H10805

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 P

Registry No. H10805

LOCALITY

State Texas

General Locality Gulf of Mexico

Locality 10 NM SE of Galveston

1998

CHIEF OF PARTY
Walter S. Simmons

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NO. H10805
	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. P

State TEXAS

General locality GULF OF MEXICO

Locality 10 MILES SE OF GALVESTON

Scale 1:20,000 Date of survey 16 May – 22 Nov 1998

Instructions dated October 23, 1997 as amended Project No. OPR-K171-KR

Vessel M/V NEPTUNE

Chief of party WALTER S. SIMMONS

Surveyed by S. Lemke, J. Kiernan, R. Franchuk, D. Walker, R. Fischman, G. Ghiorse, R. Nadeau, J. Parker, J. Squadrito, T.Snyder, L. Gates, A. Quintal, S. Ferguson, V. Ferrini

Soundings taken by (**echo sounder**), hand lead, pole MULTIBEAM RESON SEABAT 8101

Graphic record scaled by survey personnel

Graphic record checked by survey personnel

Protracted by Automated plot by HP750C (FIELD)

Verification by ATLANTIC HYDROGRAPHIC BRANCH PERSONNEL

Soundings in fathoms (**feet**) meters at MLW (**MLLW**)

REMARKS: Contract # 50-DGNC-8-90025/SAIC
Contractor Name: Science Applications International Corp.
221 Third Street; Newport, RI 02840

Subcontractor Name: RJF HydroSurveys
San Diego, California

HANDWRITTEN NOTES IN THE DESCRIPTIVE REPORT WERE MADE DURING OFFICE PROCESSING

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

AWOIS ✓ # SURF ✓ by MBH 1-21-00

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

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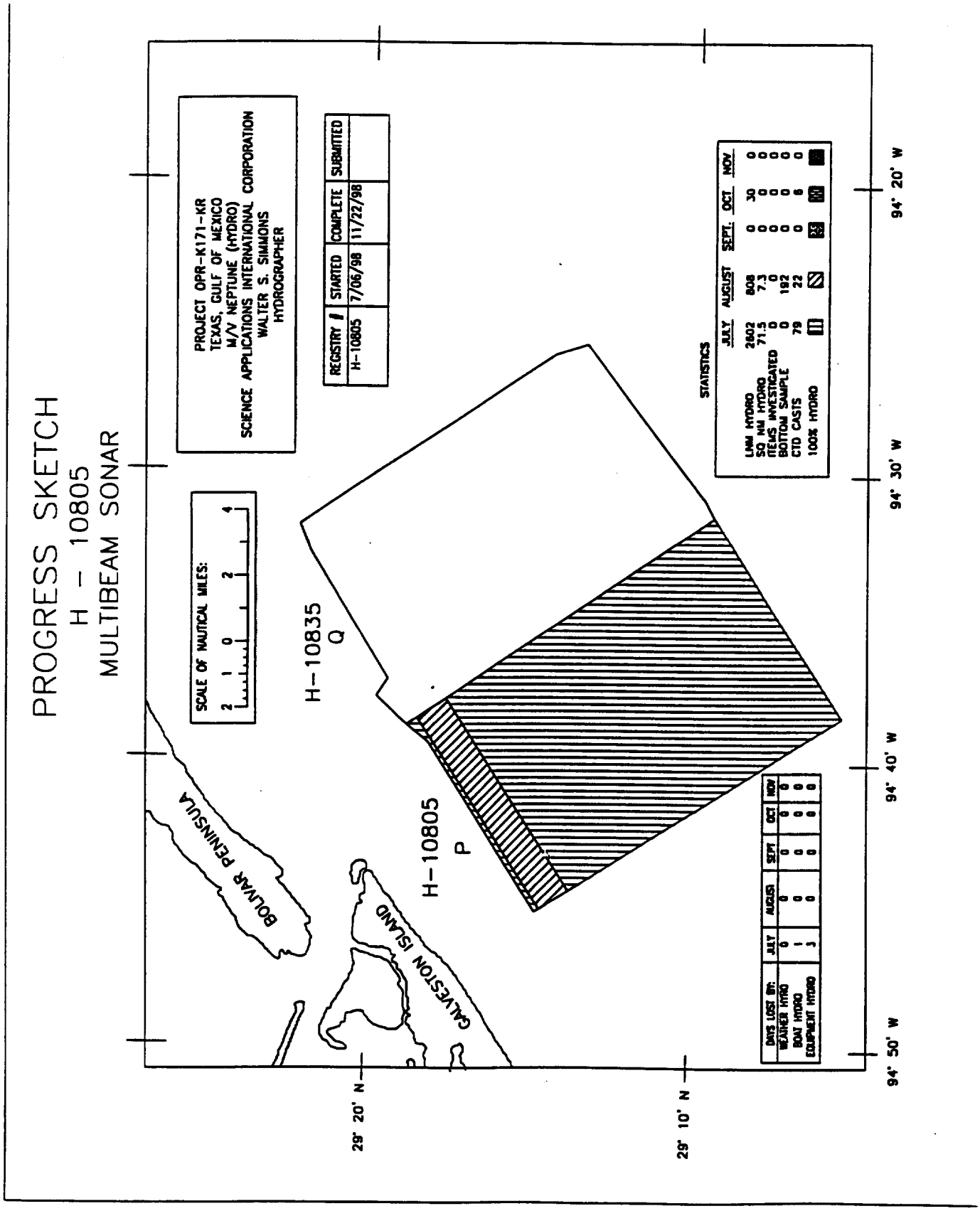
The Progress Sketches on the following pages indicate:

1. Survey Outlines
2. Field Survey Letters and Survey Registry Numbers
3. Work Accomplished by Month

Progress for multibeam and for Side Scan are shown on separate Sketches.


PROGRESS SKETCH
H - 10805
MULTIBEAM SONAR
PROJECT OPR-K171-KR
TEXAS, GULF OF MEXICO
M/V NEPTUNE (HYDRO)
SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
WALTER S. SIMMONS
HYDROGRAPHER
REGISTRY # | STARTED | COMPLETE | SUBMITTED
H-10805 | 7/06/98 | 11/22/98 |
SCALE OF NAUTICAL MILES:
2 1 0 2 4
H-10835
Q
H-10805
P
BOLIVAR PENINSULA
GALVESTON ISLAND
STATISTICS
JULY AUGUST SEPT. OCT NOV
LNM HYDRO 2602 808 0 30 0
SQ NM HYDRO 71.5 7.3 0 0 0
ITEMS INVESTIGATED 0 0 0 0 0
BOTTOM SAMPLE 0 192 0 0 0
CTD CASTS 79 22 0 6 0
100% HYDRO
DAYS LOST BY: JULY AUGUST SEPT OCT NOV
WEATHER HYDRO 0 0 0 0 0
BOAT HYDRO 1 0 0 0 0
EQUIPMENT HYDRO 3 0 0 0 0
94° 50' W
94° 40' W
94° 30' W
94° 20' W
29° 20' N
29° 10' N

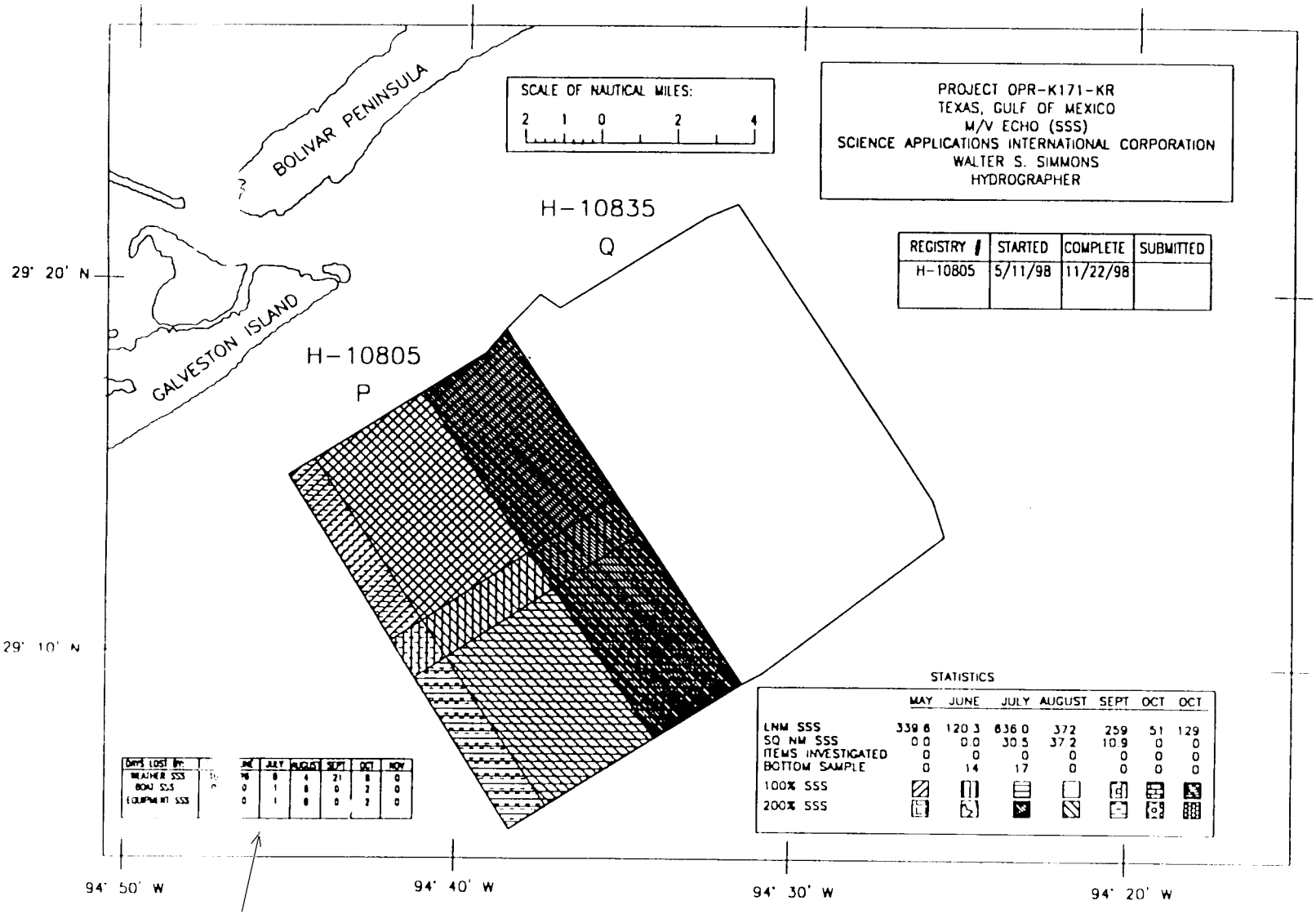
H-10805

OPR-K171-KR-07

PROGRESS SKETCH

H - 10805

SIDESCAN SONAR



ILLEGIBLE ON ORIGINAL DOCUMENT

Science Applications International Corporation (SAIC) warrants only that the survey data acquired by SAIC and delivered to NOAA under Contract 50-DGNC-8-90025/SAIC reflect the state of the sea floor in existence on the day and at the time the survey was conducted.

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* FILED WITH THE ORIGINAL FIELD DATA

FILED WITH FIELD DATA (ORIGINAL)

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Descriptive Report to Accompany
Hydrographic Survey H10805
Scale 1:20,000, Surveyed 1998
M/V NEPTUNE and M/V ECHO
Science Applications International Corporation (SAIC)
Walter S. Simmons, Hydrographer

A. PROJECT

Project number: OPR-K171-KR
Dates of instructions: 23 October 1997 **Original** 50-DGNC-8-90025/SAIC
5 January 1998 Modification #1
26 March 1998 Modification #2
Dates of supplemental instructions: 04 August 1998
Sheet letter: P
Registry number: H10805
Purpose: To provide NOAA with modern, accurate hydrographic survey data acquired using shallow water multibeam and sidescan sonar technology with which to update the nautical charts of the assigned area.

B. AREA SURVEYED

The area surveyed was primarily the Fairway Anchorage to the west of the Approach to Galveston, Texas, Shipping Safety Fairway, and includes a portion of the Precautionary Area at the entrance to the Galveston Channel. H10805 was bounded approximately by the following coordinates:

29.313192°N	094.646537°W
29.156688°N	094.524570°W
29.089518°N	094.639558°W
29.246284°N	094.753794°W
29.302413°N	094.656204°W
29.313192°N	094.646537°W

Dates of multibeam data acquisition:

7/15/98 - 08/05/98	JD 196 - 217
08/16/98 - 08/17/98	JD 228 - 229
10/02/98 - 10/03/98	JD 275 – 276
10/05/98 – 10/06/98	JD 278 - 279
10/08/98 – 10/09/98	JD 281 - 282

Dates of side scan data acquisition:

05/16/98 – 05/22/98	JD 136 – 140
05/25/98 – 06/01/98	JD 145 - 152
06/23/98 – 06/25/98	JD 174 - 176
07/02/98	JD 183
07/06/98 – 07/11/98	JD 187 - 192

07/15/98 – 07/27/98	JD 196 - 208
07/29/98	JD 210
07/31/98 – 08/02/98	JD 212 - 214
08/06/98	JD 218
08/08/98 – 08/14/98	JD 220 – 226
08/17/98	JD 228
08/20/98	JD 232
08/31/98	JD 243
09/04/98	JD 247
09/19/98 – 09/24/98	JD 262 - 267
09/29/98 – 10/01/98	JD 272 - 274
10/13/98	JD 286
11/02/98 – 11/04/98	JD 306 - 308
11/15/98 – 11/18/98	JD 319 - 322
11/21/98 – 11/22/98	JD 326 - 327

C. SURVEY VESSELS

M/V NEPTUNE was the platform for multibeam sonar, sound velocity, bottom samples, and for the final side scan sonar gap fills. Multibeam and side scan data acquisition systems were mounted in the main cabin of the NEPTUNE and post processing systems in a CONEX container welded in place on the aft deck of the NEPTUNE. The POS/MV IMU was mounted on the vessel centerline just forward and above the RESON 8101 transducer, below the main deck. Multibeam sounder transducers were mounted on the keel. Table C.1 is a list of vessel characteristics for vessels employed on this survey.

Table C.1 Survey Vessel Characteristics

Vessel Name	LOA (Ft)	Beam (Ft)	Draft (Ft)	Gross Tonnage	Power (Hp)	Registration Number
M/V NEPTUNE	106.9	26	8	90	1200	D595478
M/V ECHO	40.5	14	3	10	750	FL7014HW

M/V ECHO performed side scan sonar and bottom sampling operations. The side scan sonar tow position for both vessels was located at the " A" frame aft center. A Kevlar cable manipulated by hand was used for these configurations.

The M/V NEPTUNE layout is depicted in Figure C-1 and the vessel offsets are shown in Table C-2. Figures C-3 and C-4 show the M/V NEPTUNE's draft calculations. The Reference Point for the entire multibeam system was located at the top centerline of the POS/MV IMU.

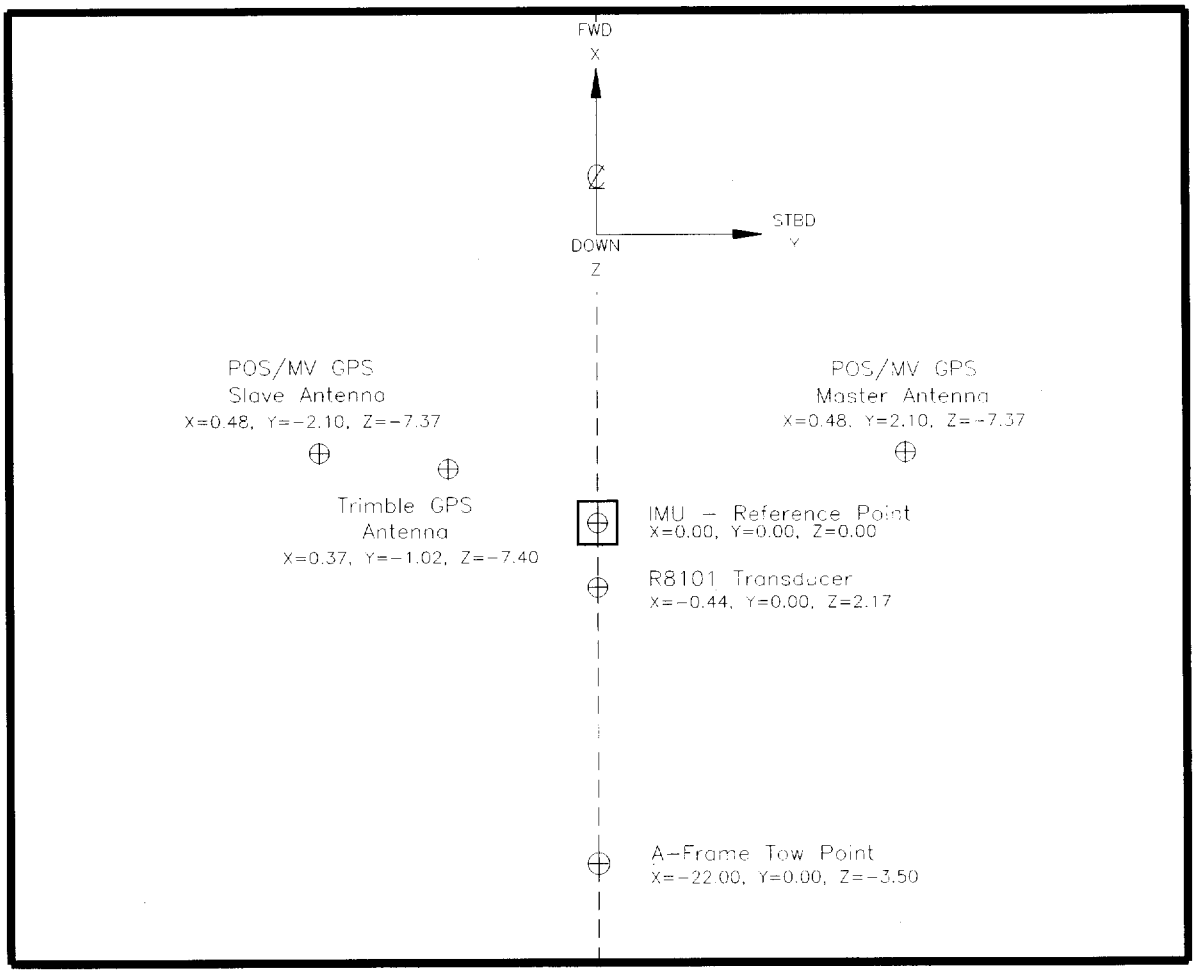

Figure C-1. M/V NEPTUNE Antenna and Transducer Locations Relative to the POS/MV IMU Vessel Reference Point

Table C-2. M/V NEPTUNE Antenna and Transducer Locations Relative to the POS/MV IMU Vessel Reference Point

Sensor	Offset in **iss2000**		POS/MV IMU	
Multibeam	X		x	-0.44
Reson Coordinate	Y		y	0
	Z		z	2.17
Trimble 7400	X	0.37		
	Y	-1.02		
	Z	-7.40		
GPS Differential Master Antenna			x	0.48
			y	2.10
			z	-7.37
Sidescan Tow PT	X	-22.0		
"A" frame aft	Y	0		
M/V NEPTUNE	Z	-3.5		

The transducer depth was recorded as 3.46 meters to the boat deck. The boat deck to waterline was measured and subtracted from the transducer hull depth to determine the draft of the electronic center of the transducer. Measurements were made on each side of the vessel before departure from port and upon return to port to prorate the draft for fuel and water consumption. Lead-line comparisons to the corresponding echo sounder beam confirmed the 3.46 meters as the correct transducer depth below deck. On and before day 260 the transducer draft was determined in accordance with *Figure C-2*.

