GE Energy

David H. Hinds
Manager, ESBWR

PO Box 780 M/C L60
Wilmington, NC 28402-0780
USA

T 910 675 6363
F 910 362 6363
david.hinds@ge.com

MFN 05-122

Project 717

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

Subject: **Additional Information Regarding ESBWR MAAP Parameters (TAC # MC8168)**

In the Reference 1 letter, GE provided the ESBWR MAAP parameter file and other associated files for the NRC's use as guidance in building their MELCOR model. Subsequently, the NRC requested additional data to complete the MELCOR input deck for the ESBWR. The following information is provided:

- Category I data (design-specific data that the NRC indicated is essential for MELCOR deck preparation)
- Category II data (design-specific data that the NRC indicated is desirable)
- Isometric Drawings and Core Plate Drawing referenced in the above tabulations of Category I and II data

Enclosure 1 contains GE proprietary information as defined by 10 CFR 2.390. GE customarily maintains this information in confidence and withholds it from public disclosure.

The affidavit contained in Enclosure 3 identifies that the information contained in Enclosure 1 has been handled and classified as proprietary to GE. GE hereby requests that the information of Enclosure 1 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17. A non-proprietary version is contained in Enclosure 2.

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

Sincerely,

David H. Hinds
Manager, ESBWR

Reference:
1. MFN 05-089, Letter from David H. Hinds to U. S. Nuclear Regulatory Commission, *ESBWR MAAP Parameters,* September 9, 2005

Enclosures:
1. MFN 05-122 – ESBWR MAAP Parameters – Category I and Category II Data – GE Proprietary Information
2. MFN 05-122 – ESBWR MAAP Parameters – Category I and Category II Data – Non Proprietary Version
3. Affidavit – George B. Stramback – dated October 28, 2005

cc: WD Beckner USNRC (w/o enclosures)
LA Dudes USNRC (w/o enclosures)
AE Cubbage USNRC (with enclosures)
GB Stramback GE (with enclosures)
eDRF 0000-0047-2518

ENCLOSURE 2

MFN 05-122

ESBWR MAAP Parameters –

Category I and Category II Data

Data Request	Response
Category I: Design-specific data that is essential for MELCOR deck preparation.	
1. Pitch or spacing between fuel assemblies in the core.	309.88 mm (12.2 inch) See DCD Table 1.3-1
2. Fuel pellet nominal density	[[ ]]
3. Dimensions of control rods.	To be provided later
Half-Span	
Blade Thickness	
Inner Diameter B4C Tube	
B4C Tube Thickness	
Cruciform Shroud Thickness	
Control Rod Pitch	
Central Filler Total Width	
Radius of Fillet at Vertex	
Active Poison Length	
Stroke	
Radius Tip	
4. Core shroud thickness.	[[ ]]
5. Core support plate thickness, and preferably a dimensioned drawing showing sizes and shapes of orifices for assembly inlets.	
Core Support Plate Thickness	[[ ]]
Core Support Plate Drawing	See file "Core Plate Page from Reactor Assembly.pdf"
6. Elevation and height of the steam dryers, and data from which could be derived the free volumes inside and outside of the dryers.	
Elevation from Vessel Bottom as ZERO to the Bottom of Steam Dryer Support Ring	[[ ]]
Elevation from Vessel Bottom as ZERO to the Top of Steam Dryer Lifting Lugs	[[ ]]
Total Dryer Volume	[[ ]]
Free Dryer Volume	[[ ]]

Category I – Continued

Data Request	Response
7. Inside diameter, thickness and material of the main steam lines. Also, information on insulation or expected heat losses through the MSL walls	
Outer Diameter of MSL	711 mm (28.0 inch)
Wall Thickness	[[ ]]
Material of MSL	Carbon Steel ASTM/ASME SA 333 Gr.6 Specification
Insulation thickness and material	[[ ]] Typical material of Insulation: THERMAL-WRAP® fiberglass blanket insulation system designed for use in nuclear power plant containments
8. Drawings and data on the drywell, wetwell, PCC/IC pools, and GDCS pools, from which could be independently derived heat sink information (i.e., surface areas and thicknesses of individual walls/floors/ceilings in various areas). MAAP had some data on heat sinks, but not in a degree of detail we would prefer for MELCOR modeling (i.e., only 17 total distributed and lumped heat sinks in MAAP, whereas we will need probably 30 to 50). Also include any available data on exposed steel structures within the containment (masses, surface areas, materials, locations).	See General Arrangement (GA) Drawing DCD Chapter 1 26A6642AD Rev 0 Note: Sensitive material. Additional GA drawing in AUTOCAD form may be provided on a case-by-case basis if more detail is required.
9. Elevation of GDCS equalization line discharge in the SP.	[[ ]] See Isometric Drawings, these give the number and locations of losses, standard piping loss coefficients (e.g. Crane Handbook) can be applied.

