

## **Inventory of Potential Beach Nourishment and Coastal Restoration Sand Sources on the Atlantic Outer Continental Shelf**

The Geophysical and Geological Data Acquisition: Inventory of Potential Beach Nourishment and Coastal Restoration Sand Sources on the Atlantic Outer Continental Shelf is an ongoing project being conducted by CB&I under contract with the Bureau of Ocean and Energy Management (BOEM). The purpose of this project is to identify, characterize and delineate potential sand resources on the Atlantic Outer Continental Shelf (OCS) for use in future coastal restoration, beach nourishment, and/or wetland restoration efforts. The eastern coast of the United States was severely damaged by strong winds, waves, and currents that were caused by Hurricane Sandy in October 2012. Since then, east coast beaches in several areas have been in need of coastal restoration. Upon the completion of this two-year project there will be an inventory of potential sand sources for future beach nourishment and coastal restoration efforts for the U.S. states adjacent to the Atlantic OCS. The project area extends from 5.6 kilometers (three nautical miles) to 14.8 kilometers (eight nautical miles) offshore on the Atlantic OCS within water depths up to approximately 30 meters from Maine to Miami, Florida. 5,600 kilometers (km) of geophysical data and 350 geological samples (250 vibracores and 100 surface grab samples) are planned. The data acquisition effort was divided between each of the 13 coastal states with an Atlantic OCS based on their length of coastline, historical need for OCS sand resources, potential future need for OCS sand resources, and historical geophysical and geological data density, among other criteria. As part of the Hurricane Sandy Disaster Relief Appropriations Act, the extent of damages caused by Hurricane Sandy was also a controlling factor, and thus required that New Jersey and New York together benefit from at least 40% of the overall project effort. Potential study areas were presented to BOEM, other federal agencies, and state and local stakeholders during State coordination meetings held between January and March 2015. Based on the criteria described above and specific input from these meetings, the study areas were refined and finalized and field investigations commenced April 19, 2015.

These data represent the sediment analysis results of the reconnaissance geologic survey samples collected using an Alpine Pneumatic vibracore for all vibracores and a Petite Ponar Grab for surface grab samples. These data were collected September 18, 2015 to September 19, 2015 and analyzed for sediment grain size and sample composition. These data are presented in the NAD 1983 Universal Transverse Mercator (UTM) Zone 19N projection.

The Bureau of Ocean Energy Management (BOEM) provides the data for use "as is." BOEM provides this information with the understanding that it is not guaranteed to be accurate, correct or complete and conclusions drawn from such information are the responsibility of the user. While every effort has been made to ensure the accuracy, correctness and timeliness of materials presented, BOEM assumes no responsibility for errors or omissions. Users are cautioned to consider carefully the provisional nature of these data and information before using them for decisions that concern personal or public safety or the conduct of business that involves substantial monetary or operational consequences. Conclusions drawn from or actions undertaken on the basis of, such data and information are the sole responsibility of the user. The data are not suitable for navigational purposes. Information found here should not be used for making financial or any other commitments. These data were developed by the U.S. Government; no other proprietary rights may be attached to them nor may they be sold to the U.S. Government as part of any procurement of products or services.

## CORING

Reconnaissance geologic samples were collected within a 50 foot buffer of the planned sample location which was approved by a qualified marine archaeologist.

This dataset is from one field activity with consistent instrument calibrations.

Navigation and horizontal positioning for the Odom Hydrotrac Sounder was provided by a Trimble SPS GPS utilizing dual frequency rover antennas with DGPS Beacon corrections. GPS measurements were offset to represent the center point of the vibracore or ponar location. GPS antennas were rigidly affixed to the vessel via a pole mount on the starboard side of the vessel. Starboard pole mount offsets were measured (to within 5 cm) in relation to the reference point (top of core or ponar capstan). The positioning of the vessel and the sample location were corrected during data collection utilizing HYPACK 2015 to account for instrument offset. DGPS in combination with beacon corrections is accurate to within 1 to 5 meters. Data were collected in UTM Zone 18N, units in meters. (NAD 1983 UTM Zone 18N)

All vertical measurements are referenced to datum NAVD88 (Geoid Model 12A). Top of core elevations were derived using soundings collected during the geophysical operations and verified using an Odom single beam sounder at the time of core collection. Sounding data has been corrected for tidal fluctuations. The Odom single beam sounder was calibrated using an Odom Digibar Pro sound velocity probe with sound velocity measurements taken before sampling began. The sounder calibration was verified using bar checks at 5 foot intervals down to 30 foot depths.

