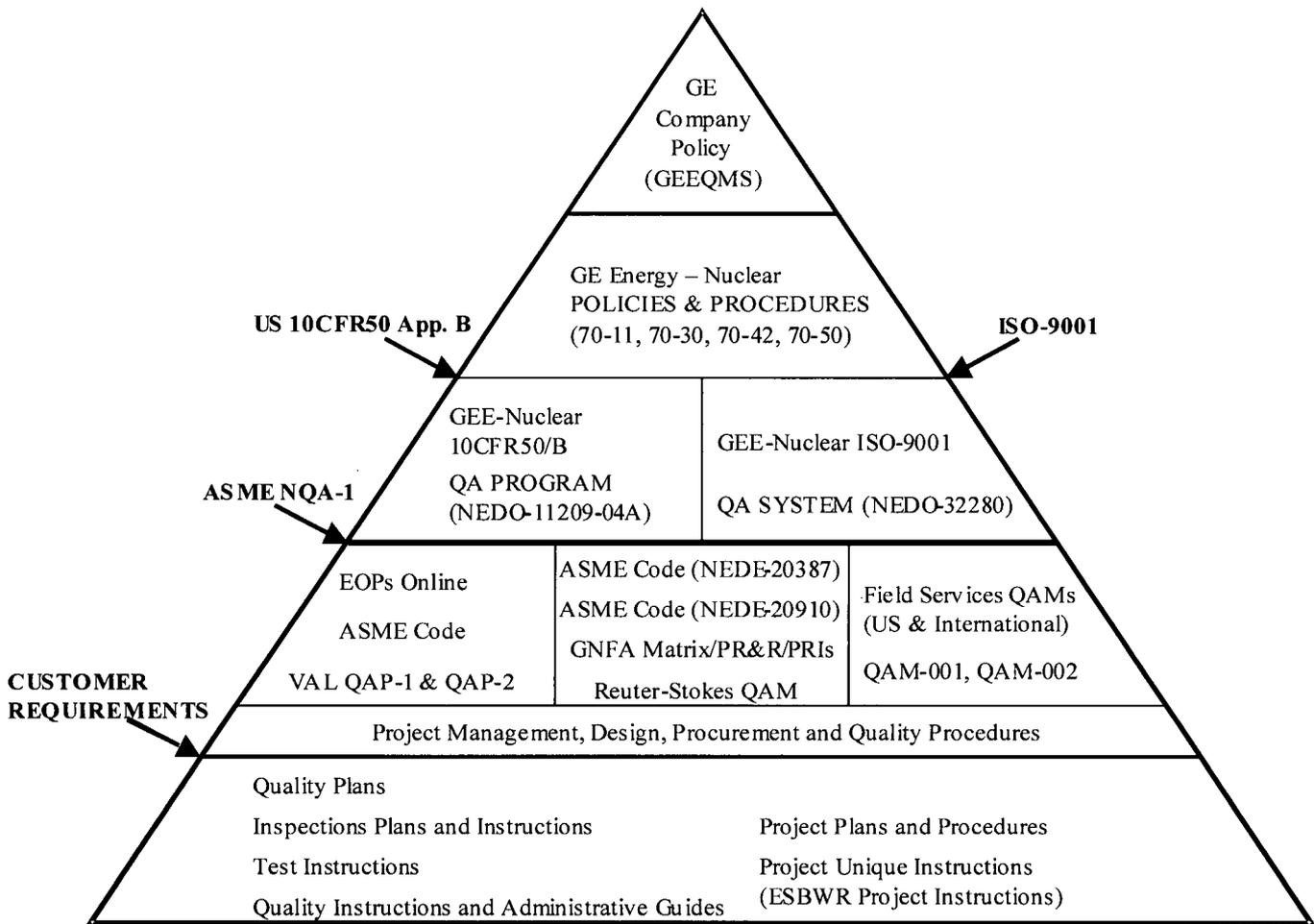


Figure 2 GE Quality System Hierarchy

## 2.1 GENE Quality Assurance Program Description

The GENE Quality Assurance Program Description, NEDO-11209-04A, delineates the Quality Assurance requirements for the ESBWR Project (Reference 1). This program meets the requirements of Appendix B of 10CFR Part 50, ANSI N45.2-1971, NRC Regulatory Guide 1.28 with noted exceptions and clarifications specified in NEDO-11209-04A, and applicable sections of the ASME Boiler and Pressure Vessel Code.

