Cover Sheet (NOAA Form 76-35A)

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

Data Acquisition and Processing Report

Type of Survey HYDROGRAPHIC

Field No S-J977-KR-FU

Registry No. H11621, H11622

LOCALITY

State ALABAMA

General Locality MISSISSIPPI SOUND

Sublocality GRAND BAY TO PETIT BOIS PASS AND DAUPHIN ISLAND

2006

CHIEF OF PARTY

DEAN MOYLES

LIBRARY & ARCHIVES

DATE ....

U.S. GOV. PRINTING OFFICE: 1985—566-054

Title Sheet (NOAA Form 77-28)

NOAA FORM 77-28 (11-72)
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTER NO.

H11621 and H11622

HYDROGRAPHIC TITLE SHEET

INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office

FIELD NO.

State ALABAMA

General Locality Mississippi Sound

Locality Areas surrounding Dauphin Island from Grand Bay to Petit Bois Pass

Scale 1:10000 Date of Survey 09/19/06 – 12/15/06

Instructions dated July 21, 2006 Project No. S-J977-KR-FU

Vessel R/V LOCATOR (CF-4540-NB) and R/V C.B.#3 (LA-5204-EU)

Chief of party DEAN MOYLES

Surveyed by MOYLES, REYNOLDS, GILL, MOUNT, STOCK, FARLEY, BRIGGS, POCKART, ET AL

Soundings taken by echo sounder, hand lead, pole ODOM DF3200 (LOCATOR - HULL MOUNT) and ODOM DF3200 (C.B. #3 - POLE MOUNT)

Graphic record scaled by FUGRO PELAGOS, INC. PERSONNEL

Graphic record checked by FUGRO PELAGOS, INC. PERSONNEL

Protracted by N/A Automated plot by N/A

Verification by

Soundings in METERS at MLLW

REMARKS: The purpose of this work is to provide NOAA with modern debris mapping survey in the area of Mississippi Sound from Grand Bay to Petit Bois Pass including the waters surrounding Dauphin Island.

ALL TIMES ARE RECORDED IN UTC.

FUGRO PELAGOS INC.
3738 RUFFIN ROAD
SAN DIEGO, CA 92123

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A – Equipment

The R/V Locator and the R/V C.B. #3 were utilized to collect single beam echo sounder and side scan sonar (SSS) data in a shallow water environment during the course of this project. The equipment list and vessel descriptions are included in Appendices I and II.

SOUNDING EQUIPMENT

The R/V Locator was equipped with a hull mounted ODOM DF3200 single beam system during the S-J977-KR-FU project. The ODOM DF3200 consists of a 200 kHz transducer and the Echotrac DF3200 MkII transceiver and processor. The ODOM transmits and receives a single sonar pulse to measure the relative water depth over a footprint which is dependent on the pulse width. The range scale, power level, ping rates and pulse width were a function of water depth and data quality. Any changes to these parameters were noted on the survey line logs (see Separate 1).

The line orientation for the Locator was generally parallel to the coastline and bathymetric contours in the area. The line spacing depended on the SSS range and data quality.

The R/V C.B. #3 was equipped with a pole mounted ODOM DF3200 single beam system during the S-J977-KR-FU project. The ODOM DF3200 consists of a 200 kHz transducer and the Echotrac DF3200 MkII transceiver and processor. The ODOM transmits and receives a single sonar pulse to measure the relative water depth over a footprint which is dependent on the pulse width. The range scale, power level, ping rates and pulse width were a function of water depth and data quality. Any changes to these parameters were noted on the survey line logs (see Separate 1).

The line orientation for the C.B. #3 was generally parallel to the coastline and bathymetric contours in the area. The line spacing depended on the SSS range and data quality.

SIDE SCAN SONAR

Both the R/V Locator and the R/V C.B. #3 were equipped with rigid fixed pole mounted Klein System 3000 Digital SSS during the S-J977-KR-FU project. The Klein System 3000 Digital SSS operates with dual frequencies of 100 and 500 kHz. Though both frequencies were logged, for the purposes of this survey, only the high frequency, 500 kHz, was utilized in processing. The system transmits and receives an acoustic signal to measure the relative range and intensity of acoustic return from the surrounding seafloor. The range scale, fixed SSS depth, and pulse width were a function of water depth and data quality. Any changes to these parameters were noted on the survey line logs (see Separate 1). Line orientation for both vessels was generally parallel to the coastline and bathymetric contours in the area. The line spacing was dependent on SSS range and data quality and never exceeded 70% of the swath coverage.

POSITIONING EQUIPMENT

Each vessel was equipped with an Applanix Position and Orientation System for Marine Vessels (POS MV V4) to measure and calculate each position. Position was determined in real time using a Trimble Zephyr L1/L2 GPS antenna, which was connected to a Trimble BD950 L1/L2 GPS card residing in the POS MV. The POS MV was configured to accept differential corrections, which were output from a CSI MBX-3S Coast Guard beacon receiver. A secondary backup system utilizing output from a CSI DGPS-Max OmniStar receiver was used only in times of complete loss of USCG beacons. OmniStar produces DGPS correction service through satellite broadcasts and produces a multi-site solution based on a world wide array of reference stations. The POS MV unit also provided the position and velocity values to the POS MV's Inertial Measurement Unit (IMU). The inertial navigation system, implemented by the POS MV, computes a position by way of a complex form of dead reckoning using the GPS position, heading, and motion of the IMU.

An MBX-S differential receiver that used the U.S. Coast Guard (USCG) network of differential beacons was the main source of RTCM (Radio Technical Commission for Maritime Services). Dual frequency GPS data were acquired at known locations on the ground so that a Kinematical GPS (KGPS) solution could be used for squat and settlement calculations. Fugro Pelagos, Inc. established one local control point: station FPI1, which was located on Dauphin Island. Refer to Appendix B of the S-J977-KR-FU "Horizontal and Vertical Control Report" for procedures and results.