The vibracores were collected using a 271B Alpine Pneumatic vibracore, configured to collect undisturbed sediment cores up to 20 ft. in length. This self-contained, freestanding pneumatic vibracore unit contains an air-driven vibratory hammer assembly, an aluminum H-beam which acts as the vertical beam upright on the seafloor, 20 ft. long steel tubes measuring 4" in diameter (with a plastic core liner), and a drilling bit with a cutting edge. An air hose array provides compressed air from the compressor on deck to drive the vibracore. The vibracore unit was A-frame deployed from AVS's vessel, the M/V Thunderforce.

The desired penetration depth was 20 feet. It is recognized, however, that maximum penetration may not be achieved at all sample locations. A minimum of 80 percent of the expected penetration was required through the unconsolidated strata. When located over a boring site, AVS made every reasonable effort to reach the required depth or to reach penetration refusal. Penetration refusal was completed when less than 1 ft of advance was accomplished after 5 minutes of vibration. When refusal was met at less than 80 percent of the desired depth of penetration, AVS removed the sampled portion and a new core pipe was set up. A jet pump hose was attached to the tip of the core pipe just below the vibrator. The rig was lowered to the bottom and jetted down to a depth 2 ft above where the first attempt met refusal. The jet was then turned off and the vibrator turned on, taking the additional part of the core and 2 ft of overlap. Retries were accomplished until penetration had reached the required depth, refusal or until three (3) retries were attempted, whichever occurred first. The jetted cores were labeled with an "A" for the first jetted section and a "B" for the second jetted section after the core name.

The vibracores were then removed from the vibracore unit. They were measured, marked and cut into 5 ft. sections. The total length of recovery was measured and compared to the measured depth of penetration to calculate percent recovery. Penetration was determined with the use of a penetrometer and chart recorder. Depth of penetration beneath the surface of the bottom was known to be within plus or minus 0.5 ft of actual penetration. Each vibracore was labeled onboard the vessel.

CB&I utilized a Ponar petite grab sampler for collection of unconsolidated surface samples. The Ponar was lowered by hand over the side to the seafloor at pre-determined and pre-approved sample locations. Once near the seafloor, the Ponar was allowed to free-fall, triggering the sampling device to penetrate

and close into the seafloor, collecting a surface sediment sample. The Ponar was then retrieved to the deck of the vessel, and the sample collected into secure sample bags for transport back to CB&I's geotechnical laboratory for visual description, photographing and sediment analysis.

## **SAMPLING and ANALYSIS**

Upon completion of field operations, all vibracores were transported to CB&I's office in Boca Raton. The vibracores were split lengthwise and logged in detail by describing sedimentary properties by layer in terms of layer thickness, color, texture (grain size), composition and presence of clay, silt, gravel, or any other identifying features in accordance with American Society for Testing and Materials (ASTM) standard procedure D 2488-09a. The vibracores were photographed in 2.0 ft intervals using an Olympus C-765 digital camera that was mounted on a frame directly above the vibracores. The photographs were taken using full spectrum overhead lighting and an 18% gray background, which provides a known reference color and is the standard reference value against which all camera light meters are calibrated. Sediment samples were extracted from the vibracores at irregular intervals based on distinct stratigraphic layers in the sediment sequence. The vibracores were then wrapped and boxed for transfer to a BOEM-designated archive facility according to that facility's requirements (the Lamont-Doherty Core Repository). Sedimentary properties of the grab samples were also described. Each grab sample was split into two representative sub-samples, one sub-sample was used to conduct the laboratory analysis and the other sub-sample was provided to the BOEM approved archive facility.