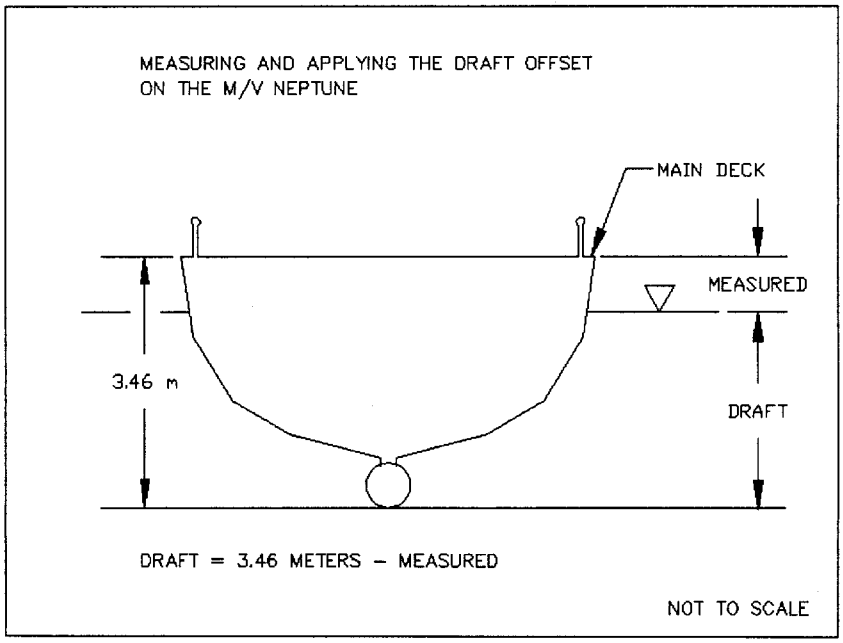

Figure C-2. M/V NEPTUNE Draft Determination Through Day 260

Upon installation of the RESON R8101 sounder, the processor control unit would not operate. The unit was changed and the system operated. Later it was discovered that the firmware in use was for the E/R projector transducer instead of being matched to the stick projector that was in use. RESON advised that this combination would cause a draft change of 0.04 to 0.05 meter, and that there might be a slight additional depth change across the swath. Draft determination and leadline comparisons had accounted for the shift in draft of the transducer. The accuracy test had demonstrated that depths across the swath met the accuracy standards. On day 261 the firmware in the RESON R8101 was upgraded to match the stick transmitter transducer which was being used. This resulted in a change in the electronic draft of the transducer of –0.04 meter as predicted by RESON and confirmed by leadline comparisons. On and after day 261 the transducer draft was determined in accordance with *Figure C-3*.

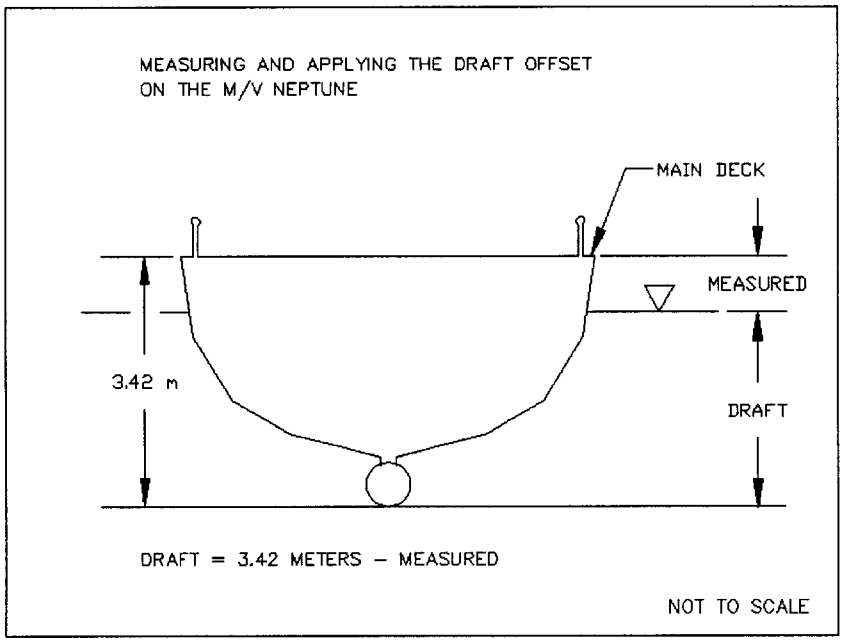

Figure C-3. M/V NEPTUNE Draft Determination on and After Day 261

The SAIC Integrated Survey System (**iss2000**) and the RESON R8101 multibeam system have different coordinate systems, and therefore care must be taken when inputting correctors to the system. The **iss2000** considers "z" to be positive down, while both the RESON and POS/MV consider "z" positive up. Both the **iss2000** and POS/MV consider "x" positive forward, the RESON considers "x" as positive athwart ships to starboard. **iss2000** considers "y" positive athwart ships to starboard, the POS/MV considers "y" positive athwart ships to port and the RESON considers "y" as positive forward. The M/V ECHO side scan tow point was on centerline, y = 0.00, and 5.80 meters aft, x = -5.80, of the navigation center of the vessel (the Trimble GPS antenna on centerline.)

D. AUTOMATED DATA ACQUISITION AND PROCESSING *SEE ALSO THE EVALUATION REPORT.*

Data acquisition was through the **SAIC iss2000** system. Survey planning, real-time navigation, and data logging were controlled by the **iss2000.** In M/V ECHO the **iss2000** was running on an OS/2 computer. In M/V NEPTUNE the **iss2000** on a HP UNIX machine, with navigation and data time tagging running on an OS/2 machine. In both vessels the **iss2000** provided navigation data to the side scan sonar systems for merging with the sonar data.

Navigation was recorded from the POS/MV system in the M/V NEPTUNE and from the Trimble 4000. Positioning confidence checks were performed alongside survey control stations in port. Daily positioning confidence checks in M/V NEPTUNE were done by comparing data recorded from the POS/MV to data recorded from the Trimble DGPS.

The RESON R8101 range scale was maintained at 50 meters for the entire survey. The data acquisition rate for the R8101 was set at 8 per second for vessel speeds above 6 knots, and at 5 per second for vessel speeds of 6 knots or less. This means that the specified on average 3.2 pings per 3 meters could be obtained at up to 14.5 knots with the 8 per second data rate, and at up to 9 knots at the 5 per second data rate. At the most common speeds the results were: 10 knots, 8 per second, on average 4.6 pings per 3 meters; 6 knots, 5 per second, on average 4.9 pings per 3 meters. In all cases the specified on average 3.2 pings per 3 meters was met.

The side scan sonar range scale was maintained at 100 meters except for a portion of the second 100% where the range scale was changed to 75 meters. For 100 meter range scale the vessel speed was maintained at 4.5 knots or less, and for 75 meter range scale the vessel speed was maintained at 6 knots or less so that there were 3 or more side scan sonar pings per meter along track.

Cleaning of the R8101 multibeam data began with evaluation of the navigation track line, application of automated filter for minimum and maximum depths of 5 and 20 meters (except in the shallow north end where the minimum was set to 1 meter), and interactive editing to remove noise, fish, etc., using the **geoswath** geo-referenced editor which allows both plan and profile views with each beam in its true geographic position and depth. Observed tides were down loaded from the NOAA web page. Initially the preliminary data from the Galveston Pleasure Pier were applied to the data using the zoning provided in the Statement of Work. After receipt of Supplemental Instruction: Final Water Level Data for Application to Hydrographic Survey OPR-K171-KR-1998 zones were changed to comply with that instruction, and verified data from the Galveston Offshore (877-1904) was applied to all data through August 08, 1998 when the tide station was destroyed in a storm. Verified data from the Sabine Offshore tide station (877-1081) was then applied to all data from the beginning of the survey. After analysis of the corrected data it was determined that wind stress on certain days made it proper to substitute the verified data from the Galveston Pleasure Pier (877-1510) station as downloaded from the NOAA/OPSD web page.

Depth data were then gridded to 1-meter cells for quality evaluation and for comparing to side scan sonar contacts. When anomalies were seen in the 1-meter grids, the edited multibeam files were re-examined and re-edited as needed. When the multibeam files were all determined to be satisfactory, the data were binned to a 20-meter cell size, populating the bin with the shoalest sounding in the bin and maintaining its true position and depth with tracking to the gsf data file.

Soundings were selected from the 20-meter binned layer using the **sel_sound** sounding selection software. This routine starts with the shoalest sounding in the survey, flags out soundings that would overlap it on the plot, proceeds to the shoalest remaining sounding and repeats the above process until all soundings in the 20-meter bin layer have been evaluated. The Set_Sounding, **setsound,** program **was** run to flag all selected soundings in the gsf multibeam file. The selected sounding file, the platform and navigation aids file, and the feature file were combined to produce the smooth sheet in **AutoCAD**. Contours were manually drawn from the selected soundings on the smooth sheet.

Processing of side scan sonar data are discussed in Section E.

Throughout this descriptive report wherever software is mentioned, it is inferred that the most current

version of the software available was used. A complete list of all software versions and dates is provided in Appendix K. FILED WITH THE ORIGINAL FIELD RECORDS

E. SIDE SCAN SONAR

The following side scan sonar equipment was used for the H10805 survey:

KVH Fluxgate Compass Serial Number 20 2003

Marine Sonic PC Side Scan Sonar System Towfish "A" Serial Number 72010
vertical beam width 40°, no depression, 300kHz.

Marine Sonic PC Side Scan Sonar System Towfish "B" Serial Number 72011
vertical beam width 40°, no depression, 300kHz.

Marine Sonic PC Side Scan Sonar System towfish leased From C & C Technologies
Serial Number 20200208982018
vertical beam width 40°, 10° depression, 300kHz.

Klein 2000 Side Scan Sonar System towfish leased from RentMAR
Serial Number 122
Vertical beam width 40°, 10° depression, 100/500kHz. (100 kHz data recorded)

A Marine Sonics PCC Scan, 300 kHz frequency sidescan towfish with no depressor was used for the majority of the survey. Use of a range delay to correspond to the side scan sonar towfish altitude allowed removal of the water column from the record, and ensured coverage to the full range of the scale selected.

A Klein 2000 Side Scan Sonar with no depressor, recording the 100 kHz data, was used to fill in some data gaps.

Sidescan operations were conducted in water depths ranging from 26 to 58 feet. The side scan range scale was maintained at 100 meters, and the side scan altitude off the bottom was maintained between 8 and 12 meters. In the shallow northern portion of the second 100% coverage the side scan range scale was changed to 75 meters, and the side scan altitude off the bottom was maintained between 6 and 7 meters. The amount of cable deployed was determined by using tape markings on the cable. As the cable length was adjusted to maintain the proper fish altitude, the operator would note the markings on the cable and enter the amount of cable deployed into the **iss2000**, which calculated layback and fish position.

To verify that the side scan signal reached the full extent of the slant range setting, records were checked for location of known objects at the far edge of the slant range. Daily confidence checks for both channels were conducted using a buoy and sinker in the Galveston channel. In addition, trawl marks and anchor scours were noted as confidence checks in both channels while on line.

1. Side Scan Sonar Survey Data Acquisition Procedure

Survey lines were run along 057.0° and 237.0° for the first 100% coverage, and 146.5° and 326.5° for the second 100% coverage. Line spacing was 180 meters for the area surveyed at 100 meter range scale, and 60 meters for the area surveyed at 75 meter range scale. Both navigation and side scan sonar data were logged continuously throughout the day. Digital side scan sonar file names were automatically changed

by the PC Side Scan acquisition software after 975 lines of data were displayed. Navigation file names were manually changed after each survey line was completed.

After completion of the day's survey operations the side scan sonar towfish was recovered and the vessel returned to port. All files were then downloaded to Jaz disks which were labeled and placed into a waterproof storage container for transport to the post-processing facility.

2. Problems Encountered During Side Scan Sonar Survey Acquisition

Side scan sonar towfish instability caused problems by producing poor quality records during days of marginal sea conditions. This marginal sea condition was generally around 3 to 4-foot waves with very short wave period. Side scan sonar survey operations were aborted when this sea state was exceeded. Use of a "mooring snubber" that was hung between the A-frame and towing sheave helped to dampen out some of the vessel's pitching motion. Putting out as much side scan sonar cable as possible to introduce more catenary also helped to stabilize the side scan sonar towfish.

Surface noise, during days of marginal sea conditions, also produced poor side scan sonar records. When utilizing either towfish "A" or towfish "B" this surface noise always seemed more evident on the port channel. A leased towfish was received and utilized for side scan sonar survey data acquisition for the first time on and after August 14, 1998. This towfish had a lower grazing angle on the transducers and produced the best records thus far in the survey. The use of this towfish eliminated the surface noise problems and produced a more balanced record between the port and starboard channels.

The presence of numerous porpoises at times caused problems with the side scan sonar records. The porpoises would sometimes bump the side scan sonar towfish, and completely wash out the records. Chatter or noise from the porpoises would produce black specks on the records. These areas were all considered gap areas and were rerun as gap fill survey lines. During the running of the gap fill survey lines, no porpoise interference was encountered.

Very large schools of fish and shrimp caused problems by producing large black areas on the side scan sonar records and sometimes large shadows as well. These areas were all considered gap areas and were rerun as gap fill survey lines.

There was a great deal of vessel traffic within the survey area, mostly from shrimp boats. The wake from these vessels would sometimes be all that was discernible on the side scan sonar record. These areas were all considered gap areas and were rerun as gap fill survey lines. A second problem was having to abort the survey line because of a vessel located on it and not moving out of the way. When this occurred, the survey line was reacquired where it was aborted, with some overlap to ensure there was no data gap. Most of the shrimp boats that were encountered would never answer their VHF radios after numerous attempts to contact them.

There were minor problems with the loss of GPS, but these were few and usually did not last very long. Losses of the Differential GPS signal from the Coast Guard beacon was experienced on only one day.

3. Side-Scan Target and Feature Processing

All acquired navigation and side scan sonar data, from the day's survey operation, was initially transferred from the Jaz disks to the side scan sonar survey post-processing computer. This computer was a Hewlett Packard Model 712/80 UNIX workstation utilizing the **iss2000** and **MBHAT** (Multibeam Hydrographic

Analysis Tool) software.

Acquired side scan sonar data from each day's survey operation were then reviewed from the Jaz disk on a Windows Version 3.11 based computer work station utilizing the Marine Sonic Sea Scan PC Review Version 1.5.3 software. The individual digital *.MST side scan sonar data files were reviewed and features annotated directly on the digital data file. All contacts, with their associated position, description and height were marked as targets, and stored in a separate marker file. The beginning and end of data gaps were also marked in the digital records and included in the marker file. After review, the data and the created marker file were transferred to the post-processing computer. Survey files created by the Marine Sonic PC Side Scan Sonar System during the data acquisition were also transferred over to the post-processing computer for use in coverage plots.

In the post-processing computer the gap markers were separated from the contacts and a combined contact file was produced from each day's individual marker file. These contacts were displayed on the post-processing computer and loaded onto the multibeam sonar post-processing computer for comparison with the multibeam sonar coverage layer. Once the contacts had been displayed and checked on the computer a side scan sonar coverage plot was produced to insure complete bottom insonification.

The gap marker file was used to edit the time windows for the side scan sonar coverage plot. Each individual survey line was edited in the time window and any gap fill times from the marker files added. These edited times combined with a catenary file from the acquired navigation data were utilized to produce an initial coverage plot of the side scan sonar data. The survey files created by the Marine Sonic PC Side Scan Sonar System during the data acquisition could also be utilized to produce a coverage plot if there was a problem with any of the catenary files recorded. This initial coverage plot was reviewed and a gap fill survey line plan was created. After the side scan sonar data for the gap fill survey lines has been collected, a new coverage plot was produced with this data, and another review was done. If there was sufficient overlap on all survey lines and 100% bottom insonification, then a final coverage plot of the first 100% side scan sonar coverage would be produced.

The exact same side scan sonar post-processing procedure as described above was followed for the second 100% side scan sonar coverage. Two separate side scan sonar coverage plots were produced to combine for the 200% bottom insonification required for the survey.

All dataset computer files and records were archived from the post-processing computer onto 4mm DAT tapes. The individual Jaz disks containing the acquired navigation and side scan sonar data have been retained. A Zip disk contains all the daily navigation logs, daily progress reports, digital side scan sonar review logs, GPS confidence check logs, and all other side scan sonar survey related items. Hard copy of all these mentioned items were also produced and placed into individual binders.

4. Problems Encountered During Side Scan Sonar Survey Post-Processing

The catenary files from the navigation Jaz disk utilized on July 29, 1998, were corrupted, although all the other files were intact. No navigation data could be recovered off of the Jaz disk utilized on August 2, 1998, due to a bad Jaz disk. There was no problem with the side scan records on these days; therefore, navigation records from the survey files created by the Marine Sonic PC Side Scan Sonar System during the data acquisition were utilized to append to the coverage plot produced from the catenary files. The side scan records from these days were fully useable. This situation occurred only on the second 100% side scan sonar coverage. On the first 100% side scan sonar coverage, only the catenary files were used to produce this coverage plot.

Prior to the problem with the bad Jaz disk, all navigation and side scan sonar data were being recorded directly to the Jaz drives on these two computers. With the potential for more bad Jaz disks, after August 2, 1998, all navigation and side scan sonar data were recorded directly to the computer's hard drive and then copied to the Jaz disks at the end of the survey day. This navigation and side scan sonar data were not removed from the computer's hard drives until it was properly transferred to the post-processing computer.

A problem occurred with the production of side scan sonar coverage plots. The computed plot files created were too large to utilize the HPGL output format and the Hewlett Packard DesignJet 650C color plotter would run out of memory before it had an opportunity to begin plotting. When utilizing the RTL (via PostScript) output format the post-processing computer would crash during the side scan sonar coverage plot computation. It was discovered that the display layer for DGPS Coverage defaults to on and this was causing the post-processing computer to crash. Once the display layer for DGPS Coverage was turned off a side scan sonar coverage plot utilizing the RTL (via PostScript) output format could be produced.

