



L-2012-018  
10 CFR 52.3

January 18, 2012

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555-0001

Re: Florida Power & Light Company  
Proposed Turkey Point Units 6 and 7  
Docket Nos. 52-040 and 52-041  
Response to NRC Request for Additional Information Letter No. 043  
(eRAI 5875) SRP Section - 02.05.03 Surface Faulting

Reference:

1. NRC Letter to FPL dated October 27, 2011, Request for Additional Information Letter No.043 Related to SRP Section 02.05.03 Surface Faulting for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application
2. FPL Letter to NRC dated November 28, 2011, Response and Response Schedule to NRC Request for Additional Information Letter No. 043 (eRAI 5875) SRP Section - 02.05.03 Surface Faulting

Florida Power & Light Company (FPL) provides, as attachments to this letter, its responses to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) 02.05.03-2, RAI 02.05.03-3, and RAI 02.05.03-4 provided in Reference 1. FPL provided a schedule for the responses to RAI 02.05.03-2, RAI 02.05.03-3, and RAI 02.05.03-4 in Reference 2, The attachments identify changes that will be made in a future revision of the Turkey Point Units 6 and 7 Combined License Application (if applicable).

If you have any questions, or need additional information, please contact me at 561-691-7490.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 18, 2012

Sincerely,

A handwritten signature in blue ink, appearing to read "W. Maher", is written over a horizontal line.

William Maher  
Senior Licensing Director – New Nuclear Projects

WDM/RFB

Florida Power & Light Company

700 Universe Boulevard, Juno Beach, FL 33408

D097  
NED

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Attachment 1 : FPL Response to NRC RAI No. 02.05.03-2 (eRAI 5875)  
Attachment 2 : FPL Response to NRC RAI No. 02.05.03-3 (eRAI 5875)  
Attachment 3 : FPL Response to NRC RAI No. 02.05.03-4 (eRAI 5875)

cc:  
PTN 6 & 7 Project Manager, AP1000 Projects Branch 1, USNRC DNRL/NRO  
Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, Turkey Point Plant 3 & 4

Proposed Turkey Point Units 6 and 7  
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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: 02.05.03-2 (eRAI 5875)**

FSAR Section 2.5.3.7, the “Designation of Zones of Quaternary Deformation in the Site Region” passage states that “Within the site region, seismicity and potential Quaternary tectonic deformation are restricted to the Cuba areal source zone, approximately 160 miles south of the site.” The staff notes that assessment of other tectonic features outside the Cuba Areal zone were not included in the FSAR. In order for the staff to determine the adequacy of the regional geologic characterization and in support of 10 CFR 100.23 please address the following:

- a) Describe the presence of the Quaternary-active Walkers Cay fault, the Santaren Anticline, and the Straits of Florida normal faults within the site region but outside the Cuba Area Source Zone.
- b) Provide a figure, centered on the site region, which reflects all potential Quaternary active features in the site region.
- c) FSAR Section 2.5.3.7, states that the Cuba Area Source is 160 miles from the site. However FSAR Section 2.5.2.4.4.3.2.1, Cuba Areal Source Zone, states that the source zone is 140 miles from the site (p 2.5.2-60, rev 2). Please clarify the inconsistency.

**FPL RESPONSE:**

a) Describe the presence of the Quaternary-active Walkers Cay fault, the Santaren Anticline, and the Straits of Florida normal faults within the site region but outside the Cuba Area Source Zone.

Mullins and Van Buren (1981) (FSAR 2.5.1 Reference 474) postulated that faulting on the Walkers Cay fault may extend “possibly even to the seafloor” (p. 226), however, this postulation is not supported by available data, as described in FSAR Subsection 2.5.1.1.1.3.2 and RAI responses 02.05.01-3 and -14 (FPL Letter L-2012-001). In addition, the response to RAI 02.05.01-14 further clarifies the conclusion that the Walkers Cay fault was last active in the Miocene and is not considered a capable tectonic structure.