The sediment samples were analyzed to determine color and grain size distribution. During sieve analysis, the wet, dry and washed Munsell colors were recorded. Grain size was determined through sieve analysis in accordance with ASTM Standard Materials Designation D422-63 for particle size analysis of soils. This method covers the quantitative determination of the distribution of sand particles. Sediment finer than the No. 230 sieve (4.0 phi) was analyzed following ASTM Standard Test Method, Designation D1140-00. Mechanical sieving was conducted using calibrated sieves with a gradation of half phi intervals. Additional sieves representing key ASTM sediment classification boundaries were also included to meet appropriate beach-compatible mineral characterization. Weights retained on each sieve were recorded cumulatively. Grain size results were entered into the gINT® software program, which computes the mean and median grain size, sorting, silt/clay percentages for each sample using the moment method.

The sediment samples extracted from the vibracores and the grab samples were prepared for processing in CB&I's accredited geotechnical laboratory. This laboratory is accredited by the Construction Materials Engineering Council, Inc. (CMEC) for (ASTM) D422/T88 Sieve Analysis, D1140, D4648, and CPE-HAT-09. Geological samples were analyzed to determine texture (grain size and sorting); percent carbonate, and color.

Data were collected by CB&I under BOEM contract number M14PC00006.

CB&I - Beau C. Suthard, Project Manager  
101 16th Avenue South, Suite 6, St Petersburg, FL 33701; 727.565.4660; Beau.Suthard@cbi.com

Jeff G. Helgerson, Marine Geologist  
101 16th Avenue South, Suite 6, St Petersburg, FL 33701; 727.565.4660; Jeff.Helgerson@cbi.com

Kristina McCoy, Project Geologist  
2481 N.W. Boca Raton Blvd., Boca Raton, FL 33431; 561.361.3183; Kristina.McCoy@cbi.com

APPENDIX 2  
VIBRACORE PHOTOGRAPHS



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC01  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC01  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC01  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC01  
6.0' - 8.0'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC01  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC01  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC01  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC01  
14.0' - 15.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC02  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC02  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC02  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC02  
6.0' - 8.0'



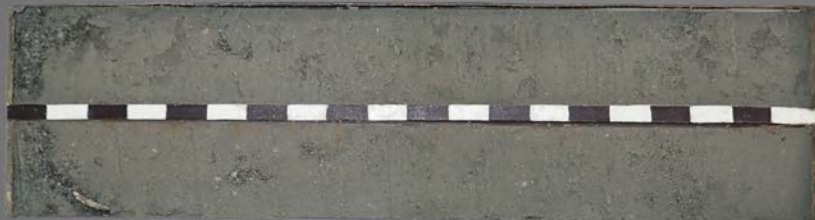




INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC02

8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC02

10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC02

12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC02

14.0' - 16.0'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC02  
16.0' - 16.6'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC03  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC03  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC03  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC03  
6.0' - 8.0'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC03  
8.0'-10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC03  
10.0'-12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC03  
12.0'-14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC03  
14.0'-16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC03  
16.0'-17.9'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
14.0' - 16.0'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC04  
18.0' - 19.6'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08  
6.0' - 8.0'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08  
14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08

16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC08

18.0' - 19.4'



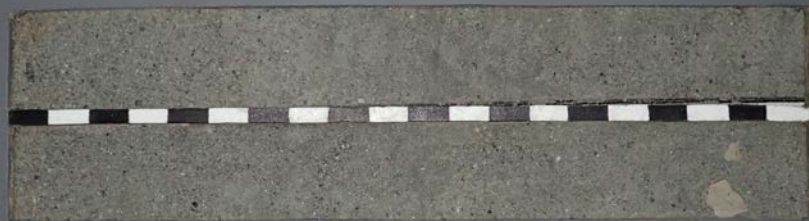




INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10

0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10

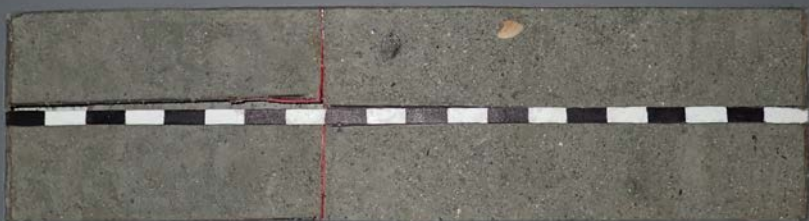
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10