Targets were correlated with multibeam features using the **iss2000/Survey Analysis/Sonar Contact Analysis** software to view the side scan contacts as an overlay to the multibeam gridded depth layer. This routine allows the hydrographer to designate features to be plotted on the smooth sheet as wreck, rock, or obstruction, and to designate which sonar contacts were correlated to each feature. The software produces the p*_feature.cnt* file and modifies the *sheet_p_all.ctv* file to indicate the results of the hydrographer's evaluation. The **feature to gsf** program was used to add tracking of the features to the gsf multibeam data records, and to create the *p_feature_att.cnt* with multibeam attributes of file, ping, beam, and depth. Of the 165 sonar contacts, 10 were resolved into 7 features for Sheet P. All 7 features in Sheet P were correlated to multibeam data meeting the specification standards. In addition, 4 other features were identified in the multibeam data meeting the specification standards, but were not seen in the side scan records. Therefore one wreck and 10 obstructions were designated for plotting on the smooth sheet.

5. Side Scan Sonar Coverage

Analysis of the second 100% coverage plot reveals two gaps in coverage near the northeast corner of the survey. The first is a right triangle area with legs of 32 meters and 100 meters, the hypotenuse being the north edge of the survey. Center of the triangle is 29 18 19.2N 094 39 12.4W. This area was fully covered by the first 100% side scan, and was covered twice by multibeam swaths meeting the accuracy standards. Nothing was detected in this area in any of the data. The second is a line 10 meters by 320 meters from 29 18 35.93N 094 38 43.19W running northwest to the north edge of the survey. This area was fully covered by the first 100% side scan, and by multibeam swaths meeting the accuracy standards. Nothing was detected in this area in any of the data.

F. SOUNDING EQUIPMENT

The following components were used for acquisition of multibeam bathymetric data:

- RESON SeaBat 8101 multibeam system installed July 08, 1998 consisting of:
    - One SeaBat Transducer, Serial Number 019704,
    - One SeaBat 8101 Processor, Serial Number 6597
    - SeaBat 6042 Controller and Processing Unit, Serial Number 590 P0 794-387

A lead line made of Kevlar line with a 10-lb. Mushroom anchor as a weight was used for checking the multibeam echo sounder. The line was marked in feet and was calibrated against a steel tape.

It was found that the RESON R8101/R6042 produced a nearly constant "frown" profile when viewing the data along track. Careful analysis showed that the data met the depth accuracy criteria. Discussions with RESON have not resolved the cause.

G. CORRECTIONS TO SOUNDINGS

1. Speed of sound

The following systems were used to determine sound velocity profiles for corrections to multibeam sonar soundings.

- Sea-Bird Electronics, Inc., Model 19 CTD, Serial Number 194275-0648, Calibration Date 20 April 1998.
- Sea-Bird Electronics, Inc., Model 19 CTD, Serial Number 193607-0565, Calibration Date 23 March 1998.
- Sea-Bird Electronics, Inc., Model 19 CTD, Serial Number 1919165-1911, Calibration Date 15 June 1998.

Speed of sound profiles were computed from casts taken with Sea-Bird Electronics, Inc. model 19 CTD's. The primary unit was SBE19 #0565. Daily confidence checks were obtained from simultaneous casts with the primary CTD and with SBE19 #0648 or SBE19 #1911. All profiles were computed using **SBE Term19 and DATCNV,** which applied the calibration correctors for the CTD being processed. Calibration forms are in Appendix G. Computed profiles were copied to the **iss2000** for comparison on the screen. A selected profile was applied to the system, recorded, and sent to the RESON 6042 where a refraction lookup table was computed for application of depth, angle and range correctors to the multibeam sounding data. If sounding depths exceeded the cast depth, the 6042 used the bottom of the table to extend correctors below the table.

Many factors were considered in determining the frequency of CTD casts. Before the survey had begun, items such as shape and proximity of the coastline, sources and proximity of freshwater, sunshine or overcast, wind velocity, wave height, and seasonal changes were taken into consideration. After downloading each CTD cast, each was converted to the proper format and compared to the previously applied cast. Over time, this comparison allowed us to see patterns of when CTD casts should be taken. The result was to take a CTD cast every 3-4 hours during the day and every 4-5 hours at night. There were biases toward taking more just after dawn and dusk and less just before dawn and dusk.

Quality control tools, including real-time displays and a multibeam swath editor were used to monitor how the sound velocity was effecting the multibeam data. The survey area being primarily of gentle slope, severe effects due to improper sound velocity could easily be seen by viewing multibeam data profile in an along-track direction. A constant monitoring of weather conditions also had an influence on the frequency of CTD casts. If it were a bright, sunny day with glassy sea conditions, the thermocline would fluctuate much more rapidly than on days that were either overcast or the water surface was rippled by wind. A table including all CTD casts, dates of each cast, and maximum depths of each cast is in Appendix J. FILED WITH ORIGINAL FIELD RECORDS

2. Instrument Corrections

No Instrument corrections were necessary after the initial installation and calibration was complete.

3. Corrections determined from vertical casts

Leadline comparisons to multibeam soundings were made weekly to verify the transducer draft and echo sounder instrument correctors. For each comparison, a CTD cast was taken and the sound velocity profile loaded into the **iss2000** and the RESON 6042. Ten leadline readings were recorded on each side of the vessel along with the UTC time of observation while the **iss2000** recorded the multibeam readings. **Exammb** was used to find the appropriate port and starboard beam depth readings for the time and position of each lead-line reading.

The results of these readings were entered into a spreadsheet along with the observed draft, the draft recorded in the gsf multibeam file, and any squat corrector which may have been entered in the **iss2000.** The spreadsheet applied a calibration corrector to the leadline readings and converted the readings from feet to meters. It also applied correctors to the port and starboard multibeam depths for the difference between the observed draft and the draft entered in the **iss2000,** and for any settlement and squat inadvertently left in the **iss2000.**

Each lead-line comparison comprised 10 measurements on port side and 10 measurements on starboard side of the vessel. The comparisons were averaged for each side of the vessel, and the standard deviations were computed. The mean of the results from 14 sets of comparisons was 0.026 meter on the port side and 0.042 meter on the starboard side. The lead-line cumulative results are included in Appendix G. *

4. Static draft

Depth of the transducer below the deck was determined from measurements made while the boat was on the marine railway, and was verified by lead-line comparisons. The static draft was observed by measuring from the deck to the waterline before getting underway from Galveston and subtracting that measurement from the transducer distance below the deck. If the static draft value changed from the previously noted value, the new value was entered into the RESON system. The static draft was again determined upon return to port and the change in draft was prorated on a daily basis, and applied to the gsf multibeam data in post processing. The prorated draft results are reported in Appendix G. *

5. Settlement and squat

Measurements of settlement and squat were conducted near 29 20.24N 094 38.10W on day 193, July 12, 1998, in 10 meters of water. The following procedures were used:

Settlement and squat of a survey vessel by echo sounder.

- Select an area of flat bottom in depth similar to the survey area, or select a feature on the bottom which will yield adequate echo sounder returns from its top.
- Plan a survey line across the flat bottom, or exactly across a feature.
  1. Give consideration for the current and wind in planning the line.
  2. Arrange recording of the water level during the test.
  3. Calibrate the echo sounder, apply sound velocity profile for the test area. (Timing latency and

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pitch, roll and heading biases should have been determined and applied.)

4. Approach the line at slow to moderate speed, bring RPM to zero and drift down the line while recording soundings over the flat bottom or the feature.
5. Run the line at each of the predetermined RPM settings while recording soundings over the flat bottom or over the feature.
6. Apply water level correctors to the soundings.
7. Subtract the depth determined from each of the RPM passes from the depth determined on the drifting, zero RPM, pass. These differences are the **settlement and squat** correctors to be applied when operating at the corresponding RPM.
8. If using a multibeam sounder over flat bottom, you may want to create a gridded depth layer of the near nadir beams from each pass, and using junction analysis determine the depth differences, zero RPM pass minus each RPM pass. These differences are the **settlement and squat** correctors to be applied when operating at the corresponding RPM.
9. Construct a lookup table of **RPM** and **settlement and squat** correctors so that the computer may interpolate a corrector based upon the RPM entered into the system

Geoswath was used to measure the depth for each pass. The results were compiled into a lookup table of vessel's engine rpm vs. settlement and squat. When on survey line, engine rpm's were entered into the **iss2000** system by the real-time system operator. The computer applied settlement and squat correctors interpolated from the lookup table, and recorded it in the "Depth Corrector" field of the GSF data file for each ping.

All results are reported in Appendix G - Settlement and Squat Test. FILED WITH ORIGINAL FIELD RECORDS

6. **Roll, Pitch and Heading**

The following sensor was used for acquisition of Heave, Roll, Pitch and Heading data:

- TSS POS/MV Inertial Navigation System, Serial Number 001615

The POS/MV was used for heave, roll, and pitch. The accuracy of the sensor was 5 percent of 1 m or 5 cm for heave; ± 0.10° dynamic accuracy for roll and pitch, and ± 0.05° static accuracy for roll and pitch. The POS/MV was used for heading. The dynamic heading accuracy of the unit was better than 0.05°.

Heading, roll, and pitch biases were determined in a series of tests performed in the survey area prior to the start of the survey. Prior to conducting any of the tests, a CTD cast was taken to determine the sound velocity profile and entered into the RESON system. In the RESON the roll bias was initially set to 0°, heading bias was initially set to 0°, and pitch bias was set to 0°.

A position timing latency test was conducted on day 193 over a feature in the near flat bottom near 29 19.2N 094 39.2W, running the same line in the same direction at slow speed and fast speed. This test confirmed the laboratory timing test with the result of no position timing latency.

The roll bias test was run first on days 192 and 193 in an area of flat bottom near 29 20.22N 094 38.14W in 10 meters water depth. The range scale of the RESON was set to 50 meters. Three lines were run spaced 40 meters apart and each line run in both directions. The data from parallel lines in the same direction were used for roll bias calculations so that the depths from the center beams from one line were compared against the depths of the mid-swath beams. Tidal corrections were applied to all data before roll corrections were calculated using routines in the **MBHAT** software. A second roll bias test was run on day

196 near 29 15.2N 094 36.6W in 15 meters water resulting in a final roll bias corrector of +0.216 degrees. Roll bias results are shown in Appendix G. *

The pitch test was conducted by surveying multiple reciprocal passes on a line perpendicular to an anchor scour. During the pitch test, ship speed was maintained as constant as possible. Roll bias was mistakenly set at +0.24 for the pitch test, while both pitch and heading were set to zero. Tidal corrections were applied to all data before the pitch bias was calculated. Pitch biases were computed by comparing runs in opposite directions. There was no discernable pitch bias as a result of the test. A pitch bias of 0.0 was kept in the system.

Following the roll and pitch bias tests, the roll bias was corrected to +0.216 in the system, and a heading bias test was conducted. For the heading bias test, 5 parallel lines were run in opposing directions so that the inner beams from the transducer overlay the intermediate to outer beams of adjacent swaths. The heading bias was then determined by measuring the distance between equal depths and calculating the angle subtended by that distance. Tidal corrections were applied to all data before heading corrections were calculated using routines in the **MBHAT** software. After repeated inconclusive test results, it was deemed that the heading bias was zero. The shallow water depths of the survey area combined with the accuracy of the navigation makes it extremely difficult to measure small degrees of heading bias. Further proof of a heading bias of zero lies in trawl marks traversing numerous swaths with perfect alignment.

Accuracy testing of the sounding system was conducted in accordance with SAIC procedures which use the evaluation criteria developed by NOAA in December 1994, and used to evaluate SAIC data in 1995. This criteria evaluates each echo sounder 1.5 degree beam angle against a reference surface, and computes the percentage of comparisons for each beam angle that meet the junction criteria of less than 0.5 meter. The NOAA criteria stated that 90% or more of the comparisons for a beam angle must be less than 0.5 meter for that beam angle to qualify as meeting the accuracy standards of depth correct within 0.30 meter. A description of the accuracy test and the results are included in Appendix G. *

Roll, pitch, and heading biases applied in H10805 are shown in Table G-2. Listings of the files used in each bias determination are included in the MULTIBEAM LOG BOOK transmitted to Chief, Atlantic Hydrographic Branch, National Ocean Service, NOAA as separate data to accompany this report.

Table G-2. Roll, Pitch, and Heading Bias for the M/V NEPTUNE

Roll	0.216
Pitch	0.0
Heading	0.0

Tide correctors were not applied in real-time. Initially the preliminary zoning provided in the Statement of Work was used to apply preliminary tides for the Galveston Pleasure Pier (877-1510) station as down-loaded from the NOAA/OPSD web page. After receipt of the NOAA Memorandum of August 4, 1998, Final Water Level data for application to Hydrographic Survey OPR-K171-KR_1998, enclosed in Appendix F, we changed to the new zoning and began to apply tides for Galveston Offshore (877-1904) as downloaded from the NOAA/OPSD web page. On August 08, 1998 at 22:54 the Galveston Offshore station ceased to function. All H10805 multibeam data were reprocessed with verified tide data for the Sabine Pass Offshore (877-1081) station as downloaded from the NOAA/OPSD web page. After analysis of the corrected data it was determined that wind stress on certain days made it proper to substitute the verified data from the Galveston Pleasure Pier (877-1510).

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H. CONTROL STATIONS See also the Evaluation Reports

The horizontal datum used for the survey was the North American Datum (NAD) 1983.

Horizontal control stations CG-18 1974 and CG-20 1974 were used for independent checks of the positioning systems on the survey vessels. Data for these stations were downloaded from the NOAA/NGS web page.

I. HYDROGRAPHIC POSITION CONTROL

The following equipment was used for positioning on the M/V NEPTUNE:

- TSS POS/MV Serial Number 001615
- Trimble 7400 GPS Receiver, Serial Number 3713A18839
- Magnavox MX50R Differential Beacon Receiver, Serial Number 154
- 41R Differential Beacon Receiver, Serial Number 3508-102-18550

The following equipment was used for positioning on the M/V ECHO:

- Trimble 4000 DS GPS Receiver, Serial Number 3504A09516
- KVH Fluxgate compass, Serial Number 20 2003
- Magnavox MX50R Differential Beacon Receiver

The primary hydrographic positioning equipment was the POS/MV on the M/V NEPTUNE and the Trimble 4000 on the M/V ECHO both using correctors from the USCG differential station at Galveston, TX. By setting real-time system thresholds, HDOP, number of satellites, elevation of satellites, and age of correctors were monitored to insure that the resulting hydrographic positioning errors, at the 95% confidence level, did not exceed 10 meters.

Each day on the M/V ECHO, DGPS data were logged and compared to basepoint values at the boat's mooring to confirm proper DGPS operation. A weekly DGPS check was performed at horizontal control station CG-18, 1974 adjacent to the Galveston Yacht Basin Marina. All the daily and weekly DGPS confidence checks were well within specifications of inverse distance of less than 15 meters, and were no more than 3 meters inverse distance from the check position.

When in port M/V NEPTUNE would tie up to pier 15 where measurements were made to calculate the offset between the hydrographic navigation position and horizontal control station CG-20, 1974. While measurements were being made, navigation data were being logged. Comparison of the navigation center position computed from the control station and the average position based on navigation resulted in confidence checks that were well within specifications of inverse distance of less than 15 meters, and were no more than 3 meters inverse distance from the check position. Daily position confidence checks were established using a Trimble DGPS with correctors from the U.S. Coast Guard station at Port Aransas, TX. A real-time monitor raised an alarm when the two DGPS positions differed by more than 10 meters horizontally. Positioning confidence checks were well below the allowable inverse distance of less than 15 meters.

During the initial alignment trials a problem was discovered in the POS/MV that caused the system to record the same attitude parameters for several intervals rather than updating as it should. Calls to TSS America and Applanix revealed that they knew of the problem and had a fix ready. Replacement e-proms

were delivered and installed before completion of alignment and accuracy testing. All data for this survey were obtained with the updated e-proms.

At the beginning of the survey, the POS/MV would lose GAMS (GPS Azimuth Measurement System) once per day for about one hour. The time of day was extremely predictable to within 5 minutes of the start time. Loss of GAMS caused the heading data to slowly degrade. Survey operations were continued until the heading accuracy decreased to .8 degrees. Surveying was then stopped until the GAMS heading accuracy returned so that positioning of the outer beam soundings would not be compromised. The problem was in the POS/MV software and seemed to be related to our geographic location and the number of satellites in view. The POS/MV manufacturer fixed the problem after several iterations of e-prom replacement.

The USCG Galveston DGPS station was used as the primary positioning corrector source. The USCG Port Aransas, TX DGPS station was used for daily positioning confidence checks in the M/V NEPTUNE. During the 5 days when the USCG Galveston DGPS transmitter was being replaced, we were in port for all but one day due to weather. The weather calmed down and survey operations began on the day the new transmitter was coming online. Several hours of data were collected in M/V NEPTUNE while using the USCG Port Aransas, TX DGPS station. The primary DGPS receiver used automatically locks onto the strongest DGPS signal, thus when the USCG Galveston DGPS station came back online M/V NEPTUNE immediately switched over to it. M/V ECHO could not receive the USCG Port Aransas, TX DGPS station, and, therefore, lost a good weather day.

On the M/V NEPTUNE, all antenna, transducer, towpoint, and towfish offsets were measured relative to the POS/MV's IMU. Two separate teams of two people measured and calculated all offsets using a measuring tape. The final offsets from both teams were then compared and agreed very well.

On the M/V ECHO, two operators measured the offset between the master DGPS antenna and the towpoint using a measuring tape. There was no offset in the port/starboard direction between the DGPS antenna and the towpoint.

On both vessels, the **iss2000** software calculates the towfish position using an input cable out value and the towpoint configuration or offsets previously measured.

J. SHORELINE

Not Applicable.

K. CROSSLINES

There were 290 linear km of crossline surveyed and 5278 linear km of mainscheme lines surveyed resulting in 5.4% coverage by crossline. Comparisons of all crossing data in the portion of the swaths which meet the standards, (A), show that more than 99 percent of comparisons were within 30 centimeters and 99.99 percent of comparisons were within 50 centimeters. Only 26 of 364212 comparisons exceed 50 centimeters, and all were less than 70 centimeters. These larger comparisons are traceable to deep soundings being left in the data. All comparisons show a bias toward a negative count revealing that the crossline data tend to be slightly deeper than data from the mainscheme lines. See *Table K-1* for the listing of the Junction Analysis, Main Scheme Standards Data (A) to Crossline Standards Data (A).

