Mississippi Canyon 252 Incident
NRDA TIER 1 Proposal
SPMD Detection of DWHOS Hydrocarbons in Water Column
Immediately over NEGOM Shelf-Edge Pinnacle Reefs
June 17, 2010

Approval of this work plan is for the purposes of obtaining data for the Natural Resource Damage Assessment. Parties each reserve its right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan.

APPROVED:

_____ 7/9/2010
Department of Commerce Trustee Representative: Date

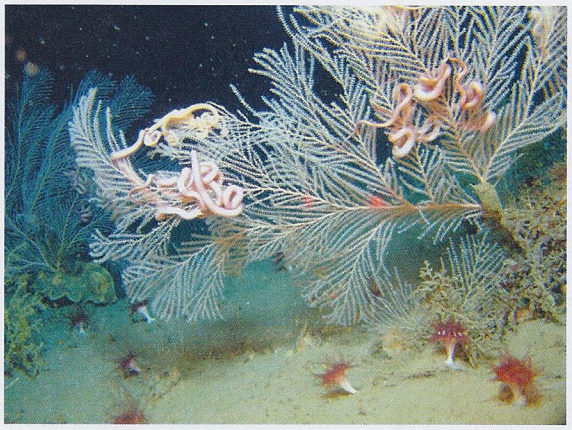
Joyce Mulley July 9 2010
BP Representative: Date

Mississippi Canyon 252 Incident

NRDA TIER 1 Proposal
SPMD Detection of DWHOS Hydrocarbons in Water Column
Immediately over NEGOM Shelf-Edge Pinnacle Reefs
June 17, 2010

Author:

Ken Sulak



Above: *Callogorgia americana* and *Asteroschema* sp.

Proposed Mission Deployment: June 2010
Mission Duration: One at-sea day (deployment of SPMDs) for subsequent retrieval during planned July Tier-1 20-day deep coral impacts cruise
Project Duration: 1 month

A. Purpose and Need Statement

East of the Mississippi delta, the northern Gulf of Mexico (NEGOM) shelf edge is abundantly populated by elevated fossil worm-algal carbonate reefs, known as Pinnacles. Lying at depths of 60-120 m depth, these hard-bottom Pinnacle reefs rise abruptly 10-15 m above the open sand plain of the outer continental shelf. They have been mapped and described geologically by USGS researchers (Gardner et al. 2000, 2001, 2002). The Pinnacles reefs support high diversity and abundance of soft corals, black corals, and planktivorous fishes.. Larger fish of economic importance in Gulf States also shelter and feed on the reefs. These shelf-edge deep reefs are potentially vulnerable to direct and indirect impacts from the DWH oil spill. Dr. James Cowan (Washington Post, 28 May 2010) has reported direct ROV observations of oil in the water column at 150 m depth 75 miles from the DWH wellhead, suggesting that direct oil contact with GOM deep reef coral communities at 60-120 m depth could be possible.

It is possible that many or all of the steps in the surface to bottom food chain of the deep-reef ecosystem are vulnerable to effects from the DWH oil spill. The primary food source sustaining the deep-reef ecosystem is surface plankton. A secondary carbon source important to some trophic specialists is *Sargassum*-derived detritus. Potential oil fouling and death of surface

plankton and *Sargassum* could impact the deep-reef food chain. Long-term deprivation of surface-derived food resources may cause impacts to the deep-reef community. Light deprivation under a mantle of surface oil may be a further problem for those mesophotic reef organisms that do depend in part on symbiotic photosynthesis (e.g., *Madracis* and *Madrepora* hard corals, red and orange encrusting sponges), as well as for visually-feeding planktivorous fishes. Direct impact in terms of injury and/or death might be encountered if dispersed oil contacts the reef surface, coating corals with a toxic film and fouling surface sediments that support benthic prey resources.

Communities inhabiting Pinnacles deep-reefs have been studied by complementary MMS and USGS projects and described by Continental Shelf Associates, Inc (2001) and Weaver et al. (2002). Pinnacle reef community studies conducted by MMS contractors (Continental Shelf Associates, Inc. 2001) and USGS (Weaver et al. 2002) have provided a robust knowledge of species diversity, dominant species, community structure, and deep reef community food webs (Sulak et al. 2010). Voucher imagery from ROV video documents the healthy-species, healthy community condition of the Pinnacles reefs fauna prior to the oil spill, at the times of those surveys.

