MC252 Deepwater Horizon Oil Spill
ADCP-Measured Currents Monitoring Plan
Amended February 18, 2011

December 2010 Quarterly Maintenance Mission

Originated as a requirement by:
Debbie French-McCay (ASA), Yong Kim (ASA), Laurie Sullivan (NOAA)

Amended plan by:
Robert Mulcahy (CSA), Tim Thompson (Cardno ENTRIX)

Background and Scope of Work

In June, 2010, an Acoustic Doppler Current Profiler (ADCP) array was installed close to the MC252 well site to provide current direction and speeds at selected depths of the water column in the vicinity of the wellhead oil release area to: (a) improve NRDA water sampling location selections and, (b) refine data inputs into fate and transport models. On 12 June 2010 an ADCP array mooring was deployed at [redacted]W in a water depth of 1,485m.

The ADCP array (Figure 1) includes the following components - (2) ADCP profilers, (2) Acoustic Releases (ACR), Acoustic Modems and a surface buoy that provides real time data via satellite link. The ADCP's include a 75 kHz RDI Long Ranger ADCP mounted at a depth of 997m facing downward to collect data for the bottom 488m of the water column and a 300 kHz RDI Workhorse ADCP mounted at a depth of 104m facing up to collect data to within approximately 3m of the surface. In addition, to the ADCP's there are (2) acoustic releases (ACRs) and acoustic modems (AM). The ADCPs are interfaced to the AM which provide communications from the ADCP's to the surface buoy and enable the ADCP's to upload data to the surface buoy at regularly scheduled intervals. The acoustic releases are used to remotely release the array from the anchor for recovery. The array components (ADCP, ACR, AM, and Surface Buoy) are powered by battery packs, which require servicing on a 90 – 100 day interval.

The following proposed December 2010 mission is required to maintain the ADCP batteries, re-position the bottom ADCP meter to provide additional coverage of the bottom currents and re-install the surface spar buoy which broke free in a storm event due to a hardware failure on the mooring (no data was lost due to the incident and the buoy was recovered intact without damage).

In addition to the ADCP array servicing, we have been requested to provide a platform to service the High-frequency Acoustic Recording Package (HARP) system, an acoustic passive monitoring package that has been installed on the seafloor in the near vicinity of the ADCP array as part of the study entitled: "Passive acoustic monitoring for marine mammals in response to the Deepwater Horizon oil spill in the Gulf of Mexico". This study is being conducted under contract to BP and NOAA by principal investigator John Hildebrand of Scripps Institution of Oceanography.

