January 16, 2007

APPLICANT: General Electric Company

PROJECT: Economic Simplified Boiling Water Reactor (ESBWR)

SUBJECT: SUMMARY OF NOVEMBER 17, 2006, CATEGORY 1 MEETING WITH GENERAL ELECTRIC, TO DISCUSS ESBWR INSTRUMENTATION AND CONTROL DESIGN AND AUDIT RESULTS

On November 17, 2006, a public meeting was held between the U. S. Nuclear Regulatory Commission (NRC), and representatives of General Electric (GE), at the General Electric facility in Wilmington, North Carolina. The purpose of the meeting was to discuss the results of the November 13 through 17, 2006, audit of the ESBWR Instrumentation and Control (I&C) design.

The staff recognized that progress was being made in the I&C design area, but expressed concern about the amount of work yet to be done by GE and the subsequent staff review effort that will be required. The staff stated that it was essential for GE to clearly communicate the scope and schedule of planned topical reports in an integrated fashion, so that the staff can plan the resources to support the reviews.

The staff stated that it was also important to establish a common understanding of the path forward for the design certification process and beyond to support future combined license (COL) applications and the Inspection, Test, Analysis, and Acceptance Criteria (ITAAC) closure process. In support of the NRC's design centered review approach, the staff encouraged GE to continue to resolve as many issues as possible during the design certification in order to reduce the reliance on design acceptance criteria. Several topics were discussed in more detail as follows:

Software Lifecycle Review

The staff discussed a number of comments on the software life cycle topical reports that were submitted for review. The number and scope of the staff's comments indicate that the plans were not of high quality. Quality issues are considered an indicator of the acceptability of the overall software development process. Consistency, clarity, identification and traceability of requirements were the major concerns discussed. GE opened corrective action reports (CARS) to track resolution of these issues. GE also informed the staff that they are planning to submit revised versions of these topical reports for staff review. This includes 10 software development plans plus the human factors engineering man machine interface system implementation plan.

The staff also had questions about how the plans related to the overall Appendix B quality assurance (QA) program and other GE internal procedures. The staff had questions about how a supplier or contractor would implement the plans outside the overall GE QA process and procedures.

GE indicated that suppliers would be contractually obligated to follow the GE QA process or an equivalent process.

Distributed Control and Information System (DCIS)

The staff requested additional documentation to describe the overall DCIS architecture including the various platforms and networks and the diversity they provide. GE plans to revise Design Control Document (DCD) Sections 7.1 and 7.9 to provide more clarity and may submit a high level topical report providing additional description of the overall DCIS architecture design.

GE informed the staff that they planned to submit several topical reports regarding the essential DCIS hardware platforms in a three phased approach - generic platform, qualification reports, and plant specific applications. GE plans to provide a table of contents for the generic platform topical reports and a schedule for all platform related submittals. It is not clear yet whether these topical reports will be part of the design certification scope or future COL applications.

Inter-Channel Communication

The staff expressed concerns regarding compliance with the Institute of Electrical and Electronics Engineers (IEEE)-603 requirements for channel independence due to the application of token ring network. GE is now considering use of point-to-point communication methods in addition to the ring to ensure IEEE-603 compliance. GE indicated that they will inform the staff when they make a decision on this design issue.

Non-Safety/Safety Data Communication

The staff expressed concerns with the communication between safety and non-safety related systems. GE stated that communications from safety to non-safety are one way. The staff indicated that ITAAC may need to be added to verify this.

Logic Diagrams

GE provided preliminary simplified logic diagrams for staff audit during the visit. The staff's preliminary observation is that the level of detail appears appropriate to support design certification. GE indicated that they will submit updated simplified logic diagrams on the docket to support the design certification review. It was agreed that a determination will be made later whether any of the simplified logic diagrams need to be added to the DCD.

Requests for Additional Information (RAIs)

GE provided an overview of the planned responses to RAI letter 76. The staff was encouraged by the progress being made, particularly on ITAAC. The proposed ITAAC format is a significant improvement.

IEEE-603 Compliance

The staff discussed staff RAIs regarding compliance with IEEE-603. GE is considering submittal of a topical report discussing IEEE-603 compliance and will revise the DCD to clarify compliance with IEEE-603.

