observed northeast-southwest trend of principal stress in the mid-plate stress province of the central and eastern United States (CEUS) dominantly reflects ridge-push body forces associated with the mid-Atlantic Ridge. They estimated the magnitude of these forces to be approximately $2x10^{12}$ to $3x10^{12}$ N/m (Newton/ meter), or 2.9 to 4.4x10 pounds per square inch (psi), (i.e., the total vertically integrated force acting on a column of lithosphere 3.28 feet wide), which corresponds to average equivalent stresses of approximately 40 to 60 MPa (megaPascals), or 5800 to 8700 psi, distributed across a 30-mile (~48-kilometer) thick elastic plate. Humphreys and Coblentz (Reference 647) evaluated the contribution of shear tractions on the base of the North American lithosphere to intra-continental stress and conclude that the dominant control on the northeast-southwest orientation of the maximum compressive principal stress in the CEUS is ridge-push force from the Atlantic Ocean Basin.

Research on the state of stress in the continental United States since publication of the EPRI (Reference 456) studies confirms observations that stress in the CEUS is characterized by relatively uniform northeast-southwest compression. Few new data have been reported since the EPRI (Reference 456) study that better determine the orientations and relative magnitudes of the principal stresses in the site region. Given that the current interpretation of the orientation of principal stress is similar to that adopted in EPRI (Reference 456) a reevaluation of the seismic potential of tectonic features based on a favorable or unfavorable orientation to the stress field would yield similar results. Thus, there is no significant change in the understanding of the static stress in the site region and site area since the publication of the EPRI source models in 1986, and there are no significant implications for existing characterizations of potential activity of tectonic structures. The mid-plate stress province is the most likely characterization of the tectonic stress at the site region and site area (Figure 2.5.1-330).

Contemporary Stress Regime in the North America-Caribbean Plate Boundary Region

The Caribbean Plate is presently moving relative to the North America Plate at a rate of approximately 18 to 20 millimeters/year along an azimuth of roughly 075° (References 502, 635, and 636). In the Cuba and Caribbean-North America Plate boundary region, the relative plate motion is accommodated by the mid-Cayman spreading center and several subvertical, left-lateral transform faults extending from offshore of the northern coast of Honduras eastward through the Cayman Trough and through the islands of Jamaica and Hispaniola. The Cayman spreading center itself is located southwest of the Cayman Islands and is

characterized by a north-south-trending axis of spreading with an average rate of approximately 15 millimeters/year since approximately 25 to 30 Ma (Reference 222). West of the Cayman Trough, Caribbean-North America Plate motion is accommodated offshore on the left-lateral Swan Islands fault (Figure 2.5.1-202). East of the Cayman Trough, on Hispaniola, the orientation of the plate-bounding structures changes and motion is partitioned between strike-slip faults (e.g., Septentrional and Enriquillo faults), minor oblique-reverse faults, and subduction on low-angle thrust faults (e.g., Northern Hispaniola thrust fault) (References 637, 638, and 639). East of Hispaniola, the Caribbean-North America Plate boundary becomes an oblique subduction zone or zones at the Puerto Rico Trench and Muertos Trough, and finally a more pure dip-slip west-dipping subduction zone in the Lesser Antilles. At the longitude of Puerto Rico, south-dipping subduction of North American crust at the Puerto Rico Trench and north-dipping subduction of Caribbean crust at the Muertos Trough accommodate relative plate motion with a highly oblique sense of shear (Figure 2.5.2-214).

Hypocenters and focal mechanisms of historical earthquakes provide information on fault geometry, crustal thickness, and fault kinematics throughout the Cuba and northern North America-Caribbean Plate boundary region. The kinematics of crustal deformation and faulting in Cuba are poorly understood. Geodetic data show that the current plate boundary is mostly south of Cuba along the Oriente and Enriquillo-Plantain Garden faults and that modern deformation rates across Cuba are likely <0.1 inch (3 millimeters) per year relative to North America (References 502 and 503). The Cayman Trough and western Hispaniola are characterized by shallow (crustal) seismicity with most focal mechanisms consistent with left-lateral strike-slip on east-west striking vertical faults (References 560, 632, and 640). Shallow seismicity in Jamaica is associated with strike-slip, oblique, and reverse focal mechanisms accommodating left-lateral shear across east-west and west-northwest-striking faults (Reference 503). Seismicity along the Oriente fault changes along strike south of Cuba as focal mechanisms show strike-slip and oblique-normal movement near the Cabo Cruz Basin and strike-slip to north-dipping reverse motion trends associated with the Santiago deformed belt (Reference 504). Shallow- to intermediate-depth seismicity defines south-dipping planes associated with the Northern Hispaniola fault and Puerto Rico Trench, with shallow focal mechanisms consistent with underthrusting of North American crust beneath the Caribbean on gently dipping planes (Reference 591). A north-dipping zone of seismicity from shallow to intermediate crustal depths is associated with the Muertos Trough (Reference 591).

2.5.1.1.5 Tsunami Geologic Hazard Assessment

This subsection provides geologic support for discussions in Subsection 2.4.6, Probable Maximum Tsunami Hazards. An extensive review of available scientific literature produced no positive evidence for Quaternary seismically induced or landslide-generated tsunami deposits within the 200-mile radius of the Units 6 & 7 site region. The literature does provide sedimentary evidence for Pliocene to Recent submarine mass movements on the Florida-Hatteras shelf and elsewhere in the western Atlantic (e.g., References 315, 316, 317, and 318). Literature also provides sedimentary evidence for Neogene and older submarine mass movements in the Florida Straits, the Bahama Platform, the northern coast of Cuba, the southeastern Gulf of Mexico, and the Yucatan Basin (References 422, 476, 727, 738, 740, and 742). Extensive geologic and historic literature is available documenting tsunami events and submarine mass movement in the Caribbean Basin (e.g., References 582, 681, 737, 738, and 739). The sedimentary and historic observation records that support a tsunami geologic hazard assessment are discussed in the following subsection.

According to Tappin (Reference 729), all forms of submarine mass movements are potentially tsunamigenic, yet there is a paucity of data relating submarine failures to tsunami generation and the physics of the process is still not well understood. Extensive retreat of the escarpments defining the edges of the Yucatan and Bahama carbonate platforms have been proposed by numerous researchers (e.g., References 305, 308, 794, and 726). However, the relevance of the processes of carbonate platform retreat to the Turkey Point site cannot be established because no stratigraphic evidence has been found to link escarpment retreat to any tsunami-like events along the southern coast of Florida. Wide-spread evidence for Miocene gravity flows in channels and troughs of the Bahama Platform has been documented (e.g., References 422, 727, and 728). Again, the relevance of seismically-induced Miocene gravity flows to the Turkey Point site region has not been established because no stratigraphic evidence has been found to link gravity flow deposits on the Bahama Platform to any tsunami-like events along the southern coast of Florida. Submarine landslides and the associated volumes of displaced seawater, whether triggered by a seismic event or another type of event (e.g., meteorite, volcanic activity, gravitation loading, or gas hydrate decomposition) are the likely cause of most Caribbean tsunamis and resulting tsunami deposits. The scientific literature does not address a means of discriminating between seismically-induced tsunami deposits and non-seismic tsunami deposits, even when there is a close relationship in time between a seismic event and a tsunami. The following describes the known

characteristics of tsunami deposits, how they would be distinguished from hurricane deposits, and identifies possible locations conducive to deposition and preservation of tsunami deposits in the Turkey Point site region.

Tuttle et al. (Reference 889) distinguish tsunami from storm surge deposits, based on a comparison of deposits from the 1929 Grand Banks tsunami and the 1991 Halloween storm. The 1929 Grand Banks tsunami was caused by an earthquake-generated landslide that left chaotic deposits on the Burin Peninsula of Newfoundland. The Halloween storm caused sand and pebble overwash of barrier beaches and seawalls, and extensive damage along the New England coast, including Martha's Vineyard off the southern coast of Massachusetts. By 2004, researchers also had closely examined the character and extent of tsunami deposits generated by the 1755 Lisbon earthquake and the 1960 Chilean earthquake. As noted by Tuttle et al. (Reference 889), the challenge of discriminating between the two types of deposits was that both tsunami and storm surge processes result in the onshore transport and re-deposition of sediments. Tuttle et al. (Reference 889) conclude that four discriminators (included verbatim below) could be used to distinguish between tsunami and storm deposits:

1. Tsunami deposits exhibit sedimentary characteristics consistent with landward transport and deposition of sediment by only a few energetic surges, under turbulent and/or laminar flow conditions, over a period of minutes to hours; whereas characteristics of storm deposits are consistent with landward transport and deposition of sediment by many more, less energetic surges, under primarily laminar flow conditions, during a period of hours to days.

2. Both tsunami and storm deposits contain mixtures of diatoms indicative of an offshore or bayward source, but tsunami deposits are more likely to contain broken valves and benthic marine diatoms.

3. Biostratigraphic assemblages of sections in which tsunami deposits occur are likely to indicate abrupt and long-lasting changes to the ecosystem coincident with tsunami inundations.

4. Tsunami deposits occur in landscape positions, including landward of tidal ponds, that are not expected for storm deposits.

Similarly, Morton et al. (Reference 890) characterize the distinction between tsunami and storm deposits as being related to differences in the hydrodynamics and sediment-sorting processes during transport. Tsunami deposition results from

a few high-velocity, long-period waves that entrain sediment from the shoreface, beach, and landward erosion zone. Tsunamis can have flow depths greater than 10 meters (33 feet), transport sediment primarily in suspension, and distribute the load over a broad region where sediment falls out of suspension when flow decelerates. In contrast, storm inundation generally is gradual and prolonged, consisting of many waves that erode beaches and dunes with no significant overland return flow until after the main flooding. Storm flow depths are commonly <3 meters (9.8 feet), sediment is transported primarily as bed load by traction, and the load is deposited within a zone relatively close to the beach (Reference 890). A schematic of typical tsunami and storm deposits is shown in Figure 2.5.1-348.

As noted by Dawson and Stewart (Reference 891), hurricane deposits are quite different from tsunami deposits. For example, Scoffin and Hendry (Reference 892) use coral rubble stratigraphy on Jamaican reefs to identify past hurricane activity, while Perry (Reference 893) use storm-induced coral rubble in reef facies from Barbados to identify episodes of past hurricane activity. Similarly, in coastal Alabama, a series of hurricanes during historical time resulted in the deposition of multiple sand layers in low-lying coastal wetlands, but never as extensive as tsunami sediment sheets. By contrast, the overwash fans along the New England coastline used by Donnelly et al. (Reference 894) to reconstruct a 700-year record of hurricane activity have analogues with similar tsunami deposited fans (References 895, 896, and 897).

A literature review indicates that storm surges result in the deposition of discontinuous sedimentary units and that tsunamis, in contrast to storm surges, generally result in deposition of sediment sheets, often continuous over relatively wide areas (Figure 2.5.1-348). The tsunami units are also deposited a considerable distances inland. For example, sediment sheets produced by the 1755 tsunami in Algarve, Portugal occur in excess of 1 kilometer (0.6 mile) inland (Reference 898).

Part of the difficulty in understanding the characteristics of tsunami deposits is due to a lack of knowledge of offshore hydraulics and sediment dynamics during modern tsunami events. Whereas the majority of the literature concerned with tsunami sedimentation has focused attention on the coastal zone, relatively little attention has been given to tsunami depositional processes both in the near-shore and offshore (Reference 891). This is because tsunami sediments are readily identifiable and easy to study along coastlines. But each incoming tsunami wave is associated with strong backwash flow from the coast into the sea. This highlights the strong possibility that sediments picked up by tsunamis may also drape the sea floor, a consequence of the cumulative depositional effect of each

backwash flow associated with the train of tsunami waves (Reference 899). During this phase, pulses of tsunami backwash may generate turbidity currents that move seaward towards the abyssal zone via submarine gullies and canyons (Reference 900).

Current tsunami research is focused on identifying potential onshore and offshore tsunami deposits as well as discriminating between types of tsunami deposits. Onshore deposits from submarine landslide-generated tsunamis probably could not be discriminated from earthquake-generated tsunamis except by careful radiometric age correlations between causative events, such as has been done with the pre-historic Storegga landslide (Reference 901). Clearly, bolide impact deposits are often associated with inclusion of impact ejecta (impact debris), including shocked minerals and impact spherules, depending on the proximity of the impact site to the deposits (References 320, 902, and 903). Volcanic collapse-generated tsunami deposits generally include a significant component of airfall tephra (Reference 731).

The boring logs from the subsurface investigations of the Units 6 & 7 site are described in detail in Subsection 2.5.1.2. The logs indicate that geologic conditions are uniform across the site (Figures 2.5.1-231 and 2.5.1-232) and show no evidence of interruption by a tsunami-like event. Furthermore, the results of geophysical surveys conducted to assess the potential for karst formation in the Power Block areas (Subsection 2.5.4.4.5) show no evidence of sinkholes that could have served as a sedimentary basin to preserve tsunami or major storm surge deposits. The site exploration data do not indicate the presence of erosional channels that are filled with poorly sorted siliciclastics containing exotic fragments or coral rubble that might have been deposited by paleo-tsunamis or topographically high areas with potential paleotsunami overwash deposits (Figure 2.5.1-348).

Recognizing tsunami deposits from drill core is especially difficult because some of the discriminators between tsunami and storm deposits are based on areal continuity of erosional and depositional horizons. The sampling done as part of the subsurface investigations at the Turkey Point site encountered about 1 meter (3 feet) of organic muck overlying Pleistocene and older carbonate strata (see Subsection 2.5.1.2.2). No nearby siliciclastic-filled sedimentary basins were identified in the site area.

The following describes available evidence for potential landslide tsunami sources along the southeastern Atlantic margin of North America, the western edge of the Florida Escarpment, the eastern edge of the Blake Plateau, the eastern edge of

the Bahama Platform, across the Straits of Florida, and along the northern coast of Cuba. The most likely source for an earthquake-generated tsunami that is close enough to possibly affect the Units 6 & 7 site is the Puerto Rico Trench. Modeling of that source is discussed later in this subsection.

Potential Central or Western Atlantic Tsunami Sources

In the early 2000s, several professional publications (References 730 and 731) predicted the effects of a mega-tsunamis caused by underwater volcanic edifice collapse in the Canary Islands. As a result, U.S. and Caribbean scientists began reexamining physiographic evidence for large, undersea landslides in the detailed topographic data from the GLORIA side-scan imagery and other remote sensing data and submersible observations within the U.S. Exclusive Economic Zone (EEZ) and in the greater Caribbean region (Reference 732).

As noted in Subsection 2.5.1.1, megasedimentary events are recognized throughout the world's ocean basins. Pilkey (Reference 315) identifies a "megaturbidite" that he calls the Black Shell Turbidite in the Hatteras Abyssal Plain, north of the Blake Plateau. A "megaturbidite" is an underwater landslide that moves great volumes of sedimentary material downslope, in the process displacing large volumes of water and likely causing a tsunami at the water surface. The Black Shell Turbidite is at least 100 kilometers^3 (24 miles^3) in volume and perhaps double that. Based on radiocarbon dates of the youngest shell fragments incorporated by the megaturbidite, the event occurred about 16,900 years ago (Reference 316). According to Pilkey (Reference 315), major events such as the occurrence of the Black Shell Turbidite should not be assumed to be restricted to times of lowered sea level. The 1929 Grand Banks submarine landslide (Reference 317) may have involved as much as 400 kilometers^3 (96 miles^3) of material. This slump resulted in a turbidity current that traveled 500 kilometers (311 miles) to the Sohm Abyssal Plain, but the full areal extent of the resulting turbidite is unknown (Reference 315). The tsunami waves associated with the Grand Banks landslide had amplitudes of 3 to 8 meters (10 to 26 feet) and run-up of up to 13 meters (43 feet) along the Burin Peninsula, Newfoundland. Waves crossing the Atlantic Ocean were recorded on the coasts of Portugal and the Azores and visually observed along the coasts of Canada and in Bermuda, and recorded on tidal gauges as far south as Charleston, South Carolina (Reference 318).

The role that salt diapirism and methane gas hydrate decomposition may play in landslide potential near the Blake Ridge is discussed in some detail in Subsection 2.5.1.1.1.1.1.3.

Contrary to widely held views based on studies of ancient rocks, basin plains are not necessarily distal portions of fans dominated by thin and relatively fine sediments (Reference 734). On the contrary, basin plains such as the Hatteras and Sohm Abyssal Plains are distinguished by the thickest and coarsest sands of any off-shelf sedimentary environments (Reference 315). This finding suggests that these large turbidite deposits are relatively common and capable of moving significant quantities of near-shore materials (coarse sands) across the continental shelf and slope and far onto the abyssal plain. According to Fine et al. (Reference 318), the Grand Banks landslide carried mud and sand eastward up to 1000 kilometers (620 miles) at estimated speeds of 60 to 100 kilometers/hour (37 to 62 miles/hour).

Based on data in the National Geophysical Data Center (NGDC) database, during the past 200 years a total of six tsunamis have been recorded in the Gulf of Mexico and East Coast States (Reference 735). Three of these tsunamis were generated in the Caribbean, two were related to magnitude 7+ earthquakes along the Atlantic coastline, and one reported tsunami in the Mid-Atlantic states may be related to an underwater explosion or landslide. In the NGDC database, as of June 2010, there are five documented run-up events listed for the Florida Peninsula. The run-up events are listed in the Table 2.5.1-207. The NGDC database does not include the 1946 Dominican Republic tsunami with a possible run-up of 10 feet (3 meters) at Daytona Beach, Florida, because the exact measure of the tidal gage run-up at that location cannot be verified from the original cited reference (Reference 736).

Potential Puerto Rico Trench Tsunami Sources

The Puerto Rico Trench is the deepest part of the Atlantic Ocean, with water depths exceeding 8400 meters (27,600 feet) (Reference 582). Large landslide escarpments have been mapped on the seafloor north of Puerto Rico although their ages are unknown. Seismic stratigraphy of the landslide slopes appears to indicate that massive carbonate blocks slide coherently. The failure of coherent blocks on a steep slope appears to cause the high tsunami run-up associated with Puerto Rican tsunamis (Reference 582).

The October 11, 1918, M_w 7.2 (see Subsection 2.5.2.1) earthquake in the Mona Passage between Hispaniola and Puerto Rico generated a local tsunami along the western coast of Puerto Rico that claimed approximately 140 lives (References 681, 737, 738, and 739). A tsunami with run-up heights reaching 6 meters (20 feet) followed the earthquake causing extensive damage along the western and northern coasts of Puerto Rico, especially to those villages

established in a flood plain (Reference 739). High-resolution bathymetry and seismic reflection lines in the Mona Passage show a fresh submarine landslide 15 kilometers (9 miles) northwest of Rinćon in northwestern Puerto Rico and in the vicinity of the first published earthquake epicenter. The landslide area is approximately 76,000 $meters^2$ (830,000 $feet^2$) and probably displaced a total water volume of 10,000 $meters^3$ (353,000 $feet^3$). The landslide's headscarp is at a water depth of 1200 meters (3900 feet), with the debris flow extending to a water depth of 4200 meters (13,800 feet) (Reference 738). This submarine landslide is now believed to be the primary cause of the 1918 tsunami (Reference 738).

Potential Bahama Platform and Straits of Florida Tsunami Sources

The Ocean Drilling Program (ODP) drilled four holes up to 447 meters (1500 feet) on the Bahama Platform in the Straits of Florida immediately south of the Units 6 & 7 site (Site 626, Figure 2.5.1-211). Holes 626C and 626D provided significant results as described below (Reference 740). Three stratigraphic units, numbered I through III from the surface down, were identified.

- Unit I is 122 meters (400 feet) thick and consists of skeletal carbonate sands comprising planktonic foraminifers and neritic skeletal grains from the platforms, middle Miocene to Pleistocene in age.
- Unit II is 48 meters (158 feet) thick and consists of muddy lime rubble, graded rubble and sand, and muddy sand, interpreted as debris flows and turbidites with intercalations of pelagic sediment, middle Miocene in age.
- Unit III is 277 meters (900 feet) thick and consists of skeletal carbonate sands as in Unit I with numerous intercalations of lithified layers (skeletal grainstones and packstones), of late Oligocene to middle Miocene in age.

Units I and III are interpreted as contourite deposits of the Gulf Stream, which sweeps the drill site with bottom velocities of 20 to 40 centimeters/second (8 to 16 inches/second) (Reference 741). In general, the contourite deposits formed in the lower velocity zones along margins or beneath the core of higher-energy currents, where flow velocities are low enough to induce deposition but yet high enough to contain a high suspended load that would not be present in the absence of the current. If there is a strong or concentrated nepheloid layer, (a layer of water above the ocean floor that contains significant amounts of suspended sediment (Reference 905)), a rapid deposition of sediment will occur, forming a contourite/ turbidity deposit (Reference 906). Unit II interrupts the contourite record in an impressive way. During a four million year interval in the middle Miocene, debris

flows and turbidites were emplaced too rapidly to be reworked by the bottom currents. ODP scientists reviewing the stratigraphic relationships hypothesize that the large debris flow and turbidites of Unit II represent material that had accumulated on top of the carbonate banks at a marine high stand and that the material became unstable as sea level fell (Reference 740). Debris flows and associated turbidites, the size of Unit II, might not be expected to occur in today's environment of rising sea levels. The present current regime is different from that in the Miocene because sea level has been generally rising since the end of the Wisconsinan glacial stage (References 907 and 908).

The Unit II gravity flows are synchronous with the "Abaco episode" (associated with the Jacksonville Fracture Zone shown in Figure 2.5.1-229) in the western North Atlantic Ocean. The "Abaco episode" is represented by gravity-flow deposits spanning most of the Miocene, with sedimentation-rate peaks in the middle Miocene as described by Reference 727. The gravity flow material points to sources on the adjacent Bahama Platform, on its flanks, and on the floor of the Straits of Florida. Several other sediment gravity-flow events occurred in the region during the same period. Lower to middle Miocene gravity-flow deposits were cored at Sites 627 and 628 (Figure 2.5.1-211) and large middle Miocene slumps were identified from seismic profiles north of Little Bahama Bank near Sites 627 and 628 (Reference 476). However, these deposits differ in scale and lithology from those at Site 626. The Great Abaco Member of the Blake Ridge Formation in the Blake-Bahamas Basin (for location see Figure 2.5.1-214), penetrated at DSDP Sites 391 (Reference 422) and 534 (Reference 728), contains gravity-flow deposits that span most of the Miocene, with sedimentation-rate peaks in the middle Miocene. Off the west coast of Florida, Mullins et al. (Reference 305) document a middle Miocene slide scar that resulted from the failure of a 120-kilometer (93-mile) length of the western margin of the Florida carbonate platform. The timing of these flow events suggests the possibility of a common paleotectonic cause.

While there is clear evidence of past submarine landslides near the Florida Peninsula, the stratigraphic record, especially from drill cores, is incomplete for use in evaluating the aerial extent of landslide effects. However, based on recent bathymetric data and for PMT purposes, a potential landslide-induced tsunami is discussed in Subsection 2.4.6.1.3.

PTN RAI 02.04.06-7

Potential West Florida Escarpment Tsunami Sources

Information on the potential West Florida Escarpment sources is discussed in Subsection 2.4.6.1.2, Submarine Landslides in the Gulf of Mexico.

Potential Northern Coast of Cuba Tsunami Sources

Subsequent to the 2004 Indian Ocean tsunami, Cuban geologists began reexamining the historical, geologic, and seismic records of Cuba to evaluate potential tsunami hazards. Iturralde-Vinent (Reference 742) summarizes the current understanding of tsunami hazards in Cuba with a simple graphic (Figure 2.5.1-345). The graphic indicates large marine boulders deposited on the southern coast of Cuba, possibly by tsunamis, on the extreme southwestern coast, on the Isla de la Juventud, and along the seismically active southeastern coast of Cuba. Iturralde-Vinent (Reference 742) also identifies a significant coastal area of northwestern Cuba as a zone of potential tsunami hazards, with evidence of medium size carbonate boulders emplaced by waves on coastal terraces. A hazard zone for 3-meter (10-feet) high tsunamis is located on the northern coast of Cuba, between the cities of Havana and Matanzas (Figure 2.5.1-345).

Based on a lack of field evidence for tsunami deposits in southern Florida, it appears that the southern Florida coastline is generally protected from potential tsunami events by the broad expanse of shallow water of the Straits of Florida, by the steep Atlantic-facing escarpments represented by the Blake Plateau and the Bahama Platform, and by the steep Gulf of Mexico-facing escarpment of the Florida Escarpment. Knight (Reference 743) provides initial modeling of tsunami impacts to the Gulf of Mexico and southern Atlantic Coast from earthquake sources within the Gulf and the Caribbean regions. The two-dimensional depth averaged model developed at the University of Alaska, Fairbanks (Reference 744) is used to propagate initial disturbances to all points along the U.S. Gulf of Mexico and Atlantic coasts. Four initial sea level disturbances were created using Okada's formulas (Reference 745) in conjunction with associated hypothetical earthquakes. The model earthquakes do not necessarily correspond to expected magnitude, likelihood of rupture, or precise location on known thrust faults. They were chosen in part to excite various ocean basins and to present worst-case conditions. The results indicate that sources outside the Gulf of Mexico are not expected to create tsunamis threatening the Gulf Coast. The results also indicate that, due to significant energy losses from bottom friction through the shallower portions of the Straits of Florida and Caribbean region, both Gulf of Mexico and Atlantic coasts, including the Units 6 & 7 site, are well shielded from the large model (Puerto Rico Trench) Caribbean source (Reference 743). Subsection 2.4.6 contains a more detailed discussion of tsunami modeling specific to the Units 6 & 7 site.

In their report to the NRC, the Atlantic and Gulf of Mexico Tsunami Hazard Assessment Group and U.S. Geological Survey (Reference 746, p. 72) note "[w]e believe the reason why there are no reports from the 1755 tsunami [from the Lisbon earthquake] in southern Florida could be attributed to the northern Bahama Banks, which may have acted as a barrier to that area."

2.5.1.2 Site Geology

The Units 6 & 7 site is located within the Southern Slope subprovince of the Atlantic Coastal Plain physiographic province. The geology of the site (Figure 2.5.1-331) was and is influenced by sea level fluctuations, processes of carbonate and clastic deposition, and erosion. The Paleogene (early Tertiary) is dominated by the deposition of carbonate rocks while the Neogene (late Tertiary) is influenced by the deposition of quartz sands, silts, and clays (Reference 287). Deposition of carbonate rock resumed again during the Pleistocene. Within the site area the dominant rock types are limestones of the late Oligocene Arcadia Formation, the late Oligocene- to early Miocene sands and silts of the Peace River and Tamiami formations, and the Pleistocene fossiliferous limestone of the Fort Thompson Formation, the Key Largo Limestone, and the Miami Limestone (Figure 2.5.1-332). Minor units of alluvial soils, organic muck, and silt cover the surface. During the Pleistocene, worldwide glaciation and fluctuating sea levels influenced the geology in the site vicinity (Subsection 2.5.1.1.1.1.1.1). Drops in sea level caused by growth of glaciers increased Florida's land area significantly, which led to increased erosion and clastic deposition. Warm interglacial periods resulted in a rise in sea level and an increase in nutrient-rich waters leading to an increase in carbonate build-up (Reference 287). The geology within the site area is dominated by flat, planar bedding in late Pleistocene and older units. No tectonic structures have been identified within the site area (Subsections 2.5.1.2.3 and 2.5.1.2.4). Subsections 2.5.1.2.4 and 2.5.3 describe karst-related vegetated solution depressions (Figure 2.5.1-333).

2.5.1.2.1 Site Physiography and Geomorphology

The Units 6 & 7 site is located within Miami-Dade County, Florida, approximately 25 miles (40 kilometers) south of Miami, 8 miles (13 miles) east of Florida City, and 9 miles (14 kilometers) southeast of Homestead, Florida. The site area is located within the Southern Slope subprovince of the Florida Platform (a partly submerged peninsula of the continental shelf) within the Atlantic Coastal Plain physiographic province (Figure 2.5.1-217). The south Florida area is a broad, gently sloping plain with poor drainage; most of the area is below the piezometric surface in saltwater marshes and swamps overlain by peat. The Units 6 & 7 site is

bordered on the east by Biscayne Bay, on the west by Florida City and Homestead, on the south by Key Largo, and on the north by Miami. There are numerous canals to the west within an Everglades mitigation bank. The physiographic features bordering the plant property are the Everglades, Florida Keys, and the Atlantic Continental Slope (Figure 2.5.1-217).

The surface geology at the site area is characterized by organic muck (peaty soil) and Miami Limestone (Figures 2.5.1-331 and 2.5.1-334). The organic muck is the dominant surficial sediment type, whereas the Miami Limestone is exposed in the northern and western parts of the site area (Figures 2.5.1-335 and 2.5.1-334). The Miami Limestone is a marine carbonate consisting predominantly of oolitic facies of white to gray limestone with fossils (mollusks, bryozoans, and corals). The overlying organic muck located near the rivers in the site area is a light gray to dark gray to pale brown sapric muck (strongly decomposed organic peaty soil) with trace amounts of shell fragments that have little or no reaction to hydrochloric acid. The muck varies in thickness across the site from 2 to 6 feet (0.6 to 1.8 meters).

The site is at or near sea level with an existing elevation of -2.4 to 0.8 feet (NAVD 88). The site generally is flat and uniform throughout with the exception of vegetated depressions, as seen in Figures 2.5.1-333 and 2.5.3-202. The vegetative depressions are dissolution features within the Miami Limestone, described in Subsection 2.5.3.

2.5.1.2.2 Site Area Stratigraphy

As part of the Units 6 & 7 site characterization program, subsurface information was collected from 88 geotechnical borings, 22 separate groundwater borings, and 4 cone penetration tests (CPTs). Of the 88 geotechnical borings drilled, 32 are located within the boundary of the Unit 6 power block (600-series borings) and 32 are located within the boundary of the Unit 7 power block (700-series borings) (Figure 2.5.1-336). Subsection 2.5.4 contains a more detailed description of the comprehensive geotechnical investigation employed to characterize the subsurface of the site. The rock core descriptions on the boring logs described in Subsection 2.5.4 and Reference 708 are based on the carbonate classification system described by Dunham (Reference 709) that is commonly used in Florida. The geologic formations encountered in the geotechnical exploration were identified in the field. The upper and lower Fort Thompson formations identified on the boring logs are reinterpreted in this subsection as the Key Largo Limestone and Fort Thompson Formation. This is based on a broad review of geologic

publications, the predominance of coralline structure in the Key Largo Limestone and moldic porosity in the lower Fort Thompson Formation.

Of the 88 geotechnical borings drilled and sampled as part of the Units 6 & 7 site investigations, only 2 were advanced to a depth greater than 290 feet (88 meters) below ground surface (bgs): B-701 was advanced to a depth of 615.5 feet (187.6 meters) bgs and B-601 was advanced to a depth of 419.2 feet (127.8 meters) bgs. The remaining 86 borings ranged in depth from 100 to 290 feet (30 to 88 meters) bgs with a median of approximately 125 feet (38 meters) bgs. The Units 6 & 7 subsurface investigation obtained detailed information about the near-surface geologic characteristics and composition of sediments underlying the site. Information gathered from the regional investigation coupled with specific data obtained from borings that were drilled as part of the subsurface investigation were used to develop the site stratigraphic column presented in Figure 2.5.1-332.

Geophysical logs were obtained for 10 of the 88 borings. A suite of nine different geophysical logs was prepared for each of the ten borings in which geophysical logging was accomplished. Natural gamma logs were recorded as part of the electric log suite and as a correlation tool with the caliper log. Gamma-ray logs are used to identify lithology, with gamma counts of shale, silt, and clay generally higher (moving to the right) because clays adsorb radioactive particles more readily than other materials. A spontaneous potential (SP) log was also taken to identify lithology, but SP is not as sensitive to changes in lithology as the natural gamma curves. Three different resistivity logs were taken to record the resistivity of the formation at various intervals away from the boring wall and to track the effects of the drilling fluid at different levels. These three logs are also used to identify rock type with sandy units moving the curve to the right and clays moving the curve to the left. A caliper log was taken to record changes in the diameter of each borehole. Suspension shear (S) and compression (P) wave velocity logs were completed in each of the ten designated borings. Finally, an acoustic televiewer log was taken to provide a visual inspection of the interior walls of the boring. The key at the top of each log identifies each of the curves. A more detailed description of the down-hole geophysical logging is available in the geotechnical data report in Reference 708.

Figures 2.5.1-331, 2.5.1-335, and 2.5.1-334 show the geology of the site vicinity, site area, and site. The site stratigraphic column (Figure 2.5.1-332) presents the lithologic and hydrostratigraphic units encountered during the site subsurface investigation. Subsection 2.4.12 describes the hydrogeologic units in more detail. These strata are described below as they occur from the ground surface to depth beneath the site. Most borings drilled for the site subsurface investigation

penetrate the Miami Limestone, Key Largo Limestone, and Fort Thompson Formation to a depth of over 100 feet (30 meters). Thirty-four deeper borings penetrated into the underlying Tamiami Formation at approximately 115 feet (35 meters) bgs and continued to a depth of around 150 feet (46 meters) bgs; ten of these borings continued to depths in excess of 215 feet (66 meters) bgs and penetrated the Peace River Formation of the Hawthorn Group. One boring, B-701 (DH), penetrated the Arcadia Formation of the Hawthorn Group at a depth of 455 feet (139 meters) bgs before terminating at a final depth of 615.5 feet (187.6 meters). The description and characteristics of the geologic units encountered in the site investigation are described below. Boring logs are included in Reference 708.

