



APPROVED

Sediment QA/QC Plan
Permit #: **0251706-001-JC**
Approval: **October 2010**

Bureau of Beaches and Coastal Systems

U.S. Army Corps of Engineers Jacksonville District

**Sediment Quality Control/Quality Assurance Plan
for
Maintenance Dredging with Beach Disposal**

St. Augustine Inlet and Vicinity IWW

JCP File No.: 0251706-001-JC, St. Johns County

October 20, 2010

A. Brief Project Description

The project is to maintenance dredge the entrance channel to St. Augustine Inlet and associated Intracoastal Waterway (IWW).

B. Plan Purpose and Objectives

The purpose of the Sediment Quality Control (QC) and Quality Assurance (QA) Plan is to ensure that sediment placed on the beach meets the standards shown in Appendix A. Geotechnical investigations and/or historical data for the project have indicated that the sediment located within the spatial limits of the permitted channel cut(s) meets the standards shown in Appendix A.

The QC provisions of the Plan reiterate the contract requirements placed on the selected contractor to perform all work within the construction tolerances of the authorized channel cut(s), to promptly modify dredging activity should sediments unsuitable for beach placement be encountered, and to take remedial actions should unsuitable material be placed on the beach. Sediment quality specifications are provided for the dredged material within a range of acceptable sand quality values which must be met for final acceptance. The sediment quality specifications take into account the variability of material within the channel and represent values which may reasonably be attained given what is known about the dredged material.

The QA provisions of the Plan outline the steps taken by the USACE Quality Assurance Representative (QAR) and Project Delivery Team (PDT) to assure compliance of observations, sample collection, and testing of the placed sediments. In addition, reporting requirements are provided.

1. Existing Beach Material

The existing beach consists of placement materials from previous routine maintenance dredging in the project channel. Beach sediment samples were collected in October 2008 at St. Augustine Beach between DNR Monument R-133 through R-146. The grain size analysis of the samples shows that the existing beach materials consist of poorly graded, fine to medium grained sand

sized quartz with a visible shell content ranging from 0 to 22%. The mean grain sizes ranges from 0.15 mm to 0.39 mm. The composite mean grain size is 0.20 mm.

2. Maintenance Dredged Material

Vibracore samples were collected from the project channel in December 2008. Based on the grain size analysis of the samples, the dredged materials from channel within the dredging depth consist of poorly graded, fine to medium grained sand sized quartz with a visible shell content ranging from 0 to 5 %. The mean grain sizes range from 0.15 mm to 0.66 mm. The composite mean grain size is 0.28 mm and the composite silt content is 2.6 %. No rock was encountered. The dredged material from the Vilano Point shoal consists of poorly graded fine-grained, sand-sized quartz and various shell layers. The shell layers consist of sand, occasional gravel-sized shell fragments with trace to some sand-sized quartz.

3. Sampling and Testing

In the event additional geotechnical information is required due to placement of unacceptable material in the previous dredging event, the character of sand within the placement area will be verified using the following sampling regime and laboratory analyses prior to placement commencement:

a. Pre-Dredge Sampling Methodology - Surface samples will be collected by the USACE (EN-GG Section) along shore-normal transects of the project's prospective placement area within the beach placement area. Transects will be located at approximately 1000 foot intervals within the prospective placement area. Along each transect, two duplicate samples of material will be obtained from a depth of no less than 6 inches below the surface and at the following cross-shore locations: (1) toe of dune, (2) mid-berm, (3) approximate mid-tide, and (4) approximately 3 feet below surface water level. Each sample should be labeled with the following information: (a) date, (b) time, (c) sample location or monument number, and (d) cross-shore location (i.e., toe of dune).

b. Laboratory Analyses - The existing beach sediments will be characterized as described in Section G.

c. Recording and Reporting of Results - The results of each sample analysis shall be submitted as follows: (a) a tabular summary of % visual shell, % fines, % fine gravel, % coarse gravel, % cobbles or other material (retained on the 3/4 inch sieve), Munsell color (moist sample), and presence of construction debris or other foreign matter; (b) grain-size cumulative frequency distribution curve (a.k.a. gradation curve), and (c) tabular summary of nested sieve sample granulometrics including mean grain size, median grain size, and sorting expressed as a numeric and verbal value. The sample submittal date to the laboratory shall be recorded by the laboratory on all reporting documents. The final data set of sampling information and analytical results from the pre-construction placement area survey and the dredge area survey shall be provided to DEP for review prior to commencement of placement activity (time permitting).

