NP-12-0027
June 26, 2012

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 (RAI) Letter No. 16
RAI 11.03-4, Response Revision 1
NRC Docket No. 52-042

Reference: (1) Exelon letter to the NRC, NP-12-0009, "Response to Request for Additional Information Letter No. 16," dated April 23, 2012

Attached is the revised response to the NRC Request for Additional Information (RAI) 11.03-4 included in Request for Additional Information Letter No. 16, dated February 27, 2012, related to the Early Site Permit Application (ESPA). The response to RAI 11.03-4 was previously submitted to the NRC in Reference 1, and is revised to provide the additional clarifications requested by the NRC as discussed on May 22, 2012. The response to RAI 11.03-4 previously submitted in Reference 1 is superseded by the enclosed revised response.

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, 2013.

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 26th day of June, 2012.

Respectfully,

Marilyn C. Kray
Vice President, Nuclear Project Development

Attachments:
1. Question 11.03-4 Response Revision 1
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, Environmental Project Manager, VCS, Division of New Reactor Licensing (w/Attachments)
USNRC Region IV, Regional Administrator (w/Attachments)
EDMS

RAI 11.03-4 Response Revision 1:

Question:

The staff has evaluated SSAR Table 11.3.3-6 values for total body and skin dose and found that the doses provided have been calculated at the site boundary. However, the site boundary location only considers plume and ground doses. For comparison to the limits in 10 CFR 50 Appendix I the total dose utilized is to be at the nearest MEI and should also include all pathway doses at the MEI. In order to accurately compare the nearest MEI doses to the 10 CFR 50 Appendix I limits, the staff requests for the applicant to re-evaluate SSAR Table 11.3.3-6 and all affected tables accordingly. In addition, please provide a markup of all SSAR changes necessary.

Supplemental NRC Request:

1. Table 11.3.3-4 - verify the distance miles, should the meat animal be 0.62 (at the site boundary)?
2. Tables 11.3.3-5 and 11.3.3-6 – MEI dose on Table 11.3.3-5 is 14 for child, and the Iodines and Particulates dose on Table 11.3.3-6 is 12, are these correct?
3. Table 11.3.3-7 changes – should there be associated changes to Tables in 11.2 addressing 40 CFR 190 criteria?
4. Table 11.2.3-4 should provide a break-down of liquid effluent doses by pathway and age group.
5. In general, tables should identify the source of data (e.g., GASPAR II, LADTAP II, or other SSAR table).

Response:

SSAR Table 11.3.3-5 currently shows gaseous effluent doses at four locations: site boundary, residence, vegetable garden, and meat animal. The doses at the last three locations are added to obtain the total MEI dose. Although no individual resides at the site boundary, plume, ground, and inhalation doses at this location are conservatively considered in demonstrating compliance with 10 CFR 50, Appendix I. Table 11.3.3-6 shows the larger of the site boundary and MEI doses from Table 11.3.3-5 for each dose type.

However, to provide additional clarification, Table 11.3.3-5 will be revised to remove the site boundary as an MEI location and to show the following pathways as contributing to the MEI doses:

- Plume at nearest residence
- Ground deposition at nearest residence
- Inhalation at nearest residence
- Vegetable ingestion from nearest garden
- Meat ingestion from animal at the site boundary

Based on a survey, Table 11.3.3-4 shows the nearest meat animal at 1.4 miles NNW. Since the meat animal may not be restricted to its owner's ranch, however, it is assumed that it can wander as close as the site boundary; accordingly, the footnote to Table 11.3.3-4 is being revised to indicate that distance to the site boundary (0.62 mi) is used for the calculation of doses to the meat animal. Table 11.3.3-6 will be revised to reflect the exposure pathways listed above, including the assumption that the meat animal is at the site boundary, for the total body, skin, and maximum organ MEI doses, but the site boundary will be retained as the unrestricted area receiving the maximum doses in air.