The Holocene section at the Turkey Point Units 6 & 7 site is classified as marl and wetland soils belonging to the saprist (muck) group. The marl and muck are interpreted to have formed in an anaerobic tidal environment. Saprist soils are generally defined as those in which two-thirds or more of the material is decomposed, and less than one-third of plant fibers are identifiable (Reference 276). Eighty-eight borings were drilled and sampled (standard penetration test [SPT] samples in soil, continuous coring in rock) as part of the Turkey Point Units 6 & 7 subsurface investigation. The description of the Holocene section (i.e., muck) in the soil borings across the Units 6 & 7 site (Reference 708) includes the thickness, color, hardness, and the presence of organics, silt, roots, and shell fragment contents. The muck soils were sampled at the site every 0.8 meter (2.5 feet) using the SPT geotechnical sampling method. The muck soils are classified under the Unified Soil Classification System in accordance with ASTM D2488-06. Modifiers such as trace (<5 percent), few (5 to 10 percent), little (15 to 25 percent), some (30 to 45 percent) and mostly (50 to 100 percent) were used to provide an estimate of the percentage of gravel, sand and fines (silt or clay size particles), or other materials such as organics (muck) or shells. In general, the thickness of the muck ranges from 0 to approximately 5 meters (0 to 15 feet). Muck is observed in the geotechnical borings and the multichannel analysis of surface waves (MASW) survey data across the site. The muck appears to be thicker in the areas of the surficial dissolution features, which act as sediment traps (Figures 2.5.4-229 and 2.5.4-230). Color ranges from black to light gray, dark grayish brown to light brownish gray, and dark olive brown to light olive brown. Mottled coloration is also noted in the muck. The consistency of the muck is very soft-to-soft. Fibrous internal structure occurs within organic soils in eight of the site borings: B-614, B-625, B-626, B-702, B-715, B-725, B-727, and B-729. The organic content of the muck was visually estimated to vary from some (30–45 percent) to mostly (50–100 percent) (Reference 708).

PTN RAI 02.05.01-7

LDP-CS564

Only one sample from boring B-601 (DH) contains "mostly silt." Trace to some sand is noted in three borings: B-617, B-623, and B-723. Neither the sand nor the silt can be correlated across the site as continuous stratigraphic units. However, fine-grained calcareous material, marl, appears to overlie the muck in six borings: B-736, B-738, B-802, B-810, B-812, and B-813. This marl-like material is described as a fat clay to sandy fat clay (rather than a silt as described in the field) that is light/dark gray to light/dark grayish brown, very soft, moist to wet, with some fine grained sand and strong hydrochloric reaction (Reference 708). This type of marl forms when the ground surface is flooded for several months each year in the summer followed by a number of dry months during the winter (hydroperiod). During the hydroperiod, the microalgae (periphyton) grow on the surface water. The precipitation of the microalgae from the calcium bicarbonate saturated water creates marl (Reference 909). PTN RAI 02.05.01-7

The bedrock surface throughout the site consists of the Pleistocene Miami Limestone overlain by muck. At the site, the Miami Limestone is a white, porous, sometimes sandy, fossiliferous, oolitic limestone (grainstone) with vugs that are typically oriented in either the horizontal or the near-vertical direction. The formation is mostly soft to medium hard throughout, but typically very hard at the base. The top of the Miami Limestone was generally encountered at a depth of 3 to 6 feet (0.9 to 1.8 meters) bgs. The Miami Limestone is approximately 25 feet (7.6 meters) thick beneath the site.

The Pleistocene Key Largo Limestone underlies the Miami Limestone at Units 6 & 7 site. The contact between the Miami Limestone and the Key Largo Limestone is generally an irregular gradational contact primarily inferred from changes in hardness and oolite content. Based on previous investigations by others (e.g., Reference 710), the Key Largo Limestone was initially identified and logged as the upper Fort Thompson Formation. Subsequent investigation, including a review of recent publications (e.g., References 373 and 711) and a reexamination of the rock core, indicate that the coralline limestone facies should be identified as the Key Largo Limestone, not the upper Fort Thompson Formation. The Key Largo Limestone is a coralline limestone characterized by the presence of vuggy porosity with a high degree of interconnectivity. The coralline vugs within the Key Largo Limestone typically exhibit evidence of precipitation of secondary minerals (i.e., calcite). The contact between the Key Largo Limestone and the underlying Fort Thompson Formation has been identified at the site as a marker layer of dark gray, fine-grained limestone occurring at the base of the Key Largo Limestone. The dark gray limestone encountered in most of the site borings is generally 2 feet (0.6 meter) or more thick and often exhibits a sharp color change from light to dark

gray at its base marking the transition from the Key Largo Limestone to the Fort Thompson Formation.

The Key Largo Limestone is a fossil coral reef that is believed to have formed in a complex of shallow-water, shelf-margin reefs and associated deposits along a topographic break during the last interglacial period (Reference 406). The Key Largo Limestone is exposed at the surface in the Florida Keys from Soldier Key on the northeast to Newfound Harbor Keys near Big Pine Key on the southwest. At the site, the Key Largo Limestone is generally encountered at a depth of 23 to 33 feet (7 to 10 meters) to bgs and is approximately 22 feet (7 meters) thick.

The Pleistocene Fort Thompson Formation directly underlies the Key Largo Limestone. The Fort Thompson Formation is generally a sandy limestone with zones of uncemented sand interbeds, some vugs, and zones of moldic porosity after gastropod and/or bivalve shell molds and casts. Overall, the vugs and molds within the Fort Thompson Formation create a secondary porosity with a lower degree of interconnectivity than the vugs within the Key Largo Limestone. The top of the Fort Thompson Formation is generally encountered at a depth between 48 and 52 feet (15 and 16 meters) bgs and has a thickness of approximately 65 feet (20 meters) at the site.

The Pliocene Tamiami Formation directly underlies the Fort Thompson Formation. The contact between the Tamiami Formation and the Fort Thompson Formation is an inferred contact picked as the bottom of the last lens of competent limestone encountered. The placement of this inferred contact in each boring was primarily determined from core recoveries and drill rates. The Tamiami Formation is a poorly defined lithostratigraphic unit containing a wide range of mixed carbonate-siliciclastic lithologies. The Tamiami Formation generally consists of well-sorted, silty sand, but locally it is interlayered with clayey sand, silt, and clean clay. The top of the Tamiami Formation is generally encountered at a depth between 113 and 117 feet (34 and 36 meters) bgs with an average thickness of 105 feet (32 meters) at the site.

The Miocene-Pliocene age Peace River Formation of the Hawthorn Group directly underlies the Tamiami Formation. The Peace River Formation comprises interbedded sands, clays, and carbonates. The contact between the Peace River Formation and the Tamiami Formation is inferred based an increase in activity on the gamma ray log (Reference 708). The Peace River Formation is penetrated in only the eight deepest borings and generally consists of well-sorted, silty sand down to approximately 460 feet (140 meters) bgs. The top of the Peace River

Formation is encountered at a depth between 216 and 224 feet (66 and 68 meters) bgs with an average thickness of 235 feet (72 meters).

The Oligocene-Miocene age Arcadia Formation of the Hawthorn Group underlies the Peace River Formation. The Arcadia Formation consists of carbonate rock ranging from packstone to wackestone to mudstone, with a few isolated lenses of silty sand. The Arcadia Formation varies in hardness from soft (friable) to hard (well indurated), with colors ranging from pale yellow to greenish gray. The Arcadia Formation is fossiliferous with shell molds and casts of bivalves and gastropods found in some locations within the core. The unit is capped by a gray, hard, indurated dolostone/grainstone with sugary texture containing a few gastropod shell molds and casts. The Arcadia Formation is encountered in a single deep boring (B-701 DH) at a depth of 455 feet (139 meters) bgs and extended to the bottom of the boring to a depth of 615.5 feet (187.6 meters) bgs where the boring was terminated. As such, the thickness of the Arcadia Formation at the site exceeds 161 feet (49 meters).

Four geologic cross sections, two isopach (thickness) maps, two structure contour maps, and a site geologic map were prepared from the information obtained from the site subsurface investigation (Figure 2.5.1-334). Geologic cross section A-A' (Figures 2.5.1-338 and 2.5.1-386) extends east-west through the power blocks and eight borings, including the two deepest borings B-601 and B-701. Cross section B-B' (Figures 2.5.1-339 and 2.5.1-387) extends west-east through the southern edge of the site and eight borings, the deepest at 46.6 meters (153 feet) bgs. Cross section C-C' (Figures 2.5.1-340 and 2.5.1-388) extends diagonally northwest-southeast through the entire site and passes through the western power block. Cross section C-C' includes seven borings including the deepest boring, B-701(DH), at a depth of 187.6 meters (615.5 feet) bgs. Cross section D-D' (Figures 2.5.1-341 and 2.5.1-389) also extends diagonally northwest-southeast through the entire site but passes through the eastern power block. Cross section D-D' includes six borings; the deepest at a depth of 215 feet (66 meters) bgs.

PTN RAI 02.05.01-17

LDP-CS564

The locations of the surface traces of the cross sections are shown on Figures 2.5.1-342 and 2.5.1-344 (isopach maps of the Key Largo Limestone and the Fort Thompson Formation, respectively) and Figures 2.5.1-349 and 2.5.1-343 (structure contour maps of the top of the Key Largo Limestone and the Fort Thompson Formation, respectively). Two versions of each of the four cross-sections are provided. Cross-sections in the first set (Figures 2.5.1-338, 2.5.1-339, 2.5.1-340, and 2.5.1-341) are truncated at the elevation of -61 meters (-200 feet) NAVD 88 and depict the subsurface stratigraphy with a vertical

exaggeration of 12 to 1. Figures 2.5.1-386, 2.5.1-388, and 2.5.1-389 depict a thicker section of the subsurface stratigraphy on the same cross-sections with a vertical exaggeration of only 4 to 1. PTN RAI 02.05.01-17

The cross sections indicate that geologic contacts beneath the site are relatively flat and undeformed. This stratigraphy reflects the environment of deposition and subsequent erosion of the paleosurface. The flat and undeformed nature of the geologic contacts is reflected in the isopach maps of the Key Largo Limestone (Figure 2.5.1-342) and the Fort Thompson Formation (Figure 2.5.1-344) that indicate a relatively uniform thickness across the site with no abrupt changes. The structure contour maps of the top of the Key Largo Limestone (Figure 2.5.1-349) and the Fort Thompson Formation (Figure 2.5.1-343) show a relatively flat paleosurface. Boring logs and descriptions of the lithology are included in the geotechnical data report in Reference 708. Section 5.3 of Appendix 2.5AA provides a discussion of the isopach and structure contour maps and reasons for concluding that they provide no strong evidence for the presence of large collapse features in the Key Largo Limestone or Fort Thompson Formation at the site.

2.5.1.2.3 Site Area Structural Geology

This subsection provides a review of the structural setting from published maps and literature and the Units 3 & 4 UFSAR (Reference 712), which is supplemented by new information from the 2008 geologic mapping and exploration program performed as part of this Investigation. The site lies on the stable Florida carbonate platform; no faults or folds are mapped within more than 25 miles (40 kilometers) (Figure 2.5.1-331). New data include geologic mapping and bedding attitudes interpreted from lithologic contacts in boreholes. Taken together, these data indicate generally flat, planar bedding in Pleistocene and older units and an absence of geologic structures within the site area.

The site area geologic and surficial maps and cross sections (Figures 2.5.1-335, 2.5.1-334, 2.5.1-337, 2.5.1-338, 2.5.1-339, 2.5.1-340, and 2.5.1-341) present basic structural information. Figure 2.5.1-343 is a structure contour map of the top of the late Pleistocene Fort Thompson Formation. Isopach maps of the Key Largo Limestone and the Fort Thompson Formation are also shown in Figures 2.5.1-342 and 2.5.1-344. Geologic field reconnaissance was performed to verify general structural interpretations presented in literature describing southern Florida and observations of that work are presented herein. The reconnaissance effort generally increased with increasing proximity to the site.

The entire site area was inspected using both pre-construction (1940 black-and-white stereo pairs) and more recent (1999 color infrared and 2004 true color) 1:40,000-scale aerial photography acquired from the USGS and the FDEP. Interpretations of the photographs did not identify any structural features to be studied further within the site area. Field reconnaissance within the site area included detailed geologic mapping of the site and inspection of available outcrops of Miami Limestone along the banks of the cooling canals. The late Pleistocene Miami Limestone underlies the entire site area, and is mapped at the surface throughout large portions of southern Florida (Figure 2.5.1-331). However, this unit rarely crops out and is often covered by recent unconsolidated soil or other deposits (Figure 2.5.1-337). The portions of the site that have not been disturbed by the construction of cooling canals are covered by a thin (roughly 2- to 6-foot or 0.6- to 1.8-meter thick) veneer of organic-rich mud and silt, generally referred to as organic muck (Figure 2.5.1-334). Field reconnaissance, a review and interpretation of aerial photography, a review of published literature, and an analysis of the results of the subsurface exploration (Reference 708) did not reveal any evidence for tectonic deformation within the site vicinity or site area. No folds, fractures, faults, or geomorphic features indicative of faulting, or other tectonic structures have been observed or mapped (Figures 2.5.1-331, 2.5.1-335, 2.5.1-334, 2.5.1-337, 2.5.1-338, 2.5.1-339, 2.5.1-340, and 2.5.1-341) in the site vicinity or site area.

Regional structural information from borings across southern Florida indicates that Cretaceous to Pleistocene strata are generally flat-lying or have shallow dips (<1°) that likely reflect paleotopography (References 257, 713, and 714) (Figures 2.5.1-259 and 2.5.1-260). For example, the base of the Fort Thompson Formation has a dip of 0.06° to the southeast in the vicinity of the existing cooling canals (from Reference 715). Data presented in Figures 2.5.1-338, 2.5.1-339, 2.5.1-340, and 2.5.1-341 and Reference 708 confirm that planar, undisturbed bedding persists beneath the site. Based upon local boring data, vertical relief of several feet is found in the contact of the Miami Limestone with the underlying Key Largo Limestone in the site vicinity. However, upon examination during the field reconnaissance, this relief is considered to be a primary sedimentary feature related to the reef origin of the Key Largo Limestone and not due to tectonic or non-tectonic deformation. Field reconnaissance, a review and interpretation of aerial photography, a review of published literature, and an analysis of the results of the subsurface exploration (Reference 708) indicate that the Miami Limestone and older strata are consistently oriented and are not measurably offset or deformed by faulting within the site area (Figures 2.5.1-335, 2.5.1-334, 2.5.1-337, 2.5.1-338, 2.5.1-339, 2.5.1-340, and 2.5.1-341).

Additionally, previous site and regional investigations (References 712 and 715) and work performed as part of this COL Application have identified no systematic jointing patterns within bedrock underlying the site area. Geologic field reconnaissance also included inspection of aerial imagery for lineaments and possible hazards within the site area. No lineaments were identified within the site area, other than minor local alignments of the vegetated depressions developed in the organic muck that covers the site (Figure 2.5.3-202). Field reconnaissance, a review and interpretation of aerial photography, a review of published literature, and an analysis of the results of the subsurface exploration (Reference 708) found no geomorphic evidence to suggest differential uplift across any of the lineaments or any structural or stratigraphic evidence to suggest lateral displacement across any of the lineaments. These lineaments are interpreted as tidally influenced channels (see description in Subsection 2.5.3.2 and Figures 2.5.1-335, 2.5.1-334, 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) and do not correlate with any potential joints, folds, faults, or other structures within the site area.

2.5.1.2.4 Site Geologic Hazards

Examination of the Units 6 & 7 site area has provided no evidence of active tectonic features, no known tsunami deposits, no evidence for seismically induced paleoliquefaction features or other indicators of paleoseismic activity, and no known sinkholes in the underlying karst terrane. No piercement-type salt domes are located within the site vicinity. The nearest salt dome is approximately 220 miles (350 kilometers) southeast of Units 6 & 7 site along Cuba's northern coast (Reference 430). Evaluation of seismic hazards in the site region and beyond is discussed in this subsection and in Subsections 2.5.2 and 2.5.3. This subsection provides further discussion of efforts to identify dissolution features at the site area as well as any tsunami-related features within the site region.

Twichell et al. (Reference 320) conclude that large landslides related to the upward migration of salt along normal faults may be the cause of increased activity of small earthquakes in this area, and these earthquakes along with oversteepening of the sea floor due to salt movement could lead to repeated slope failures.

Dissolution Features

Subsection 2.5.1.1.1.1.1.1 describes the three main types of sinkholes common to Florida as defined by Sinclair and Stewart (Reference 264). Also, as described

in Subsection 2.5.1.1.1.1.1.1, the FGS classifies sinkhole occurrences into four type areas, Area I through Area IV (Figure 2.5.1-222).

The Units 6 & 7 site is located in Area I, where sinkholes, if they occur, are typically solution sinkholes. Their gradual development is explained by the relatively slow rate at which limestone dissolution and removal occurs. The maximum rate of wall retreat in limestone is estimated to be on the order of 0.04 inches (1.02 millimeters) per year (Reference 716). The maximum potential dissolution for the Lower Suwannee River Basin in Florida, which is located approximately 300 miles (480 kilometers) northwest of the site, is calculated to be less than 0.002 inches (0.05 millimeters) per year (Reference 717). Thus, active dissolution of limestone at the site is not considered to present a geologic hazard.

While large cavities and collapses are not expected in Area I, which includes the Units 6 & 7 site, localized factors can influence whether or not cavities and the potential for collapse exist. Catastrophic collapse is not known to occur in southern Florida. In addition to the fact that cavities in this area are generally small, a stress mechanism, such as a rising or falling water table, is necessary to trigger the collapse of overburden into preexisting cavities that may have taken long periods of time to form (Reference 719). Such a natural triggering mechanism is not prevalent in south Florida because the water table is generally very close to the surface with little fluctuation.

According to Renken et al. (Reference 721), sinkholes and caves have been found in Miami-Dade County only along the Atlantic Coastal Ridge, where limestone is present at a relatively high elevation, extending southward from south Miami toward Everglades National Park (Figure 2.5.1-217). The Atlantic Coastal Ridge is up to 50 feet (15 meters) high and trends north-northeast to south-southwest into the site vicinity (Reference 265). Further discussion of the Atlantic coastal ridge is found in Subsection 2.5.1.1.1.1. Parker et al. (Reference 722) state that the Miami Limestone and Fort Thompson Formation have significant permeability and solution features that have created turbulent flow conditions in some wells. According to Cunningham et al. (Reference 723), topographic relief related to karst dissolution is well documented in the Lake Belt area of north-central Miami-Dade County approximately 17 miles (27 kilometers) northwest of Units 6 & 7. {These studies contain no suggestion of the presence of buried sinkholes, caverns, or other large-scale underground karst features in the vicinity of the site.} SOF 2.5.1-4

An FGS investigation (Reference 724) concludes that most of Miami-Dade County is underlain by limestone containing solution cavities. PTN RAI 02.05.01-17

PTN RAI 02.05.01-17

Zones of secondary porosity have formed in limestone beneath the site where microkarst features have developed (Subsections 2.4.12.1.3.1 and 2.5.1.2.4). These zones of secondary porosity provide areas of preferential groundwater flow. The microkarst features are thought to have formed by solution enlargement of sedimentary structures when fresh groundwater formerly flowed from inland areas, mixed with sea water, and facilitated dissolution as it flowed through the zone to the sea. The zones of secondary porosity can be subdivided into two categories: touching-vug porosity and moldic porosity.

The two zones of secondary porosity were identified at the site following review of the geophysical logs, the geotechnical boring logs, and the shear wave velocity logs. In general, the zones of secondary porosity were identified based on increases in borehole diameter on the caliper logs, darkened areas on the acoustic televiewer images, typically lower P-S wave velocity values, rod drops, and in the case of touching-vug porosity, loss of drilling fluid circulation. Figures 2.5.1-351, 2.5.1-352, and 2.5.1-353 show the approximate locations of the two zones of secondary porosity on three example-boring logs, B-604 (DH), B-608 (DH), and B-710 G (DH), and their locations at the Turkey Point Units 6 & 7 site are shown on Figures 2.5.1-228 and 2.5.4-202. Figures 2.5.1-351, 2.5.1-352, and 2.5.1-353 were compiled using the lithology, caliper, natural gamma, acoustic televiewer, and velocity (*Vs* and *Vp)* logs.

Recent studies by Cunningham et al. (References 404 and 723) suggest vuggy porosity is common within the Biscayne Aquifer (Miami Limestone, Key Largo Limestone, and Fort Thompson Formation) and that typical solution features associated with the touching-vug porosity include solution-enlarged fossil molds up to pebble size, molds of burrows or roots, irregular vugs surrounding casts of burrows or roots, and bedding plane vugs. Cunningham et al. (Reference 404) show images of vugs in the Miami Limestone and Fort Thompson Formation, with cavernous vugs approximately 4 feet in height (Figure 2.5.1-385). The results of extensive site investigation for Turkey Point Units 6 & 7 (Subsections 2.5.1.2.2 and 2.5.4.2.2, and Reference 708) offer no evidence that karstification of the area has developed cavernous limestone with the potential for collapse and formation of sinkholes.

Touching-vug porosity occurs on the site within the approximate depth interval of 20 to 35 feet (Figures 2.5.1-351, 2.5.1-352, and 2.5.1-353) near the contact of the Miami Limestone and Key Largo Limestone (the "Upper Zone" of secondary porosity discussed in Subsection 2.4.12.1.4). Because the elevation of ground surface at the site is approximately 0 feet NAVD 88 (Reference 708), this depth interval corresponds approximately to -20 to -35 feet NAVD 88. The origin of this

porosity is solution enlargement of burrows, inter-burrow vugs, moldic fossils, root molds, and vugs between root casts (References 404, 723, and 969). These structures are sufficiently numerous and closely spaced to form a laterally continuous zone of interconnected voids. Results of drilling and coring within the zone of touching-vug porosity during the site subsurface investigation have shown the feature to be laterally persistent, generally of centimeter scale, with very few indications of possible larger voids such as a rod drop. PTN RAI 02.05.01-17

Moldic porosity occurs in pockets within the approximate depth interval of 60 to 75 feet (-60 to -75 feet NAVD 88) (Figures 2.5.1-351, 2.5.1-352, and 2.5.1-353) in the Fort Thompson Formation and forms the "Lower Zone" of secondary porosity discussed in Subsection 2.4.12.1.4. The origin of this feature is preferential dissolution of fossil shells and other organic structures rather than the matrix rock within which they are contained, resulting in void spaces of generally centimeter scale within molds of the structures (References 404, 723, and 969). Results of drilling and coring within the zone of moldic porosity during the site subsurface investigation have shown the feature not to be laterally persistent but occurring in isolated sandy pockets with very few indications of possible larger voids such as a rod drop.

As seen from the cores taken during the subsurface investigation and photos of the cores (Reference 708), the potential origin of the touching-vug porosity within the upper zone is associated with original reef structure and, based on Cunningham et al. (References 404 and 723), solution enlargement. The potential origin of the lower zone of secondary porosity is moldic porosity resulting from dissolution on in situ bivalve shells.

As further discussed in Appendix 2.5AA, dissolution of the limestone in the upper zone of secondary porosity likely occurred during the Wisconsinan glacial stage of the Pleistocene Epoch when sea level was lower than during the preceding interglacial stages when the Miami Limestone and Key Largo Limestone were formed (Figures 2.5.1-372 and 2.5.1-373) and fresh groundwater from the Everglades mixed with seawater and discharged through the zone to the sea. The coralline vugs within the Key Largo Limestone typically exhibit evidence of precipitation of secondary minerals such as calcite (Subsection 2.5.1.2.2). This finding suggests that the environment within the Upper Zone of secondary porosity is currently one dominated by deposition rather than solution. The position of the freshwater/saltwater interface is approximately 6 miles (9.6 kilometers) inland from the site (Figure 2.4.12-207), groundwater within the zone of touching-vug porosity is saline (Table 2.4.12-210 and 2.4.12-211), the long-term sea level rise trend at Miami Beach, Florida, as estimated based on data LDP-CS564

from 1931 to 1981, is 0.78 foot (0.2 meter) per century (Subsection 2.4.5), and there is no freshwater shoreline flow near the site. Therefore, a freshwater/saltwater mixing zone that would promote further dissolution of the limestone within the zone of touching-vug porosity does not now exist and development of large underground caverns with the potential for collapse is not likely within this Upper Zone of secondary porosity. Further, this zone will be completely removed during excavation of the nuclear island foundations (Subsection 2.5.4.5.1). PTN RAI 02.05.01-17

Dissolution of the limestone in this zone of secondary porosity likely occurred during the early to mid-Pleistocene Epoch when sea level fluctuated to a level lower than when the Fort Thompson Limestone was formed and fresh groundwater from inland areas discharged through the formation toward the sea. As noted previously, the position of the freshwater/saltwater interface is approximately 6 miles (9.6 kilometers) inland from the site (Figure 2.4.12-207), groundwater within the zone of moldic porosity is saline (Table 2.4.12-210 and 2.4.12-211), the long-term sea level rise trend at Miami Beach, Florida, as estimated based on data from 1931 to 1981, is 0.78 foot (0.2 meter) per century (Subsection 2.4.5), and there is no freshwater shoreline flow near the site. Therefore, a freshwater/saltwater mixing zone that would promote further dissolution of the limestone within the zone of moldic porosity does not now exist and development of large underground caverns with the potential for collapse is not likely within this Lower Zone of secondary porosity. LDP-CS564

While touching-vug and moldic porosity similar to that noted by Cunningham et al. (References 404 and 723) and Lucia (Reference 969) occur at the Turkey Point Units 6 & 7 site, it should be noted that only occasional small rod drops were noted in 6 out of the 88 boreholes and approximately 2745 meters (9000 feet) of rock coring (Subsections 2.5.1.2.4, 2.5.4.1.2.1 and 2.5.4.4.5.5) (Table 2.5.1-208). A "rod drop" occurs when, while drilling, the bit encounters a relatively soft zone or void and the drill head and rod string suddenly advances at a rate much faster than the rate when drilling the overlying more competent material. A rod drop can also occur during an SPT when the weight of the string of drill rods is sufficient to advance the SPT sampler at the bottom of the borehole without additional blows of the sampling hammer. The occurrence of a rod drop indicates the presence of very soft or very loose material, which can be interpreted as void or cavity infill or as inter-bedded materials with substantially different hardness or compactness. Alternatively, a rod drop could indicate that the drill or sampler might have penetrated a cavity that is only partially filled with soft or loose material. LDP-CS564

Groundwater levels monitored in onsite observation wells indicate a consistent site-wide upward vertical flow potential within the Biscayne Aquifer

(Table 2.4.12-204). The geotechnical logs of the boreholes in which the rod drops occurred indicate that, except for the two drops that occurred in the Miami Limestone, the drops occurred as the drill or sampler advanced from relatively competent rock into a more sandy zone. In this situation, the upward hydrostatic head within the aquifer may have caused an upward blowout of the sand into the borehole when the confining layer above the sand was breached. The rod drops may have occurred not because the drill or sampler encountered very soft or very loose material indicative of void infill, but because liquefaction of the sand in the blowout zone reduced its bearing capacity to less than the down-pressure on the drill or the weight of the rod string. PTN RAI 02.05.01-17

Despite the presence of the aforementioned upper and lower zones of secondary porosity, the number and magnitude of rod drops that occurred during drilling were negligible, as described in Subsection 2.5.4.1.2.1. It can be noted that each of the 88 geotechnical borings drilled in support of the detailed site subsurface investigation was advanced to a minimum depth of 30.5 meters (100 feet), with many drilled to 45.7 meters (150 feet) or more, and none encountered large paleokarst sinkholes or large open voids. Boring logs (Reference 708) indicate the:

- 0.9-meter (3-foot) drop in B-805 occurred within the Miami Limestone.
- 0.6-meter (2-foot) drop in B-637 occurred within the Miami Limestone.
- One rod drop in each of borings B-738, B-811, and B-814 occurred in sandy zones in the Fort Thompson Formation.
- 0.3-meter (1-foot) drop in B-714 occurred at the base of the Fort Thompson Formation immediately before penetrating the sands of the Tamiami Formation.

No rod drops occurred in the nuclear island footprint of either Unit 6 or Unit 7. Two of the rod drops occurred within the Miami Limestone (B-637 and B-805), which will be completely removed beneath the nuclear islands. Boring B-714 is located in the footprint of the Unit 7 annex building and the rod drop in this boring might have been due to the process of drilling from the hard limestone of the Fort Thompson Formation into the underlying silty sand of the Tamiami Formation (Table 2.5.1-210, Figure 2.5.1-378).

Cavities observed during rock core operations were relatively small. The overall data collected during the Units 6 & 7 subsurface investigations are consistent with

a communication with the FGS, which indicates that dissolution present in the site area is generally considered to be microkarst with numerous small cavities. This information is consistent with investigations by Cunningham (References 404 and 723) in the Biscayne Aquifer in southeastern Florida. PTN RAI 02.05.01-17

An investigation of small surface depressions identified within the site (Figure 2.5.1-333) and site area is discussed in Subsection 2.5.3. The UFSAR for Turkey Point Units 3 & 4 concludes that "[s]uch depressions are not sinkholes associated with collapse above an underground solution channel, but rather potholes, which are surficial erosion or solution features" (Reference 712). These solution potholes are not expected to form large voids beneath the surface that would pose a hazard to the site (Reference 264).

An integrated geophysical survey focused on the Units 6 & 7 power block area and the small surface depressions identified within the site is discussed in Subsection 2.5.4.4.5. Based on an integrated interpretation of the boring data (Subsection 2.5.4.1.2.1) and the integrated site geophysical survey data, there is no apparent evidence for sinkhole hazards or for the potential of surface collapse due to the presence of large underground openings. The origin and significance of the surface depressions as well as the interpretation of the geophysical survey data are discussed further in Appendix 2.5AA. The locations of the vegetated depressions correlate well with results of the geophysical surveys (Figures 2.5.4-223 and 2.5.4-228). Soft zones within the Miami Limestone indicated by relatively low SPT "N" values recorded in logs of soil borings drilled on the geophysical survey lines correlate well with low-gravity anomalies, suggesting that the gravity anomalies identify areas of soft rock rather than large subsurface voids. LDP-CS564

The MASW data indicate that the vegetated depressions at the site are underlain by continuous Key Largo Formation (Figures 2.5.4-227 and 2.5.4-241). These two figures show MASW data along survey lines 9 and 10 that intersect at a prominent vegetated depression. Within the limits of survey resolution, the microgravity data do not indicate the presence of large subsurface voids. To address uncertainties in the resolution of the geophysical data away from survey lines and at depth beneath the foundation, a microgravity survey will be conducted at the base of the Unit 6 and Unit 7 nuclear island excavations (Subsection 2.5.4.4.5). LDP-CS564

What can be interpreted as karst or sinkhole-like features similar to the small surface depressions on site have been noted in aerial photographs of the nearby portion of Biscayne Bay (Appendix 2.5AA). The Bay has been modified and dredged and has an average water depth that ranges from 6 to 13 feet

PTN RAI 02.05.01-17

(Reference 991). Assuming the water level in the bay is 0 feet NAVD 88, the bottom of the bay ranges in elevation from approximately -6 to -13 feet NAVD 88. According to Reich et al. (Reference 992), sediments overlying bedrock in the bay range in thickness from less than 6 inches to 30 feet. Using this information and the elevations of the bottom of the bay, the elevation of the bedrock surface within which the "karst/sinkhole-like features" occur on the floor of the bay (or alternatively the "vegetated depressions," "local depressions," and "potholes" described in Subsection 2.5.3) ranges from -6.5 to -43 feet NAVD 88. The Upper Zone of secondary porosity within the Biscayne Aquifer is located near the contact of the Miami Limestone and Key Largo Limestone at an approximate elevation of -28 feet NAVD 88 (Subsection 2.5.1.2.4). The Lower Zone of secondary porosity is located within the Fort Thompson Formation at an approximate elevation of -65 feet NAVD 88 (Subsection 2.5.1.2.4). Based on site stratigraphic data (Subsection 2.5.1.2.2), the units are relatively flat and it appears that the Upper Zone of secondary porosity at the Turkey Point Units 6 & 7 site occurs within the stratigraphic interval within which the "karst/sinkhole-like features" occur on the floor of Biscayne Bay. That level is the stratigraphic interval of the Miami Limestone and Key Largo Limestone (Figure 2.5.1-332). Results of the site subsurface investigation (Reference 708) have demonstrated the absence of large solution cavities at this stratigraphic interval on the site.

While the touching-vug porosity exhibited in the Upper Zone of secondary porosity and the "karst/sinkhole-like features" on the bottom of Biscayne Bay may be in the same stratigraphic interval, the formation of these dissolution features is somewhat different. Dissolution features such as vugs are typically post-depositional features that occur in a freshwater phreatic system in which groundwater has filled open spaces and causes dissolution. The "karst/ sinkhole-like features" on the bottom of the bay appear to be paleo-dissolution features that formed during the Wisconsinan (most recent) glacial stage of the Pleistocene when sea level was approximately 100 meters (328 feet) lower than the modern ocean (Reference 262) and at an elevation favorable for dissolution by rainwater of subaerial limestone in what is now the bay. More information on the development of the "karst/sinkhole-like features" on the bottom of Biscayne Bay is provided in Appendix 2.5AA and in the following paragraph, together with a summary of the evolution of the bay.

