

PMVictoriaESPPEm Resource

From: Govan, Tekia
Sent: Tuesday, April 26, 2011 4:26 PM
To: VictoriaESP Resource
Subject: FW: Exelon Response to NRC RAI Letter No. 06
Attachments: NP-11-0012 - Response to Request for Additional Information Letter No. 06.pdf

Tekia V. Govan, Project Manager
U.S. Nuclear Regulatory Commission
Office of New Reactors
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Washington DC 20555-0001
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Tekia.Govan@nrc.gov

From: david.distel@exeloncorp.com [<mailto:david.distel@exeloncorp.com>]
Sent: Tuesday, April 26, 2011 4:09 PM
To: Govan, Tekia
Subject: Exelon Response to NRC RAI Letter No. 06

Tekia – Attached is the Exelon Response to NRC RAI Letter No. 06, NP-11-0012, dated April 26, 2011. This is a partial response addressing RAIs 15-1 and 15-2.

Dave Distel

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Subject: FW: Exelon Response to NRC RAI Letter No. 06
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From: Govan, Tekia

Created By: Tekia.Govan@nrc.gov

Recipients:
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NP-11-0012
April 26, 2011

10 CFR 52, Subpart A

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Exelon Nuclear Texas Holdings, LLC
Victoria County Station Early Site Permit Application
Response to Request for Additional Information Letter No. 06
NRC Docket No. 52-042

Attached are responses to NRC staff questions included in Request for Additional Information (RAI) Letter No. 06, dated March 31, 2011, related to Early Site Permit Application (ESPA), Part 2, Section 15.1. NRC RAI Letter No. 06 contained twenty RAI Questions. This submittal comprises a partial response to RAI Letter No. 06, and includes responses to the following two Questions:

15-1
15-2

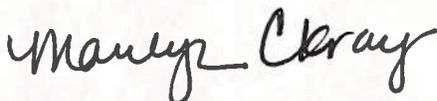
When a change to the ESPA is indicated by a Question response, the change will be incorporated into the next routine revision of the ESPA, planned for no later than March 31, 2012.

The response to RAI Questions 13.03-20 through 13.03-35, and 02.04.04-2 will be provided by May 15, 2011. The response to RAI Question 02.04.04-1 will be provided by September 27, 2011. These response times are consistent with NRC RAI Letter No. 06, dated March 31, 2011.

Regulatory commitments established in this submittal are identified in Attachment 3. If any additional information is needed, please contact David J. Distel at (610) 765-5517.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 26th day of April, 2011.

Respectfully,



Marilyn C. Kray
Vice President, Nuclear Project Development

April 26, 2011
U. S. Nuclear Regulatory Commission
Page 2

Attachments:

1. Question 15-1
2. Question 15-2
3. Summary of Regulatory Commitments

cc: USNRC, Director, Office of New Reactors/NRLPO (w/Attachments)
USNRC, Project Manager, VCS, Division of New Reactor Licensing (w/Attachments)
USNRC Region IV, Regional Administrator (w/Attachments)

RAI 15-1:**Question:**

RS-002 provides guidance regarding the information that is needed to satisfy the site acceptance criteria in 10 CFR 52.17 (a)(1) when addressing the potential radiological consequences of Design Basis Accidents (DBA) for the reactor designs considered in the VCS ESP application. In chapter 15 of the VCS ESP application, the applicant uses the DCD X/Q values for dose determination from AP1000 DCD Rev.18. However, AP1000 DCD revision 17 is the revision number referenced in SSAR Section 15.1. The DCD X/Q values from revision 17 of the AP1000 DCD are referenced when X/Q values from the AP1000 DCD revision 18 are used in section 15.1 of the VCS ESP SSAR. Please correct the discrepancy.

Response:

AP1000 DCD Revisions 17 and 18 both use two sets of identical X/Q values for accidents: one for Loss-of-Coolant Accident (LOCA) and one for all other DBAs. While Revision 18 of DCD Table 15A-5 explicitly lists both sets of X/Q values, Revision 17 lists the LOCA values only and indicates that non-LOCA values are higher.

The higher non-LOCA values used for AP1000 DCD Revision 17 were provided to Exelon for inclusion in the VCS ESP application by Westinghouse in LTR-CRA-10-35, Revision 1, "AP1000 Accident Doses and Releases as a Function of Time for DCD Rev. 17," dated November 1, 2010, which is provided as an Attachment A to this response. It is seen that the LOCA and non-LOCA X/Q values in this document are the same as those in AP1000 DCD Revision 18. Because the VCS ESP application is based on AP1000 DCD Revision 17, the reference to this DCD revision is retained.

Associated ESPA Revision:

No ESPA revision is required as a result of this RAI response.

