PMVictoriaESPPEm Resource

From: david.distel@exeloncorp.com
Sent: Tuesday, January 11, 2011 4:02 PM
To: Jessie, Janelle; Hale, Jerry
Subject: Exelon Letter - RAI Letter No. 02 Response
Attachments: NP-11-0001 - Response to Request for Additional Information Letter No. 02.pdf

Janelle/Jerry – Attached is an advance copy of the Exelon RAI Letter No. 02 response submittal letter signed out today, which meets the original 30-day response request date. The original letter and the designated cc's are being mailed today. Your cc copies are being Federal Exp to you for delivery tomorrow, and will include a copy of the CD containing the requested PAVAN and XOQDOQ input/output files. The Fed Exp package also contains a complete copy (including the CD) for the NRC staff reviewer.

Thanks.

Dave Distel

David J. Distel
New Plant Development
Exelon Licensing

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Hearing Identifier: Victoria_ESP_Public
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Subject: Exelon Letter - RAI Letter No. 02 Response
Sent Date: 1/11/2011 4:01:59 PM
Received Date: 1/11/2011 4:02:14 PM
From: david.distel@exeloncorp.com

Created By: david.distel@exeloncorp.com

Recipients:
"Jessie, Janelle" <Janelle.Jessie@nrc.gov>
Tracking Status: None
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Tracking Status: None

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Files	**Size**	**Date & Time**
MESSAGE	1437	1/11/2011 4:02:14 PM
NP-11-0001 - Response to Request for Additional Information Letter No. 02.pdf	1452246	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Exelon Generation

NP-11-0001
January 11, 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. 02
NRC Docket No. 52-042

Attached are responses to NRC staff questions included in Request for Additional Information (RAI) Letter No. 02, dated December 17, 2010, related to Early Site Permit Application (ESPA), Part 2, Sections 2.3.3, 2.3.4, and 2.3.5. This submittal includes responses to the following Questions:

02.03.03-1	02.03.04-1	02.03.05-1
	02.03.04-2	02.03.05-2
	02.03.04-3	02.03.05-3
		02.03.05-4
		02.03.05-5

When a response includes a change to the ESPA, 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 11. 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 11th day of January, 2011.

Respectfully,

Marilyn C. Kray
Vice President, Nuclear Project Development

Attachments:
1. Question 02.03.03-1
2. Question 02.03.04-1
3. Question 02.03.04-2
4. Question 02.03.04-3
5. Question 02.03.05-1
6. Question 02.03.05-2
7. Question 02.03.05-3
8. Question 02.03.05-4
9. Question 02.03.05-5
10. CD-R labeled: "Exelon Victoria County Station ESP Input/Output Files Associated with the Calculations:

    25352-000-H0C-HMMD-00004, Rev. 0, X/Q and D/Q Estimates for Routine Releases at Victoria County Station Units for ESP Application

    25352-000-H0C-HMMD-00005, Rev. 0, X/Q Estimates for Accidental Releases for ESP Application"

    Document Components:
    PAVAN: VCSPAVAN.in 7 kbytes
    VCSPAVAN.OUT 513 kbytes
    XOQDOQ: 25352-000-H0C-00004-Rev0.input 8 kbytes
    25352-000-H0C-00004-Rev0.output 65 kbytes

11. 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 + Two copies of Attachment 10)
USNRC, Region IV, Regional Administrator (w/Attachments)

RAI 02.03.03-1:

Question:

The third and fourth bullets in SSAR section 2.3.3.3.4.1 read as follows:

- Wind directions were flagged on the printout if invariant for 2 or more consecutive hours, or the (automatically calculated) sigma-theta value equaled or exceeded 50 ºF.
- Wind directions were flagged on the printout if direction shear greater than 60 ºF existed between the lower and upper level directions.

Please clarify why the sigma-theta and direction shear values listed are referred to in degrees Fahrenheit (ºF) instead of degrees (º).

Response:

The sigma-theta and direction shear values should be in degrees (°). Paragraph 2 in SSAR Section 2.3.3.3.4.1 will be revised.