Table K-1. Junction Analysis Mainscheme (A) vs. Crosslines (A)

Junction Analysis, Main Scheme Standards Data (A) to Crossline Standards Data (A)								
Depth Difference Range		All Differences		Positive Differences		Negative Differences		Zero Differences
		Count	Percent	Count	Percent	Count	Percent	Count
00.0 to	10.0cm	213756	58.69	79226	65.44	120824	52.66	13706
10.1 to	20.0cm	114969	90.26	35465	94.74	79504	87.31	
20.1 to	30.0cm	33687	99.51	6101	99.78	27586	99.33	
30.1 to	40.0cm	1722	99.98	216	99.96	1506	99.99	
40.1 to	50.0cm	52	99.99	25	99.98	27	100	
50.1 to	60.0cm	21	100	21	100	0	100	
60.1 to	70.0cm	5	100	4	100	1	100	
70.1 to	80.0cm	0	100	0	100	0	100	
80.1 to	90.0cm	0	100	0	100	0	100	
90.1 to	100.0cm	0	100	0	100	0	100	
100.1 to	110.0cm	0	100	0	100	0	100	

Comparisons of all crossing data in the portion of the mainscheme swaths which meet the standards, (A), to the crossline reconnaissance data, (B), show that more than 99 percent of comparisons were within 40 centimeters and 99.99 percent of comparisons were within 50 centimeters. Only 13 of 267550 comparisons exceed 50 centimeters. These larger comparisons were traceable to deep soundings being left in the outer edges of the crossline swath. All comparisons show a bias toward a negative count revealing that the crossline data tend to be slightly deeper than data from the mainscheme lines. See *Table K-2* for the listing of the Junction Analysis, Main Scheme Standards Data (A) to Crossline Reconnaissance Data (B).

Table K-2. Junction Analysis Mainscheme(A) vs. Crosslines (B)

Junction Analysis, Main Scheme Standards Data (A) to Crossline Reconnaissance Data (B)								
Depth Difference Range		All Differences		Positive Differences		Negative Differences		Zero Difference
		Count	Percent	Count	Percent	Count	Percent	Count
00.0 to	10.0cm	115745	43.26	27939	81.86	81197	35.8	6609
10.1 to	20.0cm	91645	77.51	5779	98.8	85866	73.66	
20.1 to	30.0cm	53811	97.63	351	99.82	53460	97.23	
30.1 to	40.0cm	6137	99.92	26	99.9	6111	99.92	
40.1 to	50.0cm	199	100	25	99.97	174	100	
50.1 to	60.0cm	7	100	5	99.99	2	100	
60.1 to	70.0cm	1	100	1	99.99	0	100	
70.1 to	80.0cm	2	100	0	99.99	2	100	
80.1 to	90.0cm	0	100	0	99.99	0	100	
90.1 to	100.0cm	0	100	0	99.99	0	100	
100.1 to	110.0cm	3	100	3	100	0	100	

Comparisons of all crossing data in the reconnaissance portion of the mainscheme swaths, (B), to the portion of the crossline swaths which meet the standards, (A), show that more than 99 percent of comparisons were within 30 centimeters and 99.99 percent of comparisons were within 50 centimeters. Only 3 of 107689 comparisons exceed 50 centimeters, and all were less than 80 centimeters. These larger comparisons were traceable to deep soundings being left in the data. All comparisons show a bias toward a negative count revealing that the crossline data tend to be slightly deeper than data from the mainscheme lines. See *Table K-3* for the listing of Junction Analysis, Main Scheme Reconnaissance Data (B) to Crossline Standards Data (A).

Table K-3. Junction Analysis Mainscheme (B) vs. Crosslines (A)

Junction Analysis, Main Scheme Reconnaissance Data (B) to Crossline Standards Data (A)								
Depth Difference Range		All Differences		Positive Differences		Negative Differences		Zero Difference
		Count	Percent	Count	Percent	Count	Percent	Count
00.0 to	10.0cm	78993	73.35	33985	69.45	39255	74.06	5753
10.1 to	20.0cm	25968	97.47	13427	96.89	12541	97.72	
20.1 to	30.0cm	2692	99.97	1499	99.96	1193	99.97	
30.1 to	40.0cm	32	100	22	100	10	99.99	
40.1 to	50.0cm	1	100	0	100	1	99.99	
50.1 to	60.0cm	1	100	0	100	1	100	
60.1 to	70.0cm	1	100	0	100	1	100	
70.1 to	80.0cm	1	100	0	100	1	100	
80.1 to	90.0cm	0	100	0	100	0	100	
90.1 to	100.0cm	0	100	0	100	0	100	
100.1 to	110.0cm	0	100	0	100	0	100	

L. JUNCTIONS

SEE ALSO THE EVALUATION REPORT

This survey junctions with H10835. Junction results will be reported in the H10835 report when data analysis is completed.

M. COMPARISON WITH PRIOR SURVEYS

SEE ALSO THE EVALUATION REPORT.

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

N. COMPARISON WITH THE CHART

SEE ALSO THE EVALUATION REPORT

H10805 was compared to Chart 11323, 56th ed., 28 March 1998 at scale 1:80,000 in lieu of the specified 55th Edition.

This survey and the chart agree quite well in the charted dumpsite with the exception of a slight shoaling in the northern portion of the dumpsite where 26-foot soundings now exist. The data show probable dumping outside the southern end of the dumpsite near 29 15 15N 094 37 24W where soundings were now 46 feet in charted 48 feet. In the area from 29 18.05 N, 094 39.5 W to 29 16.25 N, 094 41.8 W the 30 foot curve agrees well with the 30-foot depth curve charted from 1996 to 1998 surveys. The continuation of the 30-foot depth curve to the NW corner of the survey area shows a displacement of the curve seaward

up to 0.9 nautical mile. The 36-foot depth curve west of the dumpsite has also shifted seaward up to 0.9 nautical mile. Soundings compare within one or two feet except in the NW corner north of 29 12 N and west of a line from 29 12 N, 094 40 W to 29 16.5 N, 094 42 W where H-10805 soundings were 3 to 5 feet shoaler than charted. In depths of 50 feet and greater H10805 was generally one-foot shoaler than the chart.

See **Section S.** for recommendations concerning the following charted features. Concur

Charted wreck cleared to 24 feet at 29 15 32N 094 41 42W (AWOIS #360) was found in both side scan and multibeam records with least depth of 25 feet (observed) at 29 15 31.2N 094 41 40.7W in 34 feet.

Charted dangerous wreck with masts PA (AWOIS #8916) at 29 16 30N 094 41 36W was not seen in the 100% multibeam or in the 200% side scan data. There were no visible masts in the area.

Charted dangerous wreck PA (AWOIS #8921) at 29 13 36N 094 39 24W was not seen in the 100% multibeam or in the 200% side scan data. Local Notice to Mariners reported a 45 foot pleasure craft sunk in approximate position in 1985. Subsequent Notice reported that vessel could not be found.

Charted buoy "Q HORN Well (covered 35ft) Priv" at approximate position 29 14 02N, 94 38 17W was not found during the survey. The Well (covered 35ft) was not seen in the 100% multibeam or in the 200% side scan data. H10805 water depth was 50 feet.

Traces of the old trench for the charted pipeline running northeast from the platform at 29 14 32N 094 38 35W were seen along the arc from 29 15 30N 094 37 06W southeast to 29 15 12N 094 36 06W. A newer trench was seen from 29 15 18N 094 37 24W to 29 15 00N 094 35 48W. This may be a replacement for part of the charted pipeline.

Charted dangerous wreck PA (AWOIS #8972) at 29 13 00N 094 35 00W was not seen in the 100% multibeam or in the 200% side scan data. This was reported as a sunken fishing vessel in 1993. H10805 water depth was 51 feet.

Charted obstruction cleared to 46 feet (AWOIS #346) was found in the 100% multibeam data at 29 10. 50.52N 094 37 17.95W with a least depth of 49 feet (observed) in 54 feet of water.

Charted obstruction cleared to 48 feet (AWOIS #347) t 29 11 21.0N 094 40 02.0W was not seen in the 100% multibeam or in the 200% side scan data. RU/HE reported this to be an anchor 10 inches off the bottom. H10805 water depth was 53 feet.

Charted dangerous wreck PD (~~no~~ AWOIS #1039) at 29 10 02N 094 40 54W was not seen in the 100% multibeam or in the 200% side scan data.

Charted platform at 29 09 23.4N 094 40.31.2W was not seen on the surface and was not seen in the 100% multibeam or in the 200% side scan data.

Charted obstruction cleared to 49 feet (AWOIS #335 & #2652) at 29 08 58.2N 094 39 58.2W was not seen in the 100% multibeam or in the 200% side scan data. RU/HE reported this to be a pipe extending approximately 6 feet off the bottom in 57 feet (predicted) in 1973. Water depth was 55 feet.

Charted obstruction cleared to 50 feet (AWOIS #338& #2651) at 29 09 16.2N 094 39 21.0W was not seen in the 100% multibeam or in the 200% side scan data. RU/HE reported this to be a 2-inch diameter pipe extending approximately 6 feet off the bottom in 57 feet (predicted) in 1973. H10805 water depth was 55 feet.

Charted obstruction cleared to 49 feet (AWOIS #336, #337, & #2650) at 29 09 07.8N 094 37 57.6W was not seen in the 100% multibeam or in the 200% side scan data. RU/HE reported this to be a concrete block approximately 3 x 4 feet in 56 feet in 1973. H10805 water depth was 55 feet.

Charted obstruction cleared to 48 feet (AWOIS #339) at 29 09 24.0N 094 35 12.0W was not seen in the 100% multibeam or in the 200% side scan data. RU/HE reported this as an uninvestigated hang at 48 feet cleared to 50 feet in 1973. H10805 water depth was 54 feet.

Charted obstruction cleared to 48 feet (AWOIS #328) at 29 07 48.0N 094 36 24.0W was not seen in the 100% multibeam or in the 200% side scan data. RU/HE reported this to be chain, shackles, line, and junk 4 feet off the bottom in 56 feet. H10805 water depth was 55 feet.

Charted pipeline from the platform at 29 09 22.3N 094 34 32.1W northeast to the edge of the survey was not seen in the 100% multibeam or in the 200% side scan data.

Uncharted buried pipeline appears to run from the platform at 29 06 51.4N 094 38 25.4W to 29 06 50.7N 094 38 28.5W to 29 06 29.6N 094 39 13.3W at the west edge of this survey.

There were no Dangers to Navigation reported as a result of this survey.

O. NOT USED BY CONTRACTOR

P. AIDS TO NAVIGATION

Charted buoy "Q HORN Well (covered 35ft) Priv" at approximate position 29 14 02 N, 94 38 17 W was not found during the survey. See recommendation in **Section S.** Concur

Charted Platform at 29 13.5397N 094 34.7086W has racon (– • • •) installed.

See **Section N** for discussion of charted pipelines and possible new pipelines. These are all buried and are not useful as aids to navigation.

Q. STATISTICS

Survey statistics were as follows:

1906.9	Lineal nautical miles of side scan lines (sidescan only)
3440	Lineal nautical miles of sounding lines (multibeam only)
78.8	Square nautical miles of multibeam
78.6	Square nautical miles of sidescan
107	Number of sound velocity casts
0	Number of items investigated
192	Number of bottom samples

R. MISCELLANEOUS SEE ALSO EVALUATION REPORT.

Figure R-1 shows the distribution by beam number of the 684,485 soundings selected for the smooth sheet. The majority of soundings appear to be in the area where the bottom detection algorithm changes from phase to amplitude. Except for these two peaks, the distribution was fairly consistent across the swath. At the outer edges of the 54-degree off nadir swath were smaller peaks in the number of soundings selected per beam. These could indicate that a cut off angle of 50 degrees might have been wiser. All of the soundings selected meet the positioning and depth accuracy specifications (position error not exceeding 10 meters at 95% confidence, depth error not exceeding 0.3 meter at 90% confidence).

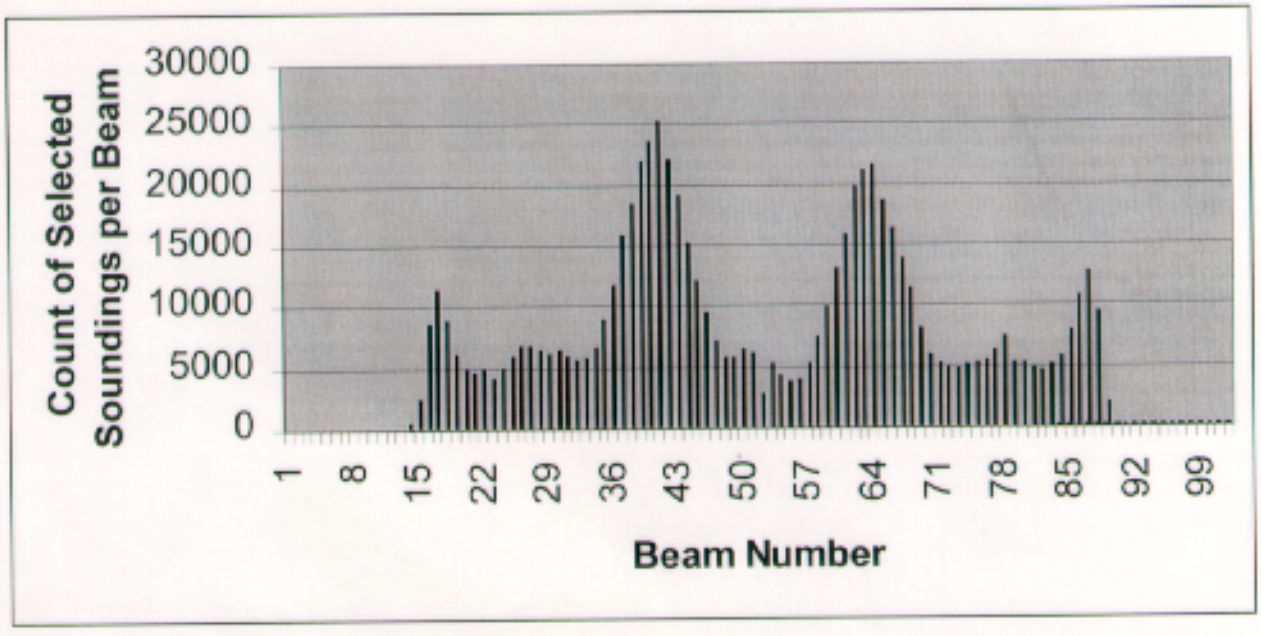


Figure R-1. Histogram of Selected Soundings by Beam Number.

S. RECOMMENDATIONS

Recommend reconstruction of the entire common area of charts 11323, and 11330 with data from this survey.

Charted wreck cleared to 24 feet at 29 15 32N 094 41 42W (AWOIS #360) was found in both side scan and multibeam records with least depth of 25 feet (observed) at 29 15 31.2N 094 41 40.7W in 34 feet. Recommend deletion of the charted Wreck cleared to 24 feet, and charting of sounding 25 Wreck at 20 15 31.2N 094 41 40.7W. CONCUR. ADD (25) WK.

Charted dangerous wreck with masts PA (AWOIS #8916) at 29 16 30N 094 41 36W was not seen in the 100% multibeam or in the 200% side scan data. There were no visible masts in the area. Recommend deletion of the charted dangerous wreck with masts PA at 29 16 30N 094 41 36W. ADDITIONAL WORK (ADWK) SEE ADDENDUM Pg 29

Charted dangerous wreck PA (AWOIS #8921) at 29 13 36N 094 39 24W was not seen in the 100%

multibeam or in the 200% side scan data. Local Notice to Mariners reported that a 45 foot pleasure craft sunk in approximate position in 1985. Subsequent Notice reported that vessel could not be found. Recommend deletion of the charted dangerous wreck PA (AWOIS #8921) at 29 13 36N 094 39 24W. CONCUR DELETE ~~(PA)~~ PA /

Charted buoy "Q HORN Well (covered 35ft) Priv" at approximate position 29 14 02 N, 94 38 17 W was not found during the survey. The Well (covered 35ft) was not seen in the 100% multibeam or in the 200% side scan data. H10805 water depth was 50 feet. Recommend deletion of the charted buoy "Q HORN Well (covered 35ft) Priv" at approximate position 29 14 02 N, 94 38 17 W. ADWK. SEE PAGE 30 OF ADDENDUM.

Charted obstruction cleared to 46 feet (AWOIS #346) was found in the 100% multibeam data at 29 10. 50.52N 094 37 17.95W with a least depth of 49 feet (observed) in 54 feet of water. Recommend deletion of the charted obstruction cleared to 46 feet, and charting of sounding 49 Obstn at 29 10. 50.52N 094 37 17.95W. ADWK. SEE PAGES 30 AND 31 OF ADDENDUM.

Charted dangerous wreck PA (AWOIS #8972) at 29 13 00N 094 35 00W was not seen in the 100% multibeam or in the 200% side scan data. This was reported as a sunken fishing vessel in 1993. H10805 water depth was 51 feet. . Recommend deletion of the charted dangerous wreck PA at 29 13 00N 094 35 00W. CONCUR. DELETE ~~(PA)~~ PA /

Charted obstruction cleared to 48 feet (AWOIS #347) at 29 11 21.0N 094 40 02.0W was not seen in the 100% multibeam or in the 200% side scan data. RU/HE reported this to be an anchor 10 inches off the bottom. H10805 water depth was 53 feet. Recommend deletion of the charted obstruction cleared to 48 feet at 29 11 21.0N 094 40 02.0W. CONCUR DELETE (48) OBSTN. /

Charted dangerous wreck PD (no AWOIS #) at 29 10 02N 094 40 54W was not seen in the 100% multibeam or in the 200% side scan data. Recommend deletion of the charted dangerous wreck PD at 29 10 02N 094 40 54W. CONCUR. DELETE ~~(PD)~~ PD /

Charted platform at 29 09 23.4N 094 40.31.2W was not seen on the surface and was not seen in the 100% multibeam or in the 200% side scan data. Recommend deletion of the charted platform at 29 09 23.4N 094 40.31.2W. CONCUR. NOT SHOWN ON LATEST ED. OF CHARS 11323

The following items are recommended for further investigation under separate instructions. Table S-1 lists items which were seen in one 100% side scan coverage, but were not clearly seen in the second 100% side scan or in the multibeam coverage. These items are those previously recommended to NOAA. Hydrographer could not make a definitive determination of the validity of these items from the contracted data. Table S-2 lists charted items which could not be resolved by the contracted 200% side scan and 100% multibeam coverage. These are additional recommendations that have not previously been made.