Westinghouse in LTR-CRA-10-35, Revision 1
“AP1000 Accident Doses and Releases as a Function of Time for DCD Rev. 17”
dated November 1, 2010

(15 Pages)



To: J. Whiteman

Date: November 1, 2010

cc: C. Lease

From: Containment & Radiological Analysis

Ext: 412-374-3955

Fax: 412-374-3846

Our ref: LTR-CRA-10-35, Revision 1

- Ref:
1. APP-SSAR-GSC-512 (CN-CRA-01-91), Rev. 1. "AP1000 Steam Generator Tube Rupture Radiological Doses," Sept. 2003.
 2. APP-SSAR-GSC-531 (CN-CRA-02-10), Rev. 1. "AP1000 Steamline Break Doses," Sept. 2003.
 3. APP-SSAR-GSC-530 (CN-CRA-02-9), Rev. 3. "AP1000 Rod Ejection Accident Doses," Feb. 2008.
 4. APP-SSAR-GSC-591 (CN-CRA-02-25), Rev. 1. "AP1000 Locked Rotor Accident Doses," Sept. 2003.
 5. APP-SSAR-GSC-511 (CN-CRA-01-79), Rev. 2. "AP1000 Fuel Handling Accident Radiological Doses," May 2007.
 6. APP-PRA-GSC-024 (CN-CRA-02-26), Rev. 2. "AP1000 – Radiological Consequences of Small Line Break Outside Containment," May 2007.
 7. APP-SSAR-GSC-560 (CN-CRA-01-67), Rev. 7. "AP1000 – LOCA Dose Analysis," Sept. 2008.
 8. LTR-CRA-08-214. "AP1000 Accident Doses and Releases as a Function of Time," October 6, 2008.
 9. Westinghouse Corrective Actions Process Issue Report 10-299-M025. "Two Errors Identified in AP1000 Release Letter," October 26, 2010

Subject: AP1000 Accident Doses and Releases as a Function of Time for DCD Rev. 17

The computer runs for the AP1000 accident radiological consequences analyses have been reviewed and the doses and activity releases have been extracted for the significant time intervals and are provided in the following pages. The doses and releases for the Loss of Coolant Accident (LOCA) reflect the revised analyses as reported in Revision 17 to the Design Control Document (DCD). The accident releases for the events other than LOCA were calculated from output files of References 1 through 6. LOCA doses and releases are from Reference 7 and are consistent with those from Reference 8. The accidents addressed are:

- Large break LOCA
- Main steam line break (MSLB) with accident-initiated iodine spike
- Main steam line break (MSLB) with pre-existing iodine spike
- Locked rotor (LRA) with feedwater unavailable
- Locked rotor (LRA) with feedwater available
- Rod ejection (CRE)
- Steam generator tube rupture (SGTR) with accident-initiated iodine spike
- Steam generator tube rupture (SGTR) with pre-existing iodine spike
- Small line break outside containment (SLBOCA)
- Fuel handling accident (FHA)

Activity releases that are lower than 1.0E-10 Ci are reported as being zero.

Revision 1 addresses the errors identified in Reference 9. The small line break outside containment LPZ dose is corrected. The Rb-86 releases for the rod ejection are corrected. The atmospheric dispersion factor discussion is updated. All other information is unchanged.

The LOCA dose analysis assumes the following atmospheric dispersion values:

Exclusion Area Boundary (EAB):

0-2 hr 5.1E-4 sec/m³

Low Population Zone (LPZ):

0-8 hr 2.2E-4 sec/m³

8-24 hr 1.6E-4 sec/m³

24-96 hr 1.0E-4 sec/m³

96-720 hr 8.0E-5 sec/m³

Doses reported for events other than LOCA use the following atmospheric dispersion factors:

Exclusion Area Boundary:

0-2 hr 1.0E-3 sec/m³

Low Population Zone:

0-8 hr 5.0E-4 sec/m³

8-24 hr 3.0E-4 sec/m³

24-96 hr 1.5E-4 sec/m³

96-720 hr 8.0E-5 sec/m³

Note, the doses provided herein are the actual calculated doses and do not include the rounding-up that may be reflected in the doses reported in the DCD.

If there are any questions on the attached material, please contact the undersigned.

