H10894

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey	Hydrographic Side Scan Sonar/Multibeam
Field No.	Sheet "N"
Registry No.	H10894

LOCALITY

State	Texas
General Locality	Gulf of Mexico
Locality	21 NM Southwest of Sabine Pass

1999-2000

CHIEF OF PARTY
Mark Melancon

NOAA FORM 77-28 (11-72)

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

REGISTER NO.

H10894

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 N

State: Texas

General locality: Gulf of Mexico

Locality: 21 Miles Southwest of Sabine Pass

Scale: 1:20,000 Date of survey: June 03, 1999 - October 17, 1999

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

Vessel: M/V Geodetic Surveyor

Chief of party: Mark Melancon (Fugro GeoServices, Inc.)

Surveyed by: C. Pastor, J. Walling, K. Gabik, M. White, D. King, J. Fuselier, W. Smith, M. Bridges, S. Belaire, K. Deshotel, L. Wootan, R. Frentz, J. Guillory, B. Newsome, M. Duos, R. Pickett, M. Harris, J. Boudreaux, K. Swart, S. Cade

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: Automated plot by: HP DESIGNJET 750C

Verification by:

Soundings in fathoms (feet) at MLW (MLLW)

REMARKS: Contract Number : 50 -DGNC -8-90026

Contractor Name: Fugro GeoServices, Inc. (formerly John E. Chance & Associates, Inc.)

Contractor Address: 200 Dulles Drive Lafayette, LA 70506

Time Reference: UTC

Horizotal Datum: NAD83

Positioning: John E. Chance Starfix

Notes in the Descriptive Report were made during Office processing!

AWOIS # SURF # BY MBH ON 3/13/01

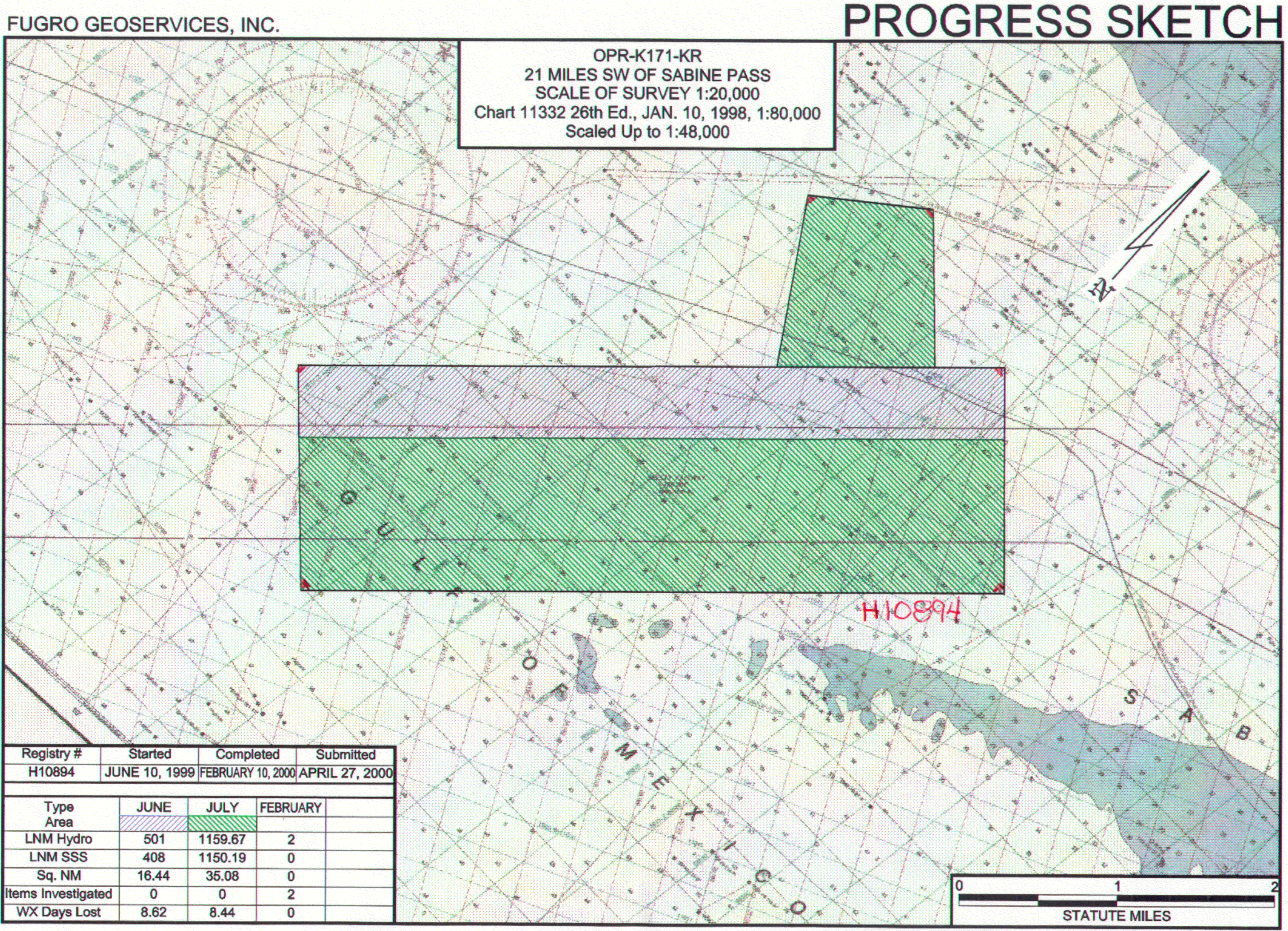
NOAA FORM 77-28 SUPERSEDES FORM C&GS-837.

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

FUGRO GEOSERVICES, INC.

PROGRESS SKETCH

OPR-K171-KR
21 MILES SW OF SABINE PASS
SCALE OF SURVEY 1:20,000
Chart 11332 26th Ed., JAN. 10, 1998, 1:80,000
Scaled Up to 1:48,000



Registry #	Started	Completed	Submitted
H10894	JUNE 10, 1999	FEBRUARY 10, 2000	APRIL 27, 2000

Type / Area	JUNE	JULY	FEBRUARY	
LNM Hydro	501	1159.67	2	
LNM SSS	408	1150.19	0	
Sq. NM	16.44	35.08	0	
Items Investigated	0	0	2	
WX Days Lost	8.62	8.44	0	

0 1 2
STATUTE MILES

Fugro GeoServices, Inc. (FGSI) and John E. Chance & Associates, Inc. guarantee only that the survey data collected by FGSI, 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.

Table of Contents Page

*Data filed with original field records

Descriptive Report to Accompany Hydrographic Survey H10894

Sheet N
Scale 1:20,000
June, 1999 – February, 2000
Fugro GeoServices, Inc.
M/V Geodetic Surveyor and *M/V Universal Surveyor*
Chief of Party: Mark A. Melancon, FGSI

A. PROJECT

Project Number: OPR-K171-KR
Contract Number: 50 DGNC-7-90026
Sheet letter: N
Registry number: H10894

Dates of Instructions:

20 November, 1997 Original Instructions
05 January, 1998 Modification of Contract
04 march, 1998 Modification of Contract
07 April, 1998 Modification of Contract
28 April, 1998 Modification of Contract
18 June, 1998 Modification of Contract
01 February, 1999 Modification of Task Order
24 March, 1999 Modification of Contract
03 June, 1999 Award of Task Order # 4
16 June, 1999 Modification of Contract
12 July, 1999 Modification of Task Order #4
04 February, 2000 Award of Task Order #7

*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, 21 miles southwest of Sabine Pass, Texas. The survey area is somewhat regular in shape. The four outer corners follow:

*Data filed with field records

Sheet N Survey Area

Latitude	Longitude
29° 29' 13.49" N	94° 00' 37.08" W
29° 26' 12.34" N	93° 57' 28.80" W
29° 17' 38.40" N	94° 08' 14.82" W
29° 20' 36.42" N	94° 11' 25.08" W

Several obstructions lie just outside the survey area for Sheet N. Although the positions of these obstructions do not lie within the original survey area, the search radii outlined in the AWOIS listing fall into the survey area. Therefore, an addition to the original survey area was added by NOAA on July 12, 1999 (see Appendix F). The coordinates for this addition are as follows:

Sheet N Addition Survey Area

Latitude	Longitude
29° 28' 22.49" N	94° 01' 41.20" W
29° 30' 26.88" N	94° 03' 54.20" W
29° 29' 06.63" N	94° 06' 01.08" W
29° 26' 27.42" N	94° 04' 06.43" W

The dates of data acquisition are:

M/V Geodetic Surveyor

06/10/99-06/13/99	JD 161-164
06/14/99-06/17/99	JD 165-168
06/20/99	JD 171
06/22/99	JD 173
07/07/99-07/09/99	JD 188-190
07/10/99-07/11/99	JD 191-192
07/12/99-07/17/99	JD 193-198
07/17/99-07/28/99	JD 198-209
07/28/99-07/29/99	JD 209-210
08/04/99-08/07/99	JD 214-219
08/09/99	JD 221
08/12/99-08/13/99	JD 224-225
08/16/99-08/17/99	JD 228-229
10/16/99-10/17/99	JD 289-290

M/V Universal Surveyor
(Investigation Dates)

02/07/00-02/08/00	JD 38-39

The survey that covers Sheet N consists of 102 parallel northeast-southwest primary tracklines spaced approximately 75 meters apart, 17 northwest-southeast crosslines spaced approximately 1,400 meters apart, and 51 infill lines. The additional survey area consists of 76 parallel northeast-southeast primary tracklines spaced approximately 75 meters apart and 20 infill lines. Survey lines plotted on the enclosed maps are post-plotted as surveyed.