Table S-1. Items for Investigation From Side Scan SEE ADDENDUM PAGES 13-26

Contact #	Yyyy/ddd	UTC Time	Latitude	Longitude		Horizontal Range meters	fish height meters	slant range meters	Contact Height meters	hydrographer comments
4	1998/137	17:35:09	29 14.950N	94 44.160W	OBSTR	26.83	7.81	27.73	0.79	INVESTIGATE
6	1998/137	18:21:27	29 16.869N	94 40.891W	OBSTR	30.55	7.42	31.25	0.82	INVESTIGATE
* 8	1998/137	19:46:39	29 17.022N	94 40.512W	OBSTR	41.43	8.59	42.19	0.66	INVESTIGATE *
9	1998/138	13:37:17	29 15.744N	94 42.387W	OBSTR	48.83	7.42	49.22	1.27	INVESTIGATE
10	1998/138	13:52:40	29 16.428N	94 41.234W	OBSTR	40.89	7.42	41.41	0.92	INVESTIGATE
11	1998/138	13:53:05	29 16.448N	94 41.202W	OBSTR	36.11	7.42	36.72	0.78	INVESTIGATE
12	1998/138	15:00:51	29 17.328N	94 39.593W	OBSTR	44.41	8.59	44.92	1.82	INVESTIGATE
16	1998/140	13:16:18	29 13.861N	94 44.013W	OBSTR	-29.84	9.38	-30.86	1.50	INVESTIGATE
19	1998/140	14:53:08	29 16.895N	94 38.629W	OBSTR	49.28	9.38	50.00	0.92	INVESTIGATE
20	1998/140	15:37:41	29 16.521N	94 39.139W	OBSTR	17.52	9.38	17.97	5.38	INVESTIGATE
22	1998/140	17:53:59	29 14.964N	94 41.516W	OBSTR	52.76	10.16	53.52	1.18	INVESTIGATE
34	1998/145	14:18:53	29 13.583N	94 43.768W	OBSTR	39.99	8.59	40.62	1.44	INVESTIGATE
46	1998/145	16:56:06	29 16.383N	94 38.530W	OBSTR	-17.72	9.38	-19.53	1.15	INVESTIGATE
63	1998/147	16:09:40	29 16.069N	94 37.831W	OBSTR	56.83	9.38	57.42	1.12	INVESTIGATE
64	1998/147	16:18:50	29 16.394N	94 37.273W	OBSTR	59.80	10.16	60.55	0.67	INVESTIGATE
65	1998/147	16:54:18	29 15.647N	94 38.441W	OBSTR	27.36	9.38	28.52	1.32	INVESTIGATE
66	1998/147	17:19:39	29 14.612N	94 40.199W	OBSTR	21.35	10.16	23.05	1.47	INVESTIGATE
76	1998/149	16:48:35	29 15.675N	94 36.529W	OBSTR	33.11	11.33	34.38	2.10	INVESTIGATE
77	1998/149	17:02:55	29 15.522N	94 36.663W	OBSTR	36.66	10.55	37.89	0.99	INVESTIGATE
100	1998/150	20:33:09	29 15.085N	94 36.143W	Wellhead	36.19	9.38	36.33	0.00	INVESTIGATE
101	1998/150	20:33:25	29 15.102N	94 36.135W	Manifold	17.91	8.98	17.97	0.00	INVESTIGATE
121	1998/205	13:08:33	29 17.334N	94 38.723W	OBSTR	-38.39	9.38	-39.06	2.16	INVESTIGATE
149	1998/264	21:41:41	29 07.969N	94 39.989W	OBSTR	58.70	14.45	60.16	1.28	INVESTIGATE
151	1998/273	20:05:42	29 16.654N	94 37.227W	OBSTR	75.34	11.72	76.17	0.46	INVESTIGATE

* NOT RECOMMENDED FOR FURTHER INVESTIGATION.

Table S-2. Charted Items Recommended for Further Investigation SEE ADDENDUM PAGES 26-31

Charted Feature	AWOIS Number	Latitude	Longitude
Charted obstruction cleared to 49 feet	(AWOIS #335 & #2652)	29 08 58.2N	094 39 58.2W
Charted obstruction cleared to 50 feet	(AWOIS #338& #2651)	29 09 16.2N	094 39 21.0W
Charted obstruction cleared to 49 feet	(AWOIS #336 #337 & #2650)	29 09 07.8N	094 37 57.0W
Charted obstruction cleared to 48 feet	(AWOIS #339)	29 09 24.0N	094 35 12.0W
Charted obstruction cleared to 48 feet	(AWOIS #328)	29 09 24.0N	094 35 12.0W

T. REFERRAL TO REPORTS

The following two binders were forwarded to Chief, Atlantic Hydrographic Branch, National Ocean Service, NOAA as separate data to accompany this report:

MULTIBEAM LOG BOOK

- Multibeam Watch Logs
- Alignment Files List
- Contact/Features Lists
- Multibeam Processing Checklist
- Position Checks
- Leadline Comparison

SIDESCAN LOG BOOK

- Sidescan Watch Logs
- Sidescan Review Logs

Recommended Items for Investigation From Side Scan were sent by e-mail to LCDR David Neander, NOAA, Hydrographic Surveys Division on December 20, 1998. NOAA issued Request for Proposal for these Item Investigations on January 13, 1999.

Table S-2. Charted Items Recommended for Further Investigation was sent by e-mail to LCDR David Neander, NOAA, Hydrographic Surveys Division on February 9, 1999.

APPENDIX A: DANGER TO NAVIGATION REPORT

None

APPENDIX B: LANDMARKS AND NON-FLOATING AIDS TO NAVIGATION LISTS

None.

APPENDIX C: LIST OF HORIZONTAL CONTROL STATIONS

Geodetic station name: CG 20
Year established: 1974
Source of position: Published in National Geodetic Survey database.
Location: Pier 15:
Latitude: 29 18 49.0409
Longitude: 094 47 10.5748
Elevation: 9.0 feet

Geodetic station name: CG 18
Year established: 1974
Source of position: Published in National Geodetic Survey database.
Location: Galveston Yacht Club:
Latitude: 29 19 15.3244
Longitude: 094 46 30.7227
Elevation: 5.0 feet

Science Applications International Corporation
An Employee-Owned Company

February 9, 1999

LETTER OF APPROVAL

REGISTRY NUMBER H10805

This report and the accompanying smooth sheet are respectfully submitted.

Field operations contributing to the accomplishment of survey H10805 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.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Walter S. Simmons
Hydrographer
February 9, 1999

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 • Office: (401) 847-4210 • Fax: (401) 849-1585
Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson

DESCRIPTIVE REPORT ADDENDUM

to Hydrographic Survey
Sheet P
H10805

10 NM SE of Galveston
Gulf of Mexico
Texas

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NO.
	HYDROGRAPHIC TITLE SHEET	**ADDENDUM TO H10805**
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. **P**

State TEXAS

General locality GULF OF MEXICO

Locality 10 MILES SE OF GALVESTON

Scale 1:20,000 Date of survey 14 July 1999 – 16 July 1999

Instructions dated 23 October 1997 as amended Project No. OPR-K171-KR

Vessel R/V Neptune

Chief of party WALTER S. SIMMONS

Surveyed by W. Simmons, G. Ghiorse, D. Walker, L. Gates, L. McAuliffe, E. Tobey, M. Estaphan, B. Ramaswamy

Soundings taken by (**echo sounder,**) hand lead, pole MULTIBEAM RESON SEABAT 8101

Graphic record scaled by survey personnel

Graphic record checked by survey personnel

Protracted by Automated plot by

Verification by ATLANTIC HYDROGRAPHIC BRANCH PERSONNEL

Soundings in fathoms (**feet,**) meters at MLW, (**MLLW**)

REMARKS: Contract # 50-DGNC-8-90025/SAIC
Contractor Name: Science Applications International Corp.
221 Third Street; Newport, RI 02840
HANDWRITTEN NOTES WERE MADE DURING OFFICE PROCESSING

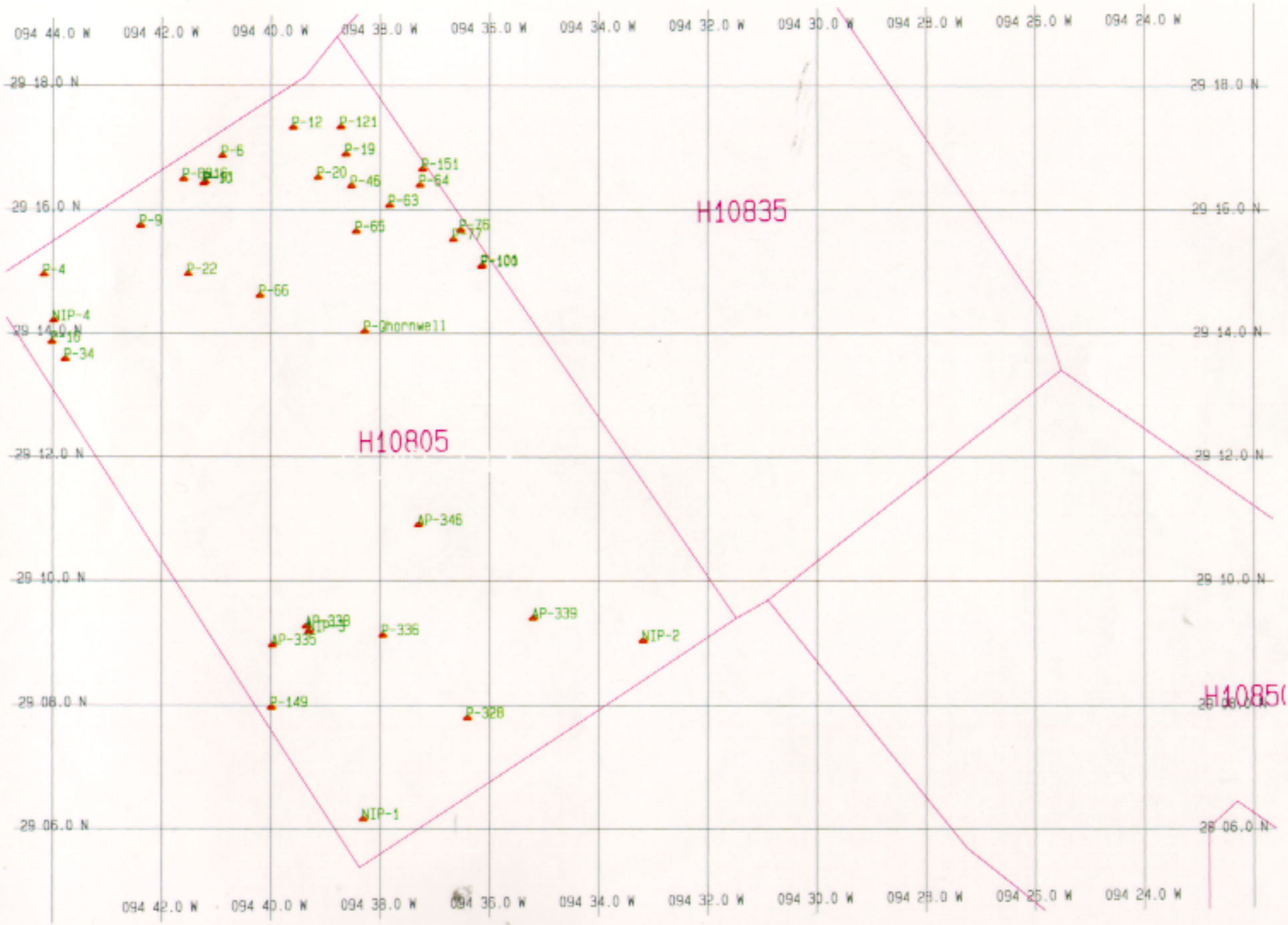
NOAA FORM 77-28 SUPERSEDES FORM C&GS-537.

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

INDEX OF SHEETS

The Index of Sheets on the following page indicates:

1. Survey Outlines
2. Survey Registry Numbers
3. Location of Items Investigated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094 36.0 W
094 34.0 W
094 32.0 W
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094 26.0 W
094 24.0 W
29 18.0 N
29 16.0 N
29 14.0 N
29 12.0 N
29 10.0 N
29 08.0 N
29 06.0 N
H10835
H10805
H10850
P-12
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P-63
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NIP-4
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AP-346
AP-339
AP-336
AP-335
NIP-2
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P-328
NIP-1

Science Applications International Corporation (SAIC) warrants only that the survey data acquired by SAIC and delivered to NOAA under Contract 50-DGNC-8-90025/SAIC reflects the state of the sea floor in existence on the day and at the time the survey was conducted.

* DATA FILED WITH ORIGINAL FIELD DATA

List of Figures

List of Tables

Descriptive Report Addendum to Accompany
Hydrographic Survey H10805
Scale 1:20,000 Surveyed 1999
R/V NEPTUNE
Science Applications International Corporation (SAIC)
Walter S. Simmons, Hydrographer

A. PROJECT

Project Number: OPR-K171-KR
Dates of Instructions: 23 October 1997 **Original:** 50-DGNC-8-90025/SAIC
5 January 1998 Modification #1:56-DGNC-8-24001/SAIC
7 August 1998 Modification #2:56-DGNC-8-24002/SAIC
9 November 1998 Modification #3:56-DGNC-9-24003/SAIC
9 April 1999 Modification #4:56-DGNC-9-24004/SAIC
12 July 1999 Modification #5:56-DGNC-9-24005/SAIC
Dates of Supplemental Instructions: 4 August 1998, 25 May 1999
Sheet Letter: P
Registry Number: H10805
Purpose: Additional Item Investigations to Accompany Hydrographic Survey H10850.

B. AREA SURVEYED

Description:

The area surveyed was primarily the Fairway Anchorage to the west of the Approach to Galveston, Texas, Shipping Safety Fairway, and includes a portion of the Precautionary Area at the entrance to the Galveston Channel. The following coordinates bound the survey approximately:

29.313192 N	094.646537 W
29.156688 N	094.524570 W
29.089518 N	094.639558 W
29.246284 N	094.753794 W
29.302413 N	094.656204 W
29.313192 N	094.646537 W

Dates of multibeam data acquisition (UTC):

07/14/99 – 07/16/99 JD 195 –197

Dates of side scan data acquisition (UTC):
07/14/99 – 07/16/99 JD 195 – 197

C. SURVEY VESSEL

The R/V Neptune was the platform for multibeam sonar, side scan sonar, and sound velocity data collection. Two CONEX containers were welded in place on the aft deck of the R/V Neptune. One container was used for multibeam and side scan data collection, the other for data processing. The POS/MV IMU was mounted on the vessel centerline just forward and above the RESON 8101 transducer, below the main deck. The multibeam sounder transducer was mounted on the keel. The side scan sonar tow position was located at the "A" frame aft center. A double-armored co-ax conductor cable on a SeaMac winch was used for towing the side scan. Table C-1 is a list of vessel characteristics for the R/V Neptune.

Table C-1. Survey Vessel Characteristics

Vessel Name	LOA (Ft)	Beam (Ft)	Draft (Ft)	Gross Tonnage	Power (Hp)	Registration Number
R/V Neptune	106.9	26	8	90	1200	D595478

The R/V Neptune sensor configuration is depicted in Figure C-1 and the vessel offsets are shown in Table C-2. Figure C-2 shows the R/V Neptune's draft calculations. All measurements are in meters. The Reference Point for the entire multibeam system is located at the top centerline of the POS/MV IMU. The transducer depth was recorded as 3.42 meters below the boat's main deck. The distance below the boat deck to the water surface was measured and subtracted from the transducer hull depth to determine the draft of the electronic center of the transducer. Lead line comparisons to the corresponding beam confirmed the 3.42 meters as the correct transducer depth below deck. Measurements were made on each side of the vessel before departure from port and upon return to port in order to prorate the daily draft for fuel and water consumption.

Figure C-1. Configuration of R/V Neptune during Survey Operations, measurements in meters

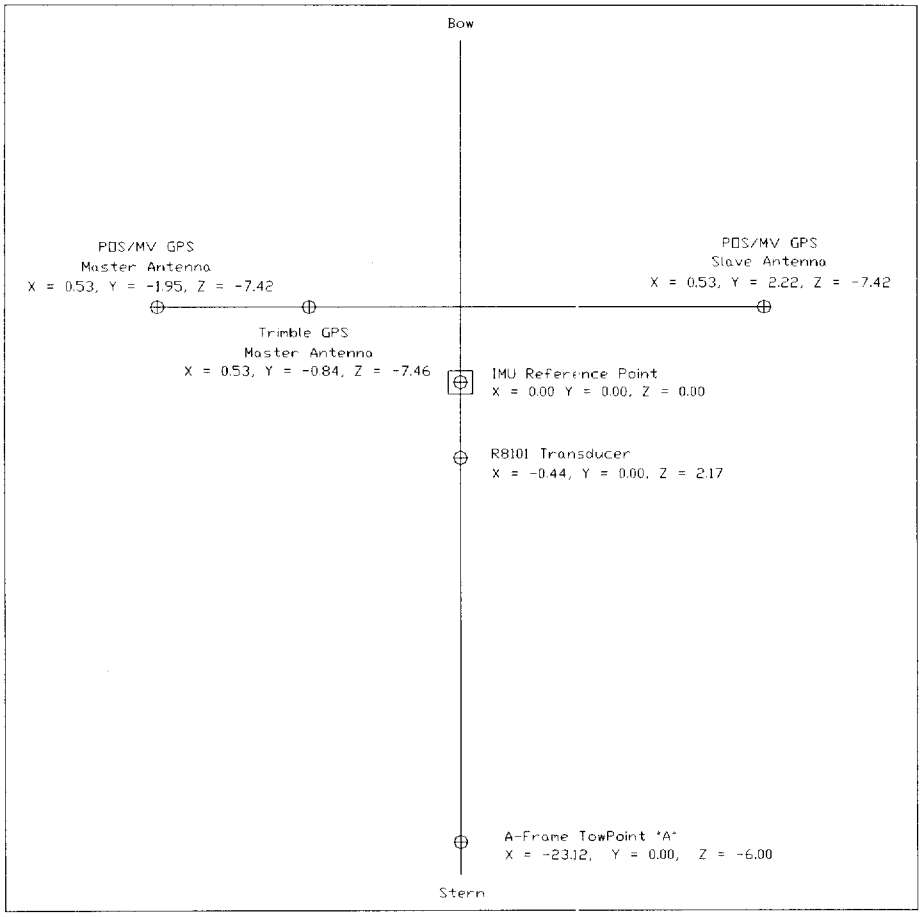
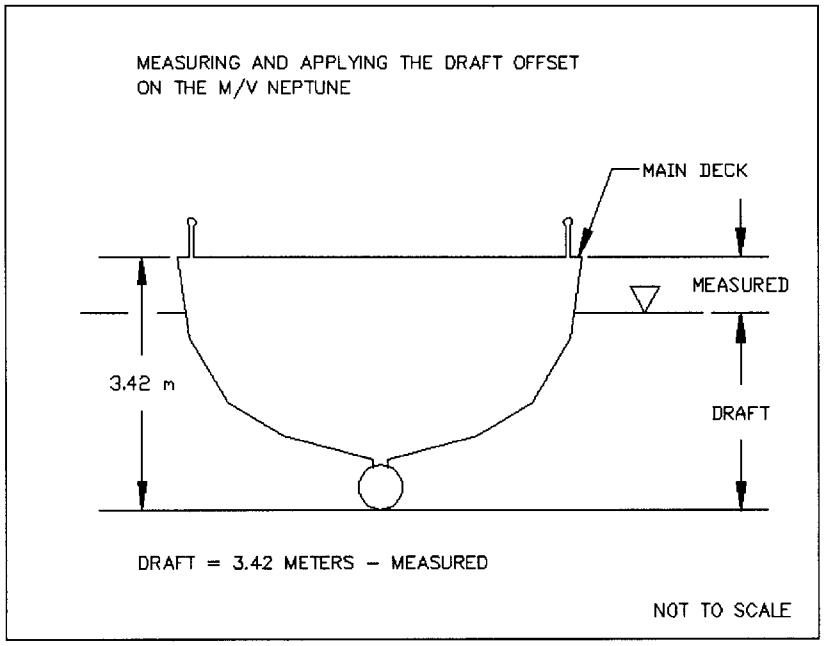


Table C-2. R/V Neptune Antenna and Transducer Locations Relative To the POS/MV IMU Vessel Reference Point, measurements in meters

Sensor	Offset in ISS2000		POS/MV IMU	
Multibeam Reson 8101 Transducer	X		X	-0.44
	Y		Y	0
	Z		Z	2.17
Trimble 7400 Antenna	X	0.53		
	Y	-0.84		
	Z	-7.46		
POS/MV GPS Master Antenna			X	0.53
			Y	-1.95
			Z	-7.42
Side Scan Tow Point "A" frame aft	X	-23.12		
	Y	0		
	Z	-6.00		

Figure C-2. R/V Neptune Draft Determination



The SAIC Integrated Survey System (**iss2000**) and the RESON 8101 multibeam system have different coordinate systems, and therefore care must be taken when inputting correctors to the system. The **iss2000** considers "z" to be positive down, while both the RESON and POS/MV consider "z" positive up. Both the **iss2000** and POS/MV consider "x" positive forward, the RESON considers "x" as positive athwart ships to starboard. The SAIC **iss2000** considers "y" positive athwart ships to starboard, the POS/MV considers "y" positive athwart ships to port and the RESON considers "y" as positive forward.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

SEE ALSO THE EVALUATION REPORT

Data acquisition was through the SAIC **iss2000** system. Survey planning, real-time navigation, and data logging were controlled by the **iss2000** on a HP UNIX machine, with navigation and data time tagging running on an OS/2 machine. The **iss2000** provided navigation data to the Klein 5500 sonar system for merging with the side scan sonar data.