Jacklyn Conley *Electronically Approved
Containment & Radiological Analysis

Verifier:
S.T. Kinnas *Electronically Approved
Containment & Radiological Analysis

Approved:
K.W. Bonadio, Manager *Electronically Approved
Containment & Radiological Analysis

Summary of Doses and Activity Releases for the AP1000 Design Basis Accidents

Accident Doses as a Function of Time

Accident	LPZ Dose during Time Interval (rem TEDE*)			
	0-8 hr	8-24 hr	24-96 hr	96-720 hr
LOCA	2.17E+01	7.50E-01	2.93E-01	5.49E-01
SGTR with accident-initiated iodine spike	6.10E-01	1.68E-01	N/A	N/A
SGTR with pre-existing iodine spike	1.16E+00	7.20E-02	N/A	N/A
MSLB with accident-initiated iodine spike	1.02E+00	3.77E-01	5.36E-01	N/A
MSLB with pre-existing iodine spike	5.81E-01	7.18E-02	1.08E-01	N/A
Rod ejection	4.38E+00	7.85E-01	6.34E-02	2.02E-02
Locked rotor without feedwater	3.89E-01	N/A	N/A	N/A
Locked rotor with feedwater available	7.52E-01	N/A	N/A	N/A
Fuel handling accident	2.59E+00	N/A	N/A	N/A
Small line break outside containment	1.03E+00	N/A	N/A	N/A

*Total Effective Dose Equivalent (TEDE)

Large Break Loss-of-Coolant Accident (LOCA)

LOCA Activity Releases (CI)							
	1.4 - 3.4 hr	0-2 hr	2 - 8 hr	8 - 24 hr	24 - 72 hr	72 - 96 hr	96 - 720 hr
I-130	5.64E+01	3.24E+01	7.85E+01	6.21E+00	5.11E-01	1.17E-01	6.00E-03
I-131	1.68E+03	9.19E+02	2.57E+03	2.56E+02	1.33E+02	5.84E+01	5.79E+02
I-132	1.23E+03	8.79E+02	1.26E+03	1.62E+01	6.00E-03	0.00E+00	0.00E+00
I-133	3.23E+03	1.82E+03	4.72E+03	3.71E+02	7.41E+01	9.90E+00	7.80E+00
I-134	6.60E+02	7.09E+02	4.29E+02	3.07E-02	0.00E+00	0.00E+00	0.00E+00
I-135	2.56E+03	1.54E+03	3.36E+03	1.58E+02	4.79E+00	1.00E-02	0.00E+00
Kr-85m	1.42E+03	6.32E+02	3.14E+03	1.87E+03	8.60E+01	0.00E+00	0.00E+00
Kr-85	8.31E+01	3.22E+01	2.65E+02	7.06E+02	1.08E+03	5.28E+02	1.36E+04
Kr-87	1.10E+03	6.88E+02	1.26E+03	5.00E+01	0.00E+00	0.00E+00	0.00E+00
Kr-88	3.11E+03	1.50E+03	5.76E+03	1.70E+03	1.70E+01	0.00E+00	0.00E+00
Xe-131m	8.26E+01	3.21E+01	2.62E+02	6.79E+02	9.42E+02	4.31E+02	5.57E+03
Xe-133m	4.43E+02	1.74E+02	1.37E+03	3.15E+03	3.14E+03	9.65E+02	2.58E+03
Xe-133	1.47E+04	5.71E+03	4.62E+04	1.16E+05	1.46E+05	5.97E+04	4.07E+05
Xe-135m	1.06E+01	3.33E+01	2.62E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135	3.15E+03	1.31E+03	8.33E+03	1.01E+04	2.06E+03	4.00E+01	1.00E+01
Xe-138	3.11E+01	1.14E+02	6.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rb-86	3.04E+00	1.72E+00	4.60E+00	2.80E-01	1.00E-03	0.00E+00	8.00E-03
Cs-134	2.58E+02	1.46E+02	3.92E+02	2.40E+01	1.00E-01	0.00E+00	1.20E+00
Cs-136	7.33E+01	4.14E+01	1.11E+02	6.70E+00	0.00E+00	0.00E+00	2.00E-01
Cs-137	1.51E+02	8.49E+01	2.28E+02	1.41E+01	0.00E+00	0.00E+00	7.00E-01
Cs-138	1.50E+02	2.60E+02	6.96E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-127	2.42E+01	1.14E+01	3.67E+01	2.14E+00	1.00E-02	0.00E+00	1.00E-02
Sb-129	5.10E+01	2.71E+01	6.23E+01	1.48E+00	0.00E+00	0.00E+00	0.00E+00
Te-127m	3.15E+00	1.47E+00	4.83E+00	2.95E-01	2.00E-03	0.00E+00	1.30E-02
Te-127	2.05E+01	1.02E+01	2.81E+01	1.11E+00	0.00E+00	0.00E+00	0.00E+00
Te-129m	1.07E+01	5.01E+00	1.64E+01	1.00E+00	1.00E-02	0.00E+00	3.00E-02
Te-129	1.88E+01	1.39E+01	1.45E+01	3.00E-02	0.00E+00	0.00E+00	0.00E+00
Te-131	3.17E+01	1.51E+01	4.69E+01	2.51E+00	0.00E+00	0.00E+00	1.00E-02
Te-132	3.23E+02	1.52E+02	4.89E+02	2.84E+01	1.00E-01	0.00E+00	1.00E-01
Sr-89	9.23E+01	4.31E+01	1.45E+02	5.40E+00	1.00E-01	0.00E+00	3.00E-01
Sr-90	7.95E+00	3.71E+00	1.22E+01	7.50E-01	0.00E+00	0.00E+00	4.00E-02
Sr-91	9.68E+01	4.79E+01	1.33E+02	5.30E+00	0.00E+00	0.00E+00	0.00E+00
Sr-92	6.83E+01	3.91E+01	7.40E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba-139	5.44E+01	3.74E+01	4.58E+01	1.50E-01	0.00E+00	0.00E+00	0.00E+00
Ba-140	1.63E+02	7.61E+01	2.49E+02	1.51E+01	0.00E+00	0.00E+00	4.00E-01
Mo-99	2.15E+01	1.01E+01	3.24E+01	1.86E+00	1.00E-02	0.00E+00	0.00E+00
Tc-99M	1.47E+01	7.54E+00	1.91E+01	5.90E-01	0.00E+00	0.00E+00	0.00E+00
Ru-103	1.73E+01	8.08E+00	2.65E+01	1.62E+00	0.00E+00	1.00E-02	6.00E-02
Ru-105	8.18E+00	4.33E+00	1.00E+01	2.40E-01	0.00E+00	0.00E+00	0.00E+00
Ru-106	5.70E+00	2.66E+00	8.75E+00	5.40E-01	0.00E+00	0.00E+00	3.00E-02
Rh-105	1.03E+01	4.88E+00	1.53E+01	8.30E-01	0.00E+00	0.00E+00	0.00E+00
CE-141	3.89E+00	1.82E+00	5.96E+00	3.64E-01	1.00E-03	1.00E-03	1.20E-02
CE-143	3.46E+00	1.64E+00	5.14E+00	2.78E-01	1.00E-03	0.00E+00	0.00E+00
CE-144	2.94E+00	1.37E+00	4.51E+00	2.76E-01	1.00E-03	1.00E-03	1.30E-02

