GE-Hitachi Nuclear Energy Americas LLC

James C. Kinsey
Project Manager, ESBWR Licensing

PO Box 780 M/C A-55
Wilmington, NC 28402-0780
USA

T 910 675 5057
F 910 362 5057
jim.kinsey@ge.com

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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 07 Related to ESBWR Design Certification Application – Process Radiation Monitoring System – RAI Number 11.5-5 S02**

Enclosure 1 contains GE-Hitachi Nuclear Energy Americas (GEH) response to the subject NRC RAI transmitted via Reference 1. Enclosure 2 contains the DCD Markups associated with this response.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

D068

NRO

Reference:

1. MFN 06-043 – Letter from U.S. Nuclear Regulatory Commission (NRC) to David H. Hinds, *Request for Additional Information Letter No. 07 Related to ESBWR Design Certification Application,* dated January 26, 2006

Enclosures:

1. Response to NRC Request for Additional Information Letter No. 07 Related to ESBWR Design Certification Application – Process Radiation Monitoring System, RAI Number 11.5-5 S02
2. DCD Markups

cc: AE Cubbage USNRC (with enclosures)
GB Stramback GEH /San Jose (with enclosures)
RE Brown GEH /Wilmington (with enclosures)
eDRF 0071-7632

Enclosure 1

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Response to Portion of NRC Request for Additional Information Letter No. 07 Related to ESBWR Design Certification Application

Process Radiation Monitoring System

RAI Numbers 11.5-5 S02

NRC RAI 11.5-5 S02:

In RAIs 11.5-5, 11.5-11, 11.5-12, 11.5-13, 11.5-16, 11.5-17, 11.5-20, 11.5-21, and 11.5-22, as they relate to DCD Tier 2, Rev. 1, Sections 11.5.3 and 11.5.4, the staff requested the applicant to provide elaborations and address the requirements of Regulatory Guides 1.21 and 4.15 on sampling requirements for batch and continuous releases, sampling and analyses frequencies, types of radionuclides or radionuclide groupings for which analyses are required, and PRMS subsystem calibration and maintenance. In DCD Rev. 3, Sections 11.5.3 and 11.5.4, the applicant corrected these inconsistencies. Therefore, these RAIs are resolved, with the exception of RAI 11.5-5. In Revision 3 of the DCD Tier 2, Sections 11.5.2, 11.5.4, and 11.5.5 the applicant does not indicate whether the design of the process and effluent sampling systems follows the guidance of IE Bulletin 80-10 Contamination of Non-radioactive System and Resulting Potential for Unmonitored, Uncontrolled Release to Environment and whether the design avoids interconnections with non-radioactive systems that could become radioactive through improper interfaces with radioactive systems. Similarly, the applicant does not indicate whether the design of the process and effluent sampling systems complies with the requirements of 10 CFR 20.1406, as it relates to the design and operational procedures to minimize contamination and minimize the generation of radioactive wastes. While DCD Rev. 3, Section 12.6 addresses some requirements associated with Part 20.1406, the discussions of DCD Section 12.6 are broadly generic and do not focus on specific design issues for the PRMS.

GEH Response:

DCD Tier 2, Rev 3 has been revised to add new Subsections 11.5.6.4 for Bulletin 80-10 evaluation, and 11.5.6.5 for 10CFR 20.1406 compliance.

DCD Impact:

DCD Tier 2, Subsections 11.5.6.4 and 11.5.6.5 will be added to the DCD Tier 2, Revision 5 as noted on the attached markup.

Enclosure 2

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DCD Markups

includes servicing and replacement of defective components and adjustments, as required, after performing a test or calibration check. If any work is performed that would affect the calibration of the instrument, a re-calibration is performed following the maintenance operation.

11.5.6.4 IE Bulletin 80-10 Evaluation

The Process Radiation Monitoring System comprises subsystems that monitor liquid and gaseous effluents and which utilize components that are designed and installed in various ways. A majority of these subsystems are constructed in a way that it is not possible for them to become contaminated due to leakage, spills, errors in valve lineup or other operating conditions as a result of interfacing with radioactive systems. These types of radiation monitoring subsystems are typically purely electrical in nature and do not physically interconnect with the radioactive systems that they are monitoring. In addition, these PRM subsystems do not interconnect with other non-radioactive systems, thereby eliminating the potential for transfer of radioactive material from a radioactive system to a non-radioactive system.

