MC252 Deepwater Horizon Oil Spill
ADCP-Measured Currents Monitoring Plan
June 17, 2011

June 2011 ADCP Maintenance Plan

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

Amended plan by:
Robert Mulcahy (CSA), Mark Schroeder (CSA), Jodi Harney (Cardno ENTRIX), and Jessie Webber (Cardno ENTRIX)

Background and Scope of Work

In June 2010, an Acoustic Doppler Current Profiler (ADCP) array was installed close to the Mississippi Canyon 252 (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 the Natural Resources Damage Assessment (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 Latitude [redacted] in a water depth of 1,485 meters (m) (approximately 3.5 miles west of the MC252 well site).

The ADCP array (Figure 1) includes the following components: two (2) ADCP profilers, two (2) Acoustic Releases (ACR), a series of Acoustic Modems (AMs), and a surface buoy that provides real-time data via satellite link. The two ADCP profilers each include a 75 kilohertz (kHz) RDI-Teledyne Long Ranger ADCP mounted at a depth of 997 m facing downward to collect data from the bottom 488 m of the water column and a 300 kHz RDI Workhorse ADCP mounted at a depth of 104 m facing upward to collect data to within approximately 3 m of the surface. The ADCPs are interfaced to the AMs, which provide communications from the ADCPs to the surface buoy and enable the ADCPs 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.

This plan covers the budgetary costs for the ADCP maintenance task and ADCP data management from June through September 2011.