LOCA Activity Releases (CI)							
	1.4 - 3.4 hr	0-2 hr	2 - 8 hr	8 - 24 hr	24 - 72 hr	72 - 96 hr	96 - 720 hr
PU-238	9.16E-03	4.28E-03	1.41E-02	8.60E-04	0.00E+00	0.00E+00	4.00E-05
PU-239	8.06E-04	3.76E-04	1.24E-03	7.60E-05	0.00E+00	1.00E-06	3.00E-06
PU-240	1.18E-03	5.52E-04	1.81E-03	1.11E-04	1.00E-06	0.00E+00	5.00E-06
PU-241	2.65E-01	1.24E-01	4.08E-01	2.50E-02	1.00E-04	0.00E+00	1.20E-03
NP-239	4.48E+01	2.12E+01	6.75E+01	3.84E+00	1.00E-02	1.00E-02	1.00E-02
Y-90	8.08E-02	3.81E-02	1.22E-01	7.00E-03	0.00E+00	0.00E+00	0.00E+00
Y-91	1.19E+00	5.54E-01	1.82E+00	1.11E-01	1.00E-03	0.00E+00	4.00E-03
Y-92	7.89E-01	4.32E-01	9.19E-01	1.80E-02	0.00E+00	0.00E+00	0.00E+00
Y-93	1.21E+00	6.00E-01	1.68E+00	6.80E-02	0.00E+00	0.00E+00	0.00E+00
Nb-95	1.59E+00	7.46E-01	2.44E+00	1.49E-01	1.00E-03	0.00E+00	5.00E-03
Zr-95	1.59E+00	7.41E-01	2.43E+00	1.49E-01	0.00E+00	0.00E+00	6.00E-03
Zr-97	1.43E+00	6.89E-01	2.05E+00	9.80E-02	0.00E+00	0.00E+00	0.00E+00
La-140	1.67E+00	7.92E-01	2.50E+00	1.39E-01	0.00E+00	0.00E+00	0.00E+00
La-141	1.03E+00	5.54E-01	1.23E+00	2.70E-02	0.00E+00	0.00E+00	0.00E+00
La-142	5.38E-01	3.57E-01	4.74E-01	2.00E-03	0.00E+00	0.00E+00	0.00E+00
Nd-147	6.16E-01	2.89E-01	9.42E-01	5.70E-02	0.00E+00	0.00E+00	1.00E-03
Pr-143	1.39E+00	6.50E-01	2.13E+00	1.28E-01	1.00E-03	0.00E+00	3.00E-03
Am-241	1.20E-04	5.59E-05	1.84E-04	1.13E-05	0.00E+00	0.00E+00	6.00E-07
Cm-242	2.82E-02	1.32E-02	4.33E-02	2.65E-03	1.00E-05	1.00E-05	1.20E-04
Cm-244	3.46E-03	1.62E-03	5.32E-03	3.26E-04	1.00E-06	0.00E+00	1.60E-05