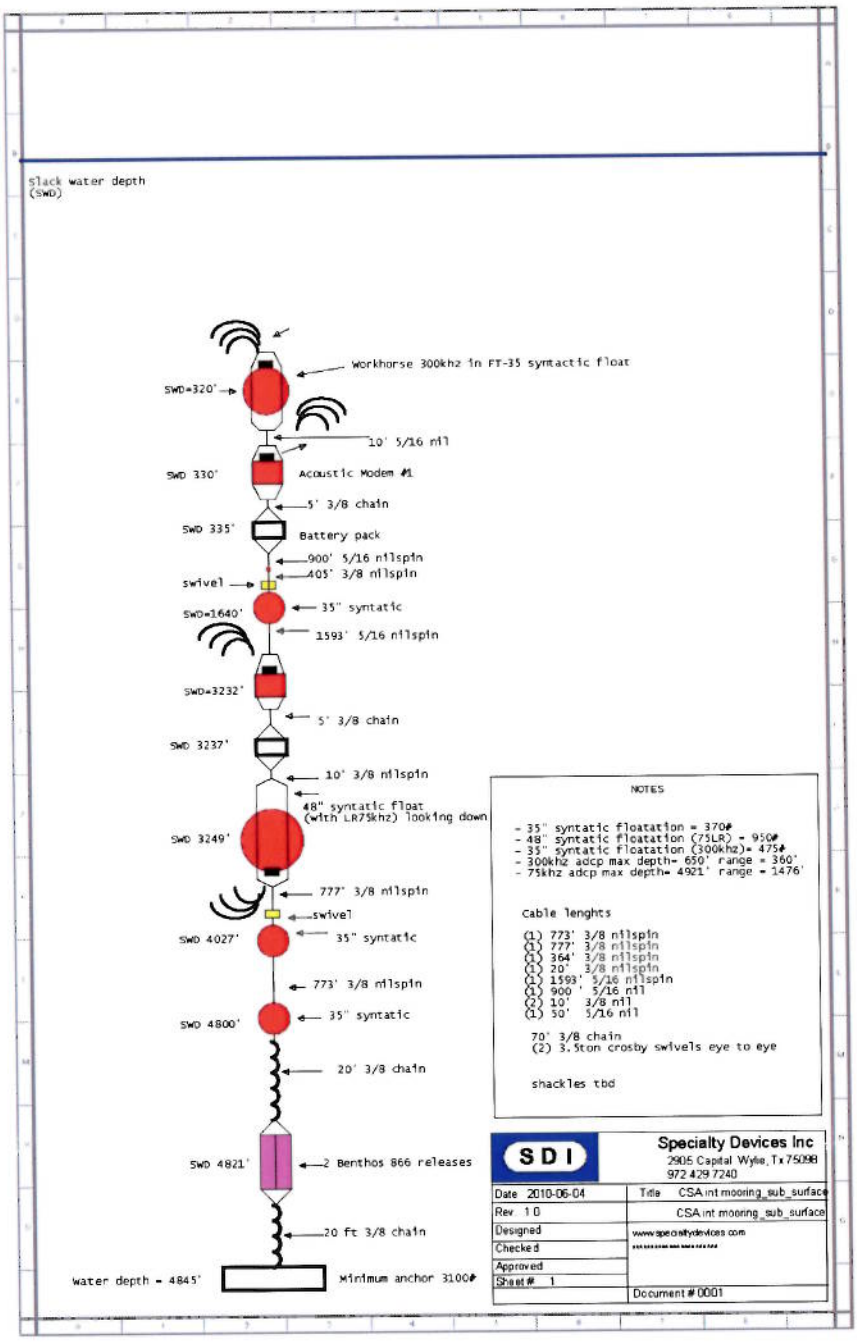

Figure 1 – Schematic illustration of ADCP Array (Surface Buoy not shown)

The HARP system collects and records marine mammal vocalization. The HARP system requires the same servicing as the ADCP array, and includes array recovery, battery servicing and array re-deployment. The following plan describes the methods that will be used to retrieve and re-install the ADCP array.

The initial ADCP single mooring study plan was approved and implemented in June 2010. Following installation, an amended work plan was developed and approved authorizing the installation of real time buoy and to conduct a single quarterly maintenance mission. These amended tasks were successfully conducted in September 2010.

The purpose of this second plan amendment is to conduct quarterly maintenance required in December 2010 and data management for the period of December 2010 through March 2011. During mooring recovery and re-deployment, the M/V Ocean Veritas will be used as the main work vessel to recover the ADCP array, re-install the telemetry buoy (December cruise only), complete required maintenance tasks and re-deploy the array. In addition, the M/V Reb Bordelon will be used as a support vessel to assist the M/V Ocean Veritas with recovery and deployment. This amendment covers the budgetary costs for one ADCP and HARP recovery and deployment and ADCP data management through March 2011.

Data Management

All electronic data collected during the maintenance cruises will be saved to an on-board computer and migrated to a dedicated hard drive. The data will be controlled and managed under project protocols, including Chain-of-Custody tracking of the hard drive. At the end of the each of the two maintenance cruises, the hard drive will be immediately duplicated in full to another hard drive or DVD and provided to the trustees along with appropriate documentation. The original hard drive provided to the trustees shall be kept in a secure facility in trustee custody.

If previously-collected data from the ADCP array has not been provided, Cardno ENTRIX shall provide to the Trustees a copy of the raw data, including all necessary metadata, collected by the ADCP array. Cardno ENTRIX makes no representation as to the accuracy, usability, or validity of the raw data provided to the Trustees because the data has not been subject to QA/QC review.

