H10804

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Hydrographic/ Multibeam/Side Scan Sonar

Field No.: Sheet 1

Registry No.: H10804

LOCALITY

State: Texas

General Locality: Gulf of Mexico

Locality: 18 NM SSE of Sabine Pass

1998

CHIEF OF PARTY
Jana L. DaSilva

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DATE: NOV 8 2000

NOAA FORM 77-28 (11-72) | U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | REGISTER NO. H-10804

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. Sheet I

State: Texas

General locality: Gulf of Mexico

Locality: 18 Miles SSE of Sabine Pass

Scale: 1:20,000 Date of survey: May 11, 1998 - January 18, 1999

Instructions dated: November 20, 1997 Project No.: OPR-K171-KR

Vessel: R/V Beacon, M/V Geodetic Surveyor, M/V Universal Surveyor

Chief of party: Jana L. DaSilva (John E. Chance & Associates, Inc.)

Surveyed by: D. Delcambre, M. Melancon, J. Walling, R. Ancelet, M. White, D. King, J. Fuselier, D. Barron, E. Whitley, S. Belaire, M. Vellion, J. Lockhart, J. Callahan, P. Tomlinson, L. Wootan, F. Gaspard, M. Henderson, C. Reed, G. Perron, G. Collins, R. Frentz, J. Jason, M. Duos, J. Barr, R. Pickett, M. Harris, J. Boudreaux, K. Swart, K. Gabik, S. Cade, G. Barilleaux, A. Hebert

Soundings taken by (echo sounder), hand lead, pole: Reson 8101 Seabat Multibeam

Graphic record scaled by: Survey Personnel

Graphic record checked by: Survey Personnel

Protracted by: 2500 CP Automated plot by: HP DESIGNJET ~~750C~~

Verification by: Office Personnel at the Atlantic Hydrographic Branch

Soundings in ~~fathoms~~ (feet) at ~~MLW~~ (MLLW)

REMARKS: Contract Number : 50 -DGNC –90026

Contractor Name: John E. Chance & Associates, Inc. 200 Dulles Drive Lafayette, LA 70506

Time Reference: UTC

Horizotal Datum: NAD83

Positioning: John E. Chance Starfix

Hand written notes in the Descriptive Report were made during office processing

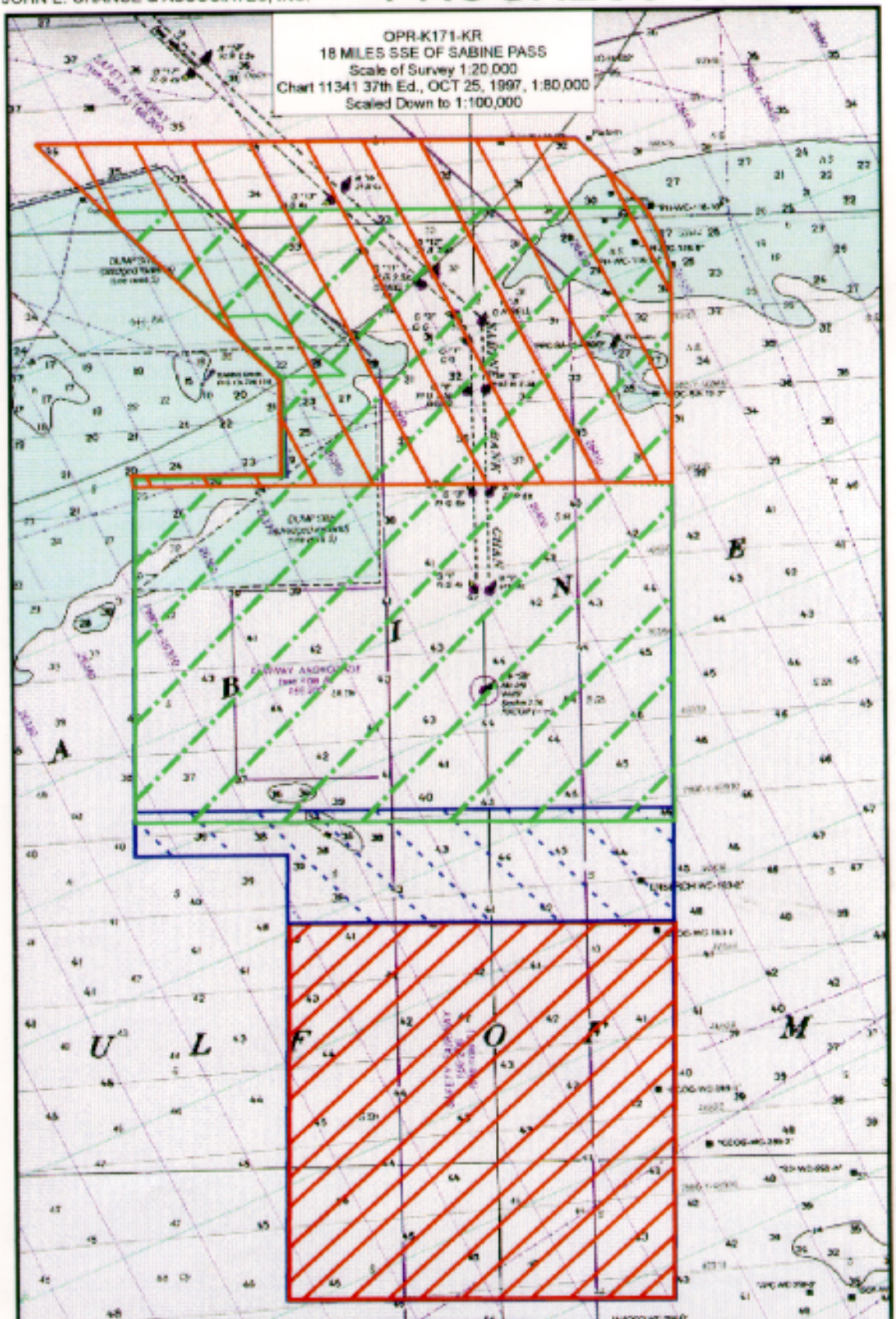
AWOIS ✓ & SURF ✓ by MBB 1/12/00

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1976—665-661/1222 REGION NO. 6

JOHN E. CHANCE & ASSOCIATES, INC.

PROGRESS SKETCH



Type / Area	May	June	July	August	September / November	October	December / January
LNM Hydro	832	381	1,632	1269	0	5	Infill
LNM SSS	406	82	730	558	0	0	Infill
Sq. NM	15.48	4.87	36.67	19.29	0	Infill	Infill
Items Investigated	0	0	0	0	0	0	4
WX Days Lost	7.5	24.75	4	4.34	0	0	0

Registry #	Started	Completed	Submitted
H-10804	MAY 5, 1998	January 18, 1999	March 1, 1999

0 2 4

STATUTE MILES

John E. Chance & Associates, Inc. (CHANCE) guarantees only that the survey data collected by CHANCE, delivered to NOAA under Contract 50-DGNC-8-90026, reflect the state of the seafloor in existence on the day and time of data acquisition.

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* Data filed with original field records

Descriptive Report to Accompany Hydrographic Survey H-10804

Sheet I
Scale 1:20,000
May, 1998 – January, 1999
John E. Chance & Associates, Inc.
R/V Beacon, M/V Geodetic Surveyor, M/V Universal Surveyor
Chief of Party: Jana L. DaSilva, CHANCE

A. PROJECT

Project Number: OPR-K171-KR
Contract Number: 50 DGNC-7-90026
Sheet letter: I
Registry number: H-10804

Dates of Instructions:

20 November, 1997 Original Instructions
16 March, 1998 Award of Task Order #1
15 May, 1998 Modification of Contract
15 July, 1998 Award of Task Order # 2
15 July, 1998 Modification of Contract
17 September, 1998 Modification of Task Order
3 December, 1998 Award of Task Order #3
1 February, 1999 Modification of Task Order
12 February, 1999 Modification of Task Order

See Appendix F for copies of modifications to Contract 50 DGNC-7-90026.

Purpose: The purpose of this contract is to provide NOAA with modern, accurate hydrographic data acquired using shallow water multibeam and side scan sonar technology with which to update the nautical charts of the assigned area. Numerous obstructions have been reported in this area. Side scan sonar shall be used to locate these obstructions and a shallow-water multibeam sonar system shall be used to determine the least depth over the obstructions as well as determine the depths over the entire project area.

B. AREA SURVEYED

The survey area is located in the Gulf of Mexico, 18 miles SSE of Sabine Pass, Texas. The survey area is irregular in shape. The four outer corners follow:

Latitude	Longitude
29° 30' 38.4" N	093° 45' 14.6"W
29° 18' 27.9" N	093° 42' 20.0"W
29° 18' 28.0" N	093° 37' 47.2"W
29° 30' 41.4" N	093° 38' 49.8"W

The dates of data acquisition are:

R/V Beacon

05/11/98-05/12/98	JD 131-132
05/15/98-05/22/98	JD 135-142
05/26/98-06/02/98	JD 146-153
06/22/98-06/25/98	JD 173-176
07/05/98-07/10.98	JD 186-191
07/15/98-08/14/98	JD 196-226
08/16/98-08/21/98	JD 228-233
08/24/98-08/29/98	JD 236-241

M/V Geodetic Surveyor

09/30/98-10/01/98	JD 273-274
12/31/98-01/01/99	JD 365-001
01/05/99	JD 005

M/V Universal Surveyor

12/15/98-12/17/98	JD 349-351
01/10/99-01/12/99	JD 010-012
01/15/99-01/18/99	JD 015-018

The survey, which covers Sheet I, consists of 767 parallel east-west primary tracklines spaced approximately 30 meters apart, 44 north-south crosslines spaced approximately 300- 500 meters apart, and 401 infill lines. Survey lines plotted on the enclosed maps are post-plotted as surveyed. Survey lines were run with distinct starting and ending points. Each individual line contained fix marks, or shot points, which were logged every 150 meters. This methodology of line numbering and annotating allows for quick comparison between adjacent lines. This is extremely useful in the comparison between side scan sonar lines.

Primary lines at the southern end of the field area were run based upon multibeam-coverage line spacing of approximately 30 meters. This line spacing resulted in side scan sonar coverage in excess of the specifications, discussed later in Section E. During development of a data collection plan, side scan sonar range was set at 75 meters to decrease the amount of side scan sonar coverage. The final survey grid was designed to provide 200 percent lateral coverage with the sonar system, running both side scan sonar and multibeam at 90-meter line spacing. Multibeam-only lines were run at a 30-meter spacing to provide a 10-meter overlap of the multibeam outer beams required in section 4.8 of the Statement of Work (SOW). Line spacing was decreased to 20 meters over the Sabine Bank shoal area. Infill lines were run to provide coverage in areas where the specifications were not met. All aspects of the fieldwork were carried out to meet or exceed NOAA specifications.

Due to the nature of line spacing development during the project, the line numbering conventions are not uniform throughout the entire survey. As a general rule, lines in the 100 series are lines that collected both side scan sonar and multibeam data. Lines in the 1000 series were collected as multibeam crosslines. Lines in the 2000 and 3000 series were run as reruns of 100 series lines. Lines in the 5000 series were run as infills over the shoal area. Lines in the 7000 series were run with the multibeam to fill the gaps between the 100 series lines. Lines in the 8000 series were run as reruns of the 7000 series. Please see the geophysical logs, which contain detailed information pertaining to the data collected during the project, for additional documentation. Geophysical logs are found in Separate 1, which is included with the survey data.

C. SURVEY VESSELS

R/V Beacon

The *R/V Beacon* (ID # 501539) was used for all primary multibeam, single beam, side scan sonar, sound velocity, and bottom sample data collection. Data acquisition hardware was mounted in the vessel operations room. Post-processing hardware and plotting hardware were mounted in the vessel lounge area.

Basic vessel descriptors follow:

Length (LOA):	120'
Beam:	24'
Draft:	6.6'-8'
Gross Tonnage:	172
Power:	840 Hp

See vessel specifications in Separate 2 (filed with survey data) for additional information.

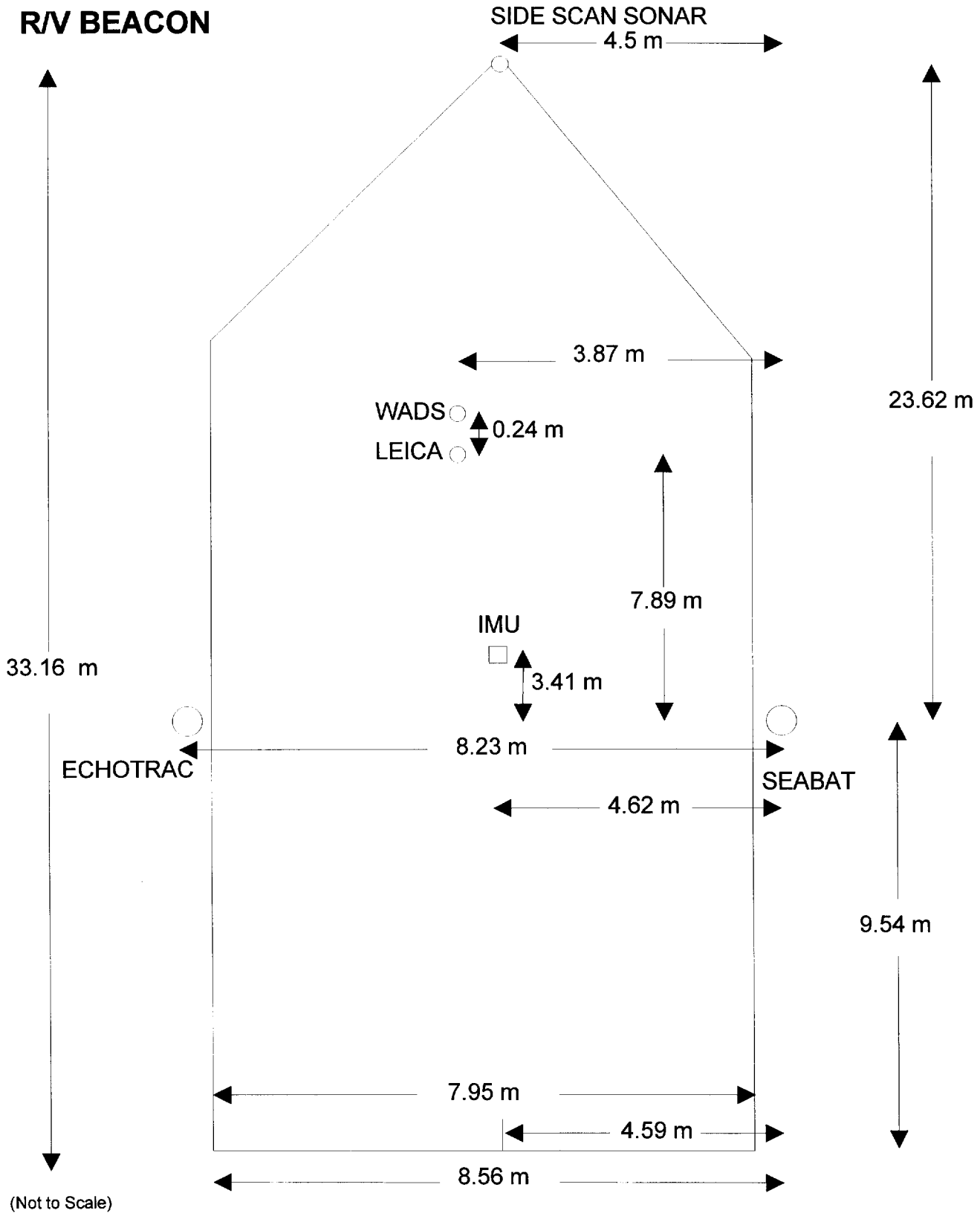
The Reson 8101 Seabat multibeam transducer was mounted on the starboard side of the vessel at the end of a 6-inch swivel pole. The pole mount and the alignment bracket were welded to the ship. The pole was located 9.54 m from the stern of the vessel. The one MHz Odom Hydrographics single beam echosounder, model DF3200 transducer, was mounted on the port side of the vessel on the same plane as the multibeam transducer. The single beam transducer was mounted on the same type of pole with the same type of mounting as the multibeam pole. The single beam data were compared weekly to multibeam data to provide a depth confidence check (see Appendix G).* The navigation antenna location was assigned to the center of the multibeam transducer.

