Exelon Generation

NP-11-0022
June 2, 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. 09
NRC Docket No. 52-042

Attached are responses to NRC staff questions included in Request for Additional Information (RAI) Letter No. 09, dated May 6, 2011, related to Early Site Permit Application (ESPA), Part 2, Sections 02.05.01 and 02.05.03. NRC RAI Letter No. 09 contained twenty-three (23) Questions. This submittal comprises a partial response to RAI Letter No. 09, and includes responses to the following six (6) Questions:

02.05.01-11	02.05.03-2
02.05.01-13	02.05.03-3
02.05.01-17	
02.05.01-21	

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 02.05.01-2, 02.05.01-6, 02.05.01-9, 02.05.01-18, 02.05.01-19, and 02.05.03-1 will be provided by June 20, 2011. The response to RAI Questions 02.05.01-3, 02.05.01-4, 02.05.01-7, 02.05.01-8, 02.05.01-10, 02.05.01-14, 02.05.01-15, and 02.05.01-16 will be provided by July 5, 2011. The response to RAI Question 02.05.01-20 will be provided by July 20, 2011. The response to RAI Questions 02.05.01-5 and 02.05.01-12 will be provided by August 4, 2011 These response times are consistent with the response times described in NRC RAI Letter No. 09, dated May 6, 2011.

Regulatory commitments established in this submittal are identified in Attachment 7.

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 2nd day of June, 2011.

Respectfully,

Marilyn C. Kray
Vice President, Nuclear Project Development

Attachments:
1. Question 02.05.01-11
2. Question 02.05.01-13
3. Question 02.05.01-17
4. Question 02.05.01-21
5. Question 02.05.03-2
6. Question 02.05.03-3
7. 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 02.05.01-11:

Question:

SSAR Section 2.5.1.2.4.2.4 describes fault E as having a similar geomorphic expression as fault D, which may imply that faults D and E are splays and may share a similar, contemporaneous movement history. In support of 10 CFR 100.23, please plot one or more representative LiDAR topographic profiles of faults D and E side-by-side, at the same scale and vertical exaggeration, to facilitate comparisons of their geomorphic expressions.

Response:

SSAR Section 2.5.1.2.4.2.4 describes the similarity between the surface expression of fault E and D as follows:

> "...the slope break associated with *[fault E]* has the same general characteristics as the non-degraded profiles of fault D (e.g., profile 4 and 8): a distinct inflection of the ground surface at the location of the lineament with the southeast side down."

This similarity between the faults can be seen in Figure 2 of this RAI response, which shows topographic profiles from the LiDAR data (TNRIS, 2007, 2008) presented in the SSAR across both growth faults E and D. The profiles from growth fault D are a subset of those shown in SSAR Figure 2.5.1-50, and the locations of those profiles are shown in SSAR Figure 2.5.1-49. The growth fault E profiles were developed explicitly for this RAI response, and the locations of the profiles are shown in Figure 1.

The discussion in the SSAR does not state that this similarity in topographic profiles implies a similar "movement history" for the two faults.

Response References:

TNRIS 2007, *Meta-data for Victoria, Refugio and Calhoun LiDAR derived elevation datasets*, Texas Natural Resources Information Systems (TNRIS), 2007.

TNRIS 2008, *Summary of Texas Coast LiDAR datasets*, Volume 2008, Texas Natural Resources Information Systems (TNRIS), http://www.tnris.state.tx.us/news.aspx?id=724, accessed on May 12, 2008, http://www.tnris.state.tx.us/news.aspx?id=724, 2008.

Associated ESPA Revision:

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

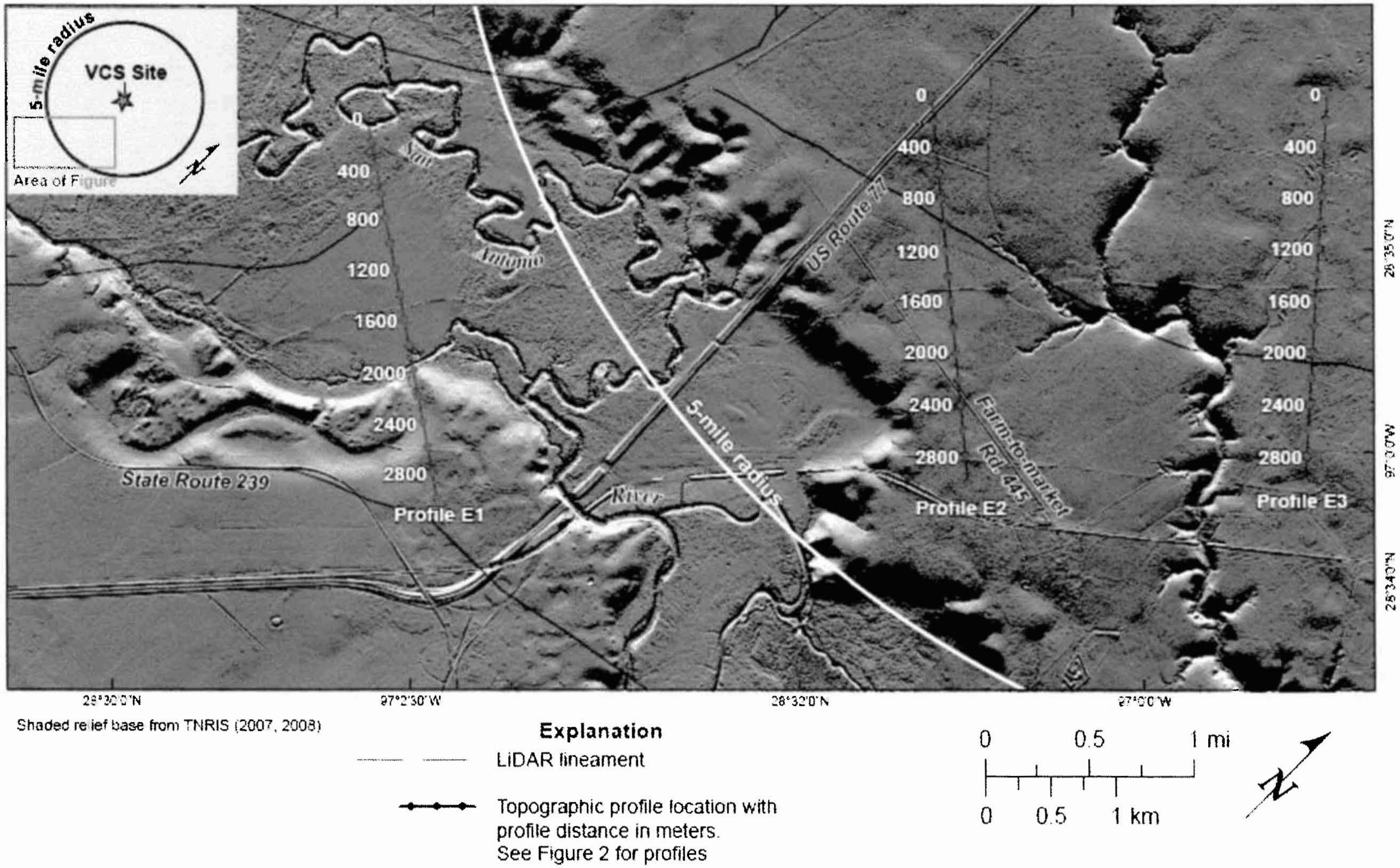


Figure 1. Location of Fault E LiDAR Profiles.