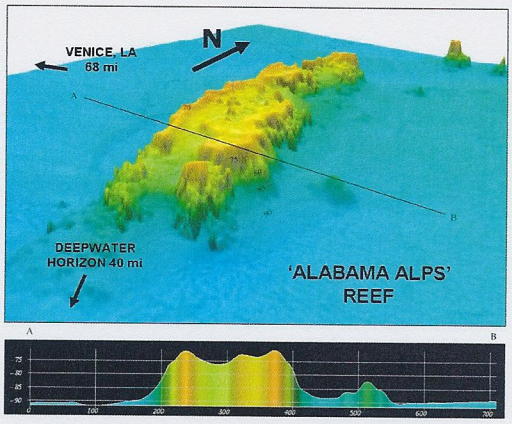
Deploying passive Semi-Permeable Membrane Devices (SPMDs; Environmental Sampling Technologies, St. Joseph, MO) as hydrocarbon detectors immediately over the reef surface has the potential of documenting direct oil contact with the reef community at depth.

B. Objective. To deploy two moored arrays of 4 SPMD canisters, with three "spider carriers" each, immediately above the reef-top of 'Alabama Alps' reef to document the presence of oil (PAHs), if any, in the near-bottom habitat of the deep reef community during the early potential impacts stage of the DWH oil spill event. One moored array would be deployed on the south end of the 1000 m long reef feature, the other on the north end. This project is a precursor for a second Deep Coral Working Group project, involving in-situ study of the reefs using an ROV. The SPMDs will be retrieved during the deepwater coral study.

C. Site Selection. The 'Alabama Alps' (Fig. 1) reef was selected for the initial SPMD deployment since that reef has lain directly under the surface plume of the DWH oil spill. The 'Alabama Alps' has also been well-studied by USGS, 1997-2005, providing a background of community composition and structure information, supplemented with in situ ROV imagery of the reef community, and voucher sediment sampling. The 'Alabama Alps' is a large (~ 1.0 km long by 0.25 km wide) feature, logistically accessible in 2.5-3.0 hours by a fast dual-hull tuna sportfishing boat out of Venice, LA (68 mi distant). Deployment can be accomplished cost-effectively. A boat is currently available for charter, with competent captain and mate, and is on standby. [redacted]

D. Strategy & Methods. The 'Alabama Alps' shelf-edge reef lies 40 mi north of the DWH wellhead, and, according to NOAA's tracking of the surface plume, has lain under the surface plume of the oil spill continuously since at least 29 April (Fig. 1, light tan area, based on NOAA satellite imagery).

Fig. 1. Location of 'Alabama Alps' deep reef ('A') relative to DWH wellhead (green dot) and area of DWH surface oil spill (light tan colored area) from 29 April to12 May from NOAA online satellite imagery reports.



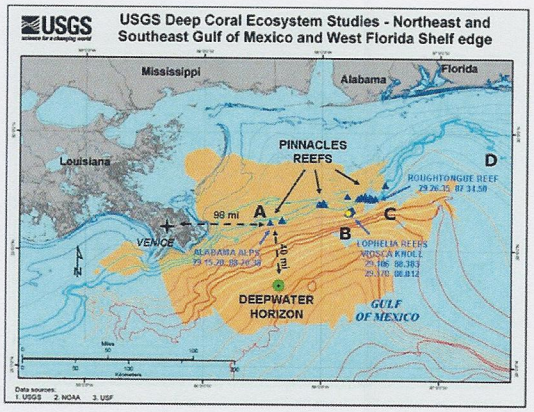


Fig. 2. 3-D bottom topography of the 'Alabama Alps' reef from USGS high-resolution multibeam swath bathymetry (J. Gardner).

The reef surface lies at 70 m depth, rising from the outer shelf sedimentary plain at 90 m depth (Fig. 2). The reef foreslope, reef crest, and reef top sustain a high diversity and abundance of reef organisms. At depth, predominant bottom currents impinge on the reef face out of the south to southwest, i.e., in the direction of the DWH wellhead.

