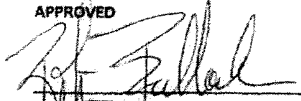
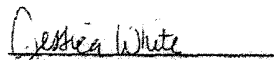


Deepwater Horizon/MC252/BP
Shoreline Vegetation Rapid Oiling Survey
NRDA Pre-Assessment Data Collection Plan
December 16, 2010

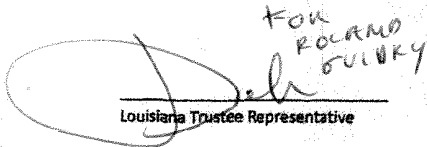
APPROVED


BP Representative

1/4/2011
Date


NOAA Trustee Representative

1/4/2011
Date


Louisiana Trustee Representative

FOR
ROLAND
DULVY

3/8/2011
Date

**Shoreline/Vegetation Rapid Shoreline Oiling Survey
NRDA Pre-Assessment Plan**

Mississippi Canyon 252 Incident

Approval of this work plan is for the purpose of obtaining data for the Natural Resource Damage Assessment. Each party reserves its right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan.

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 BP (or 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 BP (or ENTRIX on behalf of BP). 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-ed data shall be made available simultaneously to all trustees and BP (or ENTRIX on behalf of BP). 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-ed data set released by the DMT shall be considered the consensus data set. In order to assure reliability of the consensus data and full review by the parties, no party shall publish consensus data until 7 days after such data has been made available to the parties. Also, 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/un-validated" and will be made available equally to all trustees and to BP (or ENTRIX on behalf of BP). As agreed upon by the Trustees and BP, all samples collected for contaminant analysis during the sampling plan described below will be sent to Alpha Analytical Laboratory. Samples for other analyses will be sent to the laboratories indicated in the plan below.

This plan has been implemented consistent with existing BP and trustee regulations, policies, and cooperatively agreed upon standard operating procedures (SOPs). All applicable state and federal permits have been obtained prior to conducting work. All landowner authorizations and permissions have been obtained and approval conditions will be followed.

**Deepwater Horizon/MC252/BP
Shoreline Vegetation Rapid Oiling Survey
NRDA Pre-Assessment Data Collection Plan
December 16, 2010**

The trustees have developed a preliminary conceptual model of the DWH release, potential pathways and routes of exposure, and potential receptors. This preliminary model has informed the trustees' decision to pursue the studies outlined in the work plan. By signing this work plan and agreeing to fund the work outlined, BP is not endorsing the model articulated in the work plan.

Introduction

The purpose of the field effort described in this Pre-Assessment Plan was to obtain additional information on oiling conditions in vegetated shoreline areas to be used in conjunction with Pre-assessment Data Points, SCAT data, and other shoreline oiling information to determine the shoreline areas that have been exposed to oiling and to generate oiling maps indicating the level of that exposure to MC 252 oil. The goal of the shoreline pre-assessment effort, as described in the Shoreline/Vegetation NRDA Pre-assessment Data Collection Plan (July 12, 2010), is to "determine the spatial extent and degree of oiling on intertidal shoreline resources over the duration of time that shorelines are exposed to the release" and to "select locations (monitoring stations) in which to conduct potential injury assessment studies." However, review of information gathered from the Tier 2 pre-assessment ground surveys conducted to date led to the conclusion that some additional information was needed in order to achieve the goal of the shoreline pre-assessment in vegetated shoreline areas. This Shoreline Vegetation Rapid Oiling Survey Pre-Assessment Data Collection Plan describes the need for the additional data and the rapid shoreline oiling survey method developed to obtain these data.