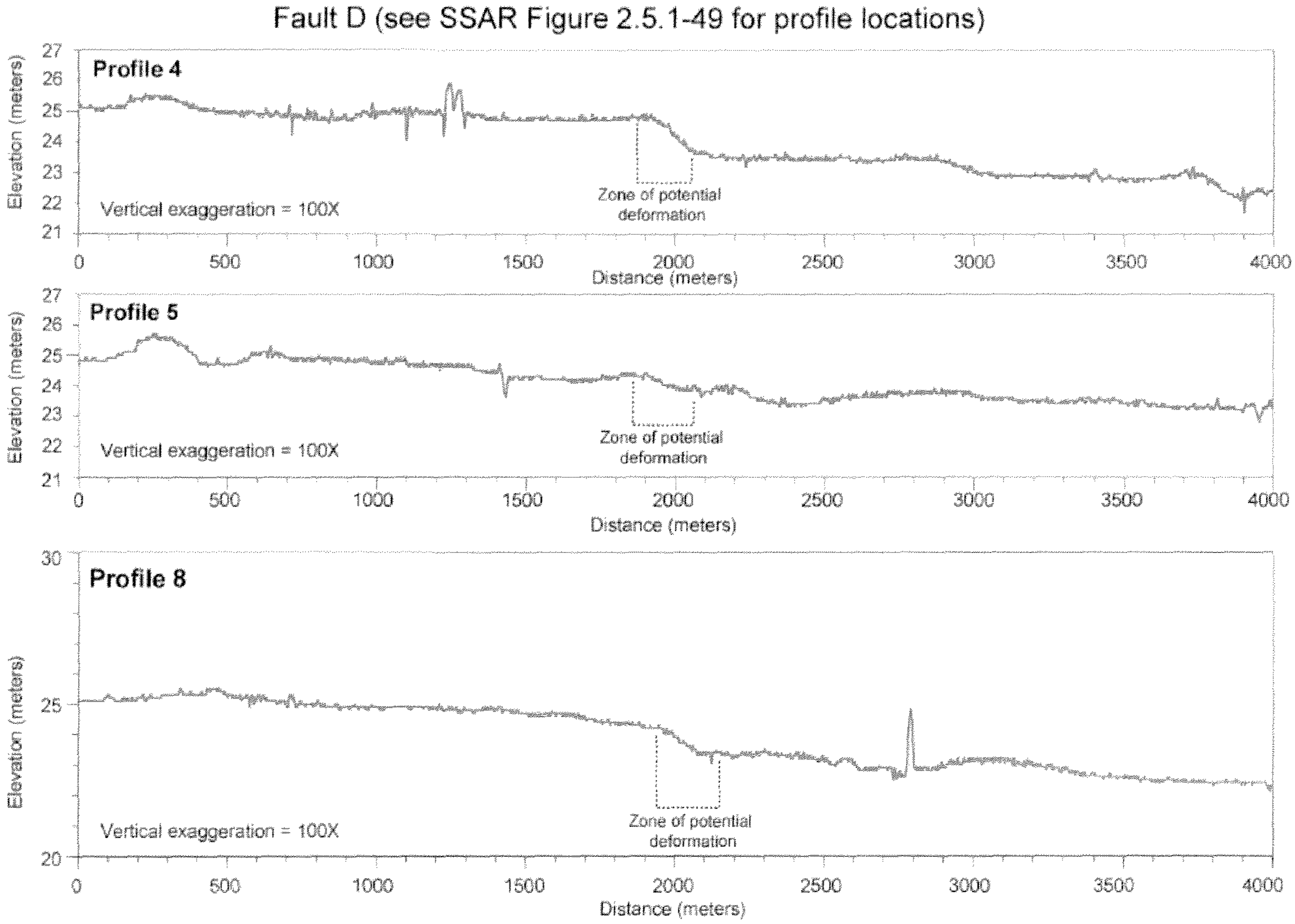


Figure 2. Topographic Profiles

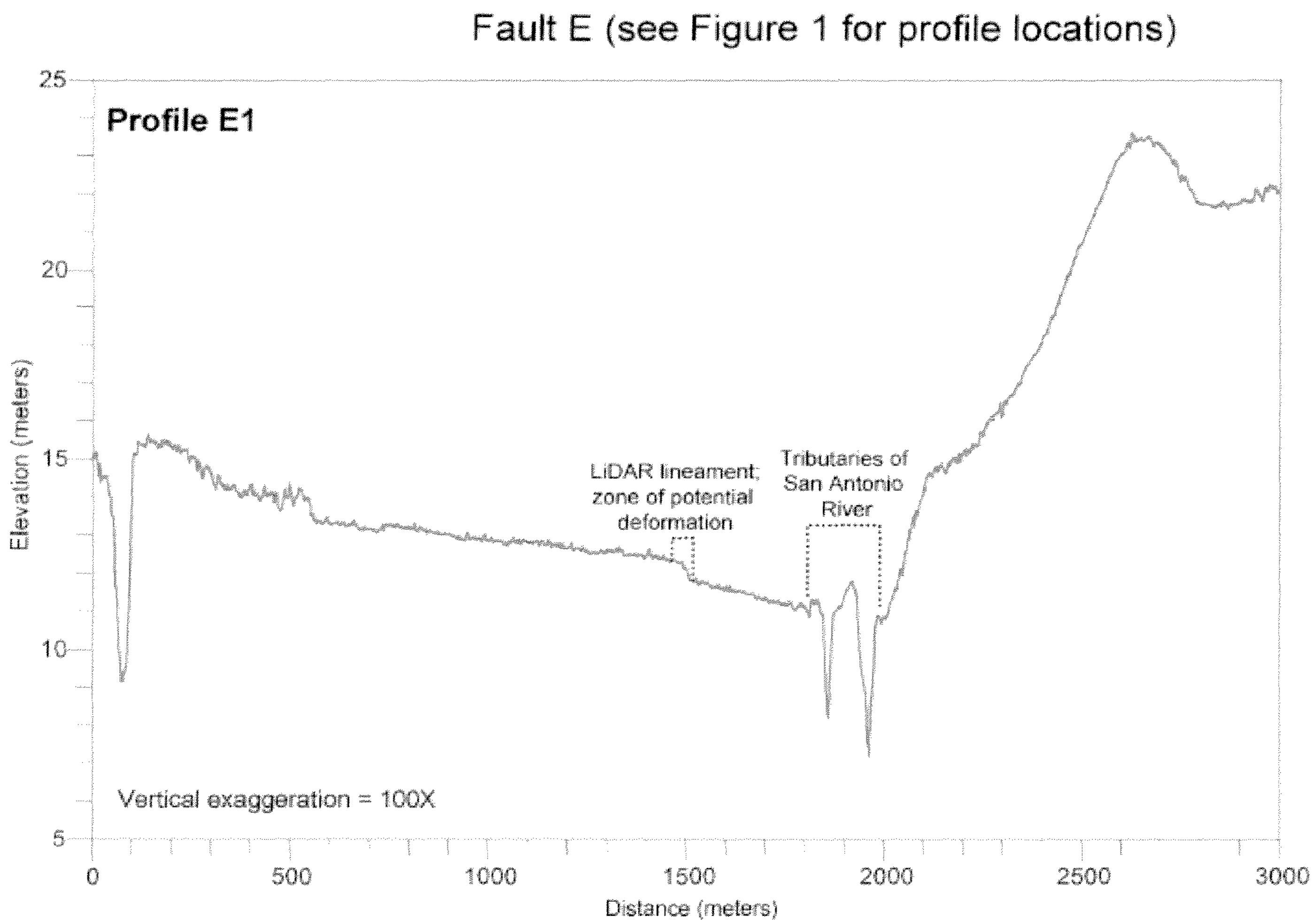
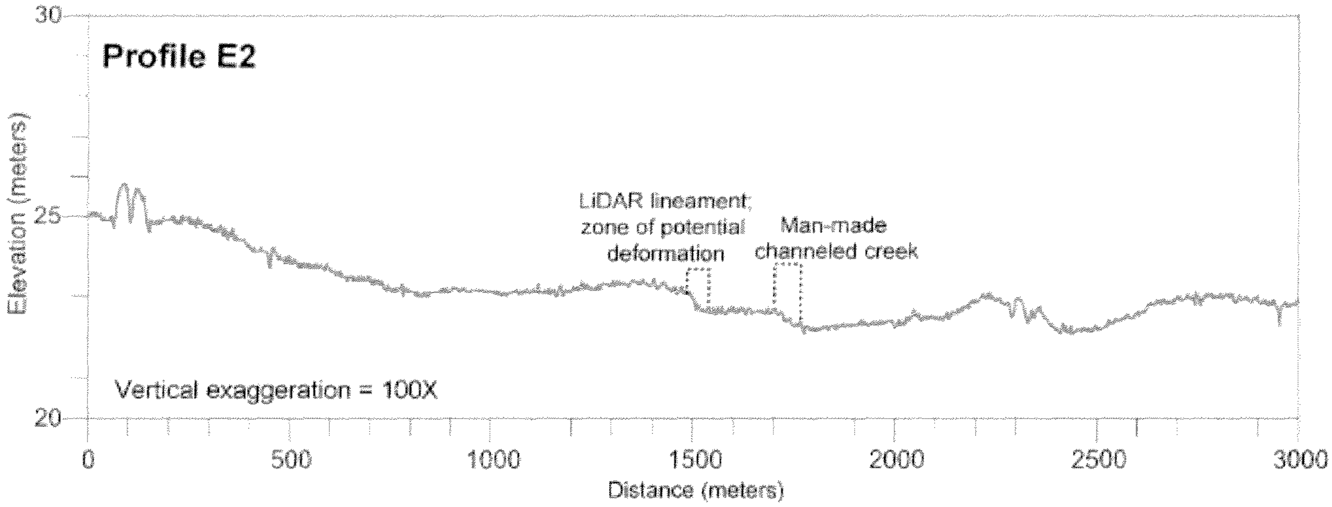