Additionally, following the December cruise activity in which the telemetry buoy will be repaired and reactivated, daily transmission of the ADCP-collected data will be resumed. The telemetered data logger packets are sent hourly as a binary file via iridium satellite link to a CSA email address. These individual binary files for a given 24-hour period will be combined by CSA into a larger data file for monthly distribution via DVD to both Trustees and Cardno ENTRIX. Note that telemetered data from each ADCP is received via satellite on an hourly basis; the data is broadcast at 15 minutes past each hour for the 300kHz ADCP and at 45 minutes past the hour for the 75kHz meter. These data transmittals can be interrupted due to sea state and atmospheric conditions and can be limited to a minimum of one hour or longer based on weather conditions on site. Therefore the telemetered data can have data gaps. However, the raw data is not compromised internally and the full data set will be collected and provided when the ADCP meter is downloaded either via acoustic modem or during the quarterly ADCP maintenance cruises. The data collected via telemetry can be viewed and processed with the data gaps but the data will be for draft and visual use only and will be identified as such when presented to

specified data managers. The full set of raw data collected via acoustic modem or during the quarterly ADCP maintenance cruises will be provided to Cardno ENTRIX and the Trustees as described above.

Project Status through December 2010 Maintenance Cruise

Since the initial deployment in June 2010, the ADCP array has worked well with no known data losses, (all data have not been QA/QC to date). In October of 2010, the real time spar buoy broke loose due to a hardware failure on the array, and was recovered without damage. Since that time, data has been collected on the hard drives of the ADCP's.

Mobilization, Recovery and Deployment

Vessel Mobilization and Mission

The vessels being utilized for this project are the M/V Ocean Veritas and the M/V Reb Bordelon. The M/V Ocean Veritas will be the primary recovery and redeployment platform and the M/V Reb Bordelon will be utilized as chase/safety boat. The mission of the M/V Reb Boredelon will be to act as a safety vessel during the array recovery operation and a chase boat during the redeployment of the array mooring.

During recovery operations the M/V Reb Bordelon will stand off at a predetermined distance and bearing (to be determined based on wind and current direction). The M/V Reb Bordelon will be prepared to aid in the recovery of the array or take over the actual recovery in the event of M/V Ocean Veritas engine or mechanical failure. During the recovery and redeployment of the mooring the M/V Reb Bordelon will follow the array as it is deployed from the stern of the M/V Ocean Veritas and help maintain a 2 nautical mile CPA (Closest Point of Approach) and intercept any vessels not responding to radio contact attempts.

Mobilization is being conducted in two phases. The first phase which is currently underway involves the installation of the following equipment and systems required for the recovery, and deployment of the ADCP array mooring:

- Winch and HPU
- Air winch
- Compressors
- Generator
- Installation of navigation system
- Miscellaneous hand tools and supplies

The second phase of the vessel mobilization involves the loading and preparation of the various OSTB-SPAR array mooring components aboard the M/V Ocean Veritas. Preparation activities will include organizing and securing array components as well as final testing of telemetry communications protocols prior to departing the dock.

During the vessel mobilization phase of the operation it is anticipated the CSA senior staff will communicate with the SIMOPS personnel to establish operational parameters and communications protocols required during the recovery and subsequent deployment of the

ADCP array mooring. It is also anticipated that protocols and limitations will be established relative to the various frequencies, which will be utilized during the various phases of the ADCP array mooring recovery and deployment.

ADCP Array Mooring Recovery Sequence

1) Safety brief and recovery plan with ship crew and previously established communications protocols with SIMOPS.

2) Approach ADCP array mooring, no closer than 200m. All recovery gear and hardware will be prepared and ready for array recovery.

3) Confirm with SIMOPS that the recovery vessels are in the vicinity of the mooring and are preparing to release the ACRs and recover the array.

4) Trigger Acoustic Releases (ACRs). At this point the uppermost ADCP/float will reach the surface within 30-40 seconds, with the second buoy reaching the surface approximately 1 minute later. Based on the location of the second buoy relative to the location of the first buoy, the recovery team will be able to ascertain the safest approach to the first buoy for recovery.

