United States Environmental Protection Agency
Region 4
Science and Ecosystem Support Division
980 College Station Road
Athens, Georgia 30605-2720

Gulf Coast Post-Oil Landfall Beach and Sediment Sampling Quality Assurance Project Plan

Mississippi/Alabama/Florida
May 26, 2010
Revision 11
SESD Project Identification Number: 10-0440

Requestor: Unified Command
Water Unit Incident Commander
1 South Water Street
Mobile, Alabama 36602

SESD Project Leader: Kevin Simmons
Science and Ecosystem Support Division
980 College Station Road
Athens, Georgia 30605

Approval Sheet

Approving Officials:

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Archie Lee, Chief
Enforcement and Investigations Branch
Science and Ecosystem Support Division

Date

SESD Project Leader:

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Kevin Simmons, Life Scientist
Enforcement and Investigations Branch
Science and Ecosystem Support Division

Date

Region 4 Quality Assurance Manager:

_____ _____

Danny France, Region 4
Quality Assurance Manager
Science and Ecosystem Support Division

Date

This quality assurance project plan (QAPP) has been prepared according to: EPA Requirements for Quality Assurance Project Plans (EPA QA/R5 EPA/240/B-01/003, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC, March 2001 (USEPA, 2001).

This document will be used to ensure that environmental and related data collected, compiled, and/or generated for this project are of the type, quantity, and quality required for their intended purposes within the limitations of available resources.

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1.0 QAPP Distribution List

Table 1: QAPP Distribution List

Recipient	Organization	Telephone Number	Address/Email Address
Stephen Ball or current Water Unit Incident Commander	Environmental Protection Agency (EPA)	404-229-9513	ball.stephen@epa.gov
Doug Mundrick	Environmental Protection Agency (EPA)	404-562-9328	mundrick.doug@epa.gov

2.0 Project Organization

Requesting Program: Unified Command
Responsibilities: Unified Command requested SESD support to assess the impact of oil on the Gulf Coast bays and beaches in Mississippi, Alabama and Western Florida due to the BP Deepwater Horizon oil spill.

Principal Data User: Stephen Ball
Water Unit Incident Commander
Unified Command

Project Leader: Kevin Simmons, EPA SESD, Post-Oil Landfall Sampling

Responsibilities: The project leader will be responsible for planning and implementing the field study to meet the data quality objectives. The project leader is responsible for:

- quality assurance project plan (QAPP) preparation
- ensuring the QAPP is implemented as written
- all data collection activities
- collation of study data; and
- report preparation.

All data generated by the various field projects will be tied to a single identification number in the SESD Data Archive and ReTrieval (DART) system. The number for the Deepwater Horizon event is #10-0436.

Table 2: Project Study Team

Team Members	Organization	Responsibilities	Contact
Kevin Simmons	SESD/EIB/ES	Project Leader	706-355-8730
TBD	SESD/EIB/ES	Beach Water/Sediment Sampling, Safety Officer	706-355-xxxx
TBD, if needed	SESD	Sampling Assistance, Photos, GPS	706-355-xxxx
TBD, if needed	SESD	Sampling Assistance, Photos, GPS	706-355-xxxx

Data Review: Internal technical review of the analytical data will be conducted by EPA SESD Staff prior to being included in the report.

Responsibilities: Upon completion of the draft report, copies will be provided to SESD team members and Incident Command for technical review. Once comments are addressed, a final report will be issued to the project requestor.

3.0 Project Management

3.1 Site Description

The oil leak from British Petroleum's Deepwater Horizon oil rig has resulted in oil reaching the bays and beaches along the Gulf Coast. Prior to the plume making landfall, SESD conducted water quality and sediment sampling in selected bays and on beaches along the coasts of Mississippi, Alabama, and Florida to establish baseline conditions in these environments.

3.2 Problem Definition

Once the oil makes landfall, SESD was requested to focus on collecting samples at each baseline station that has been impacted by the oil. Additional post-impact samples may be collected if deemed necessary by the Incident Command.

The requested analyses used for the baseline sampling have been modified to address the change in matrix that will occur once the oil makes landfall. The lists of these analyses are provided in Tables 5 and 6. The surface water samples will most likely be an emulsion of oil and water and will be collected as waste samples. The "waste" designation indicates to the laboratories that the samples have the potential to contain high concentrations of the target analytes and dilution may be necessary.

In the case that oil is not visible or apparent in the surface water and/or sediment at the

baseline station, sampling will be performed at the discretion of the field team based upon observed conditions.

The current study is designed to provide analytical data for total metals including mercury, volatile organic compounds (VOCs) and semi volatiles (SVOCs, including Polycyclic Aromatic Hydrocarbons (PAHs), total organic carbon (TOC), total petroleum hydrocarbons (TPH) including both gasoline range (GRO), diesel range organics (DRO), and oil range organics (ORO) at the sampling locations.

The Toxicity Characteristic Leaching Procedure (TCLP) for volatile and semi-volatile organics and metals plus analyses for ignitability and corrosivity may be included if requested to address disposal issues.

Samples may also be collected and analyzed for the oil spill dispersants that have been or may be used in the Gulf of Mexico. Currently the two dispersants in use are Corexit EC9500A and Corexit EC9527A manufactured by Nalco Company.

3.3 Project Description

Beach sampling will commence as soon as possible after the oil makes landfall as determined by the Unified Command (UC). This will be accomplished by the collection of surface water and sediment samples for the above mentioned compounds and analytes. Table 3 provides an anticipated, but tentative timeline.