The numerous real time displays of the POS MV controller software were monitored throughout the survey to ensure that the positional accuracies specified in the NOS Hydrographic Surveys Specifications and Deliverables (version June 2006) were achieved. These include, but are not limited to the following: GPS Status, Position Accuracy, Receiver Status (which included HDOP) and Satellite Status. During periods of high HDOP and/or low number of available satellites, survey operations were suspended.

SOFTWARE

Acquisition

The primary data sets were collected with Klein SonarPro v9.6 and WinFrog v3.6.7 operated on an Athlon X2 4200 Dual Core Processor PC running Windows XP Pro. Data were logged in the .SDF and the .RAW file format. The SonarPro v9.6 SDF files contain all SSS position, attitude, heading, and UTC time stamp data required by CARIS to process the side scan data. The WinFrog v3.6.7 RAW files contain all single beam sonar soundings, position, attitude, heading. and UTC time stamp data required by CARIS to process the bathymetric data.

The following display windows are available in SonarPro v9.6 for operators to monitor data quality:

1. A-Scan Display: The A-Scan window displays real time signal intensities returned.
2. Waterfall: The Waterfall plots the returned intensities in a range vs. time series. This window can be adjusted for color scale, gain, and become slant range corrected to ensure data quality remains superior. The waterfall display was the primary quality assurance tool used in the side scan acquisition.
3. Navigation Window: The Navigation window displays information in a plan view including charts and swath coverage.
4. Sonar Data Recorder: The recorder window displays logging information including file prefix, file size, and logging status.

The C.B. #3 and the R/V Locator were both equipped with an additional computer running WinFrog (version 3.6.7).

WinFrog offers the following display windows for operators to monitor data quality:

1. Devices: The Devices window shows the operator which hardware is attached to the PC. It also allows the operator to configure the devices, determine whether they are functioning properly and view received data.
2. Graphic: The Graphic window shows navigation information in plan view. This includes vessel position, survey lines, background vector plots and raster charts.
3. Vehicle: The Vehicle window can be configured to show any tabular navigation information required. Typically, this window displays ODOM produced depth, position, time, line name, heading, HDOP, speed over ground, distance to start of line, distance to end of line, and distance off line. Many other data items are selectable.
4. Calculation: The Calculation window is used to look at specific data items in tabular or graphical format. Operators look here to view the status of the GPS satellite constellation and position solutions.

In addition to monitoring position, attitude, and heading accuracies, the Applanix POS MV controller software was used to log raw POS MV data—consisting of the POSPac groups and group 3 (Primary GPS Data), 102 (Sensor 1 Data) and 111 (True Heave). These data were collected via the Ethernet to the WinFrog computer at an update rate of 50 Hz and used for squat settlement calculations and as a review tool for positioning data quality.

MBSurvey Tools was used to aid in file administration and reporting during data acquisition. This program created a daily file that contained survey line, SVP and static draft logs. These logs were stored digitally thus eliminating the constant printing and manual input of items such as start and end of line times, sonar settings, etc. on each log sheet.

Processing

All soundings and side scan data were processed using CARIS (Computer Aided Resource Information System) HIPS/SIPS (Hydrographic Information Processing System/Sonar Image Processing System) 6.0.

SDFTimeToLine was used to compile 10 minute SDF format line segments into complete line SDF format files.

CARIS Notebook 2.2 was utilized for conversion of soundings to generate the HOB and S57 Feature Files.

AutoDesk Map R 5.0 and ESRI ArcMap 9.1 were utilized for general survey planning, reviewing coverage plots, creating fill-in lines, tielines, etc.

ESRI ArcMap 9.1 with the Target Analyst add-on was utilized for the correlation of Side Scan targets to visualize data location, eliminate duplication of targets, filter and organize target information, and generate weekly target reports. The targets picked using CARIS were imported into Target Analyst weekly for the facilitation of Quality Control and report generation.

Applanix POSPac 4.3 was utilized for post-processing the dual frequency GPS data sets acquired by the survey vessels and the base stations during squat settlement tests.

Using POS GPS—part of the POSPac suite—dual frequency GPS data from the vessels and ground control base stations were converted from their native format (Novatel), to the POS GPS .gpb format. The KGPS data sets were then post-processed using the Z-Max antenna phase center positions given in Appendix II of the Horizontal and Vertical Control Report.

The POSPac module POSProc was then run to integrate the post-processed KGPS positions with the POSMV attitude data and refine the inertial solution. This final solution was exported to an SBET (Smoothed Best-Estimate of Trajectory) format file, which was then converted to text using an in-house converter program. The text files (.GDP format) were then imported and applied to the CARIS HDCS data using the CARIS Generic Data Parser routine.

Applanix POS Convert 1.4 was used to extract True Heave data from the raw POS data collected on the survey vessels. This text file was parsed to a format acceptable by the CARIS Generic Data Parser using MBSurvey Tools. This was only utilized on days where the GPS week rollover occurred; otherwise the True Heave was applied directly via the True Heave Import routine in CARIS.

A complete summary of the GPS post processing accuracy estimates can be found in Appendix III of the Horizontal and Vertical Control Report.

Sound Velocity Profiles

Sound velocity profile (SVP) data from the Applied Microsystems Ltd. (AML) Smart Probes were acquired using Windows' Hyper Terminal. Microsoft Excel was used to determine the harmonic mean of each SVP for use in real time acquisition and post data processing. MBSurvey Tools was used to split the profile into up and down components, decimate the data and write a CARIS format that contained time and position. A complete list of software and versions used on this project is included in Appendix I. Refer to the "2006-NOAAProcessing Procedures" document for a detailed processing routine with procedures used.

B –Quality Control

Single Beam Echosounder

To ensure correct data were output by the single beam echosounder, bar checks were performed once a week and lead line checks were performed during every fueling procedure or approximately every other day. The bar checks consisted of affixing an object directly beneath the echosounder transducer at a know distance from the transducer. This distance was then compared to the ODOM output for an accuracy comparison. Lead line checks were performed by measuring the depth of the water using a weight attached to a line with a small elasticity coefficient and comparing this result with the ODOM output.

