Exelon Generation

NP-11-0043
September 29, 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. 12
NRC Docket No. 52-042

Attached is the response to the NRC staff question included in Request for Additional Information (RAI) Letter No. 12, dated September 7, 2011, related to Early Site Permit Application (ESPA), Part 2, Section 11.03. NRC RAI Letter No. 12 contained one (1) Question. This submittal comprises the complete response to RAI Letter No. 12, and includes response to the following Question:

11.03-3

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.

Regulatory commitments established in this submittal are identified in Attachment 2.

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 29th day of September, 2011.

Respectfully,

Marilyn C. Kray
Vice President, Nuclear Project Development

Attachments:
1. Question 11.03-3
2. 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 11.03-3:

Question:

During the staff's independent verification of SSAR Table 11.3.3-5, the staff reviewed the calculated values, comparing the staff's values to Table 11.3.3-5. The staff generated version of Table 11.3.3-5 identified values 2-3 times higher than what is presented by the applicant's Table 11.3.3-5. The differences in this table also results in changes in the results for the staff's version of Table 11.3.3-6 and Table 11.3.3-7.

In comparing the dose objectives of 10 CFR 50 Appendix I, the staff calculated values for Table 11.3.3-6 that do not meet the dose objectives for skin and total body dose at the site boundary. Comparison of the results for Table 11.3.3-7 also shows a significant difference in the value obtained for Total Body Dose.

Upon comparison of the inputs provided in the Response to Request for Additional Information Letter No. 10 dated June 23, 2011, and what is referenced in the application for the inputs into GASPAR, there is a discrepancy (difference) over the values used for the XOQ and DOQ values for the MEI calculations, Table 2.3.5-8. When compared, the results of Table 11.3.3-6 dose to the skin's value either falls below the limits using data from the RAI response, or above of the limits using data provided in the Victoria County ESP application. This difference in XOQ and DOQ values result in differences between the External and Inhalation Dose Pathways in the staff generated version of Table 11.3.3-5 and the applicants Table 11.3.3-5 which is used as a source of data for Tables 11.3.3-6 and 11.3.3-7. Please verify values described in the SSAR and explain the difference between the XOQ and DOQ values used. Please revise SSAR and affected tables to correct values or explain the differences.

Response:

The doses in SSAR Tables 11.3.3-5, 11.3.3-6, and 11.3.3-7 were calculated using the GASPAR II computer code, and the inputs for this code are described in Table 11.3.3-1. The GASPAR input files were previously provided in the response to RAI 11.03-2. Table 11.3.3-1 refers to Table 2.3.5-3 for the atmospheric dispersion (χ/Q) and deposition (D/Q) factors at the site boundary. The site boundary χ/Q and D/Q values entered into GASPAR have four digits of precision, whereas the values in Table 2.3.5-3 show only two digits of precision:

	Table 2.3.5-3	GASPAR Input
χ/Q – No Decay (sec/m^3)	1.3×10^{-5}	1.274×10^{-5}
χ/Q – 2.26-day Decay (sec/m^3)	1.3×10^{-5}	1.265×10^{-5}
χ/Q – 8-day Decay (sec/m^3)	1.1×10^{-5}	1.146×10^{-5}
D/Q (m^{-2})	5.3×10^{-8}	5.315×10^{-8}

The more precise values used in GASPAR were obtained by interpolation of XOQDOQ computer code output shown in Tables 2.3.5-4, 2.3.5-5, 2.3.5-6, and 2.3.5-7. These tables show χ/Q and D/Q values at various distances, including 0.50 and 0.75 mile. The χ/Q or D/Q at the site boundary distance of 0.60 mile is obtained by log-log interpolation

between the values at 0.50 and 0.75 miles in the corresponding table. The interpolated values with four digits of precision are consistent with the XOQDOQ output in Table 2.3.5-8, which shows two digits of precision.