Category I - Continued

Data Request	Response
10. Drawings or schematics of full length of GDCS equalization lines, from which could be derived loss coefficient for flow. (Alternatively, a value of the loss coefficient itself could be supplied.)	See Isometric Drawings, these give the number and locations of losses, standard piping loss coefficients (e.g. Crane Handbook) can be applied.
11. Dimensioned drawings of BiMAC system, including location and elevation of drywell deluge lines.	[[ ]]
12. Drawings or schematics from which one could derive the loss coefficients for flow in the vent and condensate drain lines of the PCC and IC heat exchanger.	See Isometric Drawings, these give the number and locations of losses, standard piping loss coefficients (e.g. Crane Handbook) can be applied.
13. GDCS:	
Temperature at sensors embedded in basement below the RPV to activate the GDCS deluge system	[[ ]]

Category I - Continued

Data Request	Response
14.Isolation Condenser(IC)	
1. Elevations of the condensate drain lines in the IC bottom header	[[ ]]
2. Bottom header wall thickness in the heat exchangers	[[ ]]
3. Inlet line diameter for the heat exchangers	[[ ]]
4. Heat exchanger inlet line elevation at RPV	[[ ]]
5. Heat exchanger inlet line elevation in the upper header	[[ ]]
6. Heat exchanger inlet line length and inlet line loss coefficient	[[ ]] No values for loss coefficients available.
7. Heat exchanger top header wall thickness	[[ ]]
8. Heat exchanger tube length	[[ ]]

Category I – Continued

Data Request	Response
15. PCCS:	
1. Condensate drain lines elevation at GDCS pool	[[ ]]
2. Condensate drain lines inside diameter	[[ ]]
3. Condensate drain lines length	[[ ]]
4. Heat exchanger bottom header wall thickness	[[ ]]
5 Heat exchanger inlet line elevation in upper header	[[ ]]
6. Heat exchanger inlet line loss coefficient	Not available
7. Heat exchanger top header wall thickness	[[ ]]
8. Heat exchanger tube length	[[

	]]
9. Vent lines elevation at PCC bottom header	[[ ]]
16. Drywell Sprays:	
o Elevation of the spray header in the drywell	To be provided later

Category II

Data Request	Response
Category II Data	
1. Separate flow rates during full power operation for heated channels in the core, and bypass outside of channel boxes, if known (for use in inferring total losses in regions of the core).	Total core pressure drop = 70 kPa (DCD 26A6642AP Rev 00 Table 4.4-1a)
2. Nominal core inlet conditions pressure during full power operation	See DCD Figure 1.1-3a and 1.1-3b on ESBWR Heat Balance
3. Upper core plate / structures dimensions and elevations. Elevation of Top of Core Plate	[[ ]]
4. Thickness of chimney partitions.	[[ ]]
5. Reactor vessel upper head thickness.	[[ ]]
6. Outside diameter of steam separator standpipes.	[[ ]]
7. Thickness of feed water line pipe wall.	
Feed Water Pipe size and thickness	[[ ]]
8. Drawings and data on the reactor building outside of the primary containment boundary, and the turbine/auxiliary building, including values of, or drawings from which could be measured, the following parameters:	See General Arrangement (GA) Drawing DCD Chapter 1 26A6642AD Rev 0 Sensitive material. Additional GA drawing in the AUTOCAD form may be provided on case-by-case basis if more detail is required.
a. Free volume in various compartments	See GA Drawings Also see DCD Table 1.3-3
b. Elevations	See GA Drawings
c. Positions and sizes of doorways, stairwells, or other flow areas between compartments	See GA Drawings
d. Surface areas, thickness, and materials of floors, walls, and ceilings	See GA Drawings and Appendix 3G of DCD

Category II (continued)