Figure 2. Topographic Profiles (continued)



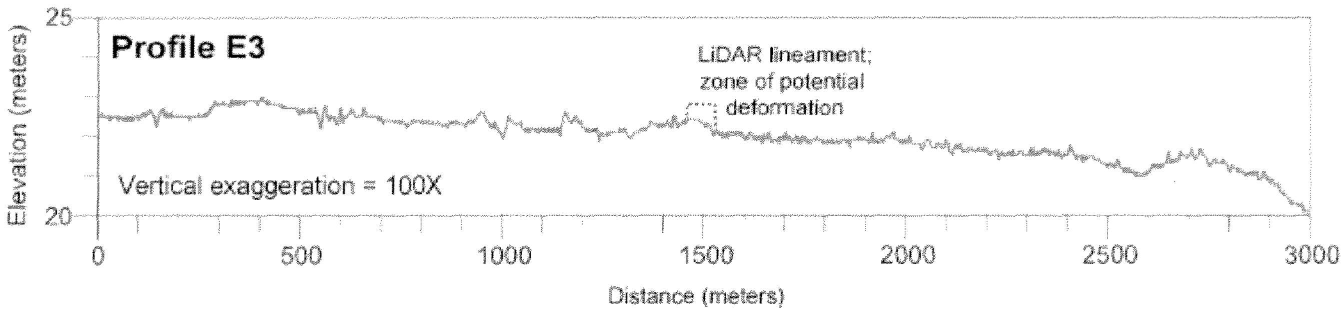


Figure 2. Topographic Profiles.
(continued)

RAI 02.05.01-13:

Question:

In response to Question 02.05.01-01, ML 102510229, 8/16/2010, you calculate the separation rate on fault E using ages of 350,000 and 100,000 years as the upper- and lower-bound for time of offset. You also state in the same response that "At the southern end of the site area, the surface deformation associated with growth fault E extends into floodplain deposits of the San Antonio River (SSAR Figure 2.5.1-4 and 2.5.1-39). The floodplain surface is inset (topographically lower and younger) into the Beaumont Formation surface. Based on the NCRS soils map, the soils developed in the floodplain deposits are interpreted to be Holocene in age (USDA 2010)".

If the fault deforms or offsets Holocene age sediments or soils, then the oldest age for this calculation would be 10,000 years. Please revise the calculation for fault E presented in response to Question 02.05.01-01 or justify using 100,000 years as the last time of movement in your calculation.

Response:

This RAI question requests that the response to RAI 02.05.01-1 part (c) be modified to account for a 10,000 year maximum age of the deformation associated with growth fault E. In this context "maximum age" refers to the observation that growth fault E appears to deform 10,000 year old Holocene deposits, so the maximum age of this deformation is 10,000 years ago. The 10,000 year maximum age is based on part (d) of RAI response 02.05.01-1 where it is stated that "Because the deformation associated with growth fault E appears to affect Holocene floodplain deposits, the most recent movement on growth fault E has occurred in the past 10,000 years."

The calculations presented in the response to RAI 02.05.01-1 part (c) did not use a 10,000 year age to calculate an end-member separation rate because RAI 02.05.01-1 part (c) explicitly asked for the details of the calculations presented within the SSAR (SSAR Section 2.5.1.2.4.2.4), and the SSAR calculations did not use 10,000 years.

There is evidence that at least some of the surface deformation associated with growth fault E has occurred during the Holocene. In this case, the most recent movement on the fault has occurred in the last 10,000 years, and this implies the following lower-limit separation rate (assuming all of the approximately 4.9 ft of deformation occurred after deposition of the Holocene deposits):

- $$\frac{4.9\,ft \times 12\frac{in}{ft}}{10{,}000\,yrs} = 5.9 \times 10^{-3}\frac{in}{yr}.$$

ESPA revisions associated with this response will be provided in the response to RAI 02.05.01-12.