The GASPAR User's Guide indicates that the code estimates the effective plume transit time from the release point to the exposure location as follows (NUREG/CR-4653, Equation 3.1):

$$T = \frac{-\ln[(\chi/Q)_d/(\chi/Q)_u]}{\lambda_{Xe}}$$

Where:

- T = plume transit time (sec)
- $(\chi/Q)_d$ = 2.26-day decayed χ/Q (sec/m^3)
- $(\chi/Q)_u$ = undecayed χ/Q (sec/m^3)
- λ_{Xe} = radiological decay constant corresponding to a half-life of 2.26 days for Xe-133m = 3.55×10^{-6} sec^{-1}

When $(\chi/Q)_d$ and $(\chi/Q)_u$ are both rounded to 1.3×10^{-5} sec/m^3, T becomes zero, meaning there is instantaneous transport of the plume to the exposure location.

When more precise values of $(\chi/Q)_d$ and $(\chi/Q)_u$ are used, GASPAR approximates the plume transit time as follows:

$$T = \frac{-\ln\left[\left(1.265 \times 10^{-5}\right)/\left(1.274 \times 10^{-5}\right)\right]}{3.55 \times 10^{-6}} = 1997 \text{ sec} \approx 33 \text{ min}$$

SSAR Table 11.3.3-2 shows that the gaseous effluent activities for short-lived isotopes like Kr-89 (half-life of 3.2 min), Xe-135m (15 min), Xe-137 (3.8 min), and Xe-138 (14 min) range from 378 to 757 Ci. Table 11.3.3-5 indicates that the plume pathway accounts for most of the total body and skin doses at the site boundary. For these short-lived isotopes, the difference in plume doses between no decay and a decay time of 33 minutes is significant.

To more accurately reflect the χ/Q and D/Q values used in GASPAR, Table 2.3.5-3 will be revised to show four digits of precision and a footnote will be added for clarification.

During the preparation of the response to this RAI, it was noted that the location of the maximum D/Q had been incorrectly transferred from the calculation in which it was generated. Therefore, SSAR Table 2.3.5-3 will be revised to show the correct location. The correct D/Q value was used in the evaluation of radiation doses from normal effluents in SSAR Section 11.3.

Associated ESPA Revisions:

SSAR Table 2.3.5-3 is being updated in a future revision to the ESPA, as follows:

Table 2.3.5-3
XOQDOQ-Predicted X/Q and D/Q Values at Receptors of Interest

	Type of Location	Direction from Site	Distance (miles)	χ/Q (sec/m^3)
X/Q - No Decay	EAB	NNW	0.60	~~1.8~~1.790 x 10^{-5}
	Property Boundary	SW	0.62	~~1.3~~1.274 x 10^{-5}
	Resident	NNW	1.40	~~2.8~~2.843 x 10^{-6}
	Meat Animal	NNW	1.40	~~2.8~~2.843 x 10^{-6}
	Vegetable Garden	NW	1.65	~~2.0~~1.983 x 10^{-6}
	Construction Worker	NNE	0.25	1.603 x 10^{-5}
X/Q - 2.26 Day Decay	EAB	NNW	0.60	~~1.8~~1.787 x 10^{-5}
	Property Boundary	SW	0.62	~~1.3~~1.265 x 10^{-5}
	Resident	NNW	1.40	~~2.8~~2.831 x 10^{-6}
	Meat Animal	NNW	1.40	~~2.8~~2.831 x 10^{-6}
	Vegetable Garden	NW	1.65	~~2.0~~1.973 x 10^{-6}
	Construction Worker	NNE	0.25	~~1.6~~1.602 x 10^{-5}
X/Q - 8 Day Decay	EAB	NNW	0.60	~~1.6~~1.616 x 10^{-5}
	Property Boundary	SW	0.62	~~1.1~~1.146 x 10^{-5}
	Resident	NNW	1.40	~~2.4~~2.424 x 10^{-6}
	Meat Animal	NNW	1.40	~~2.4~~2.424 x 10^{-6}
	Vegetable Garden	NW	1.65	~~1.7~~1.668 x 10^{-6}
	Construction Worker	NNE	0.25	~~1.5~~1.517 x 10^{-5}
D/Q				D/Q (m^{-2})
	EAB	NNW	0.60	~~1.1~~1.048 x 10^{-7}
	Property Boundary	~~SW~~NW	~~0.62~~0.81	~~5.3~~5.315 x 10^{-8}
	Resident	NNW	1.40	~~1.4~~1.448 x 10^{-8}
	Meat Animal	NNW	1.40	~~1.4~~1.448 x 10^{-8}
	Vegetable Garden	NW	1.65	~~8.8~~8.836 x 10^{-9}
	Construction Worker	NNE	0.25	5.979 x 10^{-8}