Need for Rapid Shoreline Oiling Survey Approach

The Shoreline/Vegetation NRDA Pre-Assessment Data Collection Plan (July 12, 2010) relies on the use of aerial imagery together with information gathered in pre-assessment ground surveys in order to obtain the information necessary to map the spatial extent and degree of oiling on intertidal shoreline resources. While it is possible to observe oiling along the shoreline using aerial imagery in some of the most heavily oiled vegetated shorelines, further information beyond what has been currently collected is required for those areas where the degree of oiling is less than very heavily oiled. Reliance on aerial imagery alone to help determine oiling between pre-assessment ground survey locations would not be sufficiently comprehensive to develop a map of the extent and degree of oiling.

SCAT data will be useful in augmenting the pre-assessment ground survey data to help generate oiling maps. However, not all vegetated shoreline areas that are potentially oiled will necessarily be surveyed by SCAT. Additionally, some areas previously surveyed by SCAT were oiled or re-oiled, and so conditions have changed since the SCAT surveys. Therefore it was necessary to gather information from areas that

may not have had SCAT surveys or which may have been oiled or re-oiled since the SCAT surveys were conducted. Given that the oiling conditions in vegetated areas were changing quickly and that a large area needed to be examined, it was important that the method be one that could quickly and efficiently characterize large portions of the shoreline. The methods described below were used to quickly obtain additional information on vegetated shoreline oiling sufficient to assist in the development of oiling maps.

Goal

To provide additional information to be used in conjunction with information obtained in the Tier 2 data collection efforts under the Deepwater Horizon MC252/BP Shoreline/Vegetation NRDA Pre-Assessment Data Collection Plan to determine the spatial extent and degree of oiling on intertidal shoreline resources.

Budget

Costs are given on a per-day basis and assumed to occur for 10 weeks beginning in August 2010. The only state with costs associated with rapid pre-assessment is Louisiana and the only Federal agency with contract costs is NOAA. Costs do not include data management costs, planning or cost of supplies which were incurred during the previous pre-assessment efforts.

Costs are for [redacted] teams per day).

| Equipment | Unit Cost/Day | # Boat days | Subtotal Cost |
|------------------------------|----------------------|-----------------------|----------------------|
| Boats | \$1,200 ¹ | 1,160 | \$1,392,000 |
| Crew & fuel | \$ [redacted] | [redacted] | \$ 196,000 |
| | | Rate/Day # | Subtotal Cost |
| Contract Labor (NOAA) | | [redacted] [redacted] | \$302,400 |
| [redacted] hrs/day) | | | |
| Contract Labor (LA) | | [redacted] [redacted] | Subtotal Cost |
| [redacted] hrs/day) | | | \$690,305 |
| TOTAL: | | | \$2,580,705 |

¹ Costs reflect VOO program costs

² Cost assumes 8 hour day for captain and 40 gallons of fuel

³ Rate is average for all personnel positions associated with this effort

Rapid Shoreline Oiling Survey Procedures

The procedures used for conducting the rapid surveys are described generally below and more specifically in the attached Guidance for NRDA Shoreline Rapid Assessment (Attachment 1). Surveys were conducted by boat. Teams cruised slowly along shorelines looking for changes in oiling levels and/or coverage on vegetation, changes in the predominant plant species, changes in the degree of chlorosis on plants, or degree of sediment oiling. When there was a significant transition in one of these factors, the location of the transition was marked with a GPS waypoint and the boat went to the edge of the shoreline a short distance past the transition location and collected data on vegetation and shoreline oiling, vegetation type, depth of oil penetration from the edge of the shoreline, and other things as shown in the attached NRDA Shoreline Rapid Assessment datasheet (Attachment 2). At least two photographs (normal and close-up views) were taken at each of these data collection locations.

If there was not a visible change in one of these factors before 450m of shoreline had been observed since the last data collection location, teams went to the shoreline edge, took a GPS waypoint, collected data, filled in the datasheet, and took photographs. If there was a significant change in oiling that was not observed prior to edging ashore after 450m, the team did not take a GPS waypoint or record data there, but went back and found the transition point before taking a GPS waypoint and collecting data. A change in the lighter categories of oiling was not regarded as significant and the GPS waypoint and data was recorded without going back to find the transition point. Waypoints could be taken and data collected at intervals of less than 450m at the discretion of the team members if, in their judgment, it would be helpful in clarifying the exact portions of the shoreline that were surveyed when the oiling maps are developed.