Masaferro et al. (2002) (FSAR 2.5.1 Reference 479) propose intermittent periods of tectonic growth on the Santaren Anticline extending into the early Quaternary (0.05 mm/yr), however, they cannot constrain the errors associated with their calculated uplift rates. In other words, based on the information presented in Masaferro et al. (2002), it is not possible to assess whether these very low apparent fold uplift rates since the Late Miocene are distinguishable from zero. Based on the negligible calculated average uplift rate since 20 Ma (0.03 mm/yr) and the observation that most strata younger than 15 Ma maintain constant bed thickness over the fold crest, FPL does not assess the Santaren Anticline as a capable tectonic structure (FSAR 2.5.1 Reference 479). Masaferro et al.’s (2002)

interpretation that relief in post-Miocene beds reflect fold uplift is discussed in more detail in FSAR Subsection 2.5.1.1.1.3.2.2 and RAI responses 02.05.01-3 and -15 (FPL Letter L-2012-001).

The Straits of Florida normal faults are overlain by undeformed Miocene and younger strata (Angstadt et al. (1985) (FSAR 2.5.1 Reference 482); and Denny et al. (1994) (FSAR 2.5.1 Reference 221). Uchupi (1966) (FSAR 2.5.1 Reference 790) postulated that post-Miocene faulting may have produced the Miami and Pourtales terraces, but does not provide any supporting evidence. The Straits of Florida normal faults are not assessed to be Quaternary-active, as discussed in FSAR Subsection 2.5.1.1.1.3.2.2 and FPL's responses to RAIs 02.05.01-3 and -16 (FPL Letter L-2012-001).

As such, the statement "Within the site region, seismicity and potential Quaternary deformation are restricted to the Cuba areal source zone" is supported by the existing assessments presented in the FSAR and the above-mentioned RAI responses.

During the preparation of this response it was discovered that the citation for FSAR Section 2.5.1 Reference 760 is incorrect. The correct citation for this reference is shown in the Associated COLA Revisions section.

b) Provide a figure, centered on the site region, which reflects all potential Quaternary active features in the site region.

As discussed in the FSAR (Subsection 2.5.3), FSAR Figure 2.5.3-201 depicts all known or suggested Quaternary faults in the central and eastern U.S. as compiled by Crone and Wheeler (2000) (FSAR 2.5.3 Reference 203). The Crone and Wheeler study did not extend far enough offshore to capture the Walker's Cay fault, the Santaren Anticline, the Straits of Florida normal faults, or any faults in Cuba.

The available information does not support the conclusion that the Walkers Cay fault, Santaren Anticline, and Straits of Florida normal faults are Quaternary-active features. Some researchers have postulated Quaternary activity on some of these structures (see response to part a). Additionally, a full assessment of these structures is provided in FSAR Subsection 2.5.1.1.1.3.2, FSAR Figure 2.5.1-229, and related RAI responses (see part a of this response).

c) FSAR Section 2.5.3.7, states that the Cuba Area Source is 160 miles from the site. However FSAR Section 2.5.2.4.4.3.2.1, Cuba Areal Source Zone, states that the source zone is 140 miles from the site (p 2.5.2-60, rev 2). Please clarify the inconsistency.

At its nearest point, the Cuba areal source zone is located approximately 140 miles from the Units 6 & 7 site, as stated in FSAR Subsection 2.5.2.4.4.3.2.1. The text of FSAR Subsection 2.5.3.7 will be revised to indicate that this distance is approximately 140 miles, instead of approximately 160 miles.

This response is PLANT SPECIFIC.

Proposed Turkey Point Units 6 and 7  
Docket Nos. 52-040 and 52-041  
FPL Response to NRC RAI No. 02.05.03-2 (eRAI 5875)  
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## References

FPL Letter to NRC L-2012-001 dated January 3, 2012, Response to NRC Request for Additional Information Letter No. 041 (eRAI 6024) SRP Section: 02.05.01- Basic Geologic and Seismic Information.