Single beam sounding data were acquired in the RAW format using WinFrog. In order to be used by the CARIS HDCS and HIPS processing packages, the data must be converted to HDCS format using the routine Winfrog-Beta1 to HDCS. For each survey line from both survey vessels the vessel offsets, patch test calibration values and static draft measurements were entered into the Hips Vessel File (HVF) after the conversion using Winfrog-Beta1 to HDCS.

Once converted, the Dynamic Draft, tide, and HVF data were loaded into each line and then SVP corrected in CARIS HIPS. Once SVP corrected, the lines were merged; the attitude, navigation and bathymetry data for individual lines were all examined for noise, as well as to ensure the completeness and correctness of the data set. Sounding data were then reviewed using the CARIS HIPS Single Beam Editor. This allowed the processor to visually check every sounding acquired and reject any erroneous data. Note: "Rejected" does not mean the sounding data point was deleted, but that it was flagged as being bad.

A statistical analysis of the sounding data was conducted via the CARIS Quality Control Report (QCR) routine. Tie lines were run in each sheet and were compared with lines acquired from the main-scheme lines where applicable. The Quality Control Reports are located in Separate 4.

Final features and bottom samples were converted into HOB and S-57 feature files using CARIS Notebook 2.2. Final editing of the S-57 feature file was performed through CARIS Notebook.

Final soundings were delivered via a Final BASE Surface (5m resolution) though CARIS HIPS & SIPS.

Side Scan Sonar

SSS data were acquired using SonarPro v 9.6 in the SDF format. The raw SSS acquisition files were broken into 10 minute segments to alleviate high work loads and, therefore, possible malfunctions in the acquisition computers. Line lists were generated using the MBSurveyTools SSS line logs; the SDF 10 minute files were compiled into complete SDF line files using the SDFTimeToLine software. In order to be processed by CARIS SIPS processing package, the SDF data must first be converted into SIPS using the SDF to HDCS routine. The vessel offsets and patch test calibration values were entered in a HVF for each survey vessel.

Once converted, the SSS depth was applied using the CARIS Generic Data Parser (GDP) and the attitude and navigation data were examined to ensure correctness and completeness for the data set. The altitude data were then reviewed using the CARIS Side Scan Editor on a line by line basis to guarantee that appropriate bottom tracking was used through the line and to correct inconsistencies found within. The lines were then slant range corrected and rechecked to ensure proper data quality was produced for analysis of targets. Daily Confidence Checks were performed to ensure that the SSS produced successful results.

SSS mosaics were created using the CARIS FieldSheet function to guarantee that 100% coverage was maintained throughout the survey. Mosaics were also reviewed to ensure accurate positioning data was maintained by comparing linear bottom formations passing through adjacent lines. SSS confidence checks were performed daily by visual confirmation that a distinct change in bottom return could be seen passing in a cross track fashion through nadir and can be found in Appendix IV.

ArcMap v9.1 with the Target Analyst add-on, written by Fugro Pelagos, Inc. GIS department, aided in the quality control of chosen targets. Target Analyst compiled exported CARIS contact lists into a GIS database and examined the database for duplicate targets. The targets were then reviewed further to ensure all target information was accurate and edited where necessary.

C - Corrections to Soundings

SOUND VELOCITY PROFILES

Sound velocity casts were performed nominally twice a day or during significant vessel relocation. The AML Smart Probes used to determine sound velocities for the surveys sampled at a rate of eight velocity and pressure observation pairs a second. For each cast, the probes were held at the surface for two minutes to achieve temperature equilibrium. The probes were then lowered and raised slowly (no greater then 1 meter per second) to maintain equilibrium. Between casts, the sound velocity sensors were stored in a barrel of fresh water to minimize salt water corrosion and to hold them at ambient water temperatures. Refer to Appendix III for Calibration Reports.

SETTLEMENT CURVE

The squat settlement test for the R/V Locator was conducted outside Dauphin Island, AL October 11, 2006 (Julian Day 284).

To perform the squat settlement test, the R/V Locator logged dual frequency (L1/L2) data on the POS MV. The squat settlement tests were performed by first establishing a 1000 meter line in the direction of the current. The survey vessel occupied the east end of the line for two minutes while logging L1/L2 GPS data. The line was then run heading west at an engine rate of 800 RPM and then south at 800 RPM, stopping at the west end of the line to obtain an additional two minutes of 'static' L1/L2 GPS data. Again, the survey vessel occupied the east end of the line and the scenario repeated at incrementing engine RPM's.

All measurements were corrected for heave, pitch, and roll and reduced to the vessel's common reference point (CRP) and subsequently to the single beam transducer. Static measurements observed at the end of lines were used to compute a tide curve for tidal corrections. A settlement curve for the Locator, with the ODOM DF3200 installed, was then computed.

