







Source: Reference 780

## Figure 2.5.1-325 Kinematic Illustrations Showing Interactions of Septentrional and Northern Hispaniola Faults at Depth



#### (A) EAST OF 70° LONGITUDE

Note: Northern Hispaniola Thrust fault is equivalent to North Hispaniola Subduction Zone.





Notes:

EPGF = Enriquillo-Plantain Garden fault zone NHF-TB = Northern Hispaniola fold-thrust belt SF = Septentrional fault

.









#### Figure 2.5.1-329 Timeline of Regional Tectonic and Geologic Events



Sources: References 307, 368, and 639





Base Source: Reference 822 Source of world stress data: Reference 731



## Figure 2.5.1-331 Site Vicinity Geologic Map

Base sources: Reference 435 Source of geologic information: Reference 827

## Figure 2.5.1-332 Site Stratigraphy

	ERATHEM	SYSTEM	SERIES	HYDRO- GEOLOGIC UNIT		STRATIGRAPHIC UNIT		LITHOLOGY	APPROXIMATE TOP ELEVATION (ft NAVD 88)	APPROXIMATE THICKNESS (ft)
	CENOZOIC	QUATERNARY	HOLOCENE			C	organic muck	organic soil and silt	0	3
			PLEISTOCENE	Surficial aquifer system	Biscayne aquifer	Mi	ami Limestone	sandy, oolitic limestone	-3	25
						Key Largo Limestor		well indurated, vuggy, coralline limestone	-28	22
						Fort Thompson Formation		poor/well indurated fossiliferous limestone	-50	65
		TERTIARY	PLIOCENE		Semi-confining unit	Tamiami Formation		sand and silt with calcarenitic limestone	-115	105
			MIOCENE		Intermediate confining unit	Hawthorn Group	Peace River Formation	silty calcareous sand and silt	formation contact base signa -220	d on natural gamma ture 235
							Arcadia Formation	calcareous wackestone with indurated limestones, sandstone, and sand	- <b>4</b> 55 drilling ended	>160 at -616.5 ft

Note: see Figures 2.5.1-338, 2.5.1-339, 2.5.1-340, and 2.5.1-341 for site geologic cross sections.

# Figure 2.5.1-333 Vegetated Depressions Identified Within Site from Photographs Taken Before Construction of the Cooling Canal System



Note: Reconnaissance mapping performed using 1940s 1:40,000 scale panchromatic stereo aerial photography (Reference 386), but shown on 2004 imagery (Reference 435) of the Units 6 & 7 site for reference.





Base sources: References 829, and 435 Source of geologic information: Reference 827



## Figure 2.5.1-335 Site Area Geologic Map

Base sources: Reference 435 Source of geologic information: Reference 219



## Figure 2.5.1-336 Locations of Geologic Cross Sections



## Figure 2.5.1-337 Surficial Deposits Map

Base sources: Reference 829 Source of geologic information: References 715 and 830



Actual stratification between the borings may differ.

Peace River Fm. Arcadia Fm.

Elevations (ft) are noted at the base of each boring.





#### Notes.

Stratigraphic contacts are approximate and interpolated from the borings.

Subsurface data have been obtained only at the actual boring locations. Actual stratification between the borings may differ.

Elevations (ft) are noted at the base of each boring.



Elevations (ft) are noted at the base of each boring.















### Figure 2.5.1-345 Geologic Hazards for Coastal Zones of Cuba



Modified from: Reference 742





Note: Sequence G (the shallow-water carbonate platform sampled at Site 627) is offset, while sequences A-F thicken across the fault trace, suggesting syn-sedimentary movement.

Modified from: Reference 785



## Figure 2.5.1-347 Initiation of the Greater Antilles Arc and Collision with the Caribbean Oceanic Plateau

Notes:

A. Present-day distribution of Cretaceous to Recent island arc and late Cretaceous oceanic plateau crust in the Caribbean.

