PMTurkeyCOLPEm Resource

From: Comar, Manny
Sent: Thursday, November 01, 2012 5:03 PM
To: TurkeyCOL Resource
Subject: FW: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 5875 - Surface Faulting
Attachments: Draft Revised Response for NRC RAI Letter No. 043, RAI 02.05.03-4 (eRAI 5875).pdf; Draft Revised Response for NRC RAI Letter No. 043, RAI 02.05.03-3 (eRAI 5875).pdf

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From: Franzone, Steve [mailto:Steve.Franzone@fpl.com]
Sent: Friday, October 26, 2012 11:46 AM
To: Franzone, Steve; Comar, Manny
Cc: Burski, Raymond; Maher, William
Subject: RE: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 5875 - Surface Faulting

Manny,

To support a future public meeting, FPL is providing draft revised responses for eRAI 5875 (RAI questions 02.05.03-3, & 02.05.03-4) in the attached files.

If you have any questions, please contact me.
Thanks
Steve Franzone
NNP Licensing Manager - COLA
"Never give in--never, never, never, never, in nothing great or small, large or petty, never give in except to convictions of honour and good sense. Never yield to force; never yield to the apparently overwhelming might of the enemy. " Sir Winston Churchill, Speech, 1941, Harrow School
561.694.3209 (office)
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Hearing Identifier: TurkeyPoint_COL_Public
Email Number: 707

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Subject: FW: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 5875 - Surface Faulting
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From: Comar, Manny

Created By: Manny.Comar@nrc.gov

Recipients:
"TurkeyCOL Resource" <TurkeyCOL.Resource@nrc.gov>
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Files	**Size**	**Date & Time**
MESSAGE	1606	11/1/2012 5:02:37 PM
Draft Revised Response for NRC RAI Letter No. 043, RAI 02.05.03-4 (eRAI 5875).pdf	1877844	
Draft Revised Response for NRC RAI Letter No. 043, RAI 02.05.03-3 (eRAI 5875).pdf	519796	

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NRC RAI Letter No. PTN-RAI-LTR-043

SRP Section: 02.05.03 – Surface Faulting

QUESTIONS from Geosciences and Geotechnical Engineering Branch 2 (RGS2)

NRC RAI Number: 02.05.03-4 (eRAI 5875)

FSAR Section 2.5.3.2, states in the 'Geological Evidence, or Absence of Evidence, for Surface Deformation passage", that "the second feature beyond the site vicinity investigated as part of geologic field reconnaissance includes possible faults identified from borehole data in the McGregor Isles area near Ft. Myers, 120 miles northwest of the site. Based on gamma-ray logs from several wells, Sproul et al. (Reference 230) interpret faulting of pre-upper Hawthorn (Miocene) strata. In spite of their interpretation that overlying upper Hawthorn and younger strata are unfaulted, Sproul et al. (Reference 230) suggest possible geomorphic indicators of faulting." The staff notes that possible geomorphic indicators of faulting appear to be inconsistent with the finding that upper Hawthorn and younger strata are unfaulted at the McGregor Isles are.

In order for the staff to understand evidence for or against tectonic deformation in Florida Platform specific geology and in support of 10 CFR 100.23, please clarify the apparent inconsistent conclusions that Sproul et al (Reference 230) drew regarding these possible faults. Describe the geomorphic features that Sproul et al referred to and provide more details of your field reconnaissance examination of this area completed for this application.

FPL RESPONSE:

Clarify the apparent inconsistent conclusions from Sproul et al (Reference 230)

The faults discussed in FSAR Subsection 2.5.3.2 were interpreted by Sproul et al. (1972) (FSAR 2.5.3 Reference 230) on the basis of variation in elevation of a distinctive peak in the gamma-ray logs which is interpreted as a correlation horizon in several boreholes at depth beneath portions of Ft. Myers, Florida. The correlation horizon, within the Miocene Hawthorne strata, occurs at elevations which vary from -390 to -205 feet NAVD 88. The apparent vertical offsets range from 50 to 110 feet across the interpreted faults (FSAR 2.5.3 Reference 230). Sproul et al. (1972) (FSAR 2.5.3 Reference 230), state, "The available data seem to indicate that most, but not all, of the displacement occurred after the unit represented by the gamma ray correlation marker was deposited, and prior to the deposition of the upper part of the Hawthorn Formation." The authors also state that displacement of the beds above the gamma ray correlation marker (the upper horizons of the Hawthorn Formation) "is not so obvious from an examination of the logs" (FSAR 2.5.3 Reference 230) (see Figures 1 and 2). These statements and the relationships in Figure 2 provide the only direct information regarding the timing of potential fault movements. The 'possible geomorphic indicators of faulting' are not specifically correlated with post-Miocene fault activity (FSAR 2.5.3 Reference 230). If the geomorphic features noted by Sproul et al. were clearly tied to fault activity, it would indeed be inconsistent with the timing of faulting indicated by the borehole data. Given the apparent inconsistency between interpreted geomorphology and borehole data, FPL interprets only the borehole data to have actual bearing on the ages of these proposed faults.