GENE shall perform all ASME design and fabrication work as identified in GENE's ASME Certifications and controlled by ASME Boiler and Pressure Vessel QA Program Manual, NEDE-20387 (Reference 2), and Compliance Manual for ASME Boiler and Pressure Vessel Code, NEDE-20910 (Reference 3).

GENE has developed and implemented a Quality Management System as described in GENE ISO-9001 Quality Management System Description, NEDO-32280 (Reference 4), that meets the requirements of the international standard ISO 9001:2000, Quality Management Systems – Requirements. This quality management system addresses the design, development, procurement, supply and servicing of nuclear power plants and related structures, systems and components.

Supplier and sub-tier suppliers' work is controlled through the SQAR – ESBWR QA Requirements for Procurement of Engineering Services and Equipment, NEDC-33260 (Reference 5). NEDC-33260 defines relationships, responsibilities, and requirements for the Supplier's quality program.

## 2.2 GENE Quality Assurance Program Implementation

GENE has a well-established system of quality assurance manuals, operating procedures, and instructions to implement technical, quality assurance and quality control requirements in the performance of all activities affecting quality. This QA Plan complements the existing GE standard program and procedures, as required, to meet project unique requirements.

GENE Policies are documents authorized by the GENE President to define the principles to be followed within GENE in the application of Company policies and mandatory laws, regulations, and requirements governing the business of GENE. GENE Procedures are documents authorized by the GENE President to establish mandatory courses of action for GENE, restricted to administrative activities.

The Engineering Operating Procedures (EOPs) establish required practices for technical and/or quality-related activities within Nuclear Plant Projects, Nuclear Services and supporting organizational components to assure compliance with the quality objectives and requirements of the GENE Quality Assurance Program.

The Engineering Service Instructions (ESIs) establish supplemental practices for activities within applicable components of NE Engineering & Technology (E&T).

The ESBWR Project Instructions (EPis) address key project aspects and phases with high susceptibility of defects. The EPis transform the EOPs and Policies and Procedures (P&Ps) requirements into practical instructions. The EPis provide directions beyond the scope or detail of the EOPs or as supplemental guidance in processes that have experienced performance defects, or that present a special risk of performance defects.

Additional quality procedures are applied to the development of control and instrumentation hardware and software. The controlling document is NEDE-33245, ESBWR I&C Software QA Plan (Reference 6).

### 3.0 GENE Organization

This section defines the organization and functional responsibilities and authorities of the organizations within GENE to assure that the management is directed toward satisfying the quality objectives of providing safe and reliable nuclear power plants. The organization of the ESBWR Project is shown in Figure 3. GENE business segments and functional organizations are charged with the responsibility to plan and execute project activities.

**The NPP and Nuclear Engineering General Managers** are responsible to provide leadership for the business planning, missions, technology, engineering resources, operation and management of activities. The General Manager is responsible for establishing quality policy and direction. The General Manager is also responsible to select a qualified manager based upon education, skills and experience required for the specific project.

**The ESBWR Project Managers** provide overall project management and are responsible for the administration and control of engineering, production and delivery, and quality related activities for the assigned project.

**The ESBWR Engineering Manager and Functional Managers** are responsible to provide leadership for the overall administration, operation and quality of the assigned business segment/function. The manager is responsible to coordinate quality assurance program objectives and implementation of technical, quality and regulatory requirements throughout their assigned missions and processes to assure delivery of quality products to the satisfaction of the customer.

**The Quality Manager** is responsible to provide leadership for developing and overall coordination of the quality assurance program objectives, measurement of objectives, adequate resources, and quality initiatives for improvement of processes used by GENE for product and service offerings including but not limited to, reporting to top management on the performance of the quality assurance system and ensuring the promotion of awareness of customer requirements throughout the organization.

The responsibility assignments within the organization are intended to achieve the required quality by those responsible for performing the activities and to provide verification of the quality by other trained personnel not having this direct responsibility. Verification by inspection and test is performed by quality assurance (QA) and/or quality control (QC) personnel who have the necessary organizational freedom and authority to identify quality problems, recommend corrective actions and stop work as necessary.

