Proposal for NRDA Data collection for Deepwater Horizon Oil Spill
NOAA Vessel Gordon Gunter
Anticipated Cruise Date: May 27 – June 4, 2010

Mission: Support Natural Resource Damage Assessment by collecting data and analytical samples to better quantify and model the distribution and weathering of oil (including dispersed and burned oil) released from the Deepwater Horizon platform. As part of this mission the NRDA team will also collect data from the Shadowed Image Particle Profiling and Evaluation Recorder to measure plankton presence and distribution. Data and samples collected by SEFSC scientists on the cruise will (collection and preservation of fish embryos and larvae according to NWFSC protocols) will be useful for future measurements of oil-related exposure and injury.

NRDA Personnel and roles:

Robert Nelson, Woods Hole Oceanographic Institution:
Water/Oil sampling chemist
[redacted]

Dr. Andrew Remsen, University of South Florida,
[redacted]
SIPPER Principal Investigator

Entrix employee: Stephen Fournet

Off- ship scientific coordination and support:
Robert Ricker, NOAA

Activities:

Water samples: Water samples in the surface mixed layer (below surface to thermocline) will be taken to test for the presence of dispersed oil and droplet size. Sample locations will occur along transects of known or suspected dispersed oil (from aerial application and subsurface injection) and areas of controlled burn. Water samples at depth will be taken with a rosette sampler that can collect multiple samples at various depths and collect large enough samples for chemical and droplet size analysis.

Chemical analysis of the waters will assess concentrations of whole and dissolved total and polyaromatic hydrocarbons, volatiles hydrocarbons, dispersant compounds and products of combustion.

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Whole water samples for hydrocarbon analysis will be taken in replicate in 1L I-Chem Certified Clean amber glass jars (2 x 1L) and in pre-acidified 40 mL vials for VOA analysis (2 x 40 mL). Separate water samples for dispersant analysis will be collected in 1L plastic bottles

Water samples will be collected at four depths: just below the surface, mid mixed-layer (between thermocline/pycnocline and surface), just above the thermocline, and just below the thermocline, using a conventional hydrowire with 5 L Go Flow Bottles and a rosette sampling array with pre-programmed sampling depths.

Surface Oil samples

Multiple surface oil samples from the area will be collected as they are encountered and opportunity allows for their sampling.

Floating surface oil of obvious thickness (not sheens) samples will be taken and placed in (cleaned) amber 125 mL bottles or 4-ounce widemouth amber jars. These samples will be collected using conventional bucket casts or the Teflon nets (described below). Digital photography will be used to document surface oil appearance and thickness. Surface oil samples will be measured for water content (i.e., mousse) via Karl Fischer titration and for TPH, PAH, VOC and biomarkers.

Surface oil sheens will be collected with pre-cleaned Teflon nets attached to a sampling wand/pole or attached directly to the line of a fishing pole using a hook or wooden clothes pin that is cast from the leeward side of the vessel and floated on/through the sheen. After the Teflon nets are drug through the sheen, they are removed from the wand (if wand was used) and sealed in 125 mL glass jars for shipment to the laboratory. Sheen samples will be analyzed to determined TPH, PAH, VOC, and biomarkers.

Oil droplet and plankton measurements

Oil droplets will be measured using the Shadowed Image Particle Profiling and Evaluation Recorder (SIPPER), a towed, suspended particle imaging system.

The SIPPER system will also collect high resolution information on the distribution of zooplankton, phytoplankton, larval fish and detritus within a 100 cm^2 sampling area as it moves through the water. Tow time will be integrated into the overall cruise plan and include a minimum of 6 hours of tow time per day. Tows will be conducted in impacted and unimpacted areas.

Assistance with ichthyoplankton survey team (already on mission)

NWFSC scientists are providing reagents and protocols to allow SEFSC staff to preserve ichthyoplankton samples to allow for future measures of exposure and injury to oil. Samples will need to be held under NRDA chain of custody.

Requirements for collection and maintenance of samples

1. Refrigeration for approximately 400 1 liter amber glass jars/plastic bottles, 100 125 mL bottles, and for 400 40 ml VOA vials for volatiles (or about 100 at a time).

2. Storage for 8 coolers

3. Freezer space for blue ice for maintaining sample temperature while in transit and 50 1L plastic bottles.

3. Requirements to support the SIPPER instrument are attached.

4. Ferry/supply boat will need to meet ship 4 day intervals to transport water samples under chain of custody to shore for packing and shipping to meet laboratory holding times (7 days from collection to extraction for water samples).

5. Sample collection methodology, handling, chain of custody and decontamination procedures will follow accepted standards to ensure the highest quality data will be collected. Discrete analytical samples will be tested at an approved lab(s).