Table 3: Project Schedule

Activity	Organization	Anticipated Date of Completion	Deliverable
QAPP Preparation	SESD/EIB	May 17, 2010	Final QAPP
Post-Oil Landfall Field Investigation	SESD/EIB	TBD based upon date of landfall	Complete sampling effort
Sample Analysis	SESD/Contract Lab	TBD	Analytical results from sampling
Report Generation	SESD/EIB	7 Days following release of analytical results	Draft Report issued for internal review
Final Report	SESD/EIB	3 Days following draft report issuance	Final Report

3.4 Quality Objectives and Criteria for Measurement Data

The primary objective of this study is to provide water and sediment analytical data to aid in the determination of the impact of the Deepwater Horizon oil spill on the beaches and shore-line of Alabama, Florida and Mississippi. Data quality objectives (DQOs) for this study are provided in Appendix A.

3.5 Special Training Requirements

The Project Leader and all scientists assisting with this project have been trained in the application and use of the operating procedures and equipment to be used to conduct this sampling.

3.6 Documents and Records

Dedicated field logbooks will be used to record all field information (USEPA 2007f). The Quality Assurance Project Plan (QAPP) and Final Report will be prepared in accordance with SESD Operating Procedures for Project Planning (USEPA 2007h) and Report Preparation and Distribution (USEPA 2007j), respectively. The report will include a tabular presentation of results, discussion, and conclusions. Upon completion and transmittal of the report to the Incident Commander, project records will be submitted to the SESD Records Room. The files will be maintained in the SESD Records Room according to the EPA records schedule as described in the SESD Operating Procedure for Control of Records (USEPA 2007a). The most current records schedules are available at http://epa.gov/records/policy/schedule.

4.0 Data Generation and Acquisition

4.1 Study Design

Sample site selection was determined by the baseline beach sampling that was conducted prior to the oil making landfall. Generalized baseline sampling locations were chosen to provide a spatially representative evaluation of conditions within the limitation of time imposed by the potential migration of the oil plume. The post landfall samples will be collected at the established baseline stations based on the visible presence of oil. Additional sample stations may be added at the discretion of the UC or based upon field observations. The baseline sampling locations are listed in Table 4 and shown in Figures 1 and 2. Beach station IDs are designated with a "BCH" prefix to avoid confusion with bay station IDs.

Considering the nature of the contaminant (crude oil), the analysis of pesticides/PCBs, oil and grease, nutrients, hardness, and in-situ measurements may be impractical for this event and will not be conducted during this phase. Any concentrations of pesticides or PCBs would very likely be masked by the compounds associated with the crude oil. Likewise, the oil and grease analysis method is typically used for NPDES monitoring and is more suitable for cooking fats and oils, not crude oil. In-situ measurements would also be negatively affected by fouling of the sensors and probes by the crude oil.

Where practical, sampling will be conducted at the established baseline stations; however, locations may be adjusted due to observed conditions. Any deviations will be noted in the field logbooks. Additional stations may be added at the discretion of the field team and/or UC.

The surface water samples will be collected by individually dipping the sample containers into the water at a depth such that the oil/water emulsion will be collected. The sample will be collected in a manner that will obtain any oil that is present in the water. The exact depth will be determined at each station based on the amount of oil in the water. If no oil is apparent or visible, the water sample will be collected at the discretion of the field team.

Sediment samples will be collected at a point on the beach where obvious staining or oil is visible. Only the top 1" – 3" of sediment will be collected, including the oil, over an area large enough to obtain the required volume of sample for all listed analyses. If no oil is apparent or visible, the sediment sample will be collected at the discretion of the field team. The GPS coordinates for each baseline beach station will be used for the post impact sampling locations. Coordinates will also be collected for any additional stations. These coordinates are listed in Table 4. The station IDs will be the same as the baseline station IDs and additional stations will be numbered sequentially starting at BCH14.

If requested, TCLP analysis will be performed to provide information regarding disposal options for the waste material accumulated on the beaches/shore-lines.

Table 4: Surface Water/Sediment Sampling Locations

Station	Sample ID	Station Name	Latitude	Longitude
BCH01	BCH01-SD-20100501 BCH01-SW-20100501	Bay St. Louis	30.30513333	-89.32843333
BCH02	BCH02-SD-20100502 BCH02-SW-20100502	Long Beach	30.34261667	-89.15343333
BCH03	BCH03-SD-20100503 BCH03-SW-20100503	Biloxi	30.39326667	-88.92495
BCH04	BCH04-SD-20100503 BCH04-SW-20100503	Pascagoula	30.34286667	-88.54795
BCH05	BCH05-SD-20100503 BCH05-SW-20100503	Dauphin Is.	30.24726667	-88.12938333
BCH06	BCH06-SD-20100505 BCH06-SW-20100505	Pensacola Beach	30.33105	-87.13798333
BCH07	BCH07-SD-20100504 BCH07-SW-20100504	Destin	30.3815	-86.42623333
BCH08	BCH08-SD-20100504 BCH08-SW-20100504	Panama City	30.24603333	-85.94113333
BCH09	BCH09-SD-20100505 BCH09-SW-20100505	Cape San Blas	29.66906667	-85.3561
BCH10	BCH10-SD-20100506 BCH10-SW-20100506	St. George Sound	29.69436667	-84.78856667
BCH11	BCH11-SD-20100506 BCH11-SW-20100506	St. George Is.	29.68641667	-84.78891667
BCH12	BCH12-SD-20100506 BCH12-SW-20100506	Carabelle Beach	29.82836667	-84.69298333
BCH13	BCH13-SD-20100506 BCH13-SW-20100506	St. Mark's NWR	30.0741	-84.18055

