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MFN 06-448

Docket No. 52-010

November 13, 2006

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. 71 – Radioactive Waste Management Systems – RAI Numbers 11.4-16 and 11.4-17**

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,

/Kathy Sedney for

David H. Hinds
Manager, ESBWR

D068

Reference:

1. MFN 06-383, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 71 Related to ESBWR Design Certification Application*, September 08, 2006

Enclosure:

1. MFN 06-448 – Response to Portion of NRC Request for Additional Information Letter No. 71 – Radioactive Waste Management Systems – RAI Numbers 12.4-16 and 12.4-17

cc: AE Cubbage USNRC (with enclosures)
GB Stramback GE/San Jose (with enclosures)
eDRF 60-7072

Enclosure 1

MFN 06-448

Response to NRC Request for

Additional Information Letter No. 71

Related to ESBWR Design Certification Application

Radioactive Waste Management Systems

RAI Numbers 11.4-16, 11.4-17

NRC RAI 11.4-16

A review of the types of radioactive wastes described in DCD Tier 2, Revision1, Section 11.4.2.2 indicates that there is no discussion on the generation of mixed wastes and how mixed wastes (with chemical and radiological hazards) will be processed. Provide a description of permanently installed or mobile treatment systems (processing equipment, tanks, pumps, etc.) that will be used to process, handle, and package and ship mixed wastes. Describe information and operational considerations that would be addressed by the COL applicant in the process control program. Update equipment descriptions in DCD Tier 2 Table 11.4-1 and revise DCD Tier 2 Table 11.4-2 to include an annual estimate of the projected amounts of mixed wastes.

GE Response

DCD Tier 2 Subsection 11.4.2.2 will be revised to add the heading, Mixed Waste Processing. The annual quantity of generated mixed waste is anticipated to be at or below the value provided in Table 11.4-2. Based upon the ESBWR design, mixed waste will be collected primarily in 55-gallon collection drums that are sent offsite for processing at an appropriately permitted vendor processor in compliance with DOT, EPA, NRC, state and local regulations. However, should circumstances arise that necessitate larger mixed waste quantities, approved facility procedures can address the shipment or treatment of greater quantities using other approved containers, such as HICs, in compliance with DOT, EPA, NRC, state and local regulations. For an illustrative example, a waste volume with a pH of less than 2 is considered hazardous, and, if radioactive, would be characterized as mixed waste. An approved facility procedure in accordance with state and federal regulations, could allow for sufficient base to be added in a sufficient reactor vessel (e.g., chemical drain collection tank using the chemical drain neutralization unit) such that the pH is raised above 2 to a pH whereby the waste would no longer be considered hazardous but remain as radioactive solid waste, and further processed appropriately with plant-installed equipment. Table 11.4-2 will be revised to include an estimated annual mixed waste generation of 0.416 m3/yr (14.71 ft3/yr) similar to the attached DCD markup.

DCD Impact

DCD Tier #2, Subsection 11.4.2.2 and Table 11.4-2 will be revised as noted in the attached markups.

Mixed Waste Processing

Mixed waste volumes generated at ESBWR facilities are anticipated to be less than or equal to the volumes provided in Table 11.4-2. Mixed waste will be collected primarily in 55-gallon collection drums and sent offsite to an appropriately permitted vendor processor. However, should circumstances dictate the storage or disposal of larger quantities of mixed waste, other approved containers, such as High Integrity Container (HICs), or use of multiple approved containers can be used. Storage and disposal of mixed waste will be in accordance with the facility's NRC license, DOT transportation regulations, EPA mixed waste regulations, state and local regulations and associated permits.

Some states allow (in accordance with NRC and EPA regulations) for the treatment of mixed waste on site such that the waste can be re-classified as solid radioactive waste, allowing for the waste to be stored and disposed of in accordance with NRC and DOT regulations, and any applicable state and local regulations. For example, a waste volume with a pH of less than 2 is generally considered hazardous, and, if radioactive, would be characterized as mixed waste. However, plant procedures that are developed in accordance with appropriate regulations could allow for treating the waste with sufficient base to raise the acidity to a level where the waste would no longer be hazardous, but remain radioactive, thus allowing for the waste to be processed as radioactive solid waste, typically reducing cost and generally reducing volume.

11.4.2.3 Detailed System Component Description

The major components of the SWMS are as follows:

Pumps

Two types of pumps are utilized in the SWMS.

The SWMS process pumps are centrifugal pumps constructed of materials suitable for the intended service.