Ocean gear expert (Randall, USGS, Gainesville, FL) will accomplish the field deployment. For this initial deployment, at each of two sites, four SPMD canisters (three SPMD spiders each canister, total of 12 SPMDs/ mooring) will be moored over the Alabama Alps reef-top surface, weighted to a concrete mooring block, buoyed on a high-strength synthetic fiber rope from the surface. A line spool will be used to control the deployment. Prior USGS GPS fixes for the center of the 'Alabama Alps' reef top will be used to position the mooring over prime reef-top habitat. Recommended monitoring times vary depending on the anticipated level of contaminants and water temperatures, but generally 28 days has afforded the best results (Environmental Sampling Technologies – SPMD product description). SPMDs will be protected within detachable, distilled water-filled containers (held together with time-release corrosible magnesium pop-offs) to prevent surface and upper water column oil contamination during deployment from the surface. For minimum replicability, two SPMDs will be attached to the mooring tether at each of two altitude levels (1 m and 5 m) above the reef-top. A small submerged float (15 lb buoyancy) attached at 15 m above the mooring block will suspend the SPMDs vertically above the reef-top. A surface attached plus a back-up sub-surface attached large orange buoy (2 buoys) will mark the location for retrieval. A buoyed and weighted flag mast with radar reflector and solar powered landscape light will also be attached to the line. The surface location will be recorded via GPS.

The SPMDs will be retrieved later during a planned Tier-1 ROV mission. Retrieval will be accomplished with the ROV. The SPMDs will be cut off the mooring at depth, using the ROV cutter arm, and placed within the bio-box. The bio-box will be designed with an internal sealing

surface, lid lock, and one-way pressure relief valve to prevent surface oil contamination during ROV ascent and recovery. SPMDs will be deployed and retrieved in the presence of an atmospheric blank, to correct for atmospheric PAHs. A blank SPMD will be placed in the biobox during retrieval, to check for any potential surface oil contamination. SPMDs will be stored frozen in their original containers, sealed on ship with chain-of-custody, and handled under chain-of-custody procedures for subsequent (on ice, overnight) shipment to Environmental Sampling Technologies Inc, Columbia, MO, for hydrocarbon extraction under a patented process. Extracted hydrocarbons will then be shipped to TDI-Brooks for contaminants analysis. It is currently unknown if SPMDs are capable of detecting the dispersant being used in the Deepwater Horizon incident. However, the question is under study, and if it is shown that the SPMDs do detect a dispersant signature, we anticipate analysis on the extract for dispersant signature as well. It is anticipated that replacement sets of SPMDs will redeployed on the Alabama Alps site using the 'Global Explorer' ROV during the mid-July 2010 mission. Additional SPMDs will be deployed on a second Pinnacles reef site, and on a comparative West Florida shelf-edge same-depth reef site (outside of oil impact zone comparison) during the same mission, providing comparison of potential spill impacts along a west to east shelf-edge same-depth reef-top environment.

During the deployment cruise, all safety guidelines and standard practices set by Incident Command as released on the Research Planning Trustee FTP site will be adhered to.

E. SPMD Analysis and Reporting. SPMDs from this initial rapid-response deployment will be analyzed upon return to shore and shipment. Results of SPMD laboratory analyses will be reported to the USGS SESC, Gainesville, FL, lead contaminant PI (Bargar) for interpretation and report preparation (Bargar and Sulak). Initial SPMD deployment and retrieval will be summarized in a project interim report (Randall). A field/lab data report will be prepared (Bargar, Sulak) as soon as SPMD analysis results are received, interpreted, and reviewed and approved for communication.