Associated ESPA Revision:

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

RAI 02.05.01-17:

Question:

SSAR Section 2.5.1.2.4.2.3.1.3 discusses growth fault structure and listric geometry. A "likely regional" basal detachment fault is interpreted between two-way travel times of about 3.9 and 4.5 seconds on the industry seismic reflection profiles (SSAR Fig. 2.5.1-45, 46, 47). Other than this being the "deepest and most laterally extensive" sub-horizontal horizon in the profiles, however, the criteria used to interpret this detachment at depth are not clearly stated. In addition there is uncertainty due to decreasing signal-to-noise ratios with depth, increasing migration noise tails with depth, and time-varying bandpass filtering. In support of 10 CFR 100.23, discuss the criteria for your interpretation of the basal detachment in order to justify your interpretation that the VC growth faults are shallow and do not penetrate directly to basement.

Response:

The basal detachment shown in SSAR Figures 2.5.1-45, 2.5.1-46, and 2.5.1-47 was identified and mapped using the following observations.

- Growth faults identified above the detachment systematically flatten with increasing depth towards the detachment to dips as low as 15°.
- The identified faults systematically end above or at a depth that is relatively consistent between all the seismic lines and at seismic line intersection points.
- Growth faults in the deeper stratigraphy (between Horizon 1 and the basal detachment) bound: (1) packages of reflectors exhibiting a downward fanning pattern (i.e. they become steeper with depth), and (2) convex reflectors suggesting the presence of "rollover anticlines." In all of the seismic lines these tilted reflectors abruptly end at a depth consistent with the identified detachment.
- Below the basal detachment the reflectors are primarily flat with no sign of systematic tilting suggesting the absence of faults extending beneath the detachment surface.

The general growth fault structure and presence of a basal detachment (i.e., the absence of growth faults that extend to the basement, defined as crust below the Mesozoic marine deposits) presented in SSAR Figures 2.5.1-45, 2.5.1-46, and 2.5.1-47 are consistent with the characteristics of Vicksburg growth faults mapped elsewhere (e.g., Combes, 1993; Diegel, Karlo, Schuster, Shoup and Tauvers, 1995; Erxleben and Carnahan, 1983; Tyler and Ewing, 1986). For example, Vicksburg growth faults exhibit the following characteristics:

- They formed during deposition of the Vicksburg Formation and accommodate the greatest amount of extension within the Vicksburg Formation (Erxleben and Carnahan, 1983);
- They have fanning dips down section, roll-over anticlines, and listric down-dip geometries; and

- They sole into either the upper section of the Jackson Group Shales or within the deeper Paleocene and Eocene section above the San Marcos Arch (Bruce, 1973; Combes, 1993; Diegel, et al., 1995; Erxleben and Carnahan, 1983).

In summary, the available evidence indicates that the growth faults within the VCS site vicinity are Vicksburg growth faults (SSAR Section 2.5.1.1.4.3.4.2). As such, these growth faults formed during and just after the deposition of the Vicksburg Formation. The basic behavior of growth faults is that they form when there is differential subsidence within the unit in which they formed (Bruce, 1973). This subsidence is caused by either sediment compaction or flow of salt or shale substrate (Bradshaw and Watkins, 1994). In the San Marcos Arch area, Vicksburg growth faults sole into shale bodies (massifs, diapirs, or ridges) and differential subsidence within the Vicksburg Formation (and development of the Vicksburg growth faults) is caused by movement of these bodies (Diegel, et al., 1995). Thus, there is no reason to expect the growth faults to propagate into the basement, which does not contain salt or shale stratigraphic units.

Response References:

Bradshaw, B. and Watkins, J., *Growth-fault evolution in offshore Texas*: Trans. Gulf Coast Assoc. Geol. Soc., v. 44, p. 103-109, 1994.

Bruce, C. H., *Pressured shale and related sediment deformation: Mechanisms for development of regional contemporaneous faults*: AAPG Bulletin, v. 57, p. 878-886, 1973.

Combes, J. M., *The Vicksburg Formation of Texas: depositional systems distribution, sequence stratigraphy, and petroleum geology*: AAPG Bulletin, v. 77, p. 1942-1970, 1993.

Diegel, F., Karlo, J., Schuster, D., Shoup, R. and Tauvers, P., *Cenozoic structural evolution and tectono-stratigraphic framework of the northern Gulf Coast continental margin*, in Jackson, M. P. A., Roberts, D. and Snelson, S., eds., Salt Tectonics: A Global Perspective, AAPG Memoir 65, p. 109-151, 1995.

Erxleben, A. W. and Carnahan, G., *Slick Ranch Area, Starr County Texas*, in Bally, A. W., ed., Seismic Expression of Structural Styles, Volume 2: Tulsa, OK, American Association of Petroleum Geologists, p. 2.3.1-22 to -26, 1983.

Tyler, N. and Ewing, T., *Major oil plays of south and south-central Texas*, in Stapp, W., Dutton, L., Weise, B., Jones, L. and Fergeson, W., eds., Contributions to the Geology of South Texas: 1986: San Antonio, TX, South Texas Geological Society, p. 24-52, 1986.

Associated ESPA Revision:

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

RAI 02.05.01-21:

Question:

In SSAR Section 2.5.1.2.6.4 you described the effects of human activities on the site which included a map, Figure 2.5.1-51, of active oil wells in the plant vicinity. In support of 10 CFR 100.23 (d), please provide the following:

a. The staff notes that the map is barely legible and cannot be magnified in the electronic version provided. Please provide a map that can be enlarged, and distinguish all oil and gas wells as active, inactive, abandoned, or unknown condition.

b. Volatile and flammable gases are known to potentially accumulate in the shallow subsurface, as well as in buildings, in the vicinity of oil and gas well fields. As such, provide a hazard evaluation for potential explosions or fires from accumulating volatiles on the site property. Please indicate how the condition of the well casings would impact uncertainties with respect to the hazard evaluation.