The primary and secondary GPS antennae were mounted in a fore-aft position on the upper deck at the center of the vessel. The POS/MV GPS antennae were mounted on port and starboard sides along a single pole across the aft upper deck (see vessel diagram on page 5).

The side scan sonar tow positions were located at the bow of the vessel and the center of the aft "A" frame. A Kevlar cable deployed manually was used for the bow configuration

* Data filed with field records

R/V BEACON


SIDE SCAN SONAR
4.5 m
33.16 m
3.87 m
23.62 m
WADS
LEICA
0.24 m
7.89 m
IMU
3.41 m
8.23 m
ECHOTRAC
SEABAT
4.62 m
9.54 m
7.95 m
4.59 m
8.56 m
(Not to Scale)

and an armored cable remotely operated with a hydraulic winch was used for stern deployment (see vessel diagram on page 7).

M/V Geodetic Surveyor

The *M/V Geodetic Surveyor* (ID # 637873) was used for multibeam infill lines, associated single beam, investigation side scan sonar and multibeam data, and sound velocity data collection. All data acquisition, post-processing, and plotting hardware was mounted in the vessel operations room.

Basic vessel descriptors follow:

Length (LOA):	122
Beam:	30'
Draft:	7'-10'
Gross Tonnage:	97
Power:	1,300 Hp

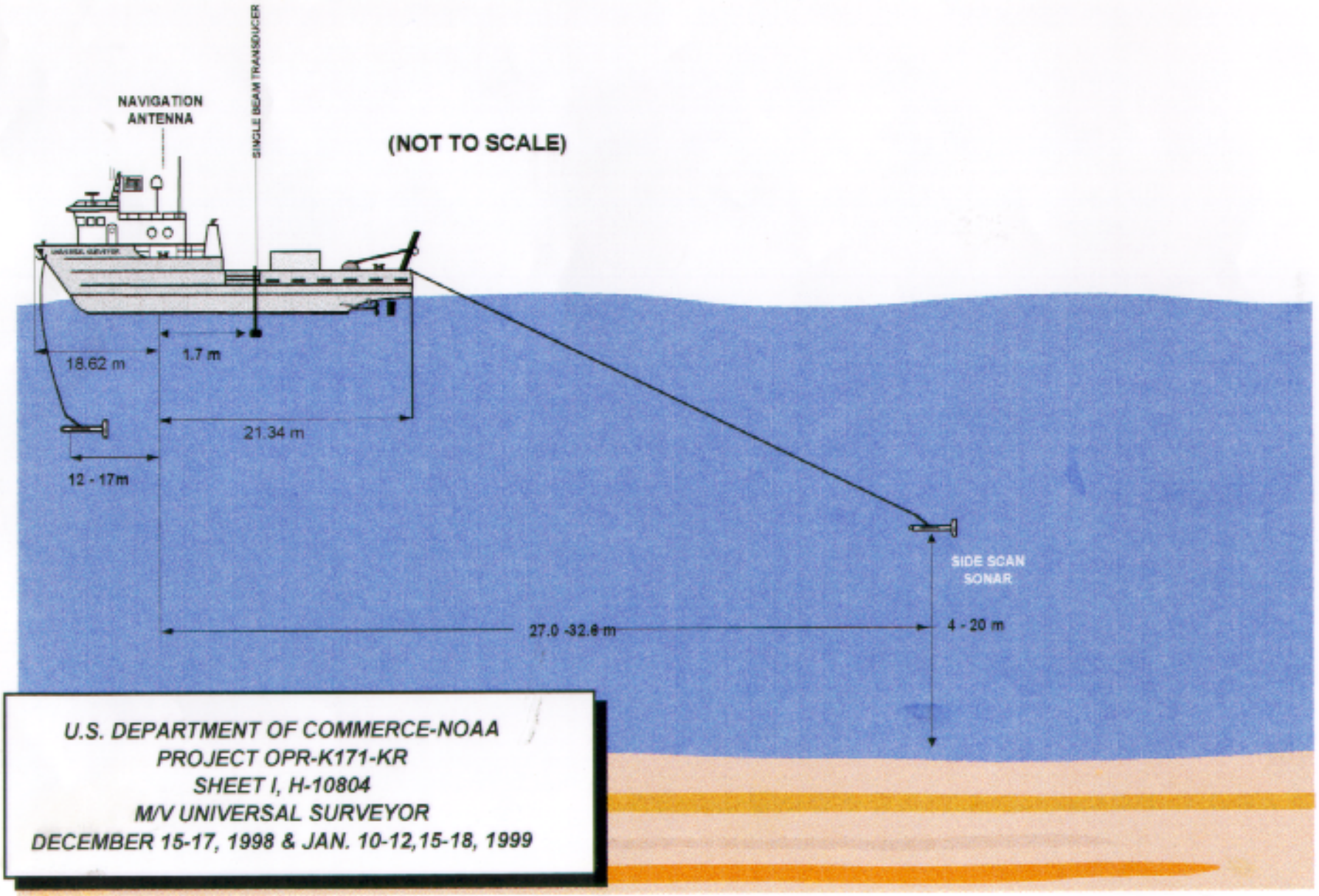
Additional vessel specifications for the *M/V Geodetic Surveyor* are in Separate 2 (filed with survey data).

The Reson 8101 Seabat multibeam transducer was mounted on the starboard side of the vessel at the end of a 9-inch swivel pole. The pole mount and the alignment bracket were welded to the ship. The pole was located 9.08 m from the stern of the vessel. The one MHz model DF3200 Odom Hydrographics single beam transducer was mounted 0.46-m starboard of the multibeam transducer on the same pole. The navigation antenna location was assigned to the center of the multibeam transducer (see vessel diagram on page 8).

The side scan sonar tow positions were located at the bow of the vessel and the center of the aft "A" frame. A Kevlar cable deployed manually was used for the bow configuration and an armored cable remotely operated with a hydraulic winch was used for stern deployment (see vessel diagram on page 9).

When the Reson 8101 Seabat was originally mounted on the M/V Geodetic Surveyor, the multibeam transducer head was cocked to the port. The displacement was not visually evident. When the patch test determined that the transducer was cocked, a decision was made to collect data because all beams were correctly positioned. The outer starboard beams, however, produce very noisy data due to the increased water column and increased angle of incidence with the seafloor.

To decrease editing time, the outer port beams are removed during processing. The exact number of beams varies with local conditions, such as sea state, velocity, and current. It is the responsibility of the data processor to edit these beams from the data set. Removing the outer beams requires a decrease in line spacing to provide full coverage. The beam numbers affected in this survey are 0000-0003, 0098, 0099.



U.S. DEPARTMENT OF COMMERCE-NOAA
PROJECT OPR-K171-KR
SHEET I, H-10804
M/V UNIVERSAL SURVEYOR
DECEMBER 15-17, 1998 & JAN. 10-12,15-18, 1999

M/V Universal Surveyor

The *M/V Universal Surveyor* (ID # 627510) was used for side scan sonar infill data collection. All data acquisition, post-processing, and plotting hardware was mounted in the vessel operations room.

The side scan sonar tow positions were located at the bow of the vessel and the center of the aft "A" frame. A Kevlar cable deployed manually was used for the bow configuration and an armored cable remotely operated with a hydraulic winch was used for stern deployment (see vessel diagram on page 11).

Basic vessel descriptors follow:

Length (LOA):	122'
Beam:	30'
Draft:	7'-10'
Gross Tonnage:	94
Power:	1,200 Hp

Additional vessel specifications for the *M/V Universal Surveyor* are in Separate 2 (filed with survey data).

Coordinate Systems

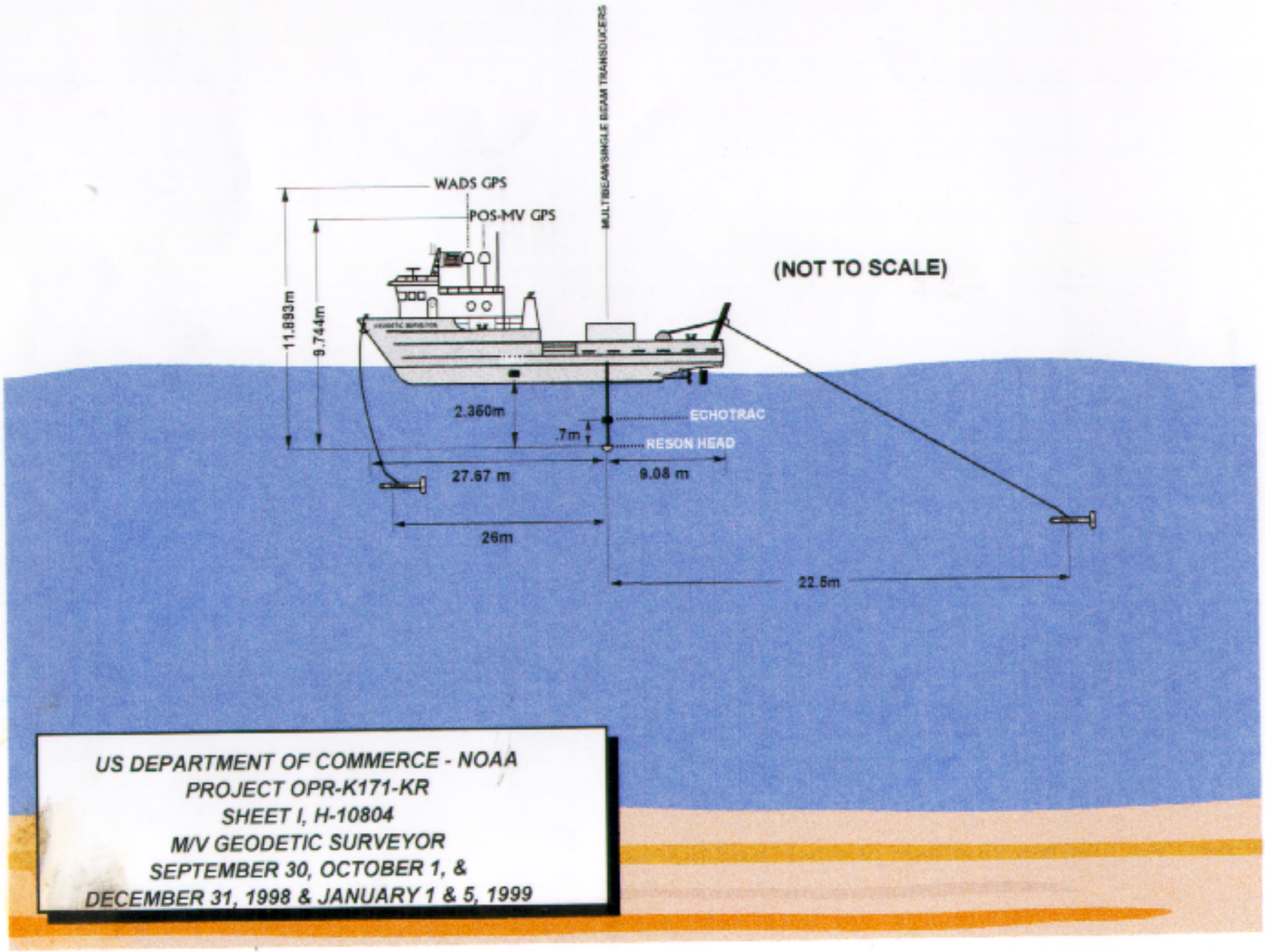
The Reson 8101 Seabat and the IP400 acquisition and processing software have similar coordinate systems. They refer to the Positive X value to the Starboard, the Positive Y value to the to the bow, and the Positive Z upward. This coordinate system differs from the POS/MV coordinate system, which designates Positive X to the bow, Positive Y to starboard, and Positive Z down. The importance of these differences must be stressed to avoid confusion when entering offset values (see page 12 for related figure).

1) *R/V Beacon*

- The vessel attitude is relative to the POS IMU. The POS IMU relative to the CG in meters is:
  X=0 Y= -1.87 Z=+0.26

- The vessel position is relative to the Seabat transducer unless noted in the geophysical logs (found in Separate 1). The Seabat transducer relative to the CG in meters is:
  X=+4.62 Y=-5.14 Z=+4.65

- The CG relative to waterline is: Z= -0.94


WADS GPS
POS-MV GPS
MULTIBEAM/SINGLE BEAM TRANSDUCERS
(NOT TO SCALE)
11.893m
9.744m
2.360m
.7m
ECHOTRAC
RESON HEAD
27.67 m
9.08 m
26m
22.5m
US DEPARTMENT OF COMMERCE - NOAA
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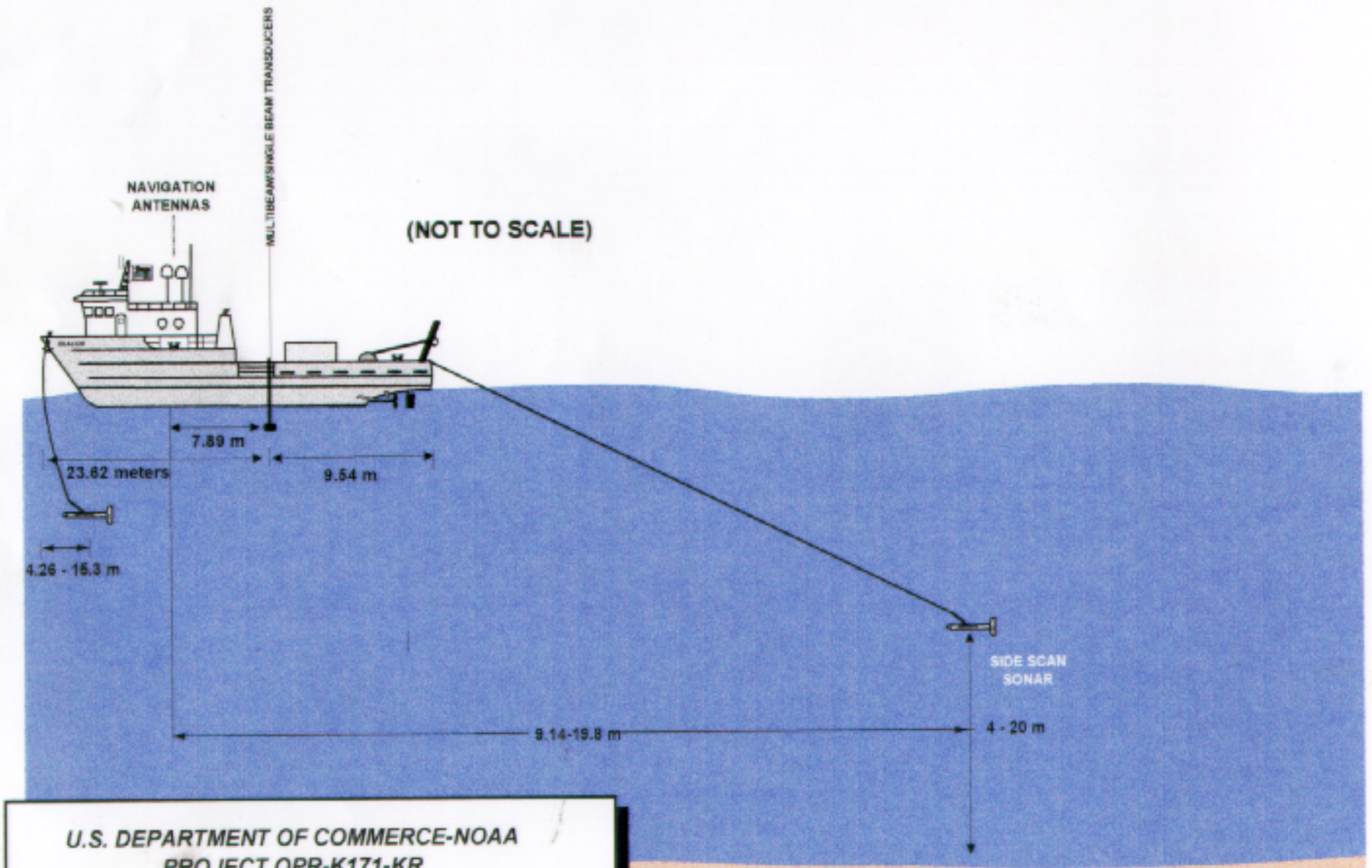
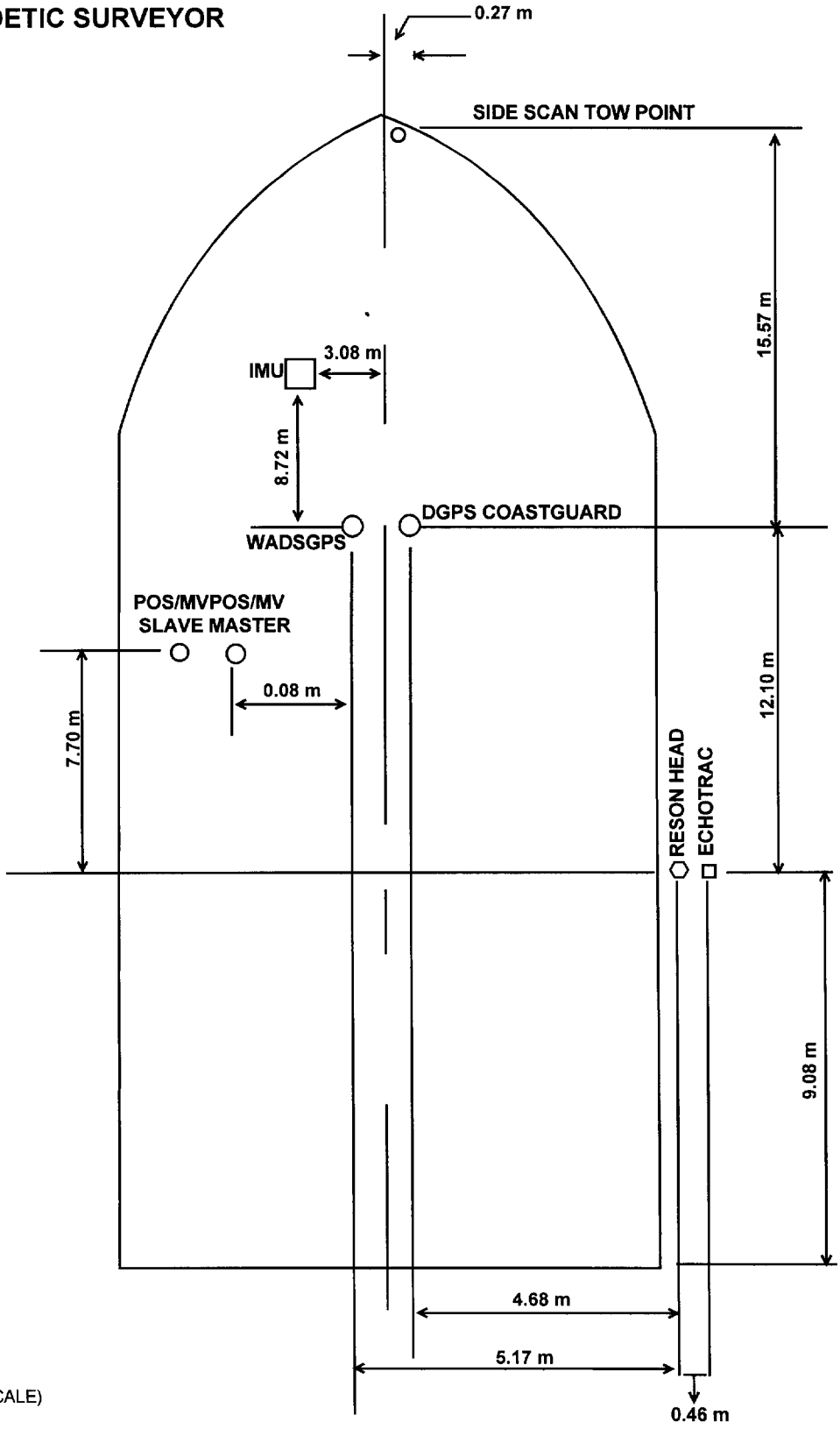
SHEET I, H-10804
M/V GEODETIC SURVEYOR
SEPTEMBER 30, OCTOBER 1, &
DECEMBER 31, 1998 & JANUARY 1 & 5, 1999