B. Mid-Cretaceous (Cenomanian) reconstruction of the Caribbean island arc and oceanic plateau







#### Notes:

A and B. Comparison of typical inundation distances, sediment-transport distances, and maximum water levels (indicated by height of wrack line) for deposition by tsunamis (A) and coastal storms (B) C. Composite characteristics of typical sandy tsunami and storm deposits







## Figure 2.5.1-350 Regional Seismicity Plotted on a Map of the Nortecubana Fault and Santaren Anticline

Source: References 439, 443, 448, 477, 492, 494, and 770

#### Figure 2.5.1-351 The Two Zones of Secondary Porosity on B-604 (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*Vs* and *Vp*) and Acoustic Televiewer Logs (Sheet 1 of 3)



#### Figure 2.5.1-351 The Two Zones of Secondary Porosity on B-604 (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*Vs* and *Vp*) and Acoustic Televiewer Logs (Sheet 2 of 3)



#### Figure 2.5.1-351 The Two Zones of Secondary Porosity on B-604 (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*Vs* and *Vp*) and Acoustic Televiewer Logs (Sheet 3 of 3)



#### Figure 2.5.1-352 The Two Zones of Secondary Porosity on B-608 (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*V*s and *V*p), and Acoustic Televiewer Logs (Sheet 1 of 5)



#### Figure 2.5.1-352 The Two Zones of Secondary Porosity on B-608 (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*V*s and *Vp*), and Acoustic Televiewer Logs (Sheet 2 of 5)



#### Figure 2.5.1-352 The Two Zones of Secondary Porosity on B-608 (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*V*s and *V*p), and Acoustic Televiewer Logs (Sheet 3 of 5)



#### Figure 2.5.1-352 The Two Zones of Secondary Porosity on B-608 (DH) Showing the Lithology Caliper, Natural Gamma, Velocity (*Vs* and *Vp*) and Acoustic Televiewer Logs (Sheet 4 of 5)



#### Figure 2.5.1-352 The Two Zones of Secondary Porosity on B-608 (DH) Showing the Lithology Caliper, Natural Gamma, Velocity (*Vs* and *Vp*) and Acoustic Televiewer Logs (Sheet 5 of 5)


#### Figure 2.5.1-353 The Two Zones of Secondary Porosity on B-710 G (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*V*s and *Vp*), and Acoustic Televiewer Logs (Sheet 1 of 5)



#### Figure 2.5.1-353 The Two Zones of Secondary Porosity on B-710 G (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*V*s and *Vp*), and Acoustic Televiewer Logs (Sheet 2 of 5)

Log ID: B-710G(DH) Total Depth: 273.5 ft Northing: 397,075 (NAD83/90) Easting: 875,792 (NAD83/90) Hole Diameter: 4" from 0.0 to 273.5 ft Elevation (Ground Surface): -1.4 ft Drilling Date: Started 3/10/08 Completed 3/13/08 Drilled By: R. Landeros / N. Rodriguez Lithology Logged By: S. Woodham Geophysical Log Operator: GEOVision Geophysical Services

Note: Caliper (upper section) from 10.4 to 130 feet bgs. Caliper (lower section) from 90.4 to 264 feet bgs. Natural Gamma (lower and upper sections) from 10.4 to 264 feet bgs. Reciever to reciever Vs and Vp from 26.2 to 257.5 feet bgs. Accustic Televiever from 19 to 120.4 feet bgs.



#### Figure 2.5.1-353 The Two Zones of Secondary Porosity on B-710 G (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*V*s and *Vp*), and Acoustic Televiewer Logs (Sheet 3 of 5)



#### Figure 2.5.1-353 The Two Zones of Secondary Porosity on B-710 G (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*V*s and *Vp*), and Acoustic Televiewer Logs (Sheet 4 of 5)



#### Figure 2.5.1-353 The Two Zones of Secondary Porosity on B-710 G (DH) Showing the Lithology, Caliper, Natural Gamma, Velocity (*V*s and *Vp*), and Acoustic Televiewer Logs (Sheet 5 of 5)





## Figure 2.5.1-354 Map of Southern Florida Showing the Locations of Caves Identified by Cressler



Figure 2.5.1-355 Palma Vista Cave



#### Cunningham and Walker Study Area in Biscayne Bay, Figure 2.5.1-356 Southeast Florida

Notes:

- Location map of area delimited in B. (a)
- Outline of study area shown in C. (b)
- Location map of seismic profiles in Biscayne Bay. (C)

## Figure 2.5.1-357 Correlation of Hydrogeologic and Geologic Units to Time Stratigraphic Units of Southern Florida



Note: Correlation of hydrogeologic and geologic units, and time stratigraphic units of southern Florida to a provisional seismic-reflection stratigraphy (SS1–SS9) of seismic profiles EW4 in Biscayne Bay, and EKW and EKE east of Elliot Key in the Atlantic Ocean (Reference 958).