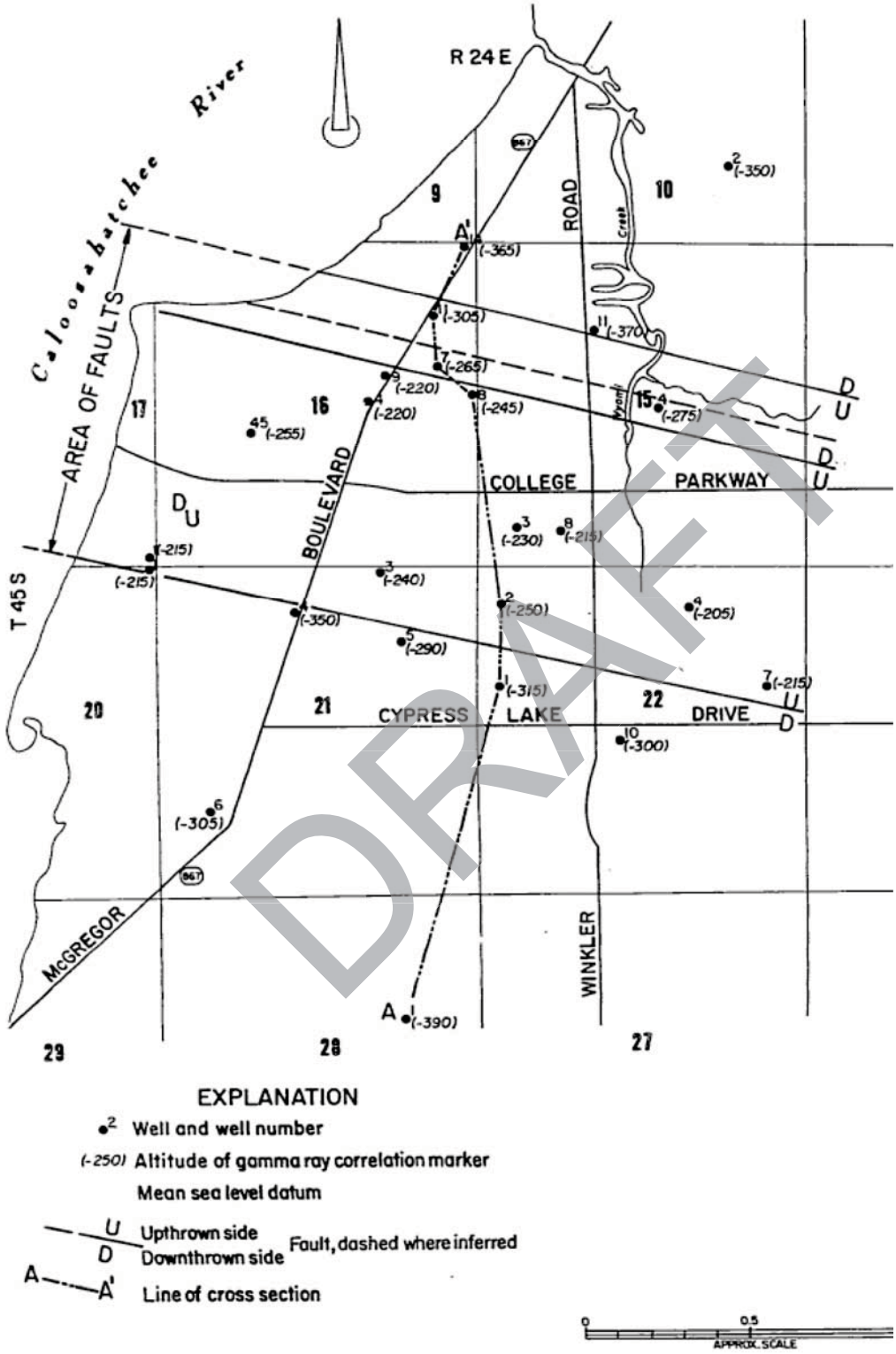
Describe the geomorphic features that Sproul et al. referred to