4.2 Ecotoxicity Methods

Ecotoxicological effects from the spill will be assessed using a two-phased approach for the water samples: 1) acute toxicity screening tests and 2) definitive sublethal (chronic) toxicity tests. Because of holding time and other constraints, the acute and chronic water tests will be conducted concurrently. This is because the lack of acute toxicity does not preclude chronic effects. Each of the acute tests will comprise a control (i.e. dilution water only), a reference sample collected from non-impacted areas (i.e., an area that appears free from visible oil contamination or detectable oil related constituents) and 100% spill water. The chronic definitive tests will comprise of 50% dilution series of the spill water to provide test concentrations of 0, 6.25, 12.5, 25, 50, and 100% water. The results of the toxicity tests will be interpreted in a stepwise fashion as depicted in Figure 4-1. A lack of acute or chronic effects in any of the test samples implies that no further action is required. Whole sediments toxicity tests will also be performed with an amphipod and a polychaete. Details of the test species and methods are presented below.

4.2.1 Acute Toxicity Screening Tests (Standard)

96-hour acute toxicity screening tests will be performed to determine if there is a significant difference between the 100% aqueous samples and the laboratory control or field reference waters. Tests will be performed with the inland silverside fish, *Menidia beryllina*, and the mysid shrimp, *Americamysis bahia* (formerly identified as *Mysidopsis bahia*) in accordance with the guidance provided in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (EPA 2002a)." A summary of test conditions and acceptability criteria proposed for the acute tests are presented in Tables 4-4 for *A. bahia* and 4-5 for *M. beryllina*. Additional toxicity tests with an echinoid, *Arbacia punctulata* and/or the eastern oyster, *Crassostrea virginica*, will be performed depending on the availability of organisms for these tests. Test methods for the latter two organisms provided in ASTM (2004a) "Standard Guide for Conducting Static Acute Toxicity Tests with Echinoid Embryos" and ASTM (2004b) "Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Four Species of Saltwater Bivalve Mollusks." Test conditions for these tests are presented in Tables 4-6 and 4-7.

The sensitivity of the each batch of test organisms used will be evaluated with reference toxicant tests. The results of the reference toxicant tests will be compared with historical limits to determine if the organisms are within their normal sensitivity ranges.

4.2.2 Acute Toxicity Screening Tests (Photo-enhanced)

Oil in the water column can be 10 times to greater than 100 times more toxic in the presence of natural sunlight. Photo-enhanced toxicity assessment will be used to assess the enhanced toxicity of simulated solar radiation using the same organisms used in the standard acute toxicity assays above.

Assessment of photo-enhanced toxicity is critical to the complete assessment of the potential impacts of the spill to aquatic life. Many waters of the Gulf are clear, allowing sunlight to penetrate and potentially enhance the toxicity of bioaccumulated oil. Photo-

enhanced acute toxicity tests (i.e., conducted under full spectrum lights) will be performed concurrently with the standard acute screening tests (i.e., conducted under normal laboratory lighting) using the same test methods (Tables 4-4 and 4-5) and batch of test organisms but under separate conditions of lighting. Measurements of both light wavelength and intensity will be made using a broad wavelength radiometer (e.g., International Light Model IL1400BL or similar device). Light intensity will be measured by placing the detector at the bottom of surrogate test containers filled with reference water. Surrogate containers will be placed at multiple locations within the test facility and measurements will be made at both test initiation and termination. Similar measurements of wavelength and intensity will also be collected at select sampling locations in the field to aid in the interpretation of the results and facilitate the ecological risk assessment.

4.2.3 Short-term Chronic Toxicity Tests

In addition to the acute tests, short-term chronic toxicity tests will be performed with the inland silverside fish, *Menidia beryllina*, and the mysid shrimp, *Americamysis bahia*. The tests will be performed in accordance with the guidance provided in the following documents: Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms (EPA 2002b), and Short-term Methods for Estimating the Short-term Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms (1995). A summary of test conditions and acceptability criteria proposed for the short-term chronic tests are presented in Tables 4-8 for *A. bahia* and 4-9 for *M. beryllina*. The sensitivity of the each batch of test organisms used will be evaluated using reference toxicant tests. The results of the reference toxicant tests will be compared with historical limits to determine if the organisms are within their normal sensitivity ranges.

4.2.4 Whole Sediment Acute Toxicity Tests

Whole sediment toxicity screening tests will be performed to determine the effects of the contaminants in sediments arising from the Gulf Spill on the survival of the marine amphipod, *Leptocheirus plumulosus*, and the polychaete, *Neanthes arenaceodentata*. The tests will be performed following guidance provided in USEPA (1994) entitled "Methods for Assessing the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Organisms," and ASTM (2007) entitled "Standard Guide for Conducting Sediment Toxicity Tests with *Polychaetous Annelids*." A summary of test conditions and acceptability criteria are presented in Tables 4-10 and 4-11 for the amphipod and polychaete, respectively. Each batch of test organisms will be evaluated in reference toxicant tests and the results shall be compared with historical control limits in order to determine if the organisms are within their normal sensitivity ranges.