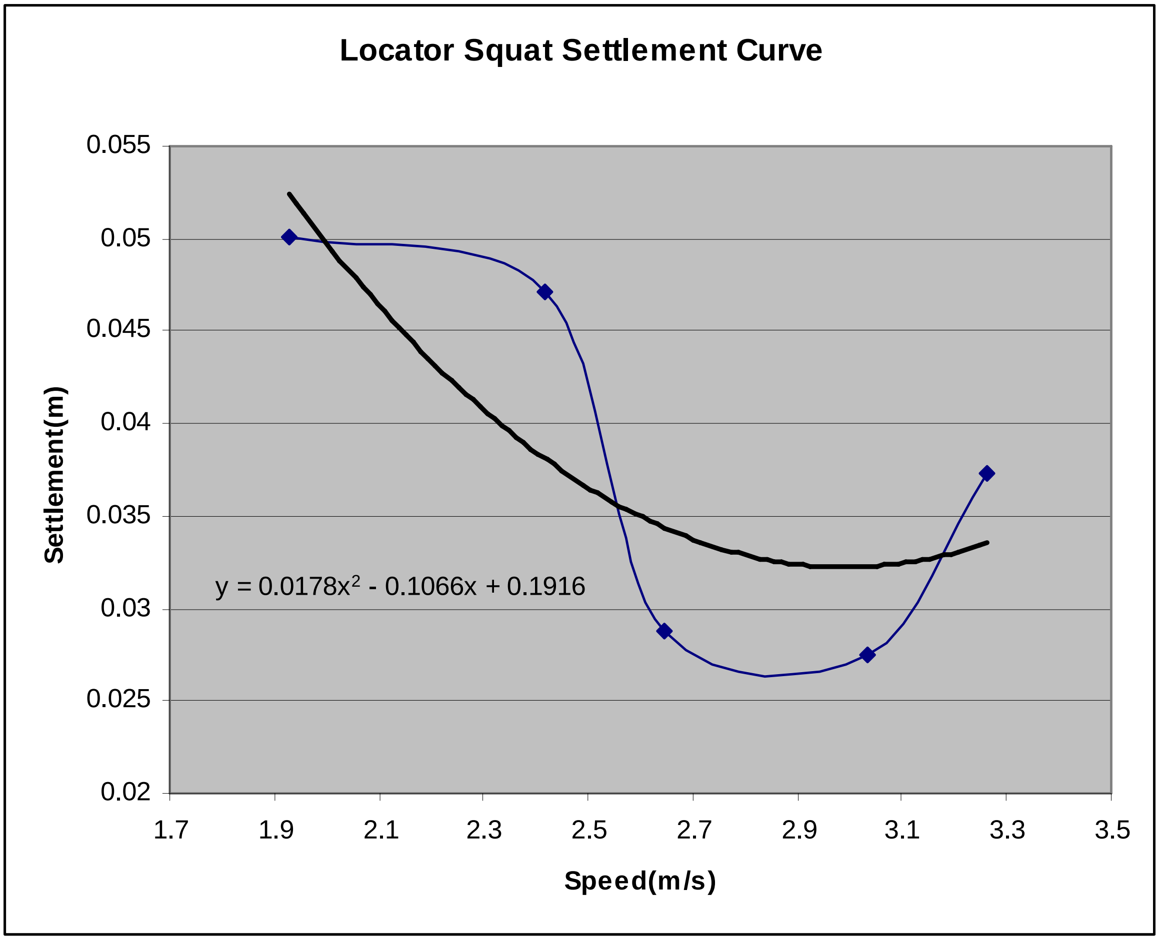


Figure 1 - R/V Locator Settlement Curve

The results of the squat settlement test for the Locator ODOM DF3200.

Table 1 - R/V Locator Squat Settlement Results

LOCATOR-ODOM DF3200 CALCULATED SETTLEMENT	
SPEED(m/s)	SETTLEMENT(m)
1.9275	0.050
2.4158	0.047
2.6471	0.029
3.0326	0.027
3.2639	0.037

Note: Vessel RPM and speed was noted on the survey line logs (refer to Separate 1).

Corrections to soundings were loaded using the delta draft function in CARIS based on speed determined from KGPS results.

The squat settlement test for the R/V C.B. #3 was conducted outside Dauphin Island, AL on November 11, 2006 (Julian Day 308).

To perform the squat settlement test, the R/V C.B. #3 logged dual frequency data on the POS MV. The squat settlement tests were performed by first establishing a 1000 meter line in the direction of the current. The survey vessel occupied the east end of the line for two minutes while logging L1/L2 GPS data. The line was then run heading west at an engine rate of 800 RPM and then south at 800 RPM, stopping at the west end of the line to obtain an additional two minutes of 'static' L1/L2 GPS data. Again, the survey vessel occupied the east end of the line and the scenario repeated at incrementing engine RPM's.

All measurements were corrected for heave, pitch, and roll and reduced to the vessel's common reference point (CRP) and subsequently to the single beam transducer. Static measurements observed at the end of lines were used to compute a tide curve for tidal corrections. A settlement curve for the C.B. #3, with the ODOM DF3200 installed, was then computed.

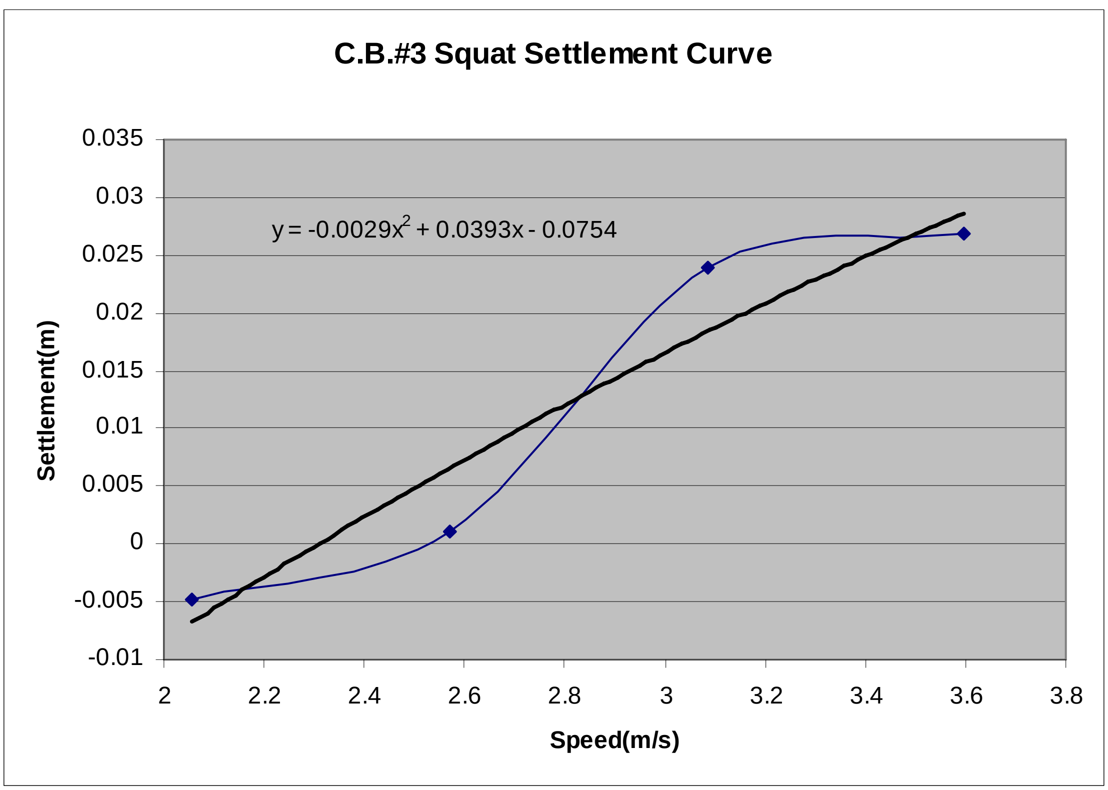


Figure 2 - R/V C.B. #3 Settlement Curve

The results of the squat settlement test for the ODOM DF3200 are shown below.