Data Request	Response
e. Nominal pressure and temperature during operation	Site conditions are on DCD 3.8-10 for pressure and Table 3G.1-2 for temperature.
f. Building failure conditions (over-pressure, over-temperature), if known	Ultimate strength of Reactor Building for pressure and temperature are not normally calculated. An indication of the ultimate capability of the Reactor Building walls in resisting design seismic loads shows a factor of safety exceeding 6 on NEDC-33201P Section 15 Table 15-2.
g. Leakage rates (if known) to the environment	See DCD Table 1.3-4
9. Material of inside cladding of the reactor vessel wall.	The materials used in the RPV are listed in DCD Table 5.2-4. The cylindrical shell and top and bottom heads of the RPV are fabricated of low alloy steel, the interior of which is clad with stainless steel weld overlay, except for the top head and most nozzles. The main steam and bottom head drain nozzles are clad with stainless steel weld overlay. The bottom head is clad with Ni-Cr-Fe alloy. The welding material used for cladding in the shell area is ASME SFA 5.9 or SFA 5.4, type 309L or 309MoL for the first layer, and type 308L or 309L/MoL for subsequent layers. For the bottom head cladding, the welding material is ASME SFA 5.14, type ERNiCr-3.
10.Materials of reactor vessel lower head penetrations.	The control rod drive (CRD) housings are inserted through the CRD penetrations in the reactor vessel bottom head and are welded to forged stub tubes made of Ni-Cr-Fe ASME Code Case N-580-1 material. Each in-core neutron flux monitor housing is inserted though the in-core penetrations in the bottom head and welded to forged Ni-Cr-Fe ASME Code Case N-580-1 stub tubes and provided with lateral supports. Also see DCD Table 4.5-1 Reactor Internal Material Specifications

Data Request	Response
11.Nominal quality of steam exiting the steam dryers in the reactor vessel.	Quality = 99.9 % (Moisture % in RPV Dome = 0.1% See DCD Figure 1.1-3a and 1.1-3b on ESBWR Heat Balance)
12.Leakage area or rate from the SP gas space to the reactor building, if different from that from the drywell to the reactor building.	See DCD Table 1.3-3
13.Leakage area or rate from the drywell to the SP gas space (i.e., not including vacuum breakers or main vent flow).	See DCD Table 1.3-3
14.Drawings or schematics of full length of drywell deluge lines, from which could be derived loss coefficient for deluge flow. (Alternatively, a value of the loss coefficient itself could be supplied.)	See DCD Figure 6.3.1 that shows the deluge lines originate from the main GDCS injection line coming out from the GDCS pool.[[ ]]

ENCLOSURE 3

MFN 05-122

Affidavit

General Electric Company

AFFIDAVIT

I, George B. Stramback, state as follows:

(1) I am Manager, Regulatory Services, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in GE letter MFN 05-122, David H. Hinds to USNRC, *Additional Information Regarding ESBWR MAAP Parameters (TAC # MC8168),* dated October 28, 2005. The proprietary information in Enclosure 1, *ESBWR MAAP Parameters – Category I and Category II Data,* is identified by a dark red font with double underlines inside double square brackets. Figures and large equation objects are identified with double brackets before and after the object. In each case, the superscript notation{3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.790(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by General Electric's competitors without license from General Electric constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, resulting in potential products to General Electric;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a., and (4)b, above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GE, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within GE is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains the details of the evaluation model supporting the probabilistic analysis that GE developed to estimate the core damage frequency of the ESBWR. This model is based on previous European SBWR information developed over several years at a significant cost to GE.

The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GE asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE's comprehensive BWR safety and technology base, and its commercial value extends

beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GE.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GE would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 28th day of October 2005

George B. Stramback
General Electric Company

ENCLOSURE 1

MFN 05-122

ESBWR MAAP Parameters –

Category I and Category II Data

Contains GE Proprietary Information

PROPRIETARY INFORMATION NOTICE

This enclosure contains proprietary information of the General Electric Company (GE) and is furnished in confidence solely for the purpose(s) stated in the transmittal letter. No other use, direct or indirect, of the document or the information it contains is authorized. Furnishing this enclosure does not convey any license, express or implied, to use any patented invention or, except as specified above, any proprietary information of GE disclosed herein or any right to publish or make copies of the enclosure without prior written permission of GE. The proprietary information is identified by a dark red font with double underlines inside double square brackets. [[This sentence is an example {3}]]. Figures and large equation objects are identified with double square brackets before and after the object. In each case, the superscript notation {3} refers to Paragraph (3) of the enclosed affidavit, which provides the basis for the proprietary determination.