Table 5: Recommended Test Species for Water-Column Toxicity Testing of Dredged Material

SUMMARY OF TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA FOR *Crassostrea virginica* LARVAE, ACUTE TOXICITY WATER COLUMN TEST	
1. Test type:	Static non-renewal
2. Test duration:	48 h, based on control development; not to exceed 54 h
3. Temperature:	25 ± 1°C
4. Salinity:	Optimal 30 (range: 18-32) ± 2‰
5. DO concentration:	60-100% of saturation
6. pH:	Optimal 7.8 ± 0.5; measure according to ASTM protocol
7. Light quality:	Ambient laboratory illumination
8. Light intensity:	500-1000 lux
9. Photoperiod:	16L/8D
10. Test chamber size:	20-30 ml
11. Test solution volume:	10-30 ml
12. Renewal of test solutions:	None
13. Age of test organisms:	Larvae, less than 4 h after fertilization
14. Concentration of organisms per test chamber:	15-30/ml; do not exceed 30/ml
15. Number of replicate chambers per elutriate concentration:	Minimum of 5, plus 1 chamber for water quality monitoring
16. Feeding requirements:	None
17. Test solution aeration:	None
18. Dilution water:	Optimal 30 (range: 18-32) ± 2‰; natural seawater or suitable artificial seawater prepared with Milli-Q® or equivalent deionized water
19. Test treatments:	100% elutriate, 100% control water, 100% dilution water (if different from control)
20. Dilution series:	100%, 50%, 10%, 1% of the dredged material elutriate (Note: lower concentrations may be necessary if test elutriate is toxic or contains very fine non-settleable solids)
21. Endpoint:	Survival, embryo shell development to hinged, D-shaped prodisoconch I larva
22. Sample holding requirements:*	<2 wk for sediments. Toxicity tests prepared from sediments should be started within 2 wk of sampling, but not later than 8 wk after sampling. <14 d for site, dilution, and control waters; elutriates are to be used within 24 h of preparation
23. Field sample volume required:^	1 L sediment per sample station/4 L site water for creation of 100% elutriate
24. Test acceptability:	>90% survival **AND** ≥70% shell development to hinged, D-shaped prodisoconch I larva in the control

* Obtain prior approval from your local EPA and USACE district offices if sediment samples will be held longer than the specified sample holding requirements. Prior approval could be obtained during the review and approval of the Sampling and Analysis Plan.

^ This is the minimum volume required to run the test one time. If you need to repeat the test or archive the sample, you should collect additional equivalent volumes.

Table 6: Test Conditions and Acceptance Criteria: 10-day *Leptocheirus plumulosus* Acute Toxicity Test

SUMMARY OF TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA FOR THE AMPHIPOD, *Leptocheirus plumulosus*, 10-DAY ACUTE TOXICITY SEDIMENT TEST	
1. Test type:	Static non-renewal
2. Test duration:	10 d
3. Temperature:	25 ± 1ºC
4. Salinity:	Optimal 20 (range: 1-32) ± 2‰
5. DO concentration:	Not less than 60% saturation
6. pH:	Optimal 7.8 ± 0.5; measure according to ASTM protocol
7. Light quality:	Ambient laboratory illumination
8. Light intensity:	500-1000 lux
9. Photoperiod:	Continuous light
10. Test chamber size:	1-L glass beaker or jar with 10-cm inner diameter
11. Test solution volume:	200 ml (about 2 cm depth minimum) 700 ml overlying water
12. Renewal of test solutions:	None
13. Age of test organisms:	2 to 4 mm, no mature males or females
14. Number of organisms per test chamber:	20
15. Number of replicate chambers per treatment:	5
16. Feeding requirement:	None
17. Test solution aeration:	Water in each test chamber should be aerated overnight before start of test, and throughout the test; aeration at rate that maintains >90% saturation of DO concentration without disturbing the sediment surface
18. Overlying water:	Optimal 20 (range: 1-32) ± 2‰, natural seawater or artificial seawater prepared with Milli-Q® or equivalent deionized water
19. Test treatments:	Site sediment, a reference sediment, and a control sediment
20. Endpoint:	Survival
21. Sample holding requirements:*	<2 wk for sediments. Sediment toxicity tests should be started within 2 wk of sampling, but not later than 8 wk after sampling. <14 d for overlying water
22. Field sample volume required:^	4 L of site, reference site, and control sediment, depending on chamber size
23. Test acceptability:	≥90% survival in controls **AND** meet requirements of Table A1.3 in ASTM 2004 and Table 11.3 in USEPA 1994

***** Obtain prior approval from your local EPA and USACE district offices if sediment samples will be held longer than the specified sample holding requirements. Prior approval could be obtained during the review and approval of the Sampling and Analysis Plan.
NOTE: Pore-water/overlying water ammonia concentrations greater than 60 mg/l total (or

0.8 mg/l unionized) ammonia at pH 7.7 will result in mortality. Follow recommended procedures in Appendix N to reduce ammonia levels before beginning tests.