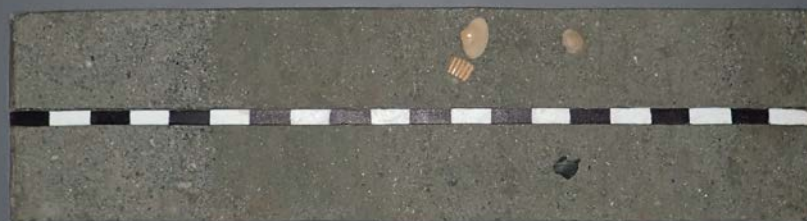
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10

6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10

8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10

10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10

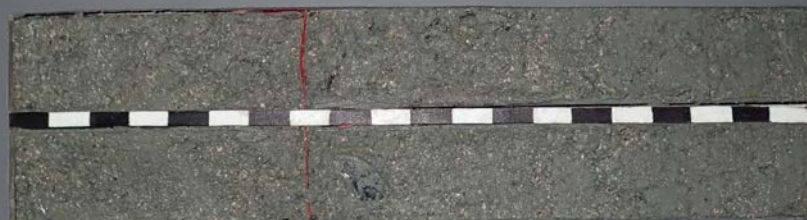
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10

14.0' - 16.0'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10  
16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC10  
18.0' - 19.7'

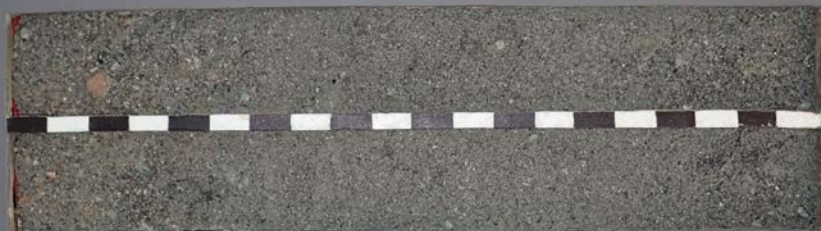




INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC15

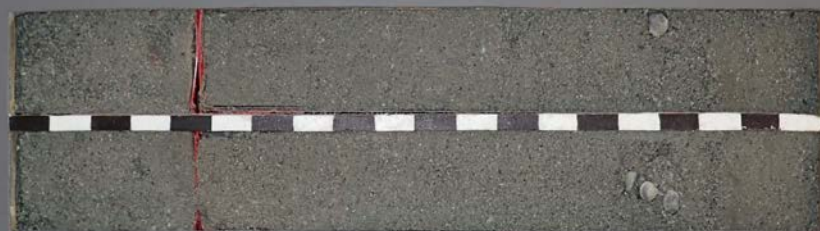
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC15

2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC15

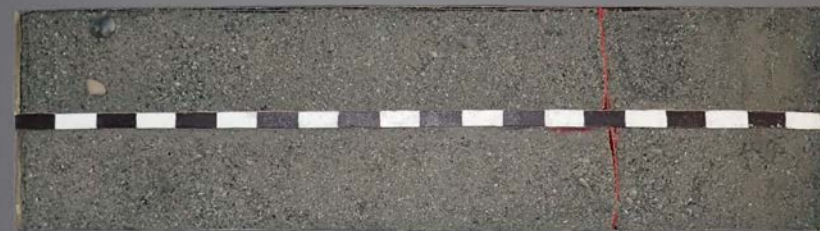
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC15

6.0' - 8.0'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC15

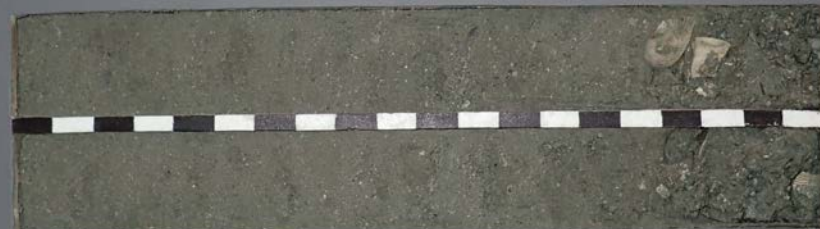
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC15

10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC15

12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC15

14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC15

16.0' - 17.5'