The process of limestone deposition in Florida was variable during the Pleistocene Epoch due to fluctuations in glacial runoff and the corresponding sea level. The Sangamon interglacial corresponds to the Q5e interglacial stage that occurred between approximately 125,000 and 75,000 thousand years ago

(Reference 928). During this time, sea level rose globally and in Florida resulted in an increase in marine carbonate deposition. Sea level was approximately 20 feet higher than today (References 993 and 994) and covered the entire Florida peninsula south of Lake Okeechobee (Reference 994). The marine sediments (i.e. the Miami Limestone and Key Largo Limestone) that accumulated during the Sangamon and the previous interglacial high sea level stands (Reference 928) were lithified and their depositional morphology preserved. Two elongated sediment ridges that formed the Key Largo Ridge and the Atlantic Coastal Ridge resulted in the limestone basin that is now filled by Biscayne Bay, Card Sound, and Barnes Sound. PTN RAI 02.05.01-17

During lower sea level stands of the Wisconsinan glacial stage, the Florida platform became emergent (sea level was approximately 100 meters (328 feet) lower than today) and the sea floor of Biscayne Bay was exposed (Reference 262). The exposed sea floor of the Bay was altered by rainwater. Dissolution, re-precipitation, and vegetative soil formation cemented the calcareous surface and slowly produced a very hard reddish limestone "soil crust" over the surface. Carbonate dissolution resulting from infiltration of rain water produced solution holes and pipes into the underlying limestone and solution-hole drainage, in particular dendritic drainage patterns, developed on the limestone of Biscayne Bay and its vicinity, including the Turkey Point Units 6 & 7 site. This process of surface dissolution ended in Biscayne Bay when sea level rose and flooded the Bay but continued on emergent areas, including the Turkey Point Units 6 & 7 site. The depositional morphology and paleo-dissolution morphology resulting from the Sangamon interglacial high sea level stand and Wisconsinan glacial low sea level stand are preserved on the sea floor of Biscayne Bay (References 993 and 994).

The position of the freshwater/saltwater interface is approximately 6 miles inland from the bay in the vicinity of the site (Figure 2.4.12-207), groundwater beneath the site is saline (Tables 2.4.12-210 and 2.4.12-211), sea level is rising (Subsection 2.4.5.2.2.1), and there is no fresh groundwater shoreline flow near the site. Therefore, a freshwater/saltwater mixing zone that would promote further dissolution of the limestone underlying the Turkey Point Units 6 & 7 site or the dissolution features on the floor of Biscayne Bay does not exist. These features on the floor of Biscayne Bay do not appear to have the capacity for development of large underground caverns with the potential for collapse and formation of sinkholes. LDP-CS564 LDP-CS564

Volcanism

Based on the absence of Holocene volcanic features in the site region, no volcanic activity is anticipated in the site vicinity. The closest active volcano is found in on Utila Island off the northwest coast of Honduras, about 750 miles (1200 kilometers) southwest of the Units 6 & 7 site. Active volcanoes are also found in the Lesser Antilles. Soufrière Hills on the island of Monserrat is the closest currently active volcano, located about 1300 miles (2100 kilometers) from the Units 6 & 7 site. Pliocene-Quaternary basaltic flows from volcanic structures are well documented in southern Haiti immediately north of the Saumatre Lake and in the Dominican Republic north of the San Juan Valley. These rocks have been dated at 1 ± 0.5 Ma by K/Ar methods and may be younger (References 816 and 818).

2.5.1.2.5 Site Area Engineering Geology Evaluation

Subsection 2.5.1.2.5 addresses engineering soil properties and behavior of foundation materials in Subsection 2.5.1.2.5.1; zones of alteration, weathering, dissolution, and structural weakness in Subsection 2.5.1.2.5.2; prior earthquake effects in Subsection 2.5.1.2.5.3; and effects of human activities in Subsection 2.5.1.2.5.4. Further discussions on earthquake effects are found in Subsection 2.5.2. Additional discussions on soil properties and foundation materials are in Subsection 2.5.4.

2.5.1.2.5.1 Engineering Soil Properties and Behavior of Foundation Materials

Engineering soil properties, including index properties, static and dynamic strength, and plasticity and compressibility are described in Subsection 2.5.4. {The foundation bearing strata will be evaluated and geologically mapped as the subgrade excavation is completed to confirm that the observed properties are consistent with those used in the design and that any deformation features discovered during construction do not have the potential to compromise the safety of the plant. The NRC staff will be notified when Seismic Category I excavations are open for construction.} COM 2.5.1-1

2.5.1.2.5.2 Zones of Alteration, Weathering, Dissolution, and Structural Weakness

Field reconnaissance, a review and interpretation of aerial photography, a review of published literature, and an analysis of the results of the subsurface exploration (Reference 708) found no unusual zones of alteration, weathering profiles, or structural weakness in the surface or subsurface. Subsection 2.5.3 describes an

investigation of small surface depressions in the site area that are due to surficial limestone dissolution.

In addition, Subsection 2.5.4.4.5 describes an integrated geophysical survey that focused on the Units 6 & 7 power block areas to further evaluate the potential for carbonate dissolution features occurring at the site. {Any noted desiccation, dissolution, weathering zones, joints, or fractures will be evaluated and mapped as the subgrade excavation is completed to confirm that the mapped characteristics, such as fracture frequency, are consistent with the borehole data used in the design.} COM 2.5.1-1

2.5.1.2.5.3 Prior Earthquake Effects

A ground and aerial field reconnaissance investigation were conducted in 2008 and a literature review was conducted through the middle of 2010 to identify potential earthquake-related deformation at the site. These investigations included a review of aerial photography to evaluate anomalous features including depressions, topographic highs, and lineaments. The geologic and geomorphic study found no evidence for active folding or faulting or other past earthquake activity. No features were identified during this investigation that may be related to earthquake-induced ground shaking, including liquefaction-related sand blows or lateral spread fractures. The field reconnaissance augmented and verified aspects of previous geologic maps and publications by the USGS, the FGS, and other researchers. These investigations have recognized no geomorphic, stratigraphic, or other features indicating recent tectonic deformation within the site vicinity. In addition to this field reconnaissance, a review and interpretation of aerial photography, a review of published literature, and an analysis of the results of the subsurface exploration (Reference 708) (Figures 2.5.1-335, 2.5.1-334, 2.5.1-337, 2.5.1-338, 2.5.1-339, 2.5.1-340, and 2.5.1-341) that were found no evidence of past earthquake activity or liquefaction-related features within the site area or site vicinity.

2.5.1.2.5.4 Effects of Human Activities

The anthropogenic effects in southeastern Florida of urban development, water mining, limestone mining, oil and gas development, agriculture, and construction of drainage canals have affected the regional groundwater table and associated saltwater intrusion. For example, about 208 Mgal/d of treated municipal sewage was injected into the Lower Floridan aquifer, at or below the Boulder Zone, during 1988 (References 747 and 748). There are no indications that the groundwater

table has been affected at the site due to those activities. Subsection 2.4.12 contains a more detailed description of the groundwater characteristics.

No oil, gas, or metallic mineral resources have been reported in the site area. There is no present mining or excavation of nonmetallic mineral resources within the site area. The closest quarrying activities are located 8 miles (13 kilometers) from the site. No oil or gas production activities occur within the site or site area. Some oil and gas exploration has been performed in southern Florida, and approximately six dry holes were drilled within the site vicinity (Reference 373).

2.5.1.3 References

201. Wilson, J., *A New Class of Faults and Their Bearing on Continental Drift*, Nature, Vol. 207, pp. 343–347, 1965.

202. Neuendorf, K., J. Mehl, and J. Jackson, *Glossary of Geology*, 5th ed., p. 779, American Geological Institute, Alexandria, Virginia, 2005.

203. Hoffman, P., *Did the Breakout of Laurentia Turn Gondwana Inside-Out?* Science, Vol. 252, pp. 1409–1412, 1991.

204. Rogers, J., and M. Santosh, *Chapter 8: Gondwana and Pangea*, Continents and Supercontinents, Oxford University Press, pp. 114–130, 2004.

205. Hatcher, R., W. Thomas, P. Geiser, A. Snoke, S. Mosher, and D. Wiltschko, *Alleghanian Orogen*, The Geology of North America, Vol. F-2, The Appalachian-Ouachita Orogen, Geological Society of America, 1989.

206. Dallmeyer, R., *$^{40}Ar/^{39}Ar$ Age of Detrital Muscovite within Lower Ordovician Sandstone in the Coastal Plain Basement of Florida: Implications for West African Terrane Linkages*, Geology, Vol. 15, No. 11, pp. 998–1001, 1987.

207. Thomas, W., T. Chowns, D. Daniels, T. Neathery, L. Glover, and R. Gleason, *The Subsurface Appalachians Beneath the Atlantic and Gulf Coastal Plains*, The Geology of North America, Vol. F-2, The Appalachian-Ouachita Orogen in the United States, Geological Society of America, 1989.

208. Bartok, P., *Prebreakup Geology of the Gulf of Mexico-Caribbean: Its Relation to Triassic and Jurassic Rift Systems of the Region*, Tectonics, Vol. 12, pp. 441–459, 1993.

209. Thomas, W., *Tectonic Inheritance at a Continental Margin - 2005 GSA Presidential Address, GSA Today*, Vol. 16, No. 2, pp. 4–11, Geological Society of America, 2006.

210. Pindell, J., and J. Dewey, *Permo-Triassic Reconstruction of Western Pangea and the Evolution of the Gulf of Mexico/Caribbean Region*, Tectonics, Vol. 1, pp. 179–211, 1982.

211. Salvador, A., *Triassic-Jurassic*, The Geology of North America, Vol. J, *The Gulf of Mexico Basin*, pp. 131–180, Geological Society of America, Boulder, Colorado, 1991.

212. Klitgord, K., P. Popenoe, and H. Schouten, *Florida: A Jurassic Transform Plate Boundary*, Journal of Geophysical Research, Vol. 89, pp. 7753–7772, 1984.

213. Gohn, G., *Late Mesozoic and Early Cenozoic Geology of the Atlantic Coastal Plain: North Carolina to Florida*, The Geology of North America, Vol. I-2, The Atlantic Continental Margin, U.S., Geological Society of America, 1988.

214. Pindell, J., S. Cande, W. Pitman, D. Rowley, J. Dewey, J. Labrecque, and W. Haxby, *A Plate-Kinematic Framework for Models of Caribbean Evolution*, Tectonophysics, Vol. 155, pp. 121–138, 1988.

215. Not Used.

216. Blein, O., S. Guillot, H. Lapierre, B. Mercier de Lepinay, J. Lardeaux, M. Trujillo, M. Campos, and A. Garcia, *Geochemistry of the Mabujina Complex, Central Cuba: Implications on the Cuban Cretaceous Arc Rocks*, Journal of Geology, Vol. 111, pp. 89–101, 2003.

217. Lewis, J., and G. Draper, *Geology and Tectonic Evolution of the Northern Caribbean Margin*, The Geology of North America, Vol. H, The Caribbean Region, Geological Society of America, 1990.

218. Schneider, J., D. Bosch, P. Monie, S. Guillot, A. Garcia-Casco, J. Lardeaux, R. Luis Torres-Roldan, and M. Trujillo, *Origin and Evolution of the Escambray Massif (Central Cuba): An Example of Hp/Lt Rocks Exhumed during Intraoceanic Subduction*, Journal of Metamorphic Geology, Vol. 22, 2004.

219. Pindell, J., and S. Barrett, *Geologic Evolution of the Caribbean: A Plate Tectonic Perspective*, The Geology of North America, Vol. H, The Caribbean Region, pp. 405–432, Geological Society of America, 1990.

220. Bralower, T., and M. Iturralde-Vinent, *Micropaleontological Dating of the Collision between the North American Plate and the Greater Antilles Arc in Western Cuba*, Palaios, Vol. 12, pp. 133–150, 1997.

221. Denny, W., J. Austin, and R. Buffler, *Seismic Stratigraphy and Geologic History of Middle Cretaceous through Cenozoic Rocks, Southern Straits of Florida*, American Association of Petroleum Geologists, AAPG Bulletin, Vol. 78, pp. 461–487, 1994.

222. Rosencrantz, E., M. Ross, and J. Sclater, *Age and Spreading History of the Cayman Trough as Determined from Depth, Heat Flow, and Magnetic Anomalies*, Journal of Geophysical Research, Vol. 93, pp. 2141–2157, 1988.

223. Florida Geological Survey, *Hydrogeological Units of Florida*, Special Publication 28, Compiled by Southeastern Geological Society Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1986.

224. Not Used.

225. Not Used.

226. Monechi, S., Preface, in S. Monechi, R. Coccioni, and M. Rampino, (eds.), *Large Ecosystem Perturbations: Causes and Consequences*, Geological Society of America, Special Paper 424, 2007.

227. Thomas, E., *Cenozoic Mass Extinctions in the Deep Sea: What Perturbs the Largest Habitat on Earth?,* S. Monechi, R. Coccioni, and M. Rampino (eds.), Large Ecosystem Perturbations: Causes and Consequences, Geological Society of America, Special Paper 424, pp. 1–23, 2007.

228. Anselmetti, F., G. Eberli, and Z. Ding, *From the Great Bahama Bank into the Straits of Florida: A Margin Architecture Controlled by Sea-Level Fluctuations and Ocean Currents*, Geological Society of America, GSA Bulletin, Vol. 112, No. 6, pp. 829–844, 2000.

229. Mullins, H. and A. Neumann, *Deep Carbonate Bank Margin Structure and Sedimentation in the Northern Bahamas*, L. Doyle and O. Pilkey (eds.),

Geology of Continental Slopes: Society of Economic Paleontologists and Mineralogists, Special Publication 27, pp. 165–192, 1979.

230. Mullins, H., A. Neumann, R. Wilber, A. Hine, and S. Chinburg, *Carbonate Sediment Drifts in the Northern Straits of Florida*, American Association of Petroleum Geologists Bulletin, Vol. 64, pp. 1701–1717, 1980.

231. Brunner, C., *Deposition of a Muddy Sediment Drift in the Southern Straits of Florida during the Quaternary*, Marine Geology, Vol. 69, pp. 235–249, 1984a.

232. Brunner, C., *Evidence for Increased Volume Transport of the Florida Current in the Pliocene and Pleistocene*, Marine Geology, Vol. 54, pp. 223–235, 1984.

233. Kaneps, A., *Gulf Stream: Velocity Fluctuations During the Late Cenozoic*, Science, Vol. 204, pp. 297–301, 1979.

234. Pinet, P., and P. Popenoe, *A Scenario of Mesozoic-Cenozoic Ocean Circulation Over the Blake Plateau and Its Environs*, Geological Society of America Bulletin, Vol. 96, pp. 618–626, 1985.

235. Richardson, W., W. Schmitz, and P. Niiler, *The Velocity Structure of the Florida Current from the Straits of Florida to Cape Fear*, Deep-Sea Research, Vol. 16, pp. 225–231, 1969.

236. Droxler, A., K. Burke, A. Cunningham, A. Hine, E. Rosencrantz, D. Duncan, P. Hallock, and E. Robinson, *Caribbean Constraints on Circulation between Atlantic and Pacific Oceans Over the Past 40 Million Years*, T. Crowley and K. Burke (eds.), Oxford Monographs on Geology and Geophysics, No. 39, Tectonic Boundary Conditions for Climate Reconstructions, New York, Oxford University Press, 1998.

237. Coffin, M., and O. Eldholm, *Large Igneous Provinces: Crustal Structure, Dimensions, and External Consequences*, Reviews of Geophysics, Vol. 32, No. 1, pp. 1–36, 1994.

238. Hall, S., and D. Bird, *Tristan da Cuhna Hotspot Tracks and the Seafloor Spreading History of the South Atlantic*, Eos, Transactions, American Geophysical Union, Vol. 88, Fall Meeting Supplement, V31F-04, 2007.

239. McHone, J., *Volatile Emissions of Central Atlantic Magmatic Province Basalts: Mass Assumptions and Environmental Consequences*, W. Hames, J. McHone, P. Renne, and C. Ruppel (eds.), The Central Atlantic Magmatic Province, American Geophysical Union, Geophysical Monograph 136, pp. 241–254, 2002.

240. Keleman, P., and S. Holbrook, *Origin of Thick, High-Velocity Igneous Crust along the U.S. East Coast Margin*, Journal of Geophysical Research, Vol. 100, No. B7, pp. 10,077–10,094, 1995.

241. McHone, J., and J. Puffer, *Chapter 10: Flood Basalt Provinces of the Pangean Atlantic Rift: Regional Extent and Environmental Significance*, P. LeTourneau and P. Olsen (eds.), The Great Rift Valleys of Pangea in Eastern North America, Vol. 1, pp. 141–154, 2003.

242. Bryan, S., and R. Ernst, *Revised Definition of Large Igneous Province (LIP)*, Earth Science Reviews, Vol. 86, No. 1-4, pp. 175–202, January 2008.

243. Kerr, A. and J. Tamey, *Tectonic Evolution of the Caribbean and Northwestern South America: the Case for Accretion of Two Late Cretaceous Oceanic Plateaus*, Geology, Vol. 33, No. 4, April 2005.

244. Hauff, F., K. Hoernle, G. Tilton, D. Graham, and A. Kerr, *Large Volume Recycling of Oceanic Lithosphere Over Short Time Scales: Geochemical Constraints from the Caribbean Large Igneous Province*, Earth and Planetary Science Letters, Vol. 174, pp. 247–264, 2000.

245. Hoernle, K., F. Hauff, and P. van den Bogaard, *70 M.Y. History (139-69 Ma) for the Caribbean Large Igneous Province*, Geology, Vol. 32, No. 8, pp. 697–700, 2004.

246. Wignall, P., *The Link Between Large Igneous Province Eruptions and Mass Extinctions*, Elements, Vol. 1, pp. 293–297, 2005.

247. Kerr, A., *Oceanic Plateau Formation: a Cause of Mass Extinction and Black Shale Deposition Around the Cenomanian-Turonian Boundary*, Journal of the Geological Society, Vol. 155, pp. 619–626, 1998.

248. Kerr, A., *Oceanic LIPs: the Kiss of Death,* Elements, Vol. 1, pp. 289–292, 2005.

249. Kelley, S., *The Geochronology of Large Igneous Provinces, Terrestrial Impact Craters and Their Relationship to Mass Extinctions on Earth*, Journal of the Geological Society, Vol. 164, 2007.

250. Coffin, M., R. Duncan, O. Eldholm, J. Fitton, F. Frey, H. Larson, J. Mahoney, A. Saunders, R. Schlich, and P. Wallace, *Large Igneous Provinces and Scientific Ocean Drilling: Status Quo and a Look Ahead*, Oceanography, Vol, 19, No. 4, pp. 150–160, 2006.

251. Courtillot, V., and P. Renne, *On the Ages of Flood Basalt Events: Comptes Rendus*, Geoscience, Vol. 335, pp. 113–140, 2003.

252. Zhang, Z., N. Fang, L. Gao, B. Gui, and M. Cui, *Cretaceous Black Shale and the Oceanic Red Beds: Process and Mechanisms of Oceanic Anoxic Events and Oxic Environment*, Frontiers of Earth Science in China, Vol. 2, No. 1, pp. 41–48, 2008.

253. Driscoll, N., and J. Diebold, *Tectonic and Stratigraphic Development of the Eastern Caribbean: New Constraints from Multichannel Seismic Data*, Sedimentary Basins of the World, Vol. 4, Caribbean Basins, pp. 591–626, 1999.

254. Sheridan, R., *Geotectonic Evolution and Subsidence of Bahama Platform: Discussion*, Geological Society of America Bulletin, Vol. 82, pp. 807–810, 1971.

255. Diebold, J., N. Driscoll, and EW-9501-Science Team, *New Insights on the Formation of the Caribbean Basalt Province Revealed by Multichannel Seismic Images of Volcanic Structures in the Venezuelan Basin*, P. Mann (ed.), Sedimentary Basins of the World, Vol. 4, Caribbean Basins, Elsevier Science B.V., Amsterdam, The Netherlands, pp. 561–589, 1999.

256. Stoffa, P., A. Mauffret, M. Truchan, and P. Buhl, *Sub-B Layering in the Southern Caribbean: The Aruba Gap and Venezuela Basin*, Earth and Planetary Science Letters, Vol. 53, pp. 131–146, 1981.

257. Chen, C., *The Regional Lithostratigraphic Analysis of Paleocene and Eocene Rocks of Florida*, American Geophysical Union, Florida Geological Survey, Bulletin 45, 1965.

258. McKinney, M., *Suwannee Channel of the Paleogene Coastal Plain: Support for the 'Carbonate Suppression' Model of Basin Formation*, Geology, Vol. 12, pp. 343–345, 1984.

259. Davis, R., A. Hine, and E. Shinn, *Holocene Coastal Development on the Florida Peninsula*, Quaternary Coasts of the United States - Marine and Lacustrine Systems, SEPM Special Publication 48, pp. 193–212, 1992.

260. Ward, W., P. Ross, and D. Colquhoun, *Interglacial High Sea Levels - An Absolute Chronology Derived from Shoreline Elevations*, Paleogeography, Paleoclimatology, Paleoecology, Vol. 9, pp. 77–99, 1971.

261. Healy, G., *Terraces and Shorelines of Florida*, U.S. Geological Survey, Map Series No. 71, 1975.

262. Adams, P., N. Opdyke, and J. Jaeger, *Isostatic Uplift Driven by Karstificaiton and Sea-Level Oscillation: Modeling Landscape Evolution in North Florida*, Geology, v. 38, no. 6, pp. 531-534, 2010.

263. Mylroie, J., and J. Carew, *Karst Development on Carbonate Islands*, Speleogenesis and Evolution of Karst Aquifers, Vol. 1, No. 2, pp. 1–20, 2003.

264. Sinclair, W., and J. Stewart, *Sinkhole Type, Development, and Distribution in Florida*, U.S. Geological Survey, Map Series No. 110, 1985.

265. White, W., *The Geomorphology of the Florida Peninsula*, Geological Bulletin 51, Florida Bureau of Geology, Florida Department of Natural Resources, 1970.

266. Schmidt, W., *Chapter 1: Geomorphology and Physiography of Florida*, A. Randazzo, and D. Jones (eds.), The Geology of Florida, pp. 57–68, University Press of Florida, Gainesville, Florida, 1997.

267. McPherson, B., and R. Halley, *The South Florida Environment: A Region Under Stress*, U.S. Geological Survey, National Water-Quality Assessment Program, Circular 1134, 1996.

268. Thormbury, W., *Regional Geomorphology of the United States*, John Wiley and Sons, Inc., New York, 1965.

269. Schmalzer, P., S. Boyle, and H. Swain, *Scrub Ecosystems of Brevard County, Florida: A Regional Characterization*, Florida Scientist, Vol. 62, No. 1, pp. 13–47, 1999.

270. Waitley, *Easygoing Guide to Natural Florida: South Florida*, Pineapple Press, Sarasota, Florida, p. 252, 2006.

271. Bryan, J., T. Scott, and G. Means, *Roadside Geology of Florida*, 376 pp., Mountain Press Publishing Company, Missoula, Montana, 2008.

272. Boniol, D., D. Munch, and M. Williams, *Recharge Areas of the Floridan Aquifer in the Crescent City Ridge of Southeast Putnam County, Florida - a Pilot Study*, Technical Publication SJ 90-9, St. Johns River Water Management District, Palatka, Florida, p. 72,1990.

273. Bennett, H., *Soils of the Atlantic and Gulf Coastal Plains Province*, C. Marbut, H. Bennett, J. Lapham, and M. Lapham (eds.), Soils of the United States, U.S. Department of Agriculture Bureau of Soils Bulletin, No. 96, pp. 221–302, 1913.

274. Hoffmeister, J., and H. Multer, *Geology and Origin of the Florida Keys*, Geological Society of America Bulletin, Vol. 79, pp. 1487–1502, 1968.

275. Randazzo, A., and R. Halley, *Chapter 14: Geology of the Florida Keys*, A. Randazzo and D. Jones (eds.), The Geology of Florida, pp. 251–260, University of Florida Press, Gainesville, Florida, 1997.

276. Mitsch, W., and J. Gosselink, *Wetlands*, 4th ed., John Wiley and Sons, Inc., Hoboken, New Jersey, 2007.

277. Palaseanu, M., and L. Pearlstine, *Estimation of Water Surface Elevations for the Everglades, Florida*, Computers and Geoscience, Vol. 34, pp. 815–826, 2008.

278. Brooks, H., *Guide to the Physiographic Divisions of Florida*, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida, 1981.

279. Southwest Florida Regional Planning Council, *Attachment A: Fish and Wildlife Coordination*, Section B.2, Final Caloosahatchee River (C-43) West Basin Storage Reservoir PIR and Final EIS, pp. 23–24, 1995.

280. Not Used.

281. Pirkle, E., W. Yohn, and W. Hendry, *Ancient Sea Level Stands in Florida*, Florida Bureau of Geology Bulletin 52, p. 61, 1970.

282. Walker, H., and J. Coleman, *Atlantic and Gulf Coastal Province*, Geomorphic Systems of North America Centennial, Special Vol. 2, Geological Society of America, 1987.

283. Alt, D., and H. Brooks, *Age of the Florida Marine Terraces*, Journal of Geology, pp. 406–411, 1965.

284. Lichtler, W., *Appraisal of Water Resources in the East Central Florida Region*, U.S. Geological Survey, Report of Investigations 61, p. 52, 1972.

285. Fish and Wildlife Research Institute, *The Cradle of the Oceans: Estuaries*, (Pamplet), Florida Fish and Wildlife Conservation Commission, May 2007.

286. Petuch, E., and C. Roberts, *The Geology of the Everglades and Adjacent Areas*, CRC Press, p. 212, 2007.

287. Lane, E., *Florida's Geological History and Geological Resources*, Florida Geological Survey, Special Publication 35, p. 64, 1974.

288. Deyrup, N., and C. Wilson, *Discovering Florida Scrub, Archibold Biological Station, Lake Placid, Fl*, last updated 2000. Available at http:// www.archbold-station.org/discoveringflscrub/, accessed June 2010.

289. Christman, S., *Endemism and Florida's Interior Sand Pine Scrub*, Final Project Report, Project No. GFC-84-101, Submitted to Florida Game and Fresh Water Fish Commission, Tallahassee, Florida, 1988.

290. Christman, S., and W. Judd, *Notes on Plants Endemic to Florida Scrub*, Florida Scientist, Vol. 53, No. 52, 1990.

291. Griffith, G., and J. Omernik, *Ecoregions of Florida (EPA)*, The Encyclopedia of Earth, last updated December 11, 2008. Available at http:/ /www.eoearth.org/article/ecoregions_of_florida_(epa), accessed June 14, 2010.

292. Hine, A., G. Brooks, R. Davis, L. Doyle, G. Gelfenbaum, S. Locker, D. Twichell, and R. Weisberg, *A Summary of Findings of the West-Central*

Florida Coastal Studies Project, U.S. Geological Survey, Open-File Report 01-303, 2001.

293. Wright, V., and T. Burchette, *Chapter 9: Shallow-Water Carbonate Environments*, H. Reading (ed.), Sedimentary Environments: Processes, Facies and Stratigraphy, pp. 325–394, Blackwell Publishing, 1996.

294. Masaferro, J., and G. Eberli, *Chapter 7: Jurassic-Cenozoic Structural Evolution of the Southern Great Bahama Bank*, K. Hsü (ed.), Sedimentary Basins of the World, Vol. 4, Caribbean Basins, pp. 167–193, 1999.

295. Not Used.

296. Poag, C., *Rise and Demise of the Bahama-Grand Banks Gigaplatform, Northern Margin of the Jurassic Proto-Atlantic Seaway*, Marine Geology, Vol. 102, pp. 63–130, 1991.

297. Kendall, C., and W. Schlager, *Carbonates and Relative Changes in Sea Level*, Marine Geology, Vol. 44, pp. 181–202, 1981.

298. Miller, K., J. Wright, and J. Browning, *Visions of Ice Sheets in a Greenhouse World*, Marine Geology, Vol. 217, pp. 215–231, 2005.

299. Sigurdsson, H., R. Leckie, and G. Acton, *Caribbean Ocean History and the Cretaceous/Tertiary Boundary Event*, Proceedings of the Ocean Drilling Program, Preliminary Reports, Vol. 165, 1997.

300. Mutti, M., A. Droxler, and A. Cunningham, *Evolution of the Northern Nicaraguan Rise during the Oligocene-Miocene Drowning by Environmental Factors*, Sedimentary Geology, Vol. 165, pp. 237–258, 2005.

301. Lyle, M., K. Dadey, and J. Farrell, *The Late Miocene (11-8 Ma) Eastern Pacific Carbonate Crash: Evidence for Reorganization of Deep-Water Circulation by the Closure of the Panama Gateway*, N. Pisias, L. Mayer, T. Janecek, A. Palmer-Julson, and T. Van Andel (eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 138, pp. 821–838, 1995.

302. Roth, J., A. Droxler, and K. Kameo, *Chapter 17: The Caribbean Carbonate Crash at the Middle to Late Miocene Transition - Linkage to the Establishment of the Modern Global Ocean Conveyer*, R. Leckie, H.

Sigurdsson, G. Acton, and G. Draper (eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 165, pp. 249–273, 2000.

303. Duncan, D., S. Locker, G. Brooks, A. Hine, and L. Doyle, *Mixed Carbonate-Siliciclastic Infilling of a Neogene Carbonate Shelf-Valley System: Tampa Bay, West-Central Florida*, Marine Geology, Vol. 200, pp. 125–156, 2003.

304. Scott, T., *Miocene to Holocene History of Florida*, A. Randazzo and D. Jones (eds.), The Geology of Florida, pp. 57–68, University Press of Florida, Gainesville, Florida, 1997.

305. Mullins, H., A. Gardulski, and A. Hine, *Catastrophic Collapse of the West Florida Carbonate Platform Margin*, Geology, Vol. 14, No. 2, pp. 167–170, 1986.

306. Not Used.

307. Sheridan, R., H. Mullins, J. Austin, M. Ball, and J. Ladd, *Geology and Geophysics of the Bahamas*, The Geology of North America, Vol. I-2, Geological Society of America, The Atlantic Continental Margin, pp. 329–364, 1988.

308. Mullins, H., J. Dolan, N. Breen, B. Andersen, M. Gaylord, J. Petruccione, R. Welner, A. Melillo, and A. Jurgens, *Retreat of Carbonate Platforms: Response to Tectonic Processes*, Geology, Vol. 19, No. 11, pp. 1089–1092, 1991.

309. Hine, A., *Chapter 11: Structural and Paleoceanographic Evolution of the Margins of the Florida Platform*, A. Randazzo and D. Jones (eds.), The Geology of Florida, pp. 169–194, University of Florida Press, Gainesville, Florida, 1997.

310. Pinet, P., *Invitation to Oceanography*, West Publishing Co., 3d ed., p. 576, 1996.

311. Trujillo, A., and H. Thurman, *Essentials of Oceanography*, 10th ed., Englewood Cliffs, New Jersey: Prentice Hall, 2010.

312. Stow, D., H. Reading, and J. Collinson, *Chapter 10, Deep Seas*, H. Reading (ed.), Sedimentary Environments, Processes, Facies and Stratigraphy, 3d ed., Blackwell Science, Ltd., pp. 395–453, 1996.

313. Schmidt, M., *Maryland's Geology*, Tidewater Publishers, Centreville, Maryland, 1993.

314. Not Used.

315. Pilkey, O., Basin Plains; *Giant Sedimentation Events*, Geological Society of America, Special Paper 229, pp. 93–99, 1988.

316. Elmore, R., O. Pilkey, W. Cleary, and H. Curran, *Black Shell Turbidite, Hatteras Abyssal Plain, Western Atlantic Ocean*, Geological Society of America Bulletin, Vol. 90, pp. 1165–1176, 1979.

317. Heezen, B., and M. Ewing, *Turbidity Currents and Submarine Slumps, and the 1929 Grand Banks Earthquake*, American Journal of Science, Vol. 250, No. 12, pp. 849–873, 1952.

318. Fine, I., A. Rabinovich, B. Bornhold, R. Thomson, and E. Kulikov, *The Grand Banks Landslide-Generated Tsunami of November 18, 1929: Preliminary Analysis and Numerical Modeling*, Marine Geology, Vol. 215, pp. 45–57, 2005.

319. Hornbach, M., D. Saffer, W. Holbrook, H. Van Avendonk, and A. Gorman, *Three-Dimensional Seismic Imaging of the Blake Ridge Methane Hydrate Province: Evidence for Large, Concentrated Zones of Gas Hydrate and Morphologically Driven Advection*, Journal of Geophysical Research, Vol. 113, pp. 1–15, 2008.

320. Twichell, D., J. Chaytor, U. ten Brink, and B. Buczkowski, *Morphology of Late Quaternary Submarine Landslides Along the U.S. Atlantic Continental Margin*, Marine Geology, Vol. 264, pp. 4–15, 2009.

321. Lee, H., *Timing of Occurrence of Large Submarine Landslides on the Atlantic Ocean Margin*, Marine Geology, Vol. 264, No. 1-2, pp. 53–64, 2009.

322. Rodriguez, N., and C. Paull, *Chapter 32. Data Report: 14C Dating of Sediment of the Uppermost Cape Fear Slide Plain: Constraints on the Timing of This Massive Submarine Landslide*, C. Paull, R. Matsumoto, P. Wallace, and W. Dillon (eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 164, pp. 325–327, 2000.

323. Hornbach, M., L. Lavier, and C. Ruppel, *Triggering Mechanism and Tsunamogenic Potential of the Cape Fear Slide Complex, U.S. Atlantic Margin*, Geochemistry, Geophysics Geosystems, Vol. 8, No. 12, pp. 1–16, 2007.

324. Siriwardane, H., and D. Smith, *Gas Hydrate Induced Seafloor Stability Problems in the Blake Ridge*, Proceedings of the Sixteenth International Offshore and Polar Engineering Conference, San Francisco, California, May 28-June 2, p. 294, 2006.

325. Paull, C., W. Buelow, W. Ussler III, and W. Borowski, *Increased Continental-Margin Slumping Frequency during Sea-Level Lowstands above Gas Hydrate-Bearing Sediments*, Geology, Vol. 24, No. 2, pp. 143–146, 1996.

326. Tappin, D., *Mass Transport Events and their Tsunami Hazard,* Mosher et al. (eds.), Submarine Mass Movements and their Consequences: Advances in Natural and Technological Hazards Research, Vol. 28, pp. 667–684, 2009.

327. Miall, A., H. Balkwill, and J. McCracken, *Chapter 14: The Atlantic Margin Basins of North America*, A. Miall (ed.), Sedimentary Basins of the World, Vol. 5, United States and Canada, pp. 473–504, 2008.