F. Data Sharing

Each laboratory shall simultaneously deliver raw data, including all necessary metadata, generated as part of this work plan as a Laboratory Analytical Data Package (LADP) to the trustee Data Management Team (DMT), the Louisiana Oil Spill Coordinator's Office (LOSCO) on behalf of the State of Louisiana and to ENTRIX (on behalf of BP). The electronic data deliverable (EDD) spreadsheet with pre-validated analytical results, which is a component of the complete LADP, will also be delivered to the secure FTP drop box maintained by the trustees' Data Management Team (DMT). Any preliminary data distributed to the DMT shall also be distributed to LOSCO and to ENTRIX. Thereafter, the DMT will validate and perform quality assurance/quality control (QA/QC) procedures on the LADP consistent with the authorized Quality Assurance Project Plan, after which time the validated/QA/QC'd data shall be made available to all trustees and ENTRIX. Any questions raised on the validated/QA/QC results shall be handled per the procedures in the Quality Assurance Project Plan and the issue and results shall be distributed to all parties. In the interest of maintaining one consistent data set for use by all parties, only the validated/QA/QC'd data set released by the DMT shall be considered the

consensus data set. The LADP shall not be released by the DMT, LOSCO, BP or ENTRIX prior to validation/QA/QC absent a showing of critical operational need. Should any party show a critical operational need for data prior to validation/QA/QC, any released data will be clearly marked "preliminary/unvalidated" and will be made available equally to all trustees and ENTRIX."

G. Personnel (USGS, Southeast Ecological Science Center + Boat Captain):

Project Leader: Kenneth J. Sulak, Ph.D., deep-water community ecologist, USGS, Southeast Ecological Science Center, 7920 NW 71st St., Gainesville, FL, 32653, [redacted]

Lead Contaminants PI: Tim Bargar, Ph.D., contaminants biologist

Field Deployment Chief: Michael Randall, fisheries biologist, ocean sampling gear expert

Tuna Boat Crew: Captain, assisted by fishing mate.

Each cruise will include room for an Entrix representative. The cruise will not be rescheduled, however, if no Entrix representative is able to take part.

G. Safety Plan: Michael Randall is the USGS SESC offshore operations safety officer, with 15 years of offshore experience and cognizance of all applicable safety issues and procedures. USGS will provide an appropriate set of medical, emergency, and rescue communication gear. Procedures at sea will adhere to all established safety protocols.

H. Budget Synopsis. Refer to attached Excel budget detail worksheet.

I. References

Continental Shelf Associates, Inc. and Texas A&M University, Geochemical and Environmental Research Group. 2001. Mississippi/Alabama Pinnacle Trend Ecosystem Monitoring, Final Synthesis Report. U.S. Department of the Interior, Geological Survey, Biological Resources Division, USGS BSR 2001-0007 and Minerals Management Service, Gulf of Mexico Regions, New Orleans, LA, OCS Study MMS 2001-080. 415 pp +apps. http://www.gomr.mms.gov/PI/PDFImages/ESPIS/3/3136.pdf

Gardner, J.V., K.J. Sulak, P. Dartnell, L. Hellequin, B. Calder, and L.A Mayer. 2000. Cruise Report RV Ocean Surveyor Cruise O1-00-GM. The Bathymetry and acoustic backscatter of the Pinnacles area, northern Gulf of Mexico May 23, through June 10 2000. U.S. Geological Survey Open-File Report 00-350, 36 pp. http://geopubs.wr.usgs.gov/open-file/of00-350.

Gardner, J.V., P. Dartnell, K.J. Sulak, B. Calder, and L. Hellequin. 2001. Physiography and late Quaternary-Holocene processes of the northeastern Gulf of Mexico outer continental shelf off Mississippi and Alabama. Gulf of Mexico Sci. 19(2): 132-157.

Gardner, J.V., P. Dartnell, and K.J. Sulak. 2002. Multibeam mapping of the Pinnacle region, Gulf of Mexico. U.S. Geological Survey Open-File Report 02-006, http://geopubs.wr.usgs.gov/open-file/of02-006/

Sulak, K. J., J. Berg, M. Randall, G. D. Dennis III, and R. A. Brooks. 2010. Dual-Carbon Sources Fuel the Deep Reef Community, a Stable Isotope Investigation. Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida, 7-11 July 2008, pp 890-894.