Air-operated diaphragm type pumps are utilized in dewatering stations.

Pump codes are per the noted requirements of Table 3.2-1 for K20 Solid Waste Management Systems.

Tanks

Tanks are sized to accommodate a sufficient volume of waste sludges or bead resin to fill a HIC. The SWMS tanks are sized for normal plant waste volumes with sufficient excess capacity to accommodate equipment downtime and expected maximum volumes that may occur. The tanks are constructed of stainless steel to provide a low corrosion rate during normal operation. They are provided with mixing eductors and/or air spargers. The capability exists to sample all SWMS tanks. All SWMS tanks are vented through a filtration unit and the exhausted air is eventually discharged into the plant vent. The SWMS tanks are designed in accordance with ASME Section III, Class 3; API 620; API 650 or AWWA D-100.

Table 11.4-2

Annual Shipped Waste Volumes♦

Waste Type		Estimated Annual Waste Generation m^3/yr (ft^3/yr)	Estimated Shipped Volume* m^3/yr (ft^3/yr)
Dry Active Solids (DAW):			
	Combustible waste:	225 (7,951)	225 (7,951)
	Compactable waste:	38 (1,343)	38 (1,343)
	Other waste:	100 (3,534)	100 (3,534)
	DAW Total	363 (12,827)	363 (12,827)
Wet Solid Wastes:			
	RWCU Spent Bead Resin:	7.6 (269)	7.6 (269)
	FAPCS Spent Bead Resin:	8.0 (283)	8.0 (283)
	Condensate Purification System Spent Bead Resin:	33.8 (1,194)	33.8 (1,194)
	LWMS Spent Bead Resin:	5.4 (191)	5.4 (191)
	Condensate Purification System Filter Sludge:	5.2 (184)	5.2 (184)
	LWMS Filter Sludge:	0.8 (28.3)	0.8 (28.3)
	LWMS Concentrated Waste◊:	50 (1,767)	25 (883)
	Wet Solid Waste Total	111 (3,922)	85.8 (3,032)
	Mixed Waste:	0.416 (14.71)	0.416 (14.71)

♦ It is assumed the COL holder will compact waste using a third party service. The waste volume reduction will be considered and determined by the COL holder depending on the type and level of waste and the waste compacting equipment and resulting compaction performance.

* Note the goal value is a long term average of resins and sludges in the dewatered condition and all other wastes packaged for shipment. The values for resins and sludges in the above table are volumes packaged for shipment.

◊ The volume reduction is based on LWMS Concentrated Waste moisture removal. An estimate of 50% volume reduction is thought to be conservative based on current moisture removal technologies, such evaporation and membrane-based operations.

NRC RAI 11.4-17

A review of the types of radioactive wastes described in DCD Tier 2,Revision 1, Section 11.4.2.2 indicates that there is no discussion on how large items, such as vessels, tanks, pumps, core components, etc. will be handled. Provide a description of equipment (cranes, decon equipment, etc.) and features of the radwaste building (shielding, staging areas, etc.) that will be used to process, handle, and package and ship large plant components. Describe information and operational considerations that would be addressed by the COL applicant in the process control program. Update equipment descriptions in DCD Tier 2, Table 11.4-1 and revise DCD Tier 2,Table 11.4-2 to describe the types and numbers, or projected amounts of such wastes.

GE Response

The reactor vessel, plant vessels, tanks and pumps are designed for the life of the plant. Replacement of the reactor vessel, plant vessels, and tanks is not anticipated, and, under the very unlikely event of their replacement, would be a special job task requiring special consideration of federal and state regulations in accordance with approved plant procedures. Approved containers that comply with applicable DOT, NRC state and local regulations, and licensed disposal site requirements, would be utilized in order to transport the contaminated equipment to an approved permitted facility. Overall, the ESBWR design incorporates several radwaste-reducing improvements. For example, reactor recirculation pump wear ring replacements have been a source of larger pieces of contaminated equipment. The ESBWR includes no reactor recirculation loops, thereby eliminating recirculation pump wear ring replacement and the associated radwaste of those larger items. As another example, the ESBWR, like the ABWR, uses finite motion control rod drives, as opposed to the over-under piston control rod drives of the former plants, thereby greatly improving the radiological cleanliness of the control rod drives, and reducing the volume of waste generated.

Therefore, only smaller equipment such as pumps and valves are anticipated to require normal maintenance, and the projected amount of that waste is already included in the estimated annual shipped waste volumes presented in Table 11.4-2.

DCD Impact

No DCD changes will be made in response to this RAI.