5) The recovery vessel will approach the first buoy (stern to) and a weighted tow line will be attached to the buoy and then immediately the recovery vessel will make way away from the Incident Site. SIMOPS will be informed of the direction the recovery vessel will tow the array and the anticipated position where the recovery vessel will stop and switch the tow line to the opposite end of the array (the array is recovered by spooling from bottom to top).

6) Once the tow line is switched to the bottom end of the array the recovery vessel will begin the actual recovery of the array while making way at idle speed. During this process the M/V Reb Bordelon will maintain a 2 mile CPA.

7) It is estimated that it will take approximately 24 hours to service the instruments and to re-install the satellite telemetry and spar buoy.

ADCP Array Deployment Sequence

1) Safety brief and deployment plan with ship crew and previously established communications protocols with SIMOPS. Communications with SIMOPS will be maintained throughout this phase of the operation. The M/V Reb Bordelon will act as chase/safety vessel and assist in maintaining 2 mile CPA.

2) Conduct bathymetry survey to confirm consistent water depth within a 100 meter radius of the planned ADCP mooring site adjust deployment site coordinates if necessary.

3) Ship drift (determine current direction and velocity).

4) Plot starting point (this distance will vary depending on current direction & speed) which could be as much a 5 nautical miles from the deployment site.

5) Transit to start position.

6) Begin deployment (deploy top float- 300 kHz ADCP).

7) Continue at max 2.5 knots towards target paying out cable.

8) Pull ship engines in and out of gear to minimize cable tension while paying out cable and deploying floats.

9) After all floats and cable deployed; secure mooring for towing (add safety lines, releases are stretched out over the stern).

10) Continue to tow array towards deployment site.

11) At 5 minutes to deployment site remove all extra tow lines leaving one slip line.

12) Tow past target to allow for pull back of mooring in water column (pre-determined length).

13) Deploy anchors.

14) Mark position.

15) After mooring reaches the bottom, triangulate position using acoustic releases (accurate deployment position and depth) SDI supplied software.

Instrument Frequencies and Estimated Duration (SIMOPS will be notified prior to initiation of any acoustic activity)

- Furuno depth sounder - 30 min at 15 kHz (deployment only).
- Acoustic releases - 1 min at 12 kHz – 14 kHz (recovery only).
- Set up and test of 300 kHz ADCP – 1hr at 18 kHz – 24 kHz (deployment only).
- Set up and test of 75 kHz ADCP – 1hr at 18 kHz – 24 kHz (deployment only).

Addition safety notes

- Only essential personnel will be allowed on deck.
- Navigation will be coordinate with the bridge (speed of vessel, course etc).
- Communications will be in place for deck, navigation, and bridge.
- Standard safety items, hard hat, work vests, steel toe boots.

- Areas on deck that will be deemed off limits are clearly marked (safety brief).

Anticipated Schedule (2010)

Saturday 18 December
- 0700 Begin array recovery
- 1700 Complete array recovery

Sunday 19 December
- 0600 Servicing and modification complete
- 0700 Recover HARPS
- 1200 Initiate re-deployment, re-install of ADCP and HARPS arrays
- 2000 Complete installation and system testing
- 2200 Head back to dock

Monday 20 December
- 1400 arrive at Fourchon and demob personnel

Tuesday 21 December
- Complete vessel demob

Estimated Costs

The following costs are anticipated for the proposed amendment:

ADCP Maintenance Missions - Cost Table*	**Units**	**Unit Cost $**	**Quantity**	**Total**
Vessel Mobilization Costs	December	$91,350	1	$91,350
Vessel Costs (incl estimated fuel)	December	$338,675	1	$338,675
CSA Fleet Mgmt / Shore Support	December	$16,800	1	$16,800
Total Estimated Cost				**$446,825**

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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.

BP Approval:

Lawrence K. Molnar
Printed Name

Signature

Aug 30, 2011
Date

Federal Trustee Approval:

Lisa DiPinto
Printed Name

Signature

8/17/2011
Date

Louisiana Trustee Approval:

FOR KOLAMD GUIDRY
FRAROLICH DEBUSSCHER
Printed Name

Signature

4/4/2012
Date