Navigation was recorded from both the POS/MV system and the Trimble 7400. Data from the POS/MV was used as the primary navigation merged with both multibeam and side scan data. Positioning confidence checks were performed alongside survey control stations in port. Daily positioning confidence checks for the R/V Neptune were done by comparing data recorded from the POS/MV to data recorded from the Trimble DGPS.

The RESON 8101 range scale was set to 35 meters in the shallower areas, and was set to 50 meters in the remainder of the sheet. The data acquisition rate for the R8101 was set at a maximum for the range scale selected. This means that the specified on average 3.2 pings per 3 meters could be obtained at up to 14.5 knots with the 8 pings per second data rate. At an average speed of 8.5 knots, the specified average of 3.2 pings per 3 meters was met.

The side scan sonar equipment used throughout the H10805 survey was the Klein 5500 System. This Transceiver/Processor Unit (TPU) was networked to a personal computer that logged data to hard disk. On a watch-by-watch basis, these raw Klein formatted data were transferred to a side scan sonar-processing computer where they were archived to 4mm tape. Both channels were set at a range scale of 100-meters throughout the survey, except for some gap fills where the hydrographer decided to set the range scale to 75-meters each side to reduce the occurrence of additional gaps caused by surface wave interference. Vessel speed averaged 8 to 9 knots and never exceeded 10 knots. This ensured three or more side scan sonar pings per meter along track.

Once collected and archived to tape, the side scan data were converted to eXtended Triton Format (XTF). A side scan processor then reviewed the side scan data using Triton ISIS software. The processor would note data gaps due to weather, system problems, the fish altitude out of range, data masking, or any other events that would cause the data to be rejected. With the assistance of the hydrographer, the processor would find and verify contacts and create a contact list using ISIS. This contact list was later imported into the **iss2000** system for side scan contact to multibeam feature correlation.

Cleaning of the R8101 multibeam data began with an evaluation of the navigation track line. An automated filter was then applied for minimum and maximum depths of 4 and 30 meters. Then the interactive editing was performed to remove noise, fish, etc. The editing process used the Geoswath geo-referenced editor which allowed for both plan and profile views with each beam in its true geographic position and depth. Tidal correctors were not applied in real-time. Observed tides were down loaded from the NOAA/CO-OPS web page. Preliminary and verified data from the Sabine Offshore Station (877-1081) were applied to the multibeam data using the zoning provided August 4, 1998. NOAA memorandum, "Final Water Level Data for Application to Hydrographic Survey OPR-K171-KR-1998", which is in Appendix F.*All H10805 multibeam data were reprocessed with verified tide data from the Sabine Pass Offshore (877-1081) station as downloaded from the NOAA/CO-OPS web page.

Depth data were then gridded to 1-meter cells for quality evaluation and for comparing to side scan sonar contacts. When anomalies were seen in the 1-meter grids, the edited multibeam files were re-examined and re-edited as needed. When all multibeam files were determined to be satisfactory, the data were binned to a 10-meter cell size, populating the bin with the shoalest sounding in the bin and maintaining its true position and depth with tracking to the GSF data file.

Soundings were selected from the 10-meter binned layer using the **sel_sound** sounding selection software. This routine starts with the shoalest sounding in the survey, flags out soundings that would overlap it on the plot, proceeds to the shoalest remaining sounding and repeats the above process until all soundings in the 10-meter bin layer have been evaluated. The **set_sound** program was run to flag all selected soundings in the GSF multibeam file. The selected sounding file, the platform and navigation aids file, and the feature file were combined to produce the smooth sheet in **AutoCAD**.

Throughout this descriptive report wherever software is mentioned, it is inferred that the most current version of the software available was used. A complete list of all software versions and dates is provided in Appendix K. *

Processing of side scan sonar data is discussed in Section E.

The real time multibeam acquisition system used for the H10805 survey included:

One UNIX workstation – Used for system control, survey operations, real-time quality control.

* FILED WITH THE ORIGINAL FIELD DATA.

One personal computer – Used for running POS M/V and Trimble software and for downloading and conversion of sound velocity data from CTD's.
One personal computer – Used for navigation and time syncing on the O/S-2 operating system.
A custom computer from RESON was used to operate the 8101 system.
A custom computer from RESON was used to operate the R6042 system.

Uninterrupted power supplies (UPS) protected the entire system.

Multibeam Data Processing

Multibeam data processing was done in two stages. Initial data cleaning and validation was done shortly after the data were collected, usually by the same watchstander who had collected the data. To maintain a high degree of continuity between data collection and data processing it was convenient to split a watchstander's work into two phases, one to collect data and the next to process that same data.

On a watch by watch basis, tracklines were made, verified, and corrected to ensure data coverage and also check for navigation errors. Next, outer beams of the multibeam data, exceeding accuracy standards calculated by the Hydrographer, were flagged as invalid using the **iss2000** software. Multibeam data were manually edited and the preliminary multibeam coverage grid was then updated. Each watchstander would perform a backup of all data on the processing system at the end of each processing watch. After the watchstander had completed the initial data cleaning, a different watchstander, a data manager, or the hydrographer verified the data. Any questionable possible obstructions were written down and later evaluated by the hydrographer. A data manager on the survey vessel would later correct the data for draft and tides, make updated coverage grids, tracklines, sounding grids, selected sounding plots and preliminary data products. The data manager's duties also included routine system backups on all computers and quality control on all data.

In the processing lab in Newport, RI, further quality assurance reviews were done, and corrections were made to all data. Contact analysis was performed correlating side scan contacts with multibeam features. Multibeam coverage and sounding grids were updated following changes found during the contact analysis. The **iss2000** system used proprietary algorithms to create the grids and selected soundings. Final plots were produced exporting data to a DXF format using the **iss2000** software. These data were then imported into **AutoCAD** for final map production.

E. SIDE SCAN SONAR

The following side scan sonar equipment was used for the H10805 survey:

Klein 5500 Side Scan Sonar System towfish
Serial Number 250
Vertical beam width 40° , 0° depression, 455kHz.
K-Wing Depressor, serial number 435

Transceiver/Processing Unit (TPU), serial number 109
Display/Control/Data logging computer

1. Side Scan Sonar Data Acquisition Procedure

The watchstander would always have the assistance of the previous watchstander who was located close by processing data. This assistance was necessary for conducting CTD casts as well as towfish deployment and retrieval. A minimum of four people were used during towfish deployment and retrieval.

Side scan operations were conducted in water depths ranging from 38 to 68 feet. The side scan towfish altitude off the bottom was maintained between eight and fifteen meters. The MacArtney Sheave used had a cable counter with a read out in meters. The cable out data was broadcast from the cable counter to the **iss2000** system where layback and fish position were calculated. The cable length was adjusted to maintain the proper fish altitude using a remote controller for the SeaMac winch. The watchstander appended to a side scan annotation file when changes were made to the cable out length. These annotation files were later merged with the XTF data using proprietary software.

Maintaining towfish height above the bottom was relatively easy due to the remote controller for the winch. Adjustments to the length of cable deployed were required several times during each survey line. These primarily occurred in the shallower water. A proprietary software program, which displays the towfish and water depths, made monitoring the towfish altitude easy.

The depressor allowed the amount of cable out to be less than the water depth. This permitted turns to be tighter and thus faster than surveys previously conducted without the use of a depressor. There was also no need to worry about the towfish hitting the seafloor while conducting CTD casts. In addition, the depressor kept the towfish below the propwash even at higher survey speeds of 9 knots.

Navigation and multibeam file names were manually changed after each survey line, or item investigation, was completed. The Klein 5500 data logging software automatically changes the file name every ten minutes. The side scan range scale was set to 50-meters where specified, and to 75-meters where the range scale was not specified.

Watchstanders used proprietary software to create digital annotation files that were later merged with XTF side scan data.

Daily confidence checks were conducted using trawl marks, anchor scours, and geologic features (sand waves) that ran through both channels while on line.

2. Problems Encountered During Side Scan Sonar Survey Acquisition

Sargasso weed floating on the water surface was a continual detriment to acquisition of good side scan data. The Klein 5500 locks on to the strongest signal. In water depths less than 60 feet, this usually means the water surface if Sargasso or wind waves are present.

Weather also had a negative impact on the quality of the side scan data. When operating in 3 to 4 foot seas, it was frequently impossible to avoid surface wave noise and the subsequent large number of data gaps.

Use of the 50-meter and 75-meter range scales reduced the impact of these problems.

3. Side Scan Sonar Processing

After being archived to 4mm tape, digital side scan data from the Klein 5500 system were converted from the Klein proprietary format to eXtended Triton Format (XTF) using a SAIC proprietary program called xtf_io. These XTF files were copied to 4mm tape in tar format and are the deliverables to be used with CARIS SIPS. The XTF data also allowed data review and target analysis using the Triton ISIS.

A side scan processor examined each record using Triton ISIS to review the data. A spreadsheet was used to log times where data gaps were caused by seaweed interference, biota in the water column, or other reasons. The time, survey line, corresponding multibeam file, start/end of line, side scan file name, watch id number, line azimuth, and data gap information were all logged in the spreadsheet. This information was used to set the bad data off-line so that they were ignored in processing and in coverage analysis.

Annotation files logged in real-time by the watchstanders were later corrected for errors and additional annotations were added. Additional annotations include contacts, confidence checks, and comments on the records. The corrected annotations were merged into the XTF data using the xtf_io program. Trackline data were extracted from the XTF files for each Julian day.

A time window file, which lists the times of all valid data, was created for each 100% of coverage in order to create both trackline and coverage plots in **iss2000.** By viewing the coverage plots in the **iss2000** survey-planning tool, a user can easily plan survey lines to fill in any data gaps.

Side Scan Contact Analysis

ISIS and Contact Post Processing Software (Triton/Elics Inc.) were used to select and process contact information from the XTF sonar files. Contact information includes the following:

1. Year and Julian Day contact was acquired.
2. Time contact was acquired.
3. Contact position - Latitude and Longitude.
4. Contact identifier (i.e. OBST for Obstruction).
5. Slant range to contact (Note: Negative number if contact was detected on port side).
6. Fish altitude when contact was acquired.
7. Contact height, based on length of shadow and geometric calculation using steps 5 & 6.

Contact information was stored in .CON files that were converted into a .CTV file using a SAIC proprietary program called ISIS2ctv. During the conversion, a postscript image file was made of each contact. This .CTV file can be directly loaded into **iss2000** as a separate data layer. Once in the **iss2000** system, contacts were correlated by position and height with the one-meter grid of the multibeam data displayed with side scan contacts overlaid. Bathymetric features in the multibeam data were then compared with the side scan contact data, and features were selected for the smooth sheet.

F. SOUNDING EQUIPMENT

The following components were used for acquisition of multibeam sounding data using the RESON SeaBat 8101 multibeam system.

- Transducer, Serial Number 099707
- 8101 Processor, Serial Number 13819
- R6042 Controller and Processing Unit, Serial Number 590 P0 794-387

A lead line made of Kevlar line with an 8 pound mushroom anchor as a weight was used for checking the multibeam echo sounder. The line was marked in feet and was calibrated against a steel tape. Lead line comparisons are summarized in Appendix G.* Numerous comparisons, at least one per watch, were made between the R8101 center beam depth versus the side scan fish depth plus the fish altitude height. These values were almost always identical. This method of confidence checks was implemented to replace the single beam Echotrak that was not working during the site investigations.

* FILED WITH THE ORIGINAL FIELD DATA.

G. CORRECTIONS TO SOUNDINGS

1. Speed of Sound

The following systems were used to determine sound velocity profiles for corrections to multibeam sonar soundings.

- "A" - Sea-Bird Electronics, Inc., Model 19 CTD, Serial Number 193607-0565, Calibration Date: 23 February 1999.
- "B" - Sea-Bird Electronics, Inc., Model 19 CTD, Serial Number 2710, Calibration Date: 15 October 1998.
- "C" - Sea-Bird Electronics, Inc., Model 19 CTD, Serial Number 1915869-2389, Calibration Date: 02 September 1998.

The primary unit was SBE19 #0565. Daily confidence checks were obtained from simultaneous casts with the primary CTD and one of the other two CTD's. After downloading CTD casts, both were converted to the proper format and compared to each other and to the previously applied cast. All profiles were computed using **SBE Term19** and converted using the **SBE DatCnv** software. Computed profiles were copied to the **iss2000** for comparison on the screen. A selected profile was applied to the system, recorded, and sent to the RESON 6042, where a refraction lookup table was computed for application of speed of sound and ray tracing correctors to the multibeam sounding data. If sounding depths exceeded the cast depth, the 6042 used the bottom of the table to extend correctors below the table.

Factors considered in determining how often a CTD cast was needed included: shape and proximity of the coastline, sources and proximity of freshwater, seasonal changes, wind, sea state, cloud cover, and changes from the previous profile. A cast was taken at least once during each 6-hour watch. Normally there were two casts per 6 hour watch during daylight, and one cast per 6 hour watch during darkness, when running multibeam.

Quality control tools, including real-time displays and a multibeam swath editor, were used to monitor how the sound velocity was affecting the multibeam data. Severe effects due to improper sound velocity could easily be seen by viewing multibeam data in an along track direction.

A table including all CTD casts, dates of each cast, the location of the cast, and the maximum depth of each cast is located in Appendix J.

2. Instrument Corrections

No instrument corrections were necessary after the initial installation and calibration was complete.

3. Corrections Determined from Vertical Casts

Lead line comparisons to multibeam center beam soundings were made at least every two weeks to verify the transducer draft and echo sounder instrument correctors. For each comparison, a CTD cast was taken and the sound velocity profile loaded into the **iss2000** and the RESON 6042. Twenty lead line readings, ten from the port side and ten from starboard, were recorded along with the UTC time of observation while the **iss2000** recorded the multibeam readings. **Exammb** was used to determine the appropriate port and starboard beam depth readings for the time and position of each lead line reading.

The results of these readings were entered into a spreadsheet along with the draft readings and any squat correctors that may have been entered into the **iss2000**. The spreadsheet applied a calibration corrector to the lead line readings and converted the readings from feet to meters. It also applied correctors for any settlement and squat inadvertently left in the **iss2000** to the port and starboard multibeam readings.

Each corrected lead line cast depth was compared to the simultaneous multibeam. The ten comparisons were averaged and the standard deviations were computed. The lead line cumulative results are included in Appendix G. *

4. Static draft

Depth of the transducer below the deck was determined from measurements made while the boat was on the marine railway in 1998, and was verified by lead line comparisons. The static draft was observed by measuring from the main deck to the waterline before getting underway from Galveston and subtracting that measurement from the transducer distance below the deck. If the static draft value changed from the previously noted value, the new value was entered into the RESON system. The static draft was again determined upon return to port and the change in draft was prorated on a daily basis. The measured and prorated draft results are reported in Appendix G, Table App. G-4. *

5. Settlement and Squat

Measurements of settlement were conducted near 29° 11.7'N, 094° 28.8'W on day 138, May 19, 1999, in fifteen meters of water. The following procedures were used to determine the settlement correctors:

- Selected an area of flat bottom at a depth similar to the survey area.
- Planned a survey line across the flat bottom.
  1. Considered the current and wind in planning the line.
  2. Used Sabine Offshore (877-1081) station for the water level during the test.
  3. Calibrated the echo sounder, and applied sound velocity profile for the test area. (Timing latency and pitch, roll and heading biases had been determined and applied.)
  4. Approached the line at a slow to moderate speed, brought the RPM's to zero and drifted down the line while recording soundings over the flat bottom.

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5. Ran the line at each of the predetermined RPM settings while recording soundings over the flat bottom.
6. Applied water level correctors to the soundings.
7. Subtracted the depth determined from each of the RPM passes from the depth determined on the drifting, zero RPM pass. These differences are the settlement and squat correctors to be applied when operating at the corresponding RPM.
8. Constructed a lookup table of RPM and settlement and squat correctors in the configuration file so that the computer could interpolate a corrector based upon the RPM entered into the system.

Geoswath was used to measure the depth for each pass. The results were compiled into a lookup table of vessel's engine RPM vs. settlement and squat. When on survey line, the engine's RPM was entered into the **iss2000** system by the real-time system operator. The computer applied settlement and squat correctors interpolated from the lookup table, and recorded them in the "Depth Corrector" field of the GSF data file for each ping.

All results are reported in Appendix G, Table App. G-5.*

6. Roll, Pitch and Heading Biases

The following sensor was used for acquisition of Heave, Roll, Pitch and Heading data:

- TSS POS/MV Inertial Navigation System, Serial Number 024

The POS/MV was used for heave, roll, and pitch. The accuracy of the sensor was five percent of one meter or five centimeter for heave $\pm 0.10°$ dynamic accuracy for roll and pitch, and $\pm 0.05°$ static accuracy for roll and pitch. The POS/MV was used for heading. The dynamic heading accuracy of the unit is better than 0.05° .