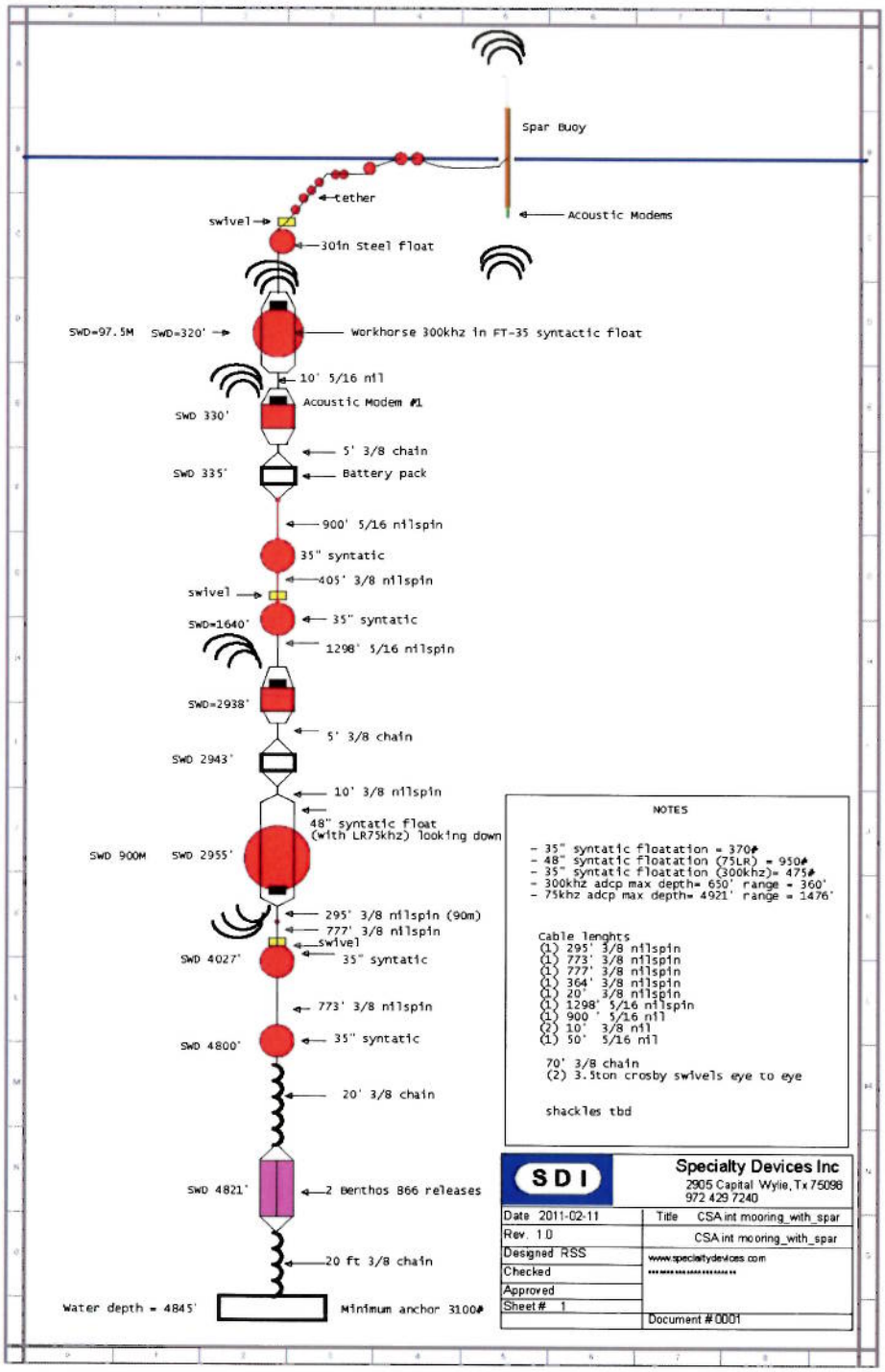

Figure 1 – Schematic Illustration of ADCP Array

Purpose

The initial ADCP single mooring study plan was approved and implemented in June 2010. Following the initial array installation, three amended work plans were developed and approved authorizing the installation of the real-time buoy and the quarterly maintenance missions. These amended tasks were successfully conducted in September and December of 2010 and March 2011. The following mission is required to conduct regularly scheduled maintenance (scheduled for June 2011) and extend data collection and management for the period of June 2011 thru September 2011. The following section describes the methods that will be used to retrieve and redeploy the ADCP array.

Data Management

All electronic data collected during the maintenance cruises will be saved to an on-board computer and migrated to a dedicated external hard drive of sufficient capacity. The data will be controlled and managed under project protocols, including Chain-of-Custody tracking of the external hard drive and the electronic data it contains. At the end of the maintenance cruise, the external hard drive will be immediately duplicated in full by the NOAA Data Manager, and the original external hard drive will be retained by the trustees along with appropriate documentation. The duplicate hard drive will be retained by Cardno ENTRIX for their records.

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 cruise activity in which the system will be serviced, 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 large 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.

ADCP Array Recovery and Redeployment

Vessel Mobilization and Mission

The vessels being utilized for this project will be the M/V Wes Bordelon (or equivalent) for principal operations and the M/V Bunny Bordelon (or equivalent) for support. The M/V Wes Bordelon will be the main recovery and redeployment platform. The mission of the M/V Bunny Bordelon 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 Bunny Bordelon will stand off at a predetermined distance and bearing (to be determined based on wind and current direction). The M/V Bunny Bordelon will be prepared to aid in the recovery of the array or take over the actual recovery in the event of M/V Wes Bordelon engine or mechanical failure. During the recovery and redeployment of the mooring, the M/V Bunny Bordelon will follow the array as it is deployed from the stern of the M/V Wes Bordelon and help maintain a two (2) nautical mile (Nm) Closest Point of Approach (CPA) and intercept any vessels not responding to radio contact attempts.

Mobilization will be conducted in two phases. The first phase involves installation of the following equipment and systems required for the recovery and deployment of the ADCP array mooring:

- Winch and hydraulic power unit (HPU);
- Air winch;
- Compressors;
- Generator;
- Installation of navigation system; and,
- Miscellaneous hand tools and supplies.

The second phase of the vessel mobilization involves the loading and preparation of the various offshore spar telemetry buoy and array mooring components aboard the M/V Wes Bordelon. 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, CSA senior staff will communicate with SIMOPS personnel to establish operational parameters and communications protocols required during the recovery and subsequent deployment of the ADCP array mooring. Additionally, 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 200 m. 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 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 Bunny Bordelon will maintain a two (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 Bunny Bordelon will act as chase/safety vessel and assist in maintaining a two (2) mile CPA.