## ASSOCIATED COLA REVISIONS:

Reference 790 in FSAR Subsection 2.5.1.3 will be revised as follows in a future FSAR revision:

790. ~~Uchupi, E., The Atlantic Continental Shelf and Slope of the United States: Topography, Professional Paper 529, U.S. Geological Survey, 1968. C~~  
**Uchupi, E., Shallow structure of the Straits of Florida: Science, v. 153, No. 3735, pp. 529-531, 1966.**

The second paragraph in FSAR Subsection 2.5.3.1.2 will be revised as follows in a future FSAR revision:

In addition to the geologic mapping described above, the U.S. Geological Survey has published a compilation of all known or suggested Quaternary faults, liquefaction features, and possible tectonic features in the Central and Eastern United States (References 203 and 235) (Figure 2.5.3-201). **These compilations did not extend into the Bahamas or Cuba, and therefore do not depict faults in these regions. Within the boundaries of these compilations,** ~~These compilations do not identify any~~ **no** Quaternary tectonic faults or tectonic features **are identified** within the site region or site area. However, one potential Quaternary feature, Grossman's Hammock, is located approximately 20 miles northwest of the site, but a ground-penetrating radar study provides evidence that the feature has no tectonic offset (Reference 217); Subsection 2.5.3.2 describes this feature in detail. The U.S. Geological Survey studies (References 203 and 235) classify Grossman's Hammock as a non-tectonic feature (Figure 2.5.3-201).

The text in FSAR Subsection 2.5.3.7 will be revised as follows in a future FSAR revision:

### 2.5.3.7 Designation of Zones of Quaternary Deformation in the Site Region

Results of the subsurface exploration program at the site indicate continuous, horizontal stratigraphy that precludes the presence of Quaternary faults, folds, or structures related to tectonic deformation at the site (Figure 2.5.1-335). There are no zones of Quaternary deformation associated with tectonic faults requiring detailed investigation within the site area (Figure 2.5.1-335). Field reconnaissance, review, and interpretation of aerial photography, and review of published literature performed, do not reveal any evidence for Quaternary tectonic deformation, including paleoliquefaction, within the site, site area, or site vicinity. Within the site region, seismicity and potential Quaternary deformation are restricted to the Cuba areal source zone, approximately ~~160~~ **140** miles south of the site. No sand blows or paleoliquefaction features have been identified in the published literature for the site region

## ASSOCIATED ENCLOSURES:

None

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

**SRP Section: 02.05.03 – Surface Faulting**

Question from Geosciences and Geotechnical Engineering Branch

**NRC RAI Number: 02.05.03-3 (e-RAI 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 its 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 USACE mapped a variety of lineaments in southern Florida (FSAR 2.5.3 Reference 232). This study used Landsat imagery at scales between 1:1,000,000 and 1:125,000. The lineaments were 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). The lack of supporting corroborating analyses on the existence of the lineament, 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 poor evidence for the existence and geometry of the high-rank lineament.

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

As described in FSAR Subsection 2.5.1.1.1.13.2.1, 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, and thus, little evidence directly indicates actual displacement has occurred on these postulated structures. 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 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 did not interpret a geomorphic expression for any of the postulated basement faults depicted in Figure 2.5.1-253 (FSAR 2.5.1 Reference 458).