Heading, roll, and pitch biases were determined in a series of tests performed in the survey area prior to the start of the survey. Prior to conducting any of the tests, a CTD cast was taken to determine the sound velocity profile and entered into the RESON system. Initially, the roll, pitch, and heading biases were set to 0° in the RESON system.

The roll bias test was run first in an area with relatively flat bottom. The range scale of the RESON was set to 50-meters. Three lines were run spaced 40-meters apart and each line was run in both directions. The data from parallel lines in the same direction were used for roll bias calculations so that the depths from the center beams from one line were compared against the depths of the mid-swath beams. Tidal corrections were applied to all data before roll corrections were calculated using routines in the **Survey Analysis** software. Roll bias results are shown in Appendix G, Table App.G-3.*

After the roll biases were calculated and entered into the RESON system, a pitch bias test was conducted. The pitch test was conducted by surveying multiple reciprocal lines perpendicular to an anchor scour. During the pitch test, ship speed was maintained at as constant a rate as possible. Tidal corrections were applied to all data before the pitch bias was calculated. Pitch biases were computed by comparing runs in opposite directions. There was no discernable pitch bias as a result of these tests. A bias of 0.0° was kept in the system for the survey.

Following the roll and pitch bias tests, a heading bias test was conducted. For the heading bias test, five parallel lines were run in opposing directions so that the inner beams from the transducer overlay the intermediate or outer beams of adjacent swaths. The heading bias was then determined by measuring the distance between equal depths and calculating the angle subtended by that distance. Tidal corrections were applied to all data before heading corrections were calculated using routines in

* FILED WITH THE ORIGINAL FIELD DATA

the **Survey Analysis** software. After repeated inconclusive test results, it was deemed that the heading bias was zero. It is believed that the shallow water depths of the survey area combined with the accuracy of the navigation makes it extremely difficult to measure small degrees of heading bias. Further proof of a heading bias of zero lies in trawl marks crossing through numerous swaths with perfect alignment.

Table App. G-6 contains the results of the Accuracy test conducted on JD 197. The Accuracy Test for data collected after the transducer change was derived from two lines run along the northwest sheet limit and compared to the north ends of the mainscheme lines run in the common area.

Roll, pitch, and heading biases applied in H10805 are shown in Table G-1.

Table G-1. Roll, Pitch, and Heading Bias for the R/V Neptune

Julian Days	139-209	272
Roll	0.40	0.15
Pitch	0.00	0.00
Heading	0.00	0.00

H. CONTROL STATIONS

SEE ALSO THE EVALUATION REPORT

The horizontal datum used for the survey was the North American Datum (NAD) 1983.

Horizontal control stations CG-20 1974 and CG-21 1974 were used for independent checks of the positioning system on the survey vessel. Data for these stations were downloaded from the NOAA/NGS web page.

I. HYDROGRAPHIC POSITION CONTROL

The following equipment was used for positioning on the R/V Neptune:

- TSS POS/MV, Serial Number 024
- Trimble 7400 GPS Receiver, Serial Number 3713A18839
- Trimble Differential Beacon Receiver
- 41R Differential Beacon Receiver, Serial Number 3508-102-18550

The primary hydrographic positioning equipment was the POS/MV, which used correctors from the USCG differential station at Galveston, TX. The **iss2000** monitored HDOP, number of satellites, elevation of satellites, and age of correctors to ensure the resulting hydrographic positioning errors did not exceed ten meters at the 95% confidence level.

When in port, the R/V Neptune tied up to Pier 15 where measurements were made to calculate the offset between the hydrographic navigation position and horizontal control station CG-20, 1974. While measurements were being made, navigation data were being logged. Comparison of the navigation center position computed from the control station and the average position based on navigation resulted in confidence checks that were well within specifications, with no more than 3 meters inverse distance from the check position. Daily position confidence checks were established using a Trimble DGPS with correctors from the U.S. Coast Guard station at Port Aransas, TX. A

real-time monitor raised an alarm when the two DGPS positions differed by more than 10 meters horizontally. Positioning confidence checks were well below the allowable inverse distance of less than 15 meters.

The USCG Galveston DGPS station was used as the primary positioning corrector source. The USCG Port Aransas, TX DGPS station was used for daily positioning confidence checks. The primary DGPS receiver automatically locks onto the strongest DGPS signal; therefore, when the USCG Galveston DGPS station was off the air for upgrades, primary navigation used the USCG Port Aransas, TX DGPS station. When the USCG Galveston DGPS station came back online, primary navigation switched back to it.

All antenna, transducer, towpoint, and towfish offsets were measured relative to the POS/MV's IMU. Two separate teams of two people measured and calculated all offsets using a measuring tape. The final offsets from both teams were compared and were found to agree.

The **iss2000** software calculates the towfish position using an automatic cable out value and the towpoint configuration or offsets previously measured.

J. SHORELINE

Not applicable.

K. CROSSLINES

Not applicable.

L. JUNCTIONS See also the Evaluation Report

Not applicable.

M. COMPARISON WITH PRIOR SURVEYS See also the Evaluation Report

Not applicable.

N. COMPARISON WITH THE CHART See also the Evaluation Report.

H10805 was compared to Chart 11323, 57th edition, 27 March 1999 at scale 1:80,000 in lieu of the specified 55th edition.

Item 4:

I-4 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-4 is located at 29° 14.950'N, 094° 44.160'W, and has aside scan contact height of 0.79m. I-4 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. Upon inspection of the side scan image, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using

shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 31-foot depths.

Least depth:	31 feet
File:	hbmba99196.d30

Comparison with the Chart and Charting Recommendations: Item 4 is not charted. Recommend application of soundings from smooth sheet. CONCUR

Comparison with the Smooth Sheet: This item is within an area of 31-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. CONCUR ✓

Item 6:

I-6 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-6 is located at 29° 16.869'N, 094° 40.891'W, and has a side scan contact height of 0.82m. I-6 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. Upon inspection of the side scan image, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 30-31 foot depths.

Least depth:	30 feet 53.51
Latitude:	29° 16.~~8919~~ 53.32 N
Longitude:	094° 40.9054 W
File:	hbmba99196.d36
Time:	10:39:41

Comparison with the Chart and Charting Recommendations: Item 6 is not charted. Recommend application of soundings from smooth sheet. CONCUR ✓

Comparison with the Smooth Sheet: This item is within an area of 30-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. CONCUR ✓

Item 9:

I-9 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-9 is located at 29° 15.744'N, 094° 42.387'W, and has a side scan contact height of 1.27m. I-9 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-9 is not located in a critical navigation area, however, due to it's 1.27m height NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 31-32 foot depths.

Least depth:	31 feet
File:	hbmba99196.d31

Comparison with the Chart and Charting Recommendations: Item 9 is not charted. Recommend application of soundings from smooth sheet. CONCUR /

Comparison with the Smooth Sheet: This item is within an area of 31-32 foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. CONCUR.

Item 10:

I-10 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-10 is located at 29° 16.428'N, 094° 41.234'W, and has aside scan contact height of 0.92m. I-10 is located 60m from contact I-11. Neither contact was detected in the standard portion of the multibeam swath. Note: AWOIS 8916 - wreck, masts PA is charted approximately 600m to the west-northwest. NOAA has determined that this conflict justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area has a flat bottom of 32-foot depths.

Least depth:	32 feet
File:	hbmba99196.d35

Comparison with the Chart and Charting Recommendations: Item 10 is not charted. Recommend application of soundings from smooth sheet. CONCUR ✓

Comparison with the Smooth Sheet: This item is within an area of 32-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur -

Item 11:

I-11 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-11 is located at 29° 16.448'N, 094° 41.202'W, and has a side scan contact height of 0.78m. I-11 is located 60m from contact I-10. Neither contact was detected in the standard portion of the multibeam swath. Note: AWOIS 8916 - wreck, masts PA is charted approximately 600m to the west-northwest. NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. This area is a flat bottom of 32-foot depths.

Least depth:	32 feet
File:	hbmba99196.d35

Comparison with the Chart and Charting Recommendations: Item 11 is not charted. Recommend application of soundings from smooth sheet. Concur -

Comparison with the Smooth Sheet: This item is within an area of 32-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur -

Item 12:

I-12 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-12 is located at 29° 17.328'N, 094° 39.593'W, and has a side scan contact height of 1.82m. I-12 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-12 is not located in a critical navigation area (contact is within the dredged material dumpsite), however, due to it's 1.82m height NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 30-foot depths.

Least depth:	30 feet
File:	hbmba99196.d38

Comparison with the Chart and Charting Recommendations: Item 12 is not charted. Recommend application of soundings from smooth sheet. Concur

Comparison with the Smooth Sheet: This item is within an area of 30 foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur

Item 16:

I-16 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-16 is located at 29° 13.861'N, 094° 44.013'W, and has aside scan contact height of 1.5m. I-16 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-16 is located in northwest portion of the charted Fairway Anchorage Area. Due to it's 1.5m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 36-foot depths.

Least depth:	36 feet
File:	hbmba99196.d29

Comparison with the Chart and Charting Recommendations: Item 16 is not charted. Recommend application of soundings from smooth sheet. Concur

Comparison with the Smooth Sheet: This item is within an area of 36-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur

Item 19:

I-19 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-19 is located at 29° 16.895'N, 094° 38.629 'W, and has aside scan contact height of 0.92m. I-19 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-19 is not located in a critical navigation area (contact is within the dredged material dumpsite), however, due to it's proximity to the Galveston Ship Channel Outbound Lane (900m), and 0.92m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area has a flat bottom of 39-foot depths.

Least depth: 39 feet
File: hbmba99196.d39

Comparison with the Chart and Charting Recommendations: Item 19 is not charted. Recommend application of soundings from smooth sheet. CONCUR.

Comparison with the Smooth Sheet: This item is within an area of 39-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. CONCUR.

Item 20:

I-20 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-20 is located at 29° 16.521'N, 094° 39.139'W, and has a side scan contact height of 5.38m. I-20 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-20 is not located in a critical navigation area (contact is within the dredged material dump site), however, due to it's 5.38m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area has a flat bottom of 39 to 40-foot depths.

Least depth: 39 feet
File: hbmba99272.d21 through hbmba99272.d24

Comparison with the Chart and Charting Recommendations: Charted sounding is 39 feet. CONCUR
REVISE TO SHOW PRESENT SURVEY DEPTHS.

Comparison with the Smooth Sheet: This is an area of 39 to 40 foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. CONCUR.

Item 22:

I-22 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-22 is located at 29° 14.964'N, 094° 41.516'W, and has aside scan contact height of 1.18m. I-22 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-22 is located within the charted Fairway Anchorage Area. Due to it's 1.18m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 38-foot depths.

Least depth: 38 feet
File: hbmba99196.d32

Comparison with the Chart and Charting Recommendations: Item 22 is not charted. Recommend application of soundings from smooth sheet. CONCUR.

Comparison with the Smooth Sheet: This item is within an area of 38-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. CONCUR.

Item 34:

I-34 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-34 is located at 29° 13.583'N, 094° 43.768'W, and has a side scan contact height of 1.44m. I-34 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-34 is located on the west edge of the survey within the charted Fairway Anchorage Area. Due to it's 1.44m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 38-foot depths.

Least depth: 38 feet
File: hbmba99196.d29

Comparison with the Chart and Charting Recommendations: Item 34 is not charted. Recommend application of soundings from smooth sheet. CONCUR.

Comparison with the Smooth Sheet: This item is within an area of 38-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. CONCUR.

Item 46:

I-46 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-46 is located at 29° 16.383'N, 094° 38.530'W, and has a side scan contact height of 1.15m. I-46 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-46 is not located in a critical navigation area (contact is within the dredged material dump site), however, due to it's 1.15m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 41-foot depths.

Least depth: 41 feet
File: hbmba99196.d40

Comparison with the Chart and Charting Recommendations: Item 46 is not charted. Recommend application of soundings from smooth sheet. Concur.

Comparison with the Smooth Sheet: This item is within an area of 41-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur.

Item 63:

I-63 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-63 is located at 29° 16.069'N, 094° 37.831'W, and has a side scan contact height of 1. 1 2m. I-63 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-63 is not located in a critical navigation area (contact is within the dredged material dump site), however, due to it's 1.12m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 41-foot depths.

Least depth: 41 feet
File: hbmba99196.d41

Comparison with the Chart and Charting Recommendations: Item 63 is not charted. Recommend application of soundings from smooth sheet. Concur.

Comparison with the Smooth Sheet: This item is within an area of 41-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur.

Item 64:

I-64 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-64 is located at29° 16.394'N, 094° 37.273'W, and has aside scan contact height of 0.67m. I-64 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-64 is located on the west edge of the Galveston Ship Channel Outbound Lane. Due to it's proximity to the outbound lane, NOAA has determined that this contact

justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan sonar coverage

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan sonar. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 45-foot depths.

Least depth:	45 feet
File:	hbmba99195.d07 through hbmba99195.d11

Comparison with the Chart and Charting Recommendations: Item 64 is not charted. Recommend application of soundings from smooth sheet. Concur -

Comparison with the Smooth Sheet: This item is within an area of 45-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur -

Item 65:

I-65 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-65 is located at 29° 15.647'N, 094° 38.441'W, and has a side scan contact height of 1.32m. I-65 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-65 is not located in a critical navigation area (contact is within the dredged material dump site), however, due to it's 1.32m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 43-foot depths.

Least depth:	43 feet
File:	hbmba99196.d42

Comparison with the Chart and Charting Recommendations: Item 65 is not charted. Recommend application of soundings from smooth sheet. Concur -

Comparison with the Smooth Sheet: This item is within an area of 43-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur -

Item 66:

I-66 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-66 is located at 29° 14.612'N, 094° 40.199'W, and has a side scan contact height of 1.47m. I-66 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-66 is located within the charted Fairway Anchorage Area. Due to it's 1.47m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 44-foot depths.

Least depth:	44 feet
File:	hbmba99196.d33

Comparison with the Chart and Charting Recommendations: Item 66 is not charted. Recommend application of soundings from smooth sheet. Concur.

Comparison with the Smooth Sheet: This item is within an area of 44-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur.

Item 76:

I-76 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-76 is located at 29° 15.675'N, 094° 36.529 'W, and has a side scan contact height of 2.10m. I-76 did not correlate with another contact from the 2nd, 100% side scan and was not detected in the standard portion of the multibeam swath. I-76 is located on the west edge of the Galveston Ship Channel Outbound Lane. Due to it's proximity to the outbound lane and it's 2.10m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan sonar.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan sonar. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 47-foot depths.

Least depth:	47 feet
File:	hbmba99195.d12 through hbmba99195.d15

Comparison with the Chart and Charting Recommendations: Item 76 is not charted. Recommend application of soundings from smooth sheet. Concur.

Comparison with the Smooth Sheet: This item is within an area of 47-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur.

Item 77:

I-77 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-77 is located at 29° 15.522'N, 094° 36.663'W, and has a side scan contact height of 0.99m. I-77 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-77 is located 370 m west of west edge of the Galveston Ship Channel Outbound Lane. Due to it's proximity to the outbound lane and it's 0.99m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan sonar.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan sonar. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 48-foot depths.

Least depth:	48 feet
File:	hbmba99195.d16 through hbmba99195.d22

Comparison with the Chart and Charting Recommendations: Item 77 is not charted. Recommend application of soundings from smooth sheet. Concur

Comparison with the Smooth Sheet: This item is within an area of 48-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur.

Item 100:

I-100 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-100 is located at 29° 15.085'N, 094° 36.143'W, and has a side scan contact height of 6.25m. Note: Table S-1 shows a contact height of 0.0m, however, previous contact tables depicted a height of 6.25. SAIC labeled this contact as a possible "wellhead". I-100 is 30m from contact I-101. Neither was detected in the standard portion of the multibeam swath. I-100 is located 370 m west-southwest of west edge of the Galveston Ship Channel Outbound Lane. Due to it's proximity to the outbound lane and suspicious side scan image, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan sonar.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan sonar. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 49-foot depths. Note, item 100 is 34 meters bearing 204° T

from item 101 described below. As noted in the original 1998 survey, this feature had no height. The side scan height recorded was a result of the method used to position the contact, and should have been changed to 0.00 meters.

Least depth: 49 feet
File: hbmba99195.d23 through hbmba99195.d28

Comparison with the Chart and Charting Recommendations: Item 100 is not charted. Recommend application of soundings from smooth sheet. Concur.

Comparison with the Smooth Sheet: This item is within an area of 49-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur

Item 101:

I-101 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-100 is located at 29° 15.102'N, 094° 36.135'W, and has aside scan contact height of 7.5m. Note: Table S-1 shows a contact height of 0.0m, however, previous contact tables depicted a height of 7.5m. SAIC labeled this contact as a possible "manifold". I-101 is 30m from contact I-100. Neither was detected in the standard portion of the multibeam swath. I-101 is located 300m west-southwest of west edge of the Galveston Ship Channel Outbound Lane. Due to it's proximity to the outbound lane and suspicious side scan image, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan sonar.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan sonar. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 49-foot depths. As noted in the original 1998 survey, this feature had no height. The side scan height recorded was a result of the method used to position the contact, and should have been changed to 0.00 meters.

Least depth: 49 feet
File: hbmba99195.d23 through hbmba99195.d28

Comparison with the Chart and Charting Recommendations: Item 101 is not charted. Recommend application of soundings from smooth sheet. Note, item 101 is 34 meters bearing 024° T from item 100 described above. Concur

Comparison with the Smooth Sheet: This item is within an area of 49-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur.

Item 121:

I-121 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-121 is located at 29° 17.334'N, 094° 38.723'W, and has a side scan contact height of 2.16m. I-121 did not correlate with another contact from the 2nd 100% side scan and was not detected in the

multibeam. I-121 is located in 70 m east of the dredged material dumpsite, and 400m west-southwest of the Galveston Ship Channel Outbound Lane. Due to it's 2.16m height and proximity to the outbound lane, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 37-foot depths.

Least depth:	37 feet
File:	hbmba99196.d38

Comparison with the Chart and Charting Recommendations: Item 121 is not charted. Recommend application of soundings from smooth sheet. Concur.

Comparison with the Smooth Sheet: This item is within an area of 37-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur.

Item 149:

I-149 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-149 is located at 29° 07.969'N, 094° 39.989'W, and has a side scan contact height of 1.28m. I-149 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-149 is located on the west edge of the survey within the charted Fairway Anchorage Area. Due to it's 1.28m height, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam, specifically two sets of orthogonal lines with the contact position near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage of the feature was obtained in both multibeam swaths. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX.

Least depth:	53 feet 57.96
Latitude:	29° 07.~~966~~'N 58.80
Longitude:	094° 39.~~980~~'W
File:	hbmba99196.d46
Time:	17:13:35

Comparison with the Chart and Charting Recommendations: Item 149 is not charted. Recommend addition of 53 Obstr with a dotted circle, blue tint. Concur ADD (53) OBSTD.

Comparison with the Smooth Sheet: This item is within an area of 58-foot soundings on the smooth sheet. Recommend addition of 53 Obstr to the smooth sheet. Concur.