Small patches (<20m) of heavier oil coverage on plants (BR: 50-90% coverage and CN: >90% coverage) within areas of lighter oil coverage were documented by taking a waypoint, recording oiling level and primary vegetation type, taking a photograph, and estimating the width along the shoreline of the heavier oiling. This was done from the boat without nosing to the shoreline edge except for rare instances when it was necessary to go to the shoreline to accurately assess the oiled patch. Small patches of lighter oiling were not normally noted or waypoints taken.

Product: Spatially referenced data that characterizes the degree and extent of oil exposure to shoreline vegetation and describes observed impacts to vegetation. These data were generated by completion of the NRDA Shoreline Rapid Assessment datasheet for vegetated intertidal shorelines (Attachment 2).

Selection of Shorelines for Rapid Shoreline Oiling Surveys

The highest priority areas for rapid shoreline oiling surveys were areas that had not had SCAT surveys conducted but which had a strong possibility of having been exposed to oil. In many instances, these areas were up canals and tidal channels in marsh where SCAT surveys found oil at the shoreline edge.

Conducting rapid shoreline oiling surveys in these areas was intended to help establish the limits of oiling in areas that were not surveyed by SCAT. The second priority was areas that were surveyed by SCAT but which have a high probability (based on field or aerial observations) to have been oiled or re-oiled since the SCAT survey. Other shoreline areas surveyed by SCAT were assessed as a lower priority to provide information on changes that occurred in oiling conditions over time.

Use of Rapid Shoreline Oiling Survey Data

The data from the rapid shoreline oiling surveys will be used together with SCAT data and aerial imagery to help characterize oiling condition along shorelines between pre-assessment ground survey locations. These data will be used in conjunction with data from pre-assessment ground survey locations in developing maps that show oiling conditions throughout the spill-affected area. Because the oiling conditions are changing fairly rapidly, the conditions observed during the rapid shoreline oiling surveys represented conditions at that time and not conditions at the time a given area was oiled. This will need to be considered when oiling maps are developed.

Health and Safety Plan

The health and safety plan used for the Deepwater Horizon MC252/BP Shoreline/Vegetation NRDA Pre-Assessment Data Collection Plan was also used for this plan and is incorporated by reference.

Attachments

Attachment 1: Guidance for NRDA Shoreline Rapid Assessment

Attachment 2: NRDA Shoreline Rapid Assessment Datasheet

Attachment 1

Guidance for NRDA Shoreline Rapid Assessment

The purpose of the Rapid Assessment is to characterize the oiling still present along the edge of shorelines. This should be a description of current conditions recognizing that conditions may have changed over time. This guidance document corresponds with the MC252 NRDA Rapid Shoreline Assessment Datasheet [Version Date: 9/1/10] (see Attachment 2).

Observation Locations

- At the dock or start of data collection
 - Turn on GPS track log (set at ~ 15 second interval); keep GPS out so it receives satellite signal
 - Verify that camera and GPS times are correct and in CST
 - Take photo of GPS – 1 of time on GPS (HH:MM:SS format in CST), 1 of Lat/Long at same location (if time and lat/long not visible on the same photo)
 - Record GPS and camera #s

Observation Method

- **General-** Rapid assessment data will be collected along a shoreline segment (or segments, depending on conditions). A segment will begin at a START (S) GPS waypoint and end at an END (E) waypoint.