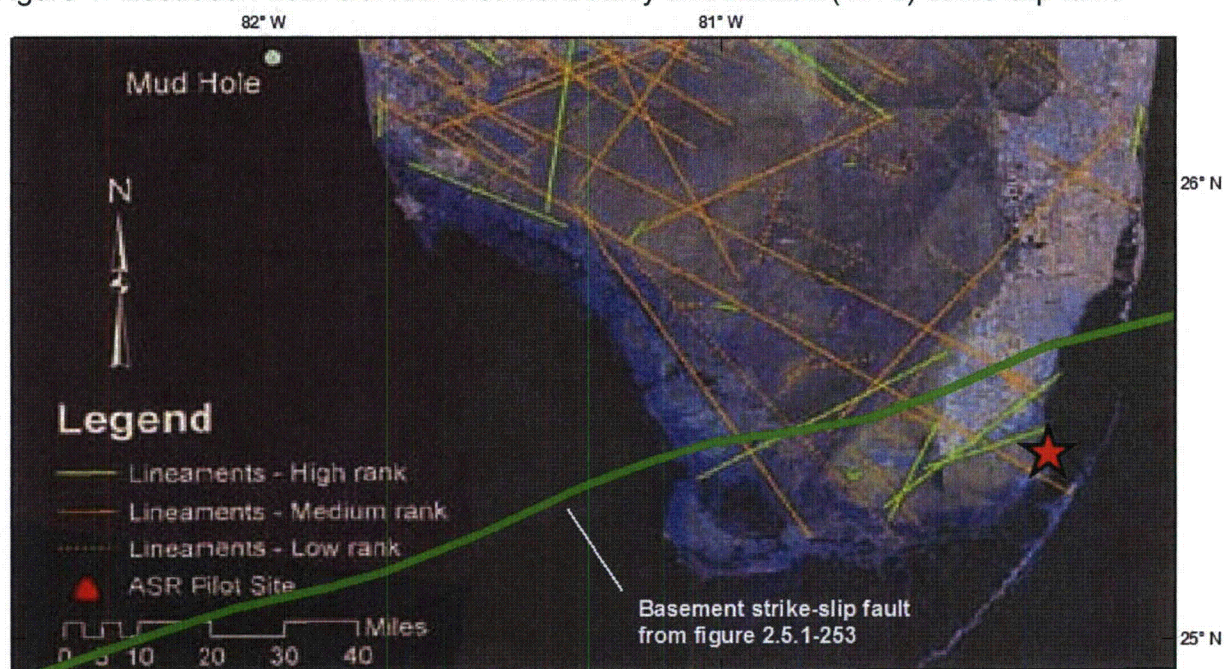
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FPL interprets the similarity in general location (southern Florida) and strike (northeast) to be coincidental.

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

There is no evidence for faulting along any of the lineaments within the site vicinity in FSAR Figure 2.5.3-204, therefore, this feature does not conflict with any statement made in the FSAR. The FSAR will be revised, however, to reflect the existence of a postulated buried basement fault shown in Figure 2.5.1-253 within the site vicinity.

Figure 1. Illustration from USACE lineament study and Barnett (1975) strike-slip fault



Source : FSAR 2.5.3 Reference 232 and FSAR 2.5.1 Reference 458

This response is PLANT SPECIFIC.

**References:**

None

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**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, **and no faults buried at depth within the site vicinity are expected to deform the surface (Subsection 2.5.1.1.3.2.1)**. 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



**NRC RAI Letter No. PTN-RAI-LTR-043 Dated Oct. 27, 2011**

**SRP Section: 02.05.03 – Surface Faulting**

Question from Geosciences and Geotechnical Engineering Branch

**NRC RAI Number: 02.05.03-4 (e-RAI 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 area.

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 on the basis of variation in elevation of a distinctive peak in the gamma-ray logs which was taken as a correlation horizon in several boreholes at depth beneath portions of Ft. Myers, Florida. The correlation horizon is found within the Miocene Hawthorne strata and shows 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). Faulting occurred after deposition of the correlation horizon and before the deposition of the upper part of the Hawthorn Formation. The upper horizons of the Hawthorn Formation did not have obvious displacements (FSAR 2.5.3 Reference 230) (Figures 1 and 2). These data provide the only direct information regarding the timing of potential fault movements. The 'possible geomorphic indicators of faulting' were 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 faults.