Associated ESPA Revisions:

The third and fourth bullets of the second paragraph in Subsection 2.3.3.3.4.1 will be revised in a future revision as indicated below:

In the screening process, each parameter was analyzed by data screening software. A sample list of the data screening criteria is provided as follows:

- Wind speeds less than 1 mph, greater than 50 mph or invariant for 2 or more consecutive hours were flagged on the data printout.
- When the lower wind speed exceeded the upper wind speed or the upper wind speed exceeded the lower wind speed by 15 mph, the wind speeds were flagged on the data printout.
- Wind directions were flagged on the printout if invariant for 2 or more consecutive hours, or the (automatically calculated) sigma-theta value equaled or exceeded 50~~ºF~~degrees.
- Wind directions were flagged on the printout if direction shear greater than 60~~ºF~~ degrees existed between the lower and upper level directions.

RAI 02.03.04-1:

Question:

10 CFR 52.17(a)(1)(ix), requires that offsite radiological consequences at the EAB and LPZ be evaluated in an ESP application. NUREG-0800, Section 2.3.4, sets forth the staff's review procedures for the short-term atmospheric dispersion estimates for accident releases. RG 1.206, Section C.I.2.3.4.2 states that the effects of topography and nearby bodies of water on short-term dispersion estimates should be discussed.

The staff feels that the potential effects of the proposed 4900-acre (nearly 20 million sq-meter) cooling basin are potentially substantial and should be discussed in FSAR Section 2.3.4. Discuss, in SSAR Section 2.3.4, the influence of the proposed main cooling reservoir on the EAB and LPZ atmospheric dispersion estimates.

Response:

As presented in ER Section 6.4.4, during the pre-operational monitoring phase, one year of onsite meteorological monitoring is planned to provide a basis that reflects the as-built environment, including the cooling basin, for identifying and assessing environmental impacts resulting from plant operation. A discussion detailing the potential effects of the proposed 4900-acre cooling basin on the EAB and LPZ atmospheric dispersion estimates, included in SSAR 2.3.3.2.5, will be added to SSAR Section 2.3.4.1.

Associated ESPA Revisions:

Two new paragraphs will be added after the seventh paragraph in Subsection 2.3.4.1 in a future revision as indicated below:

The greater of the two values (i.e., the maximum sector-dependent 0.5 percent X/Q or the overall site 5 percent X/Q value) is used to represent the X/Q value for a 0–2-hour time period. To determine X/Qs for longer time periods, the program calculates an annual average X/Q value using the procedure described in RG 1.111. The program then uses logarithmic interpolation between the 0–2-hour X/Qs for each sector and the corresponding annual average X/Q to calculate the values for intermediate time periods (i.e., 0–8 hours, 8–24 hours, 1–4 days, and 4–30 days). As suggested in NUREG/CR-2858 (Reference 2.3.4-1), each of the sector-specific 0–2-hour X/Q values provided in the PAVAN output file were examined for "reasonability" by comparing them with the ordered X/Q values presented in the model output.

A portion of the EAB and the outer boundary of the LPZ extends over the 4900-acre cooling basin. As described in Section 2.3.3.2.5, during plant operation, moisture content and temperature in the air immediately above the cooling basin are expected to increase slightly due to natural evaporation from the cooling basin and cooling basin warming from the plant thermal discharge, respectively. The influence of the planned cooling basin on the diffusion climate of the site and its relation to dispersion of accidental or routine radioactive releases has been examined. The findings are summarized as follows.

- In general, the wind speed increases as air moves from land over a low-friction water surface that would enhance local dispersion. However, the mechanical turbulence tends to decrease when air moves from land over water, independent of temperature difference, and would hinder local diffusion. The surface roughness changes on both turbulence and wind speeds could be significant when considered by themselves. However, the combination of these changes is generally offsetting, thereby having negligible effects on the local diffusion climate of the area.

- The presence of a cooling basin would alter the frictional effects on adjacent land surface; however, the impact of this on wind speed and direction is expected to be limited to the immediate vicinity of the basin.

- Temperature difference between the cooling basin and the ambient air boundary layer could influence air flow at receptors downwind of the reactor. When the basin water is warmer than the adjacent air, the increases of lower level ambient temperature would create thermal instability. Subsequently, more unstable atmospheric stability (i.e., favorable diffusion environment) is expected.

Overall, the influence of the cooling basin on wind speed, wind direction, turbulence, and vertical temperature differential is expected to have minimal impact on the EAB and LPZ dispersion estimates.

RAI 02.03.04-2:

Question:

10 CFR 52.17(a)(1)(ix), requires that offsite radiological consequences at the EAB and LPZ be evaluated in an ESP application. NUREG-0800, Section 2.3.4, sets forth the staff's review procedures for the short-term atmospheric dispersion estimates for accident releases. RG 1.206, Section C.I.2.3.4.2 states that the effects of topography and nearby bodies of water on short-term dispersion estimates should be discussed.