Main Steam Line Break (MSLB) with Accident-Initiated Iodine Spike

	Activity Releases (Ci)			
	(0-2 hr)	(2-8 hr)	(8-24 hr)	(24-72 hr)
Kr-85m	6.86E-02	1.14E-01	6.80E-02	6.20E-03
Kr-85	2.82E-01	8.47E-01	2.25E+00	6.68E+00
Kr-87	2.76E-02	1.34E-02	5.20E-04	0.00E+00
Kr-88	1.12E-01	1.37E-01	4.04E-02	8.00E-04
Xe-131m	1.28E-01	3.79E-01	9.81E-01	2.70E+00
Xe-133m	1.59E-01	4.51E-01	1.04E+00	2.05E+00
Xe-133	1.18E+01	3.45E+01	8.65E+01	2.16E+02
Xe-135m	3.04E-03	1.30E-05	0.00E+00	0.00E+00
Xe-135	3.10E-01	6.90E-01	8.35E-01	3.39E-01
Xe-138	3.99E-03	1.10E-05	0.00E+00	0.00E+00
I-130	4.15E-01	9.95E-01	1.58E+00	1.01E+00
I-131	2.57E+01	5.73E+01	1.56E+02	4.13E+02
I-132	4.57E+01	9.74E+01	2.23E+01	2.00E-01
I-133	4.85E+01	1.14E+02	2.27E+02	2.55E+02
I-134	1.33E+01	1.86E+01	2.60E-01	0.00E+00
I-135	3.20E+01	7.74E+01	7.83E+01	1.77E+01
Cs-134	1.90E+01	1.95E-01	5.19E-01	1.54E+00
Cs-136	2.82E+01	2.86E-01	7.42E-01	2.06E+00
Cs-137	1.37E+01	1.41E-01	3.74E-01	1.11E+00
Cs-138	1.01E+01	1.02E-03	0.00E+00	0.00E+00

Main Steam Line Break (MSLB) with Pre-Existing Iodine Spike

	Activity Releases (Ci)			
	(0-2 hr)	(2-8 hr)	(8-24 hr)	(24-72 hr)
Kr-85m	6.86E-02	1.14E-01	6.80E-02	6.20E-03
Kr-85	2.82E-01	8.47E-01	2.25E+00	6.68E+00
Kr-87	2.76E-02	1.34E-02	5.20E-04	0.00E+00
Kr-88	1.12E-01	1.37E-01	4.04E-02	8.00E-04
Xe-131m	1.28E-01	3.79E-01	9.81E-01	2.70E+00
Xe-133m	1.59E-01	4.51E-01	1.04E+00	2.05E+00
Xe-133	1.18E+01	3.45E+01	8.65E+01	2.16E+02
Xe-135m	3.04E-03	1.30E-05	0.00E+00	0.00E+00
Xe-135	3.10E-01	6.90E-01	8.35E-01	3.39E-01
Xe-138	3.99E-03	1.10E-05	0.00E+00	0.00E+00
I-130	3.59E-01	1.42E-01	2.09E-01	1.33E-01
I-131	2.40E+01	1.21E+01	3.10E+01	8.21E+01
I-132	3.05E+01	4.14E+00	8.07E-01	6.00E-03
I-133	4.34E+01	1.90E+01	3.53E+01	3.98E+01
I-134	6.74E+00	1.63E-01	1.40E-03	0.00E+00
I-135	2.60E+01	8.16E+00	7.54E+00	1.71E+00
Cs-134	1.90E+01	1.95E-01	5.19E-01	1.54E+00
Cs-136	2.82E+01	2.86E-01	7.42E-01	2.06E+00
Cs-137	1.37E+01	1.41E-01	3.74E-01	1.11E+00
Cs-138	1.01E+01	1.02E-03	0.00E+00	0.00E+00

Locked Rotor Accident (LRA) with no Startup Feedwater (SFW) Available

	Activity Releases (Ci)
	(0-2 hr)
Kr-85m	8.16E+01
Kr-85	7.58E+00
Kr-87	1.20E+02
Kr-88	2.08E+02
Xe-131m	3.77E+00
Xe-133m	2.02E+01
Xe-133	6.66E+02
Xe-135m	3.24E+01
Xe-135	1.59E+02
Xe-138	1.29E+02
I-130	8.45E-01
I-131	3.77E+01
I-132	2.79E+01
I-133	4.86E+01
I-134	2.88E+01
I-135	4.19E+01
Cs-134	1.29E+00
Cs-136	5.63E-01
Cs-137	7.74E-01
Cs-138	6.08E+00
Rb-86	1.33E-02