Sproul et al. (1972) (FSAR 2.5.3 Reference 230) suggest that the "configuration of the Caloosahatchee River shoreline in the vicinity of the northeast corner of section 17 (in Figure 1), and the alignment of a tributary to Whiskey Creek near the center of section 15 are suggestive of fault controlled features" (p. 12 of FSAR 2.5.3 Reference 230) (see Figure 1). The shoreline throughout the northwest corner of section 16 and the southwest corner of section 17 is not aligned with the faults, but a bend in the shoreline does occur near the northern group of 3 faults (see Figure 1). However, the fault located at the apex of the bend is dashed and listed as "inferred". If the shoreline bend had resulted from Quaternary faulting, the geometry of the bend would indicate apparent dextral slip, not dip-slip as interpreted based on stratigraphic displacement of the marker bed. Surficial strata in this area are mapped as unfaulted Tertiary-Quaternary shell units (Reference 1).

Although the short tributary to Whiskey Creek is subparallel to the proposed faults, the orientation of the main creek drainage in section 15 is at high angles to the trace of the mapped faults, with no apparent offset or deflection along the proposed structures (See Figure 1). A comprehensive geologic mapping effort in Lee County and the Caloosahatchee Basin utilizing well cuttings, cores, quarry pits and the limited natural outcrops does not indicate any surficial faulting in the area (e.g., Reference 1).

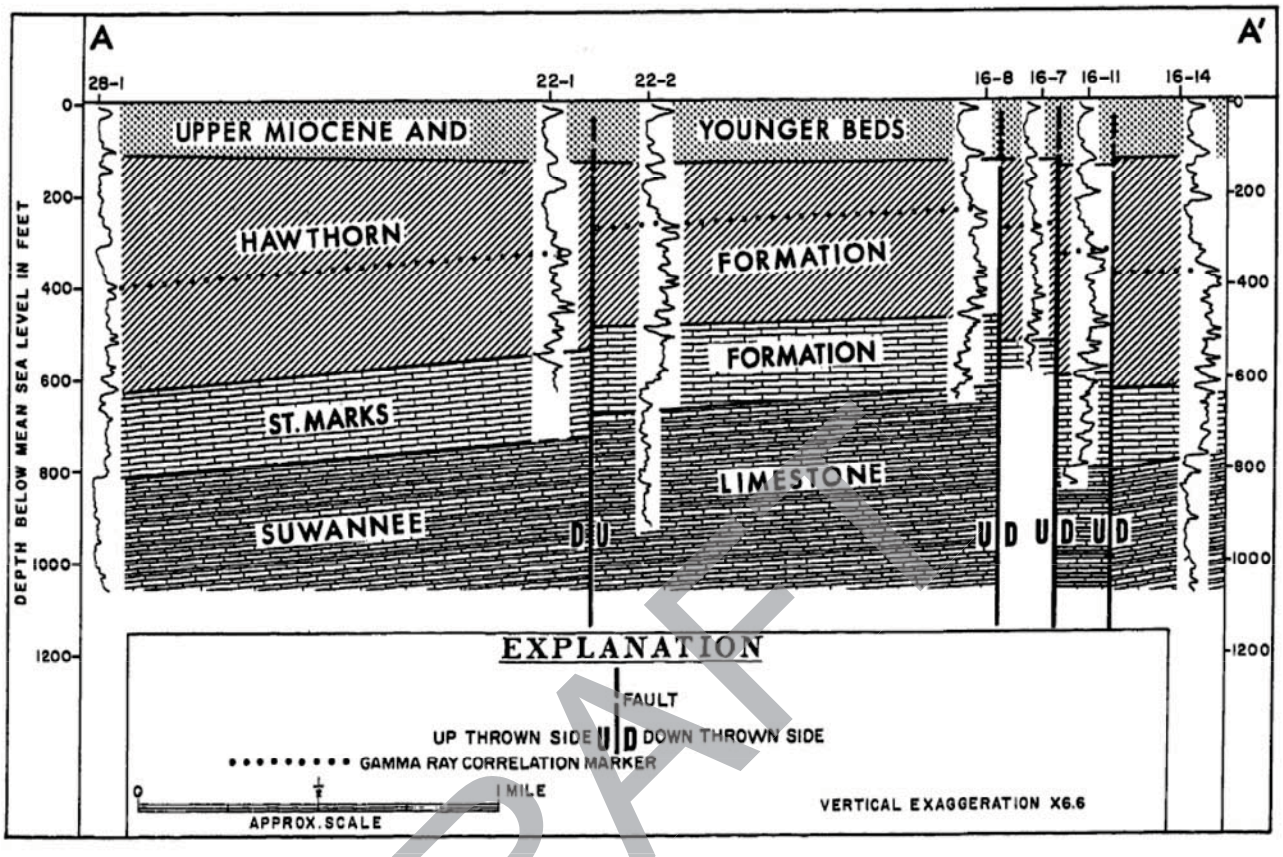
Provide more details of your field reconnaissance