Table 7: Test Conditions and Acceptance Criteria: 10-day *Neanthes arenaceodentata* Acute Toxicity Tests

SUMMARY OF TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA FOR THE POLYCHAETE, *Neanthes arenaceodentata*, 10-DAY ACUTE TOXICITY SEDIMENT TEST	
1. Test type:	Static, non-renewal
2. Test duration:	10 d
3. Temperature:	20 ± 1°C
4. Salinity:	Optimal 30 (range: 28-36) ± 2‰
5. DO concentration:	60-100% of saturation
6. pH:	Optimal 7.8 ± 0.5
7. Light quality:	Ambient laboratory illumination
8. Light intensity:	500-1000 lux
9. Photoperiod:	16L/8D
10. Test chamber size:	1 L minimum
11. Test solution volume:	200 ml (about 2 cm depth minimum) 700 ml of overlying water
12. Renewal of test solutions:	None
13. Age of test organisms:	2-3 wk post emergence
14. Number of organisms per test chamber:	5-10
15. Number of replicate chambers per treatment:	5
16. Feeding requirement:	None
17. Test solution aeration:	Trickle flow (<100 bubble/min)
18. Overlying water:	Optimal 30 (range: 28-36) ± 2‰; natural seawater or suitable artificial seawater prepared with Milli-Q® or equivalent deionized water
19. Test treatments:	Site sediment; reference sediment; and control sediment
20. Endpoint:	Survival
21. Sample holding requirements:	* <2 wk for sediments; sediment toxicity tests should be started within 2 wk of sampling, but not later than 8 wk after sampling; <14 d for overlying water
22. Field sample volume required:^	4 L of site, reference site, and control sediment, depending on chamber size
23. Test acceptability:	≥90% survival overall in controls, with >80% survival in individual replicates

*Obtain prior approval from your local EPA and USACE district offices if sediment samples will be held longer than the specified sample holding requirements. Prior approval could be obtained during the review and approval of the Sampling and Analysis Plan.
^ This is the minimum volume required to run the test one time. If you need to repeat the test or archive the sample, you should collect additional equivalent volumes.

4.3 In Situ Monitoring

Due to the nature and characteristics of the oil-laden water, in-situ water quality monitoring will not be conducted during this phase of sampling.

4.4 Sample Handling and Custody

The post landfall samples will be preserved as required, see Table 5, and delivered or shipped to the appropriate laboratory. A chain-of-custody form will be completed and accompany all samples to the laboratory.

4.5 Analytical Methods

Any analyses performed by SESD will be conducted in accordance with the SESD Analytical Support Branch Laboratory Operations and Quality Assurance Manual (ASB LOQAM; USEPA 2010). The analytical methods, sample containers, sample preservation and analysis holding times for the waste samples are listed in Tables 5 and 6, respectively and are taken from Chapter 3, Table 3-1 of the ASB LOQAM (USEPA 2010).

In the event that SESD does not have the capacity to perform any requested analyses, a contract laboratory may be utilized to conduct the analysis. All analyses performed by contract laboratories will be conducted in accordance with the contract laboratory statement of work. Any contract laboratories utilized for the analyses will be secured by the Incident Command.

For this sampling event the surface water and sediment samples will be assigned a matrix/media code of WA (waste). This designation indicates to the laboratories that the samples have the potential to contain high concentrations of the target analytes and dilution may be necessary. As a result the analytical results for a "water" sample will be reported in mg/kg instead of mg/L. The "sediment" sample results will remain as mg/kg.

If requested, samples may also be analyzed for organic and inorganic TCLP constituents plus ignitability and corrosivity if needed.

Samples may also be collected and analyzed for the major ingredients of the oil spill dispersants. Container requirements, analytical methods, holding times, etc. are to be determined.

Table 8: Surface Water (*sampled as waste*) Sample Requirements

Analytical Group	Volume/ Container	Preservative	Containers/ Sample	Holding Time	Laboratory
TOC	8 oz. Glass	n/a	1	n/a	Contract
Metals + Hg	8 oz. Glass	n/a	1	6 months, Hg-not specified	Contract
Volatiles	8 oz. Glass	n/a	1	28 Days	SESD
Semi-Volatiles (including PAHs)	8 oz. Glass	n/a	1	54 Days	SESD
Alkyl-PAHs*	TBD	TBD	TBD	TBD	TBD
TPH (GRO)	2 oz. Glass w/septum	Ice	1	7 Days	Contract
TPH (DRO) & (ORO)	8 oz. Glass	n/a	1	7 Days	Contract
TCLP Metals	8 oz. Glass	n/a	1	360 Days	TBD
TCLP VOC TCLP SVOC	8 oz. Glass 8 oz. Glass	n/a n/a	1 1	28 Days 61 Days	TBD
Dispersant Compounds* To be determined in consultation with WPD.	8oz glass	4° C	1	TBD	TBD