Washington Post. 28 May 2010; 1:09 PM. "La. Scientist locates another vast oil plume in the gulf". D. A. Fahrenthold and J. Eilperin. www.washingtonpost.com/wp-dyn/content/article/2010/05/28/AR2010052802346.html

Weaver, D.C., G.D. Dennis, and K.J. Sulak. 2002. Community structure and trophic ecology of fishes on the Pinnacles Reef Tract. Biological Sciences Report, USGS BSR 2001-0008, OCS Study MMS 2002-034, 168 pp.

J. Budget This budget excludes Trustee labor and contract employee labor costs. This budget also excludes costs for all laboratory analyses that are not specifically included in this budget. All costs that are not reflected in this budget will be documented and accounted for at a later time as part of the Trustees' assessment costs.

NRDA TIER-1 DEEP-CORAL PROJECT, MESOPHOTIC/PINNACLE REEF COMPONENT (FIELD MISSION-FAST DEPLOY OF SPMDs, PLUS POST-MISSION LABORATORY ANALYSES) BUDGET

1. USGS SALARY COSTS (AT SEA & IN LABORATORY)*

Person		FTE (PP)	Hours	Cost (PP)	Amount $	Amount $	Amount $
Randall, M.	Term	1.0	80.0	2406.4		$2,406.40	
	Field biologist; responsible for rigging, transporting, and deploying SPMDs						
Bargar, T.	Permanent	2.0	160.0	4431.2			$8,862.40
	Contaminants Scientist; responsible for interpretation of results from SPMDs						
Sulak, K.	Permanent	0.5	40.0	5589.6			$2,794.80
	Chief PI, responsible for overall design and direction of Leg-2 Deep Coral project						

2. SUPPLIES & SERVICES

SPMD contaminants detection devices (8 canisters @3/ canister, plus blank). SPMDs to be retrieved on Leg-2 of Deep Coral Cruise		
SPMDs with PRC spike (27 @$63 ea)	$1,701.00	
Dialysis/GPC (EST lab extraction)(9 @$265 (3 SPMD stack)ea)	$2,385.00	
Canister rental (8 @ $100)	$800.00	
Analysis (TDI-Brooks) [redacted]	$3,520.00	
Boat charter with captain and mate, Venice, LA, 1 day [redacted]	$1,900.00	
Boat fuel, 150 mi roundtrip (estimated cost)	$600.00	
Two mooring rigs for SPMDs (500 ft line, buoys, mooring block, hardware, flag mast, marker light, radar reflector, SPMD protectors, magnesium releases)	$600.00	

3. TRAVEL & ACCOMMODATION

GSA vehicle cost (1,500 mi roundtrip)	$600.00
Randall, M., per diem (3 days)	$175.00
Randall, M., motel, 2 nights	$140.00

* Salary costs include salary & benefits, plus institutional administrative costs	Supplies, services, and travel	Term Salaries	Permanent Salaries
	$12,421.00	$2,406.40	$11,657.20

Total request: $26,484.60

K. Quality Assurance Plan

Data Quality Objectives

The MC252 incident has the potential to injure deep coral reefs, and associated natural resources and services. The sampling program described in this document addresses the collection of the data and information relevant to characterize deep coral reefs physically, chemically, and biologically: (a) with previously-collected data, prior to potential contamination by MC252-related oil, (b) post-impact (if any), and (c) in reference areas. The exact timing and locations of potential impacts, if any, from oiling or related activities remain uncertain. The geographical scope for sampling activities therefore also remains uncertain, but will be as comprehensive as possible. Specific sampling objectives include:

- Rapid SPMD deployment: deploy sampling gear to allow determination of presence of oil
- ROV Cruise: Characterization, quantification, and determination of any oil related impacts

Data Quality Indicators

Data developed in this study must meet acceptable standards of precision, accuracy, completeness, representativeness, comparability and sensitivity. Each of these data quality indicators, some of which are not readily quantifiable, is discussed below with specific reference to the current study.

Precision is defined as the level of agreement among repeated independent measurements of the same characteristics. Precision for this study is assessed in several ways: first, by the use of field duplicates for those data types that are amenable to duplicate measurements (e.g., samples collected for chemical analysis, and core samples collected for hydrocarbon analysis, and infaunal species diversity and abundance information). Precision in the context of laboratory analysis will be addressed in the Analytical Quality Assurance Plan (under development by NRDA; not as part of this Working Group).