A brief field reconnaissance consisted of driving along roads in the area and walking along available sidewalks that crossed the proposed faults. A map of this work is shown as Figure 3. Heavy modification of the landscape through suburban development left few natural exposures useful to assessing the pre-development geomorphology. No fault scarps or topographic features suggested a fault-controlled influence on the geomorphology.



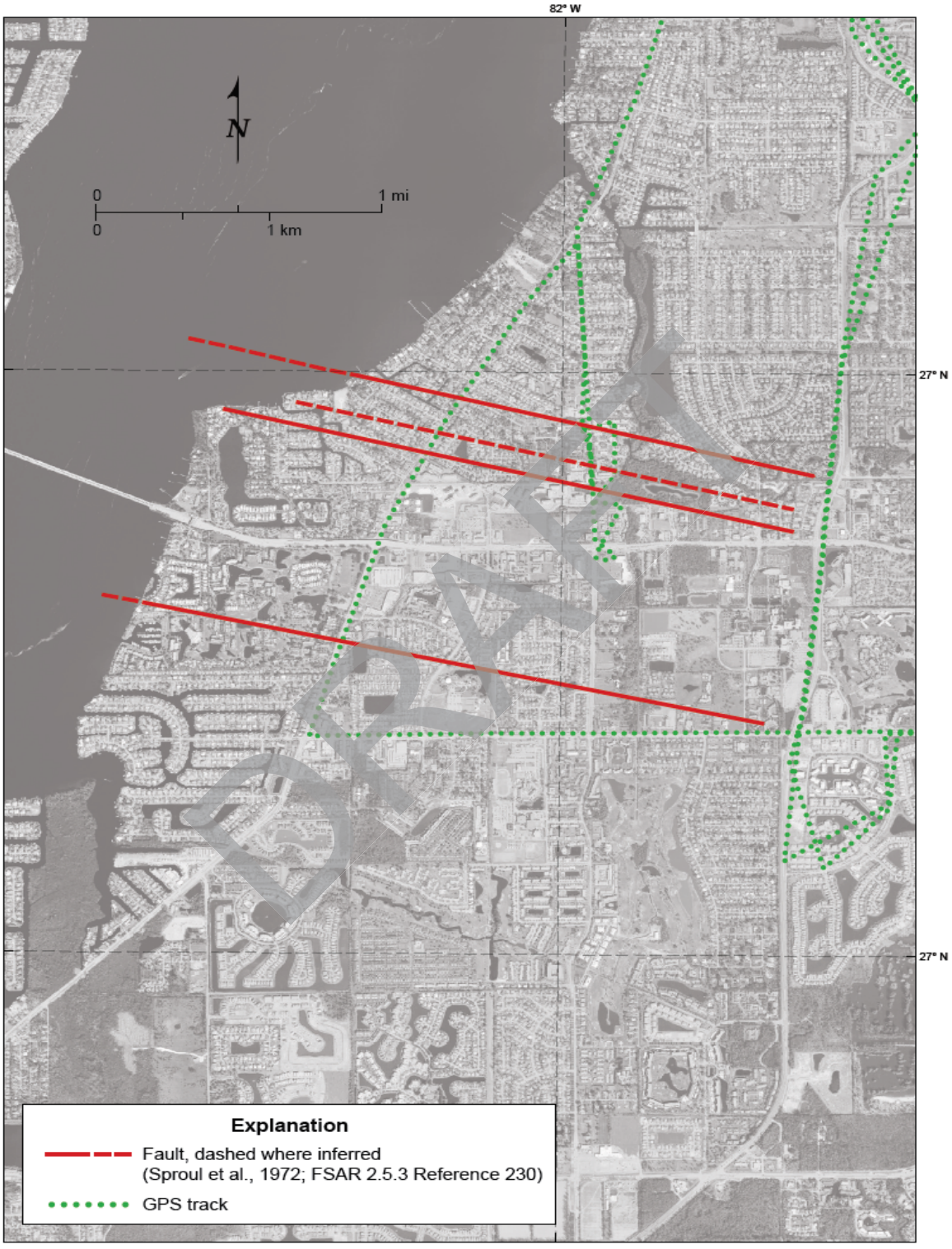
Source: FSAR 2.5.3 Reference 230

Figure 1. Map of McGregor Isles Area



Source: FSAR 2.5.3 Reference 230

Figure 2. Interpreted Borehole Section from Sproul et al.



Source: FSAR 2.5.3 Reference 230

Figure 3. Field reconnaissance near the McGregor Isles faults

This response is PLANT SPECIFIC.

References:

1. Scott, T. M., and Missimer, T. M., *The Surficial Geology of Lee County and the Caloosahatchee Basin*, Florida Geological Survey Special Publication, Issue 49, p. 17-20, 2001.

ASSOCIATED COLA REVISIONS:

The last paragraph of Subsection 2.5.3.2 will be revised as follows in a future version of the FSAR.

The second feature beyond the site vicinity investigated as part of geologic field reconnaissance includes possible faults identified from borehole data in the McGregor Isles area near Ft. Myers, 120 miles northwest of the site. Based on gamma-ray logs from several wells, Sproul et al. (Reference 230) interpret faulting of pre-upper Hawthorn (Miocene) strata. In spite of their interpretation that overlying upper Hawthorn and younger strata are unfaulted, Sproul et al. (Reference 230) suggest possible geomorphic indicators of faulting. **They noted a bend in the coastline near the westward projection of a few of the subsurface faults and that a stream between two of the faults is aligned subparallel to the faults.