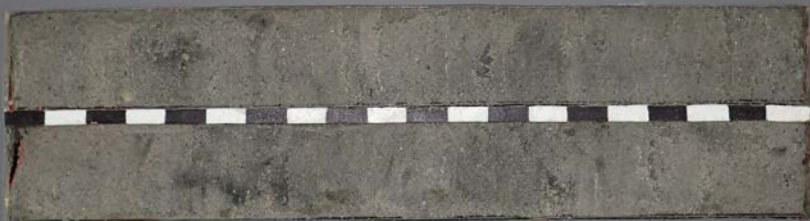






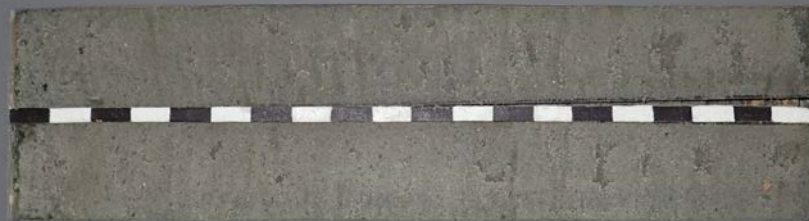
INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC16  
18.0' - 19.9'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17

0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17

2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17

4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17

6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17  
14.0' - 16.0'







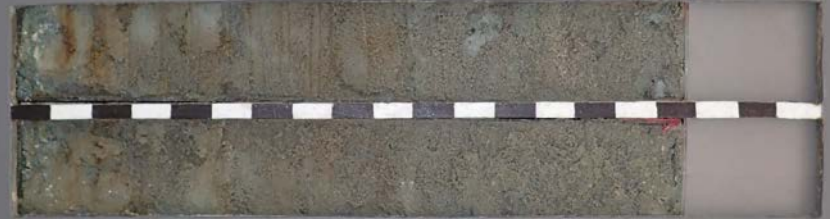
INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17  
16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC17  
18.0' - 19.7'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC18

0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC18

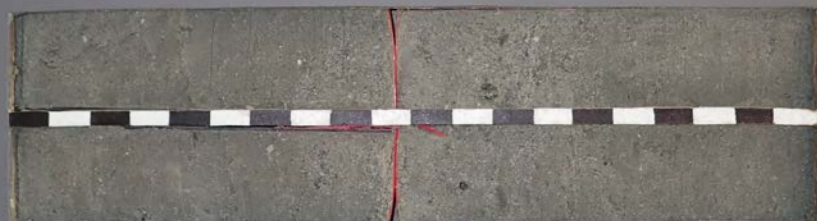
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC18

4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC18

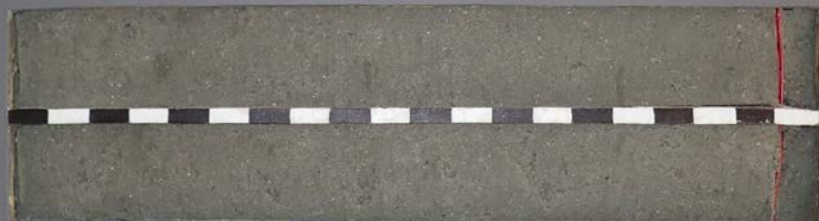
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC18  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC18  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC18  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC18  
14.0' - 16.0'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS  
FL-BOEM-2015-VC18  
16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS  
FL-BOEM-2015-VC18  
18.0' - 19.9'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19

0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19

2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19

4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19

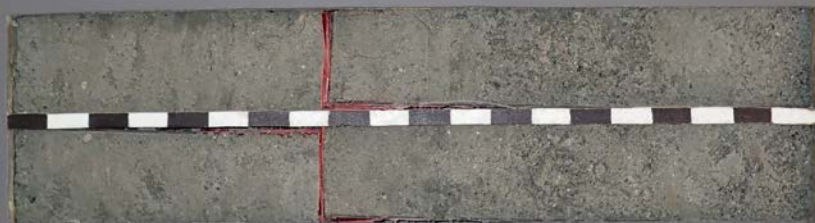
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19  
14.0' - 16.0'

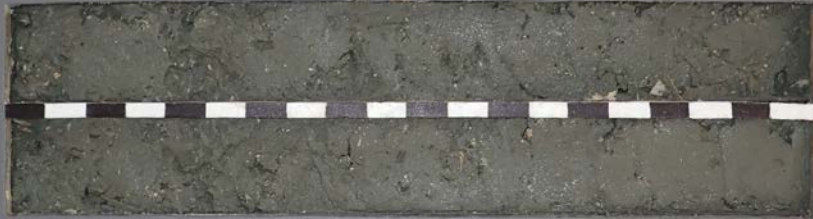




INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19

16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC19

18.0' - 18.7'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21  
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21  
14.0' - 16.0'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21