Table 11.3.3-7, Comparison of Maximally Exposed Individual Doses with 40 CFR 190 Criteria, is revised to show changes not only to gaseous effluent doses, but also to liquid effluent doses. The liquid effluent doses were revised in response to NRC questions from the Environmental Site Audit in January 2012 and subsequent NRC requests for additional information provided to Exelon under Environmental RAI Letter Number 12, dated May 31, 2012 (ML12150A152). Likewise Table 11.2.3-6, Comparison of Maximally Exposed Individual Doses with 40 CFR 190 Criteria, is revised to show changes to gaseous and liquid effluent doses. As requested, Table 11.2.3-4 is revised to show the changes to the liquid effluent doses and is reformatted into a series of tables that break down liquid doses by age group and dose pathway. In addition, Tables 11.2.3-1, 11.2.3-2, 11.2.3-5, and 11.2.3-7 are revised to show changes to liquid effluent doses, revised in response to the aforementioned Environmental RAIs. Exelon's response to Environmental RAI Letter Number 12 will be submitted to the NRC no later than July 13, 2012, in accordance with the 45-day response time requested in the letter.

With respect to the difference between the thyroid doses shown in Tables 11.3.3-5 and 11.3.3-6, the doses in Table 11.3.3-5 are larger because they are due to particulates, iodines, and gases, whereas the doses in Table 11.3.3-6 are due to particulates and iodines only. This will be clarified in the footnotes to Tables 11.3.3-5 and 11.3.3-6.

Footnotes have been added, as appropriate, to the tables in SSAR Subsections 11.2.3 and 11.3.3 to indicate the source of the data contained therein.

RAI References:

None.

Associated ESPA Revisions:

The following revisions to various tables in SSAR Subsections 11.2.3 and 11.3.3 are being made during a future revision of the ESP.

In summary, SSAR Table 11.2.3-1, Tables 11.2.3-5 through 11.2.3-7, and Tables 11.3.3-4 through 11.3.3-8 were revised to reflect the following: changes to assumptions associated with the calculation of liquid doses, exposure pathways used to calculate gaseous effluent doses to the MEI, and the assumption that meat animals could wander as close as the site boundary. In addition, Table 11.2.3-2 was revised to update the value for Y-93 for the APWR to bring the source term in line with DCD Rev. 2, consistent with that used for the accident doses. Table 11.2.3-4 was replaced by a series of tables (Tables 11.2.3-4a through -4e) to show the breakdown of doses by pathway and age group, as well as identifying the values adopted for the MEI.

Selected parameters in Table 11.2.3-1 are being updated as shown, during a future SSAR revision.

Table 11.2.3-1
Liquid Pathway Parameters

Parameter	Value	Basis/Source(s)
Impoundment Reconcentration Model	None	~~This model does not apply to the river discharge scenario.~~ Reconcentration is negligible when compared to conservatism associated with the assumed river flow rate (480 ft^3/sec versus mean and median flows of 10,076 ft^3/sec and 1988 ft^3/sec respectively).
Transit Time to Receptor	~~See RG 1.109~~ 0	~~The default transit times from RG 1.109, Table D-1 are used.~~ Conservative assumption.
50-Mile Sport Fishing Harvest	~~$6.69x10^4$ kg/yr~~ $2.67x10^5$ kg/yr	Based on RG 1.109, Appendix D and Table E-4, the average individual consumes 5.9 kg/yr of fish. Multiplying this by the 2080 population (414,902) yields the total annual consumption of fish within 50 miles of 2.43 $x10^6$ kg/yr. Of the state population of 20.9 million (Reference 11.2.3-3), 0.574 million (Reference 11.2.3-4) or about 2.75% engages in sport fishing in rivers. ~~It is assumed that 2.75%~~ Assuming that for every individual who catches fish, there are four who consume the catch, 11% of the fish consumption within 50 miles is due to sport fishing from Guadalupe River.
50-Mile Commercial Fishing Harvest	~~$1.15x10^6$ kg/yr~~ $2.17x10^6$ kg/yr	As the previous entry indicates, of the total fish consumption within 50 miles of 2.43 $x10^6$ kg/yr, ~~2.75%~~11% is due to sport fishing. It is assumed that Guadalupe River is the source of ~~50%~~100% of the fish consumed within 50 miles, with the remaining ~~47.25%~~89% coming from commercial fishing.
50-Mile Sport Invertebrate Harvest	~~$9.71x10^3$ kg/yr~~ $3.88x10^4$ kg/yr	Based on RG 1.109, Appendix D and Table E-4, the average individual consumes 0.85 kg/yr of invertebrate. Multiplying this by the 2080 population yields the total annual consumption of invertebrate within 50 miles of $3.53x10^5$ kg/yr. As with sport fishing, it is assumed that ~~2.75%~~11% of the invertebrate consumption within 50 miles is due to sport invertebrate harvest from the Guadalupe River.
50-Mile Commercial Invertebrate Harvest	~~$1.67x10^5$ kg/yr~~ $3.15x10^5$ kg/yr	As the previous entry indicates, of the total invertebrate consumption within 50 miles of $3.53x10^5$ kg/yr, ~~2.75%~~11% is due to sport invertebrate harvest. It is assumed that Guadalupe River is the source of ~~50%~~100% of the invertebrate consumed within 50 miles, with the remaining ~~47.25%~~89% coming from commercial harvest.