Table 2 - R/V C.B. #3 Squat Settlement Results

C.B. #3-ODOM DF3200 CALCULATED SETTLEMENT	
SPEED(m/s)	SETTLEMENT(m)
2.058	-0.005
2.570	0.001
3.084	0.024
3.598	0.027

Note: Vessel RPM and speed was noted on the survey line logs (refer to Separate 1). Corrections to soundings were loaded using the delta draft function in CARIS based on speed determined from KGPS results.

STATIC DRAFT

Static draft was measured from tabs on both sides of the vessels, the average was taken, and then the correction to the common reference point was applied. The table below shows the draft values for the R/V C.B. #3 used in data processing.

Table 3 - Draft Measurements for the R/V C.B. #3

DRAFT #	JULIAN DAY	DATE (UTC)	TIME (UTC)	DEPTH (m)
1	276	10/3/2006	15:21	0.47
2	277	10/4/2006	17:18	0.49
3	278	10/5/2006	17:00	0.49
4	279	10/6/2006	11:45	0.49
5	279	10/6/2006	13:20	0.48
6	280	10/7/2006	11:49	0.51
7	281	10/8/2006	12:00	0.50
8	281	10/8/2006	12:57	0.49
9	282	10/9/2006	11:42	0.49
10	283	10/10/2006	15:29	0.46
11	284	10/11/2006	11:47	0.50
12	285	10/12/2006	11:43	0.49
13	287	10/14/2006	12:09	0.49
14	288	10/15/2006	11:58	0.50
15	290	10/17/2006	19:08	0.49
16	291	10/18/2006	11:59	0.49

DRAFT #	JULIAN DAY	DATE (UTC)	TIME (UTC)	DEPTH (m)
17	292	10/19/2006	11:40	0.50
18	292	10/19/2006	18:27	0.48
19	293	10/20/2006	11:40	0.49
20	294	10/21/2006	12:00	0.49
21	295	10/22/2006	11:42	0.50
22	295	10/22/2006	16:42	0.49
23	296	10/23/2006	12:00	0.48
24	297	10/24/2006	11:42	0.50
25	298	10/25/2006	11:52	0.50
26	298	10/25/2006	15:21	0.49
27	300	10/27/2006	14:55	0.50
28	301	10/28/2006	16:20	0.49
29	302	10/29/2006	12:25	0.49
30	303	10/30/2006	11:35	0.50
31	304	10/31/2006	11:37	0.05
32	304	10/31/2006	14:44	0.50
33	305	11/1/2006	11:33	0.53
34	308	11/4/2006	11:40	0.50
35	308	11/4/2006	23:22	0.49
36	309	11/5/2006	11:43	0.50
37	310	11/6/2006	11:44	0.50
38	311	11/7/2006	12:24	0.51
39	311	11/7/2006	14:41	0.49
40	312	11/8/2006	11:40	0.49
41	313	11/9/2006	11:40	0.50
42	314	11/10/2006	11:35	0.49
43	315	11/11/2006	11:35	0.50
44	316	11/12/2006	17:30	0.47
45	317	11/13/2006	11:40	0.49
46	318	11/14/2006	11:42	0.51
47	320	11/16/2006	19:10	0.49
48	321	11/17/2006	11:40	0.49
49	322	11/18/2006	11:40	0.50
50	322	11/18/2006	21:45	0.49
51	323	11/19/2006	11:51	0.49
52	324	11/20/2006	12:09	0.49
53	326	11/22/2006	11:42	0.50
54	326	11/22/2006	19:41	0.48
55	327	11/23/2006	11:35	0.49
56	328	11/24/2006	11:40	0.51
57	328	11/24/2006	22:12	0.49

DRAFT #	JULIAN DAY	DATE (UTC)	TIME (UTC)	DEPTH (m)
58	329	11/25/2006	11:44	0.48
59	330	11/26/2006	11:40	0.50
60	331	11/27/2006	11:37	0.49
61	332	11/28/2006	11:40	0.51
62	333	11/29/2006	11:40	0.49
63	334	11/30/2006	11:40	0.51
64	335	12/1/2006	19:17	0.50
65	336	12/2/2006	12:25	0.49
66	337	12/3/2006	11:42	0.50
67	339	12/5/2006	18:10	0.49
68	340	12/6/2006	11:37	0.50
69	341	12/7/2006	11:55	0.50
70	343	12/9/2006	12:50	0.50
71	344	12/10/2006	12:25	0.49
72	345	12/11/2006	11:41	0.50
73	346	12/12/2006	12:35	0.49
74	347	12/13/2006	12:12	0.50

The table below shows the draft values for the R/V Locator used in data processing.