- **START (S) OF SEGMENT:** Pick a starting point at an oiling level transition point or on a physical transition such as the start of a canal or shoreline point, or vegetation type.
 - Take a waypoint with the GPS.
 - Move down the shoreline a short distance, pull the boat to the edge of the shoreline and take data that is typical of the oiling conditions along the shoreline segment being described.
 - Fill out the data sheet completely.
- **INTERMEDIATE (I) OBSERVATIONS WITHIN SEGMENT:** Continue along the shoreline taking waypoints for Intermediate (I) or point (P) observations where oiling conditions change or at distance no greater than 450 meters if oiling conditions appear consistent.
 - A change in oiling/vegetation conditions could include:
 - A change in the primary vegetation.
 - A change in the percent of the stem covered by oil - from one category to another
 - A change in the sediment oiling
 - A change in oil thickness
 - A distinct change in the chlorotic band
 - When you nose up to the shoreline, if the change in oiling has been relatively minor there is no need to go back to look for the exact transition point – as long as the previous point is less than 450 meters away. For example, if the change is from no oil observed to trace or sporadic, do not go back to look for the transition point. Go ahead and take the waypoint, record your observations, and take your photos. However, if the change is more significant (e.g., from NOO or SP to PT, BR, or CN) do not take a waypoint here, instead go back and find the transition. Then take the waypoint, and follow the regular procedure. (i.e., move down the shoreline and take data that is typical for the shoreline section being described)
- **POINT (P) OBSERVATION WITHIN SEGMENT:** To capture short sections (<20 meters) of heavier oil (BR and CN) in an otherwise lighter consistent shoreline section (i.e., NOO to PT) take a waypoint and indicate that it is a Point (P) observation. Indicate the primary vegetation type and oiling level, then draw a line through other columns on sheet. Record the estimated horizontal width of the heavier oiling along the shoreline and take a photo. In the interest of

maintaining a rapid assessment, these observations should be made from the water without coming to shore.

- **END (E) SEGMENT:** The end point indicates that the segment ends (e.g., team is moving to a new area, completing a survey of entire island, etc.) without a change in oiling level from the last intermediate point. Record WP # and type of observation only. Draw a line through the rest of the columns on that row.

Data Sheet Inputs

- General information on datasheet (once per sheet)
 - **Names of Team Members and affiliations**
 - **GPS # and Camera #:** unique to each “official” camera and GPS units given to trustee team members
 - **Photo # of GPS time (HH:MM:SS in CST) and Photo # of GPS Lat/Long:** take a picture of GPS screen displaying time in HH:MM:SS format with GPS time in Central Standard Time. If the same GPS screen does not display the lat/long then also take a photo of that screen as well. Record photo number(s).
- Specific information for each observation
 - Table format (see example below)

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|-------------|-------------|----------------------------|---------------------------|----------------------|-----------|---------------|-----------|------------------|---------------------|------------------|-------------------------------|----------|-------|
| GPS WPT (#) | Type of Obs | 1 ^o Veg Species | Marsh Flooding Depth (cm) | Oiled Veg @ distance | % Veg Oil | Oil thickness | Chlorosis | Veg oil to sedim | Sheen from sediment | Depth Penetr (m) | Shoreline length if Point (m) | Photo #s | Notes |
| | | | | | | | | | | | | | |

- **WPT #:** Take a waypoint and record waypoint # at each observation location
- **A. Type of Observation:**
 - START (S) of segment (fill all columns)
 - END (E) of segment (record WP # and type of observation only)
 - INTERMEDIATE (I) (< 450 m apart) within segment
 - POINT (P) observations within continuous segment (record WPT, type of veg-column B, level of oiling –column F, length-column K; then draw line through other columns)
- **B. Primary Vegetation Species:**