The value for Y-93 for the APWR liquid effluent activities is being updated to reflect the information in DCD Rev. 2. Note that only the value for Y-93 requires updating. This update has no effect on the maximum activities and thus has no effect on the source term used in the evaluations of dose from liquid effluent.

Table 11.2.3-2 (Sheet 1 of 2)
Composite Liquid Effluent Activities

Radionucilde	AP1000	APWR	ABWR-GEH	ABWR – Toshiba	ESBWR	mPower	Max
Y-90	0.00	0.00	0.00	3.11×10^{-6}	0.00	0.00	3.11×10^{-6}
Y-91m	1.00×10^{-5}	4.40×10^{-5}	0.00	0.00	0.00	7.50×10^{-6}	4.40×10^{-5}
Y-91	0.00	9.00×10^{-5}	2.35×10^{-4}	1.10×10^{-4}	1.20×10^{-4}	0.00	2.35×10^{-4}
Y-92	0.00	0.00	1.69×10^{-3}	6.00×10^{-4}	8.70×10^{-4}	0.00	1.69×10^{-3}
Y-93	9.00×10^{-5}	~~2.90×10^{-4}~~ 3.10×10^{-4}	1.36×10^{-3}	9.00×10^{-4}	1.00×10^{-3}	6.78×10^{-5}	1.36×10^{-3}

The following five tables (Tables 11.2.3-4a through -4e) are replacing existing Table 11.2.3-4 in a future revision to the SSAR:

Table 11.2.3-4a
Liquid Pathway Doses for Adult

Pathway	Dose per Unit (mrem/yr)							
	Total Body	GI-LLI	Bone	Liver	Kidney	Thyroid	Lung	Skin
Fish	3.30×10^{-1}	1.48×10^{-1}	7.40×10^{-1}	4.56×10^{-1}	1.56×10^{-1}	2.73×10^{-2}	4.87×10^{-2}	–
Invertebrate	4.37×10^{-2}	1.47×10^{-1}	5.49×10^{-2}	7.64×10^{-2}	2.82×10^{-2}	2.95×10^{-3}	6.92×10^{-3}	–
Drinking	1.69×10^{-1}	1.92×10^{-1}	5.98×10^{-3}	1.71×10^{-1}	1.67×10^{-1}	2.24×10^{-1}	1.64×10^{-1}	–
Shoreline	5.32×10^{-4}	5.32×10^{-4}	5.32×10^{-4}	5.32×10^{-4}	5.32×10^{-4}	5.32×10^{-4}	5.32×10^{-4}	6.24×10^{-4}
Swimming	1.49×10^{-5}	1.49×10^{-5}	1.49×10^{-5}	1.49×10^{-5}	1.49×10^{-5}	1.49×10^{-5}	1.49×10^{-5}	–
Boating	7.46×10^{-6}	7.46×10^{-6}	7.46×10^{-6}	7.46×10^{-6}	7.46×10^{-6}	7.46×10^{-6}	7.46×10^{-6}	–
Irrigated Vegetables Non-Leafy	1.49×10^{-1}	2.77×10^{-1}	3.60×10^{-2}	1.61×10^{-1}	1.35×10^{-1}	1.50×10^{-1}	1.21×10^{-1}	–
Irrigated Vegetables Leafy	1.86×10^{-2}	3.49×10^{-2}	4.61×10^{-3}	2.00×10^{-2}	1.68×10^{-2}	2.75×10^{-2}	1.49×10^{-2}	–
Irrigated Milk	9.79×10^{-2}	7.59×10^{-2}	2.49×10^{-2}	1.09×10^{-1}	8.33×10^{-2}	1.25×10^{-1}	7.35×10^{-2}	–
Irrigated Meat	3.09×10^{-2}	1.42	2.52×10^{-2}	2.95×10^{-2}	6.77×10^{-2}	2.65×10^{-2}	2.52×10^{-2}	–
Total	8.40×10^{-1}	2.30	8.92×10^{-1}	1.02	6.55×10^{-1}	5.84×10^{-1}	4.55×10^{-1}	6.24×10^{-4}

Note: Values from LADTAP II output.