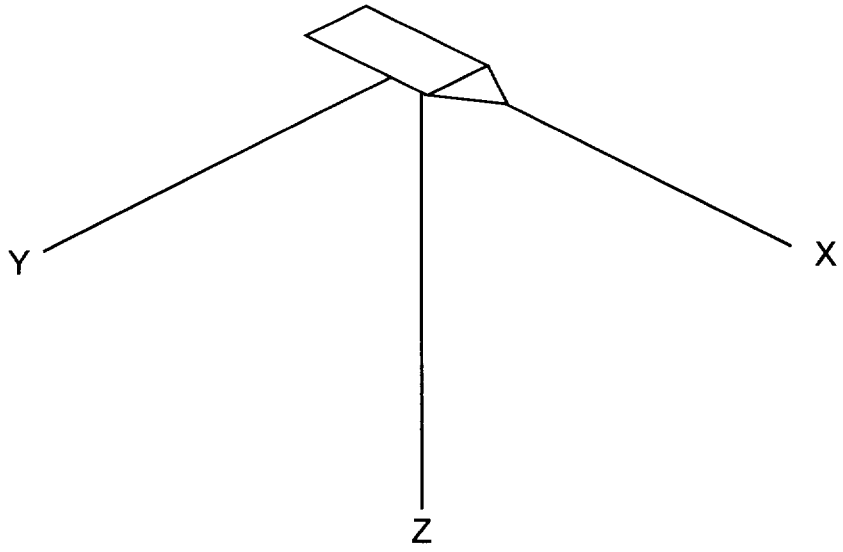
U.S. DEPARTMENT OF COMMERCE-NOAA
PROJECT OPR-K171-KR
SHEET I, H-10804
R/V BEACON
MAY 5-AUGUST 29, 1998

M/V GEODETIC SURVEYOR



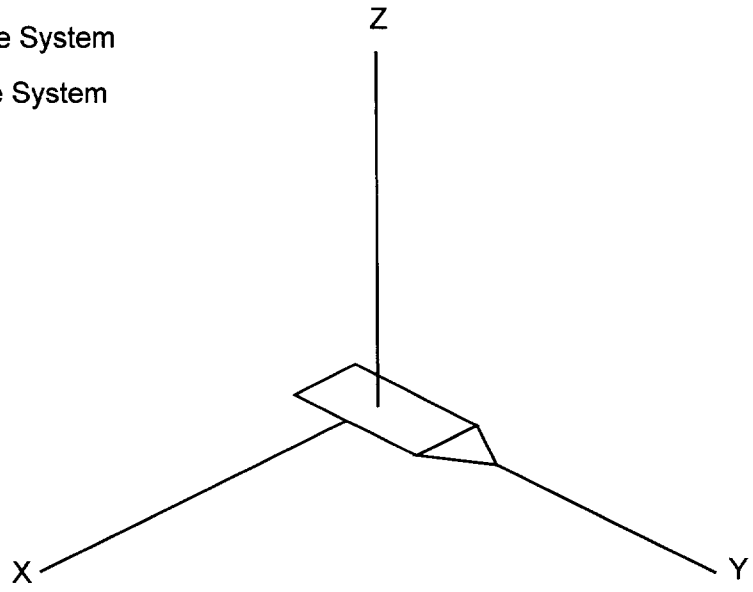
(NOT TO SCALE)

POS/MV Coordinate System



Reson Coordinate System

IP400 Coordinate System



2) *M/V Geodetic Surveyor*

- The vessel attitude is relative to the POS IMU. The POS IMU relative to the CG in meters is:
  X=+1.37 Y=+1.71 Z=-1.59

- The vessel position is relative to the Seabat transducer unless noted in the geophysical logs (found in Separate 1). The Seabat transducer relative to the CG in meters is: X=-4.94 Y=+12.56 Z=-3.14

- The CG relative to waterline is: Z= -0.5

D. AUTOMATED DATA ACQUISITION AND PROCESSING See Also Evaluation Report

Hardware/Software:

The software used for data acquisition and processing was an "in-house" FUGRO software package entitled IP400, version 6.01.01. This software possesses a data acquisition package (DAP), a post processing package (PPROC), a charting package (CHART), and a digital terrain modeling package (DTM). The software is UNIX driven and runs on GML scripts, IP400 programs, and basic UNIX scripts. TerraModel version 9.5 and TerraVista version 2.0 software packages by Spectra Precision Software, in Atlanta, Georgia were used to manually edit the data of noise spikes.

Hardware used for data acquisition and processing consisted of three (3) 266 MHz Pentium II computers utilizing UNIXWARE version 2.1. The PCs contained 4 Gig hard drives and 64 Megabytes of memory. One computer was updated to contain 384 MB memory. These computers were used for data acquisition, processing, charting, and quality control measures while onboard the vessel. Two (2) external 9 gig hard drives were also used for data storage. Two (2) SunSolaris SPARC stations using Solaris version 2.5.1 were used for final tide applications, cross-line comparisons, and final charting.

The IP400 software was used to apply velocity corrections to the data. The software referenced the most recent velocity cast, which was manually input into the CONFIG file and applied the necessary velocity corrections.

Processing Methods:

The multibeam data was collected utilizing a Reson 8101 Multibeam transducer and monitored on the Reson Console during data acquisition. Once collected, the data was brought into the IP400 software and stored on a Data Acquisition computer (DAP) in raw format. The data was then sent to the Post Processing Computer (PPROC) via a network connection (see Appendix I for additional information). *

Once the data was transcribed to the PPROC computer, processing of the raw data occurred. Immediately following processing, the data was reduced using the ReduceXYZ IP400 script, and was then brought into TerraModel for manual cleaning and for a visual check of data quality (see Appendix I for additional information). *

* Data Filed with Field Records

Cleaning Filters:

During data processing, the data was sent through several cleaning filters within the IP400 software as a means of cleaning "noise" and "out-of-specification" beams out of the data. To achieve data cleaning, the batching routine used the Clipscanpolar, Tracescan, Three-point trace, and Four-point trace IP400 scripts, that used predetermined parameters that were manually inserted (see Appendix I for additional information). ✂

E. SIDE SCAN SONAR

Side scan sonar operations were conducted using an EG&G Model 260 TH slant-range corrected side scan sonar recorder, two EG&G Model SMS-272 side scan sonar towfish, and Triton/Elics digital acquisition software version 3.22.

R/V Beacon

Equipment	Serial Number	Days Used
Recorder	014923	131-174
Recorder	014524	175-240
Towfish	16860 (Bow)	131-132
		136-138
		187-190
		201-209
		212-214
		220-223
	16860 (Stern)	230-232
		237-240
Towfish	15097 (Stern)	138-141
		147-151
		174-176
		186-187
		199-201
	15097 (Bow)	224-225
		229-232
		237-240

M/V Universal Surveyor

Recorder	015340	349-351
		010-012
		015-018
Towfish	015667 (Stern)	349-351
		010-012
		018

✂ Data Field with Field Records

M/V Universal Surveyor

Towfish	022932 (Bow)	350-351 011 015-017

M/V Geodetic Surveyor

Recorder	14524	365
Towfish	14524 (Stern) 13657 (Bow)	365 365

The vertical beam width of the EG&G SMS 272 side scan sonar was 50 degrees at 3dB. A depression angle of 20 degrees was used on the towfish. The 100 kHz frequency was used during all data collection of this survey. The side scan sonar was towed from both bow and stern locations. Aboard the *R/V Beacon* and *M/V Geodetic Surveyor*, the navigation center was assigned to the center of the multibeam transducer pole for all side scan sonar work unless otherwise specified in the geophysical logs (Separate 1).* The navigation center aboard the M/V Universal Surveyor was located at the navigation antenna. The geophysical logs (Separate 1)* for the M/V Universal Surveyor have two set back values. The first value is a value calculated to match the other logs; the second value is the distance that was measured from the navigation center to the towfish. The second values measured from the navigation center to the towfish are more accurate. A block was mounted on a swing-arm at the bow of the vessel. The side scan sonar fish, attached to a Kevlar cable, was manually deployed. The amount of cable deployed was noted from markings on the cable. The side scan was attached to an armored cable when towed from the stern. A winch was used to control cable length.

Side scan sonar operations were run at a speed 4.8 knots or slower. All side scan sonar coverage was run in an east-west direction. The majority of the side scan sonar data was collected using a 100-meter range scale. The initial side scan sonar lines, collected at the southern end of the field area, were run at the multibeam coverage line spacing. This resulted in 300%-400% side scan sonar coverage. During the development of a data collection plan, lines 29-63 were run at a 75 meter range scale to decrease the amount of side scan sonar coverage. Further development produced a plan to run the side scan sonar lines at a 100-meter range scale with 90-meter line spacing. In areas where the water depth precluded maintaining a depth off the seafloor of 8-20 percent of the 100-meter range scale, the range scale was decreased to 75 and 50 meters to assure that the data would meet or exceed specifications. Portions of lines 226, 227, 234-241, 243,247-255, 259, 264, 267, 273-276, 2225, 2235, 2243, 2248, 2255, 2257, 2270-2273, 2276, and 7516 that would not meet specifications at 100 meter range scale were run at 75 meter range scale (see geophysical logs for these segments)* Lines 5001-5045, 5116-5124, and 5144-5154, which were located over Sabine Bank, were collected at a 50-meter range scale. Infill lines 3100-3103 were collected at a 75-meter range scale. Lines 5505, 5508, and 6515 were collected at a 50-meter range scale.

Side scan sonar recorder gain was adjusted to provide the best image of the seafloor. Confidence checks were performed at least twice daily, but more often several times daily. Drag scars, ripple marks, and platforms were used as confidence checks. Where possible,

* Data Filed with Field Records

drag scars were traced across the record, checking both port and starboard channels. However, if that was not possible, confidence checks were performed separately. Interim coverage plots were created utilizing the Triton/Elics Isis system coverage command. Final coverage plots were created in AutoCAD.

At least 200 percent coverage was obtained over the entire survey area. As mentioned above, 300-400 percent side scan sonar coverage occurs at the southernmost part of the study area. Infill lines were run in areas that were disrupted by noise which included boat wakes, thermocline noise, marine life, other noise in water column, losing bottom track, data glitches, and the end of the paper roll.

The analog data records were manually scanned by at least two people. All contacts were recorded, adjacent lines were compared, and heights were calculated from shadows measured on the analog records. Questionable contacts were compared with multibeam data to determine the significance (as defined in section 5.6.2 of the SOW) of the item. Significant contacts were labeled and recorded to the side scan sonar contact list (see Separate 3)* and side scan sonar contact plot. A report was written for items that were deemed a Danger to Navigation and sent to the USCG as specified in the S.O.W. These Danger to Navigation reports can be found in Appendix A. One object identified on the AWOIS list and three objects discovered during survey operations were investigated and discussed in Section N of this report.

Digital side scan sonar data were acquired using Triton/Elics ISIS version 3.22 software. The software was run on a 300 MMX, Pentium II computer with 128 MB RAM and 4 GB hard disk space (serial number RK-MT-071). Digital data were recorded in XTF format and backed up to Exabyte tape using UNIX tar command. Lines 1-12 were recorded in an incorrect format, therefore, Lines 9008-9010 were rerun over the original to provide the required digital files. The digital side scan sonar data may have a time discrepancy with the analog side scan sonar data due to an incorrect entry in the time format. A log in Separate 3 provides analog and digital times for all contacts on the side scan sonar contact list. *

F. SOUNDING EQUIPMENT

A Reson 8101 Seabat system was utilized for the multibeam source. The Reson 8101 transducer head serial number is 049702. The Reson 8181 Seabat has 101 beams and runs at a frequency of 240 kHz. There were no depth or range limits used during data collection. A ping rate of 7 pings per second and a range scale of 50m were also utilized. An average velocity was applied to the data online.

Reson console serial number 13917 was the original console used for the project. It was replaced by console 13984 on May 14, 1998 (DN 134) due to a faulty power supply. Problems with the Reson system were encountered on August 16th (DN 228). Console serial number 13917 was returned from the factory on August 18th(DN 230) replacing console 13984. A faulty cable was also replaced on August 18th (DN 230). Reson problems continued on August 19th(DN 231). On August 21 (DN 233), Reson console serial number 13917 was replaced by console 13984 and the cable was replaced again, solving the problems with the Reson system for the remainder of the job. The replacement of the topside unit did not affect any calibration values; therefore recalibration was not necessary.

* Data Filed With Field Records

A one MHz Odom Hydrographics single beam echosounder, model DF3200, serial number 3371 was used to check the multibeam data. Single beam and multibeam data were compared weekly to provide a depth confidence check as required in section 4.11.4 of the SOW. The results of these comparisons are provided in Appendix G.* The SOW did not require delivery of single beam data; therefore, no single beam records are included with this survey.