Response:

a. SSAR Figure 2.5.1-52, titled *Mineral Leasing Rights on Victoria County, Texas,* provides the staff's requested distinction between all oil and gas wells as active, inactive, or abandoned. For ease of review, each mapping symbol delineated in the legend to Figure 2.5.1-52 for the "Oil & Gas Wells" category has been subcategorized as ***active*** or ***inactive/abandoned*** in the text below. Additionally, a description as defined by the Railroad Commission of Texas in its glossary for the Public GIS Map Viewer (Reference 1) or the Digital Map Information User's Guide (Reference 2) is provided for each mapping symbol in this category):

   Active:

   i. **Oil**- A*ny well which produces one barrel or more crude petroleum oil to each 100,000 cubic feet of natural gas.*
   ii. **Gas**- *Any well:*
      (a) which produces natural gas not associated or blended with crude petroleum oil at the time of production;
      (b) which produces more than 100,000 cubic feet of natural gas to each barrel of crude petroleum oil from the same producing horizon; or
      (c) which produces natural gas from a formation or producing horizon productive of gas only encountered in a wellbore through which crude petroleum oil also is produced through the inside of another string of casing or tubing. A well which produces hydrocarbon liquids, a part of which is formed by a condensation from a gas phase and a part of which is crude petroleum oil, shall be classified as a gas well unless there is produced one barrel or more of crude petroleum oil per 100,000 cubic feet of natural gas; and that the term "crude petroleum oil" shall not be construed to mean any liquid hydrocarbon mixture or portion thereof which is not in the liquid phase in the reservoir, removed from the reservoir in such liquid phase, and obtained at the surface as such.
   iii. **Oil/Gas**- *A completed well with a history of both oil and gas production based on reported test data.*

iv. **Injection/Disposal Well**- *A well used to inject water, gas, or other fluids into a reservoir productive of oil, gas, or geothermal resources for enhanced recovery purposes; or a well used for the disposal of saltwater or other oil and gas waste by injection into a zone not productive of oil, gas or geothermal resources.*
v. **Injection/Disposal from Oil**- *An injection/disposal well that was previously classified as an oil producer.*
vi. **Injection/Disposal from Gas**- *An injection/disposal well that was previously classified as a gas producer.*
vii. **Injection/Disposal from Oil/Gas**- *An injection/disposal well that was previously classified as an oil and gas producer.*
viii. **Sidetrack Well Surface Location**- *A well drilled from within a wellbore.*

Inactive/Abandoned:

i. **Plugged Oil**- *A well with a history of oil production that has been plugged.*
ii. **Plugged Gas**- *A well with a history of gas production that has been plugged.*
iii. **Plugged Oil/Gas**- *A well with a history of oil and gas production that has been plugged.*
iv. **Canceled/Abandoned Location**- *Well location for which the permit has expired or been canceled.*
v. **Permitted Location**- *Proposed location of a well for which the Railroad Commission of Texas has granted a drilling permit.*
vi. **Dry Hole**- *A plugged well that never produced oil or gas.*
vii. **Shut-In Oil**- *A well that is shut-in, temporarily abandoned, or unsuccessfully completed, has never produced oil or gas, and has been set up on the oil proration schedule for tracking purposes.*
viii. **Shut-In Gas**- *A well that is shut-in, temporarily abandoned, or unsuccessfully completed, has never produced oil or gas, and has been set up on the gas proration schedule for tracking purposes.*

To confirm legibility, Figure 2.5.1-52 was viewed on the Nuclear Regulatory Commission's website (http://pbadupws.nrc.gov/docs/ML1010/ML101030932.pdf) and enlarged to 1000% where it was verified that legibility was maintained for this figure when enlarged to this degree. Additionally, while SSAR Figure 2.5.1-52 correctly represents the location of the oil and gas wells, the depiction of the boundary and flow direction of the cooling basin is not representative of the current conceptual design. SSAR Figure 2.2-5 should be used to determine the placement of the cooling basin boundary with respect to the oil and gas wells.

b. A discussion concerning the identification/location and resultant hazards (including potential explosions and fires) associated with natural gas pipelines and the gas and oil extraction fields is located in SSAR Section 2.2. The identification of the oil/gas wells provided in the SSAR is in accordance with RG 1.206 (Section C.I.2.2.1), which indicates that pipelines and well locations should be identified and the need for their evaluation as a design basis event must be considered.

SSAR Subsection 2.2.2.3.4 describes the natural gas and oil extraction fields and the associated series of active and inactive oil and gas wells located within a 5-

mile radius of VCS. The location of each identified oil and gas well is provided in SSAR Figure 2.2-5. This figure identifies each individual active and inactive (plugged) well within 5-miles of VCS represented by the following legend categories: Gas Well, Oil Well, Oil/Gas Well, and Permitted Locations. (Note, SSAR Figure 2.2-5 does not locate/depict the dry holes which were included in SSAR Figure 2.5.1-52, as these are plugged wells that have never produced oil or gas and would be inconsequential to a hazards analysis pertinent to SSAR 2.2.) As detailed in SSAR Subsection 2.2.2.3.4 and Figure 2.5.1-52, many of the wells in these fields have been plugged and are no longer in operation.