*Data filed with field records

Survey lines were run with distinct starting and ending points. Each individual line contains 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.

The initial survey grid, running both side scan sonar and multibeam at 75-meter line spacing, was designed to provide 200 percent lateral coverage with the sonar system and a maximum 50 meter gap between the portion of the multibeam swath meeting specifications. The final survey grid was designed to meet or exceed side scan sonar and multibeam specifications. 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.

The following line numbering conventions were used during this survey:

Lines 1 – 102 are the primary east-west lines. Both side scan sonar and multibeam data were collected.
Lines 103 – 119 are the primary north-south crosslines. Only multibeam was collected on these lines.
Lines 500 – 576 are the primary east-west lines for the additional survey area. Both sonar and multibeam data were collected.
Reruns of primary lines will be prefaced by a 1 or 2 in three digit numbers (e.g. the rerun of line 103 would be 1103; the rerun of 1103 would be 2103). Two digit line numbers would be prefaced with 10 or 20 (e.g. the rerun of line 64 would be 1064; the rerun of 1064 would be 2064, etc.).
Infills begin with either 7000 or 8000. Reruns and line breaks of infill lines follow the same conventions as the primary lines.
Lines 04370001-04380001 (JD 38-39) are the investigation lines run within the Sheet N Addition Section.

Please see the geophysical logs, which contain detailed information pertaining to the data collected during the project, for additional documentation. The geophysical logs are found in *Separate 1, which is included with the survey data.

C. SURVEY VESSELS

M/V Geodetic Surveyor

The *M/V Geodetic Surveyor* (ID # 637873) was used for primary and infill multibeam, single beam, side scan sonar, 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

*Data filed with field records

The Reson 8101 Seabat multibeam transducer was mounted on the starboard side of the vessel at the end of a 9-inch diameter swivel pole. The pole mount and the alignment bracket were welded to the ship. The pole was located 9.14 m from the stern of the vessel. The one MHz model DF3200 Odom Hydrographics single beam transducer was mounted 0.33-m starboard of the multibeam transducer on the same pole. The draft sensor was mounted 0.33-m starboard of the multibeam transducer also on the same pole. The navigation antenna location was assigned to the center of the multibeam transducer (see vessel diagram on page 5).

The side scan sonar tow position was located at the bow of the vessel. A Kevlar cable deployed manually was used for the bow configuration (see vessel diagram on page 6).

To decrease editing time, the outer port beams were automatically cut prior to processing. Beams 000-002 and 094-100 were automatically clipped on every line due to their historic nature of being noisy. Due to an installation error while mounting the Reson 8101 transducer, there existed a slight tilt toward the starboard side of the vessel. It is due to this slight misalignment that six (6) beams were automatically clipped from the starboard side of the multibeam swath, while only three (3) were clipped from the port side. In addition, other beams were clipped 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. *See Separate 5 (filed with the survey data) for multibeam processing log.

M/V Universal Surveyor

The *M/V Universal Surveyor* (ID # 627510) was used for multibeam investigation data collection. All single beam depth sounder and velocity data acquisition and plotting hardware was mounted in the vessel operations room. All multibeam data acquisition, post-processing, and plotting hardware was mounted in an operations van on the back deck of the survey vessel.

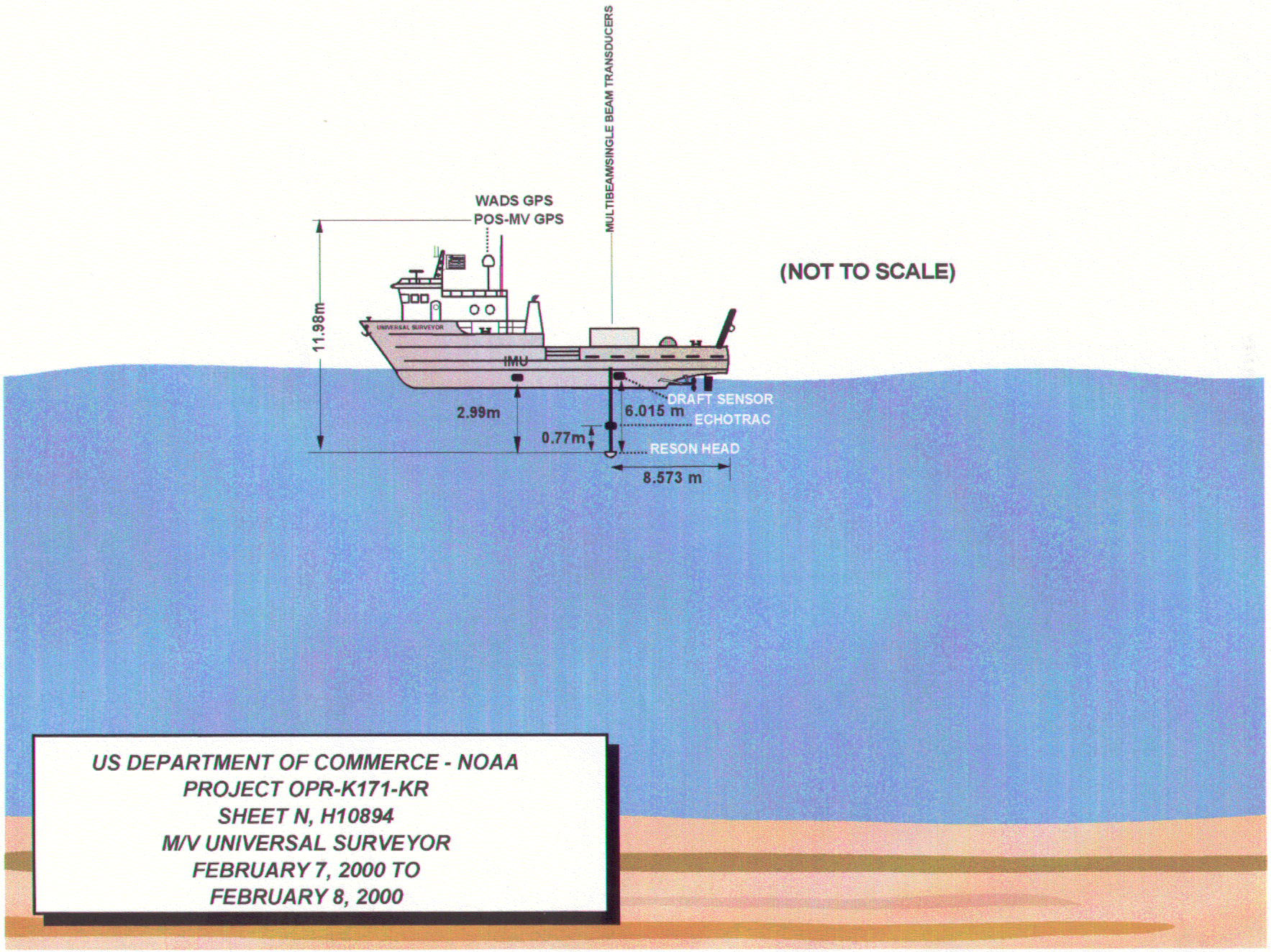
Basic vessel descriptors follow:

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

The Reson 8101 Seabat multibeam transducer was mounted on the starboard side of the vessel at the end of a 9-inch diameter swivel pole. The pole mount and the alignment bracket were welded to the ship. The pole was located 8.57 m from the stern of the vessel. The model DF3200 Odom Hydrographics single beam transducer was mounted 0.32-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 diagrams on pages 8 & 9).