However, in the design of several PRM subsystems, some interconnections to radioactive systems are necessary. In these cases, the additional subsystem interconnections to non-radioactive systems are limited to purge air, purge water and makeup water for filling loop seals. In these subsystems, the designs of these interconnections are such that the contamination of the non-radioactive system or process due to leakage, spillage, valving errors or other operating conditions is precluded. For example, for equipment requiring the use of purge air, the air is taken from the room atmosphere where the sampling subsystem is located, passed through a prefilter, and then, upon demand, made available for purging of the radiation monitoring subsystem. Because of the design of the filtering mechanism, contamination of the outside air is precluded. In the case of liquid monitors that require flush water, the design of these interconnections is such that the flush water supply is only temporarily connected during maintenance and then completely removed upon termination of the flush. Where loop seals are utilized, which is limited to drains from ventilation ducting provided to collect any condensate in the ventilation line, the loop seals are isolated from the makeup water source by use of isolation valves and backflow preventers.

11.5.6.5 Implementation of 10 CFR 20.1406

The PRM subsystem designs, and procedures used for operation, minimize contamination of the facility and environment, facilitate decommissioning, and minimize the generation of radioactive waste, in accordance with 10 CFR 20.1406, through:

- Minimizing contamination by:
  - Locating radiation detectors outside the process that they monitor, whenever feasible, to avoid the potential of coming in contact with a radioactive process;
  - Providing atmospheric purging of the internal portion of air sampling skids as necessary;
  - Providing the ability for liquid flushing of the internal portions of liquid sampling skids as necessary;

- Designing the interior portions of liquid and gaseous sampling chambers to minimize the plateout of radioactive material; and
- Designing sample extraction points such that they minimize the potential for spillage and contamination of adjacent areas.

- Facilitating decommissioning by:
  - Providing equipment, where feasible, that reduces the need for decontamination during the removal and disposal of the equipment.
- Minimizing the generation of radioactive waste by:
  - Directing continuous samples from radioactive processes back to the sampled process;
  - Utilizing electronic bug sources, where compatible with the subsystem design, in order to minimize the use of radioactive sources; and
  - Minimizing the amount of a sample that needs to be extracted, consistent with laboratory and sensitivity requirements.

11.5.7 COL Information

11.5-1-A Subsystem Lower Limit of Detection

The analysis sensitivities derivation of each Subsystem's Lower Limit of Detection is to be determined by the COL Applicant based on site specific conditions and operating characteristics of each installed effluent radiation monitoring subsystem (Subsection 11.5.4.7).

11.5-2-A Offsite Dose Calculation Manual

The COL Applicant will also develop an ODCM that contains the methodology and parameters used for calculation of offsite doses resulting from gaseous and liquid effluents. The COL Applicant will address operational setpoints for the radiation monitors and address programs for monitoring and controlling the release of radioactive material to the environment, which eliminates the potential for unmonitored and uncontrolled release. The ODCM will include planned discharge flow rates. The ODCM will also include the system information identified as COL items in Tables 11.5-5 and 11.5-6 (Subsection 11.5.4.5).

The COL Applicant will evaluate site-specific conditions and requirements in assessing radiation exposure, including N_{16} source and skyshine doses to members of the public in the ODCM in accordance with 10 CFR 20.1301 (e) and 10CFR 20.1302 (Subsection 12.2.1.3).

11.5-3-A Process and Effluent Monitoring Program

In addition, the COL Applicant is responsible for the site-specific program aspects of the process and effluent monitoring and sampling as specified in Tables 11.5-5 and 11.5-6 per ANSI N13.1 (Reference 11.5-13) and Regulatory Guides 1.21 (Reference 11.5-9) and 4.15 (Reference 11.5-10) (Subsection 11.5.4.6).

11.5-4-A Site Specific Offsite Dose Calculation