4. Risk Management

This section outlines the responsibilities of Contractor and the USACE as they relate to the placement of dredged material on the beach. These responsibilities are in response to the acknowledged minimal risk that non-beach compatible sediments may exist in lenses within the channel and could be unintentionally placed on the beach.

The USACE has performed geotechnical investigations to the standard of care in the industry and has relied on the linear nature of sedimentary deposits, and a limited number of samples to design the channel cuts. The USACE has the personnel and access to testing facilities to sample and test sediment that has been placed on the beach.

The USACE will be directing that the work be done and has relied on its findings, which are based on limited borings as well as previous experience, in authorizing the project to go to construction. The USACE has experience with these types of projects, and has the authority to modify the project (within the constraints of the permits and available funding) in the event that non-beach compatible sediments are inadvertently placed on the beach.

The Contractor will be undertaking the work and will be relying on the USACE's findings in constructing the project. The Contractor will have on-site personnel who can identify obvious changes in sediment quality at the active placement location. The Contractor has or can acquire the equipment and personnel to remediate the beach if so directed or required by the USACE. Based on the above discussion the Corps believes this project is low risk.

The Contractor will be provided with all available descriptions of sediment samples collected within the channel and will acknowledge at the preconstruction conference that he is aware of the quality of the sediment as described in the geotechnical data. This data will be presented in the construction specifications.

C. Beach Placement Sediment Quality Specifications

The sediment from the dredge cut(s) is similar to the material in the existing coastal system at the beach placement site. The Department and the USACE acknowledge that it is possible that discrete occurrences of non-beach compatible sediments may exist within the permitted dredge cuts that do not comply with the criteria as shown in Appendix A. The project compliance values are shown in Table 1.

These specifications take into account the natural variability observed within the channel areas as determined using the existing core boring data. Beach fill material which falls outside of these limits will be considered unacceptable and subject to remediation. Unacceptable material also includes debris, trash, and rocks or rubble larger than three-fourths (3/4) inch in diameter, which exceed the size of the natural occurrence of rock or shell on the beach.

Deviations from the specifications are acceptable provided that the spatial extent of the deviations does not exceed 10,000 continuous square feet.

Table 1- Sediment Quality Specifications for Channel Area Material

Sediment Parameter	Parameter Definition	Project Compliance Value
Maximum Shell Content ¹	Retained on #4 sieve	5% ²
The beach fill material shall not contain construction debris, toxic material, other foreign matter, coarse gravel or rocks.		

¹Shell Content is used as the indicator of fine gravel content for the implementation of quality control/quality assurance procedures.

²Sediments with a percentage of shell and shell fragments retained on the #4 sieve exceeding 5% are expected at the Advanced Maintenance Area at Vilano Point. DEP agreed to a special beach placement for those materials.

D. Quality Control

The Contractor will be responsible for establishing such control as may be necessary to ensure the construction tolerances are not exceeded. The contract documents should incorporate the following technical requirements, or equivalent language, that address the dredging location, sediment quality monitoring and reporting, modification of dredging activity, and remedial actions if necessary. The USACE will seek to enforce these contract requirements during the execution of work.

1. Contingency Plan.

The Contractor will be responsible for establishing such control as may be necessary to ensure that the construction tolerances are not exceeded. If the Contractor encounters unacceptable materials during dredging, the Contractor will immediately notify the USACE verbally, providing the time, location, and source of the unsatisfactory material and proceed in accordance with the contract. If the notification procedures are not specified in the contract, the following shall be adhered to:

- a. Should any beach sample not comply with the project-specific beach placement criteria, the QAR shall be notified at the first available normal business hours.
- b. Should three consecutive samples not comply with the beach placement criteria, the Contractor shall immediately notify the QAR.