G. CORRECTIONS TO SOUNDINGS

1. Speed of Sound

Sound velocity data were collected daily using two Applied Microsystems profiling velocimeters. The Applied Microsystems Ltd. SV^{PLUS}, serial number 3257, calibrated on April 28 (DN 118) and May 1, 1998 (DN 121) was the primary velocimeter for this sheet. Calibration values were applied to the data through the Total System Software processing software. The Applied Microsystems SVP-16, serial number 3045, calibrated on May 7-8, 1998 (DN 127, 128) was the secondary velocimeter for this sheet. Calibration values were applied to the data through the AML processing software. In addition, an Applied Microsystems Ltd. Sound Velocity Smart Sensor, serial number 4164, calibrated on April 16, 1998 (DN 106) was mounted on the Echotrac transducer pole at a depth equivalent to the Reson multibeam transducer head. The Smart Sensor data were displayed using Hyperterminal. They provided a continuous check on the velocity at the depth of the multibeam transducer head.

Velocity casts were obtained at least twice daily and more frequently if necessary. The frequency of velocity cast collection was based upon degradation of the multibeam outer beams. Degradation of the multibeam outer beams was monitored real-time by observing the Reson monitor and the smart sensor data. An observed difference of more than 2 meters/second was used as a guide when observing the Smart Sensor. In addition, the IP400 Profile application was utilized after processing as a velocity QC. The Profile application allows viewing of several adjacent multibeam profiles. Velocity problems are easily identifiable on the profiles as an upturn or downturn of the multibeam outer beams.

The sound velocity casts that were applied to the multibeam data follow:

Date	Primary Cast Number	Latitude	Longitude	Cast Depth
05/11/98	1Vel131a	29° 18' 27.2047" N	93° 42' 42.2087" W	15.46
05/12/98	1Vel132a	29° 18' 47.4241" N	93° 43' 38.1357" W	15.32
05/12/98	1Vel132b	29° 18' 42.8701" N	93° 43' 02.0490" W	15.32
05/15/98	1Vel135a	29° 18' 31.0031" N	93° 37' 12.0480" W	14.21
05/16/98	1Vel136a	29° 23' 25.5645" N	93° 38' 45.2834" W	14.90
05/16/98	1Vel136b	29° 18' 31.6227" N	93° 41' 04.2088" W	15.50
05/17/98	1Vel137a	29° 18' 47.1401" N	93° 43' 02.7031" W	15.04
05/17/98	1Vel137b	29° 18' 53.9208" N	93° 37' 07.3930" W	13.52
05/17/98	1Vel137c	29° 18' 56.5009" N	93° 36' 11.6547" W	11.44
05/18/98	1Vel138a	29° 18' 49.0542" N	93° 42' 33.5561" W	15.60
05/18/98	1Vel138b	29° 19' 00.7948" N	93° 37' 02.5682" W	13.93
05/18/98	1Vel138c	29° 18' 59.9969" N	93° 37' 07.8278" W	13.66
05/18/98	1Vel138d	29° 19' 08.0873" N	93° 36' 23.5317" W	13.38

* Data Filed With Field Records

Date	Primary Cast Number	Latitude	Longitude	Cast Depth
05/19/98	1Vel139a	29° 19' 16.8312" N	93° 37' 07.0211" W	14.07
05/19/98	1Vel139b	29° 19' 19.5276" N	93° 43' 25.2949" W	15.60
05/19/98	1Vel139c	29° 19' 25.1636" N	93° 43' 07.3459" W	15.60
05/20/98	1Vel140a	29° 19' 36.9779" N	93° 43' 04.9172" W	15.74
05/20/98	1Vel140b	29° 19' 42.7653" N	93° 36' 53.0587" W	14.07
05/20/98	1Vel140c	29° 19' 48.2551" N	93° 42' 18.2220" W	15.46
05/20/98	1Vel140d	29° 19' 45.3537" N	93° 37' 43.9475" W	14.77
05/21/98	1Vel141a	29° 20' 15.6050" N	93° 40' 10.4771" W	14.90
05/21/98	1Vel141b	29° 20' 02.2232" N	93° 37' 35.2646" W	14.07
05/22/98	1Vel142a	29° 23' 06.2994" N	93° 41' 26.7136" W	14.07
05/25/98	1Vel145a	29° 28' 38.0667" N	93° 40' 04.1935" W	14.77
05/26/98	1Vel146a	29° 22' 42.2451" N	93° 38' 20.6925" W	14.07
05/26/98	1Vel146b	29° 20' 14.1098" N	93° 37' 20.7886" W	14.49
05/27/98	1Vel147a	29° 20' 14.7116" N	93° 42' 38.4762" W	15.18
05/27/98	1Vel147b	29° 20' 37.8683" N	93° 42' 31.9222" W	15.32
05/28/98	1Vel148a	29° 20' 14.7116" N	93° 42' 38.4762" W	15.04
05/29/98	1Vel149a	29° 21' 47.4719" N	93° 37' 37.6024" W	14.49
05/29/98	1Vel149b	29° 21' 07.1229" N	93° 42' 53.7061" W	15.18
05/29/98	1Vel149c	29° 21' 24.7264" N	93° 36' 23.2007" W	13.66
05/30/98	1Vel150a	29° 21' 44.0746" N	93° 42' 39.9049" W	15.04
05/30/98	1Vel150b	29° 21' 02.1183" N	93° 42' 28.1835" W	14.77
05/30/98	1Vel150c	29° 22' 13.1526" N	93° 42' 34.6963" W	14.77
05/31/98	1Vel151a	29° 22' 24.0342" N	93° 36' 57.4697" W	14.21
05/31/98	1Vel151b	29° 21' 10.1119" N	93° 42' 20.2734" W	14.77
05/31/98	1Vel151c	29° 21' 30.9967" N	93° 42' 19.8584" W	15.04
06/01/98	1Vel152a	29° 21' 29.3663" N	93° 37' 09.8958" W	13.93
06/01/98	1Vel152b	29° 22' 03.4149" N	93° 42' 44.3998" W	14.77
06/02/98	1Vel153a	29° 22' 11.4573" N	93° 37' 14.9355" W	14.49
06/02/98	1Vel153b	29° 22' 18.9497" N	93° 42' 21.5202" W	14.35
06/22/98	1Vel173a	29° 26' 17.8145" N	93° 36' 56.2342" W	15.18
06/23/98	1Vel174b	29° 22' 48.4217" N	93° 37' 27.9258" W	15.74
06/24/98	1Vel175a	29° 22' 35.9388" N	93° 37' 20.6328" W	13.66
06/24/98	1Vel175b	29° 22' 58.1034" N	93° 42' 38.2961" W	14.35
06/24/98	1Vel175c	29° 19' 53.6856" N	93° 43' 18.6228" W	14.63
06/25/98	1Vel176a	29° 22' 40.1654" N	93° 36' 50.0150" W	14.07
06/25/98	1Vel176b	29° 23' 10.7050" N	93° 37' 36.4677" W	14.35
07/05/98	1Vel186a	29° 23' 34.2236" N	93° 34' 01.4833" W	16.15
07/06/98	1Vel187a	29° 23' 38.4055" N	93° 36' 52.0000" W	15.88
07/06/98	1Vel187b	29° 23' 31.3112" N	93° 44' 36.1085" W	14.49
07/06/98	1Vel187c	29° 23' 47.1596" N	93° 37' 16.6426" W	15.88
07/07/98	1Vel188a	29° 23' 43.4397" N	93° 45' 07.9734" W	13.79
07/07/98	1Vel188b	29° 24' 33.2389" N	93° 37' 02.6667" W	15.88
07/07/98	1Vel188c	29° 23' 14.1716" N	93° 44' 21.8056" W	14.63
07/07/98	1Vel188d	29° 23' 57.5836" N	93° 37' 10.4860" W	16.15
07/08/98	1Vel189a	29° 24' 05.3997" N	93° 44' 41.4233" W	13.66
07/08/98	1Vel189b	29° 24' 27.9517" N	93° 37' 13.1128" W	14.63
07/08/98	1Vel189c	29° 24' 34.4534" N	93° 37' 20.5633" W	15.46
07/09/98	1Vel190a	29° 24' 42.4293" N	93° 37' 05.8775" W	15.46
07/09/98	1Vel190b	29° 25' 09.1730" N	93° 37' 22.5102" W	15.74
07/09/98	1Vel190c	29° 25' 12.1470" N	93° 37' 18.2450" W	15.60
07/10/98	1Vel191a	29° 23' 16.4122" N	93° 44' 36.6813" W	14.07
07/15/98	1Vel196a	29° 22' 50.5324" N	93° 36' 57.6534" W	15.60

Date	Primary Cast Number	Latitude	Longitude	Cast Depth
07/15/98	1Vel196b	29° 23' 49.0499" N	93° 37' 13.7134" W	16.01
07/15/98	1Vel196c	29° 23' 48.3809" N	93° 44' 31.3263" W	14.20
07/16/98	1Vel197a	29° 23' 53.0519" N	93° 37' 11.5256" W	15.04
07/16/98	1Vel197b	29° 24' 38.8714" N	93 °37' 14.4386" W	15.45
07/16/98	1Vel197c	29° 24' 38.7793" N	93° 44' 06.0951" W	14.80
07/17/98	1Vel198a	29° 24' 46.8392" N	93° 37' 27.1261" W	15.50
07/17/98	1Vel198b	29° 24' 29.4139" N	93° 44' 07.6014" W	14.60
07/18/98	1Vel199a	29° 25' 03.2031" N	93° 39' 56.7831" W	15.40
07/19/98	1Vel200a	29° 25' 24.4931" N	93° 37' 20.0952" W	15.32
07/19/98	1Vel200b	29° 25' 34.5855" N	93° 44' 32.8747" W	15.30
07/19/98	1Vel200c	29° 25' 44.0315" N	93° 37' 24.9030" W	15.32
07/20/98	1Vel201a	29° 26' 04.8924" N	93° 37' 12.3560" W	14.60
07/20/98	1Vel201b	29° 26' 16.1555" N	93° 40' 02.0359" W	15.50
07/21/98	1Vel202a	29° 26' 40.0360" N	93° 40' 02.7062" W	15.70
07/21/98	1Vel202b	29° 26' 37.8547" N	93° 39' 56.2618" W	14.40
07/22/98	1Vel203a	29° 27' 09.5057" N	93° 40' 01.3637" W	15.30
07/22/98	1Vel203b	29° 25' 11.5210" N	93° 37' 16.7493" W	15.70
07/23/98	1Vel204a	29° 27' 30.1343" N	93° 40' 01.8313" W	15.60
07/23/98	1Vel204b	29° 27' 50.3124" N	93° 39' 58.6275" W	16.00
07/24/98	1Vel205a	29° 28' 15.7624" N	93° 39' 58.5871" W	15.50
07/24/98	1Vel205b	29° 25' 19.9943" N	93° 37' 30.4877" W	15.70
07/25/98	1Vel206a	29° 28' 59.9591" N	93° 40' 00.9467" W	14.80
07/25/98	1Vel206b	29° 29' 12.7910" N	93° 40' 10.9224" W	12.50
07/26/98	1Vel207a	29° 29' 28.7492" N	93° 40' 35.0347" W	15.59
07/26/98	1Vel207b	29° 25' 41.3202" N	93° 37' 20.3941" W	15.18
07/27/98	1Vel208a	29° 29' 58.9860" N	93° 41' 11.6166" W	15.70
07/27/98	1Vel208b	29° 25' 22.4785" N	93° 39' 57.5854" W	15.60
07/28/98	1Vel209a	29° 30' 00.0660" N	93° 41' 14.6133" W	16.00
07/28/98	1Vel209b	29° 25' 23.7431" N	93° 37' 06.0337" W	15.10
07/28/98	1Vel209c	29° 25' 32.9702" N	93° 44' 11.6665" W	14.30
07/29/98	1Vel210a	29° 25' 47.4161" N	93° 37' 29.4661" W	14.10
07/29/98	1Vel210b	29° 26' 07.0773" N	93° 39' 57.8240" W	15.10
07/29/98	1Vel210c	29° 26' 10.4144" N	93° 40' 00.2825" W	16.00
07/30/98	1Vel211a	29° 26' 22.1490" N	93° 37' 18.3429" W	15.00
07/30/98	1Vel211b	29° 26' 44.4178" N	93° 44' 11.0991" W	11.99
07/30/98	1Vel211c	29° 26' 34.1702" N	93° 40' 02.2447" W	15.73
07/31/98	1Vel212a	29° 26' 44.5812" N	93° 40' 05.5233" W	14.77
07/31/98	1Vel212b	29° 27' 00.9903" N	93° 40' 00.0154" W	15.60
07/31/98	1Vel212c	29° 30' 00.2921" N	93° 41' 19.0207" W	15.18
08/01/98	1Vel213a	29° 30' 05.6132" N	93° 41' 18.5958" W	16.29
08/01/98	1Vel213b	29° 27' 10.3243" N	93° 40' 01.5320" W	16.15
08/01/98	1Vel213c	29° 27' 23.4096" N	93° 40' 00.2563" W	16.00
08/01/98	1Vel213d	29° 30' 03.5541" N	93° 41' 17.5761" W	16.10
08/02/98	1Vel214a	29° 30' 21.2411" N	93° 41' 32.6858" W	13.93
08/02/98	1Vel214b	29° 30' 18.3950" N	93° 41' 34.1254" W	16.10
08/03/98	1Vel215a	29° 27' 31.2350" N	93° 40' 03.6568" W	15.50
08/03/98	1Vel215b	29° 27' 49.9963" N	93° 40' 05.3710" W	14.20
08/04/98	1Vel216a	29° 28' 14.3113" N	93° 40' 02.2964" W	15.70
08/04/98	1Vel216b	29° 28' 13.7639" N	93° 40' 02.1065" W	16.00
08/05/98	1Vel217a	29° 28' 31.4847" N	93° 40' 02.1431" W	15.60
08/05/98	1Vel217b	29° 28' 43.3336" N	93° 40' 01.7955" W	16.10
08/06/98	1Vel218a	29° 29' 01.1623" N	93° 40' 06.1103" W	16.80

Date	Primary Cast Number	Latitude	Longitude	Cast Depth
08/07/98	1Vel219a	29° 29' 09.6330" N	93° 40' 17.2253" W	16.10
08/07/98	1Vel219c	29° 29' 28.1096" N	93° 40' 32.5943" W	15.70
08/08/98	1Vel220a	29° 29' 36.4874" N	93° 40' 47.3790" W	14.40
08/08/98	1Vel220b	29° 29' 52.5482" N	93° 41' 02.4618" W	15.74
08/09/98	1Vel221a	29° 30' 42.1672" N	93° 42' 01.7578" W	15.20
08/09/98	1Vel221b	29° 30' 16.6795" N	93° 41' 30.6978" W	15.70
08/10/98	1Vel222a	29° 30' 36.7018" N	93° 41' 51.2008" W	14.00
08/10/98	1Vel222b	29° 28' 59.7541" N	93° 39' 58.5573" W	14.35
08/11/98	1Vel223a	29° 28' 41.3016" N	93° 40' 46.8205" W	11.51
08/11/98	1Vel223b	29° 28' 38.7339" N	93° 40' 59.5748" W	11.44
08/12/98	1Vel224a	29° 28' 38.6727" N	93° 40' 33.0632" W	12.13
08/12/98	1Vel224b	29° 30' 19.7877" N	93° 41' 36.6950" W	16.15
08/13/98	1Vel225a	29° 18' 42.0650" N	93° 37' 24.1212" W	14.90
08/13/98	1Vel225b	29° 26' 09.5642" N	93° 39' 59.0365" W	15.46
08/14/98	1Vel226a	29° 28' 22.4311" N	93° 40' 03.3666" W	15.32
08/17/98	1Vel231a	29° 28' 36.1679" N	93° 40' 04.8565" W	14.90
08/24/98	1Vel236a	29° 23' 30.0117" N	93° 45' 35.6725" W	14.35
08/25/98	1Vel237a	29° 28' 18.9773" N	93° 39' 59.1127" W	15.88
08/25/98	1Vel237b	29° 29' 01.9649" N	93° 40' 04.1448" W	16.15
08/26/98	2Vel238a	29° 27' 23.2029" N	93° 40' 05.1248" W	12.83
08/27/98	2Vel239a	29° 28' 45.3763" N	93° 37' 24.9747" W	10.58

Daily confidence checks were performed utilizing data from the primary and secondary velocimeters that were dropped simultaneously. The cast data was checked and the velocimeter was redropped if there were any problems. The casts were visually compared and all comparisons fell within specifications.