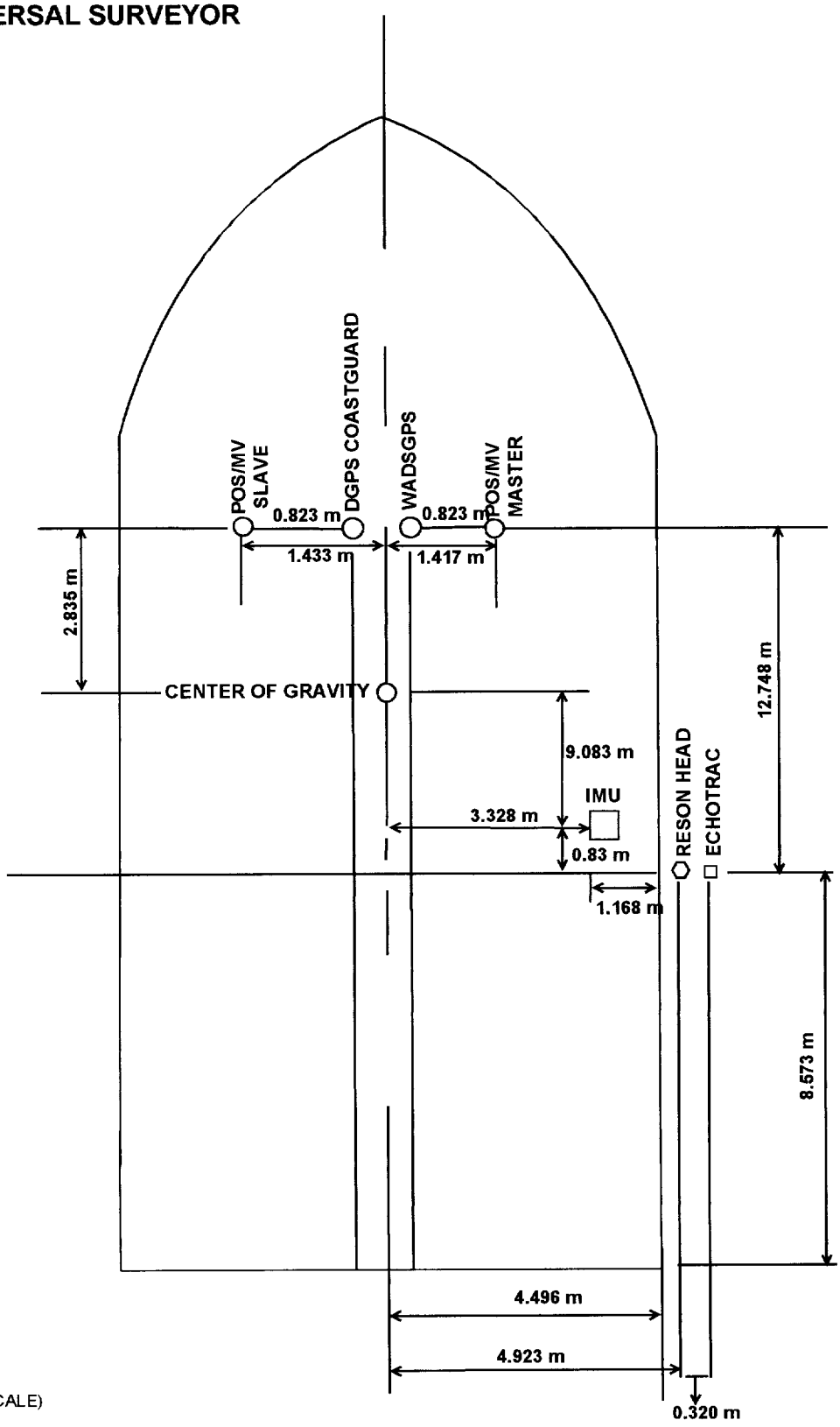
Additional vessel specifications for the *M/V Universal Surveyor* are in *Separate 2 (filed with survey data).

* Data filed with field records



US DEPARTMENT OF COMMERCE - NOAA
PROJECT OPR-K171-KR
SHEET N, H10894
M/V UNIVERSAL SURVEYOR
FEBRUARY 7, 2000 TO
FEBRUARY 8, 2000

M/V UNIVERSAL SURVEYOR



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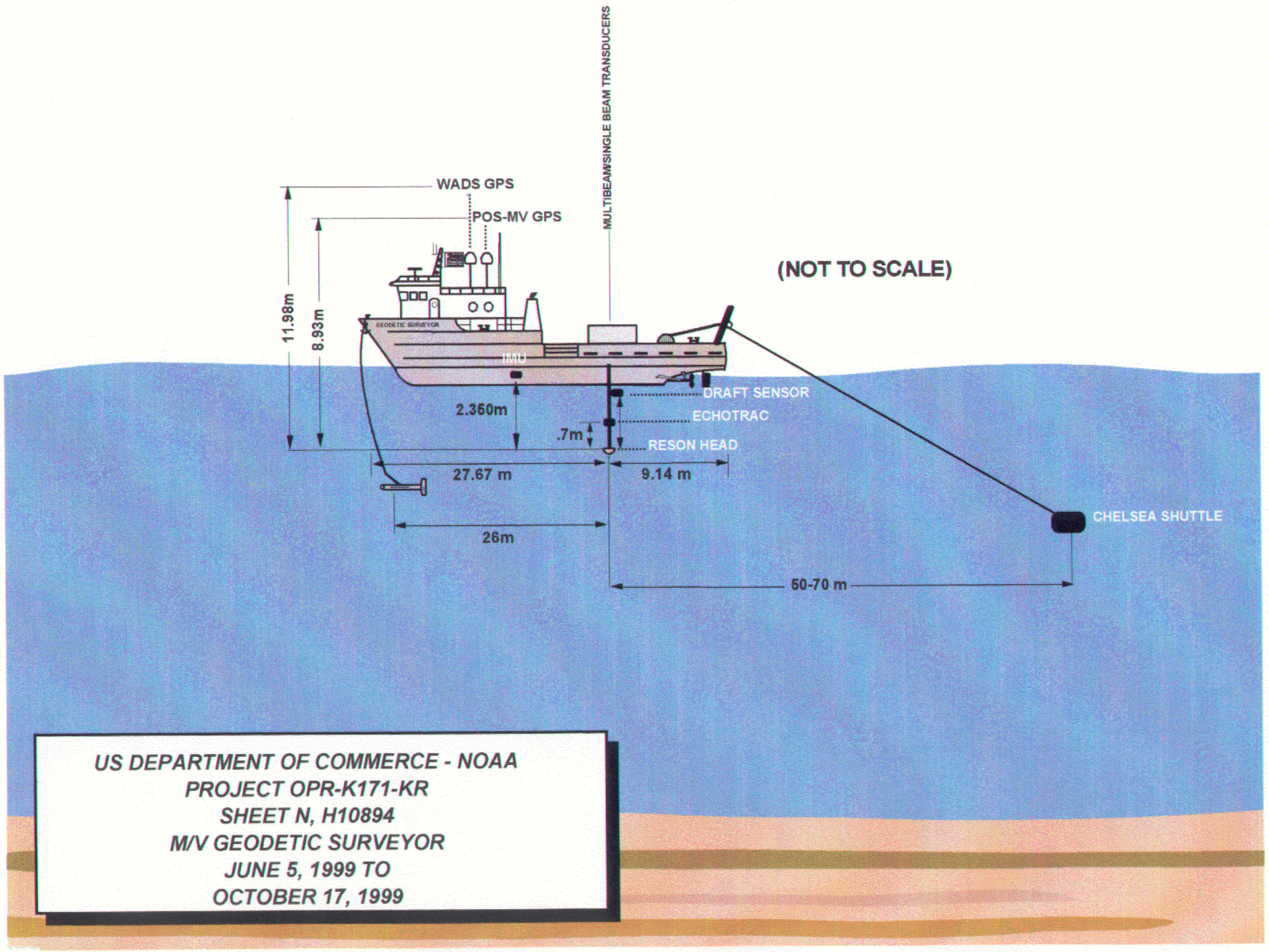
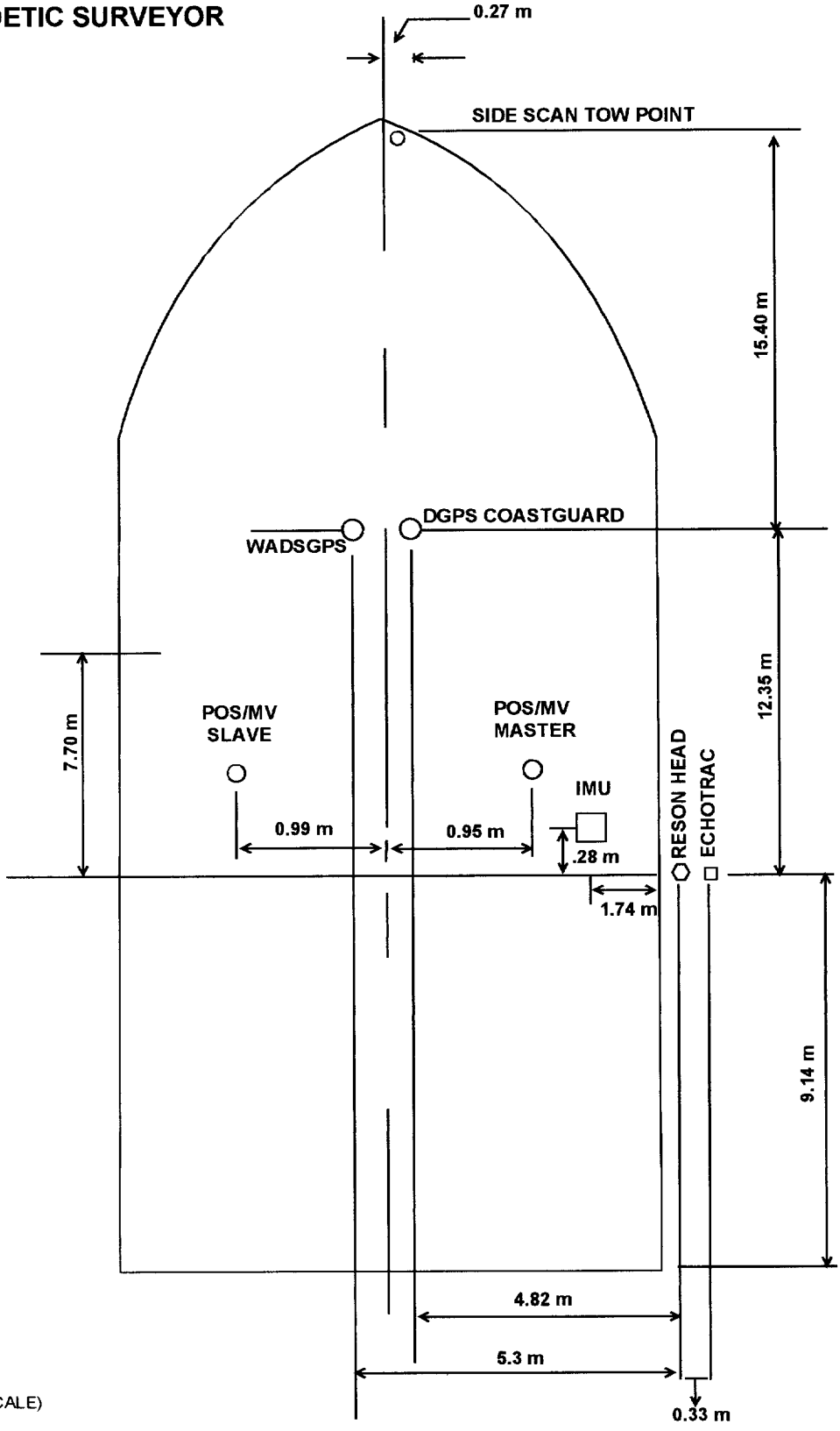