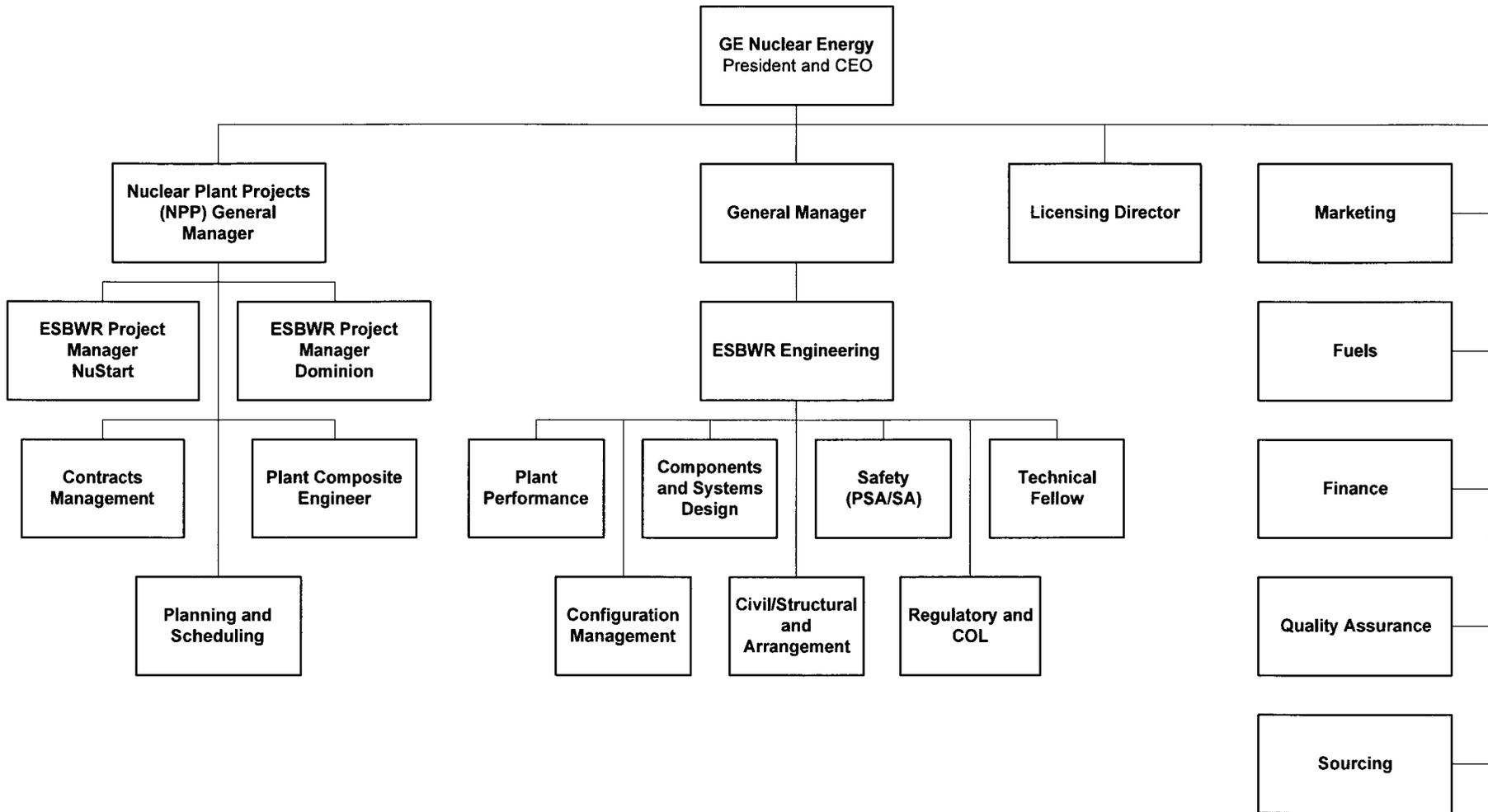


Figure 3 ESBWR COL Demonstration Project Organization

### **3.1 ESBWR Project Organization**

GENE, as the prime supplier for the ESBWR design activity, will assemble a project team which will represent a select group of companies with a spectrum of worldwide expertise and capabilities, and which encompasses those attributes required to produce a high quality nuclear power plant design.

The project organization structure is intended to clearly establish functional responsibilities and authorities of GENE and its major subcontractors performing design, design certification and COL demonstration activities.

The GENE Quality Manager will ensure that the requirements of the quality program, project procedures, and the referenced codes and standards are implemented and maintained.

## 4.0 References

1. NEDO-11209-04A, GE Nuclear Energy Quality Assurance Program Description.
2. NEDE-20387, ASME Boiler and Pressure Vessel Code QA Program Manual.
3. NEDE-20910, Compliance Manual for ASME Boiler and Pressure Vessel Code, Section III Division 1 and Section VIII Division 1.
4. NEDO-32280, GE Nuclear Energy ISO-9001 Quality System Description.
5. NEDC-33260, SQAR – ESBWR QA Requirements for Procurement of Engineering Services and Equipment.
6. NEDE-33245, ESBWR I&C Software QA Plan.