328. Shinn, E., G. Smith, J. Prospero, P. Betzer, M. Hayes, V. Garrison, and R. Barber, *African Dust and the Demise of Caribbean Coral Reefs*, Geophysical Research Letters, Vol. 27, No. 19, pp. 3029–3032, 2000.

329. Droxler, A., and W. Schlager, *Glacial Versus Interglacial Sedimentation Rates and Turbidite Frequency in the Bahamas*, Geology, Vol. 13, pp. 799–802, 1985.

330. Hine, A., R. Wilber, J. Bane, A. Neumann, and K. Lorenson, *Offbank Transport of Carbonate Sands Along Open, Leeward Bank Margins: Northern Bahamas*, Marine Geology, Vol. 42, pp. 327–348, 1981.

331. Schlager, W., *The Paradox of Drowned Reefs and Carbonate Platforms,* Geological Society of America Bulletin, Vol. 92, pp. 197–211, 1981.

332. Mullins, H., *Modern Carbonate Slopes and Basins of the Bahamas,* H. Cook, A. Hine, and H. Mullins (eds.), Platform Margin and Deep Water Carbonates, SEPM Short Course, pp. 4.1–4.138, 1983.

333. Glaser, K., and A. Droxler, *High Production and Highstand Shedding from Deeply Submerged Carbonate Banks, Northern Nicaragua Rise*, Journal of Sedimentary Petrology, Vol. 61, No. 1, pp. 128–142, 1991.

334. Wilber, R., J. Milliman, and R. Halley, *Accumulation of Bank-Top Sediment in the Western Slope of Great Bahama Bank: Rapid Progradation of a Carbonate Megabank*, Geology, Vol. 18, pp. 970–974, 1990.

335. Wright, J., *Sustainable Agriculture and Food Security in an Era of Oil Scarcity: Lessons from Cuba*, Earthscan Publishers, London, United Kingdom, 2009.

336. Rodríguez, R., Chapter 5.1. Cuba, *Encyclopedia of the World's Coastal Landforms*, E. Bird (ed.), Springer Netherlands, pp. 273–277, 2010.

337. Dallmeyer, R., M. Caen-Vachette, and M. Villeneuve, *Emplacement Age of Post-Tectonic Granites in Southern Guinea (West Africa) and the Peninsular Florida Subsurface: Implications for Origins of Southern Appalachian Exotic Terranes*, Geological Society of America Bulletin, Vol. 99, pp. 87–93, 1987.

338. Dallmeyer, R., *A Tectonic Linkage between the Rodelide Orogen (Sierra Leone) and the St. Lucie Metamorphic Complex in the Florida Subsurface*, The Journal of Geology, Vol. 97, No. 2, March 1989.

339. Arthur, J., *Petrogenesis of Early Mesozoic Tholeiite in the Florida Basement and an Overview of Florida Basement Geology*, Florida Geological Survey, Report of Investigations 97, 1988.

340. Milton, C., *Igneous and Metamorphic Basement Rocks of Florida*, Florida Bureau of Geology, Bulletin 55, 1972.

341. Klitgord, K., D. Hutchinson, and H. Schouten, *U.S. Atlantic Continental Margin; Structural and Tectonic Framework*, R. Sheridan and J. Grow (eds.), The Geology of North America, Vol. I-2, Geological Society of America, The Atlantic Continental Margin, U.S, pp. 19–55, 1988.

342. Horton, J., A. Drake, D. Rankin, and R. Dallmeyer, *Preliminary Tectonostratigraphic Terrane Map of the Central and Southern Appalachians*, U.S. Geological Survey, Miscellaneous Investigations Map 2163, 1991.

343. Heatherington, A., and P. Mueller, *Chapter 3: Geochemistry and Origin of Florida Crustal Basement Terranes*, The Geology of Florida, A. Randazzo and D. Jones (eds.), University Press of Florida, Gainesville, Florida, pp. 27–38, 1997.

344. Chowns, T., and C. Williams, *Pre-Cretaceous Rocks Beneath the Georgia Coastal Plain-Regional Implications,* Studies Related to the Charleston, South Carolina, Earthquake of 1886-Tectonics and Seismicity, U.S. Geological Survey, Professional Paper 1313, 1983.

345. Fies, M., *Draft Technical Memorandum: Lineament Analysis South Florida Region for Aquifer Storage and Recovery Regional Study*, Central and Southern Florida Project Comprehensive Everglades Restoration Plan, U.S. Army Corps of Engineers, July 2004.

346. Bass, N., *Petrology and Ages of Crystalline Basement Rocks in Florida; Some Extrapolations*, American Association of Petroleum Geologists Memoir, 11, pp. 283–310, 1969.

347. Mueller, P., A. Heatherington, J. Wooden, R. Shuster, A. Nutman, and I. Williams, *Precambrian Zircons from the Florida Basement: A Gondwana Connection*, Geology, Vol. 22, pp. 119–122, 1994.

348. Cocks, L. and R. Fortey, *Lower Paleozoic Facies and Faunas around Gondwana*, Geological Society of London, Special Publication 37, pp. 183–200, 1988.

349. Scott, T., *A Geological Overview of Florida*, Florida Geological Survey, Open-File Report 50, 1992.

350. Smith, D., and K. Lord, *Chapter 2: Tectonic Evolution and Geophysics of the Florida Basement*, A. Randazzo and D. Jones (eds.), The Geology of Florida, University Press of Florida, Gainesville, Florida, pp. 13–26, 1997.

351. Opdyke, N., D. Jones, B. McFadden, D. Smith, P. Mueller, R. Shuster, *Florida as an Exotic Terrane: Paleomagnetic and Geochronologic*

Investigation of Lower Paleozoic Rocks from the Subsurface of Florida, Geology, Vol. 15, pp. 900–903, 1987.

352. Applegate, A., *Brown Dolomite Zone of the Lehigh Acres Formation (Aptian) in the South Florida Basin*, American Association Petroleum Geologists, AAPG Bulletin, Vol. 68, No. 9, 1984.

353. Applegate, A., G. Winston, and J. Palacas, *Subdivision and Regional Stratigraphy of the Pre-Punta-Gorda Rocks in South Florida*, Gulf Coast Association of Geological Societies Transactions, Vol. 31, pp. 447–453, 1981.

354. Pollastro, R. and R. Viger, *Maps Showing Hydrocarbon Plays of the Florida Peninsula*, U.S. Geological Survey, U.S. Geological Survey Petroleum Province 50, Oil and Gas Investigations Map OM-226, 1998.

355. Pollastro, R., *Chapter 2: 1995 U.S. Geological Survey National Oil and Gas Play-Based Assessment of the South Florida Basin, Florida Peninsula Province*, National Assessment of Oil and Gas Project: Petroleum Systems and Assessment of the South Florida Basin, U.S. Geological Survey, Digital Data Series 69-A, 2001.

356. Winston, G., *Generalized Stratigraphy and Geologic History of the South Florida Basin*, Symposium on South Florida Geology, Memoir 3, Miami Geological Society, December 1987.

357. Winston, G., *The Rebecca Shoal Reef Complex of Upper Cretaceous and Paleocene Age in South Florida*, American Association of Petroleum Geologists, AAPG Bulletin, Vol. 62, pp. 122–127, 1978.

358. Calais, E., Y. Mazabraud, B. Mercier de Lepinay, and P. Mann, *Strain Partitioning and Fault Slip Rates in the Northeastern Caribbean from GPS Measurements,* Geophysical Research Letters, Vol. 29, pp. 1856–1859, 2002.

359. Mitchell-Tapping, H., and A. Mitchell-Tapping, *Exploration of the Sunniland Formation of Southern Florida*, Gulf Coast Association of Geological Societies Transactions, Vol. 53, 2003.

360. Mitchell-Tapping, H., *New Oil Exploration Play in South Florida - the Upper Fredericksburg Dollar Bay Formation*, Gulf Coast Association of Geological Societies Transactions, Vol. 40, 1990.

361. Feitz, R., *Recent Development in Sunniland Exploration of South Florida,* Gulf Coast Association of Geological Societies Transactions, Vol. 26, pp. 74–78, 1976.

362. Applegate, A. and F. Pontigo, *Future Oil Potential of Lower Cretaceous Sunniland Formation in South Florida*, American Association of Petroleum Geologists, AAPG Bulletin, Vol. 62, 1978.

363. Pollastro, R., *Florida Peninsula Province (050), 1995 National Assessment of United States Oil and Gas Resources-Results, Methodology, and Supporting Data*, Digital Data Series-30, D. Gautier, G. Dolton, K. Takahashi, and K. Varnes (eds.), U.S. Geological Survey, One CD-ROM, 1995.

364. Mitchell-Tapping, H., *Application of the Tidal Mudflat Model to the Sunniland Formation (Lower Cretaceous) of South Florida*, Gulf Coast Association of Geological Societies Transactions, Vol. 37, pp. 415–426, 1987.

365. Mitchell-Tapping, H., and A. Mitchell-Tapping, *Rudistids of the South Florida Lower Cretaceous Sunniland Formation*, Gulf Coast Association of Geological Societies Transactions, Vol. 53, 2003.

366. Pollastro, R., C. Schenk, and R. Charpentier, *Chapter 1: Assessment of Undiscovered Oil and Gas in the Onshore and State Waters Portion of the South Florida Basin, Florida - U.S. Geological Survey Province 50*, U.S. Geological Survey, National Assessment of Oil and Gas Project: Petroleum Systems and Assessment of the South Florida Basin, Digital Data Series 69-A, 2001.

367. Winston, G., *The Dollar Bay Formation of Lower Cretaceous (Fredericksburg) Age in South Florida*, Gulf Coast Association of Geological Societies Transactions, Vol. 22, 1972.

368. Salvador, A., *Origin and Development of the Gulf of Mexico Basin,* The Geology of North America, Vol. J, The Gulf of Mexico Basin, Geological Society of America, 1991.

369. Winston, G., *The Rebecca Shoal Dolomite Barrier Reef of Paleocene and Upper Cretaceous Age - Peninsular Florida and Environs*, Miami Geological Society, 1994.

370. Winston, G., *Lithostratigraphy of the Cedar Keys Formation of Paleocene and Upper Cretaceous Age - Peninsular Florida and Environs,* The Paleogene of Florida, Vol. 3, Miami Geological Society, 1994.

371. Winston, G., *Paleogene and Upper Cretaceous Zones of the Southeastern Peninsula and the Keys,* The Paleogene of Florida, Vol. 1, Miami Geological Society, 1995.

372. Not Used.

373. Cunningham, K., D. McNeill, L. Guertin, P. Ciesielski, T. Scott, and L. Verteuil, *New Tertiary Stratigraphy for the Florida Keys and Southern Peninsula of Florida*, Geological Society of America Bulletin, Vol. 110, No. 2, February 1998.

374. Fish, J., and M. Stewart, *Hydrogeology of the Surficial Aquifer System, Dade County, Florida*, U.S. Geological Survey, Water-Resources Investigations Report 90-4108, 1991.

375. Reese, R., *Hydrogeology and the Distribution and Origin of Salinity in the Floridan Aquifer System, Southeastern Florida*, U.S. Geological Survey, Water-Resources Investigations Report 94-4010, 1994.

376. Reese, R., and E. Richardson, *Synthesis of the Hydrogeologic Framework of the Floridan Aquifer System and Delineation of a Major Avon Park Permeable Zone in Central and Southern Florida*, U.S. Geological Survey, Scientific Investigations Report 2007-5207, 2008.

377. Scott, T., *Text to Accompany the Geologic Map of Florida*, Florida Geological Society, Open-File Report 80, 2001.

378. Scott, T., and M. Knapp, *The Hawthorn Group of Peninsular Florida,* Symposium on South Florida Geology, Miami Geological Society, Memoir 3, December 1987.

379. Winston, G., *A Regional Analysis of the Oligocene-Eocene Section of the Peninsula Using Vertical Lithologic Stacks*, The Paleogene of Florida, Vol. 2, Miami Geological Society, p. 55, 1993.

380. Not Used.

381. Not Used.

382. Iturralde-Vinent, M., *Principal Characteristics of Oligocene and Lower Miocene Stratigraphy of Cuba*, American Association of Petroleum Geologists, AAPG Bulletin, Vol. 56, No. 12, pp. 2369–2379, 1972.

383. Iturralde-Vinent, M., *Geology of Western Cuba, Field-Workshop of Caribbean Geology*, 2da. Convención Cubana de Ciencias de La Tierra, 2007.

384. Hoffmeister, J., K. Stockman, and H. Multer, *Miami Limestone of Florida and Its Recent Bahamian Counterpart*, Geological Society of America Bulletin, Vol. 78, pp. 175–190, 1967.

385. Eberli, G., D. McNeill, J. Kenter, F. Anselmetti, L. Melim, and R. Ginsburg, *A Synopsis of the Bahamas Drilling Project: Results from Two Deep Core Borings Drilled on the Great Bahama Bank*, Proceedings of the Ocean Drilling Program, Initial Reports, Vol. 166, 1997.

386. U.S. Geological Survey, *Historical Aerial Photography for the Greater Everglades of South Florida: The 1940, 1:40,000 Photoset*, Open-File Report 02-327, 2003. Available at http://sofia.usgs.gov/publications/ofr/02-327/htm/intro.htm, accessed January 10, 2008.

387. Kay, M., and E. Colbert, *Stratigraphy and Life History*, John Wiley & Sons, Inc., 1965.

388. Randazzo, A., *Chapter 4: the Sedimentary Platform of Florida: Mesozoic to Cenozoic*, A. Randazzo and D. Jones (eds.), The Geology of Florida, University of Florida Press, Gainesville, Florida, pp. 39–56, 1997.

389. Miller, J., *Hydrologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina*, U.S. Geological Survey, Professional Paper 1403-B, 1986.

390. Levin, H., *Micropaleontology of the Oldsmar Limestone (Eocene) of Florida*, Micropaleontology, Vol. 3, No. 2, pp. 137–154, 1957.

391. Ward, W., K. Cunningham, R. Renken, M. Wacker, and J. Carlson, *Sequence-Stratigraphic Analysis of the Regional Observation Monitoring*

Program (ROMP) 29a Test Corehole and Its Relation to Carbonate Porosity and Regional Transmissivity in the Floridan Aquifer System, Highlands County, Florida, U.S. Geological Survey, Open-File Report 2003-201, 2003.

392. Florida Geological Survey, *Florida's Rocks and Minerals*, Last Updated May 11, 2006. Available at http://www.dep.state.fl.us/geology/geologic topics/rocks/.

393. Warzeski, R., K. Cunningham, R. Ginsburg, J. Anderson, and Z. Ding, *A Neogene Mixed Siliciclastic and Carbonate Foundation for the Quaternary Carbonate Shelf, Florida Keys*, Journal of Sedimentary Research, Section B: Stratigraphy and Global Studies, Vol. 66, No. 4, Society for Sedimentary Geology, July 1996.

394. Missimer, T., *Siliciclastic Facies Belt Formation and the Late Oligocene to Middle Miocene Partial Drowning of the Southern Florida Platform,* Gulf Coast Association of Geological Societies Transactions, Vol. 51, 2001.

395. McNeil, D., K. Cunningham, L. Guertin, and F. Anselmetti, *Depositional Themes of Mixed Carbonate-Siliciclastics in the South Florida Neogene: Application to Ancient Deposits*, American Association of Petroleum Geologists, Integration of Outcrop and Modern Analogs in Reservoir Modeling, Memoir 80,2004.

396. Cunningham, K., S. Locker, A. Hine, D. Bukry, J. Barron, and L. Guertin, *Interplay of Late Cenozoic Siliciclastic Supply and Carbonate Response on the Southeast Florida Platform*, Journal of Sedimentary Research, Vol. 73, No. 1, pp. 31–46, 2003.

397. Schroeder, M. and H. Klein, *Geology of the Western Everglades Area, Southern Florida*, U.S. Geological Survey, Circular 314, 1954.

398. Kindinger, J., *Lake Belt Study Area: High Resolution Seismic Reflection Survey, Miami-Dade County, Florida*, U.S. Geological Survey, Open-File Report 02-325, 2002.

399. Ecology and Environment, Inc., *Preliminary Assessment/Site Inspection Work Plan for the Callaway Drum Recycling Site, Auburndale, Polk County, Florida*, EPA I.D. No. FLN000407303, Prepared for the Florida Department of Environmental Protection, 2001.

400. Harvey, J., S. Krupa, C. Gefvert, R. Mooney, J. Choi, S. King, and J. Giddings, *Interactions Between Surface Water and Ground Water and Effects on Mercury Transport in the North-Central Everglades*, U.S. Geological Survey, Water-Resources Investigations Report 02-4050, 2002.

401. Sonenshein, R., *Methods to Quantify Seepage Beneath Levee 30, Miami-Dade County, Florida*, U.S. Geological Survey, Water-Resources Investigations Report 2001-4074, 2001.

402. Wilcox, W., H. Solo-Gabriele, and L. Sternberg, *Use of Stable Isotopes to Quantify Flows Between the Everglades and Urban Areas in Miami-Dade County Florida*, Journal of Hydrology, Vol. 293, pp. 1–19, 2004.

403. Kindinger, J., and K. Cunningham, *Shallow Karst Aquifer System of the Lake Belt Study Area, Miami-Dade County, Florida, USA,* Second International Conference on Saltwater Intrusion and Coastal Aquifers-Monitoring, Modeling, and Management, Merida, Mexico, 2003.

404. Cunningham, K., M. Wacker, E. Robinson, J. Dixon, and G. Wingard, *A Cyclostratigraphic and Borehole-Geophysical Approach to Development of a Three-Dimensional Conceptual Hydrogeologic Model of the Karstic Biscayne Aquifer, Southeastern Florida*, U.S. Geological Survey, Scientific Investigations Report 2005-5235, 2006.

405. Cunningham, K., R. Renken, M. Wacker, M. Zygnerski, E. Robinson, A. Shapiro, and G. Wingard, *Application of Carbonate Cyclostratigraphy and Borehole Geophysics to Delineate Porosity and Preferential Flow in the Karst Limestone of the Biscayne Aquifer, SE Florida*, Perspectives on Karst Geomorphology, Hydrology, and Geochemistry-Special Paper 404, pp. 191–208, Geological Society of America, 2006.

406. Halley, R., H. Vacher, and E. Shinn, *Geology and Hydrogeology of the Florida Keys*, Developments in Sedimentology, Vol. 54, Geology and Hydrology of Carbonate Islands, 1997.

407. Johnson, R., *Lithologic Variation in the Miami Limestone of Florida*, Florida Geological Survey, Open-File Report 48, 1992.

408. Not Used.

409. Sheridan, R., *The Atlantic Passive Margin, The Geology of North America-An Overview,* Vol. A, The Geology of North America, Geological Society of America, 1989.

410. Sawyer, D., T. Buffler, and R. Pilger, *The Crust under the Gulf of Mexico Basin*, The Geology of North America, Vol. J, The Gulf of Mexico Basin, Geological Society of America, pp. 53–72, 1991.

411. Mullins, H., and G. Lyntz, *Origin of the Northwestern Bahama Platform: Review and Reinterpretation*, Geological Society of America Bulletin, Vol. 88, pp. 1447–1461, 1977.

412. Not Used.

413. Winston, G., *Atlas of Structural Evolution and Facies Development on the Florida-Bahamas Platform Triassic through Paleocene*, Miami Geological Society, p. 38, 1991.

414. Emery, K., and E. Uchupi, *Western North Atlantic Ocean: Topography, Rocks, Structure, Water, Life, and Sediments*, American Association of Petroleum Geologists, Memoir 17, Tulsa, Oklahoma, p. 532, 1972.

415. Meyerhoff, A., and C. Hatten, *Bahamas Salient of North America: Tectonic Framework, Stratigraphy, and Petroleum Potential*, AAPG Bulletin, Vol. 58, No. 6, Part II of II, pp. 1201–1239, 1974.

416. Tator, B., and L. Hatfield, *Bahamas Present Complex Geology: Part 1*, Oil Gas J., Vol. 73, No. 43, pp. 172–176, 1975.

417. Bhat, H., N. McMillan, J. Aubert, B. Porthault, and M. Surin, *North American and African Drift-the Record in Mesozoic Coastal Plain Rocks, Nova Scotia and Morocco,* C. Yorath et al. (eds.), Canadian Continental Margins and Offshore Petroleum Potential, Memoir 4, Canadian Society of Petroleum Geologists, pp. 375–389, 1975.

418. Jacobs, C., *Jurassic Lithology in Great Isaac 1 Well, Bahamas: Discussion,* AAPG Bulletin, Vol. 61, No. 3, p. 443, 1977.

419. Florida Geological Survey, *Florida's Ground Water Quality Monitoring Program - Background Hydrogeochemistry*, Special Publication 34, 1992.

420. Not Used.

421. Withjack, M., R. Schlische, and P. Olsen, *Diachronous Rifting, Drifting, and Inversion on the Passive Margin of Central Eastern North America: An Analog for Other Passive Margins*, American Association of Petroleum Geologists, AAPG Bulletin, Vol. 92, No. 5a, pp. 817–835, 1998.

422. Benson, W., and R. Sheridan, *Shipboard Scientific Party, Site 391: Blake-Bahama Basin*, W. Benson, R. Sheridan, et al. (eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 44, pp. 153–336, 1978.

423. Halley, R., *Petrographic Summary,* U.S. Geological Survey, Geological Studies of the COST GE-1 Well, United States South Atlantic Outer Continental Shelf Area, Circular 800, pp. 42–48, 1979.

424. Sheridan, R., J. Crosby, G. Bryan, and P. Stoffa, *Stratigraphy and Structure of Southern Blake Plateau, Northern Florida Straits, and Northern Bahama Platform from Multichannel Seismic Reflection Data*, AAPG Bulletin, Vol. 65, pp. 2571–2593, 1981.

425. Sheridan, R., *Atlantic Continental Margins of North America,* The Geology of Continental Margins, pp. 391–407, 1974.

426. Masaferro, J., J. Poblet, M. Bulnes, G. Eberli, T. Dixon, and K. McClay, *Palaeogene-Neogene/Present Day(?) Growth Folding in the Bahamian Foreland of the Cuban Fold and Thrust Belt*, Journal of the Geological Society, Vol. 156, pp. 617–631, 1999.

427. Case, J., W. MacDonald, and P. Fox, *Caribbean Crustal Provinces; Seismic and Gravity Evidence*, The Geology of North America, Vol. H., The Caribbean Region, Geological Society of America, 1990.

428. Uchupi, E., J. Milliman, B. Luyendyk, C. Bowin, and K. Emery, *Structure and Origin of Southeastern Bahamas,* AAPG Bulletin, Vol. 55, 1971.

429. Dunbar, J., and D. Sawyer, *Implications of Continental Crust Extension for Plate Reconstruction: An Example from the Gulf of Mexico,* Tectonics, Vol. 6, No. 6, pp. 739–755, 1987.

430. Ewing, T., *Structural Framework*, The Geology of North America, Vol. J, The Gulf of Mexico Basin, Geological Society of America, 1991.

431. Not Used.

432. Schlager, W., F. Bourgeois, G. Mackenzie, and J. Smit, *Boreholes at Great Isaac and Site 626 and the History of the Florida Straits,* Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 101, J. Austin et al. (ed.), pp. 425–437, 1988.

433. Not Used.

434. Not Used.

435. Florida Department of Environmental Protection, *RGB Aerial Photography*, Scale 1:40,000, 2004.

436. Watkins, D., and J. Verbeek, *Calcareous Nannofossil Biostratigraphy from Ocean Drilling Program Leg 101, Northern Bahamas*, Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 101, pp. 63–86, 1988.

437. University of South Carolina, *Introduction to the Stratigraphy of the Neogene of the Western Bahamas*, August 2005. Available at http://strata.geol.sc.edu, accessed September 9, 2008.

438. Carew, J., and J. Mylroie, *Chapter 3a: Geology of the Bahamas*, Geology and Hydrogeology of Carbonate Islands, Developments in Sedimentology, Vol. 54, pp. 91–133, 1997.

439. Pardo, G., *The Geology of Cuba*, Studies in Geology Series 58, American Association of Petroleum Geologists, 2009.

440. Iturralde-Vinent, M., *Cuban Geology: a New Plate Tectonic Synthesis,* Journal of Petroleum Geology, Vol. 17, pp. 39–70, 1994.

441. Winston, G., *Lower Cretaceous-Upper Jurassic Carbonate Complex of the Southern Margin of the Florida-Bahama Platform in Northern Cuba*, American Association of Petroleum Geologists, AAPG Geologists Bulletin, Vol. 72, No. 9, 1988.

442. Hutson, F., P. Mann, and P. Renne, *$^{40}Ar/^{39}Ar$ Dating of Single Muscovite Grains in Jurassic Siliciclastic Rocks (San Cayetano Formation): Constraints on the Paleoposition of Western Cuba*, Geology, Vol. 26, pp. 83–86, 1998.

443. Kerr, A., M. Iturralde-Vinent, A. Saunders, T. Babbs, and J. Tarney, *A New Plate Tectonic Model for the Caribbean: Implications from a Geochemical*

Reconnaissance of Cuban Mesozoic Volcanic Rocks, Geological Society of America Bulletin, Vol. 111, pp. 1581–1599, 1999.

444. Grafe, F., K. Stanek, A. Baumann, W. Maresch, W. Hames, C. Grevel, and G. Millan, *Rb/Sr and $^{40}Ar/^{39}Ar$ Mineral Ages of Granitoid Intrusive in the Mabujina Unit, Central Cuba: Thermal Exhumation History of the Escambray Massif,* Journal of Geology, Vol. 109, pp. 615–631, 2001.

445. Rojas-Agramonte, Y., A. Kroner, J. Pindell, A. Garcia-Casco, D. Garcia-Delgado, D. Liu, and Y. Wang, *Detrital Zircon Geochronology of Jurassic Sandstones of Western Cuba (San Cayetano Formation): Implications for the Jurassic Paleogeography of the NW Proto-Caribbean*, American Journal of Science, Vol. 308, pp. 639–656, 2008.

446. Cobeilla-Reguera, J., *Jurassic and Cretaceous Geologic History of Cuba*, International Geology Review, Vol. 42, 2000.

447. Renne, P., G. Scott, S. Doppelhammer, E. Linares Cala, and R. Hargraves, *Discordant Mid-Cretaceous Palemagnetic Pole from the Zaza Terrane of Central Cuba*, Geophysical Research Letters, Vol. 18, pp. 455–458, 1991.

448. Tait, J., Y. Rojas-Agramonte, D. Garcia-Delgado, A. Kroner, and R. Perez-Aragon, *Paleomagnetism of the Central Cuban Cretaceous Arc Sequences and Geodynamic Implications*, Tectonophysics, Vol. 470, pp. 284–297, 2009.

449. Garcia-Casco, A., R. Torres-Roldan, G. Millan, P. Monie, and J. Schneider, *Oscillatory Zoning in Eclogitic Garnet and Amphibole, Northern Serpentinite Melange, Cuba: A Record of Tectonic Instability during Subduction?* Journal of Metamorphic Geology, Vol. 20, pp. 581–598, 2002.

450. Not Used.

451. Iturralde-Vinent, M., *Introduction to Cuban Geology and Geophysics,* M. Iturralde-Vinent (ed.), Ofiolitas y Arcos Volcánicos de Cuba, IUGS/ UNESCO International Geological Correlation Program, Project 364, Miami, Florida, pp. 3–35, 1996.

452. Committee for the Gravity Anomaly Map of North America, *Gravity Anomaly Map of North America* (1:5,000,000), 5 Sheets, Geological

Society of America, 1987. Available at http://www.ngdc.noaa.gov/seg/fliers/se-2004.shtml, accessed February 2008.

453. Committee for the Magnetic Anomaly Map of North America, *Magnetic Anomaly Map of North America* (1:5,000,000), Geological Society of North America, 1987. Available at http://www.ngdc.noaa.gov/seg/fliers/se-2004.shtml, accessed February 2008.

454. National Oceanic and Atmospheric Administration, *Land and Marine Gravity CD-ROMs*, D. Dater, D. Metzger, and A. Hittelman (compilers), National Geophysical Data Center, 1999.

455. Not Used.

456. Electric Power Research Institute, *Seismic Hazard Methodology for the Central and Eastern United States*, Vol. 5–10, Tectonic Interpretations, EPRI Report NP-4726, July 1986.

457. Applin. P., and E. Applin, *The Comanche Series and Associated Rocks in the Subsurface in Central and South Florida*, U.S. Geological Survey, Professional Paper 447, p. 84, 1965.

458. Barnett, R., *Basement Structure of Florida and Its Tectonic Implications,* Gulf Coast Association of Geological Societies Transactions, Vol. XXV, pp. 122–142, 1975.

459. Pindell, J., *Alleghanian Reconstruction and Subsequent Evolution of the Gulf of Mexico, Bahamas, and Proto-Caribbean,* Tectonics, Vol. 4, pp. 1–39, 1985.

460. Ross, M., and C. Scotese, *A Hierarchical Tectonic Model of the Gulf of Mexico and Caribbean Region,* Tectonophysics, Vol. 155, pp. 139–168, 1988.

461. Beall, R., *Plate Tectonics and the Origin of the Gulf Coast Basin,* Transactions of the Gulf Coast Association of Geological Societies, Vol. 23, pp. 109–114, 1973.

462. Not Used.

463. Heatherington, A., and P. Mueller, *Mesozoic Igneous Activity in the Suwannee Terrane, Southeastern USA: Petrogenesis and Gondwanan Affinities*, Gondwana Research, Vol. 6, No. 2, pp. 296–311, 2003.

464. Ball, M., *Reassessment of the Bahamas Fracture Zone* (Annual Meeting Abstract), American Association of Petroleum Geologists, AAPG Bulletin, Vol. 75, p. 537, 1991.

465. Applin, P., *Preliminary Report on Buried Pre-Mesozoic Rocks in Florida and Adjacent States*, U.S. Geological Survey, Circular 91, p. 28, 1951.

466. Bird, D., S. Hall, K. Burke, J. Casey, and D. Sawyer, *Early Central Atlantic Ocean Seafloor Spreading History*, Geosphere, Vol. 3, pp. 282–298, 2007.

467. Puri, H., and R. Vernon, *Summary of the Geology of Florida and a Guidebook to the Classic Exposures*, Florida Geological Survey, Special Publication 5, Tallahassee, Florida, 1964.

468. Ball, M., R. Martin, R. Foote, and A. Applegate, *Structure and Stratigraphy of the Western Florida Shelf, Part 1, Multichannel Reflection Seismic Data*, U.S. Geological Survey, Open-File Report 88-439, p. 61, 1988.

469. Winston, G., *Regional Structure, Stratigraphy, and Oil Possibilities of the South Florida Basin,* Gulf Coast Association of Geological Societies Transactions, Vol. 21, pp. 15–29, 1971.

470. Winston, G., *Florida's Ocala Uplift is Not an Uplift,* American Association of Petroleum Geologists, AAPG Bulletin, Vol. 60, pp. 461–487, 1977.

471. Withjack, M., and R. Schlische, *A Review of Tectonic Events on the Passive Margin of Eastern North America*, P. Post (ed.), Petroleum Systems of Divergent Continental Margin Basins: 25th Bob S. Perkins Research Conference, Gulf Coast Section of Society for Sedimentary Geology, pp. 203–235, 2005.

472. Not Used.

473. Popenoe, P., V. Henry, and F. Idrish, *Gulf Trough-the Atlantic Connection*, Geology, Vol. 15, pp. 327–332, 1987.

474. Mullins, H., and H. Van Buren, *Walkers Cay Fault, Bahamas; Evidence for Cenozoic Faulting,* Geo-Marine Letters, Vol. 1, No. 3-4, pp. 225–231, 1981.

475. Eberli, G., and R. Ginsburg, *Segmentation and Coalescence of Cenozoic Carbonate Platforms, Northwestern Great Bahama Bank,* Geology, Vol. 15, pp. 75–79, 1987.

476. Harwood, G., and P. Towers, *Seismic Sedimentologic Interpretation of a Carbonate Slope, North Margin of Little Bahama Bank*, Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 101, pp. 263–277, 1988.

477. Masaferro, J., *Interplay of Tectonism and Carbonate Sedimentation in the Bahamas Foreland Basin* (Ph.D dissertation), p. 146, University of Miami 1997.

478. Not Used.

479. Masaferro, J., M. Bulnes, J. Poblet, and G. Eberli, *Episodic Folding Inferred from Syntectonic Carbonate Sedimentation: the Santaren Anticline, Bahamas Foreland*, Sedimentary Geology, Vol. 146, No. 1-2, pp. 11–24, 2002.

480. Case, J., and T. Holcombe, *Geologic Map of the Caribbean Region*, Geological Survey, Miscellaneous Geologic Investigations Map I-1100, U.S. 1980.

481. Not Used.

482. Angstadt, D., J. Austin, and R. Buffler, *Early Late Cretaceous to Holocene Seismic Stratigraphy and Geologic History of the Southeastern Gulf of Mexico,* American Association of Petroleum Geologists Bulletin, Vol. 69, No. 6, pp. 977–995, 1985.

483. Not Used.

484. Moretti, I., R. Tenreyro, E. Linares, J. Lopez, J. Letouzey, C. Magnier, F. Gaumet, J. Lecomte, J. Lopez, and S. Zimine, *Petroleum System of the Cuban Northwest Offshore Zone*, C. Bartolini, R. Buffler, and J. Blickwede (eds.), The Circum-Gulf of Mexico and the Caribbean: Hydrocarbon Habitats, Basin Formation, and Plate Tectonics, Vol. 79, American Association of Petroleum Geologists, pp. 675–696, 2003.

485. Saura, E., J. Verges, D. Brown, P. Lukito, S. Soriano, S. Torrescusa, R. Garcia, J. Sanchez, C. Sosa, and R. Tenreyro, *Structural and Tectonic Evolution of Western Cuba Fold and Thrust Belt*, Tectonics, Vol. 27, pp. 1–22, 2008.

486. Not Used.

487. Paull, C., and W. Dillon, *Structure, Stratigraphy, and Geologic History of the Florida-Hatteras Shelf and Inner Blake Plateau,* American Association of Petroleum Geologists Bulletin, Vol. 64, No. 3, pp. 339–358, 1980.