Locked Rotor Accident (LRA) with Startup Feedwater (SFW) Available

	Activity Releases (Ci)	
	(0-6 hr)	(6-8hr)
Kr-85m	2.38E+02	4.12E+01
Kr-85	3.03E+01	1.01E+01
Kr-87	2.07E+02	5.40E+00
Kr-88	5.21E+02	6.04E+01
Xe-131m	1.50E+01	4.94E+00
Xe-133m	7.85E+01	2.48E+01
Xe-133	2.63E+03	8.57E+02
Xe-135m	3.30E+01	0.00E+00
Xe-135	5.40E+02	1.32E+02
Xe-138	1.30E+02	0.00E+00
I-130	8.81E-01	5.65E-01
I-131	4.60E+01	3.46E+01
I-132	1.43E+01	3.96E+00
I-133	5.33E+01	3.64E+01
I-134	5.53E+00	2.09E-01
I-135	3.74E+01	2.05E+01
Cs-134	1.48E+00	1.11E+00
Cs-136	5.17E-01	3.47E-01
Cs-137	8.71E-01	6.50E-01
Cs-138	2.95E+00	1.13E+00
Rb-86	1.64E-02	1.27E-02

Rod Ejection (CRE)

	Activity Releases (Ci)				
	(0-2 hr)	(2-8 hr)	(8-24 hr)	(24-96 hr)	(96-720 hr)
Kr-85m	1.12E+02	6.48E+01	3.87E+01	1.80E+00	0.00E+00
Kr-85	5.01E+00	5.60E+00	1.49E+01	3.35E+01	2.88E+02
Kr-87	1.82E+02	2.60E+01	1.03E+00	0.00E+00	0.00E+00
Kr-88	2.91E+02	1.18E+02	3.49E+01	3.00E-01	0.00E+00
Xe-131m	4.94E+00	5.46E+00	1.42E+01	2.86E+01	1.16E+02
Xe-133m	2.67E+01	2.81E+01	6.49E+01	8.45E+01	5.31E+01
Xe-133	8.79E+02	9.59E+02	2.40E+03	4.27E+03	8.44E+03
Xe-135m	7.34E+01	5.00E-02	0.00E+00	0.00E+00	0.00E+00
Xe-135	2.15E+02	1.72E+02	2.09E+02	4.34E+01	2.00E-01
Xe-138	2.99E+02	1.40E-01	0.00E+00	0.00E+00	0.00E+00
I-130	4.90E+00	7.28E+00	4.32E+00	2.00E-01	0.00E+00
I-131	1.36E+02	2.45E+02	2.31E+02	3.10E+01	1.68E+01
I-132	1.53E+02	9.94E+01	9.80E+00	0.00E+00	0.00E+00
I-133	2.72E+02	4.40E+02	3.18E+02	2.30E+01	0.00E+00
I-134	1.66E+02	2.85E+01	1.00E-01	0.00E+00	0.00E+00
I-135	2.39E+02	2.97E+02	1.19E+02	2.40E+00	0.00E+00
Cs-134	3.08E+01	6.22E+01	6.03E+01	7.70E+00	5.20E+00
Cs-136	8.79E+00	1.75E+01	1.67E+01	2.05E+00	6.50E-01
Cs-137	1.79E+01	3.62E+01	3.51E+01	4.52E+00	3.05E+00
Cs-138	1.09E+02	7.00E+00	0.00E+00	0.00E+00	0.00E+00
Rb-86	3.62E-01	7.27E-01	6.96E-01	8.40E-02	3.70E-02

Small Line Break Outside Containment (SLBOCA)

	Activity Releases (Ci) (0-0.5 hr)
Kr-85m	1.24E+01
Kr-85	4.40E+01
Kr-87	7.05E+00
Kr-88	2.21E+01
Xe-131m	1.99E+01
Xe-133m	2.50E+01
Xe-133	1.84E+03
Xe-135m	2.59E+00
Xe-135	5.20E+01
Xe-138	3.65E+00
I-130	1.89E+00
I-131	9.26E+01
I-132	3.49E+02
I-133	2.01E+02
I-134	1.58E+02
I-135	1.68E+02
Cs-134	4.16E+00
Cs-136	6.16E+00
Cs-137	3.00E+00
Cs-138	2.21E+00
Rb-86	0.00E+00