Table 11.2.3-4b
Liquid Pathway Doses for Teen

Pathway	Dose per Unit (mrem/yr)							
	Total Body	GI-LLI	Bone	Liver	Kidney	Thyroid	Lung	Skin
Fish	2.12×10^{-1}	1.12×10^{-1}	7.98×10^{-1}	4.68×10^{-1}	1.57×10^{-1}	2.51×10^{-2}	5.57×10^{-2}	–
Invertebrate	2.95×10^{-2}	1.08×10^{-1}	5.85×10^{-2}	7.71×10^{-2}	2.82×10^{-2}	2.61×10^{-3}	7.74×10^{-3}	–
Drinking	1.18×10^{-1}	1.36×10^{-1}	5.72×10^{-3}	1.22×10^{-1}	1.19×10^{-1}	1.68×10^{-1}	1.16×10^{-1}	–
Shoreline	2.97×10^{-3}	2.97×10^{-3}	2.97×10^{-3}	2.97×10^{-3}	2.97×10^{-3}	2.97×10^{-3}	2.97×10^{-3}	3.49×10^{-3}
Swimming	8.33×10^{-5}	8.33×10^{-5}	8.33×10^{-5}	8.33×10^{-5}	8.33×10^{-5}	8.33×10^{-5}	8.33×10^{-5}	–
Boating	4.17×10^{-5}	4.17×10^{-5}	4.17×10^{-5}	4.17×10^{-5}	4.17×10^{-5}	4.17×10^{-5}	4.17×10^{-5}	–
Irrigated Vegetables Non-Leafy	1.73×10^{-1}	3.46×10^{-1}	5.95×10^{-2}	2.15×10^{-1}	1.73×10^{-1}	1.92×10^{-1}	1.51×10^{-1}	–
Irrigated Vegetables Leafy	1.17×10^{-2}	2.36×10^{-2}	4.13×10^{-3}	1.45×10^{-2}	1.17×10^{-2}	2.01×10^{-2}	1.01×10^{-2}	–
Irrigated Milk	1.19×10^{-1}	9.80×10^{-2}	4.45×10^{-2}	1.59×10^{-1}	1.14×10^{-1}	1.78×10^{-1}	9.86×10^{-2}	–
Irrigated Meat	1.87×10^{-2}	8.86×10^{-1}	2.11×10^{-2}	1.86×10^{-2}	5.08×10^{-2}	1.61×10^{-2}	1.52×10^{-2}	–
Total	6.85×10^{-1}	1.71	9.95×10^{-1}	1.08	6.57×10^{-1}	6.05×10^{-1}	4.57×10^{-1}	3.49×10^{-3}

Note: Values from LADTAP II output.