*** Specific analytical methods are under discussion between Region 4 and Region 6.**

Table 9: Sediment (*sampled as waste*) Sample Requirements

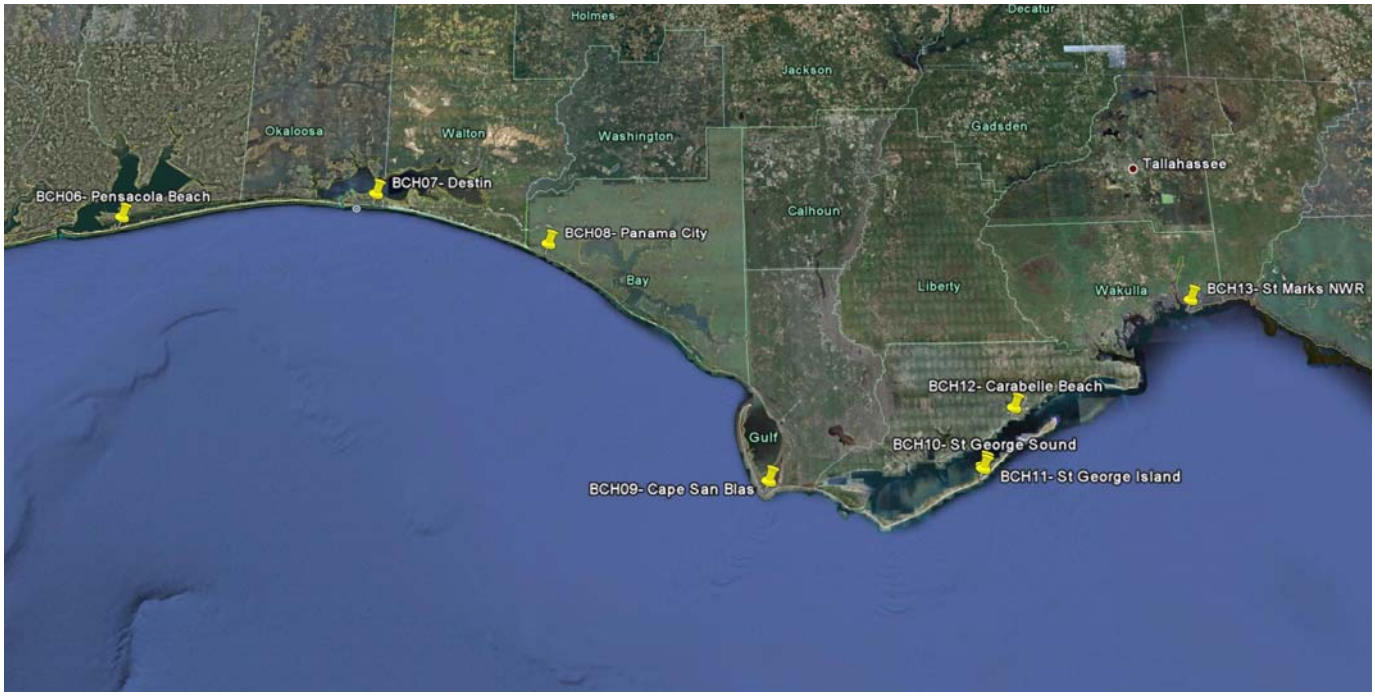
Analytical Group	Volume/ Container	Preservative	Containers/ Sample	Holding Time	Laboratory
TOC	8 oz. Glass	n/a	1	n/a	Contract
Ammonia Nitrogen	TBD	TBD	TBD	TBD	Contract
Sulfides	TBD	TBD	TBD	TBD	Contract
Particle Size	8 oz. Glass	n/a	1	Not specified	Contract
Metals + Hg	8 oz. Glass	n/a	1	6 Months, Hg- not specified	Contract
Volatiles	8 oz. Glass	n/a	1	28 Days	SESD
Semi-Volatiles (including PAHs)	8 oz. Glass	n/a	1	54 Days	SESD
Alkyl-PAHs*	TBD	TBD	TBD	TBD	TBD
TPH (GRO)	2 oz Glass w/septum	Ice	1	7 Days	Contract
TPH (DRO) & (ORO)	8 oz Glass	n/a	1	7 Days	Contract
Toxicity Test	TBD	TBD	TBD	TBD	TBD

Analytical Group	Volume/ Container	Preservative	Containers/ Sample	Holding Time	Laboratory
TCLP Metals	8 oz. Glass	n/a	1	360 Days	TBD
TCLP VOC TCLP SVOC	8 oz. Glass 8 oz. Glass	n/a n/a	1 1	28 Days 61 Days	TBD TBD
Dispersant Compounds* To be determined in conjunction with WPD.	8oz glass	4° C	1	TBD	TBD

*** Specific analytical methods are under discussion between Region 4 and Region 6.**

Figure 1 - Beach Sampling Locations
Station 01-05

Figure 2 - Beach Sampling Locations
Station 06-13



4.6 Quality Control

Each sampling, analysis, or measurement technique to be performed for this site investigation has associated quality control (QC) requirements. QC activities associated with the field operations may include, but are not limited to the following: trip blanks, preservative blanks, equipment rinse blanks, and temperature blanks. Laboratory QC activities may include use of blanks, matrix spike (MS) and matrix spike duplicates (MSD), surrogates, second column confirmation, laboratory control samples, initial and continuing calibration verifications, etc. The specific QC requirements, acceptance criteria, corrective action in case of non-conformance and the procedures used to calculate applicable statistics, are provided in the EPA Region 4 field and laboratory Standard Operating Procedures (SOPs) and methods, and in the following QA/QC documents: SESD Operating Procedure for Field Sampling Quality Control (USEPA 2007c), and chapter 5 of the ASB LOQAM (USEPA 2010).

4.7 Equipment Maintenance and Calibration

All equipment used during this study will be maintained and calibrated according to the requirements of the SESD Operating Procedure for Equipment Inventory and Management (USEPA 2007b). Spare parts for all critical elements of the study will be taken to the field in the event of a malfunction.

4.8 Inspection/Acceptance for Supplies and Consumables

All critical supplies and consumables for this field study are inspected and maintained in accordance with the following procedures:

SESD Operating Procedure for Purchasing of Services and Supplies, SESDPROC-016-R3 (USEPA 2007i).
SESD Operating Procedure for Equipment Inventory and Management, SESDPROC-108-R3 (USEPA 2007b).
SESD Operating Procedure for Field Sampling Quality Control, SESDPROC-011-R2 (USEPA 2007c).

