

**Water Column Injury Ephemeral Data Collections:  
Deepwater Horizon Oil Spill (DWHOS)**

**Plan for Adaptive Water Column NOAA-NRDA Sampling (PAWNNS)  
Cruise Plan – American Diver 2**

**September 13, 2010**

Prepared by: Deborah French-McCay (ASA), Malinda Sutor (LSU)

**Proposed Cruise Dates:**

American Diver 2 – August 28-September 1, 2010

**Objectives**

The objective of this cruise is to determine the plankton distributions and community composition in the upper water column (0-100 m) in a region to the southwest of the wellhead where oil exposure may have occurred. Planktonic organisms may have been exposed when oil and dispersant were in the surface waters; and plankton that undergo a diel vertical migration may continue to be exposed to oil in the deepwater or to alter their behavior in response to the presence of oil. We will utilize acoustics, bio-optics, and direct collection methods to assess the horizontal and vertical distribution patterns, as well as the abundance and community composition of the plankton. This cruise will sample the upper water column (0-200m), and provide data that can be compared with the nearly concurrent sampling on the Hos Davis 2 being performed with the DAVPR and Holocam by Cabell Davis, which will sample down to ~1000m or deeper in the area SW of the well where subsurface oil has been detected.

We will work closely with scientists on the HOS Davis 2 cruise to collect coincident data so that we can compare our data with the image-forming optical data collected by the Video Plankton Recorder (VPR) and the water chemistry data collected to quantify the concentration of oil and dispersants.

**Methods**

Methods are described in Attachment 1. We will conduct day and night surveys and station work from August 29-Sept. 1. We will work in a region to the southwest of the well head, approximately 100-270 km from the well head. We will work with Dr. Cabell Davis on the HOS Davis to establish transect lines along which he will tow his VPR and we will conduct acoustic and flow-through surveys. In a given 24 hour period, we will occupy the same locations for both a daytime and nighttime survey to adequately sample plankton that are diel vertical migrations. We will also determine any differences in the extent of vertical migration in and outside of areas exposed to oil.

During each transect, we will collect samples from approximately 3 m at approximately 15 minute intervals (every 0.5 nm at 2 knots speed) while underway. After each transect, we will occupy 1-3

stations, one at each end of the transect line and one in the middle. At each station we will conduct a CTD/acoustic/pump profile and a vertical net tow. We will attach a Cyclops fluorometer to the CTD to provide an index of the presence of hydrocarbons (Attachment 2). At night, we will also deploy light traps to collect rarer plankton organisms including ichthyoplankton.

This should result in approximately four, day-night pairs of transects (8 total transects) and stations (8-24 stations).

#### *Survey Details*

A two-frequency (460 and 775 kHz) ASL Environmental Acoustic Water Column Profiler (Attachment 1) will be attached to a strut on the port side of the ship, oriented in a downward-looking direction. Acoustic backscatter data will be collected continuously at both frequencies for the duration of the transect over the upper 30-50 m (both frequencies) and up to 100 m (460 kHz).

We will also collect data in a flow-through system utilizing a pump with a fixed intake at approximately 3 m (below the hull of the ship). We will collect samples for nutrients (Attachment 3), size-fractionated chlorophyll, phytoplankton, microzooplankton, and mesozooplankton at 15 minute intervals over the duration of the transect. Whole water samples will be collected fresh and analyzed immediately in a FlowCAM (imaging microscope system) and two aliquots will be preserved in acid Lugols and buffered formalin for later analysis. Water will be filtered through a 20  $\mu\text{m}$  mesh every 15 minutes (approximately 300 L) and preserved in buffered formalin for analysis of mesozooplankton. Methods are in Attachment 1.

#### *Station Details*

At each profile station, we will conduct several profiles with a CTD/Acoustics package. The package will have the following sensors: Seabird 25 CTD, Wetlabs ECO chlorophyll fluorometer, Wetlabs ECO CDOM fluorometer, SBE43 oxygen sensor, Biospherical PAR sensor, 1200 kHz RDI ADCP (calibrated with standard hydrophones), and a 2400 kHz RDI Doppler Velocity Sensor.

If we are able to get data from the CTD in real-time, then after the deeper profiles, we will recover the package, attach the pump intake, and guided by the water column stratification and profile of fluorescence, we will take discrete samples from the pump to analyze in the FlowCAM and replicate preserved whole water samples (acid Lugols and buffered formalin) for later analysis.

We will also conduct triplicate vertical tows with a 153  $\mu\text{m}$  mesh plankton net from 0-100 m. The contents of the net will be preserved in buffered formalin for later analysis of the mesozooplankton.

#### *Light Traps*

During our night station work, we will deploy two tethered light traps for approximately 15 minute to 2 hours to collect planktonic organisms in the upper 3-5 meters of the water column. The contents of the traps will be preserved in buffered formalin for later analysis. Methods are in Attachment 1.