488. Stanek, K., W. Maresch, F. Grafe, C. Grevel, and A. Baumann, *Structure, Tectonics and Metamorphic Development of the Sancti Spiritus Dome (Eastern Escambray Massif, Central Cuba)*, Geologica Acta, Vol. 4, No. 1-2, pp. 151–170, 2006.

489. Garcia, J., D. Slejko, L. Alvarez, L. Peruzza, and A. Rebez, *Seismic Hazard Maps for Cuba and Surrounding Areas,* Bulletin of the Seismological Society of America, Vol. 93, No. 6, pp. 2563–2590, 2003.

490. Garcia, J., D. Slejko, A. Rebez, M. Santulin, and L. Alvarez, *Seismic Hazard Map for Cuba and Adjacent Areas Using the Spatially Smoothed Seismicity Approach,* Journal of Earthquake Engineering, Vol. 12, pp. 173–196, 2008.

491. Not Used.

492. French, C. and C. Schenk (digital compilers), *Map Showing Geology, Oil and Gas Fields, and Geologic Provinces of the Caribbean Region*, U.S. Geological Survey, Open-File Report 97-470-K, 2004. Available at http://pubs.usgs.gov/of/1997/ofr-97-470/of97-470k/graphic/data.html, accessed June 5, 2008.

493. Mann, P., C. Schubert, and K. Burke, *Review of Caribbean Neotectonics, The Geology of North America*, Vol. H, G. Dengo and J. Case (eds.), The Caribbean Region, Geological Society of America, 1990.

494. Cotilla-Rodríguez, M., H. Franzke, and D. Cordoba-Barba, *Seismicity and Seismoactive Faults of Cuba,* Russian Geology and Geophysics, Vol. 48, pp. 505–522, 2007.

495. Not Used.

496. Not Used.

497. Echevarria-Rodriguez, G., J. Hernandez-Perez, J. Lopez-Quintero, R. Lopez-Rivera, J. Rodriguez-Hernandez, R. Sanchez-Arango, R. Socorro-Trujillo, Tenreyro-Perez, and J. Yparraguirre-Pena, *Oil and Gas Exploration in Cuba*, Journal of Petroleum Geology, Vol. 14, No. 3, pp. 259–274, 1991.

498. Not Used.

499. Leroy, S., A. Mauffret, P. Patriat, and B. Mercier de Lepinay, *An Alternative Interpretation of the Cayman Trough Evolution from a Reidentification of Magnetic Anomalies*, International Journal of Geophysics, Vol. 141, pp. 539–557, 2000.

500. Van Hinsbergen, D., M. Iturralde-Vinent, P. Van Geffen, A. García-Casco, and S. Van Benthem, *Structure of the Accretionary Prism, and the Evolution of the Paleogene Northern Caribbean Subduction Zone in the Region of Camagüey, Cuba*, Journal of Structural Geology, Vol. 31, pp. 1130–1144, 2009.

501. Ball, M., R. Martin, W. Bock, R. Sylwester, R. Bowles, D. Taylor, E. Coward, J. Dodd, and L. Gilbert, *Seismic Structure and Stratigraphy of Northern Edge of Bahaman-Cuban Collision Zone*, American Association of Petroleum Geologists Bulletin, Vol. 69, No. 8, pp. 1275–1294, 1985.

502. Demets, C., P. Jansma, G. Mattioli, T. Dixon, F. Farina, R. Bilham, E. Calais, and P. Mann, *GPS Geodetic Constraints on Caribbean-North America Plate Motion*, Geophysical Research Letters, Vol. 27, pp. 437–440, 2000.

503. Demets, C., and M. Wiggins-Grandison, *Deformation of Jamaica and Motion of the Gonave Microplate from GPS and Seismic Data*, Geophysical Journal International, Vol. 168, pp. 362–378, 2007.

504. Moreno, B., M. Grandison, and K. Atakan, *Crustal Velocity Model along the Southern Cuban Margin: Implications for the Tectonic Regime at an Active Plate Boundary*, Geophysical Journal International, Vol. 151, pp. 632–645, 2002.

505. Cotilla-Rodríguez, M., *Sismicidad y Sismotectonica de Cuba*, Física de La Tierra, No. 10, pp. 53–86, 1998.

506. Bryant, W., J. Lugo, C. Cordova, and A. Salvador, *Chapter 2: Physiography and Bathymetry*, A. Salvador (ed.), The Geology of North America, Vol. J, The Gulf of Mexico Basin, Geological Society of America, pp. 13–30, 1991.

507. Canet, C., R. Prol-Ledesma, E. Escobar-Briones, C. Mortera-Gutierrez, R. Lozano-Santa Cruz, C. Linares, E. Cienfuegos, and P. Morales-Puente, *Mineralogical and Geochemical Characterization of Hydrocarbon Seep Sediments from the Gulf of Mexico*, Marine and Petroleum Geology, Vol. 23, pp. 605–619, 2006.

508. Antoine, J., *Structure of the Gulf of Mexico*, R. Rezak and V. Henry (eds.), Texas A&M University Oceanographic Studies, Contributions on the Geological and Geophysical Oceanography of the Gulf of Mexico, Vol. 3, p. 303, Gulf Publishing Company, Houston, 1972.

509. Not Used.

510. Moody, C., *Gulf of Mexico Distributive Province*, AAPG Bulletin, Vol. 51, No. 2, pp. 179–199, 1967.

511. Bird, D., K. Burke, S. Hall, and J. Casey, *Gulf of Mexico Tectonic History: Hotspot Tracks, Crustal Boundaries, and Early Salt Distribution*, AAPG Bulletin, Vol. 89, pp. 311–328, 2005.

512. Harry, D., and J. Londono, *Structure and Evolution of the Central Gulf of Mexico Continental Margin and Coastal Plain, Southeast United States*, Geological Society of America Bulletin, Vol. 116, pp. 188–199, 2004.

513. Salvador, A., and J. Quezada Muneton, *Plate 3: Stratigraphic Correlation Chart Gulf of Mexico Basin*, The Geology of North America, Vol. J., The Gulf of Mexico Basin, 1991.

514. Tuttle, M., C. Prentice, K. Dyer-Williams, L. Pena, and G. Burr, *Late Holocene Liquefaction Features in the Dominican Republic: a Powerful Tool for Earthquake Hazard Assessment in the Northeast Caribbean*, Bulletin of the Seismological Society of America, Vol. 93, No. 1, pp. 27–46, 2003.

515. Buffler, R., *Early Evolution of the Gulf of Mexico Basin*, D. Goldthwaite, (ed.), An Introduction to Central Gulf Coast Geology, New Orleans Geological Society, New Orleans, Louisiana, pp. 1–15, 1991.

516. Krough, T., S. Kamo, V. Sharpton, L. Marin, and A. Hildebrand, *U-Pb Ages of Single Shocked Zircons Linking Distal K/T Ejecta to the Chicxulub Crater*, Nature, Vol. 366, pp. 731–734 1993.

517. Jourdan, F., P. Renne, and W. Reimold, *An Appraisal of the Ages of Terrestrial Impact Structures*, Earth and Planetary Science Letters, Vol. 286, pp. 1–13, 2009.

518. Keppie, J., J. Dostal, M. Norman, J. Urrutia-Fucugauchi, and M. Grajales-Nishimura, *Study of Melt and Clast of 546 Ma Magmatic Arc Rocks in the 65 Ma Chicxulub Bolide Breccia, Northern Maya Block, Mexico: Western Limit of Ediacaran Arc Peripheral to Northern Gondwana*, International Geology Review, pp. 1–14, Taylor & Francis Group, 2010.

519. MacKenzie, G., P. Maguire, P. Denton, J. Morgan, and M. Warner, *Shallow Seismic Velocity Structure of the Chicxulub Impact Crater from Modeling of Rg Dispersion Using a Genetic Algorithm*, Tectonophysics, Vol. 338, pp. 97–112, 2001.

520. Baez, H., E. Rebolledo, S. Sedov, T. Pi Puig, and J. Gama Castro, *Pedosediments of Karstic Sinkholes in the Eolianites of Ne Yucatan: a Record of Late Quaternary Soil Development, Geomorphic Processes and Landscape Stability*, Geomorphology, (in press), 2010.

521. Ward, W., *Geology of Coastal Islands, Northeastern Yucatan Peninsula*, H. Vacher and T. Quinn (eds.), Geology and Hydrogeology of Carbonate Islands, Developments in Sedimentology, Vol. 54, pp. 275–298, Amsterdam, New York, Elsevier Science, 1997.

522. Alvarado-Omana, M. *Gravity and Crustal Structure of the South-Central Gulf of Mexico, the Yucatan Peninsula, and Adjacent Areas from 17° 30' N to 26° N and from 84° W to 93° W* (Master's thesis), University of Oregon, 1986.

523. Pindell, J., L. Kennan, K. Stanek, W. Maresch, and G. Draper, *Foundations of Gulf of Mexico and Caribbean Evolution: Eight Controversies Resolved in Iturralde-Vinent, M. and Lidiak, E. (eds.) Caribbean Plate Tectonics,*

Stratigraphic, Magmatic, Metamorphic, and Tectonic Events, Geologica Acta, Vol. 4, No. 1-2, pp. 303–341, 2006.

524. Bird, D., and K. Burke, *Pangea Breakup: Mexico, Gulf of Mexico, and Central Atlantic Ocean*, Expanded Abstracts of the Technical Program, Society of Exploration Geophysicists 76th Annual International Meeting and Exposition, pp. 1013–1016, 2006.

525. Pindell, J., L. Kennan, W. Maresch, K. Stanek, G. Draper, and R. Higgs, *Plate-Kinematics and Crustal Dynamics of Circum-Caribbean Arc-Continent Interactions: Tectonic Controls on Basin Development in Proto-Caribbean Margins*, H. Avé Lallemant and V. Sisson (eds.), Caribbean-South America Plate Interactions, Venezuela, Geological Society of America, Special Paper 394, pp. 7–52, 2005.

526. Holcombe, T., J. Ladd, G. Westbrook, N. Edgar, and C. Bowland, *Caribbean Marine Geology: Ridges and Basins of the Plate Interior*, G. Dengo and J. Case (eds.), Geology of North America, Vol. H, The Caribbean Region, pp. 231–260, Geological Society of America, 1990.

527. Ladd, J., T. Holcombe, G. Westbrook, and N. Edgar, *Caribbean Marine Geology, Active Margins of the Plate Boundary*, G. Dengo and J. Case (eds.), The Geology of North America, Vol. H., The Caribbean Region, pp. 261–290, Geological Society of America, 1990.

528. Perfit, M., and B. Heezen, *The Geology and Evolution of the Cayman Trench*, Geological Society of America, GSA Bulletin, Vol. 89, pp. 1155–1174, 1978.

529. Rosencrantz, E., *Structure and Tectonics of the Yucatan Basin, Caribbean Sea, as Determined from Seismic Reflection Studies*, Tectonics, Vol. 9, pp. 1037–1059, 1990.

530. Erickson, A., C. Helsley, and G. Simmons, *Heat Flow and Continuous Seismic Profiles in the Cayman Trough and Yucatan Basin*, Geological Society of America Bulletin, Vol. 83, pp. 1241–1260, 1972.

531. Not Used.

532. Not Used.

533. Marple, R., and P. Talwani, *Evidence of Possible Tectonic Upwarping along the South Carolina Coastal Plain from an Examination of River Morphology and Elevation Data*, Geology, Vol. 21, pp. 651–654, 1993.

534. Marple, R., and P. Talwani, *Evidence for a Buried Fault System in the Coastal Plain of the Carolinas and Virginia-Implications for Neotectonics in the Southeastern United States*, Geological Society of America Bulletin, Vol. 112, No. 2, pp. 200–220, 2000.

535. Not Used.

536. Colquhoun, D., I. Woollen, D. Van Nieuwenhuise, G. Padgett, R. Oldham, D. Boylan, P. Howell, and J. Bishop, *Surface and Subsurface Stratigraphy, Structure and Aquifers of the South Carolina Coastal Plain*, Columbia, State of South Carolina, Office of the Governor, Ground Water Protection Division, Report for Department of Health and Environmental Control, p. 78, 1983.

537. Martin, J., and G. Clough, *Seismic Parameters from Liquefaction Evidence*, Journal of Geotechnical Engineering, Vol. 120, No. 8, pp. 1345–1361, 1994.

538. Johnston, A., *Seismic Moment Assessment of Earthquake in Stable Continental Regions — III New Madrid 1811-1812, Charleston 1886 and Lisbon 1755*, Geophysical Journal International, Vol. 126, pp. 314–344, 1996.

539. Bakun, W. and M. Hopper, *Magnitudes and Locations of the 1811-1812 New Madrid, Missouri and the 1886 Charleston, South Carolina Earthquakes*, Bulletin of the Seismological Society of America, Vol. 94, No. 1, pp. 64–75, 2004.

540. Bollinger, G., A. Johnston, P. Talwani, L. Long, K. Shedlock, M. Sibol, and M. Chapman, *Seismicity of the Southeastern United States; 1698-1986*, D. Slemmons, E. Engdahl, M. Zoback, and D. Blackwell, (eds.), Neotectonics of North America: Decade Map Volume to Accompany the Neotectonic Maps, Geological Society of America, 1991.

541. Madabhushi, S., and P. Talwani, *Composite Fault Plane Solutions of Recent Charleston, South Carolina, Earthquakes*, Seismological Research Letters, Vol. 61, No. 3-4, p. 156, 1990.

542. Madabhushi, S., and P. Talwani, *Fault Plane Solutions and Relocations of Recent Earthquakes in Middleton Place Summerville Seismic Zone Near Charleston South Carolina*, Bulletin of the Seismological Society of America, Vol. 83, pp. 1442–1466, 1993.

543. Talwani, P. and M. Katuna, *Macroseismic Effects of the 1886 Charleston Earthquake*, Carolina Geological Society Field Trip Guidebook, 2004.

544. Tarr, A., and B. Rhea, *Seismicity Near Charleston, South Carolina, March 1973 to December 1979*, Studies Related to the Charleston, South Carolina Earthquake of 1886 Tectonics and Seismicity, U.S. Geological Survey, Professional Paper 1313, R1-R17, 1983.

545. Gangopadhyay, A., and P. Talwani, *Fault Intersections and Intraplate Seismicity in Charleston, South Carolina: Insights from a 2-D Numerical Model*, Current Science, Vol. 88, No. 10, 2005.

546. Talwani, P., *An Internally Consistent Pattern of Seismicity near Charleston, South Carolina*, Geology, Vol. 10, No. 12, pp. 654–658, 1982.

547. Tarr, A., P. Talwani, B. Rhea, D. Carver, and D. Amick, *Results of Recent South Carolina Seismological Studies*, Bulletin of the Seismological Society of America, Vol. 71, No. 6, pp. 1883–1902, 1981.

548. Amick, D., *A Reinterpretation of the Meizoseismal Area of the 1886 Charleston Earthquake*, American Geophysical Union, Eos, Transactions, Vol. 61, p. 289, 1980.

549. Amick, D., R. Gelinas, G. Maurath, R. Cannon, D. Moore, E. Billington, and H. Kemppinen, *Paleoliquefaction Features along the Atlantic Seaboard*, U.S. NRC Report, NUREG/CR-5613, 1990.

550. Amick, D., G. Maurath, and R. Gelinas, *Characteristics of Seismically Induced Liquefaction Sites and Features Located in the Vicinity of the 1886 Charleston, South Carolina Earthquake*, Seismological Research Letters, Vol. 61, No. 2, pp. 117–130, 1990.

551. Obermeier, S., G. Gohn, R. Weems, R. Gelinas, and M. Rubin, *Geologic Evidence for Recurrent Moderate to Large Earthquakes near Charleston, South Carolina*, Science, Vol. 22, No. 4685, pp. 408–411, 1985.

552. Obermeier, S., R. Jacobson, J. Smoot, R. Weems, G. Gohn, J. Monroe, and D. Powars, *Earthquake-Induced Liquefaction Features in the Coastal Setting of South Carolina and in the Fluvial Setting of the New Madrid Seismic Zone*, U.S. Geological Survey, Professional Paper 1504, 1990.

553. Talwani, P. and W. Schaeffer, *Recurrence Rates of Large Earthquakes in the South Carolina Coastal Plain Based on Paleoliquefaction Data*, Journal of Geophysical Research, Vol. 106, No. B4, pp. 6621–6642, 2001.

554. Dillon, W., T. Edgar, K. Scanlon, and D. Coleman, *A Review of the Tectonic Problems of the Strike-Slip Northern Boundary of the Caribbean Plate and Examination by Gloria*, J. Gardner, M. Field, and D. Twichell (eds.), Geology of the United States' Seafloor: the View from Gloria, Cambridge University Press, New York, New York, pp. 135–164, 1996.

555. Ballard, R., B. Bryan, H. Dick, K. Emery, G. Thompson, E. Uchupi, K. Davis, J. de Boer, S. DeLong, P. Fox, F. Malcolm, R. Spydell, J. Stroup, W. Melson, and R. Wright, The Cayman Trough Project, Geological and Geophysical Investigation of the Mid-Cayman Rise Spreading Center: Initial Results and Observations, Deep Drilling Results in the Atlantic Ocean: Ocean Crust: American Geophysical Union Maurice Ewing Series, pp. 66-93, 1979.

556. Not Used.

557. Not Used.

558. Tinker, M., *Seismic Reflection Data Analysis of the Orient and Swan Fracture Zones Bounding the Cayman Trough*, CRC Handbook of Geophysical Exploration at Sea, 2d ed., pp. 194–226, 1992.

559. Rosencrantz, E., and P. Mann, *Seamarc II Mapping of Transform Faults in the Cayman Trough, Caribbean Sea*, Geology, Vol. 19, pp. 690–693, 1991.

560. McCann, W., and W. Pennington, *Seismicity, Large Earthquakes, and the Margin of the Caribbean Plate*, G. Dengo and J. Case, J. (eds.), The Geology of North America, Vol. H, The Caribbean Region, Geological Society of America, pp. 291–306, 1990.

561. Westcottt, W., and F. Etheridge, *Eocene Fan Delta-Submarine Fan Deposition in the Wagwater Trough, East-Central Jamaica,* Sedimentology, Vol. 30, pp. 235–247, 1983.

562. Vail, P., R. Mitchum, and R. Thompson, *Seismic Stratigraphy and Global Changes in Sea Level; Part 4, Global Cycles of Relative Changes in Sea Level, in Payton, D.C.*, Seismic Stratigraphy, Applications to Hydrocarbon Exploration, American Association of Petroleum Geologists, Memoir 26, pp. 83–97, 1977.

563. Mann, P., C. Demets, and M. Wiggins-Grandison, *Toward a Better Understanding of the Late Neogene Strike-Slip Restraining Bend in Jamaica: Geodetic, Geological, and Seismic Constraints,* Tectonics of Strike-Slip Restraining and Releasing Bends, Geological Society of London, Special Publication 290, pp. 239–253, 2007.

564. Budd, A., D. McNeill, J. Klaus, A. Peréz, and F. Geraldes, *Paleoecology and Sedimentology of Fossil Coral Reefs in the Dominican Republic, Universidad Autónoma de Santo Domingo, March 16-17, 2006*, University of Miami, National Science Foundation, University of Iowa, 2006.

565. Maurrasse, F., *Survey of the Geology of Haiti Guide to the Field Excursions in Haiti of the Miami Geological Society*, p. 103, Florida International University, Miami, Florida, 1982.

566. Mann, P., G. Draper, and J. Lewis, *An Overview of the Geologic and Tectonic Development of Hispaniola*, P. Mann, G. Draper, and J. Lewis, (eds.), Geologic and Tectonic Development of the North America-Caribbean Plate Boundary in Hispaniola, Geological Society of America, Special Paper 262, pp. 1–28, 1991.

567. Not Used.

568. Donnelly, T., D. Beets, M. Carr, T. Jackson, G. Klaver, J. Lewis, R. Maury, H. Schellenkens, A. Smith, G. Wadge, and D. Westercamp, *History and Tectonic Setting of Caribbean Magmatism,* G. Dengo and J. Case (eds.), The Geology of North America, Vol. H, The Caribbean Region, Geological Society of America, 1990.

569. McCann, W., *Seismotectonics of South and Western Puerto Rico: Muertos Trough, Down Going Seismic Zone and Overriding Plate Seismicity*, U.S.

Geological Survey/NEHRP Final Technical Report, Grant Award No. 06HQGR0152, p. 38, 2006.

570. Prentice, C., P. Mann, I. Pena, and G. Burr, *Slip Rate and Earthquake Recurrence along the Central Septentrional Fault, North American-Caribbean Plate Boundary, Dominican Republic,* Journal of Geophysical Research, Vol. 108, No. B3, 2003.

571. Scherer, J., *Great Earthquakes in the Island of Haiti,* Bulletin of Seismological Society of America, Vol. 2, pp. 161–180, 1912.

572. U.S. Geological Survey, *January 12 Haiti Region Record,* Earthquake Hazards Program: Significant Earthquakes of the World, 2010. Available at http://earthquake.usgs.gov/earthquakes/eqarchives/significant/sig_2010.php, accessed April 28, 2010.

573. Huerfano, V., C. Von Hillebrandt-Andrade, and G. Baez-Sanchez, *Microseismic Activity Reveals Two Stress Regimes in Southwestern Puerto Rico*, P. Mann (ed.), Active Tectonics and Seismic Hazards of Puerto Rico, the Virgin Islands, and Offshore Areas, Geological Society of America, Special Paper 385, pp. 81–103, 2005.

574. Renken, R., W. Ward, L. Gill, F. Gómez-Gómez, J. Rodríguez-Martínez, R. Scharlach, J. Hartley, D. Hubbard, P. McLaughlin, and C. Moore, *Geology and Hydrology of the Caribbean Islands Aquifer System of the Commonwealth of Puerto Rico and the U.S. Virgin Islands*, U.S. Geological Survey, Professional Paper 1419, p. 139, 2002.

575. Not Used.

576. Scanlon, K., and D. Masson, *Sedimentary Processes in a Tectonically Active Region: Puerto Rico North Insular Slope,* J. Gardner, M. Field, and D. Twichell (eds.), Geology of the United States Seafloor: the View from Gloria, pp. 123–134, Cambridge University Press, New York, 1996.

577. Laforge, R., and W. McCann, *A Seismic Source Model for Puerto Rico, for Use in Probabilistic Ground Motion Hazard Analyses*, Geological Society of America, Special Paper 385, pp. 223–249, 2005.

578. Prentice, C., and P. Mann, *Paleoseismic Study of the South Lajas Fault: First Documentation of an Onshore Holocene Fault in Puerto Rico,* P.

Mann, (ed.), Active Tectonics and Seismic Hazards of Puerto Rico, the Virgin Islands, and Offshore Areas, Geological Society of America, Special Paper 285, pp. 215–223, 2005.

579. Tuttle, M., E. Schweig III, J. Campbell, P. Thomas, J. Sims, and R. Lafferty III, *Evidence for New Madrid Earthquakes in A.D. 300 and 2350 B.C.,* Seismological Research Letters, Vol. 76, pp. 489–501, 2005.

580. Not Used.

581. ten Brink, U., and J. Lin, *Stress Interaction Between Subduction Earthquake and Forearc Strike-Slip Faults: Modeling and Application to the Northern Caribbean Plate Boundary,* Journal of Geophysical Research, Vol. 109, B12310, 2004.

582. ten Brink, U., W. Danforth, C. Polloni, B. Andrews, P. Llanes, S. Smith, E. Parker, and T. Uozumi, *New Seafloor Map of the Puerto Rico Trench Helps Assess Earthquake and Tsunami Hazards,* American Geophysical Union, Eos, Transactions, Vol. 85, No. 37, pp. 349–360, 2004.

583. Doull, M., *Turbidite Sedimentation in the Puerto Rico Trench Abyssal Plain* (unpublished Master's thesis), Duke University, p. 124, 1983.

584. Connolly, J., and M. Ewing, *Sedimentation in the Puerto Rico Trench,* Journal of Sedimentary Petrology, Vol. 37, pp. 44–59, 1967.

585. Mondziel, S., N. Grindlay, P. Mann, A. Escalona, and L. Abrams, *Morphology, Structure, and Tectonic Evolution of the Mona Canyon (Northern Mona Passage) from Multibeam Bathymetry, Side Scan Sonar, and Seismic Reflection Profiles,* Tectonics, Vol. 29, 2010.

586. Not Used.

587. Asencio, E., *Western Puerto Rico Seismicity,* U.S. Geological Survey, Open-File Report 80-192, p. 135, 1980.

588. McCann, W., *Microearthquake Data Elucidate Details of Caribbean Subduction Zone,* Seismological Research Letters, Vol. 73, pp. 25–32, 2002.

589. Mueller, C., A. Frankel, M. Petersen, and E. Leyendecker, *New Seismic Hazard Maps for Puerto Rico and the U.S. Virgin Islands,* Earthquake Spectra, Vol. 26, No. 1, pp. 169–187, 2010.

590. Not Used.

591. Dolan, J., and D. Wald, *The 1943-1953 North-Central Caribbean Earthquakes: Active Tectonic Setting, Seismic Hazards, and Implications for Caribbean-North American Plate Motions,* J. Dolan and P. Mann (eds.), Active Strike-Slip and Collisional Tectonics of the Northern Caribbean Plate Boundary Zone, Geological Society of America, Special Paper 326, pp. 143–169, 1998.

592. Granja-Bruña, J., U. ten Brink, A. Carbó-Gorosabel, A. Muñoz-Martín, and M. Gómez-Ballesteros, *Morphotectonics of the Central Muertos Thrust Belt and Muertos Trough (Northeastern Caribbean),* Marine Geology, Vol. 263, pp. 7–33, 2009.

593. ten Brink, U., S. Marshak, and J. Granja Bruna, *Bivergent Thrust Wedges Surrounding Oceanic Island Arcs: Insight from Observations and Sandbox Models of the Northeastern Caribbean Plate,* Geological Society of America Bulletin, Vol. 121, pp. 1522–1536, 2009.

594. Jansma, P., G. Mattioli, A. Lopez, C. DeMets, T. Dixon, P. Mann, and E. Calais, *Neotectonics of Puerto Rico and the Virgin Islands, Northeastern Caribbean, from GPS Geodesy,* Tectonics, Vol. 19, pp. 1021–1037, 2000.

595. Byrne, D., G. Suarez, and W. McCann, *Muertos Trough Subduction-Microplate Tectonics in the Northern Caribbean?* Nature, Vol. 317, pp. 420–421, 1985.

596. McCann, W., *Amenaza de Terremoto en la Hispaniola,* Conferencia Internacional Sobre Reducción de Riesgo Sísmico en la Región Del Caribe, Segundo Seminario Dominicano de Ingeniería Sísmica, Santiago, Dominican Republic, 2001.

597. McCann, W., *The Muertos Subduction Zone as a Major Earthquake and Tsunami Hazard for Puerto Rico,* American Geophysical Union, EOS, Transactions, Vol. 88, No. 23, Abstract S52A-03, 2007.

598. Jany, I., K. Scanlon, and A. Mauffret, *Geological Interpretation of Combined Seabeam, Gloria and Seismic Data from Anegada Passage (Virgin Islands, North Caribbean),* Marine Geophysical Researches, Vol. 12, No. 3, pp. 173–196, 1990.

599. Fink, L., and C. Harrison, *Palaeomagnetic Investigations of Selected Lava Units on Puerto Rico,* Proceedings of the 6th Caribbean Geological Conference, p. 379, 1972.

600. McCann, W., *On the Earthquake Hazard of Puerto Rico and the Virgin Islands,* Bulletin of the Seismological Society of America, Vol. 75, pp. 251–262, 1985.

601. Arden D., *Geology of Jamaica and the Nicaraguan Rise,* F. Stehli (ed.), The Ocean Basins and Margins: The Gulf of Mexico and the Caribbean, pp. 617- 661, New York Plenum Press, 1975.

602. Duncan, D., A. Hine, and A. Droxler, *Tectonic Controls on Carbonate Sequence Formation in an Active Strike-Slip Setting: Serranilla Basin, Northern Nicaraguan Rise, Western Caribbean Sea*, Marine Geology, Vol. 160, pp. 355–382, 1999.

603. Rogers, R., P. Mann, P. Emmet, and M. Venable, *Colon Fold Belt of Honduras: Evidence for Late Cretaceous Collision between the Continental Chortis Block and Intraoceanic Caribbean Arc,* P. Mann (ed.), Geologic and Tectonic Development of the Caribbean Plate Boundary in Northern Central America, Geological Society of America, Special Paper 428, 2007.

604. Sinton, C., H. Sigurdsson, and R. Duncan, *Chapter 15: Geochronology and Petrology of the Igneous Basement at the Lower Nicaraguan Rise, Site 1001,* R. Leckie, H. Sigurdsson, G. Acton, and G. Draper (eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 165, pp. 233–236, 2000.

605. Saunders, J., N. Edgar, T. Donnelly, and W. Hay, *Cruise Synthesis,* Initial Reports of the Deep Sea Drilling Project, Vol. 15, pp. 1077–1111, U.S. Government Printing Office, 1973.

606. Sinton, C., R. Duncan, M. Storey, J. Lewis, and J. Estrada, *An Oceanic Flood Basalt Province at the Core of the Caribbean Plate,* Earth Planet Science Letters, Vol. 155, pp. 222–235, 1998.

607. Bowland, C., *Depositional History of the Western Colombian Basin, Caribbean Sea, Revealed by Seismic Stratigraphy,* Geological Society of America Bulletin, Vol. 105, pp. 1321–3145, 1993.

608. James, K., *In Situ Origin of the Caribbean: Discussion of Data,* K. James, M. Lorente, and J. Pindell (eds.), The Origin and Evolution of the Caribbean Plate, Geological Society of London, Special Publication 328, pp. 77–126, 2009.

609. Ocean Drilling Program Shipboard Scientific Party, *Chapter 1. Introduction: Geologic Studies of the Caribbean,* H. Sigurdsson, R. Leckie, and G. Acton., et al. (eds.), Proceedings Ocean Drilling Program, Initial Reports, Vol. 165, pp. 7–13, 1997.

610. Kerr, A., J. Tarney, G. Marriner, A. Nivia, and A. Saunders, *The Caribbean-Colombian Cretaceous Igneous Province: The Internal Anatomy of an Oceanic Plateau,* J. Mahoney and M. Coffin (eds.), Large Igneous Provinces, Continental, Oceanic, and Planetary Flood Volcanism, Geophysical Monograph 100, pp. 123–144, American Geophysical Union, 1997.

611. Revillon, S., E. Hallot, N. Arndt, C. Chauvel, and R. Duncan, *A Complex History for the Caribbean Plateau: Petrology, Geochemistry, and Geochronology of the Beata Ridge, South Hispaniola,* The Journal of Geology, Vol. 108, pp. 641–661, University of Chicago, 2000.

612. Ewing, J., J. Antoine, and M. Ewing, *Geophysical Measurements in the Western Caribbean Sea and in the Gulf of Mexico,* Journal of Geophysical Research, Vol. 75, pp. 5655–5669, 1960.

613. Bowland, C., and E. Rosencrantz, *Upper Crustal Structure of the Western Colombian Basin, Caribbean Sea,* Geological Society of America Bulletin, Vol. 100, pp. 534–546, 1988.

614. Bowin, C., *The Caribbean Gravity Field and Plate Tectonics*, p. 79, Geological Society of America, Special Paper 69, 1976.

615. Kellogg, J., and W. Bonini, *Subduction of the Caribbean Plate and Basement Uplifts in the Overriding South American Plate,* Tectonics, Vol. 1, pp. 251–276, 1982.

616. Diebold, J., P. Stoffa, P. Buhl, and M. Truchan, *Venezuelan Basin Crustal Structure,* Journal of Geophysical Research, Vol. 86, pp. 7901–7923, 1981.

617. Diebold, J., N. Driscoll, I. Abrams, T. Donnelly, E. Laine, and S. Leroy, *Tectonic Model for the Origin and Evolution of the Rough/Smooth Basement in the Venezuelan Basin,* Eos, Transactions, Vol. 76, T42B-5, 1995.

618. Ghosh, N., S. Hall, and J. Casey, *Seafloor Spreading Magnetic Anomalies in the Venezuelan Basin,* The Caribbean-South American Plate Boundary and Regional Tectonics, Vol. 162, pp. 65–80, 1984.

619. Bader, R., R. Gerard, W. Benson, H. Bolli, W. Hay, W. Rothwell, M. Ruef, W. Riedel, and F. Sayles, *Introduction: Initial Reports of the Deep Sea Drilling Project*, Vol. 4, U.S. Government Printing Office, p. 753, 1970.

620. Edgar, N., J. Saunders, H. Bolli, R. Boyce, T. Donnelly, W. Hay, F. Maurrasse, W. Prell, I. Premoli-Silva, W. Riedel, and N. Schneidermann, *Chapter 8, Site 153, Initial Reports of the Deep Sea Drilling Project*, Vol. 15, N. Edgar, J. Saunders, et al. (eds.), pp. 367–406, Washington, D.C., U.S. Government Printing Office, 1973.

621. Leroy, S., and A. Mauffret, *Intraplate Deformation in the Caribbean Region,* Journal of Geodynamics, Vol. 21, No. 1, pp. 113–122, Elsevier Science, Great Britain, 1996.

622. Not Used.

623. Burke, K., P. Fox, and A. Sengor, *Buoyant Ocean Floor and the Evolution of the Caribbean,* Journal of Geophysical Research, Vol. 83, No. B8, pp. 3949–3954, 1978.

624. Ladd, J., and J. Watkins, *Seismic Stratigraphy of the Western Venezuela Basin,* Marine Geology, Vol. 35, pp. 21–41, 1980.

625. Talwani, M., C. Windisch, P. Stoffa, P. Buhl, and R. Houtz, *Multichannel Seismic Study in the Venezuelan Basin and the Curacao Ridge,* M.