WADS GPS
POS-MV GPS
MULTIBEAM/SINGLE BEAM TRANSDUCERS
(NOT TO SCALE)
11.98m
8.93m
GEODETIC SURVEYOR
IMU
2.350m
.7m
DRAFT SENSOR
ECHOTRAC
RESON HEAD
27.67 m
9.14 m
26m
CHELSEA SHUTTLE
50-70 m
US DEPARTMENT OF COMMERCE - NOAA
PROJECT OPR-K171-KR
SHEET N, H10894
M/V GEODETIC SURVEYOR
JUNE 5, 1999 TO
OCTOBER 17, 1999

M/V GEODETIC SURVEYOR



(NOT TO SCALE)

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 11 for related figure).

The following vessel configuration values are based upon the CARIS coordinate system: Y is Positive Bow, X is Positive Starboard, Z is Positive Down.

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=-2.21 Z=+1.66

- 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=-4.93 Y=-12.56 Z=+4.04

- The waterline relative to CG is: Z= +0.15

M/V Universal Surveyor

- The vessel attitude is relative to the POS IMU. The POS IMU relative to the CG in meters is:
  X=+3.33 Y=-9.08 Z=+1.71

- 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=+4.92 Y=-9.91 Z=+4.70

The waterline relative to CG is: Z= +0.82

The navigation center for the multibeam data provided to NOAA is the Reson transducer head. Therefore, the XTF data are already corrected for offsets, and a zero (0) value should be entered into CARIS.

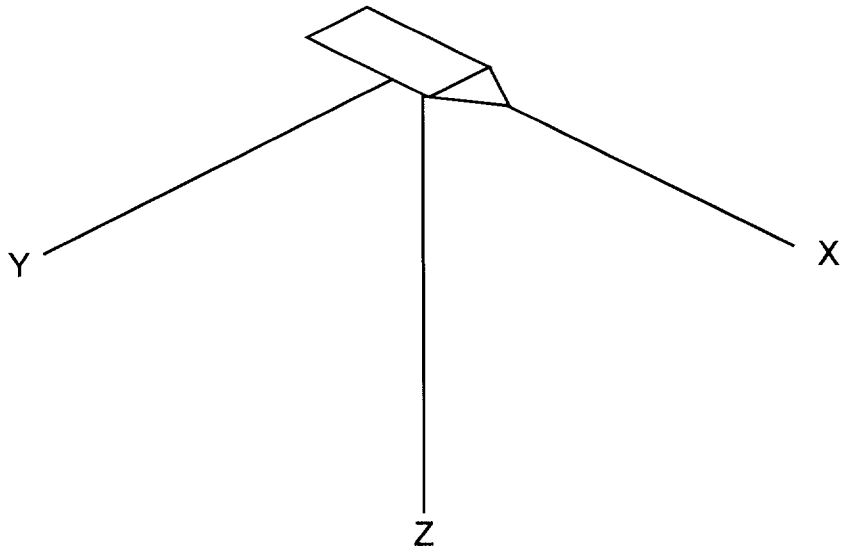
D. AUTOMATED DATA ACQUISITION AND PROCESSING -See also Evaluation Report

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

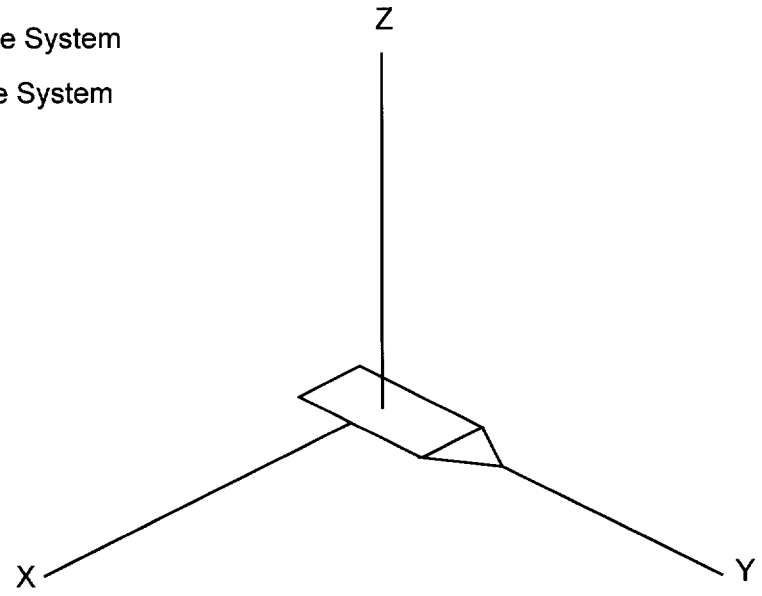
*Data filed with field records.

POS/MV Coordinate System



Reson Coordinate System

IP400 Coordinate System



scripts, IP400 programs, and basic UNIX scripts. TerraModel version 9.4 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 Pentium II 333MHz Unix computers with 384 megabytes of memory, and 18 gigabyte hard drives for data transfer and storage applications. These computers were used for data acquisition, processing, charting, and quality control measures while onboard the vessel. Three (3) external 9 gig hard drives were also used for data storage.

The IP400 software was used to apply velocity corrections to the data. The software referenced the velocity file for the line, and applied the corrections accordingly.

Processing Methods:

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

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

Cleaning Filters:

During data processing, the data were 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 a Datasonics DSP661 slant-range corrected digital side scan sonar recorder, two Datasonics Model SIS-1500 digital side scan sonar towfish, and Triton/Elics digital acquisition software version 4.32.

M/V Geodetic Surveyor

	Serial Number	Day Number
DataSonics TTV-195 Towfish	414	161, 210-291
	419	162-209
DataSonics Processor	945	161-291
EPC Recorder 1086	354	161-291

*Data filed with field records.

The vertical beam width of the Datasonics SIS-1500 side scan sonar was 55 degrees at 3dB. A depression angle of 20 degrees was used on the towfish. The 200 kHz frequency was used during all data collection of this survey. The side scan sonar was towed from the bow on the *M/V Geodetic Surveyor* and the navigation center was assigned to the center of the multibeam transducer pole for all side scan sonar work. The setback information specified in the geophysical logs (Separate 1) for the *M/V Geodetic Surveyor* is based upon a cable length from the bow. On the *M/V Geodetic Surveyor* 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.

Side scan sonar operations were run at a speed 4.8 knots or slower. All side scan sonar coverage was run in a northeast-southwest direction. All side scan sonar data were collected using a 100-meter range scale with a towfish depth off seafloor between 8 and 14 meters.

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 and other seafloor features were used as confidence checks. Where possible, 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. 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, and data glitches. On several occasions when a boat wake obscured the record, the vessel immediately circled around to collect data to fill the gap, and continued on with the line. One side scan sonar line was rerun because the side scan was not run on the first pass of data collection. One line was shot to provide 200 % coverage.

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 where possible 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. If a contact fell out of the multibeam range, it was flagged for further investigation.

No Dangers to Navigation were found during this survey. However, two objects discovered during survey operations were investigated and are discussed in Section N of this report.

Digital side scan sonar data were acquired using Triton/Elics ISIS version 4.32 software. The software was run on a Pentium II 300 MHz computer with 96 megabytes of memory, and a 4 gig and 18 gig internal hard drive. Digital data were recorded in XTF format and backed up to AIT tape using UNIX tar command.

* Data filed with field records

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 8101 Seabat has 101 beams labeled 001-101. It runs at a frequency of 240 kHz. There were no depth 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. The IP400 system numbers the beam numbers starting at 000, so the beam numbers on the raw data will be one value greater than the data that have been processed. Reson console serial number 13984 was used during the entire project.

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 daily 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 does 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

Three velocimeters were used aboard the *M/V Geodetic Surveyor.* The Applied Microsystems Ltd. SVP16, serial number 3045, calibrated on May 4-6, 1999 (DN 124-126) was the velocimeter used inside of the Chelsea undulating shuttle during data collection on June 3, 1999 through August 9, 1999 (DN 154-221). Calibration values were applied to the data through the AML processing software. The Applied Microsystems SVP-16, serial number 3062, calibrated on May 13, 1999 (DN 133) was the velocimeter mounted on the Reson transducer pole for this sheet. These velocimeter readings were entered into the DAP computer for comparison with the towed velocimeter readings. Calibration values were applied to the data through the AML processing software. In addition, a third SVP16 velocimeter was used as a backup velocimeter, serial number 3079, calibrated on May 22, 1999 (DN 142). The third velocimeter was used in the Chelsea undulating shuttle from August 9, 1999 to August 18, 1999 (DN 221-230). The Applied Microsystems Ltd. SVP16, serial number 3062, calibrated on August 8, 1999 (DN 220) was the velocimeter used for the static casts used for velocity corrections to the investigation multibeam data.

