

## **PMTurkeyCOLPEm Resource**

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**Sent:** Tuesday, February 10, 2015 1:21 PM  
**To:** orthen, Richard; Raymond Burski; Steve Franzone; STEVEN.HAMRICK; TurkeyCOL Resource; William Maher  
**Cc:** Stieve, Alice  
**Subject:** Draft RAI 7804 related to SRP Section 02.05.01 - Basic Geologic and seismic Information for the Turkey Point Units 6 and 7 combined license application.  
**Attachments:** draft RAI 7804\_TPN.docx

To All,

Attached is the draft of RAI No:7804, regarding section 02.05.01 Basic Geologic and seismic Information for the Turkey Point Units 6 and 7 combined license application.

If you need a conference call to discuss the question(s) of the draft RAIs please contact me at 301-415-3863. Unless you request additional clarification we will normally issue the RAI as final within 3 to 5 days, from today.

Thanks

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## Request for Additional Information

Issue Date:

Application Title: Turkey Point Units 6 and 7 - Dockets 52-040 and 52-041

Operating Company: Florida P and L

Docket No. 52-040 and 52-041

Review Section: 02.05.01 - Basic Geologic and Seismic Information

Application Section:

### QUESTIONS

#### 02.05.01-XX

Newly published data (D. Kula, August, 2014\*) (high resolution seismic reflection, multibeam bathymetry and sub-bottom parasound profiles) reveal Quaternary-aged tectonic structures in the Santaren Channel and the Straits of Florida within 80 miles of TPNPP. Seafloor displacements are observed in all data types.

- a) In support of 10 CFR 100.23 please provide a discussion of these tectonic features and integrate into the regional tectonic setting for TPNPP COLA.
- b) Several investigations, published by authors such as Eberli, Massafero, Bergman and Kula, make a strong case for extending the Cuba Fold and Thrust belt beneath Cay Sal Bank and as far as the northwestern end of the Santaren Channel. Even though there is no seismicity in the area beneath Cay Sal Bank and the Santaren Channel, distinct seafloor scarps argue for very recent and significant displacement. Provide an analysis of how this northward extension of the Cuban Fold and Thrust belt terrane with associated Quaternary fault displacement and seafloor scarps on at least 2 faults impacts the site seismic hazard assessment and seismotectonic boundaries.
- c) Provide appropriate illustrations and maps to support your analyses and discussions. Update any RAI responses and associated COLA revisions that pertain to the Santaren Anticline; the Cuban Fold and thrust belt; boundaries of the Cuba Areal source term, and sensitivity analysis for the Cuban source term. Include interpretation of Santaren Anticline based on Bergman, 2005\*\*.

#### References:

\* Kula, Deniz, "Neotectonics on the Edge of the Cuban Fold and Thrust Belt" (2014). Open Access Theses. Paper 498.

\*\* Bergman, K.L., 2005, Seismic Analysis of Paleocurrent Features in the Florida Straits: Insights into the Paleo-Florida Current, Upstream Tectonics, and the Atlantic-Caribbean Connection, University of Miami, Coral Gables, Florida, p. 238. (FSAR reference 906)

#### 02.05.01-XX

In support of 10 CFR 100.23 please describe your rationale to use a de-clustered Phase 2 EQ catalog to determine seismic activity associated with any Cuban faults, rather than the complete catalog.

#### 02.05.01-XX

In Cunningham et al, 2012, approximately 210 km of high resolution marine seismic data reveal normal and reverse faults in Biscayne Bay, within 25 miles of the site. One of these faults is identified on 5 seismic lines and extends about 10 miles, striking N, NE. The authors interpret this fault as a vertical normal fault offsetting the top of Arcadia formation. The fault appears to project directly to the TPNPP. Staff also notes that because the fault appears to offset the top of Arcadia Formation, the age of movement would be about middle Miocene, but might be as young as early Pliocene (5.3 Ma). Staff also notes that this tectonic structure is not included in the TPNPP FSAR.

- a) In support of 10 CFR 100.23 please provide a discussion of this tectonic feature with respect to TPNPP and integrate into the regional tectonic setting for the TPNPP COLA.
- b) Does this fault fit the characteristics of a strike-slip fault with component of dip slip? If the fault is strike-slip how would you constrain age of latest movement?
- c) What is the possibility that this fault underlies the TPNPP site? If this feature underlies the site, what impact does this have on potential surface deformation?
- d) Update any RAI responses and associated COLA revisions that pertain to this topic.

