

From: <Tony_Banks@Dom.com>
To: "Nitin Patel" <NXP1@nrc.gov>
Date: 6/8/2006 3:14:12 PM
Subject: Re: References--RAIs 4 AND 6 of RAI Letter dated 5/10/2006

Nitin - attached are the relevant pages from GE correspondence referenced in Dominion's May 24, 2006 responses to NRC's May 10, 2006 RAIs 4 and 6. Content from GEDO letters -0014 and -0026 provide information for RAI 4. Content from GEDO letter -0020 provides information for RAI 6. (This is the same information that was provided in the 5/24/06 response.)

Joe and I will follow up this transmittal with a letter.

Please let me know if you have any questions - thank you.

Tony Banks, MPH, CHMM
Dominion
ESP/COL Project
Project Lead - Environmental
804/273-2170

(See attached file: 060806 GEDO-SR5-2006-0026-ESBWR_EAB Dose_tb.pdf)(See attached file: 060806 GEDO-SR5-2006-0014-ESBWR_LOCA_Values_Report_tb.pdf)
(See attached file: 060806 GEDO-SR5-2006-0020-ESBWR Source Term based on MAAP runs_tb.pdf)

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CC: "Jack Cushing" <JXC9@nrc.gov>, <Joseph_Hegner@Dom.com>, <rlbaker@bechtel.com>, "Kingston, Rick E. (GE Infra, Energy)" <Rick.Kingston@ge.com>, <Tony_Banks@Dom.com>

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Subject: Re: References--RAIs 4 AND 6 of RAI Letter dated 5/10/2006
Creation Date 6/8/2006 3:13:06 PM
From: <Tony_Banks@Dom.com>

Created By: Tony_Banks@Dom.com

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 JXC9 CC (Jack Cushing)

ge.com
 Rick.Kingston CC (Rick E. (GE Infra Energy) Kingston)

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Files	Size	Date & Time
MESSAGE	1601	6/8/2006 3:13:06 PM
060806 GEDO-SR5-2006-0026-ESBWR_EAB Dose_tb.pdf	93518	
060806 GEDO-SR5-2006-0014-ESBWR_LOCA_Values_Report_tb.pdf	110488	
060806 GEDO-SR5-2006-0020-ESBWR Source Term based on MAAP runs_tb.pdf	105872	
Mime.822	428118	

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Concealed Subject: No
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GE Nuclear Energy		GE-NE-0000-0051-4988				
Title: ESBWR LOCA Radiological Analysis Values				Originator: E. Kirstein		NSA
				DRF Number: 0000-0031-5955		
				DRF Section #: 0000-0051-4988		
Verified	Final	GE/GNF External	Date: 3/1/06	Sheet 1 of 4		

Values are provided from the ESBWR LOCA radiological analysis. The two items are:

- (1) Isotopic releases to the environment for all radionuclides. These values are provided in Tables 1 and 2 below.
- (2) The Low Population Zone (LPZ) doses as a function of time. These values are provided in Table 3 below.

Table 1 – ESBWR LOCA Releases to the Environment (0.5 – 48 hours)