Talwani, M. and W. Pitman (eds.), Island Arcs, Deep Sea Trenches and Back-Arc Basins, Maurice Ewing Series 1, pp. 83–99, American Geophysical Union, 1977.

626. Fox, P., W. Ruddiman, W. Ryan, and B. Heezen, *The Geology of the Caribbean Crust, I: Beata Ridge,* Tectonophysics, Vol. 10, pp. 495–513, 1970.

627. Not Used.

628. Mauffret, A., S. Leroy, J. Vila, E. Hallot, B. Mercier de LéPinay, and R. Duncan, *Prolonged Magmatic and Tectonic Development of the Caribbean Igneous Province Revealed by a Diving Submersible Survey*, Marine Geophysical Researches, Vol. 22, pp. 17–45, 2001.

629. Donnelly, T., *Magnetic Anomaly Observations in the Eastern Caribbean Sea,* N. Edgar, J. Saunders, et al. (eds.), Initial Reports of the Deep Sea Drilling Project: Washington, D.C., Vol. 15, pp. 1023–1030, U.S. Government Printing Office, 1973.

630. Mauffret, A., and S. Leroy, *Neogene Intraplate Deformation of the Caribbean Plate at the Beata Ridge,* Mann, P. (ed.), Caribbean Basins - Sedimentary Basins of the World, Vol. 4, pp. 627–669, 1999.

631. U.S. Geological Survey, *Caribbean Seismicity 1900-1994*, Open-File Report 98-223, National Earthquake Information Center and Middle America Seismograph (Midas) Consortium, 1 Oversize Sheet, Scale 1:6,500,000, 1998.

632. Molnar, P., and L. Sykes, *Tectonics of the Caribbean and Middle America Regions from Focal Mechanisms and Seismicity,* Geological Society of America Bulletin, Vol. 80, pp. 1639–1684, 1969.

633. Kafka, A., and D. Weidner, *Earthquake Focal Mechanisms and Tectonic Processes along the Southern Boundary of the Caribbean Plate* Journal of Geophysical Research, Vol. 86, pp. 2877–2999, 1981.

634. Not Used.

635. Demets, C., G. Mattioli, P. Jansma, R. Rogers, C. Tenorio, and H. Turner, *Present Motion and Deformation of the Caribbean Plate: Constraints from New GPS Geodetic Measurements from Honduras and Nicaragua,* P.

Mann (ed.), Geologic and Tectonic Development of the Caribbean Plate in Northern Central America, Geological Society of America, Special Paper 428, pp. 21–36, 2007.

636. Mann, P., *Earthquakes Shakes the Big Bend Region of North American-Caribbean Boundary Zone,* Eos, Transactions, Vol. 85, No. 8, pp. 77–83, American Geophysical Union, 2004.

637. Dolan, J., H. Mullins, and D. Wald, *Active Tectonics of the North-Central Caribbean: Oblique Collision, Strain Partitioning, and Opposing Subducted Slabs,* J. Dolan and P. Mann (eds.), Active Strike-Slip and Collisional Tectonics of the Northern Caribbean Plate Boundary Zone, Geological Society of America, Special Paper 326, pp. 1–61, 1998.

638. Dolan, J., and D. Bowman, *Tectonic and Seismologic Setting of the 22 September 2003, Puerto Plata, Dominican Republic Earthquake: Implications for Earthquake Hazard in Northern Hispaniola,* Seismological Research Letters, Vol. 75, No. 5, 2004.

639. Mann, P., F. Taylor, R. Edwards, T. Ku, *Actively Evolving Microplate Formation by Oblique Collision and Sideways Motion Along Strike-Slip Faults: An Example from the Northeastern Caribbean Plate Margin,* Tectonophysics, Vol. 246, pp. 1–69, 1995.

640. Van Dusen, S., and D. Doser, *Faulting Processes of Historic (1917-1962) M6.0 Earthquakes Along the North-Central Caribbean Margin,* Pure and Applied Geophysics, Vol. 157, pp. 719–736, 2000.

641. McCann, W., *Estimating the Threat of Tsunamigenic Earthquakes and Earthquake Induced Landslide Tsunami the Caribbean,* Caribbean Tsunami Hazard, Proceedings of the National Science Foundation Caribbean Tsunami Workshop, March 2004, pp. 43–65, World Scientific Publishing Co., Singapore, 2006.

642. Not Used.

643. Manaker, D., E. Calais, A. Freed, S. Ali, P. Przybylski, G. Mattioli, and P. Jansma, *Interseismic Plate Coupling and Strain Partitioning in the Northeastern Caribbean,* Geophysical Journal International, Vol. 174, pp. 889–903, 2008.

644. Not Used.

645. Osiecki, P., *Estimated Intensities and Probable Tectonic Sources of Historic (Pre-1898) Honduran Earthquakes,* Bulletin of the Seismological Society of America, Vol. 71, No. 3, pp. 865–881, 1981.

646. Richardson, R., and L. Reding, *North American Plate Dynamics,* Journal of Geophysical Research, Vol. 96, pp. 12,201–12,223, 1991.

647. Humphreys, E., and D. Coblentz, *North American Dynamics and Western U.S. Tectonics,* Review of Geophysics, Vol. 45, p. RG3001, 2007.

648. Not Used.

649. DeMets, C., R. Gordon, D. Argus, and S. Stein, *Current Plate Motions,* Geophysical Journal International, Vol. 101, pp. 425–478, 1990.

650. Demets, C., *Earthquake Slip Vectors and Estimates of Present-Day Plate Motions,* Journal of Geophysical Research, Vol. 98, pp. 6703–6714, 1993.

651. Pollitz, F., and T. Dixon, *GPS Measurements Across the Northern Caribbean Plate Boundary Zone: Impact of Postseismic Relaxation Following Historic Earthquakes,* Geophysical Research Letters, Vol. 25, No. 12, pp. 2233–2236, 1998.

652. Ali, S., A. Freed, E. Calais, D. Manaker, and W. McCann, *Coulomb Stress Evolution in Northeastern Caribbean Over the Past 250 Years Due to Coseismic, Postseismic and Interseismic Deformation,* Geophysical Journal International, Vol. 174, pp. 904–918, 2008.

653. Jordan, T., *The Present-Day Motions of the Caribbean Plate,* Journal of Geophysical Research, Vol. 80, No. 32, pp. 4433–4439, 1975.

654. Stein, S. et al., *A Test of Alternative Caribbean Plate Relative Motion Models,* Journal of Geophysical Research, Vol. 93, No. B4, pp. 3041–3050, 1988.

655. Mann, P., K. Burke, and T. Matumoto, *Neotectonics of Hispaniola: Plate Motion, Sedimentation, and Seismicity at a Restraining Bend,* Earth and Planetary Science Letters, Vol. 70, pp. 311–324, 1984.

656. Not Used.

657. Grindlay, N., P. Mann, and J. Dolan, *Researchers Investigate Submarine Faults North of Puerto Rico,* American Geophysical Union, EOS, Transactions, Vol. 78, p. 404, 1997.

658. Prentice, C., P. Mann, F. Taylor, G. Burr, and S. Valastro, *Paleoseismicity of the North American-Caribbean Plate Boundary (Septentrional Fault), Dominican Republic,* Geology, Vol. 21, pp. 49–52, 1993.

659. Not Used.

660. Sykes, L., W. McCann, and A. Kafka, *Motion of Caribbean Plate During Last Seven Million Years and Implications for Earlier Cenozoic Movements,* Journal of Geophysical Research, Vol. 87, pp. 10,656–10,676, 1982.

661. Not Used.

662. Wells, D. and K. Coppersmith, *New Empirical Relationships Among Magnitude, Rupture Length, Rupture Width, Rupture Area, and Surface Displacement*, Bulletin of the Seismological Society of America, Vol. 84, No. 4, pp. 974–1002, 1994.

663. Lundgren, P., and R. Russo, *Finite Element Modeling of Crustal Deformation in the North America-Caribbean Plate Boundary Zone,* Journal of Geophysical Research, Vol. 101, No. B5, pp. 11,317–11,327, 1996.

664. Mann, P., E. Calais, J-C. Ruegg, C. Demets, P. Jansma, and G. Mattioli, *Oblique Collision in the Northeastern Caribbean from GPS Measurements and Geological Observations,* Tectonics, Vol. 21, No. 1057, 2002.

665. Kelleher, J., L. Sykes, and J. Oliver, *Possible Criteria for Predicting Earthquake Locations and their Application to Major Plate Boundaries of the Pacific and the Caribbean,* Journal of Geophysical Research, Vol. 78, pp. 2547–2585, 1973.

666. Russo, R., and A. Villaseñor, *The 1946 Hispaniola Earthquake and the Tectonics of North America-Caribbean Plate Boundary Zone, Northeast Hispaniola,* Journal of Geophysical Research, Vol. 100, pp. 6265–6280, 1995.

667. Hayes, G., *Finite Fault Model Updated Result of the Jan 12, 2010 M_W 7.0 Haiti Earthquake*, National Earthquake Information Center of the USGS. Available at http://earthquake.usgs.gov/earthquakes/eqinthenews/2010/us2010rja6/finite_fault.php, accessed August 14, 2010.

668. Hanks, T., and H. Kanamori, *A Moment Magnitude Scale*, Journal of Geophysical Research, Vol. 84, No. B5, pp. 2348–2351, 1970.

669. Masson, D., and K. Scanlon, *The Neotectonic Setting of Puerto Rico,* Geological Society of America Bulletin, Vol. 103, No. 1, pp. 144–154, 1991.

670. Van Gestel, J., P. Mann, J. Dolan, and N. Grindlay, *Structure and Tectonics of the Upper Cenozoic Puerto Rico-Virgin Islands Carbonate Platform as Determined from Seismic Reflection Studies,* Journal of Geophysical Research, Vol. 103, No. B12, pp. 30,505–30,530, 1998,

671. McCann, W., *Tsunami Hazard of Western Puerto Rico from Local Sources: Characteristics of Tsunamigenic Faults*, Earth Scientific Consultants Report Submitted to Dr. Aurelio Mercado, Department of Marine Sciences, University of Puerto Rico, Mayaguez, Puerto Rico, p. 88, 1998.

672. Reid, H., and S. Taber, T*he Puerto Rico Earthquake of 1918, with Descriptions of Earlier Earthquakes (Report of the Earthquake Investigation Commission)*, House of Representatives Document 269, Washington, D.C., p. 74, 1919.

673. Hornbach, M., S. Mondziel, N. Grindlay, C. Frolich, and P. Mann, *Did a Submarine Landslide Trigger the 1918 Puerto Rico Tsunami?* Science of Tsunami Hazards, Vol. 27, No. 2, pp. 22–31, 2008.

674. Not Used.

675. ten Brink, U., *High-Resolution Bathymetric Map of the Puerto Rico Trench: Implications for Earthquake and Tsunami Hazards,* Seismological Research Letters, Vol. 74, No. 2, p. 230, 2003.

676. Sykes, L., and M. Ewing, *The Seismicity of the Caribbean Region,* Journal of Geophysical Research, Vol. 70, No. 5065, pp. 5–74, 1965.

677. Shepherd, J., J. Tanner, and L. Lynch, *A Revised Earthquake Catalog for the Eastern Caribbean 1530-1992,* Proceedings, Steering Committee Meeting: Melbourne, Florida, Latin American and Caribbean Seismic Hazard Project, April 1992, pp. 95–158, 1994.

678. Not Used.

679. Grindlay, N., L. Abrams, L. Del Greco, and P. Mann, *Toward an Integrated Understanding of Holocene Fault Activity in Western Puerto Rico: Constraints from High-Resolution Seismic and Sidescan Sonar Data,* P. Mann (ed.), Active Tectonics and Seismic Hazards of Puerto Rico, the Virgin Islands, and Offshore Areas, Geological Society of America, Special Paper 385, pp. 139–161, 2005.

680. Not Used.

681. Doser, D., C. Rodriguez, and C. Flores, *Historical Earthquakes of the Puerto Rico-Virgin Islands Region (1915-1963)*, Geological Society of America, Special Paper 385, pp. 103–115, 2005.

682. Horton, J., Jr., A. Drake, and D. Rankin, *Tectonostratigraphic Terranes and their Paleozoic Boundaries in the Central and Southern Appalachians,* R. Dallmeyer (ed.), Terranes in the Circum-Atlantic Paleozoic Orogens, Geological Society of America, Special Paper 230, pp. 213–245, 1989.

683. Hatcher, R., B. Bream, and A. Merschat, *Tectonic Map of the Southern and Central Appalachians: a Tale of Three Orogens and a Complete Wilson Cycle,* 4-D Framework of Continental Crust, Geologic Society of America, Memoir 200, pp. 595–632, 2007.

684. Nance, R., and U. Linnemann, *The Rheic Ocean: Origin, Evolution, and Significance,* Geological Society of America, GSA Today, Vol. 18, No. 12, 2008.

685. Nelson, K., J. Arnow, J. McBride, J. Willemin, J. Huang, L. Zheng, J. Oliver, L. Brown, and S. Kaufman, *New COCORP Profiling in the Southeastern United States. Part I: Late Paleozoic Suture and Mesozoic Rift Basin,* Geology, Vol. 13, pp. 714–718, 1985.

686. Veevers, J., *Gondwanaland from 650-500 Ma Assembly Through 320 Ma Merger in Pangea to 185-100 Ma Breakup: Supercontinental Tectonics via*

Stratigraphy and Radiometric Dating, Earth Science Reviews, Vol. 68, 2004.

687. Schlager, W., J. Austin, W. Corso, et al., *Early Cretaceous Platform Re-Entrant and Escarpment Erosion in the Bahamas,* Geology, Vol. 12, No. 3, pp. 147–150, 1984.

688. Not Used.

689. Renne, P., J. Mattinson, C. Hatten, M. Somin, T. Onstott, G. Millan, and E. Linares, *$^{40}Ar/^{39}Ar$ and U-Pb Evidence for Late Proterozoic (Grenville-Age) Continental Crust in North-Central Cuba and Regional Tectonic Implications,* Precambrian Research, Vol. 42, pp. 325–341, 1989.

690. Iturralde-Vinent, M. and E. Lidiak, *Caribbean Tectonic, Magmatic, Metamorphic, and Stratigraphic Events - Implications for Plate Tectonics,* Geologica Acta, Vol. 4 No. 12, pp. 1–5, 2006.

691. Giunta, G., L. Beccaluva, and F. Siena, *Caribbean Plate Margin Evolution: Constraints and Current Problems,* M. Iturralde-Vinent and E. Lidiak (eds.) Geologica Acta, Vol. 4, No. 1-2, pp. 265–278, 2006.

692. Schettino, A., and E. Turco, *Breakup of Pangea and Plate Kinematics of the Central Atlantic and Atlas Regions,* Geophysical Journal International, Vol. 178, pp. 1078–1097, 2009.

693. Not Used.

694. Heatherington, A., and P. Mueller, *Geochemical Evidence for Triassic Rifting in Southwest Florida,* Tectonophysics, Vol. 188, pp. 291–302, 1991.

695. Heatherington, A., and P. Mueller, *Lithospheric Sources of North Florida, USA, Tholeiites and Implications for the Origin of the Suwannee Terrane,* Lithos, Vol. 46, No. 2, pp. 215–233, 1999.

696. Pindell, J., and L. Kennan, *Kinematic Evolution of the Gulf of Mexico and Caribbean,* GCSSEPM Foundation 21st Annual Research Conference Transactions, Petroleum Systems of Deep-Water Basins, pp. 193–220, 2001.

697. Gordon, M., P. Mann, D. Caceres, and R. Flores, *Cenozoic Tectonic History of the North American-Caribbean Plate Boundary in Western*

Cuba, Journal of Geophysical Research, Vol. 102, No. B5, pp. 10,055–10,082, 1997.

698. Not Used.

699. Mann, P., M. Hempton, D. Bradley, and K. Burke, *Development of Pull-Apart Basins,* Journal of Geology, Vol. 91: pp. 529–554, 1983.

700. Dahlen, F., *Isostasy and the Ambient State of Stress in the Oceanic Lithosphere,* Journal of Geophysical Research, Vol. 86, pp. 7801–7807, 1981.

701. Not Used.

702. Zoback, M., J. Adams, M. Assumpcao, S. Bell, and E. Bergman, *Global Patterns of Tectonic Stress,* Nature, Vol. 341, pp. 291–298, 1989.

703. Reinecker, J., O. Heidbach, M. Tingay, B. Sperner, and B. Müller, *The 2005 Release of the World Stress Map*, 2005. Available at http://www-wsm.physik.uni-karlsruhe.de/pub/maps/, accessed July 21, 2008.

704. Zoback, M., *Stress Field Constraints on Intraplate Seismicity in Eastern North America,* Journal of Geophysical Research, Vol. 97, No. B8, pp. 11,761–11,782, 1992.

705. Zoback, M., and M. Zoback, *Tectonic Stress Field of North America and Relative Plate Motions,* Neotectonics of North America, Decade Map, Vol. 1, Geological Society of America, Boulder, Colorado, 1991.

706. Coblentz, D., R. Richardson, and M. Sandiford, *On the Gravitational Potential of the Earth's Lithosphere,* Tectonics, Vol. 13, pp. 929–945, 1994.

707. Zoback, M., and M. Zoback, *Tectonic Stress Field of the Continental United States,* Geophysical Framework of the Continental United States, Geological Society of America, Memoir 172, Boulder, Colorado, 1989.

708. MACTEC Engineering and Consulting, Inc., *Final Data Report—Geotechnical Exploration and Testing: Turkey Point COL Project Florida City, Florida*, Rev. 2, included in COL Application Part 11, October 6, 2008.

709. Dunham, R., *Classification of Carbonate Rocks According to Depositional Texture,* Classification of Carbonate Rocks: a Symposium, Memoir 1, pp. 108–121, American Association of Petroleum Geologists, 1962.

710. Gupton, C., and S. Berry, *Mat Foundations on Miami Limestone*, presented to the Florida Section of American Society of Civil Engineers, Orlando, Florida, Meeting, September 24, 1976.

711. Lidz, B., C. Reich, and E. Shinn, *Regional Quaternary Submarine Geomorphology in the Florida Keys,* Geological Society of America Bulletin, Vol. 115, No. 7, pp. 845–866, Scale 1:65,000, July 2003.

712. Florida Power & Light Company, Updated *Final Safety Analysis Report, Turkey Point Nuclear Units 3 & 4*, Docket Nos. 50-250 and 50-251, Section 2.9, Miami-Dade County, Florida, 1992.

713. Enos, P., and R. Perkins, *Quaternary Sedimentation in South Florida*, Geological Society of America, Memoir 147, 1977.

714. Reese, R., and K. Cunningham, *Hydrogeology of the Gray Limestone Aquifer in Southern Florida*, U.S. Geological Survey, Water-Resources Investigations Report 99-4213, 2000.

715. Green, R., K. Campbell, and T. Scott, *Surficial and Bedrock Geology of the Eastern Portion of the U.S.G.S, 1:100,000 Scale Homestead Quadrangle*, Florida Geological Survey, Open-File Map Series 83/01-07, 2 Maps, 5 Cross Sections, 1995.

716. Palmer, A., *Origin and Morphology of Limestone Caves,* Geological Society of America Bulletin, Vol. 103, pp. 1–21, 1991.

717. Gombert, P., *Role of Karstic Dissolution in Global Carbon Cycle,* Global and Planetary Change, Vol. 33, pp. 177–184, 2002.

718. Not Used.

719. Lane, E., *Karst in Florida*, Special Publication 29, Florida Geological Survey, 1986.

720. Not Used.

721. Renken, R., J. Dixon, J. Koehmstedt, S. Ishman, A. Lietz, R. Marella, P. Telis, J. Rogers, and S. Memberg, *Impact of Anthropogenic Development on Coastal Ground-Water Hydrology in Southeastern Florida*, 1900-2000, U.S. Geological Survey, Circular 1275, 2005.

722. Parker, G., G. Ferguson, and S. Love, et al., *Water Resources of Southeast Florida*, U.S. Geological Survey, Water Supply Paper 1255, 1955.

723. Cunningham, K., J. Carlson, G. Wingard, E. Robinson, and M. Wacker, *Characterization of Aquifer Heterogeneity Using Cyclostratigraphy and Geophysical Methods in the Upper Part of the Karstic Biscayne Aquifer*, Southeastern Florida, U.S. Geological Survey, Water-Resources Investigations Report 2003-4208, 2004.

724. Vanlier, K., J. Armbruster, Z. Altschuler, and H. Mattraw, *Natural Hazards in Resource and Land Information for South Dade County*, U.S. Geological Survey, Florida Geological Survey Investigation I-850, 1973.

725. Twichell, D., W. Dillon, C. Paull, and N. Kenyon, *Morphology of Carbonate Escarpments as an Indicator of Erosional Processes,* J. Gardner, M. Field, and D. Twichell (eds.), Geology of the United States' Seafloor: the View from Gloria, Cambridge University Press, New York, pp. 97–108, 1996.

726. Twichell, D., P. Valentine, and L. Parson, *Slope Failure of Carbonate Sediment on the West Florida Slope,* in W. Schwab, H. Lee, and D. Twichell (eds.), Submarine Landslides: Selected Studies in the U.S. Exclusive Economic Zone, U.S. Geological Survey, Bulletin 2002, pp. 69–78, 1993.

727. Fulthorpe, C., and A. Melillo, *Chapter 12, Middle Miocene Carbonate Gravity Flows in the Straits of Florida at Site 626,* J. Austin, Jr., and W. Schlager (eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 101, pp. 179–191, 1988.

728. Gradstein, F., and R. Sheridan, *Introduction,* R. Sheridan and F. Gradstein (eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 76, U.S. Government Printing Office, 1983.

729. Tappin, D., *Submarine Mass Failures as Tsunami Sources: Their Climate Control,* Philosophical Transactions of the Royal Society, Vol. 368, pp. 2417–2434, 2010.

730. Ward, S., and S. Day, *Cumbre Vieja Volcano - Potential Collapse and Tsunami at La Palma, Canary Islands,* Geophysics Research Letters, Vol. 28, No. 17, pp. 3397–3400, 2001.

731. Pararas-Carayannis, G., *Risk Assessment of Tsunami Generation from Active Volcanic Sources in the Eastern Caribbean Region,* A. Mercado-Irizarry, and P. Lium (eds.), Caribbean Tsunami Hazards, Proceedings of the NSF Caribbean Tsunami Workshop, pp. 91–137, World Scientific Publishing Co., 2006.

732. Gardner, J., M. Field, and D. Twichell, *Geology of the United States Seafloor - The View from Gloria,* Cambridge University Press, Cambridge, New York, p. 364, 1996.

733. Not Used.

734. Pilkey, O., *Sedimentology of Abyssal Plains,* E. Weaver (ed.), Geology and Geochemistry of Abyssal Plains, Geological Society of London, Special Publication, No. 31, pp. 1–12, 1987.

735. Dunbar, P., and G. Weaver, *U.S. States and Territories National Tsunami Hazard Assessment: Historical Record and Sources for Waves*, National Tsunami Hazard Mitigation Program, 2008.

736. Bodle, R., and L. Murphy, *Tidal Disturbances of Seismic Origin, United States Earthquakes, 1946*, U.S. Department of Commerce, Coast and Geodetic Survey, Government Printing Office, Washington, D.C., p. 23, 1948.

737. Gutenberg, B., and C. Richter, *Seismicity of the Earth and Associated Phenomena*, Princeton University Press, 1954.

738. López-Vanegas, A., U. ten Brink, and E. Geist, *Submarine Landslide as the Source for the October 11, 1918 Mona Passage Tsunami: Observations and Modeling,* Marine Geology, Vol. 254, pp. 35–46, 2008.

739. Lander, J., L. Whiteside, and P. Lockridge, *A Brief History of Tsunamis in the Caribbean Sea in Science of Tsunami Hazards*, Vol. 20, No. 1, p. 61, 2002.

740. Ocean Drilling Program Shipboard Scientific Party, *Chapter 5. Site 626: Straits of Florida,* J. Austin, Jr., and W. Schlager (eds.), Proceedings of the Ocean Drilling Program, Initial Report, Vol. 101, pp. 49–109, 1986.

741. Brooks, I., *Fluctuations in the Transport of the Florida Current at Periods Between Tidal and Two Weeks,* M. Iturralde-Vinent (ed.), Journal of Physical Oceanography, Vol. 9, pp. 1048–1053, 1979.

742. *Geología de Cuba Para Todos, Edición Científica,* Museo Nacional de Historia Natural-CITMA, Preprint, p. 114, 2009.

743. Knight, B., *Model Predictions of Gulf and Southern Atlantic Coast Tsunami Impacts from a Distribution of Sources,* Science of Tsunami Hazards, Vol. 24, No. 5, pp. 304–313, 2006.

744. Kowalik, Z., W. Knight, T. Logan, and P. Whitmore, *Numerical Modeling of the Global Tsunami, Indonesian Tsunami of 26 December 2004*, Science of Tsunami Hazards, Vol. 23, pp. 40–56, 2005.

745. Okada, Y., *Surface Deformation due to Shear and Tensile Faults in a Half-Space,* Bulletin of the Seismological Society of America, Vol. 75, No. 4, pp. 1135–1154, 1985.

746. Atlantic and Gulf of Mexico Tsunami Hazard Assessment Group, *Evaluation of Tsunami Sources with the Potential to Impact the U.S. Atlantic and Gulf Coasts*, an Updated Report to the U.S. NRC, p. 322, 2007.

747. Miller, J., *Ground Water Atlas of the United States - Segment 6, Alabama, Florida, Georgia, and South Carolina,* U.S. Geological Survey, Hydrologic Investigations Atlas, No. HA-730G, p. 28, 1990.

748. Jones, D., *Chapter 7: The Marine Invertebrate Fossil Record of Florida,* A. Randazzo, and D. Jones (eds.), The Geology of Florida, University of Florida Press, Gainesville, Florida, pp. 89–118, 1997.

749. Barnett, T., *Recent Changes in Sea Level: a Summary,* Sea-Level Change, pp. 37–51, National Research Council, Geophysics Study Committee, National Academy Press, Washington D.C., 1990.

750. Lowrey, L., *Sedimentary Evidence of Coastal Response to Holocene Sea-Level Change, Blackwater Bay, Southwest Florida,* Fifteenth Keck Research Symposium in Geology Proceedings, Amherst College, Amherst, Massachusetts, pp. 81–84, 2002.

751. Parkinson, R., *Decelerating Holocene Sea-Level Rise and Its Influence in Southwest Florida Coastal Evolution: a Transgressive/Regressive Stratigraphy,* Journal of Sedimentary Petrology, Vol. 59, pp. 960–972, 1989.

752. Parkinson R., *Holocene Sedimentation and Coastal Response to Rising Sea Level Along a Subtropical Low Energy Coast, Ten Thousand Islands, Southwest Florida* (unpublished Ph.D dissertation), University of Miami, p. 224, 1987.

753. Davis, R., S. Knowles, and M. Bland, *Role of Hurricanes in the Holocene Stratigraphy of Estuaries: Examples from the Gulf Coast of Florida,* Journal of Sedimentary Petrology, Vol. 59, pp. 1052–1061, 1989.

754. Tedesco, L., H. Wanless, L. Scusa, J. Risi, and S. Gelsanliter, *Impact of Hurricane Andrew on South Florida's Sand Coastlines,* Journal of Coastal Research, Special Issue 21, pp. 59–82, 1995.

755. Goodbred, S., E. Wright, and A. Hine, *Sea-Level Change and Storm-Surge Deposition in a Late Holocene Florida Salt Marsh,* Journal of Sedimentary Research, Vol. 68, No. 2, pp. 240–252, March 1998.

756. Wanless, H., L. Tedesco, J. Risi, B. Bischof, and S. Gelsanliter, *The Role of Storm Processes on the Growth and Evolution of Coastal and Shallow Marine Sedimentary Environments in South Florida,* 1st SEPM Congress on Sedimentary Geology, Field Trip Guidebook, 1995.

757. Wanless, H., R. Parkinson, and L. Tedesco, *Sea Level Control on Stability of Everglades Wetlands*, S. Davis, and J. Ogden (eds.), Everglades, The Ecosystem and its Restoration, pp. 199–222, St. Lucie Press, 1994.

758. Bakun, W., A. Johnston, and M. Hopper, *Modified Mercalli Intensities (MMI) for Large Earthquakes Near New Madrid, Missouri, in 1811-1812 and Near Charleston, South Carolina, in 1886*, U.S. Geological Society, Open-File Report 02-184, p. 31, 2002.

759. Torsvik, T., *The Rodinia Jigsaw Puzzle*, Science, Vol. 300, pp. 1379–1381, 2003.

760. U.S. Geological Survey, *Introduction: Subsurface Characterization of Selected Water Bodies in the St. Johns River Water Management District, Northeast Florida*, USGS Open-File Report 00-180, p. 8, 2000.

761. Takashima, R., H. Nishi, H., Huber, and R. Leckie, *Greenhouse World and the Mesozoic Ocean*, Oceanography, Vol. 19, No. 4, pp. 82–92, 2006.

762. Not Used.

763. Not Used.

764. Hine, A., G. Brooks, R. Davis, Jr., D. Duncan, S. Locker, D. Twichell, and F. Gelfenbaum, *The West-Central Florida Inner Shelf and Coastal System: a Geologic Conceptual Overview and Introduction to the Special Issue*, Marine Geology, Vol. 200, pp. 1–17, 2003.

765. Not Used.

766. Noble, C., R. Drew, and J. Slabaugh, *Soil Survey of Dade County, Florida*, Natural Resource Conservation Service, 1996.

767. Not Used.

768. Harris, P., G. Eberli, and M. Grammer, *Reservoirs in Isolated Carbonate Platforms-Insight from Great Bahama Bank*, Association of Petroleum Geologists, AAPG International Conference and Exhibition, Barcelona, Spain, American 2003.

769. Stanek, K., W. Maresch, and J. Pindell, *The Geotectonic Story of the Northwestern Branch of the Caribbean Arc: Implications from Structural and Geochronological Data of Cuba*, K. James, M. Lorente, and J. Pindell (eds.), Geological Society of London, The Origin and Evolution of the Caribbean Plate, Special Publication 328, pp. 361–398, 2009.

770. Hall, C., S. Kesler, N. Russell, E. Pinero, R. Sanchez, M. Perez, J. Moreira, and M. Borges, *Age and Tectonic Setting of the Camaguey Volcanic-Intrusive Arc, Cuba: Late Cretaceous Extension and Uplift in the Western Greater Antilles*, Journal of Geology, Vol. 112, pp. 521–542, 2004.

771. Not Used.

772. Not Used.

773. Not Used.

774. Not Used.

775. Weems, R., and W. Lewis, *Structural and Tectonic Setting of the Charleston, South Carolina, Region: Evidence from the Tertiary Stratigraphic Record*, Geological Society of America Bulletin, Vol. 114, pp. 24–42, 2002.

776. Budd, A., D. McNeill, Klaus, J. López-Pérez, and F. Geraldes, *Paleoecology and Sedimentology of Fossil Coral Reefs in the Dominican Republic*, p. 39, 2006.

777. Asencio, E., *Western Puerto Rico Seismicity*, U.S. Geological Survey, Open-File Report 80-192, p. 144, 1980.

778. Mauffret, A., and S. Leroy, *Seismic Stratigraphy and Structure of the Caribbean Sea,* Tectonophysics, Vol. 283, pp. 61–104, 1997.

779. Mann, P., C. Prentice, G. Burr, L. Pena, and F. Taylor, *Tectonic Geomorphology and Paleoseismology of the Septentrional Fault System, Dominican Republic,* J. Dolan and P. Mann (eds.), Active Strike-Slip and Collisional Tectonics of the Northern Caribbean Plate Boundary Zone, Geological Society of America, pp. 63–123, 1988.

780. Dixon, T., F. Farina, C. Demets, P. Jansma, P. Mann, and E. Calais, *Relative Motion Between the Caribbean and North American Plates and Associated Boundary Zone Deformation Based on a Decade of GPS Observations,* Journal of Geophysical Research, Vol. 103, pp. 15,157–15,182, 1998.

781. Not Used.

782. Mann, P., *Caribbean Sedimentary Basins: Classification and Tectonic Setting from Jurassic to Present,* P. Mann (ed.), Sedimentary Basins of the World: Caribbean Basins, Elsevier Science B.V., Amsterdam, The Netherlands, pp. 3–31, 1999.

783. Not Used.

784. Not Used.

785. Austin, J., J. Ewing, J. Ladd, H. Mullins, and R. Sheridan, *Seismic Stratigraphic Implications of ODP Leg 101 Site Surveys,* J. Austin et al. (eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 101, pp. 391–424, 1988.

786. Iturralde-Vinent, M., C. Otero, A. García-Casco, and D. van Hinsbergen, *Paleogene Foredeep Basin Deposits of North-Central Cuba: A Record of Arc-Continent Collision between the Caribbean and North American Plates,* International Geology Review, Vol. 50, No. 10, pp. 863–884, 2008.

787. Ladd, J., and R. Sheridan, *Seismic Stratigraphy of the Bahamas,* American Association of Petroleum Geologists, AAPG Bulletin, Vol. 71, pp. 719–736, 1987.

788. Not Used.

789. Not Used.

790. Uchupi, E., *Shallow Structure of the Straits of Florida,* Science, Vol. 153, No. 3735, pp. 529–531, 1966.

791. Van Buren, H., and H. Mullins, *Seismic Stratigraphy and Geologic Development of an Open-Ocean Carbonate Slope: the Northern Margin of the Little Bahama Bank,* Initial Reports of the Deep Sea Drilling Project, Vol. 76, pp. 749–762, 1983.

792. Not Used.

793. Schlager, W., R. Buffler, et al., *Deep Sea Drilling Project, Leg 77, Southeastern Gulf of Mexico,* Geological Society of America Bulletin, Vol. 95, pp. 226–236, 1984.