Costs:
Since the vessel is being tasked by the response, vessel costs are not included here. Contractor costs will be updated prior to signature.

SIPPER rental: $7,000
Remsen: $13,000
Nelson: $12,000
Dade Moeller: $4,600 for labor; $2,200 for supplies/shipping
Total: $38,800

Laboratory and Data:
All water chemistry samples will be sent to Alpha Laboratories in Mansfield, MA.

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."

Attachment:
SIPPER Information

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.

NOAA

6/5/10
Date

~~Entrix~~ BP

June 5, 2010
Date

Attachment 1: Description of Shadowed Image Particle Profiling and Evaluation Recorder (SIPPER)

Mission of Work:
The Shadowed Image Particle Profiling and Evaluation Recorder is an /in-situ/ suspended particle imaging system capable of collecting high resolution information on the distribution of zooplankton, phytoplankton, larval fish and detritus. It uses a high speed line scan camera to continuously image a 100 cm^2 sampling area as it moves through the water. A typical 1 hour profile of the upper 100 m in the Gulf of Mexico can generate hundreds of thousands of plankton and detrital images. A comprehensive analysis software package is then used to extract, size, classify and manage the image and environmental data.

The SIPPER could also be used to determine the composition of scattering layers and their vertical extent. The SIPPER could be towed horizontally and vertically to determine the zooplankton and part of the icthyoplankton response to water possibly affected by the spill. The SIPPER towbody is outfitted with a SBE-19 plus CTD, SBE 43 Oxygen sensor, a Wetlabs Chl a and backscatter ECO fluorometer, a Wetlabs Wetstar transmissometer and a Wetlabs ECO CDOM fluorometer. SIPPER can deploy with all the sensors but a decision would have to be made whether to run with the transmissometer or the CDOM fluorometer as the CTD can only handle 4 external sensor inputs. The SIPPER could be deployed on the Gunthers CTD cable to its maximum depth of 350 m in search of subsurface oil and possibly detect it visually, through its DO meter, CDOM sensor or transmissometer/backscatter sensors.

SIPPER is a man portable system that is mounted on a small 5′×3′×2′ towed body that contains a conductivity, temperature and depth probe, a chlorophyll fluorometer, turbidity sensor and a transmissometer. It can be deployed off any ship with standard 0.322" conducting (3 conductor) cable and a slip ring. The system is towed through the water at speeds between 1-4 knots and can sample down to depths of 350 m. SIPPER tows require at least an hour per 100 m depth.

The objective is to conduct multiple tows in both impact and pre-impact waters for an anticipated 6 hours per/day. Exact station locations can be adaptively selected.

Names:
Dr. Andrew Remsen, University of South Florida, [redacted]

Roles:
SIPPER P.I.

Equipment Requirements:
The SIPPER is relatively small, self powered and requires very little footprint in a ship's dry and wet areas. However, there are still some requirements necessary for efficient operation of the system while at sea.

Winch, A-frame and tackle system

The SIPPER was developed for operation on most oceanographic vessels that carry standard 3 conductor 0.322" hydro-wire used for CTD and trawl operations. We utilize two conductors to operate a digital subscriber line (DSL) connection between the SIPPER and a personal computer on board the ship. We've operated on cable lengths up to 10 km long. Typically this hydro-wire is terminated with female Impulse RMG-2-FS connector or a female Impulse IE2F-5/8 connector. We have the capability to connect to either. If the cable is terminated differently, we can either re-terminate the cable or build an adapter pigtail with the correct connectors. A winch with a payout speed and wire out indicator is preferred but not necessary.

The ship would need an A-frame that can lift a 250 lb tow-body and a block that could handle a 400 lb. dynamic load and clearance to lift a 3' wide, 5' long and 2' high tow-body. A working deck area at least 10' wide and long would be necessary for safely deploying and recovering the system. The ship would need to be able to motor relatively slow and steady between 1-3 knots or have a trawl gear for best results.The length of cable available will determine the maximum depth we can deploy SIPPER to until we reach it's safe operation depth maximum at 350 m. At 350 m, typically 1500 m of cable is paid out. For this application, I foresee most work in the 50-100 m depth range.

SIPPER operation

The SIPPER is operated remotely through DSL link to a desktop computer on the ship. We would need space for an operator and computer as well as 120V AC to power the computer, DSL modem and other accessories. This space should be in proximity to the slip-ring conductors or a remote junction box. Additionally, as SIPPER is powered via battery, we would require a 3' by 2' area for a battery charging station and another 120V AC outlet.

Sample Requirements:
None