The Contractor will also report any encounters with unacceptable material in the daily QC reports. The Contractor will report the approximate elevation and horizontal position (in project reference datum) as to where the materials were encountered, as well as the location where material was placed in the beach disposal area. The excavation location of unacceptable material will be provided with the DEP notification required in Section E. 9. below.

The specifications for this project now include requirements for dredge plant positioning. Dredge plants will be equipped with horizontal and vertical control systems that provide the operator with the position of the excavation device. The electronic positioning equipment will be continuously operated to monitor the positioning of the dredge location(s). The dredge positioning equipment will have a horizontal accuracy equal to or better than a standard Differential Global Positioning System (DGPS), equal to or better than plus/minus 5 feet. Vertical positioning shall account for tides and have an accuracy of plus/minus 0.5 foot. If a

known permit violation occurs, the dredge positioning data will be made available for review at the USACE Jacksonville office.

2. Beach Observation.

The Contractor will continuously visually monitor the material being placed on the beach for unacceptable material. If noncompliant sediment is placed on the beach, the Contractor will immediately verbally notify the USACE, providing the time, location, and description of the noncompliant sediment. The Contractor will also report any encounters with noncompliant sediment in the Contractor's Daily Report, providing depth and location in State Plane Coordinates of said materials within the dredge cut(s). The Contractor will take the appropriate actions. The material can be deemed unacceptable based on the content of rock, debris, shell, color and silty materials. If occasional debris, trash, rocks, or silty materials appear on the beach during dredging operations and appear to exceed background or existing levels, the Contractor will remediate as specified in the contract. The Contractor will notify the USACE of any observed non-beach compatible sediment.

3. Geotechnical Data.

The Contractor will be provided with all available descriptions of sediment samples collected within the channel and will acknowledge at the preconstruction conference that he is aware of the quality of the sediment as described in the geotechnical data. This data will be presented in the construction specifications.

4. Noncompliant Material Handling Provision.

The Contractor shall have plans and equipment available for use to handle any noncompliant material encountered during dredging. Any debris placed on the beach shall be handled under the guidelines set forth in Section F. below.

E. Quality Assurance

The USACE may use the contractor's daily reports, plans, and sample descriptions to determine where the Contractor may dredge to avoid placement of unacceptable materials. The USACE will adjust the construction operation to avoid placement of the unacceptable material on the beach to the greatest extent practicable. The USACE will determine where non-beach compatible material will be disposed of if encountered. Remediation actions are discussed in Section F below.

The USACE will enforce the construction contract and FDEP permits related to sediment quality in accordance with the following:

1. Construction observation by the USACE Quality Assurance Representative (QAR) will be performed during periods of active construction. Most observations will be conducted during daylight hours. However, random nighttime observations may be conducted.
2. The USACE QAR will provide oversight. The QAR shall be an individual with training or experience in beach placement, construction inspection, and testing; and is knowledgeable of the project design and permit conditions.
3. The project QC provisions to be implemented by the Contractor will be discussed as a matter of importance at the pre-construction meeting. The Contractor will be required to acknowledge the goals and intent of the above described QC Plan at the preconstruction conference.
4. The USACE will review the Contractor's daily reports which characterize the nature of the sediments encountered at the channel area and placed on the beach with attention to the presence of rock, rubble, shell, silt, or debris that exceeds acceptable limits.
5. The QAR will be available during the period of construction for the purpose of making decisions regarding issues that involve QA/QC Plan compliance.
6. Any modification to the Contract between the USACE and the Contractor will be evaluated by USACE to determine whether or not the change in scope will potentially adversely affect the above described QC Plan.
7. To assure that the fill material placed on the beach is in compliance with the permit, the USACE will conduct assessments of the beach fill material. The USACE will collect a sediment sample at not less than 200-foot intervals of newly constructed berm to visually assess grain size, Munsell color, shell content, and silt content. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). This assessment will consist of handling the fill material to ensure that it is predominantly sand, to note the physical characteristics, and to assure the material meets the sediment compliance parameter specified in this Plan. If deemed necessary by the QAR, testing by a USACE-approved laboratory of the material will be conducted by the Contractor for grain size, Munsell color, shell and silt content as described in Section G. Each sample will be archived with the date, time, and location of the sample. The results of these daily inspections, regardless of the quality of the sediment, will be appended to or notated on the Contractor's Daily Report. All samples will be stored by the USACE for at least 30 days after physical completion of the project.