Time (hr)	Release to Environment (Ci)									
	0.5	2	4	8	12	16	24	30	36	48
Co-58		1.82E-03	8.13E-03	1.96E-02	2.94E-02	3.77E-02	5.07E-02	5.80E-02	6.37E-02	7.18E-02
Co-60		1.75E-03	7.85E-03	1.90E-02	2.84E-02	3.64E-02	4.91E-02	5.62E-02	6.18E-02	6.97E-02
Kr-85	2.57E-02	5.27E+00	4.81E+01	2.64E+02	6.33E+02	1.13E+03	2.44E+03	3.63E+03	4.96E+03	7.92E+03
Kr-85m	5.34E-01	9.09E+01	6.69E+02	2.50E+03	4.22E+03	5.42E+03	6.67E+03	7.06E+03	7.23E+03	7.33E+03
Kr-87	8.74E-01	9.39E+01	4.23E+02	7.82E+02	8.56E+02	8.66E+02	8.68E+02	8.68E+02	8.68E+02	8.68E+02
Kr-88	1.40E+00	2.14E+02	1.40E+03	4.31E+03	6.24E+03	7.16E+03	7.75E+03	7.84E+03	7.87E+03	7.88E+03
Rb-86	3.26E-03	1.10E-01	3.96E-01	9.12E-01	1.35E+00	1.72E+00	2.29E+00	2.61E+00	2.86E+00	3.21E+00
Sr-89		2.82E+00	1.26E+01	3.05E+01	4.56E+01	5.85E+01	7.86E+01	8.99E+01	9.88E+01	1.11E+02
Sr-90		2.78E-01	1.25E+00	3.01E+00	4.51E+00	5.79E+00	7.79E+00	8.92E+00	9.81E+00	1.11E+01
Sr-91		3.16E+00	1.31E+01	2.76E+01	3.69E+01	4.27E+01	4.86E+01	5.05E+01	5.15E+01	5.23E+01
Sr-92		2.54E+00	8.68E+00	1.41E+01	1.58E+01	1.63E+01	1.64E+01	1.65E+01	1.65E+01	1.65E+01
Y-90		5.07E-03	3.45E-02	1.41E-01	2.92E-01	4.73E-01	8.66E-01	1.15E+00	1.42E+00	1.89E+00
Y-91		3.67E-02	1.67E-01	4.13E-01	6.31E-01	8.22E-01	1.13E+00	1.31E+00	1.45E+00	1.65E+00
Y-92		3.91E-01	2.78E+00	8.45E+00	1.21E+01	1.40E+01	1.51E+01	1.53E+01	1.54E+01	1.54E+01
Y-93		3.95E-02	1.64E-01	3.49E-01	4.70E-01	5.45E-01	6.25E-01	6.53E-01	6.67E-01	6.78E-01
Zr-95		5.11E-02	2.29E-01	5.52E-01	8.26E-01	1.06E+00	1.42E+00	1.63E+00	1.79E+00	2.02E+00
Zr-97		4.93E-02	2.11E-01	4.72E-01	6.60E-01	7.94E-01	9.60E-01	1.03E+00	1.07E+00	1.12E+00
Nb-95		5.14E-02	2.30E-01	5.55E-01	8.32E-01	1.07E+00	1.44E+00	1.65E+00	1.81E+00	2.04E+00
Mo-99		6.64E-01	2.94E+00	6.95E+00	1.02E+01	1.29E+01	1.68E+01	1.89E+01	2.04E+01	2.24E+01
Tc-99m		5.97E-01	2.67E+00	6.39E+00	9.48E+00	1.20E+01	1.59E+01	1.80E+01	1.95E+01	2.16E+01
Ru-103		5.33E-01	2.38E+00	5.75E+00	8.61E+00	1.10E+01	1.48E+01	1.69E+01	1.86E+01	2.10E+01
Ru-105		2.78E-01	1.05E+00	1.95E+00	2.37E+00	2.54E+00	2.66E+00	2.68E+00	2.69E+00	2.69E+00
Ru-106		1.86E-01	8.32E-01	2.01E+00	3.01E+00	3.86E+00	5.20E+00	5.95E+00	6.54E+00	7.38E+00
Rh-105		3.24E-01	1.44E+00	3.43E+00	5.04E+00	6.31E+00	8.11E+00	9.00E+00	9.63E+00	1.04E+01
Sb-127		7.27E-01	3.23E+00	7.68E+00	1.14E+01	1.44E+01	1.89E+01	2.14E+01	2.32E+01	2.56E+01
Sb-129		1.74E+00	6.54E+00	1.21E+01	1.45E+01	1.56E+01	1.63E+01	1.64E+01	1.64E+01	1.64E+01
Te-127		7.43E-01	3.31E+00	7.91E+00	1.17E+01	1.49E+01	1.98E+01	2.25E+01	2.45E+01	2.72E+01
Te-127m		9.76E-02	4.37E-01	1.06E+00	1.58E+00	2.03E+00	2.73E+00	3.13E+00	3.44E+00	3.89E+00
Te-129		1.93E+00	7.64E+00	1.49E+01	1.88E+01	2.12E+01	2.41E+01	2.54E+01	2.63E+01	2.76E+01
Te-129m		3.27E-01	1.46E+00	3.54E+00	5.29E+00	6.78E+00	9.12E+00	1.04E+01	1.14E+01	1.29E+01
Te-131m		9.76E-01	4.26E+00	9.84E+00	1.42E+01	1.75E+01	2.21E+01	2.43E+01	2.58E+01	2.75E+01

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Verified	Final	GE/GNF External		Date: 3/1/06	Sheet 2 of 4	