Describe the geomorphic features that Sproul et al. referred to

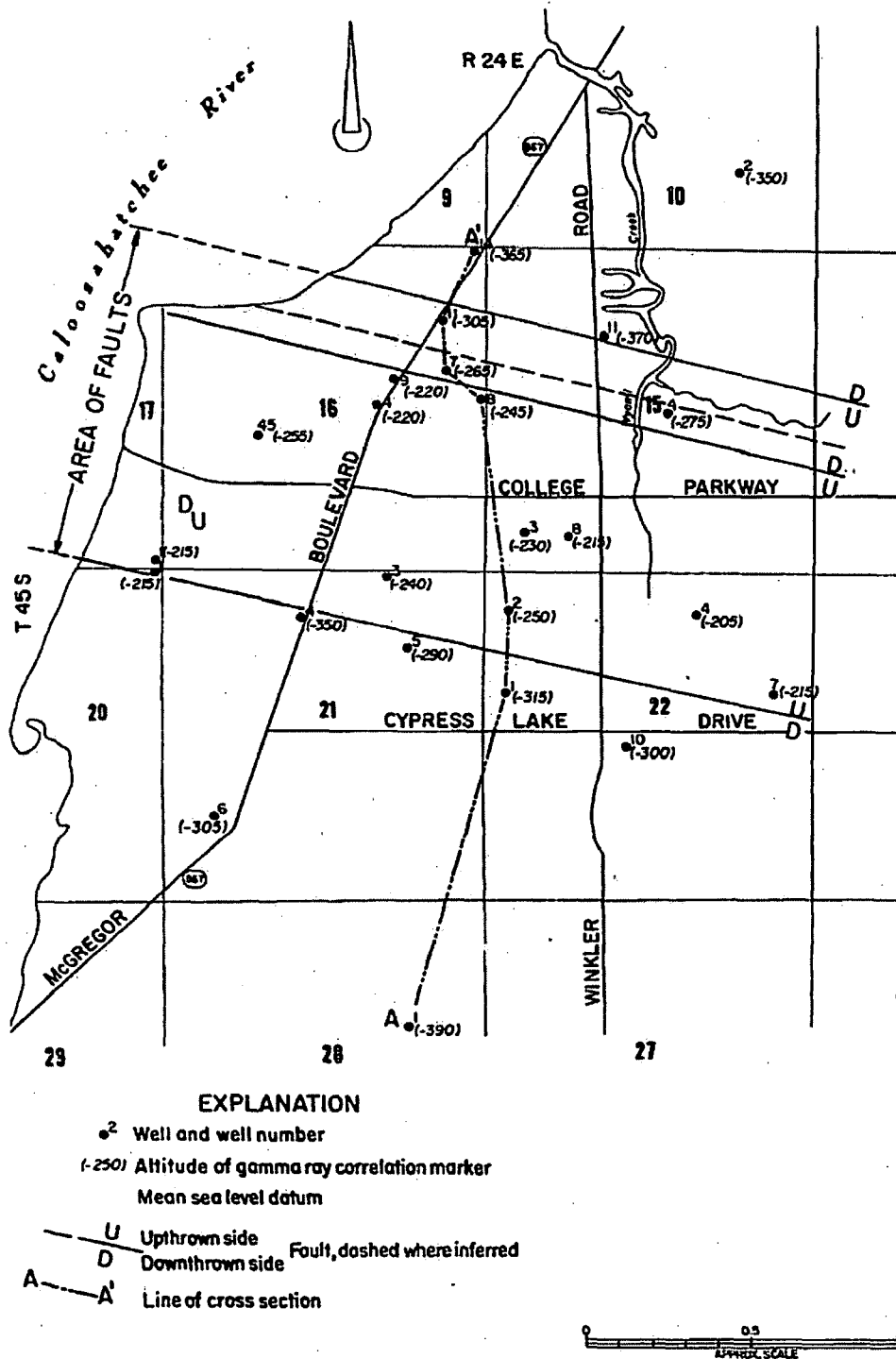
Sproul et al. suggest that the 'configuration of the Caloosahatchee River shoreline in the vicinity of the northeast corner of section 17 (in Figure 1), and the alignment of a tributary to Whisky Creek near the center of section 15 are suggestive of fault controlled features