Steam Generator Tube Rupture (SGTR) with Accident-Initiated Iodine Spike

	Activity Releases (Ci)		
	(0-2 hr)	(2-8 hr)	(8-14 hr)
Kr-85m	5.53E+01	1.93E+01	0.00E+00
Kr-85	2.20E+02	1.08E+02	2.00E-01
Kr-87	2.39E+01	3.61E+00	0.00E+00
Kr-88	9.22E+01	2.65E+01	0.00E+00
Xe-131m	9.96E+01	4.88E+01	0.00E+00
Xe-133m	1.24E+02	5.91E+01	1.00E-01
Xe-133	9.19E+03	4.47E+03	1.00E+01
Xe-135m	3.44E+00	6.00E-03	0.00E+00
Xe-135	2.46E+02	1.02E+02	1.00E-01
Xe-138	4.56E+00	5.00E-03	0.00E+00
I-130	8.87E-01	1.62E-01	8.23E-01
I-131	4.36E+01	1.14E+01	6.76E+01
I-132	1.47E+02	4.89E+00	1.29E+01
I-133	9.33E+01	1.99E+01	1.08E+02
I-134	5.59E+01	6.06E-02	6.02E-02
I-135	7.61E+01	9.89E+00	4.38E+01
Cs-134	1.63E+00	6.10E-02	2.16E-01
Cs-136	2.42E+00	8.80E-02	3.15E-01
Cs-137	1.17E+00	4.40E-02	1.56E-01
Cs-138	5.64E-01	0.00E+00	0.00E+00

Steam Generator Tube Rupture (SGTR) with Pre-Existing Iodine Spike

	Activity Releases (Ci)		
	(0-2 hr)	(2-8 hr)	(8-14 hr)
Kr-85m	5.53E+01	1.93E+01	0.00E+00
Kr-85	2.20E+02	1.08E+02	2.00E-01
Kr-87	2.39E+01	3.61E+00	0.00E+00
Kr-88	9.22E+01	2.65E+01	0.00E+00
Xe-131m	9.96E+01	4.88E+01	0.00E+00
Xe-133m	1.24E+02	5.91E+01	1.00E-01
Xe-133	9.19E+03	4.47E+03	1.00E+01
Xe-135m	3.44E+00	6.00E-03	0.00E+00
Xe-135	2.46E+02	1.02E+02	1.00E-01
Xe-138	4.56E+00	5.00E-03	0.00E+00
I-130	1.79E+00	5.39E-02	2.67E-01
I-131	1.21E+02	5.27E+00	3.05E+01
I-132	1.42E+02	7.86E-01	1.91E+00
I-133	2.16E+02	7.63E+00	4.06E+01
I-134	2.74E+01	1.06E-02	2.00E-04
I-135	1.27E+02	2.70E+00	1.17E+01
Cs-134	1.63E+00	6.10E-02	2.16E-01
Cs-136	2.42E+00	8.80E-02	3.15E-01
Cs-137	1.17E+00	4.40E-02	1.56E-01
Cs-138	5.64E-01	0.00E+00	0.00E+00

Fuel Handling Accident (FHA)

	Activity Releases (Ci)
	(0-2 hr)
Kr-85m	8.40E+00
Kr-85	1.10E+03
Kr-88	3.00E-01
Xe-131m	5.52E+02
Xe-133m	2.30E+03
Xe-133	8.88E+04
Xe-135m	1.02E+02
Xe-135	5.68E+03
I-130	7.00E-01
I-131	3.47E+02
I-132	2.44E+02
I-133	1.08E+02
I-135	3.20E+00

RAI 15-2:**Question:**

RS-002 provides guidance regarding the information that is needed to address the potential radiological consequences of DBAs for the reactor designs considered in meeting the site acceptance criteria in 10 CFR 52.17 (a)(1). In the VCS ESP application, the applicant incorrectly presented all of the Site Dose values (both Whole Body and Thyroid) in the last two columns of Tables 15.1-44, 15.1-45, 15.1-47, 15.1-49, 15.1-51, 15.1-53 for the ABWR design in units of "rem TEDE". Therefore, please correct the column header in each of the tables listed to show the dose units of "rem" instead of "rem TEDE".

Response:

The "Site Dose" column headings for the ABWR dose tables are revised to change the dose units from "rem TEDE" to "rem."

Associated ESPA Revision:

The changes to SSAR Tables 15.1-44, 15.1-45, 15.1-47, 15.1-49, 15.1-51, and 15.1-53 are shown on the following pages. These tables also reflect previous changes submitted to the NRC by letter NP 11-0003, dated January 13, 2011.