The staff did not find any discussion on the potential effects of land and sea breeze circulations and their potential effects on the short-term dispersion estimates. Discuss the influence of the Gulf of Mexico and the resulting land and sea breezes on the short-term atmospheric dispersion estimates presented in SSAR Section 2.3.4.

Response:

The effects on short-term dispersion due to the Gulf of Mexico were reflected in the calculations of the short-term dispersion estimates. A discussion detailing the inputs used to account for these effects will be added to SSAR Section 2.3.4.1.

Associated ESPA Revisions:

A new paragraph will be added before the eighth paragraph in Subsection 2.3.4.1 in a future revision as indicated below:

To account for possible coastal sea breeze recirculation effects on local meteorological conditions from the Gulf of Mexico, and because the VCS site is generally flat, the default terrain adjustment factor is implemented in the PAVAN model. This factor is implemented to satisfy Section C.1.c of RG 1.111 and to properly account for possible recirculation due to land-water boundaries, which could raise X/Q values in an open terrain area such as the VCS site.

The PAVAN model input data are presented below:

- Meteorological data: 24 months (July 2007–June 2009) onsite joint frequency distributions (JFDs) of wind speed, wind direction, and atmospheric stability (see Subsection 2.3.2)
- Type of release: Ground-level
- Wind sensor height: 10 meters
- Vertical temperature difference: as measured at the 10-meter and 60-meter levels of the onsite meteorological tower
- Number of wind speed categories: 12 (including calm and the 11 categories listed in Table 2.3.2-5)
- Release height: 10 meters, default height
- Distances from release point to EAB for all downwind sectors
- Distances from release point to LPZ for all downwind sectors
- The EAB and the LPZ are both assumed to be located beyond the building wake influence zone.

RAI 02.03.04-3:

Question:

10 CFR 52.17(a)(1)(ix), requires that offsite radiological consequences at the EAB and LPZ be evaluated in an ESP application. NUREG-0800, Section 2.3.4, sets forth the staff's review procedures for the short-term atmospheric dispersion estimates for accidental releases. In order for the staff to complete an independent review of the EAB and LPZ atmospheric dispersion estimates, please provide an electronic copy of the PAVAN input and output files used in SSAR Section 2.3.4, along with justification for any assumptions that were made in generating the input files.

Response:

An electronic copy of the PAVAN input and output files used in SSAR Section 2.3.4 are provided on the enclosed CD (Attachment 10). The assumptions are presented in Subsection 2.3.4.1.

Associated ESPA Revisions:

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

RAI 02.03.05-1:

Question:

10 CFR 20, Subpart D requires that the SSAR demonstrate that the proposed plant will be in compliance with dose limits for individual members of the public. NUREG-0800, Section 2.3.5, sets forth the staff's review procedures for ensuring that sufficient information is presented to demonstrate the site characteristics and design parameters of the proposed site. In order for the staff to complete an independent review of the offsite dose analysis, please provide an electronic copy of the XOQDOQ input and output files, as well as any assumptions that were made.

Response:

An electronic copy of the XOQDOQ input and output files used in SSAR Section 2.3.5 are provided on the enclosed CD (Attachment 10). The assumptions are presented in subsection 2.3.5.1.

Associated ESPA Revisions:

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

RAI 02.03.05-2:

Question:

10 CFR 20, Subpart D requires that the SSAR demonstrate that the proposed plant will be in compliance with dose limits for individual members of the public. NUREG-0800, Section 2.3.5 sets forth the staff's review procedures for ensuring that sufficient information is presented to demonstrate the site characteristics and design parameters of the proposed site.

The staff was unable to determine the basis for the receptor locations near the VCS site. In order for the staff to complete an independent review of the long-term dispersion atmospheric estimates, this information is needed. Please provide the basis for the source receptors discussed in SSAR Section 2.3.5 and the distances provided in SSAR Table 2.3.5-1.

Response:

The locations of the receptors used in the XOQDOQ analysis are based on the shortest distance from the power block area boundary to the closest residence, vegetable garden, or meat animal for each directional sector. The identification of each receptor was accomplished through the use of satellite imagery and field reconnaissance as follows:

- Using satellite imagery, all nearest potential residences, gardens, and meat animals in each directional sector closest to the proposed power block were first identified.
- Field reconnaissance was subsequently performed to verify each identified receptor.
    - The field reconnaissance work consisted of driving all access roads to confirm the locations determined by satellite imagery.
    - Land owners were also interviewed for any additional information regarding potential receptor locations that were not identified during the satellite imagery investigation.
    - Each of the confirmed sensitive receptors were cataloged during field reconnaissance work with a hand-held GPS unit.