794. Schlager, W., R. Buffler, D. Angstadt, and R. Phair, *32. Geologic History of the Southeastern Gulf of Mexico,* Initial Reports DSDP, 77, R. Buffler, W. Schlager, J. Bowdler, P. Cotillon, R. Halley, et al., (eds.), Washington, D.C., U.S. Government Printing Office, pp. 715–738, 1984.

795. Hatcher, R. Jr., *The Appalachian Orogen: A Brief Summary*, Geological Society of America Memoir 206 (in press), 2010.

796. Scheffers, A., and T. Browne, *Chapter 5.3, Hispaniola (Haiti and the Dominican Republic),* Encyclopedia of the World's Coastal Landforms, pp. 285–288, 2010.

797. Not Used.

798. Banks, K., B. Riegl, E. Shinn, W. Piller, and R. Dodge, *Geomorphology of the Southeast Florida Continental Reef Tract (Miami-Dade, Broward, and Palm Beach Counties, USA),* Coral Reefs, Vol. 26, pp. 617–633, 2007.

799. Kramer, P., F. Anselmetti, and R. Curry, *Geophysical Characterization of Pre-Holocene Limestone Bedrock Underlying the Biscayne National Park Reef Tract, Florida,* E. Kuniansky (ed.), USGS Karst Interest Group Proceedings, Water-Resources Investigations Report 01-4011, pp. 128–133, 2001.

800. Wanless, H., and B. Vlaswinkel, *Coastal Landscape and Channel Evolution Affecting Critical Habitats at Cape Sable, Everglades National Park, Florida*, Final Report to Everglades National Park, United States Department of the Interior, Homestead, Florida, 2005.

801. Not Used.

802. Texas A&M University College of Geosciences, *About the Deep Sea Drilling Project*. Available at http://www.deepseadrilling.org/about.htm, (funded by the National Science Foundation), accessed June 14, 2010.

803. Consortium for Ocean Leadership, Inc. and Participating Institutions, Ocean Drilling Program Final Technical Report, p. 67. Available at http://www.odplegacy.org/ (funded by the National Science Foundation), accessed June 14, 2010.

804. Mattson, P., *Subduction, Buoyant Braking, Flipping, and Strike-Slip Faulting in the Northern Caribbean,* Journal of Geology, Vol. 87, pp. 293–304, 1979.

805. Mitchell S., *Timing and Implications of Late Cretaceous Tectonic and Sedimentary Events in Jamaica,* Geologica Acta, Vol. 4, pp. 179–191, 2006.

806. Hastie, A., A. Kerr, S. Mitchell, and L. Millar, *Geochemistry and Tectonomagmatic Significance of Lower Cretaceous Island Arc Lavas from the Devils Racecourse Formation, Eastern Jamaica,* J. Pindell, K. James, and M. Lorente (eds.), Geology of Middle America and Origin of the Caribbean Plate, Geological Society of London, Special Publication 328, pp. 339–360, 2009.

807. Kesler, S., H. Campbell, and C. Allen, *Age of the Los Ranchos Formation, Dominican Republic: Timing and Tectonic Setting of Primitive Island Arc Volcanism in the Caribbean Region,* Geological Society of America Bulletin, Vol. 117, pp. 987–995, 2005.

808. Draper, G., G. Gutierrez, and J. Lewis, *Thrust Emplacement of the Hispaniola Peridotite Belt: Orogenic Expression of the Mid-Cretaceous Caribbean Arc Polarity Reversal?* Geology, Vol. 22, No. 12, pp.1143–1146, 1996.

809. Jolly, W., E. Lidiak, J. Schellekens, and H. Santos, *Volcanism, Tectonics, and Stratigraphic Correlations in Puerto Rico,* E. Lidiak and D. Larue (eds.), Tectonics and Geochemistry of the Northeastern Caribbean, Geological Society of America, Special Paper 322, pp.1–34, 1998.

810. Lewis, J., G. Kysar-Mattietti, M. Perfit, and G. Kamenov, *Geochemistry and Petrology of Three Granitoid Rock Cores from the Nicaraguan Rise Caribbean Sea: Implications for Its Composition, Structure and Tectonic Evolution,* Geologica Acta (in press), 2010.

811. Lewis, J., P. Emmet, P. Mann, and M. Perfit, *A New Look at the Nicaraguan Rise, Cayman Ridge and Cayman Trough: Implications for Stratigraphic/Structural Relations and Tectonic/Magmatic Evolution* (abstract), Circumcaribbean and North Andean Tectonomagmatic Evolution: Impacts on Paleoclimate and Resource Formation Workshop, Cardiff University, Cardiff, Wales, September 2009.

812. Pinet, P., *Structural Evolution of the Honduras Continental Margin and the Sea Floor South of the Western Cayman Trough,* Geological Society of America Bulletin, Vol. 86, pp. 830–838, 1975.

813. Rogers, R., and P. Mann, *Transtensional Deformation of the Western Caribbean-North America Plate Boundary Zone,* P. Mann (ed.), Geologic and Tectonic Development of the Caribbean Plate in Northern Central America, Special Paper 428, pp. 37–64, Geological Society of America, 2007.

814. Mann, P., R. Rogers, and L. Gahagan, *Chapter 8, Overview of Plate Tectonic History and Its Unresolved Tectonic Problem,* J. Buncdschud (ed.), Central America: Geology, Resources, and Natural Hazards, pp. 205–241, Balkema Publishers, The Netherlands, 2006.

815. Dillon, W., and J. Vedder, *Structure and Development of the Continental Margin of British Honduras,* Geological Society of America Bulletin, Vol. 84, pp. 2713–2732, 1973.

816. MacDonald, W., and W. Melson, *A Late Cenozoic Volcanic Province Hispaniola,* Caribbean Journal of Science, Vol. 9, pp. 81–91, 1969.

817. Not Used.

818. Wadge, G., and J. Wooden, *Late Cenozoic Alkaline Volcanism in the Northwestern Caribbean: Tectonic Setting and SR Isotopic Characteristics,* Earth and Planetary Science Letters, Vol. 57, pp. 35–46, 1982.

819. Lara, M., *Divergent Wrench Faulting in the Belize Southern Lagoon: Implications for Tertiary Caribbean Plate Movements and Quaternary Reef Distribution,* American Association of Petroleum Geologists Bulletin, Vol. 77, No. p. 6, 1041–1063, 1993.

820. Montgomery, H., E. Pessagno, J. Lewis, and J. Schellekens, *Paleogeography of Jurassic Fragments in the Caribbean,* Tectonics, Vol. 13, pp. 725–732, 1994.

821. Woods Hole Oceanic Institute, *Will the Ocean Circulation Be Unbroken? Line W Moorings Monitor and Intersection Where Key Climate Influencing Currents Converge*, Oceanus: the Magazine That Explores Oceans in

Depth, October 31, 2007. Available at http://www.whoi.edu/oceanus/viewarticle.do?id=33286, accessed July 16, 2010.

822. British Oceanographic Data Centre, *Centenary Edition of the GEBCO Digital Atlas (GDA), Global One Arc-Minute Bathymetric Grid,* General Bathymetric Chart of the Oceans (GEBCO), January 15, 2008. Available at http://www.bodc.ac.uk/data/online_delivery/gebco/, accessed November 18, 2008.

823. Ewing, T., R. Lopez, (Compilers), *Principal Structural Features,* The Geology of North America, Vol. J, the Gulf of Mexico Basin, Geological Society of America, 1991.

824. Not Used.

825. Not Used.

826. Not Used.

827. Scott, T., K. Campbell, F. Rupert, J. Arthur, T. Missimer, J. Lloyd, W. Yon, and J. Duncan, *Geologic Map of the State of Florida*, Map Series 146, Florida Department of Environmental Protection, Florida Geologic Survey, 2001 (Revised April 15, 2006, by David Anderson).

828. Not Used.

829. National Oceanic and Atmospheric Administration, *National Geophysical Data Center (NGDC) Coastal Relief Model*. Available at http://www.ngdc.noaa.gov/mgg/coastal/startcrm.htm, accessed March 19, 2008.

830. Green, R., K. Campbell, and T. Scott, *Surficial and Bedrock Geology of the Western Portion of the U.S.G.S. 1:100,000 Scale Homestead Quadrangle*, Open-File Map Series 83/08-12, 2 Maps, 5 Cross Sections, 1996.

831. Not Used.

832. Not Used.

833. Lebron, M., and M. Perfit, *Stratigraphic and Petrochemical Data Support Subduction Polarity Reversal of the Cretaceous Caribbean Island Arc,* Journal of Geology, Vol. 101, pp. 389–396, 1993.

834. Draper, G., and J. Barros, *Cuba,* S. Donovan and T. Jackson (eds.), Caribbean Geology: An Introduction, University of West Indies Publishers Association, pp. 65–86, 1994.

835. Not Used.

836. Schellekens, J., *Composition, Metamorphic Grade, and Origin of Metabasites in the Bermeja Complex, Puerto Rico,* International Geology Review, Vol. 40, No. 8, pp. 722–747, 1998.

837. Escuder-Viruete, J., P. Hernaiz-Huerta, G. Draper, G. Gutierrez- Alonso, J. Lewis, and A. Pérez-Estaún, *El Metamorfismo y Estructura de la Formación Maimón y los Complejos Duarte y Río Verde, Cordillera Central Dominicana: Implicaciones en la Estructura y la Evolución del Primitivo Arco Isla Caribeño,* Acta Geológica Hispánica, Vol. 37, pp. 123–162, 2002.

838. Paull, C., R. Matsumoto, P. Wallace, and W. Dillon (eds.), *Scientific Results*, Proceedings of the Ocean Drilling Program, Vol. 164, 2000. Available at http://www-odp.tamu.edu/publications/164_ SR/164TOC.HTM, accessed August 16, 2010.

839. Salvador, A., *Plate 6: Cross Sections of the Gulf of Mexico Basin,* The Geology of North America, Vol. J, the Gulf of Mexico Basin, 1991.

840. Calais, E., and B. Mercier de Lepinay, *Strike-Slip Tectonics and Seismicity Along the Northern Caribbean Plate Boundary from Cuba to Hispaniola,* J. Dolan and P. Mann (eds.), Active Strike-Slip and Collisional Tectonics of the Northern Caribbean Plate Boundary Zone, Geological Society of America, Special Paper 326, pp. 125–141, 1998.

841. Not Used.

842. Not Used.

843. Perrot, J., E. Calais, and B. Mercier de Lepinay, *Tectonic and Kinematic Regime Along the Northern Caribbean Plate Boundary: New Insights from Broad-Band Modeling of the May 25, 1992,* $M_S = 6.9$ *Cabo Cruz, Cuba, Earthquake,* Pure and Applied Geophysics, Vol. 149, pp. 475–487, 1997.

844. ten Brink, U., D. Coleman, and W. Dillon, *The Nature of the Crust Under Cayman Trough from Gravity,* Marine and Petroleum Geology, Vol. 19, pp. 971–987, 2002.

845. Lewis, J., G. Draper, J. Proenza, J. Espaillat, and J. Jiménez, *Ophiolite-Related Ultramafic Rocks (Serpentinites) in the Caribbean Region: A Review of Their Occurrence, Composition, Origin, Emplacement, and Ni-Laterite Soil Formation,* Geologica Acta, Vol. 4, No. 1-2, pp. 237–263, 2006.

846. Pushcharovskiy, Y., M. Borkowska, G. Hamor, J. Suarez, and I. Velinov (eds.), *Geologic Map of Cuba* (Mapa Geológico de Cuba), 1:250,000 Scale (40 Sheets), Academy of Sciences of Cuba, Institute of Geology and Paleontology, 1988.

847. Pushcharovskiy, Y. (ed.), *Tectonic Map of Cuba* (Mapa Tectónico de Cuba), 1:500,000 Scale (4 Sheets), 1989.

848. Perez-Othon, J., and V. Yarmoliuk (eds.), *Geologic Map of the Republic of Cuba* (Mapa Geológico de la República de Cuba), 1:500,000 Scale (5 Sheets), Ministry of Basic Industry, Center for Geologic Investigations, 1985.

849. Marton, G., and R. Buffler, *Chapter 3: Jurassic-Early Cretaceous Tectono-Paleogeographic Evolution of the Southeastern Gulf of Mexico Basin,* P. Mann (ed.), Sedimentary Basins of the World: Caribbean Basins, pp. 63–91, 1999.

850. Dengo, G., and O. Bohnenberger, *Structural Development of Northern Central America,* A. McBirney (ed.), Tectonic Relations of Northern Central America and the Western Caribbean - The Bonacca Expedition, American Association of Petroleum Geologists, pp. 203–220, 1969.

851. Dengo, G., *Estructura Geológica, Historia Tectonico y Morfología de America Central* (Geologic Structure, Tectonic History, and Morphology of Central America), Instituto Centroamericano de Investigación Tecnología Industrial, Guatemala City, Guatemala, pp. 1–52 1973.

852. Couch, R. and S. Woodcock, *Gravity and Structure of the Continental Margins of Southwestern Mexico and Northwestern Guatemala,* Journal of Geophysical Research, Vol. 86, No. B3, pp. 1829–1840, 1981.

853. Meyerhoff, A. and D. Hull, *Surge Tectonics: A New Hypothesis of Global Tectonics*, Springer-Verlag, New York, p. 348, 1996.

854. Not Used.

855. Not Used.

856. Meschede, M., and W. Frisch, *A Plate-Tectonic Model for the Mesozoic and Early Cenozoic History of the Caribbean Plate,* Tectonophysics, Vol. 296, pp. 269–291, 1998.

857. Lynch, J., and S. Bodle, *The Dominican Earthquakes of August, 1946,* Bulletin of the Seismological Society of America, Vol. 38, pp. 1–17, 1948.

858. Hippolyte, J., P. Mann, and N. Grindlay, *Geologic Evidence for the Prolongation of Active Normal Faults of the Mona Rift into Northwestern Puerto Rico,* P. Mann (ed.), Active Tectonics and Seismic Hazards of Puerto Rico, the Virgin Islands, and Offshore Areas, Geological Society of America, Special Paper 385, pp. 161–171, 2005.

859. Mann, P., and K. Burke, *Transverse Intra-Arc Rifting: Paleogene Wagwater Belt, Jamaica,* Marine and Petroleum Geology, Vol. 7, pp. 410–427, 1990.

860. Not Used.

861. Not Used.

862. South Florida Water Management District and U.S. Army Corps of Engineers, *Central and Southern Florida Project Comprehensive Everglades Restoration Plan: Final Aquifer Storage and Recovery Pilot Project Design Report*, Vol. 1, 2004.

863. Glaser, K., A. Droxler, and P. Baker, *Highstand Shedding off Two Semi-Drowned Shallow Carbonate Systems, Pedro Bank and the Southern Shelf of Jamaica, Northeastern Nicaraguan Rise,* Twelfth Caribbean Geological Conference, St Croix, U.S. Virgin Islands, Program and Abstracts, p. 58, 1989.

864. Glaser, K., and A. Droxler, *Controls and Development of Late Quaternary Periplatform Carbonate Stratigraphy in Walton Basin (Northeastern Nicaragua Rise, Caribbean Sea),* Paleoceanography, Vol. 8, No. 2, pp. 243–274, 1993.

865. Risi, J., H. Wanless, L. Tedesco, and S. Gels, *Catastrophic Sedimentation from Hurricane Andrew Along the Southwest Florida Coast,* Journal of Coastal Research, Special Issue, Vol. 21, pp. 83–102, 1995.

866. Smith, T., G. Anderson, and G. Tiling, *A Tale of Two Storms: Surges and Sediment Deposition from Hurricanes Andrew and Wilma in Florida's Southwest Coast Mangrove Forests,* Journal of Coastal Research, Special Issue, Vol. 21, pp. 169–174, 1995.

867. Not Used.

868. Not Used.

869. Buffler, R., *Seismic Stratigraphy of the Deep Gulf of Mexico Basin and Adjacent Margins,* A. Salvador (ed.), The Geology of North America, Vol. J., The Gulf of Mexico Basin, Geological Society of America, pp. 353–387, 1991.

870. Pierazzo, E., *Cretaceous/Tertiary (K-T) Boundary Impact, Climate Effects,* V. Gornitz (ed.), Encyclopedia of Paleoclimatology and Ancient Environments, Springer, The Netherlands, pp. 217–221, 2009.

871. Prothero, D., *Paleogene Climates,* V. Gornitz (ed.), Encyclopedia of Paleoclimatology and Ancient Environments, Springer, The Netherlands, pp. 728–733, 2009.

872. Tripati, A., and H. Elderfield, *Abrupt Hydrographic Changes in the Equatorial Pacific and Subtropical Atlantic from Foraminiferal Mg/Ca Indicate Greenhouse Origin for the Thermal Maximum at the Paleocene/Eocene Boundary,* Geochemistry, Geophysics, Geosystems, Vol. 5, Q02006, 2004.

873. Nunes, F., and R. Norris, *Abrupt Reversal in Ocean Overturning During the Palaeocene/Eocene Warm Period,* Nature, Vol. 439, pp. 60–63, 2006.

874. Schmitz, B., B. Peucker-Ehrenbrink, C, Heilmann-Clausen, G. Aberg, F. Asaro, C. and Lee, *Basaltic Explosive Volcanism, but no Comet Impact at the Paleocene-Eocene Boundary: High Resolution Chemical and Isotope Records from Egypt, Spain and Denmark,* Earth and Planetary Science Letters, Vol. 225, pp. 1–17, 2004.

875. Kent, D., B. Cramer, L. Lanci, D. Wang, J. Wright, and R. van der Voo, *A Case for a Comet Impact Trigger for the Paleocene/Eocene Thermal Maximum and Carbon Isotope Excursion,* Earth and Planetary Science Letters, Vol. 211, pp. 13–26, 2003.

876. Bralower, T., W. Sliter, M. Arthur, R. Leckie, D. Allard, and S. Schlanger, *Dysoxic/Anoxic Episodes in the Aptian-Albian (Early Cretaceous),* M. Pringle et al. (eds.), The Mesozoic Pacific: Geology, Tectonics and Volcanism, American Geophysical Union, Geophysical Monograph 77, pp. 5–37, Washington, D.C., 1993.

877. Miller, K., M. Kominz, J. Browning, J. Wright, G. Mountain, M. Katz, P. Sugarman, B. Cramer, N. Christie-Blick, and S. Pekar, *The Phanerozoic Record of Global Sea-Level Change,* Science, Vol. 310, pp. 1293–1298, 2005.

878. Katz, M., B. Cramer, G. Mountain, S. Katz, and K. Miller, *Uncorking the Bottle: What Triggered the Paleocene/Eocene Thermal Maximum Methane Release?* Paleoceanography, Vol. 16, pp. 549–562, 2001.

879. Droxler, A., and Shipboard Scientific Part of ODP Leg 165, *Caribbean Carbonate Crash at the Middle/Late Miocene Transition (12.4 and 10.6 Ma): Initiation of the Modern Global Thermohaline Ocean Circulation,* Highlights of ODP Discoveries, Greatest Hits, Available at http://www.odplegacy.org/science_results/highlights.html#c, accessed June 29, 2010.

880. Schellekens, J., H. Montgomery, J. Joyce, and A. Smith, *Late Jurassic to Late Cretaceous Development of Island Arc Crust in Southwestern Puerto Rico*, Transactions of the Caribbean Geological Conference, D. Larue and G. Draper (eds.), Vol. 12, pp. 268–281, Miami Geological Society, Miami, Florida, 1991.

881. Monroe, W., *Geology of the Middle Tertiary Formations of Puerto Rico*, USGS Professional Paper 953, p. 93,1980.

882. Frost, S., J. Harbour, M. Realini, and M. Harris, *Oligocene Reef Tract Development Southwestern Puerto Rico, Part 1*, Report, p. 144, University of Miami, Miami, Florida, 1983.

883. Fluegeman, *The Early-Middle Eocene Transition in the Northwestern Caribbean; Studies from Cuba, Jamaica, and the Cayman Rise,* 2007 GSA Denver Annual Meeting (October 28–31, 2007), Paleoclimatology/ Paleoceanography (Posters), Session No. 111, Booth 26, 2007.

884. Pusz, A., K. Miller, J. Wright, M. Katz, B. Cramer, and D. Kent, *Stable Isotope Response to Late Eocene Extraterrestrial Impacts,* C. Koeberl and A. Montanari (eds.), The Late Eocene Earth, Hothouse, Icehouse, and Impacts, pp. 83–96, 2009.

885. Lawver, L., and L. Gahagan, *Evolution of Cenozoic Seaways in the Circum-Antarctic Region,* Palaeogeography, Palaeoclimatology, Palaeoecology, Vol. 198, pp. 11–37, 2003.

886. Tator, B., and L. Hatfield, *Bahamas Present Complex Geology: Part 2,* Oil & Gas Journal, Vol. 73, No. 44, pp. 120–122, 1975.

887. ten Brink, U., E. Geist, and B. Andrews, *Size Distribution of Submarine Landslides and its Implication to Tsunami Hazard in Puerto Rico,* Geophysical Research Letters, Vol. 33, pp. L11,307–L11,310, 2006.

888. Not Used.

889. Tuttle, M., A. Ruffman, T. Anderson, and H. Jeter, *Distinguishing Tsunami from Storm Deposits in Eastern North America: The 1929 Grand Banks Tsunami versus the 1991 Halloween Storm,* Seismological Research Letters, Vol. 75, No. 1, pp. 117–131, 2004.

890. Morton, R., G. Gelfenbaum, and B. Jaffe, *Physical Criteria for Distinguishing Sandy Tsunami and Storm Deposits using Modern Examples,* D. Tappin (ed.), Sedimentary Features of Tsunami Deposits-Their Origin, Recognition, and Discrimination, Sedimentary Geology, Vol. 200, No. 3-4 (special issue), pp. 184–207, 2007.

891. Dawson, A., and I. Stewart, *Tsunami Geoscience,* Progress in Physical Geography, Vol. 31, No. 6, pp. 575–590, 2007.

892. Scoffin, T., and M. Hendry, *Shallow Water Sclerosponges on Jamaican Reefs as a Criterion of Recognition of Hurricane Deposits,* Nature, Vol. 307, pp. 728–729, 1984.

893. Perry, C., *Storm-Induced Coral Rubble Deposition: Pleistocene Records of Natural Reef Disturbance and Community Response,* Coral Reefs, Vol. 20, pp. 171–183, 2001.

894. Donnelly, J., S. Bryant, J. Butler, J. Dowling, L. Fan, N. Hausmann, P. Newby, B. Shuman, J. Stern, K. Westover, and T. Webb III, *700 yr Sedimentary Record of Intense Hurricane Landfalls in Southern New England,* Geological Society of America Bulletin, Vol. 113, pp. 714–727, 2001.

895. Andrade, C., *Tsunami Generated Forms in the Algarve Barrier Islands,* A. Dawson (ed.), Science of Tsunami Hazards, European Geophysical Society Tsunami Meeting, Vol. 10, pp. 21–34, 1992.

896. de Lange, W., and V. Moon, *Tsunami Washover Deposits, Tawharanui, New Zealand,* Sedimentary Geology, Vol. 200, pp. 232–247, 2007.

897. Nanayama, F., *Nine Unusually Large Tsunami Deposits from the Past 4000 Years at Kiritappu Marsh Along the Southern Kuril Trench,* Sedimentary Geology, Vol. 200, pp. 26–274, 2007.

898. Dawson, A., *Geomorphological Effects of Tsunami Run-Up and Backwash,* Geomorphology, Vol. 10, pp. 83–94, 1994.

899. Einsele, G., S. Chough, and T. Shiki, *Depositional Events and Their Records - An Introduction,* Sedimentary Geology, Vol. 104, pp. 1–9, 1996.

900. Bralower, T., C. Paull, and R. Leckie, *The Cretaceous Tertiary Boundary Cocktail: Chicxulub Impact Triggers Margin Collapse and Extensive Sediment Gravity Flows,* Geology, Vol. 26, pp. 331–334, 1998.

901. ten Brink, U. et al., *Assessment of Tsunami Hazard to the U.S. East Coast Using Relationships Between Submarine Landslides and Earthquakes,* Marine Geology, Vol. 264, pp. 65–73, 2009.

902. Poag, C., C. Koeberl, and W. Reimold, *The Chesapeake Bay Crater: Geology and Geophysics of a Late Eocene Submarine Impact Structure*, Springer-Verlag Berlin Heidelburg, p. 489, 2004.

903. Cagen, K., and D. Abbott, *Evidence for a Tsunami Generated by an Impact Event in the New York Metropolitan Area Approximately 2300 Years Ago,* Section I, S. Fernald, D. Yozzo and H. Andreyko (eds.), Final Reports of

the Tibor T. Polgar Fellowship Program, 2008, Hudson River Foundation, 2009.

904. Draper, G., P. Mann, and J. Lewis, *Hispaniola,* S. Donovan and T. Jackson (eds.), Caribbean Geology: An Introduction, University of the West Indies Publishers Association/University of the West Indies Press, Kingston, Jamaica, pp. 129–150, 1994.

905. Bates, L., and J. Jackson (eds), *Glossary of Geology*, 2d ed., American Geological Institute, Virginia, 1980.

906. Bergman, K., *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, 2005.

907. Otvos, E., *Holocene Gulf Levels: Recognition Issues and an Updated Sea-Level Curve*, Journal of Coastal Research, Vol. 20(3), pp. 680–699, 2004.

908. Potter, E., and K. Lambeck, *Reconciliation of Sea-Level Observations in the Western North Atlantic During the Last Glacial Cycle,* Earth and Planetary Science Letters, Vol. 217, pp. 171–181, 2004.

909. Li, Y., *Calcareous Soils in Miami-Dade County*, Fact Sheet SL 183, Soil and Water Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, 2001.

910. Khudoley, K., Principal Features of Cuban Geology, American Association of Petroleum Geologists Bulletin, Vol. 51, No. 5, pp. 668–677, 1967.

911. Hatten, C., M. Somin, G. Millan, P. Renne, R. Kistler, and J. Mattinson, Tectonostratigraphic Units of Central Cuba, Eleventh Caribbean Geological Conference Symposium Volume, Barbados, British West Indies, pp. 35:1–13, 1988.

912. Agassiz, A., *A Reconnaissance of the Bahamas and Elevated Reefs of Cuba,* Bulletin of the Museum of Comparative Zoology, Vol. 26, p. 203, 1894. PTN RAI 02.05.01-22

913. Broecker, W., and D. Thurber, *Uranium-Series Dating of Coral and Oolites from Bahaman and Florida Key Limestones,* Science, Vol. 149, pp. 58–60, 1965. PTN RAI 02.05.01-22

914. Chen, J., H. Curran, B. White, and G. Wasserburg, *Precise Chronology of the Last Interglacial Period: 234U–230 The Data from Fossil Coral Reefs in the Bahamas,* Geological Society of America Bulletin, Vol. 103, pp. 82–97, 1991.

915. Ducloz, C., *Etude Geomorphologique de la Region de Matanzas, Cuba Avec une Contribution a l'etude des Depots Quaternaires de la Zone Habana-Matanzas,* Archives des Sciences, Societe de Physique et d'Histoire Naturelle de Geneve, Imprimerie Kundig, p. 402, 1963. PTN RAI 02.05.01-21 PTN RAI 02.05.01-22

916. Gallup, C., R. Edwards, and R. Johnson, *The Timing of High Sea Levels over the Past 200,000 Years,* Science, Vol. 263, pp. 796–800, 1994.

917. Hayes, C., T. Vaughan, and A. Spencer, *A Geological Reconnoissance [sic] of Cuba*, pp. 18–20, 1901. LDP-CS564

918. Hill, R., *Notes on the Geology of the Island of Cuba, Based Upon a Reconnoissance [sic] Made for Alexander Agassiz,* Bulletin of the Museum of Comparative Zoology, Vol. XVI, No. 15, pp. 264–274, 1895. LDP-CS564

919. Iturralde-Vinent, M., *Linked Earth Systems Field Guide Sedimentary Geology of Western Cuba,* The 1st SEPM Congress on Sedimentary Geology, August 13–16, St. Pete Beach, Florida, 1995.

920. Pedoja, K., L. Husson, V. Regard, P. Cobbold, E. Ostanciaux, M. Johnson, S. Kershaw, M. Saillard, J. Martinod, L. Furgerot, P. Weill, and B. Delcaullau, *Relative Sea-Level Fall Since the Last Interglacial State: Are Coasts Uplifting Worldwide?,* Earth Science Reviews, Vol. 108, pp. 1–15, 2011. PTN RAI 02.05.01-21 PTN RAI 02.05.01-22 PTN RAI 02.05.01-23

921. Penalver Hernandez, L., E. Castellanos Abella, R. Perez Aragon, and R. Rivada Suarez, *Las Terrazas Marinas de Cuba y Su Correlacion con Algunas del Area Circumcaribe,* Memorias Geomin, V Congreso de Geologia y Mineria, Cuba, 24–28 de Marzo, La Habana, p. 10, 2003. PTN RAI 02.05.01-22

922. Osmond, J., J. Carpenter, and H. Windom, *230 Th/234 U Age of Pleistocene Corals and Oolites of Florida,* Journal of Geophysical Research, Vol. 70, pp. 1843–1847, 1965. PTN RAI 02.05.01-22

923. Shanzer, E., O. Petrov, and G. Franco, *Sobre las Formaciones Costeras del Holoceno en Cuba, las Terrazas Pleistocenicas de la Region Habana-Matanzas y los Sedimentos Vinculados a Ellas,* Serie Geologica No. 21, Academia de Ciencias de Cuba, Instituto de Geologia y Paleontologia, pp. 1–26, 1975. PTN RAI 02.05.01-21 PTN RAI 02.05.01-22

924. Spencer, J., *Geographical Evolution of Cuba,* Bulletin of the Geological Society of America, Vol. 7, pp. 67–94, 1895.

925. Toscano, M., E. Rodriguez, and J. Lundberg, *Geologic Investigation of the Late Pleistocene Jaimanitas Formation: Science and Society in Castro's Cuba,* Proceedings of the 9th Symposium on the Geology of the Bahamas and Other Carbonate Regions, Bahamian Field Station, Ltd., San Salvador, Bahamas, pp. 125–142, 1999. PTN RAI 02.05.01-21 PTN RAI 02.05.01-22 PTN RAI 02.05.01-23

926. Vaughan, T., and A. Spencer, *The Geography of Cuba,* Bulletin of the American Geographical Society, Vol. 34, No. 2, pp. 105–116, 1902. PTN RAI 02.05.01-22

927. Adams, P., N. Opdyke, and J. Jaeger, *Isostatic Uplift Driven by Karstification and Sea-Level Oscillation: Modeling Landscape Evolution in North Florida,* Geology, Vol. 38, pp. 531–534, 2010. PTN RAI 02.05.01-4

928. Hickey, T., A. Hine, E. Shinn, S. Kruse, and R. Poore, *Pleistocene Carbonate Stratigraphy of South Florida: Evidence for High-Frequency Sea-Level Cyclicity,* Journal of Coastal Research, Vol. 26, pp. 605–614, 2010.

929. Muhs, D., K. Simmons, R. Schumann, and R. Halley, *Sea-Level History of the Past Two Interglacial Periods: New Evidence From U-Series Dating of Reef Corals from South Florida,* Quaternary Science Reviews, Vol. 30, pp. 570–590, 2011.

930. Multer, H., E. Gischler, J. Lundberg, K. Simmons, and E. Shinn, *Key Largo Limestone Revisited: Pleistocene Shelf-Edge Facies, Florida Keys, USA* Facies, Vol. 46, pp. 229–272, 2002.

931. Toscano, M., and J. Lundberg, *Submerged Late Pleistocene Reefs on the Tectonically-Stable S.E. Florida Margin: High-Precision Geochronology, Stratigraphy, Resolution of Substage 5a Sea-Level Elevation, and Orbital Forcing,* Quaternary Science Reviews, Vol. 18, pp. 752–767, 1999. PTN RAI 02.05.01-4

932. Toscano, M., and J. Lundberg, *Early Holocene Sea-Level Record from Submerged Fossil Reefs on the Southeast Florida Margin,* Geology, Vol. 26, pp. 255–258, 1998.

933. Muhs, D., J. Wehmiller, K. Simmons, and L. York, *Quaternary Sea-Level History of the United States,* Developments in Quaternary Science, Vol. 1, pp. 147–183, 2004.

934. Guertin, L., T. Missimer, and D. McNeill, *Hiatal Duration of Correlative Sequence Boundaries from Oligocene-Pliocene Mixed Carbonate/ Siliciclastic Sediments of the South Florida Platform: Sedimentary Geology,* Vol. 134, pp. 1–26, 2000. PTN RAI 02.05.01-12

935. Cunningham, K., D. Bukry, T. Sato, J. Barron, L. Guertin, and R. Reese, *Sequence Stratigraphy of a South Florida Carbonate Ramp and Bounding Siliciclastics (Late Miocene-Pliocene),* Florida Geological Survey, Special Publication 49, pp. 35–66, 2001.

936. Hine, A., B. Suthard, S. Locker, K. Cunningham, D. Duncan, M. Evans, and R. Morton, *Karst Sub-Basins and their Relationship to the Transport of Tertiary Siliciclastic Sediments on the Florida Platform,* International Association of Sedimentologists, Special Publication, Vol. 41, pp. 179–197, 2009.

937. Austin, J., Jr., W. Schlager, A. Palmer, et al., Proceedings of the Ocean Drilling Program, Initial Results (Part A), 101: 6, Site 627: Southern Blake Plateau, pp. 111–212, 1986. PTN RAI 02.05.01-14

938. Austin, J., Jr., W. Schlager, A. Palmer, et al., Proceedings of the Ocean Drilling Program, Initial Results (Part A), 101: 7, Site 628: Little Bahama Bank, pp. 213–271, 1986.

939. Austin, J. Jr., W. Schlager, A. Palmer et al., Proceedings of the Ocean Drilling Program, Initial Results (Part A), 101: 8, Site 629 and 630: Little Bahama Bank, pp. 271–340, 1986.