**Personnel**

8 NOAA contractors:

Dr. Malinda Sutor (LSU), Chief Scientist

2 LSU technicians: Alvaro Armas, Kate Lingoni

1 NOAA Data Manager: David McCarty

2 NOAA technicians (Fred Marin (AIS), Steve Hall (DCA))

1, BP representative, Kristin Morrison, (ENTRIX)

Boat Crew (Captain, mate, deck hands)

**Vessel**

Operations will be completed on the American Diver.

**Estimated Costs:**

<b>Costs</b>	<b>Hrs/Days/Trips</b>	<b>Day/Hr Rate</b>	<b>Total</b>
Ship Mobilization / Preparation			\$100,000
CSA Labor			\$6,780
Leased Equipment: Cyclops			(loan)
Leased Equipment (LSU): FlowCam		\$	\$3000
Other Direct Costs (LSU)		\$	\$2000
<b>Total</b>			<b>\$111,780</b>
<b>Field Survey Costs</b>			
<b>Am Diver</b>			\$57,500
<b>NOAA Labor (days):</b>			
Malinda Sutor			\$10,000
2 LSU Technicians			\$10,000
LSU data analysis (Sutor and techs)			\$25,000
NOAA technician ("Water Sampler")			\$ 5,000
NOAA technician ("Water Sampler")			\$ 5,000
Data Manager			\$ 8,750
<b>Misc Costs Sample Handling</b>			\$11,000
<b>Travel</b>			
<b>Total</b>			<b>\$132,250</b>
<b>TOTAL</b>			<b>\$244,030</b>

Days/Trips based on 1/dy Mob, 3dys Fid, 1dy demob

Labor is estimated cost and hours

Vessel Costs for standby not included

Standby costs for Equipment are not included

## **Budgeting**

The Parties acknowledge that this budget is an estimate, and that actual costs may prove to be higher due to a number of potential factors. As soon as factors are identified that may increase the estimated cost, BP will be notified and a change order describing the nature and cause for the increase cost in addition to a revised budget for BP's consideration and review.

## **Safety Plans**

BP's full operations and safety plan is attached as Attachment 4. In addition, the NOAA incident site safety plan (which all NOAA employees and contractors must sign prior to the cruise) is attached (Attachment 5).

## **Transfer of the shared electronic media in the onboard equipment to each of the party's hardware for retention and use.**

Upon return to port, the vessel Operations Manager shall produce identical copies of the raw and processed electronic media generated during the cruise and deliver one of those copies each to NOAA (or its QA contractor) and to ENTRIX.

## **Laboratory**

All VOC and water chemistry samples (filters and water samples) for PAH will be sent to Alpha Analytical Laboratories in Mansfield, MA. The RP may take additional unfiltered and toxicity water samples at selected locations, which are not part of the cooperative sampling. These samples will be sent to a laboratory of their choosing. ENTRIX will provide all related sampling supplies for their samples. RP will provide all testing results for all samples taken on the cruise to NOAA and the other trustees using the Distribution of Laboratory Results procedure below.

## **Distribution of Laboratory Results**

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.

**Attachments:**

- Attachment 1. Sutor Optics-Acoustics-Plankton [M. Sutor (LSU) Sampling Procedures for CTD, Acoustic Profilers, FlowCAM, Light Traps, Assessment of Oil Droplets and Plankton Distributions]
- Attachment 2. CNES CTD and Fluorometer Package
- Attachment 2. Annex 1. CNES Manual
- Attachment 3. Procedures for Nutrients, Carbon, Suspended Particulates, and Trace Metals
- Attachment 4. CSA-Davis HSE Plan Rev 005\_Final
- Attachment 5. NOAA-NRDA\_MC\_252\_Site\_Safety\_Plan\_5.13.10
- Attachment 6. MC252\_Incident\_SIMOPS\_Plan\_
- Attachment 7. Transfer of Personnel and Material at Sea 070510
- Attachment 8. MC252 HSSE Incident Reporting Final 02 May 10 rev 1
- Attachment 9. NRDA\_Field\_Sampler\_Data\_Management\_Protocol\_7\_5\_2010


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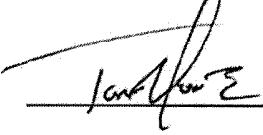
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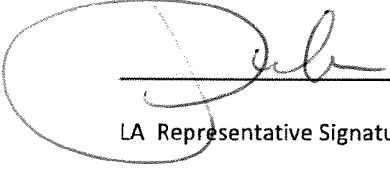
August 28-September 1, 2010

Approvals

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.

	Carl Fay	9-18-10
BP Representative Signature	Name	Date

	Tom Moore	9/17/10
Federal Representative Signature	Name	Date

	KAROLIEN DEKUSSCHER	9/22/10
LA Representative Signature	Name	Date