(p. 12 of FSAR 2.5.3 Reference 230) (Figure 1). However, the shoreline throughout the northwest corner of section 16, and the southwest corner of section 17 does not indicate an alignment with the faults (Figure 1) and 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 (Figure 1).

Provide more details of your field reconnaissance

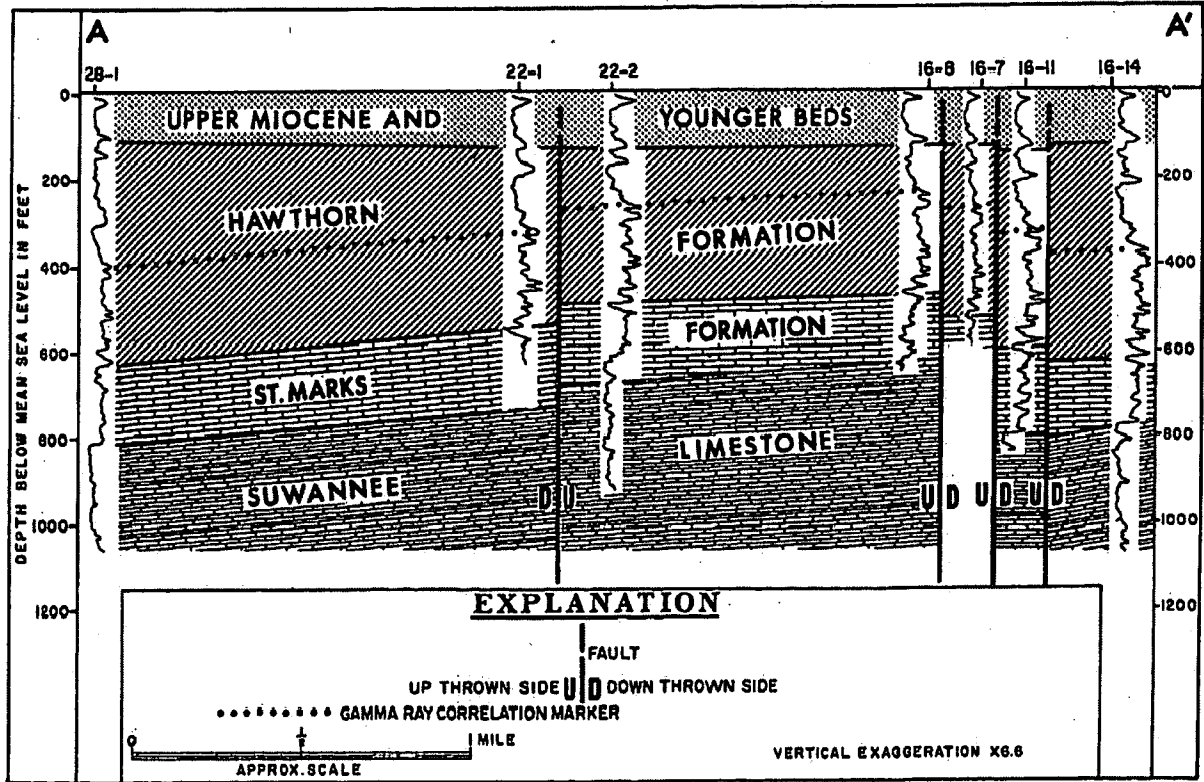
A brief field reconnaissance consisted of driving along roads in the area and walking along available sidewalks that crossed the proposed faults. A map of this work is shown as Figure 3. Heavy modification of the landscape through suburban development left little natural exposures useful to assessing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