Time (hr)	Release to Environment (Ci)									
	0.5	2	4	8	12	16	24	30	36	48
Te-132		9.93E+00	4.40E+01	1.05E+02	1.54E+02	1.95E+02	2.55E+02	2.88E+02	3.12E+02	3.43E+02
I-131	1.37E+00	5.33E+01	1.98E+02	4.64E+02	6.93E+02	8.90E+02	1.21E+03	1.40E+03	1.57E+03	1.82E+03
I-132	1.82E+00	6.30E+01	1.96E+02	3.38E+02	4.11E+02	4.61E+02	5.34E+02	5.72E+02	6.01E+02	6.38E+02
I-133	2.79E+00	1.05E+02	3.77E+02	8.33E+02	1.18E+03	1.45E+03	1.81E+03	1.99E+03	2.11E+03	2.26E+03
I-134	2.27E+00	3.97E+01	7.27E+01	8.05E+01	8.07E+01	8.08E+01	8.08E+01	8.08E+01	8.08E+01	8.08E+01
I-135	2.54E+00	8.85E+01	2.94E+02	5.74E+02	7.36E+02	8.26E+02	9.07E+02	9.30E+02	9.41E+02	9.48E+02
Xe-133	4.23E+00	8.64E+02	7.83E+03	4.24E+04	1.00E+05	1.76E+05	3.69E+05	5.39E+05	7.22E+05	1.11E+06
Xe-135	1.44E+00	2.94E+02	2.51E+03	1.15E+04	2.29E+04	3.41E+04	5.25E+04	6.23E+04	6.93E+04	7.73E+04
Cs-134	2.74E-01	9.29E+00	3.35E+01	7.73E+01	1.15E+02	1.46E+02	1.96E+02	2.24E+02	2.46E+02	2.78E+02
Cs-136	9.53E-02	3.22E+00	1.16E+01	2.66E+01	3.93E+01	5.00E+01	6.66E+01	7.58E+01	8.30E+01	9.29E+01
Cs-137	1.78E-01	6.03E+00	2.17E+01	5.02E+01	7.44E+01	9.50E+01	1.27E+02	1.46E+02	1.60E+02	1.80E+02
Ba-139		2.37E+00	6.46E+00	8.37E+00	8.58E+00	8.61E+00	8.61E+00	8.61E+00	8.61E+00	8.61E+00
Ba-140		5.01E+00	2.24E+01	5.38E+01	8.03E+01	1.03E+02	1.37E+02	1.56E+02	1.71E+02	1.92E+02
La-140		1.12E-01	8.34E-01	3.64E+00	7.63E+00	1.24E+01	2.26E+01	2.99E+01	3.66E+01	4.77E+01
La-141		3.60E-02	1.33E-01	2.41E-01	2.86E-01	3.04E-01	3.14E-01	3.16E-01	3.16E-01	3.16E-01
La-142		2.27E-02	6.49E-02	8.74E-02	9.06E-02	9.09E-02	9.10E-02	9.10E-02	9.10E-02	9.10E-02
Ce-141		1.19E-01	5.34E-01	1.29E+00	1.93E+00	2.47E+00	3.32E+00	3.79E+00	4.16E+00	4.69E+00
Ce-143		1.08E-01	4.71E-01	1.09E+00	1.58E+00	1.96E+00	2.49E+00	2.74E+00	2.92E+00	3.13E+00
Ce-144		9.70E-02	4.34E-01	1.05E+00	1.57E+00	2.01E+00	2.71E+00	3.11E+00	3.41E+00	3.85E+00
Pr-143		4.37E-02	1.96E-01	4.76E-01	7.16E-01	9.22E-01	1.25E+00	1.43E+00	1.58E+00	1.79E+00
Nd-147		1.90E-02	8.48E-02	2.04E-01	3.04E-01	3.88E-01	5.19E-01	5.91E-01	6.47E-01	7.24E-01
Np-239		1.35E+00	5.96E+00	1.41E+01	2.06E+01	2.59E+01	3.36E+01	3.76E+01	4.06E+01	4.43E+01
Pu-238		2.38E-04	1.07E-03	2.58E-03	3.86E-03	4.95E-03	6.67E-03	7.64E-03	8.40E-03	9.48E-03
Pu-239		2.87E-05	1.29E-04	3.11E-04	4.66E-04	5.98E-04	8.06E-04	9.23E-04	1.02E-03	1.15E-03
Pu-240		3.72E-05	1.66E-04	4.02E-04	6.02E-04	7.73E-04	1.04E-03	1.19E-03	1.31E-03	1.48E-03
Pu-241		1.08E-02	4.83E-02	1.17E-01	1.75E-01	2.24E-01	3.02E-01	3.46E-01	3.80E-01	4.29E-01
Am-241		4.86E-06	2.18E-05	5.26E-05	7.90E-05	1.01E-04	1.37E-04	1.57E-04	1.72E-04	1.95E-04
Cm-242		1.14E-03	5.10E-03	1.23E-02	1.84E-02	2.36E-02	3.18E-02	3.64E-02	4.00E-02	4.52E-02
Cm-244		5.53E-05	2.47E-04	5.97E-04	8.95E-04	1.15E-03	1.55E-03	1.77E-03	1.95E-03	2.20E-03