### Figure 2.5.1-358 A Part of Seismic-Reflection Profile N1 Across Four Vertically Stacked, Narrow Zones (1–4) of Seismic Sags That Combine to Form a Single Seismic-Sag Structural System



### Figure 2.5.1-359 Seismic-Reflection Profile N5 Across a Vertically Stacked Arrangement of Structural Sags

Note: Three zones (1–3) of sags in seismic reflections are shown with each zone of seismic sags having different sag angles. No effects of the collapse are visible above the top of zone 1 (Reference 958).



## Figure 2.5.1-360 Sinkhole in the Key Largo National Marine Sanctuary About 1 Mile (1.8 km) From Key Largo Dry Rocks Reef



# Figure 2.5.1-361 Salt Pond Cave, Long Island, Bahamas, a Flank Margin

Note: The cave has an irregular phreatic morphology and is horizontally extensive but vertically restricted (Reference 263).



#### Figure 2.5.1-362 **Diagrammatic Representation of the Main Dissolution**

Note: The features shown are epikarst with paleosol, pit caves, banana holes, phreatic caves, and flank margin caves. Changes in sea level move the position of the karst features (Reference 263).

0

DIFFUSE PHREATIC FLOW

DEVELOPING

CURRENT

FRESHWATER LENS



## Figure 2.5.1-363 Location of the Quintana Roo Caves



## Figure 2.5.1-364 Locations of Crescent Beach Spring and Red Snapper Sink

Source: Reference 966



## Figure 2.5.1-365 Location Map of the Bahamas Showing a Chain of Fracture-Controlled Blue Holes on South Andros Island

Source: Reference 950



## Figure 2.5.1-366 Mapped Depictions of the Walkers Cay Fault Based on

Source: References 474 and 791





SITE 628	LBB-18 NE **	SITE 627	
1.2	LBB-15 sea floor	(projected) I 1.2	
0 1.4	A the former of the	1.8-07-1.4	
T.D. 298 m.	le l	2.3 (2.45) 1.6	
1.8	1	2.8 235 1.8	
Vertical exaggeration: 5x		4.2 T.D. 536 m.	





Source: References 476 and 785





Multiple sources were used to compile this map, including References 439, 448, 492, and 494.



#### Figure 2.5.1-368 Fault Map of Cuba Showing Earthquakes From the Phase 2 Earthquake Catalog (Sheet 2 of 3)

Multiple sources were used to compile this map, including References 439, 448, 492, and 494.



#### Figure 2.5.1-368 Fault Map of Cuba Showing Earthquakes From the Phase 2 Earthquake Catalog (Sheet 3 of 3)

Multiple sources were used to compile this map, including References 439, 448, 492, and 494.



### Figure 2.5.1-369 Map of Estimated Ages of Faults in Cuba

Note: Modified after Reference 848.



## Figure 2.5.1-370 Locations of the Trail Ridge, Penholoway Terrace, and Talbot Terrace in Northern Florida and Southern Georgia

Note: Oblique hill shade image of northern Florida and southern Georgia showing Trail Ridge, modern shoreline, and karstified central Florida. The inset is a profile along Trail Ridge axis showing spatial variation in uplift, which agrees with spatial variation in karstification and/or lithology (Reference 927).



## Figure 2.5.1-371 Joe Ree Rock Reef and Grossman Ridge Rock Reef

Source: Modified from Reference 928

Epoch	Formation	Hoffmeister & Multer (1964, 1968)	Perkins (1977)	Harrison et al. (1984)	Multer et al. (2002)	Cunningham et al. (2006)	Everglades Rock Reefs (this study)
Pleistocene Fort Thompson Formation Miami Limestone	nestone	2	Q5	Q5	Q5e	HFC5e	Q5e
	iami Lin		Q4	Q4b	Q4b	HFC4	Q4b
	W	imestor		Q4a	Q4a		Q4a
	nompson Formation Key Largo L	Q3	Q3	Q3	HFC3b HFC3a	Q3a	
		Q2	Q2	Q2	HFC2h HFC2g3 HFC2g2 HFC2g1 HFC2g1 HFC2g2	Q2d Q2c Q2b Q2a	
	Fort TI		Q1	Q1	QI	HFC2a HFC2b HFC2a	Q1b Q1a