16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC21

18.0' - 19.8'







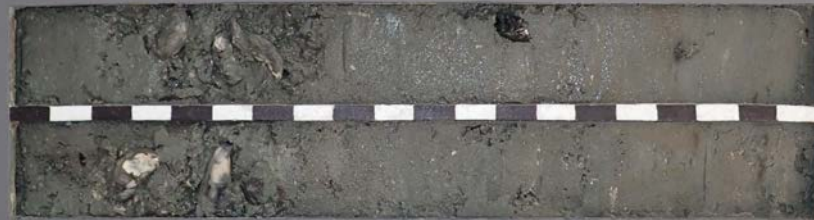
INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22  
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22

8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22

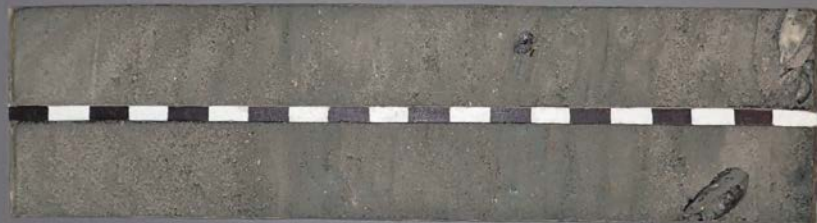
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22

12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22

14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22

16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC22

18.0' - 19.6'

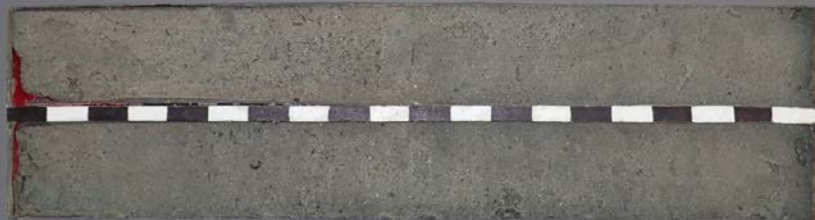






INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC23  
0.0' - 2.0'



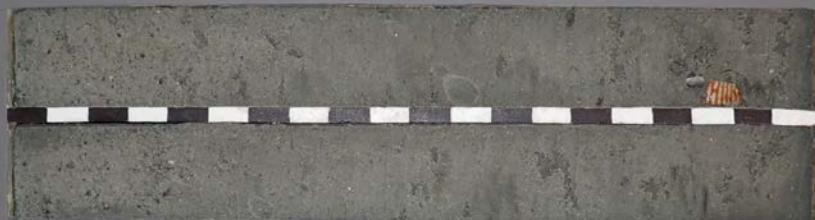
INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC23  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC23  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC23  
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC23

8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC23

10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC23

12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC23

14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC23  
16.0' - 17.7'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24

0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24

2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24

4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24

6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24  
14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24  
16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC24  
18.0' - 18.7'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
8.0' - 10.0'



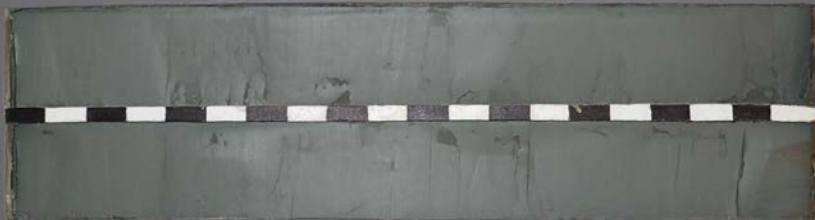
INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC25  
18.0' - 19.4'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC26  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC26  
2.0' - 4.0'