Accuracy is defined as the agreement of a measure with its true value. Accuracy in the context of laboratory chemical analyses will be addressed in the Analytical Quality Assurance Plan (under development). Accuracy in species identification will be achieved by use of a reference set of ID photos, vetted by a second expert. Accuracy may also be evaluated, although more qualitatively, via comparison with results from prior studies in similar locations, if available.

Completeness is defined as the percentage of the planned samples actually evaluated and processed. Completeness can be evaluated for all components of this study. In particular, for all sites visited, it can be determined whether all specified measurements were recorded, and whether samples were acquired from all sites for which sampling was planned. Completeness can also be evaluated with respect to the proposed sampling strategy—e.g., taking three cores per site, or running a 3 minute transect. Note, however, that since the condition of the deep coral reefs is unknown, the conditions encountered may require changes in the sampling design. Also, work at depth is complex; equipment is prone to failure, and all sampling is subject to weather restrictions; thus not completing an ambitious sampling plan is not likely to be a sign of failure. Completeness in the context of the analytical chemistry measurements is addressed in the Analytical Quality Assurance Plan (under development).

Representativeness refers to the degree to which the data accurately reflect the broader community represented by the sampling effort. The careful selection of sites for evaluation, among all possible sites, and the positioning of specific sampling locations within sites, has been designed using statistical considerations intended to allow results to be representative. Representativeness also will be ensured by proper handling and

storage of samples and analysis within accepted holding times so that the material analyzed reflects the material collected as accurately as possible.

Comparability expresses the confidence with which one data set can be compared to another. Comparability for this project will not be quantified, but will be addressed through the use of consistent field and laboratory methods.

Sensitivity, the ability of a measurement technique or instrument to operate at a level sufficient to measure the parameter of interest, is largely not applicable to the biological parameters. The detection limits for chemistry parameters are addressed in the Analytical Quality Assurance Plan (under development). These, in conjunction with the measured biological parameters, will likely provide sufficient sensitivity for the purpose of providing insight into the potential for the measured contaminants to impact the deep coral reef community.

Project Management

Project organization, roles, and responsibilities help ensure that individuals are aware of specific areas of responsibility as well as internal lines of communication and authority. Overall authority for project management rests with the Trustee Council. The Trustee Council has divided its staff into a number of technical work groups (TWGs), which are overseeing the development of specific plans for the evaluation and generation of information of relevance for the ongoing natural resource damage assessment. The Trustees are currently engaged in a cooperative effort with BP, whose representatives are also participating in the TWGs. The current members of the Deep Coral TWG, and their affiliations, are listed below.

Table 2. Current Participants in the Deep Coral TWG

Name	Affiliation
Andrews	NOAA/NOS/OCRM
Arzayus	NOAA/OAR/OER
Battle-Sanborn	NPS
Bigford	NOAA/NMFS/HC
Boland	MMS
Bray	NOAA/NOS/ORR
Brewer	USGS
Brooks	TDI Brooks
Charles	USGS
Cluck	MMS
Cordes	Temple University
Cortelyou-Hamilton	DOI
Cubit	NOAA/NOS/ORR/ARD/PIB
David	NOAA/NMFS/SEFSC
Deal	DOI
Demopoulos	USGS
Dorfman	NOAA/NOS/NCCOS/Biogeography
Embesi	NOAA
	NOAA/NOS/NCCOS/CCEHBR/PARB

Etnoyer	USGS
Finger	Pennsylvania State University
Fisher	WHOI
German	NOAA/NOS/ONMS
Gittings	MMS
Glenn	NOS/ONMS/SE GOM&CR/NMS
Goodwin	NOAA
Harter	NOAA/NOS/ONMS/FGBNMS
Hickerson	NOAA/NMFS/HC
Hourigan	NOAA/NOS/NCCOS/CCEHBR/PARB
Hyland	Entrix
Jakubczak	USGS
Kellogg	Florida Department of Environmental Protection
Kosmynin	NOAA/NMFS/HC
Koss	NOAA
MacLaughlin	NOAA/OAR/OER
McDonough	NOAA
Moore	Louisiana Department of Wildlife and Fisheries
Peter	
Peters	NOAA/NOS/ONMS/FKNMS
Precht	USGS
Randall	NOAA General Counsel
Rolle	MMS
Roscigno	UNC-Wilmington
Ross	NOAA/NOS/ONMS/FGBNMS
Schmahl	ASA
Schroeder	NOAA/NMFS/SEFSC
Schull	MMS
Sinclair	NOAA
Stratton	USGS
Sulak	NOAA/NMFS/HC
Tsao	