Table 4 - Draft Measurements for the R/V Locator

DRAFT #	JULIAN DAY	DATE (UTC)	TIME (UTC)	DEPTH (m)
1	261	9/18/2006	15:00	0.69
2	262	9/19/2006	15:00	0.69
3	263	9/20/2006	17:52	0.71
4	264	9/21/2006	13:58	0.70
5	265	9/22/2006	16:08	0.71
6	266	9/23/2006	11:57	0.71
7	267	9/24/2006	6:30	0.73
8	267	9/24/2006	20:08	0.71
9	268	9/25/2006	12:00	0.71
10	269	9/26/2006	15:25	0.73
11	270	9/27/2006	12:55	0.69
12	271	9/28/2006	11:47	0.73
13	272	9/29/2006	18:31	0.73
14	273	9/30/2006	12:05	0.73
15	273	9/30/2006	19:10	0.70
16	274	10/1/2006	11:50	0.71
17	275	10/2/2006	13:49	0.70

DRAFT #	JULIAN DAY	DATE (UTC)	TIME (UTC)	DEPTH (m)
18	276	10/3/2006	13:23	0.69
19	277	10/4/2006	11:49	0.70
20	279	10/6/2006	11:48	0.72
21	281	10/8/2006	12:41	0.69
22	282	10/9/2006	11:50	0.70
23	283	10/10/2006	11:45	0.75
24	283	10/10/2006	15:27	0.73
25	284	10/11/2006	12:11	0.69
26	285	10/12/2006	12:08	0.71
27	287	10/14/2006	12:08	0.69
28	288	10/15/2006	12:29	0.67
29	290	10/17/2006	19:30	0.67
30	291	10/18/2006	12:01	0.66
31	292	10/19/2006	12:10	0.70
32	293	10/20/2006	11:47	0.67
33	293	10/20/2006	15:34	0.67
34	294	10/21/2006	11:57	0.66
35	295	10/22/2006	12:17	0.69
36	295	10/22/2006	17:12	0.64
37	297	10/24/2006	11:42	0.67
38	298	10/25/2006	12:42	0.66
39	301	10/28/2006	16:24	0.65
40	302	10/29/2006	11:43	0.67
41	302	10/29/2006	14:27	0.66
42	303	10/30/2006	11:45	0.67
43	304	10/31/2006	11:56	0.69
44	304	10/31/2006	14:41	0.64
45	305	11/1/2006	18:27	0.65
46	308	11/4/2006	12:28	0.66
47	309	11/5/2006	12:30	0.67
48	309	11/5/2006	15:46	0.65
49	310	11/6/2006	11:42	0.66
50	311	11/7/2006	11:49	0.67
51	312	11/8/2006	11:54	0.65
52	313	11/9/2006	11:51	0.65
53	314	11/10/2006	12:00	0.66
54	315	11/11/2006	12:11	0.67
55	315	11/11/2006	15:44	0.66
56	317	11/13/2006	11:48	0.65
57	318	11/14/2006	11:53	0.67
58	320	11/16/2006	18:35	0.65
59	321	11/17/2006	11:49	0.66

DRAFT #	JULIAN DAY	DATE (UTC)	TIME (UTC)	DEPTH (m)
60	322	11/18/2006	12:01	0.67
61	322	11/18/2006	14:44	0.65
62	323	11/19/2006	12:54	0.67
63	324	11/20/2006	12:16	0.66
64	325	11/21/2006	12:30	0.66
65	326	11/22/2006	11:48	0.66
66	327	11/23/2006	11:49	0.66
67	328	11/24/2006	11:54	0.67
68	328	11/24/2006	22:02	0.65
69	329	11/25/2006	11:48	0.66
70	330	11/26/2006	12:07	0.67
71	331	11/27/2006	11:54	0.66
72	332	11/28/2006	12:07	0.66
73	332	11/28/2006	22:49	0.66
74	333	11/29/2006	11:52	0.65
75	334	11/30/2006	11:50	0.66
76	336	12/2/2006	18:32	0.66
77	337	12/3/2006	11:51	0.66
78	337	12/3/2006	20:46	0.66
79	339	12/5/2006	18:17	0.66
80	340	12/6/2006	11:51	0.65
81	341	12/7/2006	12:03	0.66
82	343	12/9/2006	12:51	0.65
83	344	12/10/2006	12:18	0.65
84	345	12/11/2006	12:08	0.70
85	346	12/12/2006	11:40	0.65
86	347	12/13/2006	12:01	0.67
87	348	12/14/2006	12:50	0.67

TIDES

Predicted tidal data for a month long period, UTC (Central Daylight Time to UTC was +5 hours), was assembled from the National Water Level Observation Program accessed through the NOAA tides and currents website (http://tidesandcurrents.noaa.gov/). A cumulative file for the gauge was updated monthly by appending the new data. Refer to the S-J977-KR-FU Horizontal and Vertical Control Report for any additional tidal information.

On January 12, 2007, verified tide data was acquired from the National Water Level Observation Program accessed through the NOAA tides and currents website (http://tidesandcurrents.noaa.gov/). Tidal zoning file was developed and provided by NOAA. From January 15, 2007 to January 16, 2007, all sounding data were re-merged using CARIS HIPS and SIPS tide routine. The Dauphin Island, AL, 873-5180 and the Pascagoula NOAA Lab, 874-1533, tidal stations verified tides were used in final processing. Verified tidal data were used for the final Navigation Base Surfaces and S-57 Feature files. Refer to the Vertical & Horizontal Control Report for unusual tidal conditions encountered during the course of the S-J977-KR-FU survey.

VESSEL ATTITUDE: HEADING, HEAVE, PITCH, AND ROLL

Vessel heading and dynamic motion were measured by the Applanix POS MV 320 V4.The system calculated heading by inversing between two Trimble GPS generated antenna positions. An accelerometer block (the IMU), which measured vessel attitude, was mounted directly over the single beam transducer on each vessel. The operational accuracy specifications for this system, as documented by the manufacturer, are as follows:

Table 5 - POS MV Specifications

POS MV Accuracy	
Pitch and Roll	0.035°
Heading	0.05°
Heave	5% or 5-cm over 20 seconds

CALIBRATIONS

Single Beam

A patch test was conducted to identify alignment errors (timing) between the motion sensor and sonar systems.