#### 02.05.01-XX

The Technos 2009 Geophysical Survey for Karst Characterization at Proposed Units 6 and 7 Turkey Point Nuclear Power Plant describes a filled sinkhole at Jewfish Creek, within 10 miles of TPNPP. Technos describes the filled sinkhole: The sinkhole at Jewfish Creek is ~1900 ft across and estimated to be more than 600 feet deep, based upon seismic and microgravity data. Borings and geophysical logging indicated open cavities within this paleocollapse feature up to 9 feet in diameter. Staff notes that a 600 ft deep sinkhole is well below the -350 ft sea level lowstand from Late Pleistocene glacial maxima. Staff notes that the Jewfish Creek sinkhole is also in a similar setting to TPNPP with respect to current and paleo shorelines.

- a. In support of 10 CFR 100.23, please provide other relevant details regarding the Jewfish Creek feature. What stratigraphic formations does the sink hole impact? At what depth and in what stratigraphic formation were the open cavities found? Does the Jewfish Creek sinkhole represent hypogenic limestone dissolution (as described in Klimchouk, 2009) in an onshore location, near TPNPP?
- b. Klimchouk, 2009, describes process and features associated with hypogenicspeleogenesis that fit dissolution features identified in southern Florida within the site vicinity and the Keys as described by various researchers such as: Cunninham and Walker, 2009; Cunningham et al, 2012; Land and Paull, 2000; Land et al, 1995; and possibly the feature at Jewfish Creek (Technos, 2009). Land et al, 1995 describes a Quaternary-aged, large, deep sink hole that formed under persistent submarine circumstances as hypogenic karst. Land and Paull found several more sinkholes all along the Keys and Miami. More recently and close to TPNPP, Cunningham and Walker, 2009, describe 12 seismic sags, capped by Miocene strata, in Biscayne Bay, close to shore, as derived from hypogenic processes. Klimchouk, 2009 describes hypogenicspeleogenesis as occurring in semi-confined groundwater circumstances and forming vertically stacked or chimney-like voids; active over large spans of geologic time and demonstrating reactivation cycles. Dissolving mechanisms include both physical and chemical conditions.

You state in RAI response 2.5.1-2 that 'deep pore water upwelling generally occurs well off shore, where the slope of the shelf is steeper and erosion of this thickness of confining sediments is

more likely. For this reason, carbonate dissolution associated with deep pore water upwelling from the Floridan Aquifer is not likely to pose a threat of surface collapse or sinkhole hazard at the site'. Staff notes that the seismic sags in Biscayne Bay and possibly the sinkhole at Jewfish Creek are near-shore or on-shore features (not out on the shelf break) that likely represent hypogenic karst that could affect TPNPP. In support of 10 CFR 100.23, please provide a discussion of hypogenic dissolution processes in southern Florida and include features in the site vicinity. Consider the uncertainty of the age of these features from onset to closure if the hypogenic process reactivates. Consider the possible locations where this might occur in the site vicinity.

- c. Please provide a map showing all dissolution features found in the TPNPP site vicinity, include the locations of the 12 subsurface seismic sags from Cunningham and Walker and the young sinkholes identified by Land and Paull (1995 and 2000). Update any RAI responses and associated COLA revisions that pertain to this topic.
- d. You state in response to RAI 2.5.1-1, with respect to the seismic sags in Biscayne Bay, that regardless of the mechanism of formation, the geophysical data indicate absence of deformation in rocks younger than middle Miocene. This finding suggests that if the same mechanism had been active at the Turkey Point Units 6 & 7 site during the Eocene, none of the strata younger than middle Miocene (Miami, Key Largo limestones, Fort Thompson, Tamiami and Peace River Formations) would be deformed. At the site this section is approximately 450 feet (137 meters) and deformation below this depth is not likely to pose a threat of surface collapse at the site. Considering the diameter dimensions of the seismic sags identified in Biscayne Bay as published in the Cunningham and Walker paper, please provide a basis or reference to a calculation to support your statement that deformation below this depth (450 ft) is not a threat of surface collapse at the site