SSAR Subsections 2.2.2.3 and 2.2.2.3.1 and SSAR Figure 2.2-2 detail the natural gas pipelines located on or near the site, including Exelon's plans to relocate three of the pipelines. Following relocation, the nearest identified pipeline would be approximately 0.42 miles (2237 feet) from the power block area. From SSAR Table 2.2-6 and Figure 2.2-2, the largest of these three lines has a diameter of 30 inches and an operating pressure of 900 psig. In contrast, as indicated in SSAR Subsection 2.2.2.3.4, the closest active well is located approximately 0.76 miles (4013 feet) from the VCS power block area. This well has a tubing size diameter of 2-3/8 inches, and a recorded tubing wellhead pressure of 73 psi under flowing conditions was recorded in 1978. (Reference 3)

When identifying plausible design basis events, as described in SSAR 2.2 (Subsection 2.2.2.3.4), the potential hazards resulting from a postulated scenario involving a leaking oil or gas well were dispositioned by the bounding hazards analysis of a catastrophic break in a natural gas transmission line. The bounding hazards analyses for the natural gas pipeline included: a deflagration of a flammable vapor cloud of natural gas (SSAR Subsection 2.2.3.1.1.1); a delayed explosion of a flammable vapor cloud of natural gas involving probability of a delayed explosion of a vapor cloud of natural gas exceeding 1 psi at the power block area (SSAR Subsection 2.2.3.1.2.1.); and a heat flux analysis due to a jet fire (SSAR Subsection 2.2.3.1.5). This analysis is considered to bound a leak in a gas or oil well based on:

- the closer proximity of the natural gas transmission line to the power block area;
- the larger volume (larger diameter and operating pressure) of natural gas in the transmission lines;
- the safety controls (such as blowout preventers) on the wells; and
- the expected damage radius.

As such, any potential for explosions or fires from the identified oil and gas wells is bounded by the natural gas pipeline hazard analyses. The hazards posed by toxic gases, such as hydrogen sulfide, will be evaluated at the COL stage, as permitted by NRC guidance in RS-002 and the SRP Section 2.2.3, and as indicated in Subsection 2.2.3.1.3.

In regards to the accumulation of volatile and flammable gases, the abandoned oil and gas wells within the footprint of the cooling basin and plant will be plugged in accordance with Texas regulations—Title 16, Part 1, Chapter 3, Rule 3.14 of the Texas Administrative Code. As any abandoned well would be properly plugged, it is not anticipated that there will be any leakage of volatile and flammable gases, and as delineated on SSAR Figure 2.5.1-52, there are no plugged or abandoned wells located closer than the closest active well (0.76 miles (4013 feet) from the VCS power block area). Therefore, all wells are located a substantial distance from any buildings within the power block area, and the potential for accumulation and confinement in buildings from either active or inactive oil and gas wells would be unrealistic. Further, taking into account the bounding analysis presented for the natural gas pipelines and the comparative distances from the power block area to the closest active and plugged wells, consideration of the condition of the well casings would have no bearing with respect to the hazards analysis.

Response References:

1. Railroad Commission of Texas, *Public GIS Map Viewer Glossary of Terms*, available online at: http://gis2.rrc.state.tx.us/public/help/GIS_glossary.html , accessed May 15, 2011.
2. Railroad Commission of Texas, *Railroad Commission of Texas Information Technology Services Division User's Guide Digital Map Information, Publication Number: OGA094,* January 2005.
3. Railroad Commission of Texas, *GIS Wellbore Attributes (API #46901539) Operator/Wellbore/PDQ—Data on Well Completion and Log and Application for Exception to Statewide Rules 28 and, or 29*, available online at: http://rrcsearch.neubus.com/esd-rrc/index.php?_module_=esd&_action_=viewimage&id=165377&oversized=0&profile= , accessed May 16, 2011.

Associated ESPA Revision:

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

RAI 02.05.03-2:

Question:

In SSAR Section 2.5.3.1, you cite discussions with current researchers in the area as a basis in your assessment for tectonic and non-tectonic deformation potential. Please provide summary details of these discussions that specifically pertained to active growth faulting.

Response:

The statement from SSAR Section 2.5.3.1 referred to in this RAI question addresses the potential for tectonic and non-tectonic deformation within the 5-mile radius VCS site area. As part of the process of compiling background information on the geology and seismology of the VCS site region, dialogs were initiated with numerous experts and individuals with local knowledge. Because of the lack of research and investigations on deformation related to growth faulting within the 25-mile radius site vicinity and the site area, none of the conversations with current researchers were directly on the topic of surface deformation related to growth faults. The most relevant interaction with an active research scientist, with respect to growth fault issues within the site area, was with Professor Michael Blum of Louisiana State University. Dr. Blum does not study growth faults, but he has numerous papers on the stratigraphy of the Texas coastal plain (e.g., Aslan and Blum, 1999; Blum and Price, 1998; Blum and Aslan, 2006; Blum and Carter, 2000; Blum et al., 2001; Blum et al., 2003; Blum and Valastro, 1994).

As described in SSAR Section 2.5.1.2.4.2.3.3, 2.5.1.2.4.2.4.1, and 2.5.3.4.2.1.3, the age of the surficial deposits is one constraint on timing of deformation related to growth faults within the site area. As described in SSAR Section 2.5.1.2.3, there are two different published interpretations of what geologic formation occurs in the site area and thus is deformed by growth faults D and E. Some maps show the site on the older Lissie Formation (e.g., Barnes, 1987), and other maps show the site on the younger Beaumont Formation (e.g., Winker, 1979). Correspondence with Michael Blum helped to establish that the formation at the site is Beaumont and not Lissie (SSAR Figure 2.5.1-23).