Table 11.2.3-4c
Liquid Pathway Doses for Child

Pathway	Dose per Unit (mrem/yr)							
	Total Body	GI-LLI	Bone	Liver	Kidney	Thyroid	Lung	Skin
Fish	1.17×10^{-1}	4.55×10^{-2}	1.02	4.10×10^{-1}	1.32×10^{-1}	2.62×10^{-2}	4.40×10^{-2}	–
Invertebrate	1.87×10^{-2}	4.24×10^{-2}	7.65×10^{-2}	6.78×10^{-2}	2.40×10^{-2}	2.73×10^{-3}	6.39×10^{-3}	–
Drinking	2.25×10^{-1}	2.41×10^{-1}	1.64×10^{-2}	2.35×10^{-1}	2.28×10^{-1}	3.54×10^{-1}	2.22×10^{-1}	–
Shoreline	6.21×10^{-4}	6.21×10^{-4}	6.21×10^{-4}	6.21×10^{-4}	6.21×10^{-4}	6.21×10^{-4}	6.21×10^{-4}	7.28×10^{-4}
Swimming	1.74×10^{-5}	1.74×10^{-5}	1.74×10^{-5}	1.74×10^{-5}	1.74×10^{-5}	1.74×10^{-5}	1.74×10^{-5}	–
Boating	8.70×10^{-6}	8.70×10^{-6}	8.70×10^{-6}	8.70×10^{-6}	8.70×10^{-6}	8.70×10^{-6}	8.70×10^{-6}	–
Irrigated Vegetables Non-Leafy	2.53×10^{-1}	3.86×10^{-1}	1.41×10^{-1}	3.47×10^{-1}	2.76×10^{-1}	3.24×10^{-1}	2.39×10^{-1}	–
Irrigated Vegetables Leafy	1.28×10^{-2}	1.96×10^{-2}	7.34×10^{-3}	1.76×10^{-2}	1.40×10^{-2}	2.72×10^{-2}	1.20×10^{-2}	–
Irrigated Milk	1.68×10^{-1}	1.48×10^{-1}	1.06×10^{-1}	2.57×10^{-1}	1.82×10^{-1}	3.17×10^{-1}	1.56×10^{-1}	–
Irrigated Meat	2.35×10^{-2}	5.50×10^{-1}	3.97×10^{-2}	2.28×10^{-2}	6.54×10^{-2}	1.99×10^{-2}	1.85×10^{-2}	–
Total	8.19×10^{-1}	1.43	1.41	1.36	9.22×10^{-1}	1.07	6.99×10^{-1}	7.28×10^{-4}

Note: Values from LADTAP II output.

Table 11.2.3-4d
Liquid Pathway Doses for Infant

Pathway	Dose per Unit (mrem/yr)							
	Total Body	GI-LLI	Bone	Liver	Kidney	Thyroid	Lung	Skin
Fish	0	0	0	0	0	0	0	–
Invertebrate	–	–	–	–	–	–	–	–
Drinking	2.20×10^{-1}	2.30×10^{-1}	1.74×10^{-2}	2.35×10^{-1}	2.24×10^{-1}	4.26×10^{-1}	2.18×10^{-1}	–
Shoreline	0	0	0	0	0	0	0	0
Swimming	–	–	–	–	–	–	–	–
Boating	–	–	–	–	–	–	–	–
Irrigated Vegetables Non-Leafy	–	–	–	–	–	–	–	–
Irrigated Vegetables Leafy	–	–	–	–	–	–	–	–
Irrigated Milk	–	–	–	–	–	–	–	–
Irrigated Meat	–	–	–	–	–	–	–	–
Total	2.20×10^{-1}	2.30×10^{-1}	1.74×10^{-2}	2.35×10^{-1}	2.24×10^{-1}	4.26×10^{-1}	2.18×10^{-1}	0

Note: Values from LADTAP II output.

Table 11.2.3-4e
Liquid Pathway Doses for MEI

Group	Dose per Unit (mrem/yr)							
	Total Body	GI-LLI	Bone	Liver	Kidney	Thyroid	Lung	Skin
Adult	8.4×10^{-1}	2.3	8.9×10^{-1}	1.0	6.5×10^{-1}	5.8×10^{-1}	4.5×10^{-1}	6.2×10^{-4}
Teen	6.8×10^{-1}	1.7	9.9×10^{-1}	1.1	6.6×10^{-1}	6.1×10^{-1}	4.6×10^{-1}	3.5×10^{-3}
Child	8.2×10^{-1}	1.4	1.4	1.4	9.2×10^{-1}	1.1	7.0×10^{-1}	7.3×10^{-4}
Infant	2.2×10^{-1}	2.3×10^{-1}	1.7×10^{-2}	2.4×10^{-1}	2.2×10^{-1}	4.3×10^{-1}	2.2×10^{-1}	0.0
Maximum	8.4×10^{-1}	2.3	1.4	1.4	9.2×10^{-1}	1.1	7.0×10^{-1}	3.5×10^{-3}
Maximum Group	Adult	Adult	Child	Child	Child	Child	Child	Teen

Note: Maximum is the maximum of the values for each age group (i.e., adult, teen, child, and infant). Values for each age group are the totals taken from Tables 11.2.3-4a through -4d.

The following changes are being made to Tables 11.2.3-5, 11.2.3-6, and 11.2.3-7 to reflect revised liquid doses in a future SSAR revision.