Table 15.1-44
Doses for ABWR Main Steam Line Break with Pre-Incident Iodine Spike

Location	Time (hr)	DCD Dose (Sv)		X/Q Ratio	Site Dose (rem TEDE)	
		W. Body	Thyroid	Site to DCD	W. Body	Thyroid
EAB	0-2	1.3×10^{-2}	5.1×10^{-1}	1.94×10^{-1}	2.5×10^{-1}	9.9
LPZ	0-8	—	—	1.13×10^{-2}	1.5×10^{-2}	5.8×10^{-1}
Limit	—	—	—	—	25	300

Reference: ABWR DCD Rev. 4 (15.5-9)

Table 15.1-45
Doses for ABWR Main Steam Line Break with Equilibrium Iodine Activity

Location	Time (hr)	DCD Dose (Sv)		X/Q Ratio	Site Dose (rem TEDE)	
		W. Body	Thyroid	Site to DCD	W. Body	Thyroid
EAB	0-2	6.2×10^{-4}	2.6×10^{-2}	1.94×10^{-1}	1.2×10^{-2}	5.0×10^{-1}
LPZ	0-8	—	—	1.13×10^{-2}	7.0×10^{-4}	2.9×10^{-2}
Limit	—	—	—	—	2.5	30

Reference: ABWR DCD Rev. 4 (15.5-9)

Table 15.1-47
Doses for ABWR Small Break Outside Containment

Location	Time (hr)	DCD Dose (Sv)		X/Q Ratio	Site Dose (rem TEDE)	
		W. Body	Thyroid	Site to DCD	W. Body	Thyroid
EAB	0-2	9.4×10^{-4}	4.8×10^{-2}	1.94×10^{-1}	1.8×10^{-2}	9.3×10^{-1}
LPZ	0-8	—	—	1.13×10^{-2}	1.1×10^{-2}	5.4×10^{-2}
Limit	—	—	—	—	2.5	30

Reference: ABWR DCD Rev. 4 (15.5-9)

**Table 15.1-49
Doses for ABWR Loss-of-Coolant Accident**

Location	Time (hr)	DCD Dose (Sv)		X/Q Ratio	Site Dose (rem-TEDE)	
		W. Body	Thyroid	Site to DCD	W. Body	Thyroid
EAB	0-2	4.1×10^{-2}	1.9	1.94×10^{-1}	8.0×10^{-1}	3.7×10^1
LPZ	0-8	1.0×10^{-2}	3.1×10^{-1}	9.94×10^{-2}	9.9×10^{-2}	3.1
	8-24	8.0×10^{-3}	2.0×10^{-1}	1.05×10^{-1}	8.4×10^{-2}	2.1
	24-96	1.1×10^{-2}	7.9×10^{-1}	1.25×10^{-1}	1.4×10^{-1}	9.9
	96-720	9.0×10^{-3}	1.1	1.60×10^{-1}	1.4×10^{-1}	1.8×10^1
	Total	3.8×10^{-2}	2.4	—	4.7×10^{-1}	3.3×10^1
Limit	—	—	—	—	25	300

Reference: ABWR DCD Rev. 4 (15.5-9)

**Table 15.1-51
Doses for ABWR Cleanup Water Line Break**

Location	Time (hr)	DCD Dose (Sv)		X/Q Ratio	Site Dose (rem-TEDE)	
		W. Body	Thyroid	Site to DCD	W. Body	Thyroid
EAB	0-2	2.8×10^{-3}	3.0×10^{-1}	1.16×10^{-2}	3.3×10^{-3}	3.5×10^{-1}
LPZ	0-8	—	—	6.77×10^{-4}	1.9×10^{-4}	2.0×10^{-2}
Limit	—	—	—	—	25	300

Reference: ABWR DCD Rev. 4 (15.5-9)

**Table 15.1-53
Doses for ABWR Fuel Handling Accident**

Location	Time (hr)	DCD Dose (Sv)		X/Q Ratio	Site Dose (rem-TEDE)	
		W. Body	Thyroid	Site to DCD	W. Body	Thyroid
EAB	0-2	1.2×10^{-2}	7.5×10^{-1}	1.94×10^{-1}	2.3×10^{-1}	1.5×10^1
LPZ	0-8	—	—	1.13×10^{-2}	1.4×10^{-2}	8.5×10^{-1}
Limit	—	—	—	—	6	75

Reference: ABWR DCD Rev. 4 (15.5-9)

ATTACHMENT 3

SUMMARY OF REGULATORY COMMITMENTS

(Exelon Letter to USNRC, NP-11-0012, dated April 26, 2011)

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	Programmatic (Yes/No)
Exelon will revise the VCS ESPA SSAR Section 15.1 to incorporate the changes shown in the enclosed response to the following NRC RAI: 15-2 (Attachment 2)	Revision 1 of the ESPA SSAR and ER planned for no later than March 31, 2012	Yes	No