The velocimeter data from the primary system was loaded onto the IP400 system. The upcast was compared with the downcast and the selected profile was applied during post-processing. Every attempt was made to drop the velocimeters to 95 percent of the water depth at the deepest point of the surveyed area. Velocity casts were extrapolated to provide complete depth coverage. The velocity data were extrapolated by taking ten percent of the deepest depth, adding that value to the deepest depth, while keeping the velocity of the deepest depth constant. See Appendix J for table containing additional velocity information. *

On August 26, 1998 (DN 240) the SV^{PLUS} ceased to work. The SVP-16 was used as the primary velocimeter. The geophysical operators closely monitored the velocity at the transducer head by viewing the readings of the Smart Sensor. The readings did not fall out of specifications.

During the post-processing and data evaluation lines 846-849 were found to have discrepancies with adjacent lines. After further investigation, it was determined that an incorrect velocity had been applied. These lines were reprocessed using the correct velocity values and the lines fell within specifications.

On the *M/V Geodetic Surveyor* sound velocity data were collected daily using two Applied Microsystems SVP-16 profiling velocimeters. The Applied Microsystems SVP-16, serial number 3062, calibrated on September 2-3, 1998 (DN 245, 246) was the primary velocimeter for this sheet. The Applied Microsystems SVP-16, serial number 3045,

* Data Filed With Field Records

calibrated on May 7-8, 1998 (DN 127, 128) was the secondary velocimeter for this sheet. Calibration values were applied to the data through the AML processing software.

Date	Primary Cast Number	Latitude	Longitude	Cast Depth
09/30/98	1Vel273a	29° 17' 58.2086" N	93° 54' 01.3550" W	12.08
12/31/98	1V365a	29° 21' 18.3726" N	93° 41' 58.6819" W	13.42
12/31/98	1V365b	29° 28' 19.6859" N	93° 40' 00.0826" W	12.99
01/01/99	1V001a	29° 20' 54.3790" N	93° 42' 36.3828" W	13.42
01/05/99	1V005a	29° 27' 28.0593" N	93° 38' 41.9722" W	10.92
01/05/99	1V005b	29° 22' 08.7280" N	93° 39' 58.4409" W	12.17
01/05/99	1V005c	29° 24' 41.9502" N	93° 41' 3.7237" W	12.99

2. Instrument Corrections

The POS/MV was recalibrated on two occasions. See section G.6 for a discussion of these recalibrations.

3. Corrections determined from bar checks and vertical cast.

As mentioned in G.1 velocity casts were applied to the data within the IP400 software.

4. Static Draft

Static draft was observed daily by reading markings on the transducer pole while the vessel was stationary during velocity casts. When the static draft value differed from that previously recorded, it was noted and applied in the IP400 CONFIG file. A table containing the static draft information can be found in Appendix G.

5. Settlement and Squat

R/V Beacon

A squat/settlement survey was performed on the *R/V Beacon* on April 28, 1998 (DN 118) to meet requirements set in section 4.9.1 of the SOW. The vessel was mobilized at the Survey Boats Inc. dock in Patterson, La. and the test was performed in the Bayou Teche, in water depths ranging from 4 to 8 meters. Before mobilization, a current GPS almanac was downloaded and consulted in order to perform the survey when the maximum number of GPS satellites were available.

The vessel was mobilized with two Trimble 4000SSE dual channel GPS receivers, one mounted at the stern, and the other mounted approximately mid ship. Both receivers were mounted along the center line of the vessel. A third Trimble 4000SSE GPS receiver was set at the dockyard to be used as a base station. All receivers were set with consideration of 360 degrees of visibility in order to make best use of available GPS satellites.

Data was logged on the receivers at one-second intervals with an elevation mask of 10 degrees. GPS data was downloaded using Trimble's GPSurvey software and processed into xyz coordinates using John E. Chance and Associates version of On The Fly (OTF)

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software. This software takes collected L1 and L2 RINEX formatted GPS data strings and solves for position by differentiating carrier phase observations between the base and each rover. The OTF refers to the ability to resolve the ambiguities while the rover is in motion without returning to the reference sight for reinitialization. The solutions were then read into a spreadsheet and averaged and compared for each separate speed run.

The results of the test and comparison indicate that squat and settlement based on vessel motion will be a very small factor in determining the dynamic draft of the *R/V Beacon* at normal survey speeds. Settlement and squat test data are included in Appendix G. *

There should be no substantial difference in the results as a function the salinity difference between the Bayou Teche and Gulf of Mexico, as a relative comparison rather than an absolute comparison was performed. At the higher speeds of the squat test, the dynamics of the vessel relative to the water depth could be affected. As all of our squat and settlement factors were well below the noise limits for the survey and the survey was conducted at a slower speed, the total affect should be minimal.

M/V Geodetic Surveyor

A squat/settlement survey was performed on the *M/V Geodetic Surveyor* on August 26, 1998 (DN 238) to meet requirements set in section 4.9.1 of the NOAA Statement of Work. The vessel was mobilized at Survey Boats Inc. dock in Patterson, La. and the test was performed in the Bayou Teche, in water depths ranging from 4 to 8 meters. Before mobilization, a current GPS almanac was downloaded and consulted in order to perform the survey when the maximum number of GPS satellites were available.

The vessel was mobilized with two Ashtech Z-12 dual channel GPS receivers: one mounted at the stern and the other mounted approximately mid ship. Both receivers were mounted along the centerline of the vessel. A third Ashtech Z-12 GPS receiver was set at the dockyard to be used as a base station. All receivers were set with consideration of 360 degrees of visibility in order to make best use of available GPS satellites.

Data was logged on the receivers at one-second intervals with an elevation mask of 10 degrees. GPS data was downloaded using Ashtech's Prism software and processed into xyz coordinates using John E. Chance and Associates version of On The Fly (OTF) software. This software takes collected L1 and L2 RINEX formatted GPS data strings and solves for position by differentiating carrier phase observations between the base and each rover. The OTF refers to the ability to resolve the ambiguities, while the rover is in motion without returning to the reference sight for reinitialization. The solutions were then read into a spreadsheet and averaged and compared for each separate speed run.

The results of the test and comparison indicate that squat and settlement based on vessel motion will be a very small factor in determining the dynamic draft of the *M/V Geodetic Surveyor* at normal survey speeds. Settlement and squat test data are included in Appendix G. *

* Data Filed With Field Records

6. Heave, Roll, and Pitch

The TSS POS/MV Model 320 serial number 005 was used as the multibeam motion sensor. The accuracy of the sensor is better than 0.05 for roll, pitch measurement, 5% of heave amplitude for periods up to 10 seconds, 0.05 for true heading, and 0.75-5 meters circular error of probability (CEP) depending on reference station.

TSS Heave Compensator Model 320B serial numbers 103 and 288 were used with the single beam echosounder. The accuracy of the Model 320B is ±5 cm or a percentage of the measured range whichever is greater:

Short wave period	5% 1 to 7 seconds
Medium wave period	5% 1 to 12 seconds
Long wave period	5% 1 to 16 seconds
Extended wave period	5% 10 to 20 seconds
	9% 1 to 20 seconds

±10 meter range, and 1 cm resolution.

At the end of May, the POS/MV exhibited rare, arbitrary irregularities in roll compensation values due to firmware problems. These problems, consisting of the POS/MV holding a value for three strings, produced spikes in the data. It appears that on a few occasions, the roll sensor did not compensate the data. When the data was not compensated the values skewed. The bad points were edited through the tracing programs or manually. The problem was discussed with TSS and Applanix and solved with the installation of new EPROMS on July 4, 1998 (DN185). The affected data was minimal, as the month of June was largely unworkable. Once EPROMS were installed there were few additional irregularities seen in the data. The installation of the EPROMS did not require recalibration of the system.

On August 6, 1998 DN (218) the POS/MV roll and heave sensors failed during the collection of Line 7459 between 213459 - 213713. There is no explanation for the failure of the roll and heave sensors. This was the only time such a problem was experienced. This small gap in data should not have any affect on the final product.

The POS/MV failed in the navigation mode on several occasions. On July 18, 26, and 28 (DN 199, 207, 209) the system was reset and data collection continued. On August 4 (DN 216) the system went down twice. The first time the system was reset; the second time a full calibration was performed and data collection continued. On August 6 the system locked up again, was reset, and data were collected. Later that day the *R/V Beacon* returned to the dock and TSS technicians repaired the navigation slave board in the POS/MV and the system was recalibrated. No additional problems occurred with the POS/MV during data collection. The navigation failure had no affect on the accelerometers except for a somewhat degraded heading status. The degraded heading status fell well within specifications for the survey, plus we had the Sperry for comparison. The failure of the POS/MV had no affect on the data because we were not using it as a primary or secondary navigation sensor.

Calibration of Multibeam echo sounder

Aboard the *R/V Beacon*, the Reson multibeam echo sounder was calibrated using the IP400 software by sailing several lines in opposite directions, using different speeds, over a distinct feature. Roll, pitch, heading, and time delay biases were determined by running a patch test over a fish haven south of the field area (see details in Appendix G). *

Multibeam calibration (patch test) at 'Fish Haven', May 11, 1998 (DN 131), position Northing = 3241550, Easting = 413704

System	Time Delay	Pitch	Roll	Yaw
WADS	0.45	0	2.34	-2.00
POS/MV	-.50	0	2.34	-2.00

A similar procedure was undertaken when performing the patch test on the *M/V Geodetic Surveyor*. The results of that patch test follow:

Multibeam calibration (patch test) at 'Fish Haven', October 2, 1998 (DN 275), position Northing = 3241550, Easting = 413704

System	Time Delay	Pitch	Roll	Yaw
WADS	-0.45	0	3.15	1.6
POS/MV	2.0	0	3.15	1.6

Tide Correctors

As specified in the SOW, predicted tides from Galveston Pleasure Pier 8771510 were used as preliminary tide values. Sheet I fell within three zones of the Galveston Pleasure Pier zonation. Zone 6 has a time corrector of –12 minutes with a range ration of X1.3; Zone 7 has a time corrector of –24 minutes and a range ratio or X1.17; Zone 8 has a time corrector of –24 minutes and a range ratio or X1.13.

As specified in a memorandum to Andrew Armstrong from Michael Szabados (see Appendix F)* final verified tides from the Texas Coastal Ocean Observation Network (TCOON) Sabine Pass Offshore gauge 8771081 were used for final post-processing. The tide gauge is located at the following coordinates: 29°29.9'N, 93°38.4'W. Sheet I fell within three of the Sabine Pass Offshore tidal zones.

Tidal Zone	High Water Correction	Low Water Correction	Average Time Correction	Range Correction
G308	+ 6 mins.	-18 mins.	-6 mins.	x0.83
G309	-6 mins.	-12 mins.	-12 mins.	X0.91
G315	0 mins.	0 mins.	0 mins.	X1.00

The verified six-minute tide data from the Sabine Pass Offshore gauge was downloaded from the Oceanographic Products and Services Division (OPSD) Hydro Hot List web page (http://www.opsd.nos.noaa.gov/hydro.html). The tide information was applied to the data using the IP400 data processing software.

* Data filed with field records

The Sabine Pass Offshore gauge was down on October 1, 1998 (DN 274) during infill data collection performed on the M/V Geodetic Surveyor. Verified tides from the Galveston Pleasure Pier gauge and associated tidal zonation were used to process this data.

Investigation lines iv1-iv15, iv17-iv25, iv1001, iv1002, iv2002, and iv16A were collected with a -24 hour time difference. The time values associated with the edited data sets have been corrected. However, the raw data in the XTF format will still have the erroneous times.

H. CONTROL STATIONS See Also Evaluation Report

The Horizontal datum for the survey is North American Datum of 1983 (NAD-83). The John E. Chance and Associates, Inc. StarFix® system, provided primary navigation. StarFix® is a satellite navigation system developed by CHANCE. The CHANCE Multi-Site DGPS is the first system in the industry that implements the concept of Wide Area DGPS (WADS). The CHANCE system uses the MX 4200 GPS receiver and differential corrections from the CHANCE DGPS network transmitted via STARFIX®. The current CHANCE DGPS network covers the continental United States.

The basic idea of Long Range or Wide Area Multi-Site DGPS is to extend the range of operation of typical stand-alone DGPS systems from 300 km to at least 1000 km. The degradation of accuracy with distances longer than 300 km occurs due to the decorrelation of errors. These errors do not cancel out in the differencing process. However, the errors tend to be a linear function of the distance and frequently tend to affect the individual DGPS position solutions with opposite signs, depending on relative location of DGPS stations, with respect to satellite passes. Therefore the combined solution of several DGPS baselines has an advantage of canceling out most of the systematic errors that are present in individual stand-alone DGPS solutions. An additional important advantage of Multi-Site DGPS is a redundancy necessary for monitoring integrity of pseudo-range corrections from DGPS stations.

Correctors were computed using the Gulf Coast network of Starfix® OMNISTAR sites. These sites included Mercedes, TX, Houston, TX, Pensacola, FL, and Cocoa Beach, FL. The United States Coast Guard Differential Station at Galveston, TX was used for secondary navigation in this survey. The POS/MV & CGDGPS positioning was not applied to the survey data.

Please see Appendix C for a list of horizontal control stations.

I. HYDROGRAPHIC POSITION CONTROL

The method of sounding position control was exclusively Differential GPS (DGPS) using the CHANCE Starfix® system mentioned above.

1. The hydrographic position control met or exceeded specifications. A minimum of five satellites was used to compute positions. The mask on the GPS receivers was configured to accept data from satellites that were 10 degrees above the horizon. The age of navigation corrections never exceeded 20 seconds for the primary system and no data were collected while dead reckoning.

Hourly comparisons between the primary and secondary positioning systems were recorded and printed. Differences were typically sub-meter. Daily comparisons as required by Section 4.11.2 of the SOW are included in Appendix H. *

Primary positioning system :

Leica 12 channel GPS receiver S/N 3193
Starfix II differential receiver S/N 630080 and 630036

Correctors were computed using the Gulf Coast network of OMNISTAR sites. These sites included Mercedes, TX, Houston, TX, Pensacola, FL, and Cocoa Beach, FL. The correctors were computed using CHANCE's Wide Area Differential (WADS) software, version 2.1.

Secondary positioning system :

Leica 12 channel GPS receiver S/N 2297
CSI differential receiver (USCG DGPS) S/N Y-1016A

2. No malfunctions affecting the accuracy or operation of the positioning system occurred during the survey. PDOP (position dilution of precision) and HDOP (horizontal dilution of precision) were monitored throughout the survey. The system was set to sound an audible alarm whenever a PDOP value of 6.0 was exceeded. Survey operations were then suspended until the PDOP value became acceptable. (< 6.0). On all occasions the HDOP value stayed below 2.5.

3. No unusual atmospheric conditions were noted.

4. The signal from the Coast Guard Differential site at Galveston, TX was weak on a regular basis. At no time during the survey did this affect the comparison between primary and secondary positioning systems

5. No systematic errors were discovered during the survey.

6. Aboard the *R/V Beacon* and *M/V Geodetic Surveyor*, the multibeam transducer was the navigation center. The navigation center on the M/V Universal Surveyor was the navigation antenna. The side scan sonar offsets varied depending on the amount of cable deployed. The offsets from the navigation center to the side scan sonar tow points are shown on the figures on pages 6,9, and 10..

J. SHORELINE

Not Applicable

K. CROSS LINES

In accordance with section 4.11.3 of the SOW, the lineal kilometers of crosslines were approximately 5% of the planned total kilometers. Crosslines were run at angles between 45° and 90°. Ten percent of the total crossings were compared. The SOW requires a comparison between areas that meet accuracy requirements, and separate comparison between areas that meet accuracy requirements and portions of the swath that do not meet the accuracy requirements. An initial investigation of crossings showed that the entire

* Data Filed with Field Records

swath of data included in the final dataset for Sheet I met accuracy requirements (the three outer beams 0, 1, 2, 98, 99, and 100 were tagged and not included in the final dataset). Therefore, a single set of crossing comparisons was completed.

Comparisons show that 97.4 percent of all crossing comparison data fell within 30 centimeters and 99.88 percent of all data are within 50 centimeters.