Interlock Systems

The staff discussed staff RAIs regarding documentation of interlocks. GE indicated that they will verify that all interlocks important to safety are described in DCD Chapter 7 and provide a table of the interlocks in DCD Section 7.6.

Commercial grade dedication

The staff discussed staff RAIs regarding commercial grade dedication. GE offered to make additional information available in the Washington, DC office for staff reference.
The staff will consider the need for a QA inspection focusing on the commercial grade dedication process.

Cyber security

GE discussed plans to submit a topical report in December 2007 to address Regulatory Guide (RG) 1.152 compliance. GE indicated that they will confirm the plans and schedule for this submittal.

Technical Specifications

GE and the staff discussed proposed DCD Tier 2, Revision 2, Chapter 16 Technical Specifications (TS), specifically Section 3.3 of the TS. GE is currently proposing that the TS require three divisions of electrical power/DCIS. GE also proposed use of analytical limits rather than allowable values or limiting safety system setting. The staff expressed concerns regarding this approach in light of Regulatory Issue Summary (RIS)-2006-17 and the requirements of 10 CFR 50.36. GE stated that they will ensure that adequate processes can be put in place for tracking the status of the fourth division. GE also indicated that they will revisit the proposed use of analytical limits as limiting safety system settings in the TS.

Setpoint Methodology

The current DCD reference for setpoint methodology is a topical report (NEDC-31336P-A) approved in 1996 prior to issuance of Branch Technical Position (BTP) HICB-12. The staff is concerned that this report may be out of date relative to current NRC guidance and industry practice. GE expressed concerns regarding the availability of NRC guidance. The staff referred GE to RIS-2006-17. GE indicated that they will inform the staff whether they plan to submit an updated setpoint methodology for review as part of the design certification review. GE stated that they will provide an electronic version of the 1996 topical report NEDC-31336P-A so that the staff can add it to the Agencywide Documents Access and Management System (ADAMS). GE will also provide a non-proprietary version that could be made available to the public. GE is considering submittal of a topical report regarding instrument response time.

Post-Accident Monitoring Instrumentation

GE previously committed to address Revision 4 of Regulatory Guide (RG) 1.97 which endorses IEEE-497. GE has expressed concerns that completion of work in this area could be delayed pending Human Factors Engineering (HFE) task analysis.

The staff suggested that appropriate ITAAC could be proposed to address IEEE-497 criteria similar to the ITAAC proposed for IEEE-603 compliance. GE will consider a post-accident instrumentation ITAAC similar to proposed ITAAC regarding IEEE-603 compliance. It was agreed that further discussion was needed on this topic.

Automated Fixed Incore Probe (AFIP)

DCD Revision 1 includes a discussion of the gamma thermometer technology for the AFIP. DCD Revision 2 now states that AFIP can be a gamma thermometer, a platinum self-powered detector or "other" detector type suitable for the application.

The staff expressed concern that the specific technology has not yet been selected. The staff also expressed concern that the available qualification testing data does not appear to support long-term use. The schedule for the long-term testing program does not appear to support the current schedule for design certification. The staff requested that GE clarify the proposed technology and propose a period of use along with the long term qualification plans.

Regulatory Treatment of Non-Safety Systems (RTNSS)

GE discussed their current proposal of systems for RTNSS. The staff noted that significant progress has been made in this area.

The staff also received presentations on numerous related subjects including: potential hardware/software platforms for the reactor protection system (RPS) and/or engineered safety feature (ESF) architectures, diversity of protection systems, configuration management (including GE's corporate controls or documents and records), and GE's equipment qualification program. The staff also observed a demonstration of a simulated assisted engineering modeling of the reactor water cleanup system.

Members of the public were in attendance by teleconference. No comments were made by members of the public.

A list of meeting attendees is attached. The applicant's handout for the meeting can be accessed through the Agencywide Documents Access and Management System (ADAMS). This system provides text and image files of NRC's public documents. The handout mentioned above may be accessed through the ADAMS system under Accession No. ML063340017. If you do not have access to ADAMS or if there are problems in accessing the handout located in

ADAMS, contact the NRC Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737 or by e-mail to pdr@nrc.gov.

Please direct any inquiries to Amy Cubbage at 301-415-2875 or aec@nrc.gov.

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Docket No.: 52-00010

Enclosure:
1. List of Attendees

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