An additional patch test was also conducted for the C.B. #3 and Locator for quality control and testing purposes, but the derived values were not entered into the HVF, hence, not used in processing since they were in agreement. Patch test calibration values used to correct all soundings for the survey were as follows:

Table 6 - Patch Test Results for Locator ODOM DF3200

Patch Test Results for Locator ODOM DF3200 December 12th, 2006 (2006-339)		
Test	**CARIS Session**	**Mean Correction**
Navigation Timing Error	n/a	0.00 seconds

Table 7 - Patch Test Results for C.B. #3 ODOM DF3200

Patch Test Results for C.B. #3 ODOM DF3200 December 12th, 2006 (2006-339)		
Test	**CARIS Session**	**Mean Correction**
Navigation Timing Error	n/a	0.00 seconds

D - Approval Sheet

Approval Sheet

For

H11621 & H 11622

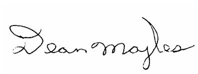
Standard field surveying and processing procedures were followed in producing this survey in accordance with the following documents:

S-J977-KR-FU statement of work and hydrographic manual;
Fugro Pelagos, Inc. Acquisition Procedures (2006- NOAAAcquisitionProcedures);
Fugro Pelagos, Inc. Processing Procedures (2006-NOAAProcessingProcedures);

The data were reviewed daily during acquisition and processing.

This report has been reviewed and approved. All records are forwarded for final review and processing to the Chief, Pacific Hydrographic Branch.

Approved and forwarded,



Dean Moyles,
Lead Hydrographer
Fugro Pelagos, Inc. Survey Party

Appendix I – Equipment List and Software Versions

Equipment

Table 8 - Equipment List

System	Manufacturer	Model	Serial No.
Side Scan Sonar	Klein	Klein Model 3000 Processor	487
		Klein Model 3000 Towfish	609
Side Scan Sonar	Klein	Klein Model 3000 Processor	477
		Klein Model 3000 Towfish	600
Single Beam Sonar	ODOM	ODOM DF3200 Processor	9313
Single Beam Sonar	ODOM	ODOM DF3200 Processor	9393
Single Beam Sonar	ODOM	ODOM DF3200 Processor	9735
POS MV	Applanix	Firmware: 3.22	2161
POS MV	Applanix	IMU	78
POS MV	Applanix	Firmware: 3.22	2354
POS MV	Applanix	IMU	231
GPS Antenna	Trimble	L1/L2	12697293
GPS Antenna	Trimble	L1/L2	60008160
GPS Antenna	Trimble	L1/L2	60124972
GPS Antenna	Trimble	L1/L2	60125059
Smart Sensor	Applied Microsystems Ltd.	Smart Sound Velocity and Pressure	4703-SV&P
Smart Sensor	Applied Microsystems Ltd.	Smart Sound Velocity and Pressure	4431-SV&P
Smart Sensor	Applied Microsystems Ltd.	Smart Sound Velocity and Pressure	4932-SV&P
Smart Sensor	Applied Microsystems Ltd.	Smart Sound Velocity and Pressure	4655-SV&P
RTCM	CSI Inc.	CSI MBX-3	9841-2496-0002
RTCM	CSI Inc.	CSI-MBX-3	9833-2166-0001
RTCM	CSI Inc.	CSI MBX-3	9913-3442-0001
DGPS	CSI Inc.	CSI-DGPS-Max	0417-15715-0001
DGPS	CSI Inc.	CSI-DGPS-Max	0417-15715-0002
GPS Receiver	Thalas	Z-Max L1/L2	200348070
Digital Camera	Kodak	Kodak	CX6445

Software

SonarPro v9.6
Winfrog V 3.6.7
CARIS Hips/Sips V 6.0 (w/ Service Pack 2, Hotfix 1-6)
CARIS GIS V 4.4a (w/ Service Pack 5, Hotfix 1-19)
CARIS Notebook V 2.2 (w/ Service Pack 1)
MapInfo Professional V 5.0
AutoDesk Map R 5.0
Fugro MBSurvey Tools V1.0
Fugro File Convert V 1.0
Fugro Target Analyst for ArcMap
Fugro SDFTimetoLine V1.0
Fugro Correlator for ArcMap V 1.0
ESRI Arc Map V 9.1
Applanix POS MV V4 Controller V 3.3.1.0
Applanix POSConv v1.4
Applanix POSPac 4.3

Appendix II – Vessel Descriptions

R/V C.B. #3

The R/V C.B. #3 (Figure 3) was modified to accommodate a survey crew and acquisition hardware. A retractable pole was installed amidships on the port side as a rigid mount to accommodate the Klein Model 3000 SSS Tow Fish. A second pole was installed abeam of the side scan on the starboard side as a rigid mount to affix a 200 kHz single beam transducer. The accelerometer package for a POS MV was mounted in the hull of the vessel along the keel between the side scan and single beam systems.

Two Trimble L1/L2 antennas (Figure 5) were mounted above the ship's house and accelerometer for positioning and heading. The two POS MV antennas were separated by 2.10m from each other. The port side antenna (L1/L2) functioned as the POS MV master antenna; the starboard side antenna functioned as the POS MV secondary.

The AML Smart Probe SV&P sensors were deployed from a hand line.

Offset values were derived from a total station survey and applied to the data in CARIS HIPS as specified in the HIPS vessel file (HVF). Vessel offsets used are shown in the following table. Note that the HVF does not contain navigation offsets because the position provided by the POS MV is already corrected to the CRP.

Table 9 - Vessel Offsets (C.B. #3)

C.B.#3 Vessel Offsets				
From	**To**	**X**	**Y**	**Z**
CRP	IMU – POS MV	0.000	0.000	0.000
CRP	Klein SSS Mounting Point	-1.676	0.311	n/a
CRP	Single Beam Transducer	1.284	0.026	0.640
CRP	GPS1 – Master Antenna	-1.249	-2.382	2.505
CRP	GPS3 – Slave Antenna	0.896	-2.365	2.513
CRP	Draft Measuring Point, Port	-1.478	0.772	0.393
CRP	Draft Measuring Point, Starboard	1.105	0.455	0.400

Note: All units are meters.
CRP is the top-center of the IMU.
Axis used: X positive toward Starboard
Y positive toward Bow
Z positive in to the water

Table 10 - Vessel Specifications (C.B. #3)

Survey Launch	R/V C.B.#3
Official Number	LA-4204-EU
Owner	Faucheux Brothers Airboat Services, Inc.
Length	28 ft
Beam	9 ft
Draft	.75 ft
Mechanical Power	(2) 150Hp Yamaha Outboards
Electrical	3kW Honda Generator

Figure 3 - R/V C.B. #3

Figure 4 – Side Scan Sonar (C.B. #3)