Table 1 summarizes the distances from the power block to each receptor for every directional sector. Figure 1 illustrates the locations of the receptors for each directional sector surrounding the VCS site.

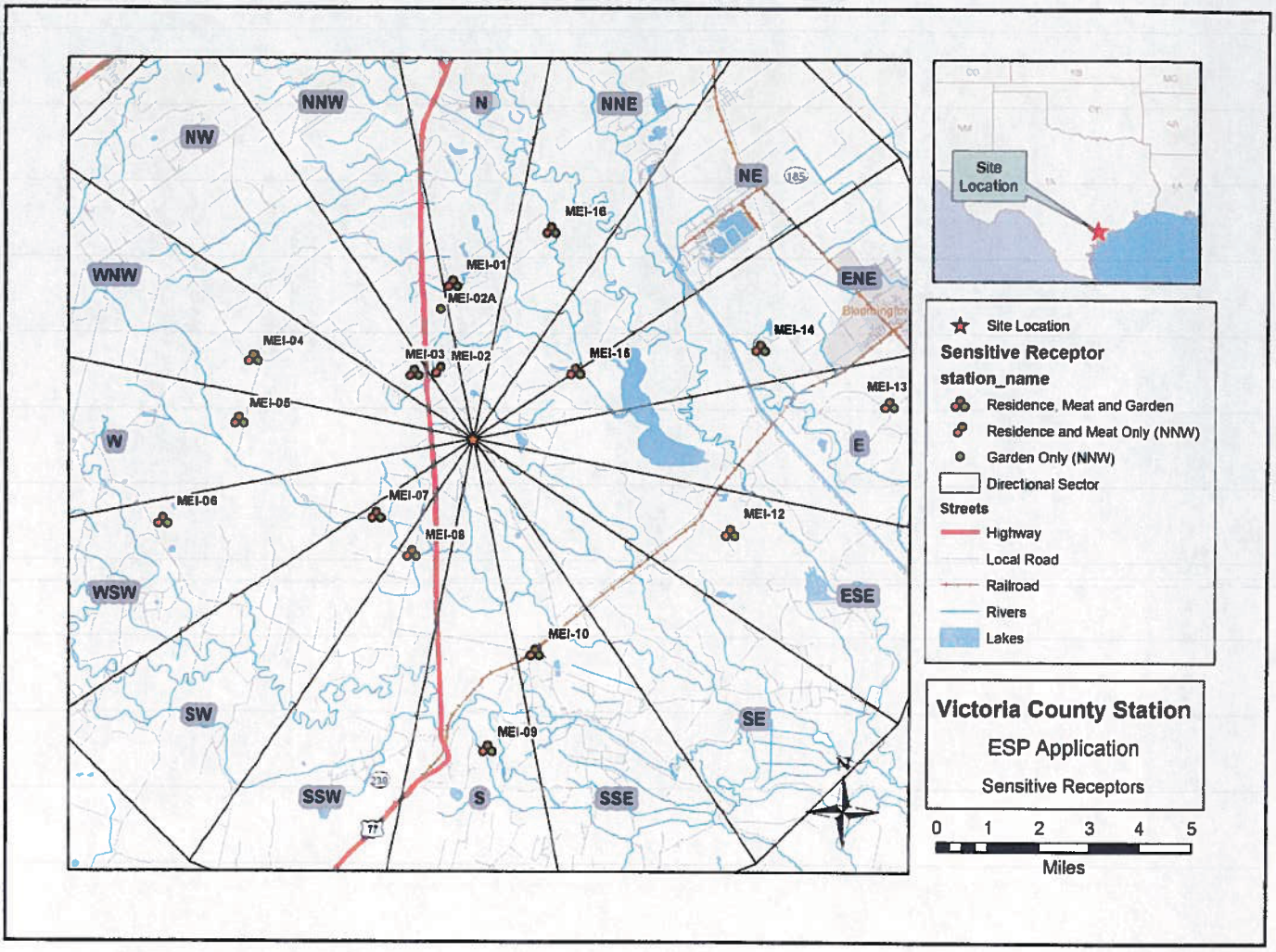
Associated ESPA Revisions:

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

Table 1: Distances to each sensitive receptor from the proposed VCS Power Block.