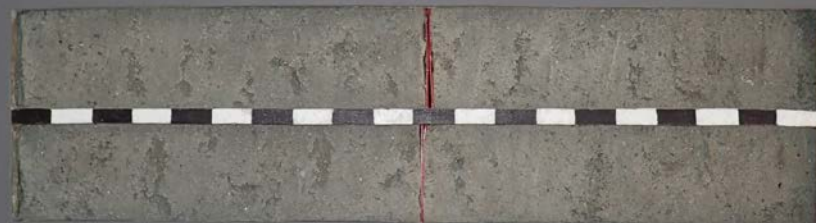
INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC26  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC26  
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC26  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC26  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC26  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

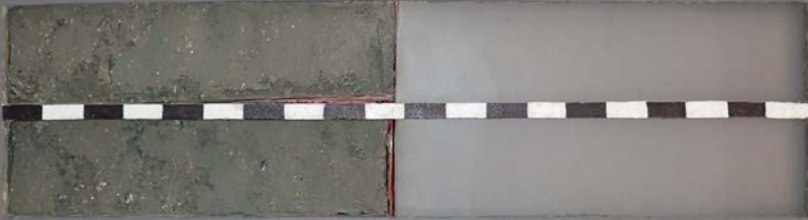
FL-BOEM-2015-VC26  
14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC26  
16.0'-17.0'

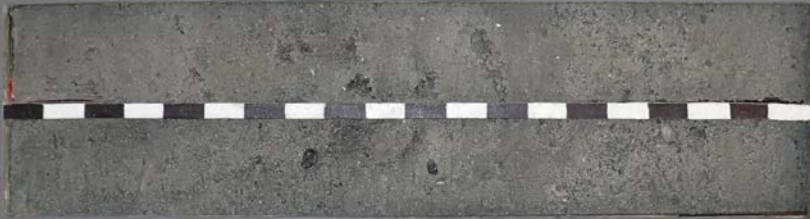






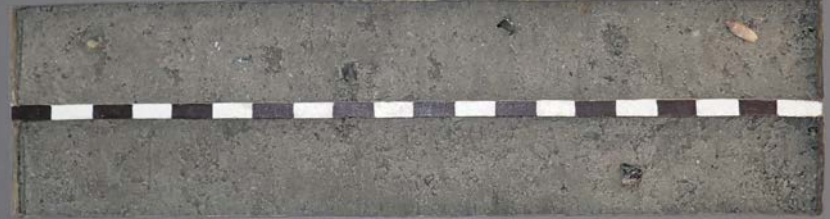
INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
2.0' - 4.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
4.0' - 6.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC27  
18.0' - 18.9'







INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC28  
0.0' - 2.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC28  
2.0' - 4.0'



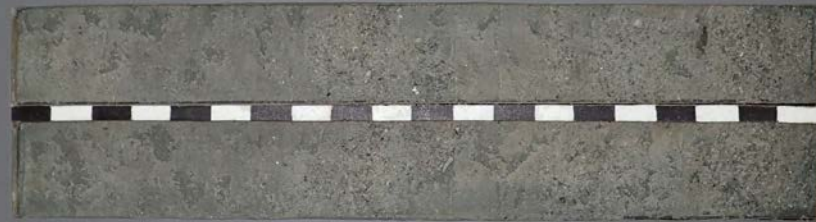
INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC28  
4.0' - 6.0'



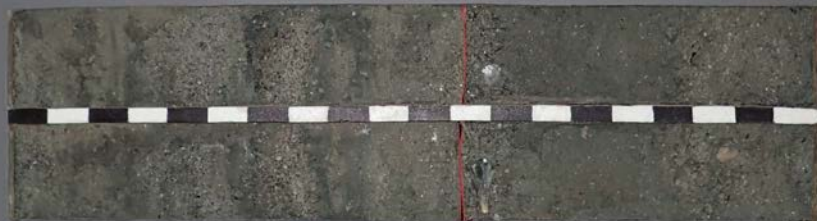
INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC28  
6.0' - 8.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS  
FL-BOEM-2015-VC28  
8.0' - 10.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS  
FL-BOEM-2015-VC28  
10.0' - 12.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS  
FL-BOEM-2015-VC28  
12.0' - 14.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS  
FL-BOEM-2015-VC28  
14.0' - 16.0'





INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC28  
16.0' - 18.0'



INVENTORY OF  
POTENTIAL SAND  
RESOURCES ON THE  
ATLANTIC OCS

FL-BOEM-2015-VC28  
18.0' - 19.1'