## Figure 2.5.1-372 Correlation of Marine Sequences of the Fort Thompson Formation and Miami Limestone



## Figure 2.5.1-373 Interpreted Correlation of South Florida Pleistocene Sea Level Record



#### Figure 2.5.1-374 Carysfort Outlier Reef and Sand Key Outlier Reef

Source: Modified from Reference 931



### Figure 2.5.1-375 Schematic Cross Sections of the Sand Key Outlier Reef and the Carysfort Outlier Reef

Note: Interpreted cross sections for Sand Key (main outlier reef) and Carysfort Outlier Reef. All dates were determined via the high-precision TIMS U-Th technique. Unconformities were placed using the U-Th dates and stable isotope data differentiating marine units from subaerial exposure horizons (Reference 932). All Pleistocene U-Th dates indicate in situ post-Substage 5e reef growth. A: Sand Key Cross Section — One Pleistocene date of 86.2 ka in cotre SKOR2A is considered to be reworked into the associated rubble-pinnacle feature. B: Carysfort Cross Section — All cores are shown. An A. *palmata* reef crest occurts in core CSFT4A (Reference 932).

#### Figure 2.5.1-376 Composite Cross Section of the Florida Keys from Northwest to Southeast and U-Series Ages of Corals From Quaternary Reefs







Notes:

- (a) Upper: Map of the state of Florida showing the modern, last glacial (~21,000 years), and last interglacial (~120,000 years) shorelines.
- (b) Lower: Detail of southern Florida, including the Florida Keys and U-series ages of emergent or shallow-submerged Pleistocene reefs.
- (c) Abbreviations: WK–Windley Key, UM–Upper Matecumbe Key, LK–Long Key, SKR–Sand Key Reef (Reference 933).







### Figure 2.5.1-379 Map of Selected Seismic Lines in the Straits of Florida







## Figure 2.5.1-381 Structure Contour Map of the Top of the Oligiocene-Miocene Arcadia Formation



## Figure 2.5.1-382 Total Field Magnetic Anomaly From the Geological Survey of Canada

Note: Total field magnetic anomaly from the Geological Survey of Canada modified in Behn and Lin, 2000. Areas without adequate data control are masked in black. The segmented magnetic high running parallel to the margin is the ECMA. Solid gray lines show the location of the Kane and Northern fracture zones, white lines show the location of the offset zone traces identified in Behn and Lin (Reference 972), solid lines represent areas where the offset zone traces are constrained by offsets in magnetic lineations; dashed lines are used where the traces are primarily constrained and the dotted lines are used to represent the high uncertainty in the location of the offset zone traces between the BSMA and the East Coast margin. The right hand margin labels are major offset zones (Atlantis, Kane, Northern, and A-I).
# Figure 2.5.1-383 Shaded Bathymetry of the U.S. East Coast, Combining NGDC Ship Track Data and ETOPO5 Digital Bathymetry Data



- (a) Shaded bathymetry of the U.S. East Coast, combining National Geophysical Data Center (NGDC) ship track data and ETOPO5 (Earth Topography 5-minute) digital bathymetry data. Light black contour lines show sediment thickness from USGS seismic reflection grids and thick black lines show the extent of the USGS data coverage.
- (b) Free-air gravity satellite gravity map.
- (c) Isostatic gravity anomaly map.
- (d) Reduced-to-the-pole (R-T-P) magnetic anomaly along the East Coast margin. LASE (Large Aperture Seismic Experiment), EDGE-801, USGS32 and BA-6 are seismic transect lines.

Source: Reference 972



Figure 2.5.1-384 Basement Map of the Florida-Northern Bahamas Region

Note: Basement map of the Florida-northern Bahamas region showing depth in kilometers and basement type (continental, transitional, or oceanic with approximate age ranges).

Source: Modified from Reference 307



# Figure 2.5.1-385 Relation Between Touching-Vug Porosity and Conduit Porosity for the Fort Thompson Formation and Miami Limestone of the Biscayne Aquifer in Cunningham et al. Study Area

Source: Modified from Reference 404



# Figure 2.5.1-386 Cross-Section A-A' (Vertical Exaggeration = 4:1) This figure appears in Appendix 2.5AA as Figure 2.5AA-215



# Figure 2.5.1-387 Cross-Section B-B' (Vertical Exaggeration = 4:1) This figure appears in Appendix 2.5AA as Figure 2.5AA-216

2.5.1-588



Figure 2.5.1-388 Cross-Section C-C' (Vertical Exaggeration = 4:1) This figure appears in Appendix 2.5AA as Figure 2.5AA-217

2.5.1-589



Figure 2.5.1-389 Cross-Section D-D' (Vertical Exaggeration = 4:1) This figure appears in Appendix 2.5AA as Figure 2.5AA-201