- record only single primary species, other co-occurring species can be noted in the notes section
 - *Spartina alterniflora* (SA)
 - *Phragmites australis* (PA)
 - Mangrove (M)
 - Other (O) – describe in the notes section
- **C. Depth of Marsh Flooding:** actual distance between water level and top of sediment (in cm) within marsh (not water depth from the boat)
- **D. Oil on vegetation visible from boat :** Can you see the oil on vegetation from offshore (i.e., as you approach to take overview photo) ? Yes/No
- **E. % Veg Oiling:** average % oiling vertically on vegetation as range;
 - No Oil Observed (NOO)
 - Trace (TR) >0-1%
 - Sporadic (SP) - >1 – 10%
 - Patchy (PT) - >10 - 50%
 - Broken (BR) - >50 - 90%
 - Continuous (CN) - >90 - 100%
- **F. Oil Thickness:**
 - no veg oiling so no applicable oil thickness - (N/A)
 - Film/stain (FL) – <0.01 cm thick, can't scrape off
 - Coat (CT) – >0.01 - 0.1 cm thick
 - Cover (CV) – >0.1 - 1 cm thick
 - Pooled (PO) - >1 cm thick
- **G. Chlorosis:** type of chlorosis seen (if any);
 - chlorotic band (CB),
 - general chlorosis that may be oil related (GC)
 - not significant (NS)
 - not observed (NO)
- **H. Oil to sediment:** Does oil on the plant stems extend down to the top of the sediment? Yes/No or no veg oiling (N/A)
- **I. Sheen released from sediment:** record the heaviest oil released from sediment when disturbed
 - none (N)
 - silver (S)
 - rainbow (R)
 - droplets (D)
- **J. Depth of penetration:** Use a 5 meter section of PVC pipe to part the vegetation and examine the vegetation to determine the depth of penetration into the marsh. Record distance oil penetrates into the marsh
 - no veg oiling (N/A)
 - not readily visible (NV),
 - record actual distance (in meters) if ≤ 5 m pole
 - longer than 5 m pole record (5+)
- **K. Shoreline length for Point observations:** distance along shoreline represented by point observation (in m) or N/A if not point observation
- **L. Photo #s:** 2 per site, one overview photo plus one close-up photo
- **M. Notes:** include any additional observations of note

- Some considerations for filling in the data sheet:
 - Any information recorded outside the black border (0.25" from edge) is cut off in the scanned version. Please make any notations within the border so this information can be recorded.
 - All measurements should be recorded in metric (m or cm as noted).
 - Don't take transition waypoints for small changes that only last a very short distance. For example, a 50 meter long stretch of shoreline where the oiling goes from patchy to trace (or trace to sporadic) in an otherwise consistent shoreline should not be called out on the data sheet.
 - For any changes needed on the data sheet, draw a single line through the original value, write in the new value, and document the change on the errata sheet
- **Errata Sheet (for corrections that can't be made clearly/legibly on the Datasheet)**
 - Table format (see example below)
 - Complete one errata sheet per day (unless additional rows are needed) that documents all the specific changes made on the datasheets
 - For each change, record the page #, WP #, and letter of the column to identify the specific value that was changed
 - Record the original and revised values.
 - Each team representative (federal, state, and Entrix) should sign or initial each row.

Team Members: _____ (Fed) _____ (State)
 _____ (Entrix)

Note: Complete one row for each cell changed; identify given cell changes by entering the waypoint # and letter of the column (A-M where change occurred); write the original and revised values (this helps make sure the values are legible); and have all team members sign off on changes. You can use the same page for all datasheets for a given day (if there are enough lines available).

| Page # | WP # | Column Letter | Original value | Revised value | Fed rep | State rep | Entrix rep | Notes |
|--------|------|---------------|----------------|---------------|---------|-----------|------------|-------|
| | | | | | | | | |

Post Field Work tasks

- Upon returning to the dock, turn off the track log
- Data download
 - Meet data download team
 - Verify transfer of photos, gpx, and quality of scanned data forms
 - Save a copy of all files
- Prepare for next day's field work
 - Once you double-check that files have been saved and transferred, delete all photos, waypoints, and tracks from camera and GPS units

Pre-Work Inspection

- Verify equipment batteries are charged