Under the auspices of the TWGs, field teams are being organized to implement the plans developed by the TWGs. Field team members have partially overlapping and partially distinct areas of responsibility. All field team members are responsible for ensuring that they are adequately trained with respect to health and safety requirements, requirements relating to the implementation of study-specific data generation activities, and adherence to case-wide protocols on topics including (but not necessarily limited to) chain-of-custody documentation, sample collection documentation, use of camera and GPS equipment, sample handling, packaging, and shipping requirements.

Designated field team leaders (Chief Scientists) have additional responsibilities, including overall responsibility for the activities of the field teams while they are deployed. Field team leaders have responsibility for communication with designated contacts on the status and safety of their teams. They are also responsible for ensuring the accuracy of information and the integrity of samples collected during field activities, and to make sure samples are appropriately handled and delivered, under chain-of-custody, to designated locations where they will be temporarily stored prior to shipment to an appropriate laboratory. Field team leaders are also responsible for ensuring complete collection of all information, data, and samples. They have responsibility for ensuring that electronic data (e.g., from cameras and GPS units) are appropriately archived and uploaded into Trustee databases, and that hard copy data are transcribed into case-wide databases.

The Trustees have also been assembling a quality assurance team, comprised of individuals who will have responsibility for various aspects of quality assurance for this NRDA including the effort described in this plan. Individuals from the QA team have been and will continue to serve in roles including but not necessarily limited to: development of the Analytical Quality Assurance Plan; reviewing/assisting TWGs with the development of project-specific QA plans; conducting audits and ensuring implementation of QA plans; archiving samples, data, and all documentation supporting the data in a secure and accessible form; and reporting to the Trustee Council. Members of the QA team include Ms. Ann Bailey of EcoChem, Inc. and Mr. Charles Ramsey of EnviroStat, Inc.; the team may be expanded in the future.

Data Generation and Acquisition

The SOPs included in this document, and included by reference, provide full details about how data will be generated, including sampling methods, sample handling, and chain-of-custody requirements. All data generated will be compiled in a GIS-compatible electronic database.

Assessment and Oversight

All field-collected information is recorded in forms kept in loose leaf notebooks and will be signed and dated. The Chief Scientist supervises day-to-day field investigations, including sample collection, field observations, and field measurements and generally is responsible for all field quality assurance procedures. The Data Manager, designated by the Chief Scientists, shall review all forms for accuracy prior to their submittal at the end of the field day. The field forms will be scanned and archived, and data from the forms will be entered into the case-wide database (in development).

If technically and logistically feasible[1], during the course of the field work, an external audit will be conducted by a Trustee-designated member of the QA team to evaluate adherence to relevant protocols and ensure that procedures are in place for proper sample handling, processing, and documentation of results. Laboratory audits are also anticipated.

If, during the course of any field or laboratory audits, the QA auditor identifies deficiencies and other non-conforming conditions, the QA auditor or designee shall document these issues and shall formulate recommendations for corrective actions, which shall be communicated to the responsible team members, designated TWG representatives, and/or Trustee Council representatives.

Data Validation and Usability

All of the chemistry data will be subjected to formal data validation prior to use. The other data will also be evaluated to determine if they meet the performance criteria for measurement data that are described in this

[1] Feasibility may be limited by boat availability and capacity limits, response activity restrictions, or other factors.

document. Any data that do not meet the performance criteria for measurement data will be flagged appropriately

The data generated in this study will be compiled in a GIS-compatible electronic database. The accuracy of data transcriptions will be evaluated by conducting checks of the data. This evaluation level will be increased if any errors are encountered during the initial evaluation of the data.