940. Austin, J. Jr., W. Schlager, et al., Proceedings of the Ocean Drilling Program, Scientific Results, 101: 29, Leg 101: An Overview, pp. 455–472, 1988. PTN RAI 02.05.01-14

941. Reed, J., J. Wheeler, and B. Tucholke, *Decade of North American Geology, Geologic Map of North America*, The Geological Society of America, Boulder, Colorado, 2005.

942. Cotilla-Rodriguez, M., and D. Cordoba-Barba, *Study of the Cuban Fractures,* Geotectonics, Vol. 44, No. 2, pp. 176–202, 2010. PTN RAI 02.05.01-21

943. Cotilla-Rodriguez, M., and D. Cordoba-Barba, *Study of the Earthquake of the January 23, 1880, in San Cristobal, Cuba and the Guane Fault,* Physics of the Solid Earth, Vol. 47, No. 6, pp. 496–518, 2011.

944. Oliva Gutierrez, G., and E. Sanchez Herrero (directors), *Nuevo Atlas Nacional de Cuba,* Instituto de Geografía de la Academia de Ciencias de Cuba, the Instituto Cubano de Geodesia y Cartografía, and the Instituto Geográfico Nacional de España, 1989.

945. Price, R., and J. Herman, *Geochemical Investigation of Salt-Water Intrusion into a Coastal Carbonate Aquifer: Mallorca, Spain,* Geological Society of America Bulletin, Vol. 103, pp. 1270–1279, 1991. PTN RAI 02.05.01-1

946. Moore, W., *The Effect of Submarine Groundwater Discharge on the Ocean,* Annual Review of Marine Science, Vol. 2, pp. 59–88, 2010.

947. Evans, R., and D. Lizarralde, *Geophysical Evidence for Karst Formation Associated with Offshore Groundwater Transport: An Example from North Carolina, Geochemistry Geophysics Geosystems,* American Geophysical Union, Vol. 4, No. 8, pp. 1–9, 2003.

948. Langevin, C., *Simulation of Submarine Ground Water Discharge to a Marine Estuary: Biscayne Bay, Florida,* Ground Water, Vol. 41, No. 6., pp. 758–771, 2003.

949. Langevin, C., *Simulation of Ground-Water Discharge to Biscayne Bay, Southeastern Florida,* U.S. Geological Survey, Water-Resources Investigations Report 00-4251, 2001.

950. Smart, P., J. Dawans, and F. Whitaker, *Carbonate Dissolution in a Modern Mixing Zone,* Nature, Vol. 335, pp. 811–813, 1988.

951. Land, L., and C. Paull, *Submarine Karst Belt Rimming the Continental slope in the Straits of Florida,* Geo-Marine Letters, Vol. 20, pp. 123–132, 2000. PTN RAI 02.05.01-16 PTN RAI 02.05.01-1

952. Reich, C., P. Swarzenski, J. Greenwood, and D. Wiese, *Investigation of Coastal Hydrogeology Utilizing Geophysical and Geochemical Tools Along the Broward County Coast, Florida,* U.S. Geological Survey, Open-File Report 2008-1364, p. 21, plus Apps. A–C., 2009.

953. Taniguchi, M., W. Burnett, J. Cable, and J. Turner, *Investigation of Submarine Groundwater Discharge,* Hydrological Processes, Vol. 16, pp. 2115–2129, 2002.

954. Cunningham, K., and L. Florea, *The Biscayne Aquifer of Southeastern Florida,* Caves and Karst of the USA, A. Palmer (ed.) Huntsville, Alabama: National Speleological Society, pp. 196–199, 2009.

955. Cressler, A., *The Caves of Dade County, Florida,* Georgia Underground, Vol. 30, Issue 3, 1993.

956. Parks, A., *The Forgotten Frontier: Florida Through the Lens of Ralph Middleton Munroe,* Past Perfect Florida History, p. 187, 2004.

957. Florea, L., and A. Yuellig, *Everglades National Park—Surveying the Southernmost Cave in the Continental United States,* Inside Earth, Vol. 10, No. 1, pp. 3–5, 2007.

958. Cunningham, K., and C. Walker, *Seismic-Sag Structural Systems in Tertiary Carbonate Rocks Beneath Southeastern Florida, USA: Evidence for Hypogenic Speleogenesis?,* A. Klimchouk and D. Ford (eds.), Hypogene Speleogenesis and Karst Hydrogeology of Artesian Basins, Ukrainian Institute of Speleology and Karstology, Special Paper 1, pp. 151–158, 2009.

959. Shinn, E., C. Reich, S. Locker, and A. Hine, *A Giant Sediment Trap in the Florida Keys,* Journal of Coastal Research, Vol. 12, No. 4, pp. 953–959, 1996.

960. U.S. Geological Survey, *Manual Water-Level Measurements in the Homestead, FL Area, as of March 2009, Groundwater Conditions in*

Southern Florida. Available at http://www.sflorida.er.usgs.gov/edl_data/text/hstd_gov.html, accessed May 22, 2009. PTN RAI 02.05.01-1

961. Barlow, P., and E. Reichard, *Saltwater Intrusion in Coastal Regions of North America,* Hydrogeology Journal, Vol. 18, pp. 247–260, 2010.

962. Sonenshein, R., *Delineation of Saltwater Intrusion in the Biscayne Aquifer, Eastern Dade County, Florida, 1995*, U.S. Geological Survey, Water-Resources Investigations Report 96-4285, p. 13, 1996.

963. Wait, R., and J. Callahan, *Relations of Fresh and Salty Ground Water Along the Southeastern U.S. Atlantic Coast,* National Ground Water Association, Vol. 3, Issue 4, pp. 3–17, 1965.

964. Godfrey, M. (with contribution by T. Catton), *River of Interests: Water Management in South Florida and the Everglades*, 1948–2000, U.S. Army Corps of Engineers, June 2006.

965. Smart, P., P. Beddows, J. Coke, S. Doerr, S. Smith, and F. Whitaker, *Cave Development on the Caribbean Coast of the Yucatan Peninsula, Quintana Roo, Mexico,* R. Harmon and C. Wicks, (eds.), Perspectives on Karst Geomorphology, Hydrology, and Geochemistry–a Tribute Volume to D. Ford and WB. White, Geological Society of America Special Paper 404, pp. 105–128, 2006.

966. Spechler, R., and W. Wilson, *Stratigraphy and Hydrogeology of a Submarine Collapse Sinkhole on the Continental Shelf, Northeastern Florida,* Beck and Stephenson (eds.), The Engineering Geology and Hydrogeology of Karst, Terranes, pp. 61–66, 1997.

967. Malloy, R., and R. Hurley, *Geomorphology and Geologic Structure: Straits of Florida,* Geological Society of America Bulletin, Vol. 81, pp. 1947–1972, 1970. PTN RAI 02.05.01-16

968. Mullins, H., and A. Neuman, *Geology of the Miami Terrace and its Paleooceanographic Implications,* Marine Geology, Vol. 30, pp. 205–232, 1979.

969. Lucia, F., *Rock-Fabric/Petrophysical Classification of Carbonate Pore Space for Reservoir Characterization,* AAPG Bulletin, Vol. 79, No. 9, pp. 1275–1300, September 1995. PTN RAI 02.05.01-2

970. McNabb Hydrogeologic Consulting, Inc., *Report on the Construction and Testing of Class V Exploratory Well EW-1 at the Florida Power & Light Company Turkey Point Units 6 & 7, Vol. 1*, in Turkey Point Units 6 & 7 Site Certification Application Amendment Rev. 2, September 2012. Available at http://publicfiles.dep.state.fl.us/Siting/Outgoing/FPL_Turkey_Point/Units_6_7/Amendment_Application_Rev2/08_APPENDIX%2010.2.8.pdf, accessed January 10, 2013. LDP-CS535

971. Ball, M., *Tectonic Control of the Configuration of the Bahama Banks,* GCAGS Transactions, Vol. 17, pp. 265–267, 1967. LDP-CS536

972. Behn, M., and J. Lin, *Segmentation in Gravity and Magnetic Anomalies Along the U.S. East Coast Passive Margin: Implications for Incipient Structure of the Oceanic Lithosphere,* Journal of Geophysical Research, Vol. 105, pp. 25,769–25,790, 2000.

973. Behrendt, J., and K. Klitgord, *High-Sensitivity Aeromagnetic Survey of the U.S. Atlantic Continental Margin,* Geophysics, Vol. 45, No. 12, pp. 1813–1846, 1980.

974. Dietz, R., *Morphologic Fits of North America/Africa and Gondwana: A Review,* D. Tarling, and S. Runcorn (eds.), Implications of Continental Drift to the Earth Sciences, Vol. 2, Academic Press, pp. 865–872, 1973.

975. Emery, K., E. Uchupi, J. Phillips, C. Brown, E. Bunce, and S. Knott, *Continental Rise off Eastern North America,* AAPG Bulletin, Vol. 54, pp. 44–108, 1970.

976. Holbrook, W., and B. Kelemen, *Large Igneous Province on the United States Atlantic Margin and Implications for Magmatism During Continental Breakup,* Nature, Vol. 364, pp. 433–436, 1993.

977. Janney, P., and P. Castillo, *Geochemistry of the Oldest Atlantic Oceanic Crust Suggests Mantle Plume Involvement in the Early History of the Central Atlantic Ocean,* Earth and Planetary Science Letters, Vol. 192, pp. 291–302, 2001.

978. Keen, M., *Possible Edge Effect to Explain Magnetic Anomalies off the Eastern Seaboard of the U.S.,* Nature, Vol. 222, pp. 72–74, 1969.

979. McHone, J., *Non-Plume Magmatism and Rifting During the Opening of the Central Atlantic Ocean,* Tectonophysics, Vol. 316, pp. 287–296, 2000. LDP-CS536

980. Mittelstaedt, E., G. Ito and M. Behn, *Mid-Ocean Ridge Jumps Associated with Hotspot Magmatism,* Earth and Planetary Science Letters, Vol. 266, Issues 3-4, pp. 256–270, 2008.

981. Nomade, S., K. Knight, E. Beutel, P. Renne, C. Verati, G. Feraud, A. Marzoli, N. Youbi, and H. Bertrand, *Chronology of the Central Atlantic Magmatic Province: Implications for the Central Atlantic Rifting Processes and the Triassic-Jurassic Biotic Crisis,* Paleogeography, Paleoclimatology, Paleoecology, Vol. 244, pp. 326–344, 2007.

982. Wyer, P., and A. Watts, *Gravity Anomalies and Segmentation at the East Coast, USA Continental Margin,* Geophysical Journal International, Vol. 166, pp. 1015–1038, 2006.

983. Eberli, G., C. Kendall, P. Moore, G. Whittle, and R. Cannon, *Testing a Seismic Interpretation of Great Bahama Bank with a Computer Simulation,* AAPG Bulletin, Vol. 78, No. 6, pp. 981–1004, 1994.

984. Mulder T., E. Ducassou, G. Eberli, V. Hanquiez, E. Gonthier, P. Kindler, M. Principaud, F. Fournier, P. Léonide, I. Billeaud, B. Marsset, J. Reijmer, C. Bondu, R. Joussiaume, and M. Pakiades, *New Insights into the Morphology and Sedimentary Processes Along the Western Slope of Great Bahama Bank*, Geology, Vol. 40, No. 7, pp. 603–606, July 2012.

985. Miall, A., *Principles of Sedimentary Basin Analysis*, Springer, 3d ed., Berlin, Germany, 1999.

986. Society for Sedimentary Geology, Third-Order Sequence. Available at http://sepmstrata.org/terminology/ third-order-cyc.html, accessed October 12, 2011.

987. Society for Sedimentary Geology, Sigmoid Configuration. Available at http://sepmstrata.org/terminology/sigmoid.html, accessed October 12, 2011.

988. Not used. PTN RAI 02.05.01-17

989. Cunningham, K., C. Walker, and R. Westcott, *Near-Surface, Marine Seismic-Reflection Data Define Potential Hydrogeologic Confinement*

Bypass in the Carbonate Floridan Aquifer System, Southeastern Florida, SEG Las Vegas 2012 Annual Meeting, 2012. PTN RAI 02.05.01-17

990. Perkins, R., *Depositional Framework of Pleistocene Rocks in South Florida*, Quaternary Sedimentation in South Florida, Enos, P. and R. Perkins, (eds.), Geological Society of America Memoir 147, pp. 131-197, 1977.

991. Cantillo, A., (editor) *1983 Biscayne Bay Hydrocarbon Study*, NOAA National Ocean Service, USDC, February 2005.

992. Reich, C., R. Halley, T. Hickey, and P. Swarzenski, *Groundwater Characterization and Assessment of Contaminants in Marine Areas of Biscayne National Park*, U.S. Department of the Interior, National Park Service Technical Report NPS/NRWRD/NRTR-2006/356, 2006.

993. Reich, C., T. Hickey, K. DeLong, R. Poore, and J. Brock, *Holocene Core Logs and Site Statistics for Modern Patch-Reef Cores: Biscayne National Park*, Florida, USGS Open-File Report 2009-1246, 2009.

994. Wanless, H., *Geologic Setting and Recent Sediments of the Biscayne Bay Region*, Florida in Biscayne Bay: Past/Present/Future, A. Thorhaug and A. Volker, (editors), A symposium presented by the University of Miami, April 2-3, 1976.

Table 2.5.1-201
Locations of DSDP and ODP Drill Sites Referenced in FSAR 2.5

DSD/ ODP	Leg #	Site #	Location Name	Latitude	Longitude	Subsection #
DSDP	4	29	Beata Ridge/A" and B" Horizons	14° 47.11'N	69° 19.36'W	2.5.1.1
DSDP	15	146	Venezuelan Basin	15° 06.99'N	69° 22.67'W	2.5.1.1.2.2.7
DSDP	15	149	Venezuelan Basin	15° 06.25'N	69° 21.85'W	2.5.1.1 and 2.5.1.1.2.2.7
DSDP	15	150	Venezuelan Basin	14° 30.69'N	69° 21.35'W	2.5.1.1.2.2.7
DSDP	15	151	Beata Ridge	15° 01.02'N	73° 24.58'W	2.5.1.1.2.2.7 and 2.5.1.1.2.2.8
DSDP	15	152	Northern Nicaraguan Rise	15° 52.72'N	74° 36.47'W	2.5.1.1.2.2.6 and 2.5.1.1.2.2.7
DSDP	15	153	Aruba Gap	13° 58.33'N	72° 26.08'W	2.5.1.1.2.2.7 and 2.5.1.1.2.2.8
DSDP	15	154	Colombian Basin, drilled on Panama outer ridge	11° 05.11'N	80° 22.75'W	2.5.1.1.2.2.5
DSDP	44	391	Blake/Bahamas Basin (for location see Figure 2.5.1-214)	28° 13.73'N	75° 36.76'W	2.5.1.2.4
DSDP	68	502	Mono Rise/Colombian Basin	11° 29.42'N	79° 22.78'W	2.5.1.1.2.2.6
DSDP	76	534	Blake/Bahamas Basin	28° 20.6'N	75° 22.9'W	2.5.1.2.4
DSDP	77	537	Vicinity of the Catoche Knoll	23° 56.01'N	85° 27.62'W	2.5.1
DSDP	77	538	on top of the Catoche Knoll	23° 50.98'N	85° 10.26'W	2.5.1
ODP	101	626	Bahamas/Straits of Florida	25° 35.08'N	79° 32.73'W	2.5.1.2.4
ODP	101	627	Bahamas/Northern Slope, Little Bahama Bank	27° 38.10'N	78° 17.65'W	2.5.1.2.4
ODP	101	628	Bahamas/Little Bahama Bank, Mid-Slope	27° 31.85'W	78° 18.95'W	2.5.1.2.4
ODP	165	999	Kogi Rise in Colombian Basin	12° 44.639'N	78° 44.360'W	2.5.1.1 and 2.5.1.1.2.2.7
ODP	165	1000	Northern Nicaraguan Rise	16° 33.223'N	79° 52.044'W	2.5.1.1.2.2.5
ODP	165	1001	Southern Nicaraguan Rise/Hess Escarpment	15° 45.427'N	74° 54.627'W	2.5.1.1.2.2.5.2

Table 2.5.1-202 (Sheet 1 of 2)
K/Pg and Cenozoic Boundary Events Affecting the Caribbean, Gulf of Mexico, and Florida Regions

Boundary Name	Boundary Event	Description
K/Pg (~65 Ma)	End-Cretaceous mass extinction event had widespread effects, including the production of toxic gases (NO, NO_2) and nitric acid (HNO_3), ejection of gases and dust into the stratosphere, destruction of stratospheric ozone, major wildfires that consumed most terrestrial biomass, and widespread evidence of solar radiation absorbing soot (Reference 870).	General consensus is that the K/Pg extinction event was caused by a 65.5 Ma bolide impact at the Chicxulub crater of the Yucatan Peninsula (Reference 518). The tsunami deposits associated with the impact event are found throughout the southern and southeastern U.S. and have been recovered from drill cores throughout the Gulf of Mexico, Cuba and the Caribbean (References 516 and 299).
P/E (~56 Ma)	The Paleocene to early Eocene boundary was a return to a "greenhouse" state that had occurred through most of the later Mesozoic. The entire Earth was much warmer than today on average, a condition that required efficient heat transport from the equators to the poles (Reference 871). Sedimentary oxygen isotope ratios indicate a greenhouse-related thermal maximum (Reference 872) possibly caused by one or a combination of events such as changing oceanic circulation patterns (e.g., Reference 873), continental slope failure due to increased current strengths (e.g., Reference 878), sea-level lowering (e.g., Reference 874), bolide impact (e.g., Reference 875), and explosive Caribbean volcanism (References 209 and 220).	Miller et al. (Reference 877) proposed that the early Eocene peak in global warmth and sea level was due not only to slightly higher ocean-crust production but also to a late Paleocene-early Eocene tectonic reorganization. The largest change in mid-ocean ridge length of the past 100 m.y. occurred approximately 60 to 50 Ma, associated with the opening of the Norwegian-Greenland Sea, a significant global reorganization of spreading ridges, and extrusion of 1 to 2 x 10^6 kilometers^3 of basalts of the Brito-Arctic province (Reference 877). A late Paleocene to early Eocene sea-level rise coincides with this ridge-length increase, suggesting a causal relation. Miller et al. (Reference 877) suggest that this reorganization also increased CO_2 outgassing and caused global warming to an early Eocene maximum.

Table 2.5.1-202 (Sheet 2 of 2)
K/Pg and Cenozoic Boundary Events Affecting the Caribbean, Gulf of Mexico, and Florida Regions

Boundary Name	Boundary Event	Description
E/O (~33 Ma)	The E/O boundary is a period of climatic deterioration loosely called the "doubtless," a transition between greenhouse and icehouse conditions. Climate generally cooled progressively. The boundary is represented by changes in oceanic circulation patterns and in stable isotope composition in sediments. Changes were possibly caused by addition or withdrawal of greenhouse gases. At least three major bolide impacts also occurred at 35.5-36 Ma, but they caused no significant change in climate or extinctions (Reference 871)	The E/O boundary represents a decline of mean global temperatures by more than 10° C and was accompanied by expansion of Antarctic glaciation (Reference 883). Tecktites/microtecktites appear across the Caribbean Basin from the Chesapeake Bay and the Popigai bolide impacts (Reference 884). The pervasive Everglades unconformity is postulated to be due to erosion from the tsunami that followed the Chesapeake Bay impact (Reference 286). Some have suggested that CO_2 and other greenhouse gases were locked up in methane hydrates on the seafloor (Reference 871). The opening of a seaway between the South Tasman Rise and Antarctica was very close to the E/O boundary (Reference 885).

Table 2.5.1-203
Florida's Marine Terraces, Elevations, and Probable Ages

PTN RAI 02.05.01-4

Terrace Name	Elevation Range (feet above MSL)	Notes	Probable Age[(a),(b)]
Silver Bluff	1–10	—	0.043 Ma
Princess Anne[(c)]	10–20	—	0.064 Ma
Pamlico	10–25	—	0.095–0.145 Ma
Bethera[(d)] Talbot[(b)]	25–42	Formed during pause in sea level retreat from 100-25 feet	0.210 Ma 0.120[(b)]–0.227 Ma
Penholoway[(b)]	42–70	Formed during pause in sea level retreat from 100-25 feet	0.393–0.408 Ma[(b)]
Wicomico	70–100	Penholoway-Wicomico form single transgressive-regressive sequence	0.393 Ma
Okefenokee[(d)] Sunderland	100–170	Okefenokee and Sunderland terraces grouped by some authors	0.763 Ma 1.430 Ma
Coharie	170–215	Coharie-Sunderland form single transgressive-regressive sequence	1.650 Ma
Hazelhurst	215–320	—	1.66 to 1.98 Ma

(a) Probable age is a calculated from $\Delta H = kT$ ($k = 0.135 \times 10^{-3}$) with final correlation of high sea level data with deep-sea core stages (Reference 260). Age is given in millions of years before present (Ma).

(b) The approximate age is derived from modeling precipitation, karstification, isostatic uplift, and sea level rise (Reference 927).

(c) The Princess Anne terrace is not seen in Florida but is the ninth terrace that Ward (Reference 260) observes in South Carolina.

(d) Based on terrace recognized in southern Georgia; not recognized as a separate terrace in Florida in Reference 271.

Source: Modified from References 260, 271, and 927

PTN RAI 02.05.01-4

Table 2.5.1-204 (Sheet 1 of 2)
Summary of Regional Fault Zones of Cuba

Fault Name	Within Site Region (200 miles)?	Youngest Unit Offset (1989, Tectonic Map of Cuba, 1:500,000 scale)[a]	Youngest Unit Offset (1988, Geologic Map of Cuba, 1:250,000 scale)[b]	Assigned Age from Geologic Map of Cuba Inset (1985, 1:500,000 scale)[c]	Assigned Age(s) from Other Sources
Baconao	No	Eocene	Not mapped	Neogene-Quaternary	Active[d]
Camaguey	No	Not mapped	Eocene (portions dashed)	Paleogene	Active[d]
Cochinos	Yes	Not mapped	Not mapped	Not mapped	Active[d]
Cubitas	No	Pre-Cenozoic	Early Miocene (dashed)	Mesozoic	Pliocene-Quaternary[d] Post-Middle Eocene[i]
Domingo	Yes	Eocene	Eocene	Not mapped	Inactive[d] Late Eocene[e,f]
Guane	No	Not mapped	Not mapped	Paleogene	Active[d]
Habana -Cienfuegos	Yes	Not mapped	Not mapped	Paleogene	Active[d]
Hicacos	Yes	Not mapped	Miocene	Not mapped	Active[d]
La Trocha	No	Not mapped	Middle-Upper Miocene	Neogene-Quaternary	Pliocene-Quaternary[d] Eocene[g]
Las Villas	Yes	Eocene	Eocene (portions dashed)	Mesozoic	Pliocene-Quaternary[d]
Nipe	No	Not mapped	Miocene (dashed)	Neogene-Quaternary	Active[d] (assessment of Cauto-Nipe fault)
Nortecubana	Yes	No data (no mapping offshore)	No data (no mapping offshore)	Mesozoic and Neogene-Quaternary	Inactive [d]
Oriente	No	No data (no mapping offshore)	No data (no mapping offshore)	Neogene-Quaternary	Active[d] (assessment of Bartlett-Caiman fault) Active[j]
Pinar	Yes	Upper Pliocene-Lower Pleistocene (also covered by same unit)	Early-Middle Miocene	Neogene-Quaternary	Inactive[d]
Punta Allegre	No	No data (not mapped at surface)	No data (not mapped at surface)	No data (not mapped at surface)	Unassigned[h]

Table 2.5.1-204 (Sheet 2 of 2)
Summary of Regional Fault Zones of Cuba

Notes:
(a) Mapa Tectonico de Cuba (Reference 847)
(b) Mapa Geologico de Cuba (Reference 846)
(c) Mapa Geologico de la Republica de Cuba (Reference 848) | PTN RAI 02.05.01-29
(d) Cotilla-Rodríguez et al. (Reference 494)
(e) Iturralde-Vinent (Reference 440)
(f) Pardo (Reference 439)
(g) Leroy et al. (Reference 499)
(h) Ball (Reference 468)
(i) van Hinsbergen et al. (Reference 500)
(j) Mann et al. (Reference 493)

Table 2.5.1-205
Correlation of Morphotectonic Zones and Tectonic Terranes in Hispaniola

	Morphotectonic Zone	Tectonic Terrane
Zone 1	Old Bahama Trench (offshore)	—
Zone 2	Cordillera Septentrional-Samaná Peninsula	Puerto Plata-Pedro García-Río San Juan; Samaná
Zone 3	Cibao Valley	One or more of the three following terranes may be in the subsurface of Zone 3: Altamira; Tortue-Amina-Maimon; Seibo
Zone 4	Massif du Nord-Cordillera Central	Tortue-Amina-Maimon; Loma Caribe-Tavera; Duarte; Tireo; Trois Revières-Peralta
Zone 5	Northwestern-south-central zone (includes Plateau Central, San Juan Valley, Azua Plain, Sierra de Ocoa, Presqu'île du Nord-Ouest)	Presqu'île du Nord-Ouest-Neiba
Zone 6	Cul-de-Sac Plain; Enriquillo Valley	Selle-Hotte-Bahoruco terrane appears to underlie most of the subsurface of Zone 6
Zone 7	Southern Peninsula; Massif de la Selle; Massif de la Hotte; Sierra de Bahoruco	Selle-Hotte-Bahoruco
Zone 8	Eastern Peninsula; Cordillera Oriental; Seibo coastal plain	Seibo; Oro
Zone 9	San Pedro Basin and north slope of the Muertos Trough	One or more of the following terranes may be in the subsurface of the San Pedro Basin: Loma Caribe-Tavera; Tortue-Amina-Maimon; Seibo
Zone 10	Beata Ridge and Southern Peninsula	Selle-Hotte-Bahoruco

Source: Reference 566

Table 2.5.1-206
Tectonic Interpretation of Terranes in Hispaniola

Fragments of the Forearc / Accretionary Prism of an Island Arc	Fragments of the Volcano-Plutonic Part of an Island Arc	Fragments of Ocean Floor including Seamounts	Fragment of a Back Arc Basin	Fragment of an Oceanic Plateau
1. Samaná	3. Altamira	7. Loma Caribe-Tavera	10. Trois Rivières-Peralta	12. Selle-Hotte- Bahoruco
2. Puerto Plata-Pedro García-Río San Juan	4. Oro	8. Duarte		
	5. Seibo			
	6. Tortue-Amina-Maimon			
	9. Tireo			
	11. Presqu'île du Nord-Ouest-Neiba			

Note: Numbers for tectonic terranes correspond to tectonic terranes (zones) in Figure 2.5.1-305
Modified from: Reference 566

Division of Terranes in Hispaniola Based on Deformational Characteristics[a]		
Stratigraphic[b]	Metamorphic[c]	Disrupted[d]
3. Altamira	1. Samaná	2. Puerto Plata-Pedro García-Río San Juan
4. Oro	6. Tortue-Amina-Maimon	7. Loma Caribe-Tavera
5. Seibo	8. Duarte	
9. Tireo		
11. Presqu'île du Nord-Ouest-Neiba		
12. Selle-Hotte- Bahoruco		
10. Trois Rivières-Peralta		

Notes:
(a) Numbers for tectonic terranes correspond to tectonic terranes (zones) in Figure 2.5.1-305
(b) Stratigraphic terranes are characterized by coherent sequences of strata in which depositional relations between successive lithologic units can be demonstrated.
(c) Metamorphic terranes are characterized by rocks metamorphosed to a high enough grade that original minerals, stratigraphic features, and stratigraphic relationships are obscured.
(d) Disrupted terrane are characterized by brittle deformation that obscures the depositional relations between successive lithologic units.
Source: Modified from Reference 566

Table 2.5.1-207
NOAA NGDC Database Tsunami Run-Up Events

Date	Tsunami Source	Run-up Location(s)	Distance from Source(s) (Kilometers)	Maximum Water Height
09/01/1886	Charleston, SC EQ M 7.7	Jacksonville, FL Mayport, FL	327 310	No data (eye witness reports)
08/04/1946	Dominican Republic EQ M 8.1	Daytona Beach, FL	1648	No data (tidal gage measurement)
08/08/1946	Dominican Republic EQ M 7.9	Daytona Beach, FL	1571	No data (tidal gage measurement)
07/03/1992	Probably meteorologically induced –not true tsunami (several eye witness reports of offshore fireball)	Daytona Beach, FL	No data	6 meters
		New Smyrna Beach, FL		1.2 meters
		Ormond Beach, FL		1.2 meters
		St. Augustine, FL		No data
12/26/2004	Sumatra EQ M 9.0	Trident Pier, FL	16,475	0.17 meters

PTN RAI 02.05.01-22

Table 2.5.1-208
Marine Terraces in the Matanzas Area of Northern Cuba (Sheet 1 of 2)

Marine Terrace (Reference 915)	Elevation of Marine Terrace (Reference 915)	Geologic Stratum (References 915 and 921)	Depositional Environment (Reference 915)	Possible Geologic Age (Reference 915)	Possible Geologic Age (Reference 921)
			Start of emergence	Start of the Upper Miocene	
			Erosion Cycle (No. 1)	Upper Miocene	
			Uplift and buckling (env. 60m)	Pliocene (?)	
			Erosion Cycle (No. 2)		
			Uplift (env. 80 m)	Pliocene	
			Erosion Cycle (No. 3)		
			Uplift and folding (10 and 45 m)		
La Rayonera	25 and 51 m		Erosion Cycle (No. 4)		Pliocene-Pleistocene
			Uplift and folding (15 and 25 m)		
Yucayo	15 and 33 m		Erosion epicycle (No. 1)	Pliocene (?)	Pliocene-Pleistocene
			Drop in sea level: uplift, very light folding (10m)	Pliocene (?)	
Puerto	16 m		Erosion epicycle (No. 2)	Start of the Illinoian Glaciation	
			Drop in sea level (11 and 13 m)		
submarine terrace	No. 1 (-1 m)		Erosion epicycle (No.3)		
			Drop in sea level (1 m)		
submarine terrace	No. 2 (-2 and -6 m)		Erosion epicycle (No. 4)		
			Drop in sea level (env. 130 m)	Illinoian Glaciation Maximum	
Continental Shelf terrace			Erosion epicycle (No. 5)		
			Rise in eustatic sea level (11 m)		
		Jaimanitas Formation (Terraza de Seboruco), Rosario Terrace (continental alluvial terrace)	Formation of fringing reefs on uplifted alluvium deposits	Sangamon Interglacial	Pleistocene

LDP-CS564

PTN RAI 02.05.01-22

Table 2.5.1-208
Marine Terraces in the Matanzas Area of Northern Cuba (Sheet 2 of 2)

Marine Terrace (Reference 915)	Elevation of Marine Terrace (Reference 915)	Geologic Stratum (References 915 and 921)	Depositional Environment (Reference 915)	Possible Geologic Age (Reference 915)	Possible Geologic Age (Reference 921)
Limits of the Terraza de Seboruco	+/- 8 m		Drop in sea level (env. 12 m)	Start of the Wisconsinan Glaciation	
submarine terrace	No. 3 (-10 and -17 m)		Erosion epicycle (No. 6)		
			Drop in sea level (env. 10 m)		
submarine terrace	No. 4 (-20 and -55 m)		Erosion epicycle (No. 7)		
			Drop in sea level (env. 110 m)	Wisconsinan Glaciation Maximum	
Limit of the Restart of the Continental Plate			Erosion epicycle (No. 8)		
			Eustatic rise to present sea level	Flandrian Transgression	
		Recent alluvium	Induation of river valleys		

Source: References 915 and 921

PTN RAI 02.05.01-22

PTN RAI 02.05.01-22

PTN RAI 02.05.01-4

Table 2.5.1-209
Marine Terrace Sequences in Southern Florida

Epoch	Litho-stratigraphic Unit	Marine Sequence Stratigraphic Unit	Radiometric Age Date (ka)	Sample Location	Depth/Elevation	MIS
Pleistocene	Key Largo Limestone/ Miami Limestone	Q5e (youngest)	130–121	Windley Key, Upper Matecumbe Key and Key Largo	~4.9 to 5.3 meters above sea level at Windley Key Quarry, water depths of ~16 and ~22 meters	5e
		Q5c Q5a	112.4 to 77.8	Conch Reef, Looe Key, Carysfort Light area and Molasses Reef	water depth of -15.2 and -15.5 meters (Carysfort Light area)	5c 5a
		Q4b?	230–220	Long Key Quarry	~0.7 to 3.5 meters above sea level	7
	Fort Thompson Formation	Q4a	340–300	Point Pleasant Core	NR	9
		Q3 Q2 Q1 (oldest)	*** *** ***	Grossman Ridge Rock Reef and Joe Ree Rock Reef	NR	11 11 11?

Notes:
"?" uncertainty
*** no reliable dates (Reference 928)
NR- denotes the elevations are not recorded in Reference 928
The Radiometric Age Date column is derived from Uranium-series ages ($^{234}U/^{238}U$) on corals and thermal ionization mass-spectrometric Uranium-Thorium (TIMS U-Th) dating.
The Depth Column is approximate.

Source: References 928, 929, 930, and 933

LDP-CS564

PTN RAI 03.08.05-1

LDP-CS564

Table 2.5.1-210
Rod Drops at the Turkey Point Units 6 & 7 Area

Boring ID	From (Depth, feet)	To (Depth, feet)	Rod Drop (Length, feet)	Stratigraphic Unit
B-637	28.6	30.6	2	Miami Limestone
B-714	112	113	1	Fort Thompson Formation
B-738	71.9	74.5	2.6	Fort Thompson Formation
B-805	27	30	3	Miami Limestone
B-811	61.3	65.3	4	Fort Thompson Formation
B-814	87.6	88.1	0.5	Fort Thompson Formation

Note: No rod drops in the Power Blocks. B-714 is located in the Annex Building footprint in Unit 7.

PTN RAI 03.08.05-1

Source: Reference 708