While the Chelsea undulating shuttle was being used, velocity casts were obtained approximately every 15 minutes during data collection. The velocity data were time referenced and applied to the corresponding multibeam data in the IP400 batching routine. The frequency of velocity casts could be redefined by the user anytime degradation of the multibeam outer beams became visually apparent. Degradation of the multibeam outer beams was monitored real-time by observing the Reson monitor and the real-time velocity display on the DAP computer. In addition, the swath profiles were visually inspected in TerraModel as a velocity QC.

While the Chelsea undulating shuttle was not being used, velocity casts were obtained at least twice per day during data collection. The frequency of velocity casts was increased if necessary. The data from a single velocity cast were applied to the to the multibeam data

* Data filed with field records

collected subsequent to the velocity cast. 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 swath profiles were visually inspected in TerraModel as a velocity QC.

The sound velocity casts that were applied to the multibeam data are included in Appendix J.

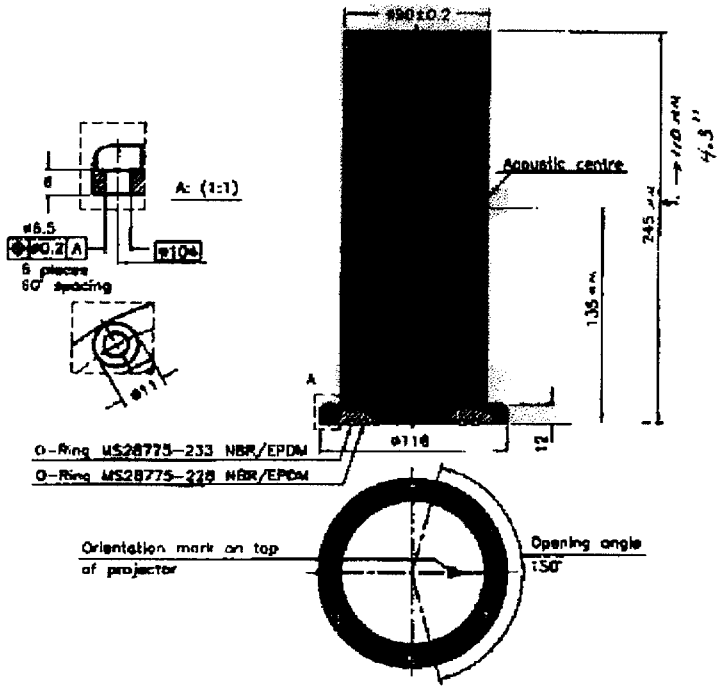
The velocimeter data from the SVP16 velocimeter housed inside of the Chelsea undulating shuttle were loaded into the IP400 system. The downcast profile was applied during post-processing. The undulating real-time velocimeter was run continuously at 80% of the water depth, and was dropped 95 percent of the water depth at least once during every line. To provide complete depth coverage, the velocity data were extrapolated by taking ten percent of the deepest depth and adding that value to the deepest depth. The velocity data were extended to the extrapolated depth based upon the velocity curve above the extrapolated depth values. On August 11-12, 1999 (DN 223-224) a static cast was used to correct the multibeam data due to malfunctions experienced with the Chelsea undulating shuttle. See Appendix J for table containing additional velocity information.

Two velocimeters were used aboard the *M/V Universal Surveyor.* The Applied Microsystems SVP-16, serial number 3062, calibrated on August 12, 1999 (DN 224) was the primary velocimeter used to take a static cast in the investigation area on February 8, 2000 (DN 039). Calibration values were applied to the data through the AML processing software. The Applied Microsystems Ltd. SVP16, serial number 3038, calibrated on November 12, 1999 (DN 316) the secondary velocimeter used to take a static cast in the investigation area on February 8, 2000 (DN 039). The Applied Microsystems SVP-16, serial number 3079, calibrated on October 5, 1999 (DN 279) was the velocimeter mounted on the Reson transducer pole on February 8-9, 2000 (DN 039-040).

2. Instrument Corrections

The vertical reference point that has been used for the Reson 8101ER system is not measured to the correct reference point, on the Reson head. The term "acoustic center" was interpreted to mean the absolute vertical reference. Reson's "acoustic center" refers to the center of the projector (sound source).
Our misunderstanding was based on the diagram below:

* Data filed with field records)



Our surveys depict the water depth deeper than the true value. The total correction that is needed to correct this data set is 10.95 cm or 4 5/16 inches. Both the edited data set and smooth sheet have been corrected for this error.

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

The real time draft sensor developed by Fugro GeoServices, Inc. incorporates the use of a 20 kilohertz acoustic transducer mounted inside of a three inch diameter pipe. The three inch pipe is inside of a six inch pipe, which in turn is inside of an eight inch pipe. Holes were drilled at one, three, and five foot intervals, below the water line, to allow for proper water inflow. The reason for the 3 pipe configuration was to try and damper as much wave action as possible. The draft pipe(s) was welded directly to the Reson transducer pole to get as accurate a reading of the draft affects introduced to the multibeam data as possible. The distance from the reference point of the draft sensor to the Reson transducer reference point equals 4 meters. The draft sensor pings at a rate of 20 times per second and measures the distance from the fixed draft transducer reference point to the surface level of the water inside of the pipe. As the vessel sinks (or squats) in the water, the water inside of the pipe rises, resulting in a difference in the draft sensor reading.

The draft sensor was calibrated on June 2, 1999. Tick marks were manually drawn on the exterior of the draft pole at 5 cm intervals so that a visual draft value could be ascertained for comparison with the digital readings. To accurately calibrate the draft sensor the

readings had to be compared with the actual change of vessel position in the vertical plane. To do this a GPS antenna mounted directly over the transducer head was used. While the vessel was at 0 knots (static) a GPS reading and a digital draft reading was taken. A visual draft reading was also taken to double-check the digital draft value.

The vessel then traveled at various speeds (1-7 knots), the GPS and draft monitor values were recorded. Once the test was complete, the recorded values were processed. Processing these values entailed first subtracting the static values, from both the GPS and draft sensors, from the values obtained while the vessel was in motion. After this was done, the draft sensor readings then had to be subtracted from the 4 meter offset so that the draft at the Reson transducer could be derived.

During line run, the draft sensor readings are stored in the IP400 stor directory for that line. After line completion, the data are processed during batching procedures. The draft data are cleaned of erroneous spikes, then all the draft readings for that line are averaged into a single draft value to be used for that line.

5. Settlement and Squat

M/V Geodetic Surveyor

A squat/settlement survey was performed on the *M/V Geodetic Surveyor* on June 2, 1999 (DN 153) 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. 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 starboard side 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 were logged by the receivers at one-second intervals with an elevation mask of 10 degrees. GPS data were 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

M/V Universal Surveyor

A squat/settlement survey was performed on the *M/V Universal Surveyor* on February 3, 2000 (DN 34) 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. 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 starboard side 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 were logged by the receivers at one-second intervals with an elevation mask of 10 degrees. GPS data were 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 Universal Surveyor* at normal survey speeds. Settlement and squat test data are included in* Appendix G.

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.

Calibration of Multibeam echo sounder

Aboard the *M/V Geodetic Surveyor* and the *M/V Universal Surveyor*, 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).

M/V Geodetic Surveyor

Multibeam calibration (patch test) at 'Fish Haven', June 10, 1999 (DN 161), position Northing = 3241550, Easting = 413704

* Data filed with field records

System	Time Delay	Pitch	Roll	Yaw
WADS	-0.65	-1.05	-1.50	1.25
POS/MV	-0.65	-1.05	-1.50	1.25

M/V Universal Surveyor

Multibeam calibration (patch test) at 'Fish Haven', February 8, 2000 (DN 039), position Northing = 3241550, Easting = 413704

System	Time Delay	Pitch	Roll	Yaw
WADS	-0.84	+0.80	-0.05	-5.08
POS/MV	-0.84	+0.80	-0.05	-5.08

The XTF data provided to NOAA is corrected for patch test offsets; an offset value of zero (0) should be applied to the data in CARIS.

Tide Correctors

As specified in the SOW, predicted tides from Galveston Pleasure Pier 8771510 were used as preliminary tide values. Sheet N fell within four zones of the Texas Offshore Ocean Observation Network zonation. Two zones, G309 and G315, encompassed such a minute portion of the survey area, that it was proposed to NOAA by FGSI that only the two larger zones be used in the tidal corrections of the multibeam data. A comparison between the zones showed that zone G309 and G315 tidal values had a difference range of only 0 to 10 centimeters from zones G318 and G321. Acceptance of this proposal was obtained on June 8, 1999 (see Appendix F). As a result, only zones G318 and G321 were used to tide correct the multibeam data for Sheet N. Zone G318 has a time corrector of –18 minutes with a range ratio of X0.95; Zone G321 has a time corrector of –12 minutes and a range ratio of X0.91

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) were used for final post-processing. Tidal data from the Sabine Pass Offshore gauge (8771081) located at 29°29.9'N, 93°38.4'W were utilized for Sheet N, except for investigation lines run on February 7 and 8, 2000, see explanation below. Sheet N fell within two tidal zones: G318 and G321, as outlined above. The correctors used are located in the table below.