The USACE will have the authority to determine whether the material placed on the beach is acceptable or unacceptable. If the QAR determines that the beach fill material does not comply with the sediment compliance specifications in this QC/QA Plan, the QAR will inform the Contractor and Area/Resident Engineer. The Area/Resident Engineer will promptly determine the appropriate course of action. If necessary, the Project Delivery Team (PDT) will determine if further material excavated from this area should be placed in an alternate location.

In the event that the USACE determines that a section of beach contains material that is not in compliance with the permit, then the FDEP will be notified. Notification will indicate the volume, aerial extent, location of any unacceptable beach areas and any planned remediation.

Additional testing may be required to delineate the area of unacceptable material at the discretion of the PDT.

8. In order to determine if an area greater than 10,000 square feet of beach fill is noncompliant, the following procedures will be performed by the Contractor with USACE oversight:

a. Upon determination that the first random surface grab sample (a minimum of one will be taken) is noncompliant, a minimum of five additional surface grab samples will be taken at a 25-foot spacing in all directions and visually analyzed. If the additional samples are noncompliant, then additional samples can be taken at 25-foot spacing in all directions until the aerial extent is identified.

b. The samples will be visually compared to the sediment quality specifications denoted in Table 1. If deemed necessary, testing by a USACE-approved laboratory of the material will be conducted for grain size, Munsell color, shell and silt content as described in Section G.

c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of non-compliant fill. The total square footage will be determined; the site map and laboratory analyses will be provided to the USACE and forwarded to FDEP.

F. Remediation Actions

1. The QAR shall have the authority to determine whether the material placed on the beach is compliant or noncompliant. If placement of noncompliant material occurs, the QAR will inform the contractor that remediation action is required as specified in the contract. Should a situation arise during beach disposal that cannot be corrected by the remediation methods described within this QC/QA Plan, the FDEP will be notified. The typical remediation actions for each sediment parameter are as follows:

a. Silt: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value, or removing the noncompliant fill material.

b. Shell: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material.

c. Munsell color: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material.

d. Coarse gravel: screening and removing the noncompliant fill material.

f. Construction debris, toxic material, or other foreign matter: removing the noncompliant fill material.

All fill material that cannot be remediated will be removed from the beach and transported to an appropriate location approved by the USACE located landward of the Coastal Construction Control Line.

2. Post-Remediation Testing.

Re-sampling shall be conducted by the contractor following any remediation actions in accordance with the protocols described in Section E.8a and 8b. Samples will be archived by the USACE.

3. Reporting.

A post-remediation report containing a site map will be prepared depicting the location of all samples and the boundaries of all areas of remediation actions. The site map, laboratory analyses, and volume of noncompliant fill material will be provided to the USACE and forwarded to FDEP within 120 days.

G. Post-Dredge Sampling for Laboratory Testing

In order to facilitate post-construction sampling, USACE EN-GG will be notified by the field office approximately two weeks prior to the completion of dredging. To assure that the fill material placed on the beach was adequately assessed by the dredge material investigation, the USACE EN-GG will conduct assessments of the sediment as follows:

1. Post-construction sampling and testing of the fill material will be conducted to verify that the sediment placed on the beach meets the expected criteria/characteristics provided during from the geotechnical investigation. For each 500-ft long section of beach placement, the USACE Representative will collect two (2) duplicate sand samples, preferably at a FDEP reference monument profile line, to quantitatively assess the grain size distribution, moist Munsell color, shell content, and silt content for compliance. If the beach placement is along less than 1,000 feet, then duplicate samples shall be collected at a minimum of three (3) sample locations evenly spaced along the length of the beach placement area. The USACE Representative will collect the sediment samples of a minimum of 1 U.S. pint (at least 200 grams) each from the bottom of a test hole, 6 to 18 inches deep within the limits of the constructed berm. The USACE Representative will visually assess grain size, Munsell color, shell content, and silt content of the material by handling the fill material to ensure that it is predominantly sand, and further to note the physical characteristics. The USACE Representative will note the existence of any layering or rocks within the test hole. One sample will be sent for laboratory analysis while the other sample will be archived by the USACE. All samples and laboratory test results will be labeled with the Project name, FDEP Reference Monument Profile Line designation, date sample was obtained, and "Berm."

2. All samples will be evaluated for visual attributes (Munsell color and shell content), sieved in accordance with the applicable sections of ASTM D 6913 Particle Size Analysis of Soils, ASTM C 136 Sieve Analysis of Aggregates, and analyzed for carbonate content if applicable. The samples will be sieved using the following U.S. Standard Sieve Numbers: ¾", 3/8", 3.5, 4, 5, 7,

10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230. The testing shall be performed by a USACE-approved laboratory.

3. A summary table of the sediment samples and test results for the sediment compliance parameters shall accompany the complete set of laboratory testing results. The column headings will include: Sample Number; State Plane (X,Y) Coordinate location, Mean Grain Size (mm); Sorting Value; Munsell Color, Silt Content (%); Shell Content (%); and a column stating whether each sample MET or FAILED the compliance values found in Table 1. The sediment testing results will be certified by a P.E or P.G from the testing laboratory. The USACE will submit sediment testing results and analysis report to FDEP within 90 days following beach placement.

4. In the event that a section of beach contains fill material that is not in compliance with the sediment quality specifications, then FDEP will be notified. Notification will indicate the volume, aerial extent and location of any unacceptable beach areas and remediation planned.

H. Reports and Notices

All reports or notices relating to this permit shall be emailed and sent to the Department at the following locations:

DEP Bureau of Beaches & Coastal Systems

JCP Compliance Officer

Mail Station 300

3900 Commonwealth Boulevard

Tallahassee, Florida 32399-3000

Phone: 850-414-7716

E-mail: JCPCCompliance@dep.state.fl.us

APPENDIX A- Florida DEP Rules on Beach Fill

62B-41.007 (2) (j), F.A.C.

To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Such material shall be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.062mm (4.0 ϕ) and 4.76mm (-2.25 ϕ) (classified as sand by either the Unified Soils or the Wentworth classification), shall be similar in color and grain size distribution (sand grain frequency, mean and median grain size and sorting coefficient) to the material in the existing coastal system at the disposal site and shall not contain:

1. Greater than 5 percent, by weight, silt, clay or colloids passing the #230 sieve (4.0 ϕ);
2. Greater than 5 percent, by weight, fine gravel retained on the #4 sieve (-2.25 ϕ);

3. Coarse gravel, cobbles or material retained on the 3/4 inch sieve in a percentage or size greater than found on the native beach;
4. Construction debris, toxic material or other foreign matter; and
5. Not result in cementation of the beach.

If rocks or other non-specified materials appear on the surface of the filled beach in excess of 50% of background in any 10,000 square foot area, then surface rock should be removed from those areas. These areas shall also be tested for subsurface rock percentage and remediated as required. If the natural beach exceeds any of the limiting parameters listed above, then the fill material shall not exceed the naturally occurring level for that parameter.

62B-41.007 (2) (k), F.A.C.

Pursuant to subsection 62B-41.005(15), F.A.C., sandy sediment derived from the maintenance of coastal navigation channels shall be deemed suitable for beach placement with up to 10% fine material passing the #230 sieve, provided that it meets the criteria contained in subparagraphs (j)2. through 5. above and water quality standards. If this material contains between 10% and 20% fine material passing the #230 sieve by weight, and it meets all other sediment and water quality standards, it shall be considered suitable for placement in the nearshore portion of the beach.