Figure 1. Map of McGregor Isles area



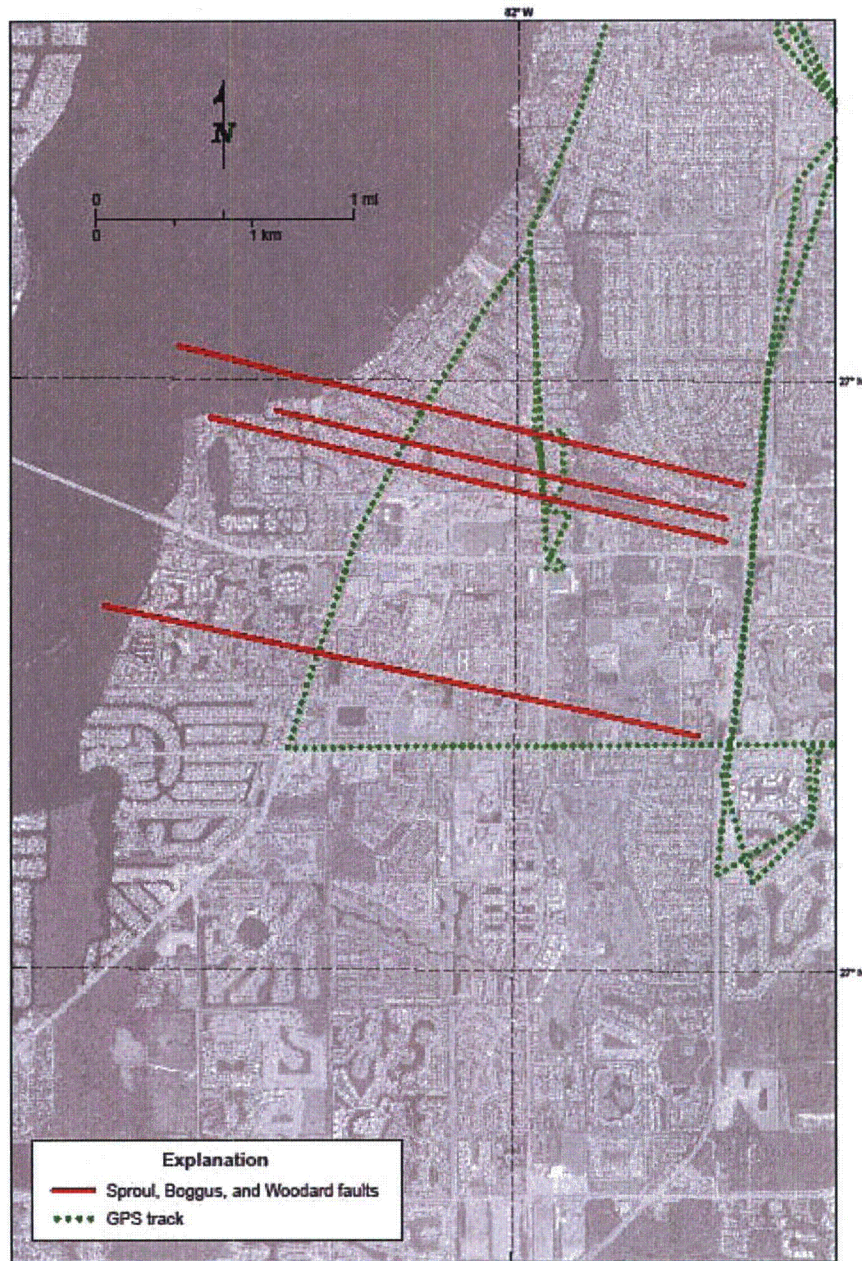
Source: FSAR 2.5.3 Reference 230

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



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This response is PLANT SPECIFIC.

**References:**

None

**ASSOCIATED COLA REVISIONS:**

None

**ASSOCIATED ENCLOSURES:**

None