It was observed during tidal post-processing of the Sheet N investigation data that the tidal data obtained from the Sabine Pass Offshore (TCOON) tidal gauge (8771081) for February 7 and 8, 2000, was in error on the order of 1 meter. Due to this fact, permission was granted on March 23, 2000 to utilize tidal values from the Galveston Pleasure Pier tidal gauge (8771510), located at 29°17.1'N, 94°47.3'W to post-process the investigation data. Tidal zones G318 and G321were again used, and the correctors used for the Galveston Pleasure Pier tide gauge are included below (see Appendix F).

*Data filed with field records.

M/V Geodetic Surveyor

Station Number	Tidal Zone	High Water Correction	Low Water Correction	Average Time Correction	Range Correction
8771081	G318	-18 mins.	-12 mins.	-18 mins.	X0.95
8771081	G321	-12 mins.	-12 mins.	-12 mins.	X0.91

M/V Universal Surveyor

Station Number	Tidal Zone	High Water Correction	Low Water Correction	Average Time Correction	Range Correction
8771510	G318	-12 mins.	-12 mins.	-12 mins.	X1.13
8771510	G321	0 mins.	-18 mins.	-12 mins.	X1.08

The verified six-minute tide data from the Galveston Pleasure Pier tide gauge were downloaded from the NOAA Oceanographic Products and Services Division (OPSD) web page (http://www.co-ops.nos.noaa.gov). The tide information was applied to the data using the IP400 data processing software.

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.

* Data filed with field records

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.

M/V Geodetic Surveyor

Primary positioning system:

WADS Magnavox T-4000	S/N 10
Starfix II differential receiver	S/N 023 and 138

Correctors were computed using the Gulf Coast network of OMNISTAR sites mentioned above. 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 2232
CSI differential receiver (USCG DGPS)	S/N X20-020

M/V Universal Surveyor

Primary positioning system:

WADS Magnavox T-4000	S/N 0595101
Starfix II differential receiver	S/N 630307 and 630101

Correctors were computed using the Gulf Coast network of OMNISTAR sites mentioned above. The correctors were computed using CHANCE's Wide Area Differential (WADS) software, version 2.1.

Secondary positioning system:

Trimble 4000	S/N 0395101
CSI differential receiver (USCG DGPS)	S/N X20-012

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.

* Data filed with field records

3. No unusual atmospheric conditions were noted.

4. There were no instances of weak signal or poor geometric configurations encountered during the survey.

5. No systematic errors were discovered during the survey.

6. Aboard the *M/V Geodetic Surveyor*, Line Run an in-house navigation program was used. The multibeam transducer was the navigation center. 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 5 and 6. Aboard the *M/V Universal Surveyor*, StarFix.Nav an in-house Fugro navigation program was utilized. The multibeam transducer was the navigation center. The side scan sonar data were setback corrected. The offsets from the navigation center to the side scan sonar tow points are shown on the figures on pages 8 and 9.

J. SHORELINE

Not Applicable

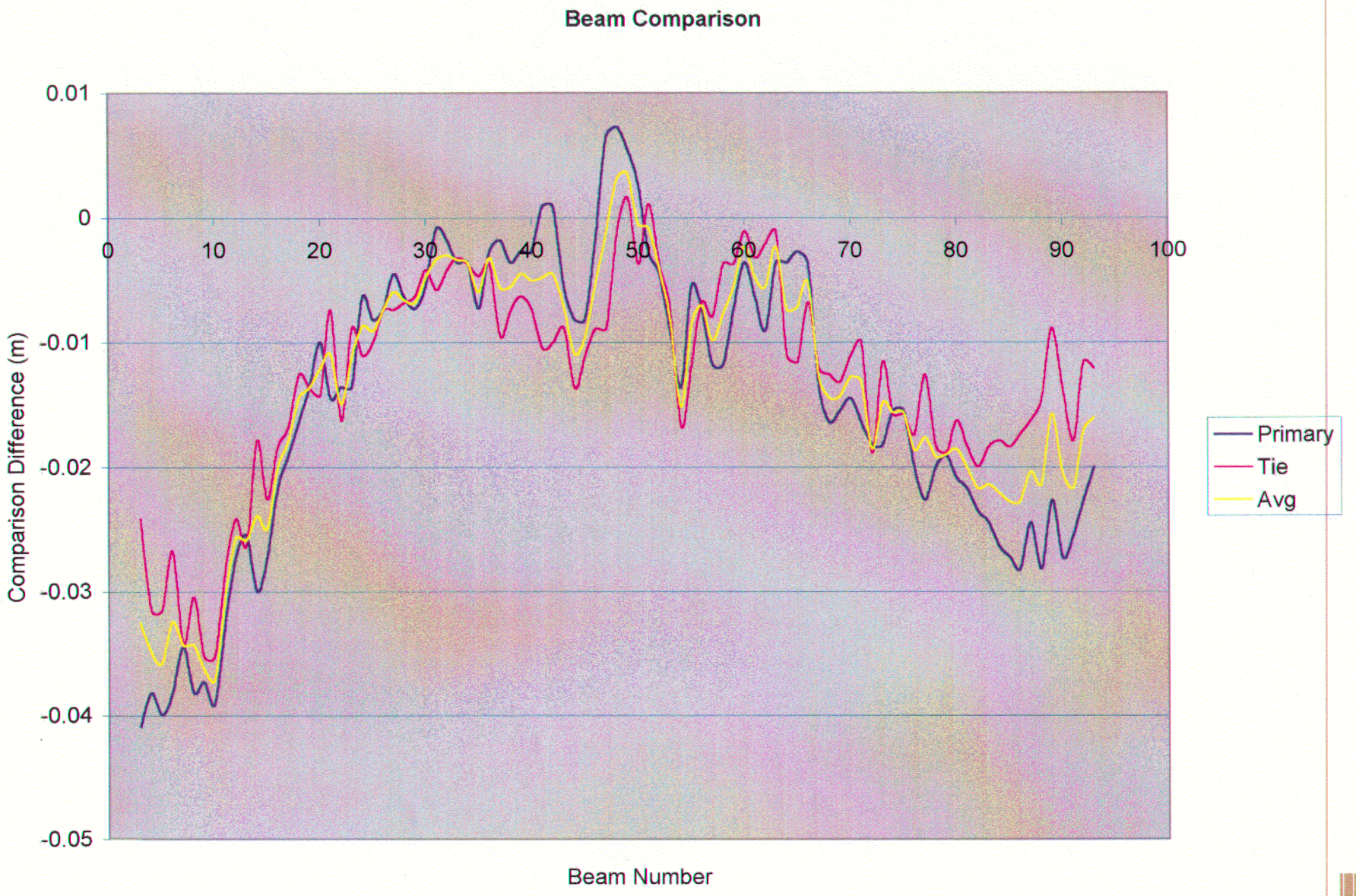
K. CROSS LINES

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°. For 10% of all mainscheme lines, evenly spaced throughout the dataset, the nadir beam of each crossline was compared to each of the nearest unsmoothed soundings contained within the mainscheme line. For all crosslines, the nadir beam of 5% of the mainscheme lines, evenly spaced throughout the dataset were compared to each of the nearest unsmoothed soundings of the crosslines. Separate statistical analyses were performed as a function of beam number for each of the mainscheme lines and crosslines used for comparison. See the processing logs in Separate #4, included with the survey data for the beams numbers omitted in the final data set.

It should be noted that Reson beams 000-002, and 0094-100 were automatically clipped prior to data processing. These beams have been historically noisy, so clipping of these beams took place prior to processing. No data from these beams are represented in the edited data or smooth sheet.

Original survey comparisons fell within 5 centimeters, while investigation beam comparisons fell within 30 centimeters due to questionable final tide data. The distances between points all fell within 30 centimeters. The results of the crossline comparisons are displayed in the enclosed graphs (see pages 23 and 24). Complete beam comparison statistics are enclosed as Separate #5, with survey data included.