** However, despite the landscape being heavily modified by urban development, field reconnaissance and inspection of aerial photography reveal no evidence for faulting at the surface **and published studies identified no surficial faulting in the area (Reference 240).**

A new reference will be added to Subsection 2.5.3.9 in a future version of the FSAR.

240. Scott, T. M., and Missimer, T. M., *The Surficial Geology of Lee County and the Caloosahatchee Basin*, Florida Geological Survey Special Publication, Issue 49, p. 17-20, 2001.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. PTN-RAI-LTR-043

SRP Section: 02.05.03 – Surface Faulting

QUESTIONS from Geosciences and Geotechnical Engineering Branch 2 (RGS2)

NRC RAI Number: 02.05.03-3 (eRAI 5875)

FSAR Section 2.5.3.2, "Geological Evidence, or Absence of Evidence, for Surface Deformation", states that published geologic mapping at a range of scales show no bedrock faults mapped within the site vicinity (References 211, 213, 224, and 226). However, the staff note, that Figure 2.5.1-253 depicts a strike-slip fault within 25 miles of the site; this feature is also shown as a high-rank lineament on Figure 2.5.3-204.

In order for the staff to completely understand the geologic setting of the site and in support of 10 CFR 100.23 please discuss the high-rank lineament shown on Figure 2.5.3-204, and clarify it's relationship with the strike-slip fault north of TPNPP shown on Figure 2.5.1-253. Include a discussion regarding how these figures are in agreement with the FSAR Section 2.5.3.2 statement that no faults have been mapped in the site vicinity. Finally, please clarify this apparent disagreement between the text and figures in the appropriate FSAR section(s).

FPL RESPONSE:

Discuss the high-rank lineament shown on Figure 2.5.3-204

As described in FSAR Subsection 2.5.3.1.2, the United States Army Corps of Engineers (USACE) mapped a variety of lineaments in southern Florida (FSAR 2.5.3 Reference 232), including the high-rank lineament shown on FSAR Figure 2.5.3-204. The study relied only on Landsat imagery viewed at scales between 1:1,000,000 and 1:125,000. The lineaments were generally not field checked, and the authors indicate that "a considerable number of the mapped lineaments may be dismissed after further investigation" (FSAR 2.5.3 Reference 232, p. 50). The northeast-trending 'high-rank' lineament in question was not identified in previous lineament analyses that included southern Florida (FSAR 2.5.3 Reference 232). No field evidence or information about whether this lineament was field-checked was provided in FSAR 2.5.3 Reference 232. In the methodology section of FSAR 2.5.3 Reference 232, it is pointed out that normally each lineament is assigned a "Low", "Medium" or "High" rank based on the number and types of features that are found along it (e.g., ponds, sinkholes, tonal changes), but that any lineament with a stream alignment on part of it was automatically assigned a "High" rank. The southwestern end of the high-rank lineament is located near the linear portion of the Shark River, and because this represents a stream alignment, this is expected to be the reason it was assigned a "High" rank by the USACE. The lack of supporting corroborating analyses on the existence of the high-rank lineament shown on FSAR Figure 2.5.3-204, the coarse nature of the lineament identification study dictated by the small scales at which the lineament analysis was conducted, and the lack of field evidence all provide uncertainty in the existence and geometry of the high-rank lineament. Field and aerial photo reconnaissance as part of this application found no evidence for faulting associated with the linear segment of the Shark River channel. As discussed in FSAR Subsection 2.5.3.2, the linear expression of the

Shark River is likely influenced by tides, joints in the limestone bedrock, and human-controlled water flow.

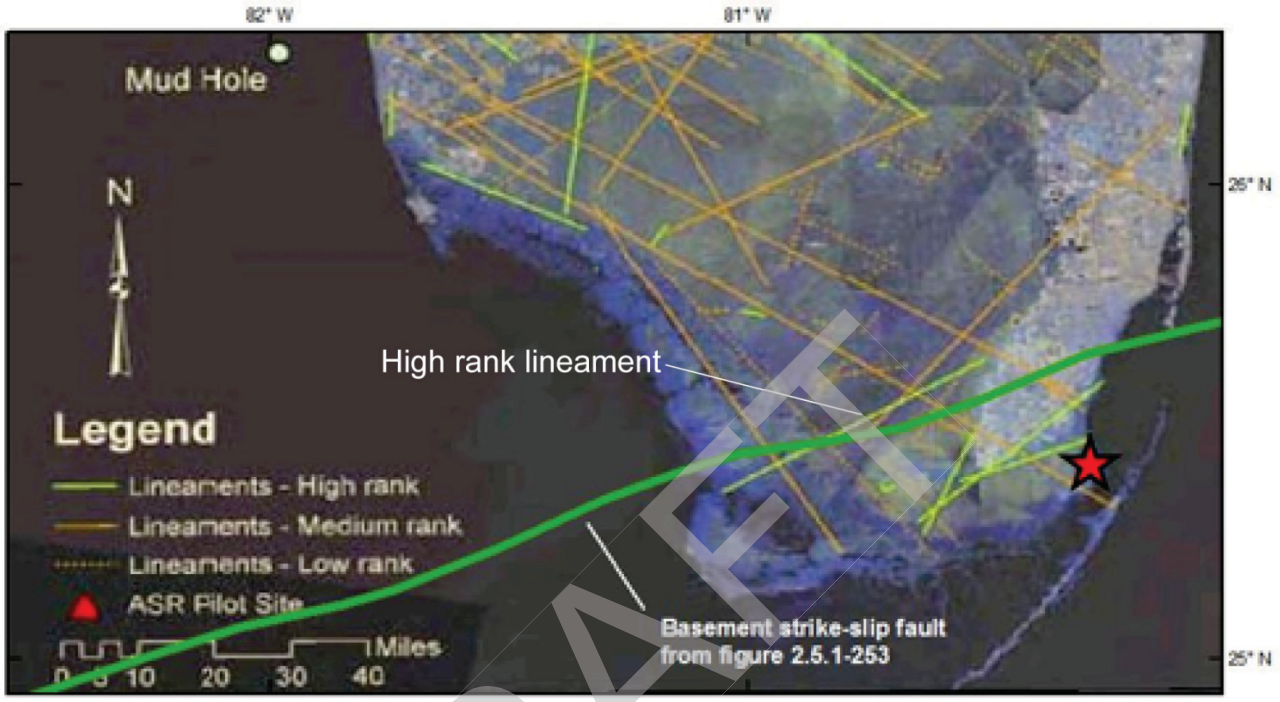
Clarify the high-rank lineament's relationship with the strike-slip fault north of TPNPP