Comparison Range	Number in Range	Percent	Cumulative Percent
0.0-0.1 m	905548	51.27	51.27
0.11-0.2 m	605014	34.25	85.52
0.21-0.3 m	209935	11.89	97.40
0.31-0.4 m	39855	2.26	99.66
0.41-0.5 m	3948	0.22	99.88
0.51-0.6 m	756	0.04	99.93
0.61-0.7 m	397	0.02	99.95
0.71-0.8 m	224	0.01	99.96
0.81-0.9 m	147	0.01	99.97
0.91-1.0 m	134	0.01	99.98
> 1 m	395	0.02	100.00
Total number of comparison points	1766353		

L. JUNCTIONS

OPR-K171-KR, Sheet I, H-10804 junctions with the southeast corner of OPR-K171-KR, Sheet H, H-10836. H-10836 is a 1:20,000 scale survey in progress. It overlaps at the northwest corner of the present survey. H-10836 data were processed using predicted tides.

Agreement between H-10804 and H-10836 is very good. The soundings generally agree within 0.20 meters. The differences in the depths may possibly be attributed to the variations in the tidal data.

No adjustments to soundings, features, or depth curves are recommended.

M. COMPARISON WITH PRIOR SURVEYS See Also Evaluation Report

Comparison with prior surveys was not required under this contract. See Section N for comparison to the nautical charts.

N.COMPARISON WITH THE CHART See Also Evaluation Report

This survey was compared with the following charts:

Chart	Scale	Edition	Date
11332	1:80,000	~~26th~~ 27th	~~January 10, 1998~~ 4/3/99
11341	1:80,000	37th	October 25, 1997

Two Dangers to Navigation were found during the survey. The first Danger to Navigation Report was submitted on July 31, 1998 (DN 212). The second Danger to Navigation Report was submitted on September 17, 1998 (DN 260) and resubmitted on February 5, 1999 (DN 036). One Danger to Navigation was submitted after investigation lines were run and post-processing was complete February 25, 1999 (DN 056). All documentation pertaining to the Dangers to Navigation are included in Appendix A. All reports are based upon Galveston Pleasure Pier predicted tides. *

Three features were labeled as obstructions on the smooth sheet that were not submitted as Dangers to Navigation. These features showed a 3 – 6 foot elevation above the seafloor, but the shoal value differed by a foot or less from the charted value. These features are located in the following locations:

SSS Line Number	MB Line Number	Latitude 29°27'47.4"	Longitude 93°41'58.8"	Shoalest Depth (ft)	Seafloor Depth (ft)	Charted Depth (ft)	Chart: GKM
232	7405	~~29° 28.21' N~~	~~93° 39.92' W~~	24	30	25	24 Obstn
245/246	7431	29° 28.41' N	93° 37.88' W	27	31	27	27 Obstn
5026/5027	lv13	29° 28.76' N	93° 41.47' W	25	28	26	25 Obstn

Chart 11332 and 11341 were compared to each other. Sounding values within the survey area were digitized from Chart 11332 and compared to sounding values on the smooth sheet at a 1:20,000 scale. The majority of the data from this survey either compared exactly to the chart or the value fell within 150 meters of the value on the chart. Fourteen values are 1-4 feet shoaler than those reported on the nautical chart. Twenty-four of the discrepancies are 1-4 feet deeper than those reported on the chart. Many of these differences are seen in the vicinity of shoal areas, such as Sabine Bank and a zone south of the anchorage area. Sand waves seen on the side scan sonar data provide evidence of bottom movement. The differences in depths could indicate possible shoal migration. In addition, a few of the sounding differences are located near the channel. The changes to the depth values may be attributed to movement of dredged material. For the soundings that lie relatively near the correct depth value, the differences may be due to the increased precision in navigation since the original data were collected.

In the northern section of the survey area, the channel depths show general agreement with chart 11341 because the dominant controlling depths at the edge of the channel are 41 feet. Moving to the south, the controlling depths increase to 42 feet and deeper. According to the Local Notices to Mariners (LNM) 30-97, 01-98, and 05-98 the Sabine Bank Channel was dredged July, 1997- February, 1998 (see Appendix F for LNMs). * It is possible that the recent dredging has attributed to the deeper depths charted within the channel.

A shoal area with a charted depth of 29 feet, seen on the edge of the Sabine Bank Channel chart 11332 (Latitude 29° 29.2' N; Longitude 93° 40.5' W), but not on chart 11341, was reported in 1973. The multibeam data set does not show shallow depths in the area of the reported shallow area, which is in agreement with chart 11341, but not chart 11332.

Concur

* Data Filed with Field Records

ITEM INVESTIGATION REPORT

Item Description (as charted): Not charted

Source: NOS AWOIS 7008 OBSTRUCTION

Charted Position: Latitude = 29° 29' 42.00" N, Longitude = 93° 39' 42.00" W

Charts Affected: 11332, 11341

INVESTIGATION

Date(s)/ Day Number(s): 12/31/98 / 365 **Survey Vessel Name:** M/V Geodetic Surveyor

Investigation Method: The objective of this investigation is to disprove AWOIS item 7008, which is stated to be remnants of a dredge tower. Most of the tower had been removed by 5/90, but to disprove this object, it was necessary to provide 400 percent side scan sonar coverage and echosounder data within a search radius of 500 meters. Our original data set, collected running east-west, provided us with 200 percent coverage of this AWOIS item. To investigate this feature we ran the shallow-water multibeam and side scan sonar at a 100-meter range scale with 80-meter line spacing, running north-south. The centerline (900 meters) was run through the AWOIS location centered at Latitude=29° 29' 42.00" N, Longitude = 93° 39' 42.00" W (N=3261165, E=435851.92). Six parallel lines flanking the central line were run to provide the coverage over the entire 500-meter search radius.

Surveyed Position (NAD 83): Item not seen.

Position Determined By: Item not seen.

Investigation Summary: 4. AWOIS 7008

The search radius of 500 meters for AWOIS 7008 was completely insonified with 400% side scan sonar coverage at a 100 meter range. Line numbers iv19-iv25 were run during the investigation. No contacts were discovered within the investigated area. There was no evidence of an obstruction on the multibeam. Concur w/ clarification - Not currently charted

No change in Charting is Recommended

See attached E-MAIL, LPD 11/8/00

Subject: H10804, AWOIS 7008
Date: Mon, 31 Jan 2000 12:45:15 EST
From: "Eric Sipos" <Eric.Sipos@noaa.gov>
Reply-To: <Eric=Sipos%NCG244%noaa@mhc.rdc.noaa.gov>
To: <Maurice.Hickson@noaa.gov>
CC: <Dave.Neander@noaa.gov>,
"Robert R Hill" <Robert=R=Hill%NCG244%noaa@mhc.rdc.noaa.gov>

In regard to FUGRO H10804, Sheet "I", AWOIS 7008 (remnants of dredge tower), AWOIS position of 29-28-42.83, 93-39-42.58 (NAD83):

I have just taken another look at the raw SSS lines listed in the DR's Item Investigation Report page 29 (iv lines 19-25). They were actually run in the correct location ... centered at 29-28-42, 93-39-42. In addition, the records showed no contacts of any kind.

I did not look at the corresponding SWMB lines again because I do not have them loaded on the SGI. I could load them but it would take a few hours to convert them and I do not think that it is truly necessary. I recall looking at them several months ago and my notes say that I did not see any contacts.

So ... it all amounts to the DR having a typo. "29-29-42" should be "29-28-42". Can you make a pen and ink change to correct it ?? We can revise our copy here. In any event, based on my review of the raw records, I think that item 7008 is adequately disproved and should remain off of the chart. (It was taken off of the chart by Chart Letter CL651/90 -COE when the dredge towers and associated debris were reported removed to 5 ft below the mud line.)

We should have caught this typo here at AHB, in particular ...me. Typo's from the contractors have been a problem. When we find them, we point them out so that they learn from them and work to prevent them.

ITEM INVESTIGATION REPORT

Item Description (as charted): N/A

Source: SSS Contact 98149131531

Charted Position: N/A

Charts Affected: 11332, 11341

INVESTIGATION

Date(s)/ Day Number(s): 12/31/98 / 365 **Survey Vessel Name:** M/V Geodetic Surveyor

Investigation Method: Side scan sonar at 50m range and shallow water multibeam were run. A 250 meter search radius and 15 meter line spacing was used to investigate the object centered at Latitude = 29° 21' 20.6835" N, Longitude = 93° 41' 51.4578" W (N= 3247602.31, E=432284.25). One line was run up the long axis of the feature with two parallel lines flanking the central line, and three perpendicular to the long-axis.

Surveyed Position (NAD 83): Not found

Position Determined By: Not found

Investigation Summary: 1. Line 100

This object was documented during the original survey on both side scan sonar and multibeam data. It appeared as a few parallel lines, and small. It did not reach a height off bottom greater than 1 meter, but appeared to be a man-made object.

Line numbers iv1-iv6, iv1001, iv1002, and iv2002 were run during the investigation. Side scan sonar and multibeam data collected during the investigation did not show evidence of the previously documented contact. Concur

No change in charting is recommended

ITEM INVESTIGATION REPORT

Item Description (as charted): N/A

Source: SSS Contact 98204232100

Charted Position: N/A

Charts Affected: 11332, 11341

INVESTIGATION

Date(s)/ Day Number(s): 12/31/98 / 365 **Survey Vessel Name:** M/V Geodetic Surveyor

Investigation Method: Shallow-water multibeam was run with a 100 meter search radius. Ten meter line spacing was used to investigate the object centered at Latitude = 29° 28' 12.3077" N, Longitude = 93° 39' 55.3573" W (N= 3260253.18, E=435486.97). One line was run up the long axis of the feature with two parallel lines flanking the central line, and three lines perpendicular to the long-axis.

Surveyed Position (NAD 83): 29° 28' 12.3077"N, 93° 39' 55.4895"W (N=3260253.20, E=435483.41)

Position Determined By: Shallow-water multibeam data

Investigation Summary: 2. Line 241

This object was documented during the original survey on both side scan sonar and multibeam data. It appeared to reach a height of 3.63 meters off bottom, however the height off bottom was questionable due to the presence of fish interfering with the multibeam data. Line numbers iv7-iv12 were run during the investigation. Line iv8 produced the best image of the contact, which rose 2.25 meters above the seafloor. A least-depth value of 32 feet is depicted on the Smooth Sheet. The feature was located at 29° 28' 12.3077" N, 93° 39' 55.4895" W (N=3260253.20, E=435483.41). Concur

Chart 32 Obstn
& Delete notation "PA"

ITEM INVESTIGATION REPORT

Item Description (as charted): N/A

Source: SSS Contacts 98223122950, 98223130200

Charted Position: N/A

Charts Affected: 11332, 11341

INVESTIGATION

Date(s)/ Day Number(s): 12/31/98 / 365 **Survey Vessel Name:** M/V Geodetic Surveyor

Investigation Method: Shallow-water multibeam was run with a 100 meter search radius. Ten meter line spacing was used to investigate the object centered at Latitude = 29° 28' 45.5142" N, Longitude = 93° 41' 28.4449" W (N= 3261289.84, E=432985.89). One line was run up the long axis of the feature with two parallel lines flanking the central line, and three lines perpendicular to the long-axis.

Surveyed Position (NAD 83): 29° 28' 45.41" N, 93° 41' 28.4609" W (N=3261286.48, E=432985.44)

Position Determined By: Shallow-water multibeam data

Investigation Summary: 3. Line 5026/5027 (1070/1071)

This object was documented during the original survey on both side scan sonar and multibeam data. It appeared to reach a height greater than 2 meters off bottom, however the height off bottom was questionable due to the presence of fish interfering with the multibeam data. Line numbers iv13-iv15, iv16A, iv 17, and iv18 were run during the investigation. Line iv13 produced the best image of the contact, which rose 1.11 meters above the seafloor. A least-depth value of 25 feet is depicted on the Smooth Sheet. The feature was located at 29° 28' 45.41" N, 93° 41' 28.4609" W (N=3261286.48, E=432985.44). Concur

Chart 25 Obstn

(same as 25 Obstn on page 28)

O. <NOT USED BY CONTRACTOR>

P. AIDS TO NAVIGATION

There are 14 U.S. Coast Guard maintained aids to navigation on Sheet I. The *R/V Beacon* was used to position all buoys. The center of navigation was moved to the bow of the vessel, the vessel nosed up to the buoys, and a fix was taken. All buoys are channel markers and are on station and in agreement with Charts 11332 and 11341, and with Light List, Volume IV, Gulf of Mexico, 1998 COMDTPUB P16502.4. These aids appear adequate to serve their intended purposes.

Buoy Name	Characteristic	Survey Position	Charted Position
Lighted Whistle Buoy SB	Mo (A) W Fl W 2.5^{s}	29° 25' 0.8833" N 93° 40' 0.7469" W	29° 25.0' N 93° 40.0' W
Lighted Buoy 1	Fl G 4^{s}	29° 26' 5.0956" N 93° 40' 6.8039" W	29° 26.1' N 93° 40.1' W
Lighted Buoy 2	Fl R 4^{s}	29° 26' 6.1358" N 93° 39' 55.4135" W	29° 26.1' N 93° 39.9' W
Lighted Buoy 3	Fl G 6^{s}	29° 27' 7.5820" N 93° 40' 7.2034" W	29° 27.1' N 93° 40.1' W
Lighted Buoy 4	Fl R 6^{s}	29° 27' 7.6940" N 93° 39' 55.5362" W	29° 27.1' N 93° 39.9' W
Lighted Gong Buoy 5	Fl G 2.5^{s}	29° 28' 13.0575" N 93° 40' 6.0000" W	29° 28.2' N 93° 40.1' W
Lighted Buoy 6	Fl R 2.5^{s}	29° 28' 13.3313" N 93° 39' 55.4546" W	29° 28.2' N 93° 39.9' W
Lighted Buoy 7	Q G	29° 28' 42.8399" N 93° 40' 5.8423" W	29° 28.7' N 93° 40.1' W
Lighted Bell Buoy 8	Q R	29° 28' 56.7665" N 93° 39' 55.0773" W	29° 28.9' N 93° 39.9' W
Lighted Buoy 9	Q G	29° 29' 1.6899" N 93° 40' 15.0374" W	29°29.0' N 93° 40.2' W
Lighted Gong Buoy 11	Fl G 2.5^{s}	29° 29' 21.4206" N 93° 40' 39.4078" W	29° 29.3' N 93° 40.6' W
Lighted Buoy 12	Fl R 2.5^{s}	29° 29' 26.7127" N 93° 40' 28.0722" W	29° 29.4' N 93° 40.4' W
Lighted Buoy 13	Fl G 4^{s}	29° 30' 15.6181" N 93° 41' 40.9817" W	29° 30.3' N 93° 41.7' W
Lighted Buoy 14	Fl R 4^{s}	29° 30' 23.9612" N 93° 41' 32.2374" W	29° 30.4' N 93° 41.5' W

There are several platforms and pipelines within the survey area. It is required that pipelines in the survey area be buried. There is no evidence that the pipelines on Charts 11332 and 11341 are exposed or suspended.

The *R/V Beacon* was used to position all structures. The center of navigation was moved to the bow of the vessel, the vessel nosed as close as possible to the structure, and a fix was taken. The *M/V Universal Surveyor* confirmed structure locations and investigated all

structures found on Charts 11332 and 11341. All structures found within the survey area are provided in the table below. The only change in the structures below that was found in the Local Notice to Mariners (LNM 46-97), was platform "Apache-SA-12-A" which had the Phoenix #1 rig on location when the structure was confirmed by the *M/V Universal Surveyor*. For additional information, see the geophysical logs in Separate 1 filed with original data.

Platform Name	Owner	Survey Position	Charted Position
WC 118-01 (3 Wells)	Phillips Petroleum	29° 29' 56.8629" N 93° 38' 24.6288" W	29° 29.93' N 93° 38.40' W
WC 118-17	Phillips Petroleum	29° 30' 51.2436" N 93° 39' 39.3433" W	29° 30.85' N 93° 39.65' W
WC 163-1	Ensearch	29° 22' 27.6102" N 93° 38' 00.9867" W	29° 22.40' N 93° 38.00' W
WC 163-2	Force Energy	29° 22' 59.9853" N 93° 38' 12.8878" W	29° 23.00' N 93° 38.20' W
WC 163-3	Force Energy	29° 23' 00.0459" N 93° 38' 12.4352" W	
WC 289A	Ensearch	29° 20' 42.3766" N 93° 38' 04.0865" W	29° 20.70' N 93° 30.20' W
SA 12 A (not on 11341)	Phoenix #1 Drill Rig	29° 30' 25.8554" N 93° 39' 58.8033" W	29° 30.40' N 93° 39.90' W
SA 13 AD Connected to AP	A. B. P.	29° 28' 38.6932" N 93° 38' 21.9062" W	29° 28.60' N 93° 38.30' W
SA 13 AP Connected to AD, BD	A. B. P.	29° 28' 39.9476" N 93° 38' 19.4845" W	
SA 13 BD Connected to AP	A. B. P.	29° 28' 41.8429" N 93° 38' 18.0998" W	

The structures in the table below were plotted from Charts 11332 and 11341. These structures were not located during an investigation by the *M/V Universal Surveyor*.