*Data filed with field records


Beam Comparison
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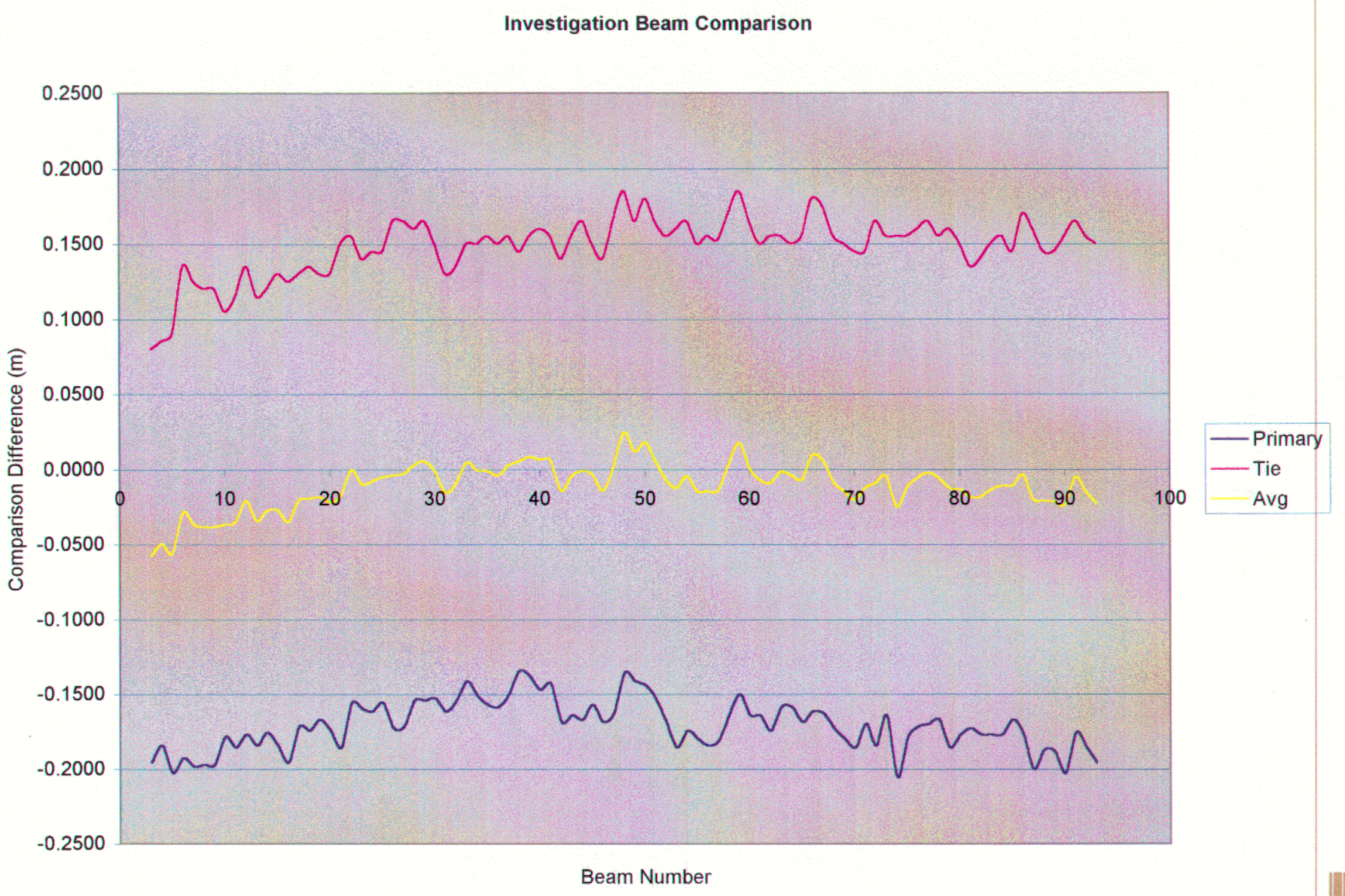
0
-0.01
-0.02
-0.03
-0.04
-0.05
0
10
20
30
40
50
60
70
80
90
100
Comparison Difference (m)
Beam Number
Primary
Tie
Avg


Investigation Beam Comparison
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0.2000
0.1500
0.1000
0.0500
0.0000
-0.0500
-0.1000
-0.1500
-0.2000
-0.2500
Comparison Difference (m)
0
10
20
30
40
50
60
70
80
90
100
Beam Number
Primary
Tie
Avg

L. JUNCTIONS – See also Evaluation Report

OPR-K171-KR, Sheet N, H10894 junctions with the southwest border of OPR-K171-KR, Sheet H, H10836. H10836 is a 1:20,000 scale survey submitted on May 27, 1999. It overlaps at the northeast boundary of the present survey. Both data sets were processed using verified tides. OPR-K171-KR, Sheet N, H10894 also junctions with the northeast border of OPR-K171-KR, Sheet O, H10915. H10915 is a 1:20,000 scale survey not yet submitted. It overlaps the southwest border of the present survey. Both data sets were also processed using verified tides.

Agreement between H10894 and H10836 is very good. The soundings generally agree within 0.30 meters. The differences in the depths may possibly be attributed to the variations in the tidal data

.

Agreement between H10894 and H10915 is very good. The soundings generally agree within 0.30 meters. The differences in the depths may possibly be attributed to the variations in the tidal data.

M. COMPARISON WITH PRIOR SURVEYS See also Evaluation Report

Comparison with prior surveys was not required under this contract. However, during post-processing of Sheet N and O data, we requested prior surveys after finding up to a three foot discrepancy between our data values and the charted values (see Section N for comparison to the nautical charts). Sheet N falls within prior survey H-8712 which was collected in 1962. Sheet O also falls within prior survey H-9775 which was collected in 1978. Sheet O data matches very well (0 to 1 foot difference) with prior survey H-9775, but matches poorly with prior survey H-8712 (1 to 3 foot difference). The same 1 to 3 foot difference was observed when comparing survey H-8712 with the Sheet N data. The junction between H-8712 and H-9775 is at approximately 94° 14' W. This junction displays a difference of 1-2 feet. This boundary is reflected within the comparison of H10915 to nautical chart 11323. The descriptive report for the 1978 survey H-9775 states that the agreement of 1 to 2 feet is acceptable. The verifier's report stated that the bottom configuration and general depths were in good agreement. Changes in depths were attributed to natural causes and less accurate horizontal control. The H-9775 descriptive report attributed the junction differences between H-9775 and H-8712 to variations between real and predicted tides. In the verifier's report, the junction was not considered because survey H-8712 was not considered contemporary for junctioning purposes. We believe the 1 to 3 foot discrepancy observed when comparing Sheet N data to prior survey H-8712 is similar to what is occurring with the Sheet O data.

N. COMPARISON WITH THE CHART – See also Evaluation Report

This survey was compared with the following charts:

Chart	Scale	Edition	Date
11323	1:80,000	~~51st~~ 58th	~~September 23, 1989~~ JUNE 24, 2000
11332	1:80,000	~~26th~~ 27th	~~January 10, 1998~~ APRIL 3, 1999

Two features were labeled as obstructions on the smooth sheet that were not submitted as Dangers to Navigation. These features showed a 3 to 6 foot elevation above the seafloor, but the shoal value differed by 1 foot to 6 feet from the charted value. These features are located in the following locations:

SSS Line Number	MB Line Number	Latitude	Longitude	Shoalest Depth (ft)	Seafloor Depth (ft)	Charted Depth (ft)
504/505	00010437/ 00020438	29° 27' 23"N .27	94° 03' ~~14~~"W 13.73	~~36~~ 35	42	36
526/527	00030436/ 00040435	29° 27' 34"N .27	94° 04' 31"W .36	~~40~~ 39	42	40

Chart 35' obstn

Chart 39' obstn

Charts 11323 and 11332 were compared to each other. Chart 11330 is not used for comparison because it is at such a small scale. Smooth sheet sounding values were superimposed onto a raster image of nautical chart 11332 at a 1:80,000 scale. The smooth sheet soundings are generally one to three feet deeper than the values on nautical chart 11332. From the discussion within Section M, it appears that the sounding data on nautical chart 11332 are primarily taken from the 1962 survey H-8712. The differences in depths could indicate possible sediment movement due to storms, dredging of the fairway, or increased precision in navigation since the original data were collected.

When it was discovered that the H10915 survey values differed by three feet in many portions of the Sheet O survey area, lead line values were collected from *the M/V L'Arpenteur* to provide an additional QC of the collected multibeam. Lead lines were dropped at two locations that showed a three foot discrepancy between the nautical chart and survey data. Due to the fact that Sheet N falls within the same survey, we believe this data is pertinent to Sheet N as well. The results of this test follow
:

Point Number	Latitude	Longitude	Charted Value	Multibeam Value	Lead Line Value	Echotrac Raw Data	Echotrac Heave Comped
19582	29.245	-94.241	44	47	46	46.3	46.7
23315	29.238	-94.220	43	46	46	45.5	44.9

There was a 2-3 foot swell while the test was being performed (See ~~A~~ppendix F for memo from the *M/V L'Arpenteur*).

*Data filed with field records

ITEM INVESTIGATION REPORT

Item Description (as charted): Obstruction PA (AWOIS Item# 10409)

Source: SSS Contact 99206153103 and 99206162112

Charted Position: Latitude = 29° 27' ~~30~~ 32.00"N
Longitude = 94° 03' 18.00"W

Charts Affected: 11323, 11332

INVESTIGATION

Date(s)/ Day Number(s): 2/07/00 / 38, 2/08/00/ 39

Survey Vessel Name: M/V Universal Surveyor

Investigation Method: Two orthogonal shallow water multibeam lines were run, crossing the contact near nadir. The object is centered at Latitude = 29° 27' 23.7028"N, Longitude = 94° 03' 14.0474"W.

Surveyed Position (NAD 83): 29° 27' 23.27"N, 94° 03' 13.73"W (N= 3259021.78, E=397809.84)

Position Determined By: Shallow water multibeam

Investigation Summary: N-1

This object was documented during the original survey on side scan sonar and shallow water multibeam data. It appeared to be a man-made object rising 0.90 meters above the seafloor.

Lines 00010437 and 00020438 were run during the investigation. Line 00020438 produced the best image of the contact, but no relief above the seafloor was identified. A least-depth value of ~~36~~ 35 feet is depicted on the Smooth Sheet. The feature was located at 29° 27' 23.27"N, 94° 03' 13.73"W (N= 3259021.78, E=397809.84).