Note: The values in this table are obtained by log-log interpolation of the data presented in Tables 2.3.5-4 through 2.3.5-7, based on specific receptor locations. These interpolated values are consistent with the output of the XOQDOQ computer program as presented in Table 2.3.5-8, although the values in Table 2.3.5-8 are shown to two digits. The more precise values in Table 2.3.5-3 are needed to perform the dose analysis in Chapter 11.

In reviewing ER Table 2.7-14 for consistency with SSAR Section 2.3.5, it was noted that the "meat animal" X/Q values for 2.26-day and 8-day decay were not correctly transferred from the calculation in which they were generated. Therefore, ER Table 2.7-14 is being revised to show the correct values. The correct values were used in the evaluations of radiation dose from normal effluents in ER Section 5.4.

This ER Table will be updated in a future revision to the ESPA.

Table 2.7-14
XOQDOQ-Predicted Maximum X/Q and D/Q Values at Receptors of Interest

	Type of Location	Direction from Site	Distance (miles)	X/Q (sec/m³)
No Decay	EAB	NNW	0.60	1.790E-05
	Property Boundary	SW	0.62	1.274E-05
	Resident	NNW	1.40	2.843E-06
	Meat Animal	NNW	1.40	2.843E-06
	Vegetable Garden	NW	1.65	1.983E-06
	Construction Worker	NNE	0.25	1.603E-05
2.26 Day Decay	EAB	NNW	0.60	1.787E-05
	Property Boundary	SW	0.62	1.265E-05
	Resident	NNW	1.40	2.831E-06
	Meat Animal	NNW	1.40	~~2.843E-06~~ 2.831E-06
	Vegetable Garden	NW	1.65	1.973E-06
	Construction Worker	NNE	0.25	1.602E-05
8 Day Decay	EAB	NNW	0.60	1.616E-05
	Property Boundary	SW	0.62	1.146E-05
	Resident	NNW	1.40	2.424E-06
	Meat Animal	NNW	1.40	~~2.843E-06~~ 2.424E-06
	Vegetable Garden	NW	1.65	1.668E-06
	Construction Worker	NNE	0.25	1.517E-05
		Direction from Site	**Distance (miles)**	**D/Q (1/m²)**
	EAB	NNW	0.60	1.048E-07
	Property Boundary	~~SW~~NW	~~0.62~~0.81	5.315E-08
	Resident	NNW	1.40	1.448E-08
	Meat Animal	NNW	1.40	1.448E-08
	Vegetable Garden	NW	1.65	8.836E-09
	Construction Worker	NNE	0.25	5.979E-08

ATTACHMENT 2

SUMMARY OF REGULATORY COMMITMENTS

(Exelon Letter to USNRC, NP-11-0043, dated September 29, 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 2.3.5 and ER Section 2.7 to incorporate the changes shown in the enclosed response to the following NRC RAI: 11.03-3 (Attachment 1)	Revision 1 of the ESPA SSAR and ER planned for no later than March 31, 2012	Yes	No