Table 11.2.3-5
Comparison of Maximally Exposed Individual Doses with 10 CFR 50, Appendix I Criteria

Type of Dose	Location	Annual Dose per Unit	
		VCS	Limit
Liquid Effluent			
Total Body (mrem)	Guadalupe River	~~0.74~~ 0.84	3
Maximum Organ – GI-LLI (mrem)	Guadalupe River	~~2.2~~ 2.3	10

Note: The total body dose is the maximum total body value from Table 11.2.3-4e. The maximum organ dose is the largest value of all of the maximum values for the different organs (e.g., GI-LLI, bone, liver, etc.), as listed in Table 11.2.3-4e.

Table 11.2.3-6
Comparison of Maximally Exposed Individual Doses with 40 CFR 190 Criteria

	Site Dose for Two Units (mrem/yr)				
	Liquid	Gaseous	Direct	Total	Limit
Total Body	~~1.5~~ 1.7	~~5.8~~ 4.4	5.0	~~12.0~~ 11	25.0
Thyroid	~~1.3~~ 2.1	~~16.0~~ 28	5.0	~~22.0~~ 35	75.0
Other Organ - Bone	~~2.6~~ 2.8	~~11.0~~ 16	5.0	~~19.0~~ 24	25.0

Note: Site doses for two units are obtained by doubling the doses from a single unit. Liquid effluent doses are obtained by doubling the MEI doses in Table 11.2.3-4e. Gaseous effluent doses are obtained by doubling the ~~higher of site boundary and~~ MEI doses in Table 11.3.3-5. The direct radiation dose is obtained by doubling 2.5 mrem/yr, the dose outside the controlled area corresponding to the shielding criteria for the ABWR (Reference 11.3.3-4, Table 3.2a); this is the largest direct dose component for the reactor technologies being evaluated.

Table 11.2.3-7 Collective Doses Within 50 Miles

Pathway	Dose per Unit (person-rem/yr)		Site Dose (person-rem/yr)	
	Total Body	Thyroid	Total Body	Thyroid
Liquid Effluents	~~8.7~~ 13	~~8.4~~ 9.1	~~17~~ 26	~~17~~ 18
Gaseous Effluents				
Noble Gases	2.9×10^{-1}	2.9×10^{-1}	5.8×10^{-1}	5.8×10^{-1}
Iodines	6.6×10^{-3}	2.6	1.3×10^{-2}	5.2
Particulates	1.4×10^{-1}	1.1×10^{-1}	2.8×10^{-1}	2.1×10^{-1}
C-14	5.9×10^{-1}	5.9×10^{-1}	1.2	1.2
H-3	1.0×10^{-1}	1.0×10^{-1}	2.1×10^{-1}	2.1×10^{-1}
Total Gaseous Effluents	1.1	3.7	2.3	7.4
Total	~~9.9~~ 14	~~12~~ 13	~~20~~ 28	~~24~~ 26
Natural Background[(a)]	1.2×10^{5}			

(a) Based on dose rate of 300 mrem/yr (Reference 11.2.3-7)

Note: Liquid doses per unit are from LADTAP II. Gaseous doses per unit are obtained by summing GASPAR II results for particulates, iodines, and gases. Site doses are for the new units only and are obtained by doubling the doses per unit.

Tables 11.3.3-4, 11.3.3-5, 11.3.3-6, 11.3.3-7, and 11.3.3-8 are being updated in a future revision of the ESPA as follows.

Table 11.3.3-4
Distance to Sensitive Receptors

Nearest Receptor	Direction	Distance (mi)
Site Boundary	SW	0.62
Residence	NNW	1.40
Vegetable Garden	NW	1.65
Meat Animal	NNW	1.40

Note: The site boundary and residence, garden, and meat animal locations indicated in this table are shown in Figure 11.3.3-1. The distances to the receptor locations are from the edge of the power block. Because it is not restricted to the location shown in Figure 11.3.3-1, for calculation of doses, it is assumed that the meat animal is located at the site boundary (0.62 mi).