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

3) Assess ship drift (determine current direction and velocity).

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

5) Transit to start position.

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

7) Continue at a maximum speed of 2.5 knots toward the target, paying out cable.

8) Place 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 and ensure 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) and SDI supplied software.

Acoustic Instruments, Estimated Duration, and Frequencies

Note: SIMOPS will be notified prior to initiation of any acoustic activity

- Furuno depth sounder (or equivalent) – 30 minutes at 15 kHz (redeployment only)
- Acoustic releases – 1 minute at 12 kHz – 14 kHz (recovery only)
- Set up and test of 300 kHz ADCP – 1 hour at 18 kHz – 24 kHz (redeployment only)
- Set up and test of 75 kHz ADCP – 1 hour at 18 kHz – 24 kHz (redeployment only)

Additional 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, and steel toe boots.
- Areas on deck that will be deemed off limits are clearly marked (safety brief).

Lagrangian Floats:

The Webb Research Corporation APEX float is an autonomous drifting profiler used to measure subsurface currents and make profile measurements. The float contains a CTD, which profiles the water column during descent and ascent. Four such Lagrangian floats were deployed in fall of 2010 to track the movement of water at about 1000-1400m. Two of these floats, which are now in De Soto Canyon, will be retrieved and redeployed near the wellhead-area ADCP mooring. The other two floats, now southwest of the wellhead, need to be retrieved and serviced.

As of 16 June, 2011, the position of the floats are as follows. The positions will be updated by Yong Kim of ASA when the vessel is on the scene.

De Soto Canyon area
#7047: [redacted]
#7075: [redacted]
SW region
#7071: [redacted]
#7073: [redacted]

Floats #7047 & #7075 will be re-deployed in the vicinity of the well head (MC252) [redacted]

Floats #7071 & #7073 will be brought to the shore for servicing.

Anticipated Schedule (June 2011)

June 17 - 20: Mobilize M/V Wes Bordelon and M/V Bunny Bordelon for ADCP mooring recovery.

June 21: M/V Wes Bordelon and M/V Bunny Bordelon conduct ADCP mooring recovery.

June 22: ADCP mooring is serviced aboard the M/V Wes Bordelon. The M/V Bunny Bordelon assists in the redeployment of the ADCP mooring.

June 23: M/V Wes Bordelon and M/V Bunny Bordelon redeploy ADCP mooring. Upon successfully completing post-deployment tests on the ADCP mooring, the M/V Wes Bordelon and M/V Bunny Bordelon will transit back the CSA Houma facility. The M/V Wes Bordelon and M/V Bunny Bordelon arrive at the CSA Houma facility and begin demobilization.

June 24 - 25: Complete the Lagrangian Float Recovery and Re-deployment

June 26: The M/V Wes Bordelon and the M/V Bunny Bordelon complete demobilization.

Estimated Costs

Budget Chart #1.

Field Survey Costs	Hrs/Days/Trips	Day/Hr Rate	Total
NOAA Labor (days):			
1 Data Manager	4	$1,500	$6,000
TOTAL			**$6,000**

Budget Chart #2.

ADCP Maintenance Mission	Units	Unit Cost	Quantity	Total
Mobilization Costs	Quarterly	$97,650	1	$97,650
Vessel Costs* (including estimated fuel and lubrication)	Quarterly	$1,103,164	1	$1,188,254
CSA Fleet Management / Shore Support	Quarterly	$16,800	1	$16,800
			Total Estimated Cost	**$1,302,704**

* Includes 39 standby days for the Wes Bordelon and 17 standby days for the Bunny Bordelon

MC252 Deepwater Horizon Oil Spill
ADCP-Measured Currents Monitoring Plan
Amended June 17, 2011

ADCP Maintenance Plan

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. Malinor		Aug 30, 2011
Printed Name	Signature	Date

Federal Trustee Approval:

Daniel Hahn		6/17/11
Printed Name	Signature	Date

Louisiana Trustee Approval:

FOR ROLAND GUIDRY KAROLIEN DEBUSSCHERE		4/4/2012
Printed Name	Signature	Date