As described in FSAR Subsection 2.5.1.1.1.3.2.1, the postulated basement faults shown on Figure 2.5.1-253 are drawn to accommodate potential misfits in plate tectonic reconstruction models or differences in lithology from widely separated boreholes (FSAR 2.5.1 Reference 458); there is little direct evidence that actual displacement has occurred on these postulated structures. The northeast-striking basement fault near the site is drawn by Barnett (1975) (FSAR 2.5.1 Reference 458) in order to align magnetic anomalies on Andros Island in the Bahamas with the Peninsular Arch. Barnett (1975, p. 130) (FSAR 2.5.1 Reference 458) states "The evidence for the actual presence of major shear faults in the basement of the Florida-Bahama Platform is interpretative, necessarily. These faults must have been inactive since the end of the Jurassic Period, except for more or less localizing younger depositional flexures. If these faults really had an active part in the development of the Gulf of Mexico region, then the evidence is circumstantial, in the final analysis". It is worth noting that most of the faults from Barnett (1975) (FSAR 2.5.1 Reference 458) (in particular, this southern-most, northeast-striking one) do not appear in later publications concerning the lithology and geophysics of the Florida basement (e.g. FSAR 2.5.1 Reference 463; FSAR 2.5.1 Reference 212).

There is no clear relationship between the postulated buried strike-slip basement fault depicted in Figure 2.5.1-253 and the high-rank lineament on Figure 2.5.3-204. As shown in Figure 1, the two features are both northeast-striking, but have different geometries, extents, and locations. No geologic evidence of faulting is reported to support a tectonic origin for the lineaments identified in the USACE study, and no evidence was provided to relate the postulated basement faults at depth to any lineament at the surface (FSAR 2.5.3 Reference 232). The original study by Barnett (1975) (FSAR 2.5.1 Reference 458) did not interpret geomorphic expression of any of the postulated basement faults depicted in Figure 2.5.1-253. FPL interprets the similarity in general location (southern Florida) and strike (northeast) of the high-rank lineament and postulated basement fault to be coincidental.

Discuss the high-rank lineament and basement strike-slip fault relative to statements made in the FSAR

Because there is no evidence for surface faulting along any of the lineaments shown in FSAR Figure 2.5.3-204 within the site vicinity (e.g., FSAR 2.5.3 Reference 202; FSAR 2.5.3 Reference 212; FSAR 2.5.3 Reference 214), there is no conflict between lineaments shown in FSAR Figure 2.5.3-204 and statements made in the FSAR regarding lack of evidence of surface faulting in the site vicinity. Nonetheless, the FSAR will be revised to highlight the existence of a postulated buried basement fault shown in Figure 2.5.1-253 within the site vicinity.



Source : FSAR 2.5.3 Reference 232 and FSAR 2.5.1 Reference 458

Figure 1. Illustration from USACE Lineament Study and Barnett (1975) Strike-slip Fault

This response is PLANT SPECIFIC.

References:

None

ASSOCIATED COLA REVISIONS:

The first paragraph in FSAR Subsection 2.5.3.2 will be revised as follows in a future FSAR revision:

Field reconnaissance, review and interpretation of aerial photography, and review of published literature did not reveal any evidence for tectonic deformation within the site vicinity or site area. No faults or geomorphic features indicative of faulting have been mapped **at the surface** (Figures 2.5.1-334, 2.5.1-336, 2.5.1-337, 2.5.1-338, 2.5.1- 339, 2.5.1-340, 2.5.1-341, and 2.5.1-342) in the site vicinity, site area, or the site. **Although a sinistral basement fault has been postulated to exist northwest of the site (Figure 2.5.1-253), no faults buried at depth within the site vicinity are expected to deform the surface (Subsection 2.5.1.1.1.3.2.1)**. In addition, no seismic activity has been reported within the site vicinity (Subsection 2.5.2), and bedding is horizontal and undisturbed (Subsection 2.5.1.2.3). No salt domes, Quaternary volcanic features, or glacial sources of deformation occur in the site vicinity (Figures 2.5.1-201 and 2.5.1-237) (Subsections 2.5.3.8.2.1, 2.5.1.1.2.1.1, 2.5.1.1.1.2.1.1, 2.5.1.2.4, and 2.5.1.2.3). Non-tectonic deformation features in the site area are interpreted to be “potholes” caused by surficial dissolution (Subsections 2.5.1.2.4 and 2.5.4.4.5).

ASSOCIATED ENCLOSURES:

None