Receptor Number	Sector	Type of Receptor	Distance (Meters)	Distance (miles)	Additional Information
MEI-01	N	Residence, Meat, Garden	4773	2.97	Residence located off Old Refugio Road with meat cows and gardens.
MEI-02	NNW	Residence, Meat	2261	1.40	Building occupied by two ranch workers. There are meat cows but no garden at the location.
MEI-02A	NNW	Garden	4033	2.51	Garden identified in the NNW sector.
MEI-03	NW	Residence, Meat, Garden	2651	1.65	Residence with meat cows and gardens.
MEI-04	WNW	Residence, Meat, Garden	7267	4.52	Residence located at the intersection of Morristown Road and Kemper City Road East with meat cows and gardens.
MEI-05	W	Residence, Meat, Garden	7227	4.49	Residence located off Morristown Road with meat cows and gardens.
MEI-06	WSW	Residence, Meat, Garden	9838	6.11	Residence located off San Antonio River Road with meat cows and gardens.
MEI-07	SW	Residence, Meat, Garden	3467	2.15	Residence located off Murphy Road with meat cows and gardens.
MEI-08	SSW	Residence, Meat, Garden	3656	2.27	Residence with meat cows and gardens.
MEI-09	S	Residence, Meat, Garden	9524	5.92	Residence with meat cows and gardens.
MEI-10	SSE	Residence, Meat, Garden	6795	4.22	Residence with meat cows and gardens.
MEI-11	SE	n/a	n/a	n/a	No residences, cows, or gardens present in the SE sector
MEI-12	ESE	Residence, Meat, Garden	8430	5.24	Residence with meat cows and gardens.
MEI-13	E	Residence, Meat, Garden	12929	8.03	Residence located off Traylor Road with meat cows and gardens.
MEI-14	ENE	Residence, Meat, Garden	9172	5.70	Residence located off Ednas Lane with meat cows and gardens.
MEI-15	NE	Residence, Meat, Garden	3479	2.16	Paradise Ranch residence with meat cows and gardens.
MEI-16	NNE	Residence, Meat, Garden	6687	4.16	Whittie House residence with meat cows and gardens.

Figure 1: Sensitive Receptor Locations



RAI 02.03.05-3:

Question:

10 CFR 20, Subpart D requires that the SSAR demonstrate that the proposed plant will be in compliance with dose limits for individual members of the public. NUREG-0800, Section 2.3.5 states that the specific location of potential receptors of interest should be provided.

SSAR Section 2.3.5.1 states that X/Q and D/Q values were determined for a construction worker at a subsequent unit after the initial unit has begun operation. The predicted X/Q and D/Q values are presented in VCS SSAR Table 2.3.5-3. Please update SSAR Table 2.3.5-1 to include the distances from the source to the construction worker for each of the 16 radial directions.

Response:

The χ/Q and D/Q values were determined for a construction worker at a subsequent unit after the initial unit has begun operation with the predicted χ/Q and D/Q values for the construction worker presented in VCS SSAR Table 2.3.5-3. To provide clarification in SSAR Section 2.3.5.1 Paragraph 5, the reference to construction workers will be removed from the indicated bullet and a new bullet will be added specific to construction workers. The new bullet, which includes the 0.25 mile distance from the source to the construction worker, will also include a pointer to Table 2.3.5-3 rather than Table 2.3.5-1. This distance was determined by dividing the power block area in half and approximating the distance between the center points of each half. The basis for the derivation of this distance considers that a construction worker would be mobile (that is, it represents an average location as the construction worker moves about the site).

Associated ESPA Revisions:

The ninth bullet of the fifth paragraph in Subsection 2.3.5.1 will be revised and a bullet specific to construction workers will be added in a future revision as indicated below:

Because the XOQDOQ model is used in the analysis, diffusion parameters (σ_y and σ_z), as specified in RG 1.145 and implemented by the XOQDOQ code, are used in estimating the X/Q and D/Q values. The following input data and assumptions are used in the XOQDOQ modeling analysis:

- Meteorological data: 2-year (July 2007–June 2009) onsite joint frequency distributions of wind speed, wind direction, and atmospheric stability (see Subsection 2.3.2).
- Type of release: Ground-level
- Wind sensor height: 10 meters
- Vertical temperature difference: (10–60 meters)
- Number of wind speed categories: 12 (including calm and the 11 categories listed in Table 2.3.2-5)
- Release height: 10 meter (default height)

- Minimum reactor building cross-sectional area: 1263 square meters
- Reactor building height: 24.38 meters above grade
- The shortest distances from the release point along the source boundary to the nearest residence, nearest property boundaries, ~~construction worker,~~ vegetable garden, and meat animal (Table 2.3.5-1)
- For technologies considering the placement of multiple units, the impact to construction workers, once a first unit is operational, was evaluated to the north-northeast at 0.25 miles (Table 2.3.5-3).
- No milk cows/goats are identified within 5 miles of the VCS site, and no dairies are identified within 50 miles.