Platform Name	Charted Position
SA 13-2 *	29° 28.10' N 93° 37.90' W
PH WC 118-9 *	29° 29.60' N 93° 38.10' W
Platform NW *	29° 30.35' N 93° 44.70' W
Platform NE 1 *	29° 30.30' N 93° 38.35' W
Platform NE 2 **	29° 29.93' N 93° 38.40' W

* Remove from Chart

** Same as Platform "WC 118-01"

Q. STATISTICS

	R/V Beacon	M/V Geodetic Surveyor	M/V Universal Surveyor	Total
Lineal nautical miles of sounding data (side scan sonar acquisition concurrent with multibeam acquisition or side scan sonar acquisition alone)	1776	6	205	1987
Lineal nautical miles of sounding data (multibeam with out concurrent side scan)	2439	33	-	2472
Square nautical miles	58	-	-	58
Number of velocity casts	136	7	0	143
Number of supplemental tide stations installed	0	0	0	0
Number of horizontal control stations occupied/established	0	0	0	0
Number of items investigated	0	4	0	4

R. MISCELLANEOUS

In some areas, sand waves were noted on the side scan sonar providing evidence of bottom currents. In addition, there was an abundance of drag marks throughout the survey area and occasional can holes also documented on the side scan sonar records. These seafloor deformations may rise above the seafloor, but may not necessarily be hazardous to the mariner.

Bottom samples were collected and described, but were not retained in accordance with section 7.1 of the SOW. A table of the sediment descriptions is located in Separate 4 included with survey data

S. RECOMMENDATIONS

While no present construction or dredging will affect the results of this survey, the transient nature of the oil industry in the area may result in the addition of new platforms or removal of existing platforms.

T. REFERRAL TO REPORTS

None noted.

APPENDIX A

DANGER TO NAVIGATION REPORTS

John E. Chance and Associates, Inc.
200 Dulles Drive
Lafayette, Louisiana 70506
U.S.A.
Phone : 318-265-6200
Telefax: 318-268-3221

Fax Message No

Date **7/31/98**

Page **1** of **3**

To **U.S. Coast Guard Group- New Orleans**

Fax No **504-589-6654**

Attn **Petty Officer Caffkey**

CC:To

Fax No

Attn

From **Jana L. DaSilva**

File

Subject **Danger to Navigation**

Dear Sir:

While conductiing hydrographic survey operations in the approaches to Sabine Pass, Texas, John E. Chance and Associates discovered an obstruction. The following pages contain the Danger to Navigation Report and a section of Chart 11341 indicating the postion of this danger.

Differential GPS, side scan sonar, and multibeam sonar were used to determine the position and depth. These data are preliminary and subject to office review. When we return to port, I will send a copy in the mail to your attention.

Sincerely,

Jana L. DaSilva
Lead Hydrographer

JOHN E. CHANCE & ASSOCIATES

August 6, 1998

Commander (OAN)
Eighth Coast Guard District
Hale Boggs Federal Building
New Orleans, LA 70130-3396

ATTN: Petty Officer Steve Caskey

RE: Danger to Navigation
Project OPR-K171-KR
Sheet I
H-10804

Dear Sir:

This letter is a follow-up to the fax sent on July 31, 1998.

While conducting hydrographic survey operations in the approaches to Sabine Pass, Texas, John E. Chance and Associates discovered an obstruction. The following pages contain the Danger to Navigation Report and a section of Chart 11341 indicating the position of this danger.

Differential GPS, side scan sonar, and multibeam sonar were used to determine the position and depth. These data are preliminary and subject to office review.

Please check the contents if this shipment and return a signed and dated copy of this letter to the fax number below.

Sincerely,

Jana L. DaSilva
Lead Hydrographer
John E. Chance and Associates

Enclosures

cc: David Neander

Received By:_____

Date:_____

200 DULLES DRIVE LAFAYETTE, LA 70506 PH# (318) 237-1300 FAX# (318) 268-3221

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry Number: H-10804

State: Texas

General Locality: Gulf of Mexico

Sublocality: 18 miles SSE of Sabine Pass

Project Number: OPR-K171-KR

The following item was found during hydrographic survey operations:

Object Discovered: Obstruction

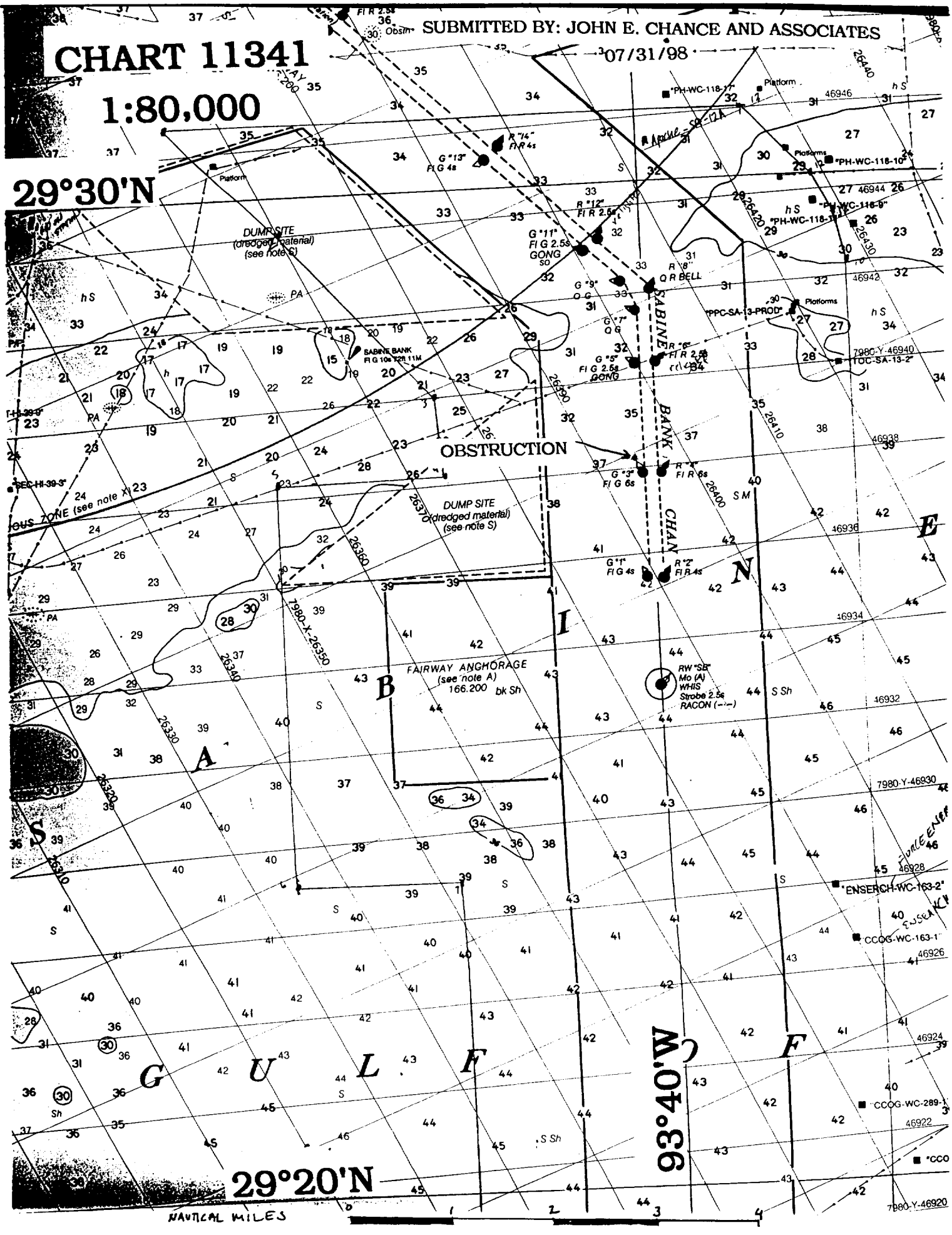
Covered 35 feet corrected to Mean Lower Low Water using ~~predicted tide~~ Approved Tide correctors. Surrounding seafloor is at 38 feet corrected to Mean Lower Low Water using predicted tide correctors.

Affected Nautical Charts:

Chart Number	Map Edition		Reported Depth	Charted Horiz. Datum	Geographic Position	
	Number	Date			Latitude	Longitude
11341	37	10/25/97	35	NAD 83	29° 27' 16.7"N	093°40' 11.8"W
11332	26	01/10/98	35	NAD 83	29° 27' 16.7"N	093°40' 11.8"W

No change in charting is recommended

SUBMITTED BY: JOHN E. CHANCE & ASSOCIATES JULY 31, 1998


SUBMITTED BY: JOHN E. CHANCE AND ASSOCIATES
07/31/98
CHART 11341
1:80,000
29°30'N
29°20'N
93°40'W
OBSTRUCTION
SABINE BANK CHANNEL
DUMP SITE (dredged material) (see note S)
DUMP SITE (dredged material) (see note S)
FAIRWAY ANCHORAGE (see note A) 166.200
SABINE BANK Fl G 10s 72ft 11M
R "14" Fl R 4s
G "13" Fl G 4s
R "12" Fl R 2.5s
G "11" Fl G 2.5s GONG
R "8" QR BELL
G "9" Q G
G "7" Q G
R "6" Fl R 2.5s
G "5" Fl G 2.5s GONG
G "3" Fl G 6s
R "4" Fl R 6s
G "1" Fl G 4s
R "2" Fl R 4s
RW "SE" Mo (A) WHIS Strobe 2.5s RACON (—·—)
"PH-WC-118-11"
"PH-WC-118-10"
"PH-WC-118-9"
"PPC-SA-13-PROD"
7980-Y-46940
TOC-SA-13-2"
"ENSERCH-WC-163-2"
CCOG-WC-163-1
CCOG-WC-289-1
7980-Y-46930
7980-Y-46920
Platform
Platforms
PA
S Sh
bk Sh
NAUTICAL MILES
0 1 2 3 4

JOHN E. CHANCE & ASSOCIATES, INC.

September 17, 1998

Commander (OAN)
Eighth Coast Guard District
Hale Boggs Federal Building
New Orleans, LA 70130-3396

Attention: Petty Officer Steve Caskey

Dear Sir:

While conducting hydrographic survey operations in the approaches to Sabine Pass, Texas, John E. Chance and Associates discovered an obstruction. The enclosed pages contain the Danger to Navigation Report and a section of Chart 11341 indicating the position of this danger.

Differential GPS, side scan sonar, and multibeam sonar were used to determine the position and depth. These data are preliminary and subject to office review.

Please check the contents of this shipment for accuracy and return a signed and dated copy of this transmittal letter to acknowledge receipt. You may send the transmittal to my attention via mail or FAX at the address or FAX number below.

Sincerely,

Jana L. DaSilva
Lead Hydrographer

Enclosures
cc: David Neander

Recd. by: _____

Date: _____

200 DULLES DRIVE, LAFAYETTE, LOUISIANA 70506 PH#: 318-237-1300, FAX#: 318-237-0011

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry Number: H-10804

State: Texas

General Locality: Gulf of Mexico

Sublocality: 18 miles SSE of Sabine Pass

Project Number: OPR-K171-KR

The following item was found during hydrographic survey operations:

Object Discovered: Obstruction

Approved

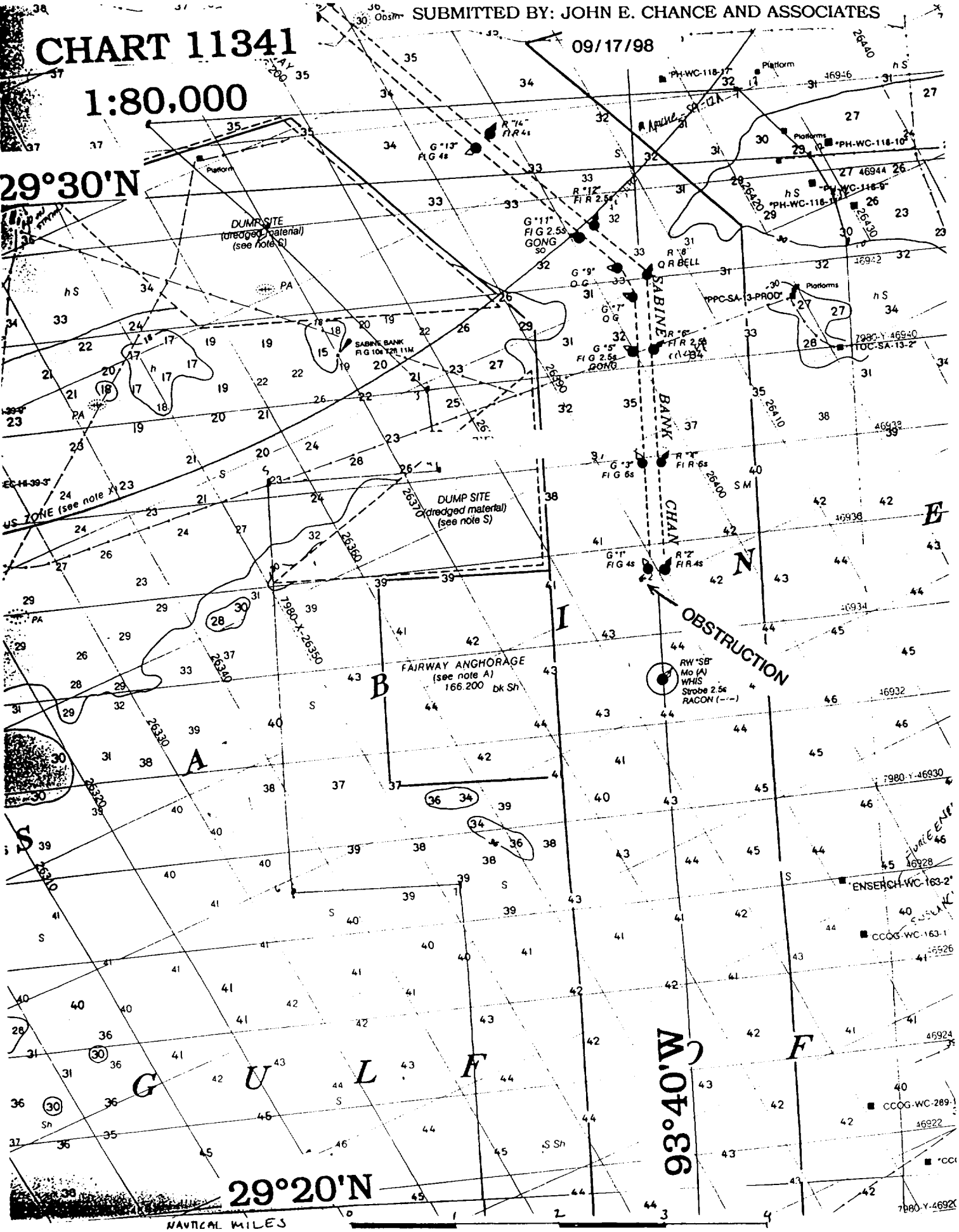
Covered 38 feet corrected to Mean Lower Low Water using ~~predicted~~ tide correctors. Surrounding seafloor is at 44 feet corrected to Mean Lower Low Water using predicted tide correctors.