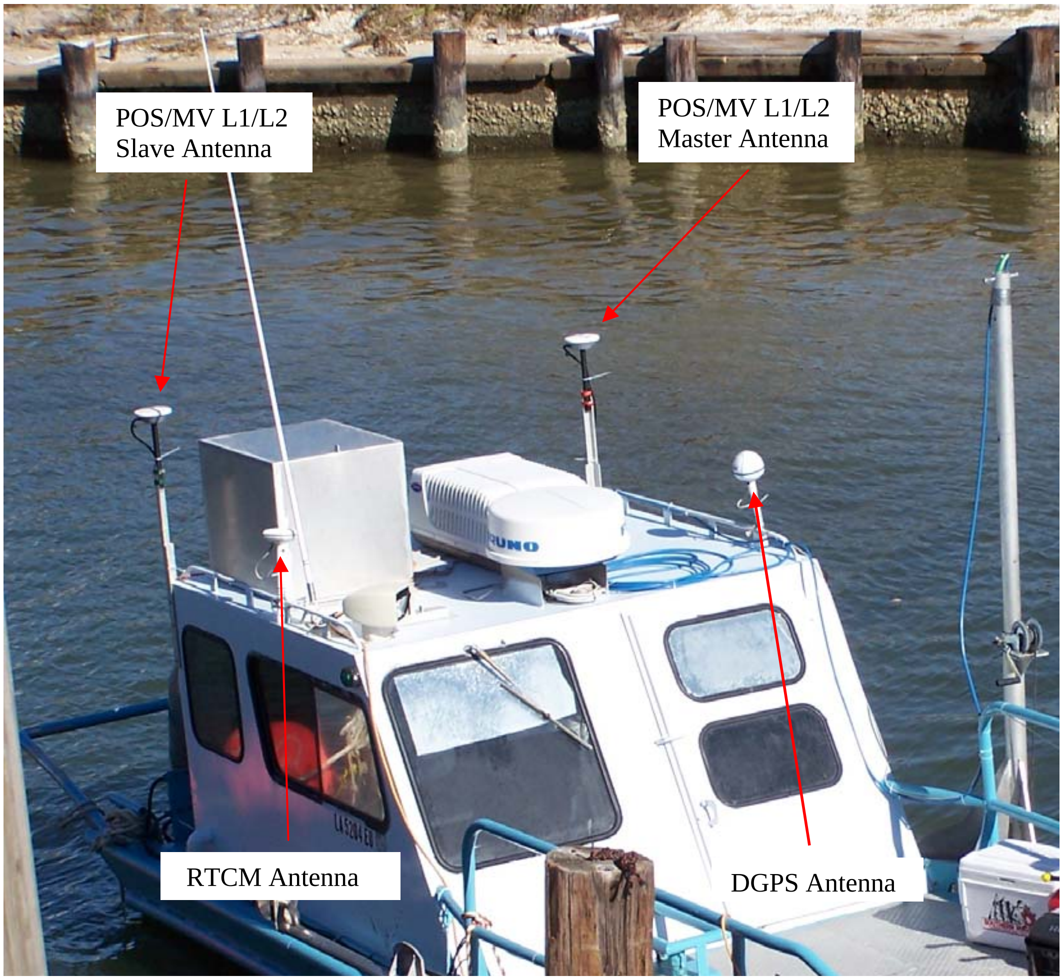


Figure 5 – POS MV, DGPS & RTCM Antennas (C.B. #3)

R/V LOCATOR

The R/V Locator (Figure 6) accommodated a survey crew and acquisition hardware. A retractable pole was installed amidships on the port side as a rigid mount to accommodate the Klein Model 3000 SSS Tow Fish. The 200 kHz single beam transducer was mounted amidships along the keel through an acoustically clear window. The accelerometer package for a POS MV was mounted along the keel of the vessel just above the single beam transducer head.

Two Trimble L1/L2 GPS antennas (Figure 8) were mounted on poles extending from the ship's radar arch to determine positioning and heading. The two POS MV antennas were separated by 1.2m port and starboard. The port side antenna (L1/L2) functioned as the POS MV master antenna; the starboard side antenna functioned as the POS MV secondary.

The AML Smart Probe SV&P sensors were deployed from a hand line.
Offset values were applied to the data in CARIS HDCS as specified in the HIPS vessel file (HVF). Vessel offsets used are shown in the following table. Note that the HVF does not contain navigation offsets because the position provided by the POS MV is already corrected to the CRP.

Table 11 - Vessel Offsets (Locator)

Locator Vessel Offsets				
From	**To**	**X**	**Y**	**Z**
CRP	IMU – POS MV	0.000	0.000	0.000
CRP	Klein SSS Mounting Point	-1.575	-1.479	n/a
CRP	Single Beam Transducer	0.000	0.000	-0462
CRP	GPS 1 - Master Antenna	-0.625	0.226	2.522
CRP	GPS 3 - Slave Antenna	0.630	0.233	2.516
CRP	Draft Measuring Point, Port	-1.424	-0.179	0.601
CRP	Draft Measuring Point, Starboard	1.444	-0.158	0.600

Note: All units are meters.
CRP is the top-center of the IMU.
Axis used: X positive toward Starboard
Y positive toward Bow
Z positive in to the water

Table 12 - Vessel Specifications (Locator)

SURVEY LAUNCH	R/V LOCATOR
Official Number	CF-4540-NB
Owner	Fugro Pelagos, Inc.
Length	25’ 4”
Beam	9’ 6”
Draft	18”
Dry Weight	3900 lbs.
Main Engine	Outboard Yamaha 250hp

Figure 6 - R/V Locator

Figure 7 – Side Scan Sonar (Locator)

Figure 8 - POS MV, DGPS & RTCM Antennas (Locator)

Appendix III – Calibration Reports

4431-BGR121767.pdf
4655-BGR600674.pdf
4703- BGR121840.pdf
4932-BGR124098.pdf

Appendix IV – SSS Daily Confidence Checks

Daily Confidence Checks_CB3.xls
Appendix IV\Locator\Daily Confidence Checks_Locator.xls