



GE Energy

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MFN 07-220

Docket No. 52-010

April 20, 2007

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

**Subject: Response to Portion of NRC Request for Additional Information
Letter No. 60 – Radiation Protection – RAI Numbers 12.3-8**

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

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

Sincerely,

Bathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

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Reference:

1. MFN 06-342, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 60 Related to the ESBWR Design Certification Application*, September 18, 2006

Enclosures:

1. MFN 07-220 – Response to Portion of NRC Request for Additional Information Letter No. 60 – Radiation Protection – RAI Number 12.3-8

cc: AE Cabbage USNRC (with enclosures)
GB Stramback/GE/San Jose (with enclosures)
eDRF 0066-6662

Enclosure 1

MFN 07-220

**Response to Portion of NRC Request for
Additional Information Letter No. 60
Related to ESBWR Design Certification Application**

Radiation Protection

RAI Number 12.3-8

NRC RAI No. 12.3-8:

DCD Tier 2, Table 12.2-5 provides dose rates for various components of the control rod drive (CRD) system before and after cleaning. Explain how both dose rates are factored into the ESBWR design. Does the ESBWR design provide for routine cleaning of these CRD system components?

GE Response:

The ESBWR design does provide for routine cleaning of some of the Control Rod Drive (CRD) system components. The FMCRD consists of the upper component and lower component. Only the upper component is exposed to reactor water and needs decontamination and cleaning when removed. Referring to DCD Tier 2, Revision 3, Table 12.2-5, the upper CRD component consists of:

- Rotating Ball Spindle
- Hollow Piston
- Throttle Bushing (will be renamed as “Labyrinth Seal” in DCD Revision 4 to be consistent with common CRD terminology)
- Guide Tube
- Cylinder Tube/Flange (will be renamed as “Outer Tube/Flange” in DCD Revision 4 to be consistent with common CRD terminology)

The lower component consists of:

- Seal Housing (will be deleted in DCD Table 12.2-5 Revision 4, per the response to RAI 4.6-7 provided in GE Letter MFN 06-078 dated March 13, 2006)
- Motor/Synchro Assembly (will be deleted in DCD Table 12.2-5 Revision 4, since the lower component does not come in contact with reactor water)

In terms of frequency of maintenance, FMCRDs are not routinely removed for cleaning, but will be cleaned if removed for maintenance or repair. FMCRDs will be removed for inspection on a routine basis as part of the FMCRD life cycle maintenance program. The response to RAI 3.9-130 (GE Letter 06-452 dated November 14, 2006) identifies the FMCRD components and their frequency of maintenance.

The cleaning of FMCRD components is to occur in Reactor Building Room 2200. Per DCD Tier 2, Revision 3, Figure 12.3-2, this room is designated as Radiation Zone C ($\leq 50 \mu\text{Sv/hr}$) for full power and Radiation Zone D ($\leq 250 \mu\text{Sv/hr}$) for shutdown conditions. The FMCRD units are to be removed and maintained during shutdown, and the shutdown radiation zone designation reflects this fact.

DCD Impact:

DCD Tier 2, Table 12.2-5 will be revised in Revision 4 based on the attached markup.

Table 12.2-5
Radioactive Sources in the Control Rod Drive System

Control Rod Drive Radiation Survey Data		
Upper Component	Gamma Dose Measured at Contact, mSv/hr	
	Before Cleaning	After Cleaning
Rotating Ball Spindle	0.0E+00	3.0E-01
Hollow Piston	7.5E-01	3.8E-01
Labyrinth Seal	6.0E-01	6.0E-01
Guide Tube	4.5E-01	3.0E-01
Outer Tube/Flange	3.3E+00	3.0E-01

Control Blade Principal Isotopes	
Isotope	MBq/Blade
Cr-51	5.2E+09
Mn-54	3.4E+08
Fe-55	5.9E+09
Co-58m	3.3E+08
Co-60	4.1E+09
Ni-63	1.9E+08
Total	1.6E+10