GE Nuclear Energy		GE-NE-0000-0051-4988			
Title: ESBWR LOCA Radiological Analysis Values				Originator: E. Kirstein	
				DRF Number: 0000-0031-5955	
				DRF Section #: 0000-0051-4988	
Verified	Final	GE/GNF External	Date: 3/1/06	Sheet 3 of 4	

Table 2 – ESBWR LOCA Releases to the Environment (60 – 720 hours)

Time (hr)	Release to Environment (Ci)						
	60	72	84	96	288	480	720
Co-58	7.70E-02	8.03E-02	8.25E-02	8.41E-02	9.36E-02	9.96E-02	1.05E-01
Co-60	7.48E-02	7.81E-02	8.03E-02	8.19E-02	9.17E-02	9.84E-02	1.05E-01
Kr-85	1.12E+04	1.46E+04	1.73E+04	1.91E+04	2.83E+04	4.05E+04	6.16E+04
Kr-85m	7.35E+03	7.35E+03	7.35E+03	7.35E+03	7.35E+03	7.35E+03	7.35E+03
Kr-87	8.68E+02	8.68E+02	8.68E+02	8.68E+02	8.68E+02	8.68E+02	8.68E+02
Kr-88	7.88E+03	7.88E+03	7.88E+03	7.88E+03	7.88E+03	7.88E+03	7.88E+03
Rb-86	3.43E+00	3.57E+00	3.66E+00	3.72E+00	4.08E+00	4.25E+00	4.38E+00
Sr-89	1.19E+02	1.24E+02	1.28E+02	1.30E+02	1.44E+02	1.53E+02	1.61E+02
Sr-90	1.19E+01	1.24E+01	1.28E+01	1.30E+01	1.46E+01	1.56E+01	1.67E+01
Sr-91	5.25E+01	5.26E+01	5.26E+01	5.26E+01	5.26E+01	5.26E+01	5.26E+01
Sr-92	1.65E+01	1.65E+01	1.65E+01	1.65E+01	1.65E+01	1.65E+01	1.65E+01
Y-90	2.24E+00	2.51E+00	2.71E+00	2.87E+00	4.17E+00	5.22E+00	6.27E+00
Y-91	1.78E+00	1.86E+00	1.91E+00	1.95E+00	2.19E+00	2.33E+00	2.46E+00
Y-92	1.54E+01	1.54E+01	1.54E+01	1.54E+01	1.54E+01	1.54E+01	1.54E+01
Y-93	6.82E-01	6.83E-01	6.83E-01	6.83E-01	6.83E-01	6.83E-01	6.83E-01
Zr-95	2.16E+00	2.26E+00	2.32E+00	2.36E+00	2.63E+00	2.79E+00	2.94E+00
Zr-97	1.13E+00	1.14E+00	1.14E+00	1.14E+00	1.14E+00	1.14E+00	1.14E+00
Nb-95	2.19E+00	2.29E+00	2.35E+00	2.40E+00	2.68E+00	2.88E+00	3.06E+00
Mo-99	2.35E+01	2.41E+01	2.45E+01	2.47E+01	2.54E+01	2.55E+01	2.55E+01
Tc-99m	2.27E+01	2.33E+01	2.37E+01	2.40E+01	2.47E+01	2.47E+01	2.47E+01
Ru-103	2.24E+01	2.34E+01	2.40E+01	2.45E+01	2.71E+01	2.87E+01	3.00E+01
Ru-105	2.69E+00	2.69E+00	2.69E+00	2.69E+00	2.69E+00	2.69E+00	2.69E+00
Ru-106	7.92E+00	8.26E+00	8.50E+00	8.67E+00	9.69E+00	1.04E+01	1.11E+01
Rh-105	1.08E+01	1.09E+01	1.10E+01	1.11E+01	1.12E+01	1.12E+01	1.12E+01
Sb-127	2.70E+01	2.79E+01	2.84E+01	2.87E+01	2.99E+01	3.01E+01	3.01E+01
Sb-129	1.64E+01	1.64E+01	1.64E+01	1.64E+01	1.64E+01	1.64E+01	1.64E+01
Te-127	2.89E+01	2.99E+01	3.05E+01	3.09E+01	3.25E+01	3.31E+01	3.34E+01
Te-127m	4.17E+00	4.35E+00	4.47E+00	4.56E+00	5.10E+00	5.46E+00	5.79E+00
Te-129	2.84E+01	2.89E+01	2.92E+01	2.95E+01	3.09E+01	3.16E+01	3.23E+01
Te-129m	1.38E+01	1.44E+01	1.48E+01	1.50E+01	1.66E+01	1.75E+01	1.83E+01
Te-131m	2.83E+01	2.88E+01	2.90E+01	2.91E+01	2.93E+01	2.93E+01	2.93E+01
Te-132	3.61E+02	3.71E+02	3.78E+02	3.82E+02	3.95E+02	3.97E+02	3.97E+02
I-131	2.01E+03	2.17E+03	2.29E+03	2.36E+03	2.66E+03	2.81E+03	2.92E+03
I-132	6.60E+02	6.72E+02	6.80E+02	6.85E+02	7.01E+02	7.02E+02	7.03E+02
I-133	2.34E+03	2.38E+03	2.41E+03	2.42E+03	2.43E+03	2.43E+03	2.43E+03
I-134	8.08E+01	8.08E+01	8.08E+01	8.08E+01	8.08E+01	8.08E+01	8.08E+01
I-135	9.50E+02	9.50E+02	9.50E+02	9.50E+02	9.50E+02	9.50E+02	9.50E+02
Xe-133	1.51E+06	1.90E+06	2.20E+06	2.38E+06	2.96E+06	3.21E+06	3.34E+06