Affected Nautical Charts:

Chart Number	Map Edition		Reported Depth	Charted Horiz. Datum	Geographic Position	
	Number	Date			Latitude	Longitude
11341	37	10/25/97	~~42~~ 38	NAD 83	29° 26' 1.71"N	093°40' 9.06"W
11332	26	01/10/98	~~42~~ 38	NAD 83	29° 26' 1.71"N	093°40' 9.06"W

No change in charting is recommended

SUBMITTED BY: JOHN E. CHANCE AND ASSOCIATES SEPTEMBER 17, 1998


SUBMITTED BY: JOHN E. CHANCE AND ASSOCIATES
CHART 11341
1:80,000
09/17/98
29°30'N
29°20'N
93°40'W
DUMP SITE (dredged material) (see note S)
DUMP SITE (dredged material) (see note S)
SABINE BANK
CHANNEL
OBSTRUCTION
FAIRWAY ANCHORAGE (see note A) 166.200 bk Sh
RW "SB" Mo (A) WHIS Strobe 2.5s RACON (—·—)
US ZONE (see note X)
PA
hS
Platform
Platforms
PH-WC-118-10
PPC-SA-13-PROD
TOC-SA-13-2
ENSERCH-WC-163-2
CCOG-WC-163-1
CCOG-WC-289-1
G "13" FlG 4s
R "14" FlR 4s
R "12" Fl R 2.5s
G "11" FlG 2.5s GONG
G "9" O G
R "8" Q R BELL
G "7" O G
R "6" Fl R 2.5s
G "5" FlG 2.5s GONG
G "3" FlG 6s
R "4" FlR 6s
G "1" FlG 4s
R "2" FlR 4s
SABINE BANK FlG 10s 22ft 11M
NAUTICAL MILES
0
1
2
3
4
G U L F
I N T E

JOHN E. CHANCE & ASSOCIATES, INC.

February 5, 1999

Commander (OAN)
Eighth Coast Guard District
Hale Boggs Federal Building
New Orleans, LA 70130-3396

Attention: Petty Officer Steve Caskey

Dear Sir:

This is a correction to a Danger to Navigation Report submitted on September 17, 1998. While conducting hydrographic survey operations in the approaches to Sabine Pass, Texas, John E. Chance and Associates discovered an obstruction. The enclosed pages contain the Danger to Navigation Report and a section of Chart 11341 indicating the position of this danger.

Differential GPS, side scan sonar, and multibeam sonar were used to determine the position and depth. These data are preliminary and subject to office review.

Sincerely,

Jana L. DaSilva
Lead Hydrographer

Enclosures
cc: David Neander

200 DULLES DRIVE, LAFAYETTE, LOUISIANA 70506 PH#: 318-237-1300, FAX#: 318-237-0011

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry Number: H-10804

State: Texas

General Locality: Gulf of Mexico

Sublocality: 18 miles SSE of Sabine Pass

Project Number: OPR-K171-KR

The following item was found during hydrographic survey operations:

Object Discovered: Obstruction

Covered 38 feet corrected to Mean Lower Low Water using ~~predicted~~ Approved tide correctors. Surrounding seafloor is at 44 feet corrected to Mean Lower Low Water using predicted tide correctors.

Affected Nautical Charts:

Chart Number	Map Edition		Reported Depth	Charted Horiz. Datum	Geographic Position	
	Number	Date			Latitude	Longitude
11341	37	10/25/97	38	NAD 83	29° 26' 1.71"N	093°40' 9.06"W
11332	26	01/10/98	38	NAD 83	29° 26' 1.71"N	093°40' 9.06"W

No change in charting is recommended

SUBMITTED BY: JOHN E. CHANCE AND ASSOCIATES SEPTEMBER 17, 1998

JOHN E. CHANCE & ASSOCIATES, INC.

February 25, 1999

Commander (OAN)
Eighth Coast Guard District
Hale Boggs Federal Building
New Orleans, LA 70130-3396

Attention: Petty Officer Steve Caskey

Dear Sir:

Upon review of hydrographic survey data in the approaches to Sabine Pass, Texas, John E. Chance & Associates, Inc. discovered an obstruction. The enclosed pages contain the Danger to Navigation Report and a section of Chart 11341 indicating the position of this danger.

Differential GPS, side scan sonar, and multibeam sonar were used to determine the position and depth.

Sincerely,

Jana L. DaSilva
Lead Hydrographer

Enclosures
cc: David Neander

200 DULLES DRIVE, LAFAYETTE, LOUISIANA 70506 PH#: 318-237-1300, FAX#: 318-237-0011

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry Number: H-10804

State: Texas

General Locality: Gulf of Mexico

Sublocality: 18 miles SSE of Sabine Pass

Project Number: OPR-K171-KR

The following item was found during hydrographic survey operations:

Object Discovered: Obstruction

Covered 32 feet corrected to Mean Lower Low Water using verified tide correctors. Surrounding seafloor is at 37 feet corrected to Mean Lower Low Water using verified tide correctors.

Affected Nautical Charts:

Chart Number	Map Edition		Reported Depth	Charted Horiz. Datum	Geographic Position	
	Number	Date			Latitude	Longitude
11341	37	10/25/97	32	NAD 83	29° 28' 12.31"N	093°39'55.49"W
11332	26	01/10/98	32	NAD 83	29° 28' 12.31"N	093°39'55.49"W

Revise charted 32' Obstn PA to 32' Obstn

SUBMITTED BY: JOHN E. CHANCE AND ASSOCIATES February 25, 1999

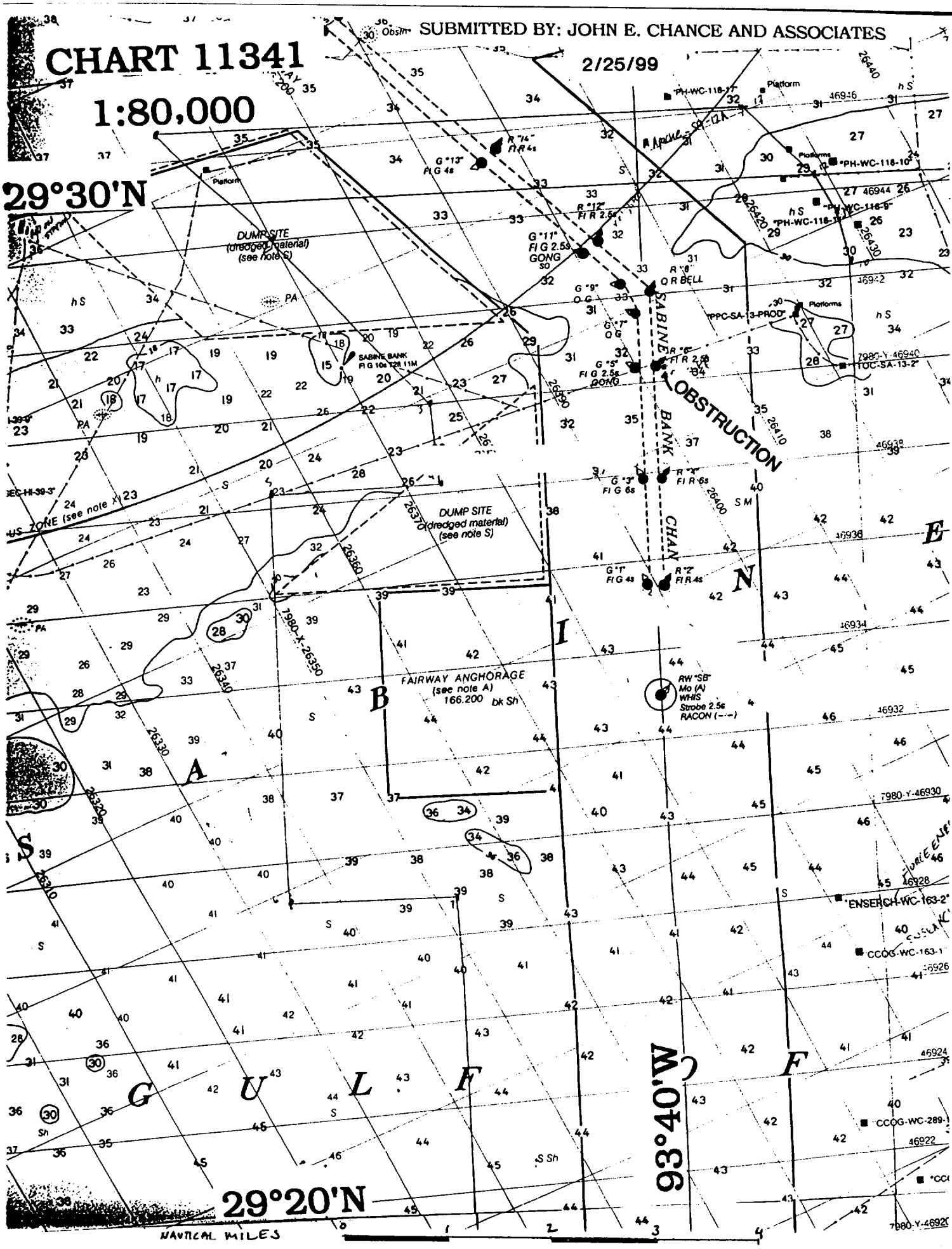


CHART 11341
1:80,000
SUBMITTED BY: JOHN E. CHANCE AND ASSOCIATES
2/25/99
29°30'N
29°20'N
93°40'W
DUMP SITE (dredged material) (see note S)
DUMP SITE (dredged material) (see note S)
SABINE BANK
SABINE BANK CHANNEL OBSTRUCTION
FAIRWAY ANCHORAGE (see note A) 166.200 bk Sh
US ZONE (see note X)
GULF
Platform
PH-WC-118-10
PPC-SA-13-PROD
TOC-SA-13-2
ENSERCH-WC-163-2
CCOG-WC-163-1
CCOG-WC-289-
NAUTICAL MILES

LETTER OF APPROVAL

REGISTRY NO. H-10804

This report and the accompanying smooth sheet are respectfully submitted.

Field operations contributing to the accomplishment of survey H-10804 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and smooth sheet have been closely reviewed and are considered complete and adequate as per the Statement of Work.

Jana L. DaSilva
Hydrographer
John E. Chance & Associates, Inc.
March 1, 1999

NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10804

Name on Survey	A ON CHART NO. 1152	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
GULF OF MEXICO	X		X							1
SABINE BANK	X									2
SABINE BANK CHANNEL	X									3
SABINE PASS (title)	X		X							4
TEXAS (title)	X		X							5
										6
										7
										8
										9
										10
										11
										12
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										23
										24
										25

Approved

Chief, Coastal Mapping Branch

JUN 29 1999

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 61-29
(12-71)

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

REFERENCE NO.

N/CS33-69-00

LETTER TRANSMITTING DATA

DATA AS LISTED BELOW WERE FORWARDED TO YOU BY *(Check):*

☐ ORDINARY MAIL ☐ AIR MAIL

☐ REGISTERED MAIL ☒ EXPRESS

☐ GBL *(Give number)* _____

TO:

CHIEF, DATA CONTROL GROUP, N/CS3x1
NOAA/NATIONAL OCEAN SERVICE
STATION 6815, SSMC3
1315 EAST-WEST HIGHWAY
SILVER SPRING, MARYLAND 20910-3282

DATE FORWARDED

OCTOBER 12,2000

NUMBER OF PACKAGES

ONE TUBE

NOTE: A separate transmittal letter is to be used for each type of data, as tidal data, seismology, geomagnetism, etc. State the number of packages and include an executed copy of the transmittal letter in each package. In addition the original and one copy of the letter should be sent under separate cover. The copy will be returned as a receipt. This form should not be used for correspondence or transmitting accounting documents.

H10804

TEXAS, GULF OF MEXICO, 18 MILES SSE OF SABINE PASS

(ONE) TUBE CONTAINING THE FOLLOWING:

1 SMOOTH SHEET FOR SURVEY H10804
1 ORIGINAL DESCRIPTIVE REPORT
1 DRAWING HISTORY FORMS (NOAA FORM #76-71) FOR NOS CHART 11332
1 RECORD OF APPLICATION TO CHART FORM (NOAA FORM #75-96)
1 H-DRAWING FOR NOS CHART 11332 ON MYLAR
2 COMPOSITE DRAWINGS FOR NOS CHART 11332

FROM: *(Signature)*

ROBERT R. HILL Robert R. Hill

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

ATLANTIC HYDROGRAPHIC BRANCH
N/CS33
439 WEST YORK STREET
NORFOLK, VA 23510-1114

NOAA FORM 61-29 SUPERSEDES FORM C & GS 413 WHICH MAY BE USED.

*U.S.GPO:1983-0-664-006/1192

10/11/2000

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H10804

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	21498
NUMBER OF SOUNDINGS	21498

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	44.0	04/26/1999
VERIFICATION OF FIELD DATA	65.0	06/11/1999
QUALITY CONTROL CHECKS	0.0	
EVALUATION AND ANALYSIS	2.0	
FINAL INSPECTION	33.0	10/18/1999
COMPILATION	244.0	10/06/2000
TOTAL TIME	388.0	

ATLANTIC HYDROGRAPHIC BRANCH APPROVAL 08/30/2000

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR H10804 (1998)

This Evaluation Report has been written to supplement and/or clarify the original Descriptive Report. Sections in this report refer to the corresponding sections of the Descriptive Report.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

NADCON, version 2.10
CARIS HIPS/SIPS
AutoCAD, Release 14
MicroStation 95, version 5.05
I/RAS B, version 5.01

The smooth sheet was plotted using an Hewlett-Packard DesignJet 2500CP plotter.

H. CONTROL STATIONS

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD 83). Office processing of this survey is based on these values. The smooth sheet has been annotated with ticks showing the computed mean shift between the NAD 83 and the North American Datum of 1927 (NAD 27).

To place this survey on the NAD 27, move the projection lines .845 seconds (26.027 meters or 1.3 mm at the scale of the survey) north in latitude, and .588 seconds (15.841 meters or 0.79 mm at the scale of the survey) west in longitude.

L. JUNCTIONS

H10836 (1998) to the north west

A standard junction could not be effected with survey H10836 (1998). The note ADJOINS has been shown on the present survey smooth sheet. Any adjustments to the depth curves in the junctional area will have to be made on the chart during compilation. There are no junctional surveys to the north, south, or east. Present survey depths are in harmony with the charted hydrography to the north, south, east and to the west.

M. COMPARISON WITH PRIOR SURVEYS

A comparison with prior surveys was not done during office processing in accordance with section 4. of the memorandum titled "Changes to Hydrographic Survey Processing," dated May 24, 1995.

N. COMPARISON WITH CHART 11332 (27th Edition, Apr 3/99) 11341 (37th Edition, Oct 25/97)

Hydrography

The charted hydrography originates with the prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in section N. of the Descriptive Report. Attention is directed to the following:

An uncharted submerged obstruction with a least depth of 38-ft in latitude 29°22'40.35"N, longitude 93°38'47.30"W, was located by the present survey. This feature was not addressed in the Descriptive Report by the hydrographer. It is recommended that a submerged obstruction with a least depth of 38-ft be charted in latitude 29°22'40.35"N, longitude 93°38'47.30"W, as shown on the present survey.

The present survey is adequate to supersede the charted hydrography within the common area.

Dangers to Navigation

Danger to Navigation reports were submitted to Commander(OAN), Eighth Coast Guard District, New Orleans, Louisiana for inclusion in the Local Notice to Mariners, and to the Marine Chart Division, N/CS3x1, Silver Spring, Maryland. Copies of the reports are appended to the Descriptive Report.

Controlling Depths

The conflicts between the charted controlling depths and the present survey are adequately addressed in section N. of the descriptive report.

P. AIDS TO NAVIGATION

Fourteen floating aids to navigation were located by this

survey and should be charted as shown on the present survey.

R. MISCELLANEOUS

Chart compilation was done by Atlantic Hydrographic Branch personnel, in Norfolk, Virginia. Compilation data will be forwarded to Marine Chart Division, Silver Spring, Maryland.

The following NOS Charts are used for compilation of the present survey:

11332 (27th ED., Apr 3/99)

Robert Snow

Robert Snow
Cartographic Technician
Verification of Field Data
Evaluation and Analysis
Line-item budget

APPROVAL SHEET
H10804

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The digital data have been completed and all revisions and additions made to the smooth sheet during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Robert R. Hill Jr. Date: 8-29-00

Robert R. Hill Jr.
Cartographer
Atlantic Hydrographic Branch

I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

Andrew L. Beaver Date: 8/30/00

Andrew L. Beaver,
LCDR, NOAA
Chief, Atlantic Hydrographic Branch

****

Final Approval:

Approved: Samuel P. de Bow Dated: 11/8/00

Samuel P. De Bow, Jr.
Captain, NOAA
Chief, Hydrographic Surveys Division

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H10804

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.

1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
11332	9-15-00	Robert Hill	Full ~~Part~~ ~~Before~~ After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
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			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.