Table 11.3.3-5
Gaseous Pathway Doses for Maximally Exposed Individuals

Pathway	Dose (mrem/yr) per Unit							
	Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
~~Site Boundary~~								
~~External~~								
~~Plume~~	~~1.9~~	~~1.9~~	~~1.9~~	~~1.9~~	~~1.9~~	~~1.9~~	~~2.0~~	~~6.7~~
~~Ground~~	~~0.85~~	~~0.85~~	~~0.85~~	~~0.85~~	~~0.85~~	~~0.85~~	~~0.85~~	~~1.0~~
~~Total~~	~~2.8~~	~~2.8~~	~~2.8~~	~~2.8~~	~~2.8~~	~~2.8~~	~~2.8~~	~~7.7~~
~~Inhalation~~								
~~Adult~~	~~0.11~~	~~0.13~~	~~0.029~~	~~0.13~~	~~0.14~~	~~3.2~~	~~0.17~~	~~0~~
~~Teen~~	~~0.12~~	~~0.13~~	~~0.037~~	~~0.14~~	~~0.16~~	~~4.1~~	~~0.21~~	~~0~~
~~Child~~	~~0.11~~	~~0.11~~	~~0.047~~	~~0.13~~	~~0.14~~	~~5.0~~	~~0.18~~	~~0~~
~~Infant~~	~~0.062~~	~~0.060~~	~~0.030~~	~~0.084~~	~~0.085~~	~~4.6~~	~~0.12~~	~~0~~
~~Total~~								
~~Adult~~	~~2.9~~	~~2.9~~	~~2.8~~	~~2.9~~	~~2.9~~	~~5.9~~	~~3.0~~	~~7.7~~
~~Teen~~	~~2.9~~	~~2.9~~	~~2.8~~	~~2.9~~	~~2.9~~	~~6.9~~	~~3.1~~	~~7.7~~
~~Child~~	~~2.9~~	~~2.9~~	~~2.8~~	~~2.9~~	~~2.9~~	~~7.8~~	~~3.0~~	~~7.7~~
~~Infant~~	~~2.8~~	~~2.8~~	~~2.8~~	~~2.9~~	~~2.9~~	~~7.4~~	~~3.0~~	~~7.7~~
Residence								
External								
Plume	0.54	0.54	0.54	0.54	0.54	0.54	0.55	1.7
Ground	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.27
Total	0.77	0.77	0.77	0.77	0.77	0.77	0.78	2.0
Inhalation								
Adult	0.025	0.028	0.0062	0.029	0.032	0.70	0.038	0
Teen	0.026	0.029	0.0080	0.031	0.035	0.90	0.046	0
Child	0.024	0.024	0.010	0.028	0.032	1.1	0.039	0
Infant	0.014	0.013	0.0065	0.019	0.019	1.0	0.026	0
Vegetable								
Adult	0.24	0.24	1.2	0.25	0.23	4.3	0.20	0
Teen	0.35	0.35	1.8	0.39	0.36	5.4	0.31	0
Child	0.75	0.73	4.2	0.84	0.78	10	0.70	0
Meat								
Adult	~~0.10~~ 0.45	~~0.16~~ 0.66	~~0.45~~ 2.0	~~0.11~~ 0.47	~~0.10~~ 0.45	~~0.39~~ 1.5	~~0.094~~ 0.42	0
Teen	~~0.083~~ 0.37	~~0.11~~ 0.48	~~0.38~~ 1.7	~~0.089~~ 0.39	~~0.083~~ 0.37	~~0.29~~ 1.1	~~0.078~~ 0.35	0
Child	~~0.15~~ 0.66	~~0.16~~ 0.71	~~0.71~~ 3.2	~~0.16~~ 0.69	~~0.15~~ 0.67	~~0.46~~ 1.8	~~0.14~~ 0.64	0
Total MEI Dose*								
Adult	~~1.1~~ 1.5	~~1.2~~ 1.7	~~2.4~~ 3.9	~~1.2~~ 1.5	~~1.1~~ 1.5	~~6.1~~ 7.2	~~1.1~~ 1.4	2.0
Teen	~~1.2~~ 1.5	~~1.3~~ 1.6	~~2.9~~ 4.2	~~1.3~~ 1.6	~~1.2~~ 1.5	~~7.4~~ 8.2	~~1.2~~ 1.5	2.0
Child	~~1.7~~ 2.2	~~1.7~~ 2.2	~~5.6~~ 8.1	~~1.8~~ 2.3	~~1.7~~ 2.2	~~13~~ 14	~~1.7~~ 2.2	2.0
Infant	0.78	0.78	0.77	0.79	0.79	1.8	0.81	2.0

Note: Gaseous doses are obtained by summing GASPAR II output for particulates, iodines, and gases. There are no milk animals within five miles of the gaseous effluent discharge location, and thus the total ~~Total~~ MEI dose is the sum of the residence, vegetable, and meat pathways.