The SESD Field Quality Manager and the Branch Quality Assurance Officers are responsible for ensuring that these requirements are met.

4.9 Non-direct Measurements

Non-direct measurement data for this project may include hydrologic or meteorological data available from other Federal or State agencies. These data may be used qualitatively to enhance understanding of the SESD sampling effort. Therefore, there are no Quality Assurance requirements for this data.

4.10 Data Management

The project leader will be responsible for ensuring that all requirements for data management are met. All field data generated during this study, whether hand-recorded or obtained using an electronic data logger will be recorded, stored and managed according to the SESD Operating Procedures for Control of Records (USEPA 2007a), Sample and Evidence Management (USEPA 2007k), and Logbooks (USEPA 2007f).

5.0 Assessment/Oversight

5.1 Assessments and Response Actions

Assessments will be conducted by the project leader during the field investigation according to the SESD Operating Procedure for Project Planning (USEPA 2007h) to ensure the QAPP is being implemented as approved. The project leader is responsible for all corrective actions while in the field. Any issues that may arise during the study will be documented in the logbooks. This documentation and any corrective actions taken will be used to determine the overall quality and usability of the data.

5.2 Reports to Management

The project leader will be responsible for notifying the project requestor and appropriate SESD management if any circumstances arise during the field study that may adversely

impact the quality of the data collected. Any problems noted during field sampling that could result in unusable data will be addressed in the final report.

6.0 Data Validation and Usability

All data derived from SESD field measurements, if applicable, will be reviewed, verified, validated and reported in accordance with the SESD Operating Procedure for Report Preparation and Distribution (USEPA 2007j). Analytical data will be reviewed, verified, validated in accordance with SESD's ASB LOQAM (USEPA 2010).

7.0 Long Term Sampling Plan

During and after remediation efforts, SESD will be available to provide additional technical support as requested. Further revisions to this QAPP may be necessary to accommodate the demands of this dynamic situation.

8.0 References

USEPA 2007a-m, SESD Field Branches Quality System and Technical Procedures, can be found at http://epa.gov/region4/sesd/fbqstp/index.html.

USEPA 2007a. Operating Procedure for Control of Records, SESDPROC-002-R4, Region 4, SESD, Athens, GA

USEPA 2007b. Operating Procedure for Equipment Inventory and Management, SESDPROC-108-R3, Region 4, SESD, Athens, GA

USEPA 2007c. Operating Procedure for Field Sampling Quality Control, SESDPROC-011-R2, Region 4, SESD, Athens, GA

USEPA 2007d. Operating Procedure for Global Position System, SESDPROC-110-R2, Region 4, SESD, Athens, GA

USEPA 2007f. Operating Procedure for Logbooks, SESDPROC-010-R3, Region 4, SESD, Athens, GA

USEPA 2007g. Operating Procedure for Packing, Marking, Labeling and Shipping of Environmental and Waste Samples, SESDPROC-209-R1, Region 4, SESD, Athens, GA

USEPA 2007h. Operating Procedure for Project Planning, SESDPROC-016-R1, Region 4, SESD, Athens, GA

USEPA 2007i. Operating Procedures for Purchasing of Services and Supplies, SESDPROC-016-R3, Region 4, SESD, Athens, GA

USEPA 2007j. Operating Procedure for Report Preparation and Distribution, SESDPROC-003-R3, Region 4, SESD, Athens, GA

USEPA 2007k. Operating Procedure for Sample and Evidence Management, SESDPROC-005-R1, Region 4, SESD, Athens, GA

USEPA 2007l. Operating Procedure for Surface Water Sampling, SESDPROC-201-R1, Region 4, SESD, Athens, GA.

USEPA 2007m. Operating Procedure for Sediment Sampling, SESDPROC-200-R1, Region 4, SESD Athens, GA.

USEPA 2007n. Operating Procedure for Waste Sampling, SESDPROC-302-R1, Region 4, SESD Athens, GA.

USEPA 2007o. Operating Procedure for Management of Investigation Derived Waste, SESDPROC-202-R1, Region 4, SESD Athens, GA.

USEPA 2007p. Operating Procedure for Field Equipment Cleaning and Decontamination, SESDPROC-205-R1, Region 4, SESD Athens, GA.

USEPA 2010. SESD Analytical Services Branch Laboratory Operations and Quality Assurance Manual (ASB LOQAM). United States Environmental Protection Agency. Region 4, SESD, Athens, GA

USEPA 2010. Quality Assurance Sampling Plan for British Petroleum Oil Spill, US EPA Emergency Response prepared in conjunction with EPA Region 6, EPA Region 4, EPA Environmental Response Team, EPA ASPECT, and CTEH.

USEPA 2001. Methods for Assessing the Chronic Toxicity of Marine and Estuarine Sediment-Associated Contaminants with the Amphipod, *Leptocheirus plumulosus,* EPA/600/R-01/020.

American Society for Testing and Materials (ASTM). 2004a. Standard Guide for Conducting Static Acute Toxicity Test with Echinoid Embryos. Annual Book of ASTM Standards, Vol. 11.06. E1563-98 (2004-e1). American Society for Testing and Materials, Philadelphia, PA.

ASTM, 2004b. Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Invertebrates. Annual Book of ASTM Standards, Vol. 11.06. E1367-03e1. American Society for Testing and Materials, Philadelphia, PA.

ASTM. 2007. Standard Guide for Conducting Sediment Toxicity Tests with Polychaetous Annelids. Annual Book of ASTM Standards, Vol. 11.06.