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Verified	Final	GE/GNF External	Date: 3/1/06	Sheet 4 of 4	

Time (hr)	Release to Environment (Ci)						
	60	72	84	96	288	480	720
Xe-135	8.08E+04	8.22E+04	8.27E+04	8.29E+04	8.29E+04	8.29E+04	8.29E+04
Cs-134	2.98E+02	3.11E+02	3.19E+02	3.26E+02	3.65E+02	3.91E+02	4.17E+02
Cs-136	9.91E+01	1.03E+02	1.06E+02	1.07E+02	1.17E+02	1.21E+02	1.23E+02
Cs-137	1.93E+02	2.02E+02	2.07E+02	2.11E+02	2.37E+02	2.54E+02	2.71E+02
Ba-139	8.61E+00	8.61E+00	8.61E+00	8.61E+00	8.61E+00	8.61E+00	8.61E+00
Ba-140	2.05E+02	2.13E+02	2.18E+02	2.22E+02	2.41E+02	2.49E+02	2.54E+02
La-140	5.58E+01	6.17E+01	6.60E+01	6.92E+01	8.89E+01	9.84E+01	1.04E+02
La-141	3.16E-01	3.16E-01	3.16E-01	3.16E-01	3.16E-01	3.16E-01	3.16E-01
La-142	9.10E-02	9.10E-02	9.10E-02	9.10E-02	9.10E-02	9.10E-02	9.10E-02
Ce-141	5.01E+00	5.23E+00	5.37E+00	5.47E+00	6.04E+00	6.37E+00	6.64E+00
Ce-143	3.23E+00	3.28E+00	3.31E+00	3.33E+00	3.35E+00	3.35E+00	3.35E+00
Ce-144	4.13E+00	4.31E+00	4.43E+00	4.52E+00	5.06E+00	5.41E+00	5.76E+00
Pr-143	1.92E+00	2.01E+00	2.06E+00	2.10E+00	2.32E+00	2.41E+00	2.47E+00
Nd-147	7.72E-01	8.02E-01	8.22E-01	8.35E-01	9.03E-01	9.30E-01	9.46E-01
Np-239	4.63E+01	4.75E+01	4.82E+01	4.86E+01	4.97E+01	4.97E+01	4.97E+01
Pu-238	1.02E-02	1.06E-02	1.09E-02	1.11E-02	1.25E-02	1.34E-02	1.43E-02
Pu-239	1.23E-03	1.28E-03	1.32E-03	1.35E-03	1.51E-03	1.62E-03	1.73E-03
Pu-240	1.59E-03	1.66E-03	1.70E-03	1.74E-03	1.95E-03	2.09E-03	2.23E-03
Pu-241	4.60E-01	4.80E-01	4.94E-01	5.04E-01	5.64E-01	6.05E-01	6.46E-01
Am-241	2.09E-04	2.18E-04	2.25E-04	2.29E-04	2.59E-04	2.80E-04	3.03E-04
Cm-242	4.84E-02	5.05E-02	5.20E-02	5.30E-02	5.92E-02	6.32E-02	6.71E-02
Cm-244	2.36E-03	2.46E-03	2.53E-03	2.58E-03	2.89E-03	3.10E-03	3.31E-03

Table 3 – ESBWR LOCA LPZ TEDE Doses

Time (hr)	LPZ TEDE (rem)
0	0.00E+00
8	2.15E+00
24	3.73E+00
96	5.30E+00
720	5.60E+00