Table 11.3.3-6
Comparison of Maximally Exposed Individual Doses with 10 CFR 50, Appendix I Criteria

Type of Dose	Location	Annual Dose per Unit	
		VCS	Limit
Gaseous Effluent			
Gamma Air (mrad)	Site Boundary	3.0	10
Beta Air (mrad)	Site Boundary	7.5	20
Total Body (mrem)	~~Site Boundary~~ Residence	~~2.8~~ 0.77	5
Skin (mrem)	~~Site Boundary~~ Residence	~~7.7~~ 2.0	15
Iodines and Particulates Maximum Organ — Thyroid (mrem)	Residence/Garden/Meat ~~Cow~~ Animal	~~11~~ 12	15

Note: The thyroid dose in this table is obtained by summing GASPAR II output for particulates and iodines due to all pathways. All other doses in this table are obtained by summing GASPAR II output for particulates, iodines, and gases due to external pathways only.

Table 11.3.3-7
Comparison of Maximally Exposed Individual Doses with 40 CFR 190 Criteria

	Site Dose for Two Units (mrem/yr)				
	Liquid	Gaseous	Direct	Total	Limit
Total Body	~~1.5~~ 1.7	~~5.8~~ 4.4	5.0	~~12.0~~ 11	25.0
Thyroid	~~1.3~~ 2.1	~~16.0~~ 28	5.0	~~22.0~~ 35	75.0
Other Organ - Bone	~~2.6~~ 2.8	~~11.0~~ 16	5.0	~~19.0~~ 24	25.0

Note: Site doses for two units are obtained by doubling the doses from a single unit. Liquid effluent doses are obtained by doubling the MEI doses in Table 11.2.3-4~~e~~. Gaseous effluent doses are obtained by doubling the ~~higher of site boundary and~~ MEI doses in Table 11.3.3-5. The direct radiation dose is obtained by doubling 2.5 mrem/yr, the dose outside the controlled area corresponding to the shielding criteria for the ABWR (Reference 11.3.3-4, Table 3.2a); this is the largest direct dose component for the reactor technologies being evaluated.

Table 11.3.3-8 Collective Doses Within 50 Miles

Pathway	Dose per Unit (person-rem/yr)		Site Dose (person-rem/yr)	
	Total Body	Thyroid	Total Body	Thyroid
Liquid Effluents	~~8.7~~ 13	~~8.4~~ 9.1	~~17~~ 26	~~17~~ 18
Gaseous Effluents				
Noble Gases	2.9×10^{-1}	2.9×10^{-1}	5.8×10^{-1}	5.8×10^{-1}
Iodines	6.6×10^{-3}	2.6	1.3×10^{-2}	5.2
Particulates	1.4×10^{-1}	1.1×10^{-1}	2.8×10^{-1}	2.1×10^{-1}
C-14	5.9×10^{-1}	5.9×10^{-1}	1.2	1.2
H-3	1.0×10^{-1}	1.0×10^{-1}	2.1×10^{-1}	2.1×10^{-1}
Total Gaseous Effluents	1.1	3.7	2.3	7.4
Total	~~9.9~~ 14	~~12~~ 13	~~20~~ 28	~~24~~ 26
Natural Background[(a)]	1.2×10^{5}			

(a) Based on dose rate of 300 mrem/yr (Reference 11.2.3-7)

Note: Liquid doses per unit are from LADTAP II. Gaseous doses per unit are obtained by summing GASPAR II results for particulates, iodines, and gases. Site doses are for the new units only and are obtained by doubling the doses per unit.

Similar changes are being made to the tables in ER 5.4 and will be provided as a part of the response to the series of RAIs issued under Environmental Request for Additional Information Letter Number 12, dated May 31, 2012.

ATTACHMENT 2

SUMMARY OF REGULATORY COMMITMENTS

(Exelon Letter to USNRC, NP-12-0027, dated June 26, 2012)

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 Subsections 11.2.3, 11.3.3, and ER Section 5.4 to incorporate the changes shown in the enclosed response to the following NRC RAI: 11.03-4 Response Revision 1 (Attachment 1)	Revision 2 of the ESPA SSAR and ER planned for no later than March 31, 2013	Yes	No