RAI 02.03.05-4:

Question:

10 CFR 20, Subpart D requires that the SSAR demonstrate that the proposed plant will be in compliance with dose limits for individual members of the public.

SSAR Section 2.3.5.1 states that "directional sectors without a receptor within 5 miles were not modeled." However, SSAR Table 2.3.5-8 displays multiple receptors that have a distance greater than 5 miles. Please clarify this apparent discrepancy in the SSAR.

Response:

Because receptors at distances greater than 5 miles were modeled, the sentence indicating that the receptors outside 5 miles were not modeled will be deleted. Paragraph seven in SSAR Section 2.3.5.1 will be revised.

Associated ESPA Revisions:

The seventh paragraph of SSAR Section 2.3.5.1 will be revised in a future revision as indicated below:

The shortest distances from the source boundary to various receptors of interest (i.e., nearest residence, meat animal, and vegetable garden) are calculated for each directional sector. The results are presented in Table 2.3.5-1. Sensitive receptors ~~within 5 miles~~ were evaluated based on guidance in Subsection 2.3.5 of NUREG-0800. ~~Directional sectors without a receptor within 5 miles were not modeled~~. The shortest distance from the sensitive receptor to the source boundary was used for each sector. X/Q and D/Q were also determined …

RAI 02.03.05-5:

Question:

SSAR Section 2.3.5.1 provides the cross-sectional area and reactor building height for the mPower design. These measurements are then stated to be used as input for use in the XOQDOQ computer program. In order for the staff to evaluate whether this is a conservative assumption, please provide a listing of the reactor heights and containment cross-sectional areas of the other reactor designs being considered.

Response:

The following table presents the building dimensions that were considered to determine the bounding case for the XOQDOQ analysis. The bounding case was chosen based on the dimensions presented in the table and the understanding that larger cross sectional areas and heights are associated with larger building wakes and greater turbulent diffusion—that is, the smaller the cross sectional area and height, the less effect the potential building will have on turbulence, and thus, the more conservative the selection. Therefore, as indicated in Table 1, the mPower design was selected to most conservatively represent the parameters which would likely bound a chosen plant design. It should be noted that when considering the mPower design, the height and width were taken from the Reactor Service Building, as this building provides the largest potential source of turbulent diffusion resulting from building wakes from the mPower design.

Table 1: Building Height and Cross Sectional Areas for Various Reactor Types or Technologies

	Reactor Building[a]	
Technology	Height (m)	Cross Sectional Area (m^2)
ESBWR	48	2352
ABWR	37.8	2139
AP1000	69.7	2636
APWR	69.93	3092
mPower[b]	24.38	1263

[a]Grey shading represents bounding parameters used in the ESP analysis.
[b]mPower height and area are from the Reactor Service Building.

Associated ESPA Revisions:

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

ATTACHMENT 10

CD-R labeled:

"Exelon Victoria County Station ESP Input/Output Files Associated with the Calculations:

25352-000-H0C-HMMD-00004, Rev. 0, X/Q and D/Q Estimates for Routine Releases at Victoria County Station Units for ESP Application

25352-000-H0C-HMMD-00005, Rev. 0, X/Q Estimates for Accidental Releases for ESP Application"

January 2011

ATTACHMENT 11

SUMMARY OF REGULATORY COMMITMENTS

(Exelon Letter to USNRC, NP-11-0001, dated January 11, 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 Sections 2.3.3, 2.3.4, and 2.3.5 to incorporate the changes shown in the enclosed responses to the following NRC RAIs: 02.03.03-1 (Attachment 1) 02.03.04-1 (Attachment 2) 02.03.04-2 (Attachment 3) 02.03.05-3 (Attachment 7) 02.03.05-4 (Attachment 8)	Revision 1 of the ESPA SSAR planned for no later than March 31, 2012	Yes	No