



GE Energy

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U.S. Nuclear Regulatory Commission  
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**Subject: Response to NRC Request for Additional Information Letter No. 56 –  
Loose Parts Monitoring System – RAI Numbers 4.4-7 through 4.4-9,  
Single Failure Evaluation – RAI Number 6.3-38**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter.

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

Sincerely,

A handwritten signature in cursive script that reads "George Strambro for".

David H. Hinds  
Manager, ESBWR

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Reference:

1. MFN 06-316, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 56 Related to ESBWR Design Certification Application*, September 7, 2006

Enclosure:

1. MFN 06-349 – Response to NRC Request for Additional Information Letter No. 56 – Loose Parts Monitoring System – RAI Numbers 4.4-7 through 4.4-9, Single Failure Evaluation – RAI Number 6.3-38

cc: AE Cabbage USNRC (with enclosures)  
GB Stramback GE/San Jose (with enclosures)  
eDRFs 0058-9752, 0057-4114

**ENCLOSURE 1**

**MFN 06-349**

**Response to NRC Request for Additional Information**

**Letter No. 56 – Loose Parts Monitoring System**

**RAI Numbers 4.4-7 through 4.4-9**

**Single Failure Evaluation – RAI Number 6.3-38**

**NRC RAI 6.3-38**

*DCD Tier 2, Table 6.3-6 "Single Failure Evaluation," indicates that two standby liquid control (SLC) systems are remaining for each scenario listed. This table implies that there are two 100% capacity SLC Systems. Since each SLC accumulator is 50% capacity, please clarify this table in the DCD..*

**GE Response**

DCD Table 6.3-6 will be revised to replace "2 SLC system" with "2 SLC Accumulators" all places in the referenced DCD table

**NRC RAI 4.4-7**

*Address how operating experience with loose parts monitoring systems (LPMS) was factored into the design of the ESBWR LPMS. Identify improvements and/or differences, if any, between the current LPMS design used in operating BWRs compared to design of the LPMS proposed for the ESBWR.*

**NRC RAI 4.4-8**

*In DCD Tier 2, Chapter 4, describe the sensitivity of the LPMS sensors in terms of its ability to detect the range of size, mass and kinetic energy of metallic parts, and the maximum distance from the sensor location up to which a part can be detected.*

**NRC RAI 4.4-9**

*The staff requests that ITAAC be provided for LPMS in ESBWR consistent with the ABWR ITAAC in DCD Tier 2, Chapter 4.*

**GE Response to RAI 4.4-7, RAI 4.4-8, and RAI 4.4-9:**

GE intends to delete the Loose Parts Monitoring System (LPMS) from the ESBWR Design currently described in DCD Tier 2 Subsection 4.4.5, and as a consequence the DCD Tier 2 Subsection 4.4.5 will be deleted. The basis for deleting the LMPS is discussed in the following paragraphs.

In a letter addressed to Mr. James Kenny, Chairman BWR Owners' Group (BWROG) dated January 25, 2001; the NRC approved the Loose Parts Monitoring System regulatory relaxations that were requested by the BWROG. The January 25, 2001 NRC approval letter and the associated safety evaluation that defines the basis for NRC acceptance of the topical report was enclosed in Reference 4.4-7.1.

The NRC Safety Evaluation conclusion section contained in Reference 4.4-7.1 states (in Section 4.0 first three paragraphs):

“In Topical Report NEDC-32975P, “Regulatory Relaxation for BWR Loose Parts Monitoring Systems,” the BWROG reported on the effectiveness of the LPMS installed in some BWR plants and proposed eliminating the LPMS requirements. The BWROG stated that although loose parts have been detected on a few occasions: (1) the BWROG did not identify any BWR that was shutdown due to the impact of loose parts, (2) no LPMS detected a failed or weakened safety-related component, (3) licensees employ an aggressive foreign material exclusion program, and underwater inspection during refueling outages to ensure loose parts do not accumulate in the reactor vessel, (4) experience also shows that components left in the reactor system are retained in low flow regions, which do not pose as a safety problem, and (5) small metallic filings and other similar debris could contribute to fuel cladding damage, but the LPMS would not detect this class of debris and the industry has installed debris filters into the fuel support pieces which may reduce fuel cladding damage due to fretting.”

“The staff finds that operating history does indicate that LPMS did detect weakened or degraded safety related components as well as damage to components due to loose parts inadvertently left during maintenance or refueling. However, the LPMS in use are not reliable or sensitive enough to provide the safety benefits envisioned by RG 1.133. Loose parts can be detected by the normal plant process and monitoring systems and also through visual inspections. Also, operating history does not show a higher incidence or occurrence of damage to safety-related components in plants that have no LPMS installed. The staff concurs that the safety benefits of the LPMS do not appear to be commensurate with the cost of maintenance and the associated radiation exposure for plant personnel.”

“Therefore the staff finds that Topical Report NEDC-32975P is acceptable for referencing in licensing applications to the extent specified and under the limitations delineated in this safety evaluation. The staff will not repeat its review of the matters described in the subject report when the report appears as a reference in licensing applications, except to ensure that the material presented applies to the specific plant involved.”

**Note:**

The ESBWR design incorporates debris filters. All fuel supplied by GNF has a filter at the bottom to prevent debris from entering the bundle. This supports the statement made in item (5) above.

**Reference:**

4.4-7.1 General Electric Nuclear Energy, “Regulatory Relaxation for BWR Loose Parts Monitoring Systems,” BWR Owners Group Licensing Topical Report NEDC-32975P-A, February 2001

**DCD/LTR Impact**

DCD Tier2, Subsection 4.4.5 will be deleted. The basis for deleting the Loose Parts Monitoring System from the ESBWR design is as stated above.