E1611-00 (2007). American Society for Testing and Materials, Philadelphia, PA

USEPA. 1990. Conducting the Sea Urchin Larval Development Test. ERL-Narragansett Standard Operating Procedure 1.03.007.

USEPA. 1994. Methods for Assessing the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Amphipods. EPA/600/R-94/025.

USEPA. 1995. Short-Term Methods for Estimating the Chronic Toxicity of Efluents and Receiving Waters to West Coast Marine and Estuarine Organisms. First edition. EPA/600/R-95/136. West Coast Manual. EPA/600/R-95/136.

USEPA. 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. EPA/540/R-97/006.

USEPA. 1998. Guidelines for Ecological Risk Assessment. Risk Assessment Forum. EPA/630/R-95/002F.

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. 5th Edition. EPA-821-R-02-012. U.S. Environmental protection Agency, Office of Water, Washington, DC.

USEPA and U.S. Army Corps of Engineers. 2008. Southeast Regional Implementation Manual (SERIM) Requirements and Procedures for Evaluation of the Ocean Disposal of Dredged Material in Southeastern U.S. Atlantic and Gulf Coast Waters. Prepared by EPA Region 4 Atlanta, Georgia and U.S. Army Corps of Engineers South Atlantic Division Atlanta, Georgia, with assistance from ANAMAR Environmental Consulting, Inc. 904-B-08-001.

Appendix A: Data Quality Objectives

STEP	DATA QUALITY OBJECTIVES		DESCRIPTION
1	State the Problem	• Concise description of the problem • Identify members of the planning team and the primary decision maker • Develop a conceptual model of the environmental hazard to be investigated • Determine resources – budget, personnel, and schedule	Description of Problem The Unified Command desires to determine the impact the oil has made on beaches in Alabama, Mississippi, and Florida as a result of the BP Deepwater Horizon spill. Planning Team Kevin Simmons* R4, SESD Art Masters R4, SESD Danny France R4, SESD Antonio Quniones R4, SESD Doug Mundrick R4, WPD Andrea Zimmer R4, WPD Dave Melgaard R4, WPD *Project Leader for Field Study Conceptual Model The Region 4 coastal states of Mississippi, Alabama, and Florida along the Gulf of Mexico. Resources/Personnel/Schedule Field sampling will commence as soon as possible after oil makes landfall. The draft report will be prepared by the project leader 7 days following data release from the lab with a final report 3 days following the draft.
2	Identify the Goal of the Study	• Identify the principal study question • Define the alternative actions that could result from resolution of the principal study question. • For decision problems, develop decision statements(s), organize multiple decisions. • For estimation problems, state what needs to be estimated and key assumptions.	Principal Study Questions 1. To characterize the concentrations of pollutants in the surface water and sediment as a result of the Deepwater Horizon oil spill. These data will be used by EPA to characterize the adverse effects resulting from the oil spill. No alternative actions at present.
3	Identify Information Inputs	• Identify types and sources of information needed to resolve decisions or produce estimates. • Identify the basis of information that will guide or support choices to be made in later steps of the DQO process.	Information Type and Source Sampling of surface water and sediment. Analytical laboratory results of oil laden surface water and sediment. Baseline data and regulatory criteria.

STEP	DATA QUALITY OBJECTIVES		DESCRIPTION
		• Select appropriate sampling and analysis methods for generating the information	Sampling and analytical methods will meet EPA SESD accreditation standards.
4	Define the Study Boundaries	• Define the target population of interest and its relevant spatial boundaries. • Define what constitutes a sampling unit. • Specify temporal boundaries and other practical constraints associated with sample/data collection. • Specify the smallest unit on which decisions or estimates will be made.	Beaches in Alabama, Florida, and Mississippi that were sampled during the baseline phase of the study and are now impacted by oil entering the bays or washing ashore. Sampling will occur at the baseline stations and/or nearby impacted areas. Ongoing studies may be required due to the dynamic nature of the oil spill.
5	Develop the Analytic Approach	• Specify appropriate population parameters for making decisions or estimates. • For decision problems, choose a workable Action level and generate and "If....then....else" decision rule which involves it. • For estimation problems, specify the estimator and the estimation procedure.	Results of surface water and sediment analysis will be compared to the baseline data in addition to other regulatory standards/criteria as requested by the Unified Command. If exceedences are encountered, the data will be reported to the Incident Command as soon as possible for follow-up action. *In situ* water quality data may not be collected due to the impact the oil would have upon water quality instruments.
6	Specify Performance or Acceptance Criteria	• For decision problems, specify the decision rule as a statistical hypothesis test, examine consequences of making incorrect decisions from the test, and place acceptable limits on the likelihood of making decision errors. • For estimation problems, specify acceptable limits on estimation uncertainty.	<u>Decision Ruling</u> If there are no exceedances of the baseline data, it will be assumed that the spill has not impacted these areas at the time of sampling. If exceedences are encountered, the data will be reported to the Incident Command for follow-up action. See Section 6.0 in QAPP for data validation verification and usability.
7	Develop the Plan for Obtaining Data	• Compile all information and outputs generated in Steps 1 through 6 above. • Use this information to identify alternative sampling and analysis designs that are appropriate for your intended use. • Select and document a design that will yield data that will best achieve your performance or acceptance criteria.	<u>Sampling and Analysis Design</u> The project team will make assessments based on interpretation of all data generated.