Recommendation: The object stands 6 feet above the surrounding seafloor. Chart a ~~36~~ 35 foot obstruction at Latitude=29° 27' 23.27"N, Longitude=94° 03' 13.73"W Concur

Delete charted Obstn PA in LAT 29-27-30N
94-03-18W

Chart 35' Obstn in (See also p. 26 this report)
Lat 29-27-23.27N
Lon 94-03-13.73W

ITEM INVESTIGATION REPORT

Item Description (as charted): N/A

Source: SSS Contact 99207102034 and 99207185810

Charted Position: N/A

Charts Affected: 11323, 11332

INVESTIGATION

Date(s)/ Day Number(s): 2/07/00 / 38, 2/08/00/ 39

Survey Vessel Name: M/V Universal Surveyor

Investigation Method: Two orthogonal shallow water multibeam lines were run, crossing the contact near nadir. The object is centered at Latitude = 29° 27' 34.5021"N, Longitude = 94° 04' 30.3976"W.

Surveyed Position (NAD 83): 29° 27' 34.27"N, 94° 04' 31.00"W (N= 3259379.31, E=395731.32)

Position Determined By: Shallow water multibeam

Investigation Summary: N-2

This object was documented during the original survey on side scan sonar data, but fell outside the multibeam swath. It appeared to be a man-made object rising 0.24 meters above the seafloor.

Lines 00030436 and 00040435 were run during the investigation. Line 00030436 produced the best image of the contact, which rose .52 meters above the seafloor. A least-depth value of ~~40~~ 37 feet is depicted on the Smooth Sheet. The feature was located at 29° 27' 34.27"N, 94° 04' 31.00"W (N= 3259379.31, E=395731.32).

Recommendation: The object stands 2 feet above the surrounding seafloor. Chart a ~~40~~ 39 foot obstruction at Latitude=29° 27' 34.27"N, Longitude=94° 04' 31.00"W Concur

Chart 39; Obstn in Lat 29-27-34.27N Lon 94-04-31.00W] sameas p. 26

O. <NOT USED BY CONTRACTOR>

P. AIDS TO NAVIGATION - See also Evaluation Report

There are no aids to navigation or platforms on Sheet N, but there is one pipeline within the survey area. It is required that pipelines in the survey area be buried. There is no evidence that the pipeline on Charts 11323 and 11332 is exposed or suspended. Concur

Q. STATISTICS

	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)	1660	0	1660
Lineal nautical miles of sounding data (multibeam with out concurrent side scan)	102	2	104
Square nautical miles	52	0	52
Number of static velocity casts	23	2	25
Number of supplemental tide stations installed	0	0	0
No. horizontal control stations occupied/established	0	0	0
Number of items investigated	0	2	2

R. MISCELLANEOUS - See also Evaluation Report

Abundant drag marks throughout the survey area and occasional can holes were documented on the side scan sonar records. These seafloor deformations may rise above the seafloor, but may not necessarily be hazardous to the mariner.

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.

OPR-K171-KR
Sheet N
H10894

List of Horizontal Control Stations

OMNISTAR SITES

Geodetic Station Name	Latitude	Longitude	Station Elevation Ellipsoidal Height	Year Established	Source of Station's Position
HOUSTON	29 35 04.3610 N	95 30 10.7830 W	+0004.700 M	January-96	Surveyed
PENSACOLA	30 28 50.1870 N	87 14 55.3626 W	+0011.543 M	January-96	Surveyed
COCO BEACH	28 07 09.0600 N	80 34 42.2340 W	-020.620 M	January-96	Surveyed
MERCEDES	26 06 10.8446 N	97 51 24.3918 W	-002.830 M	January-96	Surveyed

UNITED STATES COAST GUARD DIFFERENTIAL BEACON

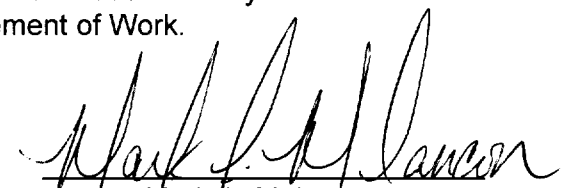
Geodetic Station Name	Latitude	Longitude	Transmission Frequency	Transmission Rate	Source of Station's Position
GALVESTON, TX	29 19 47.5524 N	94 44 12.4854 W	296 KHz	100 BPS	Internet

LETTER OF APPROVAL

REGISTRY NO. H10894

This report and the accompanying smooth sheet are respectfully submitted.

Field operations contributing to the accomplishment of survey H-10894 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.



Mark A. Melancon
Hydrographer
Fugro GeoServices, Inc.
April 27, 2000

NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10894

Name on Survey	A ON CHART NO. 1332, 1323	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 PASS (title)	X		X							2
TEXAS (title)	X		X							3
				[redacted]						4
				Dennis J. Romesburg						5
										6
				[redacted]			NOV 14 2000			7
										8
										9
										10
										11
										12
										13
										14
										15
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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/CS33-08-2001

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

FEB 7, 2001

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.

H10894

TEXAS, GULF OF MEXICO, 21 NM SOUTHWEST OF SABINE PASS

ONE TUBE CONTAINING THE FOLLOWING:

1 SMOOTH SHEET FOR H10894
1 CONTRACTOR SMOOTH SHEET FOR H10894
1 ORIGINAL DESCRIPTIVE REPORT FOR H10894
1 RECORD OF APPLICATION TO CHART (NOAA FORM 76-96) FOR SURVEY H10894
1 H-DRAWING FOR NOS CHART 11332
2 COMPOSITE DRAWINGS FOR NOS CHART 11332
MISC. CONTRACTOR PLOTTER SHEETS

FROM: *(Signature)*

DEBORAH A. BLAND Deborah A Bland

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

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR H10894 (1999)

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
MicroStation 95, version 5.05
I/RAS B, version 5.01
Caris HIPS/SIPS
AutoCAD, Release 14

The smooth sheet was plotted using a 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 0.834 seconds (25.689 meters or 1.28 mm at the scale of the survey) north in latitude, and 0.635 seconds (17.114 meters or 0.86 mm at the scale of the survey) west in longitude.

L. JUNCTIONS

H10836 (1998-1999) 1:20,000 to the northeast
H10915 (1999-2000) 1:20,000 to the southwest

A standard junction was effected between the present survey and survey H10915 (1999-2000). A standard junction could not be made between the present survey and survey H10836 (1998-1999) because this survey has not reached the smooth sheet stage.

Junctions will have to be made during the processing of H10836. There are no junctional surveys to the east or west.

Present survey depths are in harmony with the charted hydrography to the north, east and 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 11323 (58th Edition, Jun 24/00) CHART 11332 (27th Edition, Apr 03/99)

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.

1. Automated Wreck and Obstruction Information System (AWOIS) Item #10407, a charted dangerous sunken wreck, PA in Latitude 29°26'03.0"N, Longitude 94°03'00.0"W, originates with Local Notice to Mariners 126 of 1961 (LNM 126/61). This item was investigated by the present survey with no indication of the wreck being found. It is recommended that the sunken wreck symbol and the notation *PA* be removed from the charts.

2. Automated Wreck and Obstruction Information System (AWOIS) Item #10408, a charted submerged obstruction, PA in Latitude 29°27'00.0"N, Longitude 94°03'00.0"W, originates with Local Notice to Mariners 47 of 1990 (LNM 47/90). This item was investigated by the present survey with no indication of the obstruction being found. It is recommended that the obstruction and the notation *PA* be removed from the charts.

3. Automated Wreck and Obstruction Information System (AWOIS) Item #10410, a charted dangerous sunken wreck, PA in Latitude 29°28'00.0"N, Longitude 94°03'00.0"W, originates with Local Notice to Mariners 48 of 1988 (LNM 48/88). This item was investigated by the present survey with no indication of the wreck being found. It is recommended that the sunken wreck symbol and the notation *PA* be removed from the charts.

4. Automated Wreck and Obstruction Information System (AWOIS) Item #10411, a charted dangerous sunken wreck, PD in Latitude 29°28'50.0"N, Longitude 94°04'20.0"W, originates with

Local Notice to Mariners 46 of 1990 (LNM 46/90). This item was investigated by the present survey with no indication of the wreck being found. It is recommended that the sunken wreck symbol and the notation *PD* be removed from the charts.

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

P. AIDS TO NAVIGATION

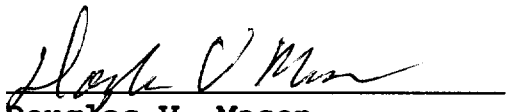
There are no aids to navigation located in the present survey area.

R. MISCELLANEOUS

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

The following NOS Chart was used for compilation of the present survey:

11332 (27th Edition, Apr 03/99 80,000



Douglas V. Mason
Cartographic Technician
Verification of Field Data
Evaluation and Analysis

02/07/2001

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H10894

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	43222
NUMBER OF SOUNDINGS	43222

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	53.0	10/25/2000
VERIFICATION OF FIELD DATA	151.5	11/20/2000
QUALITY CONTROL CHECKS	15.0	
EVALUATION AND ANALYSIS	27.0	
FINAL INSPECTION	28.0	12/21/2000
COMPILATION	40.0	12/28/2000
TOTAL TIME	314.5	

ATLANTIC HYDROGRAPHIC BRANCH APPROVAL 12/21/2000

APPROVAL SHEET
H10894

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.

Deborah A. Bland
Cartographer,
Atlantic Hydrographic Branch

Date: 21 DEC 1999

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.

for Andrew L. Beaver
Lieutenant Commander, NOAA
Chief, Atlantic Hydrographic Branch

Date: 21 DECEMBER 2000

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Final Approval:

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

Date: May 16, 2001

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. H10894

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	12/28/200[illegible]	Deborah [illegible]	Full [redacted] 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
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			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES [illegible] FORM [illegible] WHICH MAY BE USED