References:

Aslan, A., and Blum, D., 1999, Contrasting styles of Holocene avulsion, Texas Gulf Coastal Plain, USA: Special Publications of the International Association of Sedimentologists, v. 28, p. 193-209.

Barnes, V.E., 1987, Geologic Atlas of Texas Beeville-Bay City Sheet: Austin, TX, Bureau of Economic Geology

Blum, M., and Price, D.M., 1998, Quaternary alluvial plain construction in response to glacio-eustatic and climatic controls, Texas Gulf coastal plain, Relative Role of Eustasy, Climate, and Tectonism in Continental Rocks, Society for Sedimentary Geology, Special Publication 59, p. 31-48.

Blum, M.D., and Aslan, A., 2006, Signatures of climate vs. sea-level change within incised valley-fill successions: Quaternary examples from the Texas Gulf Coast: Sedimentary Geology, v. 190, p. 177-211.

Blum, M.D., and Carter, A.E., 2000, Middle Holocene evolution of the central Texas coast: Gulf Coast Assoc. Geol. Soc. Trans, v. 50, p. 331-342.

Blum, M.D., Misner, T.J., Collins, E., Scott, E.S., Morton, R.A., and Aslan, A., 2001, Middle Holocene sea-level rise and highstand at +2m, central Texas coast: J. Sed. Res., v. 71, p. 581-588.

Blum, M.D., Sivers, A.E., Zayac, T., and Goble, R.J., 2003, Middle Holocene seal-level and evolution of the Gulf of Mexico coast: Gulf Coast Assoc. Geol. Soc. Trans, v. 53, p. 64-77.

Blum, M.D., and Valastro, S., 1994, Late Quaternary sedimentation, lower Colorado River, Gulf Coastal Plain of Texas: GSA Bulletin, v. 106, p. 1002-1016.

Winker, C.D., 1979, Late Pleistocene Fluvial-Deltaic Deposition: Texas Coastal Plain and Shelf [MA thesis]: Austin, TX, University of Texas at Austin.

Associated ESPA Revision:

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

RAI 02.05.03-3:

Question:

Regulatory Guide 1.208, Appendix C, Section C.24 states "growth faults can be identified and avoided in siting and their displacements can be monitored". Due to the uncertainties in the location of the growth faults in the vicinity of the site, the uncertainties with respect to the rate of slip on these faults, and their potential impact on the stability of the structures, please discuss how you will monitor displacements or the activity of the growth faults.

Response:

Exelon proposes a VCS site growth fault displacement monitoring program outlined below to be implemented at the COL stage.

The standard-of-practice survey technique within the earth sciences for documenting subtle vertical deformation of the earth¹s surfaces is commonly referred to as tectonic first-order geodetic leveling. This technique is well established and can be used to document elevation changes (vertical displacements) as a function of time by repeated surveys of permanent benchmarks installed across a fault. To achieve the accuracy and resolution likely required to document subtle deformation that may be related to growth fault deformation (on the order of millimeters per year), the surveys should be conducted to First Order, Class II standards (Federal Geodetic Commission, 1984). This standard is referred to as "tectonic first order precision" (1 ppm) and has an accepted vertical elevation uncertainty of less than or equal to 1.0 mm (L1/2) where L equals the one-way line length in kilometers.

Surveys following this standard require drilling and installation of permanent benchmarks across the fault. The benchmarks act as survey control points and thus require permanence and relative vertical stability with respect to the Earth's crust over the time period of interest (~40 years for an operating license). Benchmarks should be Class A rod marks (Floyd, 1978) consisting of corrosion-resistant metal (brass) disks set on long metal rods driven deep into the ground (see http://www.ngs.noaa.gov/PUBS_LIB/GeodeticBMs/ <http://www.ngs.noaa.gov/PUBS_LIB/GeodeticBMs/ for examples). Rod depths of > 1.5 to 15 meters are commonly used. Given the relatively unconsolidated soil conditions at the VCS site, appropriate rod depths are likely towards the deeper range. For detailed surveys across active faults, benchmarks are typically spaced 10 to 30 meters. For adequate characterization of Fault D, minimum line length (i.e., horizontal extent of the benchmarks) of 1.5 km is recommended. With an approximately 30-meter spacing, 50 to 60 benchmarks would be required for a 1.5 km long line. However, exact spacing, and the number of benchmarks, required for growth fault D would depend on the local site conditions and the goal of the surveys (i.e., a smaller number of benchmarks may be appropriate).

Once the benchmarks have been established, an initial survey should be conducted that establishes the horizontal and vertical coordinates baseline) for the survey line. Repeated surveys would then be conducted at regular intervals (e.g., on the order of a year or more) and compared to the baseline to determine whether there has been any deformation. A higher density of benchmarks (e.g., spacing across the fault of 10 m) will allow for more precise identification of exactly where any surface deformation has occurred.

Associated ESPA Revision:

SSAR Section 2.5.3 will be revised to include the above commitment to a VCS site growth fault displacement monitoring program to be implemented at the COL stage.

ATTACHMENT 7

SUMMARY OF REGULATORY COMMITMENTS

(Exelon Letter to USNRC, NP-11-0022, dated June 2, 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 2.5.3 to incorporate the change shown in the enclosed response to the following NRC RAI: 02.05.03-3 (Attachment 6)	Revision 1 of the ESPA SSAR and ER planned for no later than March 31, 2012	Yes	No