Item 151:

I-151 originates in SAIC's table S-1 and is recommended by SAIC for an additional investigation. I-151 is located at 29° 16.654 N, 094° 37.227 W, and has a side scan contact height of 0.46m. I-151 did not correlate with another contact from the 2nd 100% side scan and was not detected in the standard portion of the multibeam swath. I-151 is located in the western portion of the Galveston Ship Channel Outbound Lane. Due to it's location in the outbound lane, NOAA has determined that this contact justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan sonar.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan sonar. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 45-foot depths.

Least depth:	45 feet
File:	hbmba99195.d02 through hbmba99195.d06

Comparison with the Chart and Charting Recommendations: Item 151 is not charted. Recommend application of soundings from smooth sheet. Concur

Comparison with the Smooth Sheet: This item is within an area of 45-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. Concur

AWOIS Item 335/2652:

AWOIS Item 335/2652 is addressed in SAIC's table S-2, and is recommended by SAIC for an additional investigation. The item is a charted obstruction cleared to 49', located at 29° 08.970'N, 094° 39.970'W. RU/HE reported this to be a 2" diameter pipe extending approximately 6' off the bottom in 57' of water in 1973. Present survey water depths are 55'. This item was not detected in the 200% side scan or 100% multibeam. NOAA has determined that this item justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan sonar.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan sonar. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX.

Least depth:	54 feet 59.7
Latitude:	29° 08.~~9957~~ 9733'N
Longitude:	094° 39.~~9210~~ 9226'W
File:	hbmba99196.d52
Time:	18:42:04

Comparison with the Chart and Charting Recommendations: Recommend that the charted obstruction, dotted circle, blue tint be cleared to 49 feet ~~and that~~ RE-DELETED 54 Obstr, dotted circle, blue tint be charted. CONCUR ADD (54) OBSTN.

Comparison with the Smooth Sheet: Recommend addition of 54 Obstr to the smooth sheet. CONCUR.

AWOIS Item 338/2651:

AWOIS Item 338/2651 is addressed in SAIC's table S-2, and is recommended by SAIC for an additional investigation. The item is a charted obstruction PA cleared to 50', located at 29° 09.270'N, 094° 39.350'W. RU/HE reported this to be a 2" diameter pipe extending approximately 6'off the bottom in 57'of water in 1973. Present survey water depths are 55'. This item was not detected in the 200% side scan or 100% multibeam. NOAA has determined that this item justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX

		AHB POSITION
Least depth:	54 feet	53 FEET
Latitude:	29° 09.2780N	29-09-20.300
Longitude:	094° 39.3421W	94-39-22.635
File:	hbmba99196.d58 through hmba99196.d62	

Comparison with the Chart and Charting Recommendations: Recommend that the charted obstruction be cleared to 50 feet and be replaced by 54 Obstr, and that the dotted circle, blue tint be retained. DELETE THE CLEARED 50 OBSTN. CHART 53 OBSTN LOCATED DURING OFFICE PROCESSING.

Comparison with the Smooth Sheet: This item is within an area of 55-foot soundings on the smooth sheet. Recommend addition of 54 Obstr to the smooth sheet. DO NOT CONCUR. SHOW 53 OBSTR ON THE SMOOTH SHEET AS LOCATED BY AHB.

AWOIS Item 336/337/2650:

AWOIS Item 336/337/2650 is addressed in SAIC's table S-2, and is recommended by SAIC for an additional investigation. The item is a charted obstruction ~~PA~~ cleared to 49', located at 29° 09.~~130~~ 113'N, 094° 37.~~950~~ 879'W. RU/HE reported this to be a concrete block approximately 3'x4'in 56'of water in 1973. Present survey water depths are 55'. This item was not detected in the 200% side scan or 100% multibeam. NOAA has determined that this item justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan sonar.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan sonar. Data were fully corrected, including application of

verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 55 to 56 foot depths.

Least depth: 55 feet
File: hbmba99196.d63 through hbmba99196.d69

Comparison with the Chart and Charting Recommendations: Recommend that the charted obstruction cleared to 49 feet, dotted circle, blue tint, be removed, and that soundings from smooth sheet be charted. CONCUR DELETE (49) OBSTN.

Comparison with the Smooth Sheet: This item is within an area of 55-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. CONCUR.

AWOIS Item 339:

AWOIS Item 339 is addressed in SAIC's table S-2, and is recommended by SAIC for an additional investigation. The item is a charted obstruction cleared to 48', Located at 29° 09.400'N, 094° 35.200'W. RU/HE reported this, as un-investigated hangs at 48' cleared to 50m in 1973. Present survey water depths are 54'. This item was not detected in the 200% side scan or 100% multibeam. NOAA has determined that this item justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 200m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. There was no obstruction detected in this investigation. The area is a flat bottom of 55-56 foot depths.

Least depth: 55 feet
File: hbmba99196.d78 through hbmba99196.d81, and hbmba99196.d83 through hbmba99196.d85, and hbmba99197.d01

Comparison with the Chart and Charting Recommendations: Recommend charted obstruction cleared to 48 feet, dotted circle, blue tint be removed. CONCUR DELETE (48) OBSTN.

Comparison with the Smooth Sheet: This item is within an area of 54 to 56-foot soundings on the smooth sheet. Recommend no changes to the smooth sheet. CONCUR.

AWOIS Item 328:

AWOIS Item 328 is addressed in SAIC's table S-2, and is recommended by SAIC for an additional investigation. The item is a charted obstruction cleared to 48', located at 29° 07.~~800~~ 880'N, 094° 36.~~400~~ 320'W. RU/HE reported this to be chain, shackles, line, and junk 4 feet off the bottom in 56'of water. Present survey water depths are 55'. This item was not detected in the 200% side scan or 100% multibeam. NOAA has determined that this item justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX

Least depth:	55 feet
Latitude:	29° 07.761'N
Longitude:	094° 36.395'W
File:	hbmba99196.d70

Comparison with the Chart and Charting Recommendations: Recommend removal of charted obstruction cleared to 48 feet, dotted circle, blue tint. Recommend charting 55 Obstr, dotted circle, blue tint. DELETE CLEARED 48 OBSTN. / CHART PRESENT SURVEY DEPTHS.

Comparison with the Smooth Sheet: This item is within an area of 56-foot soundings on the smooth sheet. Recommend addition of 55 Obstr to the smooth sheet. DO NOT CONCUR. ADDITIONAL 55 FT SOUNDINGS ARE IN IMMEDIATE AREA. /

AWOIS Item 8916:

AWOIS Item 8916 is addressed by SAIC in Section S of the Descriptive Report. This item is a charted dangerous wreck with masts PA in 1979, located at 29° 16'30" N, 094° 41'36" W. The item was not detected in the 200% side scan or 100% multibeam. No visible masts were noted. Present survey depths are 30'. NOAA has determined that this item justifies additional work by SAIC. Additional investigation shall be conducted using side scan sonar. Side scan coverage shall be 200%, encompassing the area within a 1500m search radius around the original position of 29° 16'30" N, 094° 41'36" W, outside of the original survey area. If the item in question is detected with side scan, multibeam data shall be acquired, specifically two orthogonal lines crossing the contact near nadir. If additional significant side scan contacts are detected within the 1500m-search radius, SAIC shall identify these items for additional potential investigations.

Method of Investigation: Shallow water multibeam and 200% side scan.

Results of Investigation: Full coverage in the area of the reported feature was obtained using side scan sonar with concurrent shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX No contacts were detected in the 200% side scan sonar coverage. No features were deleted in the shallow water multibeam data.

File:	hbmba99196.d01, and hbmba99196.d03 through hmba99196.d06, and hbmba99196.d08 through hmba99196.d19

Comparison with the Chart and Charting Recommendations: Charted soundings are within one foot of soundings from this investigation. Recommend application of soundings from this investigation. Recommend removal of charted dangerous wreck masts PA at 29° 16.5'N, 094° 41.6'W and removal of charted dangerous wreck PD at 29° 17.01'N, 094° 42.01'W.* Neither of these wrecks was detected in the 200% side scan coverage or the multibeam coverage. CONCUR IN PART. RETAIN DANGEROUS WK PD. DELETE WK, MAST PA. * outside project limits mcR 8/25/00

Comparison with the Smooth Sheet: This area is outside the limits of the smooth sheet. Recommend addition of soundings from this investigation to the smooth sheet. DO NOT CONCUR.

Charted Buoy "Q Horn Well (covered 35 ft) Priv":

The charted buoy "Q Horn Well (covered 35 ft) Priv" is addressed in Section S of the Descriptive Report. This item is a charted buoy marking a well at 29° 14' 02" N, 094° 38' 17" W, and was not detected in the 200% side scan or 100% multibeam. Neither the buoy nor well was detected. Present survey water depths are 50'. SAIC recommends removing this item from the chart. Due to the nature of the item, and the location within the Fairway Anchorage Area, NOAA has determined that additional work should be conducted. An additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 200m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX No contacts or features were detected.

Least depth:	49feet
File:	hbmba99195.d31 through hbmba99195.d39

Comparison with the Chart and Charting Recommendations: Soundings are within one foot of charted soundings. Recommend application of smooth sheet soundings. There is no buoy at this location. No contacts or features were detected. Recommend removal of charted lighted buoy "Q HORN Well (covered 35ft) Priv". Concur.

Comparison with the Smooth Sheet: Soundings agree with smooth sheet. Recommend no change to smooth sheet. Concur.

AWOIS Item 346:

AWOIS Item 346 is addressed by SAIC in Section S of the Descriptive Report. Item 346 is a charted obstruction -cleared to 46' located at 29° 10' 54.00"N, 094° 37' 18.00"W. This item was detected in the standard portion of the multibeam swath, on the outer edge at beam 86. A least depth of 49 Was determined at 29° 10' 50.52"N, 094° 37' 17.95"W. Due to the location of the least depth (outer beams), NOAA has determined that an additional investigation shall be conducted using shallow water multibeam, specifically two orthogonal lines crossing the contact near nadir.

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX

Least depth:	52 feet at 29 10 50.65N 094 37 17.61W
File:	hbmba99272.d19 and hbmba99272.d20

Comparison with the Chart and Charting Recommendations: Charted 54 and 55 foot soundings surround the charted obstruction cleared to 49 feet. No obstruction was found at the charted position.

Recommend removal of the charted obstruction cleared to 49 feet, and charting of this 52 foot obstruction. CONCUR IN PART. DELETE (46) OBSTN. CHART 52 FT DEPTH.

Comparison with the Smooth Sheet: This is an area of 53 and 54 foot soundings surrounding the obstruction. A least depth of 52 feet was found on the obstruction. Recommend replacement of the 49 foot obstruction with a 52 foot ~~obstruction~~ on the smooth sheet. CONCUR - SOUNDING

New Item 1:

NI-1 is an additional item, which AHB has identified for additional work. NI-1 is a 57' OBSTR located on the smooth sheet at 29° 06' 09.48" N, 094° 38' 18.65" W. The multibeam shows a feature 0.2m in height (outer beam, #84), while the side scan shows a feature with a shadow height of 0.5m. Due to the location of the least depth (outer beams), NOAA has determined that an additional investigation shall be conducted using shallow water multibeam, specifically two orthogonal lines crossing the contact near nadir. NOTE: HYDROGRAPHER SEARCHED IN WRONG AREA DUE TO G.P. ERROR ABOVE

Method of Investigation: Shallow water multibeam two sets of orthogonal lines crossed with the item near nadir.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX. No feature was detected in this investigation.

Least depth:	58 feet
File:	hbmba99196.d45

Comparison with the Chart and Charting Recommendations: Soundings agree with chart. Recommend application of soundings from this survey. CHART 57 OBSTN SHOULD BE SCALE OF THE CHART ALLOW IN 29-06-49.22N, 94-38-21.52W.

Comparison with the Smooth Sheet: Recommend removal of 57 Obstr and addition of sounding 58 to the smooth sheet. DO NOT CONCUR RETAIN 57 OBSTR AT 29-06-49.22N, 94-38-21.52W,

New Item 2:

NI-2 is an additional item, which AHB has identified for additional work. NI-2 is a 52' OBSTR located on the smooth sheet at 29° 09' 02.54" N, 094° 33' 11.22" W. The multibeam shows a feature 0.75m in height (outer beam, #87), which appears to be a valid feature. There are no correlating side scan contacts. Due to the location of the least depth (outer beams), NOAA has determined that this item justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX No contacts or features were detected within the 100m radius.

Least depth: 54 feet
File: hbmba99272.d12 through hbmba99272.d18

Comparison with the Chart and Charting Recommendations: Soundings are one foot shallower than the chart. Recommend charting smooth sheet soundings. CONCUR

Comparison with the Smooth Sheet: Soundings agree with smooth sheet, except for the 52 foot obstruction. No obstruction found in this investigation. Recommend deletion of the 52 foot obstruction from the smooth sheet. CONCUR. NOT SHOWN ON THE PRESENT SURVEY.

New Item 3:

NI-3 is an additional item, which AHS has identified for additional work. NI-3 is a 53' OBSTR located on the smooth sheet at 29° 09' 11.0" N, 094° 39' 18.0" W. The multibeam shows a feature 0.70m in height (outer beam, #85), which appears to be a valid feature. There are no correlating side scan contacts. Due to the location of the least depth (outer beams), NOAA has determined that this item justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX Small contacts and features were detected in the side scan and multibeam data. The 53 Obstr was not found, but several 54 soundings were found.

Least depth: 54 feet
File: hbmba99196.d56 through hbmba99196.d62

Comparison with the Chart and Charting Recommendations: Soundings are slightly shoaler than the charted soundings. Recommend application of soundings from this survey. CONCUR

Comparison with the Smooth Sheet: Recommend removal of 53 Obstr from smooth sheet. Recommend adding soundings from this investigation to the smooth sheet. CONCUR

New Item 4:

NI-4 is an additional item, which AHB has identified for additional work. NI-4 was detected within the side scan records (13oct103.mst - height 2.6 m, and 04sep143.mst-height 3.8m). SAIC noted these contacts as "fish". Nothing was detected within the 100% multibeam. Both side scan contacts are within 9m of each other. The 13oct103 contact is located at 29° 14.206'N, 094° 43.982'W, and the 04sep143 contact is located at 29° 14.203'N, 094° 43.987'W. Due to the suspicious nature of the side scan contacts, NOAA has determined that this item justifies additional work by SAIC. Additional investigation shall be conducted using shallow water multibeam and side scan sonar. Side scan coverage shall be 200% using the 50m-range scale, and the search radius shall be 100m around the contact position. Multibeam shall be acquired concurrently with side scan.

Method of Investigation: Shallow water multibeam and 200% side scan.

Results of Investigation: Full coverage in the area of the reported feature was obtained using shallow water multibeam and 200% side scan. Data were fully corrected, including application of verified tides from station 877-1081, Sabine Offshore, TX An obstruction was detected in both side scan and multibeam coverage. It appears to be a possible platform section.

Least depth:	29 feet 12.6
Latitude:	29° 14.211'N 29.28
Longitude:	094° 43.988'W
File:	hbmba99196.d20
Time:	04:18:11

Comparison with the Chart and Charting Recommendations: Charted soundings are 4 to 5 feet deeper than soundings from this survey. Recommend application of soundings from the smooth sheet. Recommend charting 29 Obstr, dotted circle, blue tint. CONCUR CHARTS (29) OBSTD.

Comparison with the Smooth Sheet: This is an area of 35-foot soundings on the smooth sheet. Recommend addition of 29 Obstr to the smooth sheet. CONCUR. ✓

O. ADEQUACY OF SURVEY

Not applicable.

P. AIDS TO NAVIGATION

Not applicable.

Q. STATISTICS

Survey statistics are as follows:

46	Linear nautical miles of sounding lines (multibeam and side scan)
5	Linear nautical miles of sounding lines (multibeam only)
9	Number of sound velocity casts
35	Number of items investigated

R. MISCELLANEOUS

Not applicable.

S. RECOMMENDATIONS

See Section N for recommendations.

T. REFERRAL TO REPORTS

Descriptive Report, H10805, 09 February 1999.

APPENDIX A: DANGER TO NAVIGATION REPORT

Not applicable.

APPENDIX B: LANDMARKS AND NON-FLOATING AIDS TO NAVIGATION LISTS

Not applicable.

APPENDIX C: LIST OF HORIZONTAL CONTROL STATIONS

Pier 15:
Latitude: 29° 18'49.0409"N
Longitude: 094° 47'10.5748"W
Elevation: 9.0 feet
Geodetic station name: CG 20
Year established: 1974
Source of position: Published in National Geodetic Survey database.

Pier 15:
Latitude: 29° 18'42.29418"N
Longitude: 094° 47'22.07144"W
Elevation: 9.0 feet
Geodetic station name: CG 21
Year established: 1974
Source of position: Published in National Geodetic Survey database.

APPENDIX D: LIST OF GEOGRAPHIC NAMES

Not applicable.

APPENDIX E: TIDE NOTES

See Appendix F for the NOAA Memorandum of August 4, 1998 changing the tide zones and the tide stations to be used.

All data, including tides, were annotated with Coordinated Universal Time (UTC). Tidal heights for Sabine Offshore, 877-1081,were downloaded from the NOAA/CO-OPS web page. Correctors for each zone were created using the Create Correctors routine in the **iss2000 Survey Analysis** software. Correctors were then applied to the multibeam data files using the Process/Correctors/Tides routine in the **iss2000 Survey Analysis** software. When it is necessary to apply different tide correctors such as verified tides to replace preliminary tides, the program removes the previous tide corrector and applies the new corrector. Each time a routine is run on the GSF multibeam data file, a history record is written at the end of the file.

The on-line times for acquisition of valid hydrographic data are presented in Table App. E-1.

Science Applications International Corporation
An Employee-Owned Company
221 Third Street
Newport, RI 02840
(401) 847-4210

September 20, 1999

LETTER OF APPROVAL

REGISTRY NUMBER H10805

This report and data are respectfully submitted.

Field operations contributing to the accomplishment of survey H10805, Item Investigations, were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and data have been closely reviewed and are considered complete and adequate as per the Statement of Work.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Walter S. Simmons
Hydrographer
September 20, 1999

NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10805

Name on Survey	A ON CHART NO. 1125	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	
GALVESTON (title)	X		X							1
GULF OF MEXICO	X		X							2
TEXAS (title)	X		X		[redacted]					3
										4
										5
										6
										7
										8
										9
										10
										11
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										23
										24
										25

Dennis J. Romberg
JUL 6 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

LETTER TRANSMITTING DATA

REFERENCE NO.
N/CS33-01-01

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

☐ ORDINARY MAIL ☐ AIR MAIL
☐ REGISTERED MAIL ☒ EXPRESS
☐ GBL (Give number)_____

DATE FORWARDED
01/04/2001

NUMBER OF PACKAGES
2

TO:

NOAA, National Ocean Service
Chief, Data Control Group
N/CS3x1, Station 6813, SSMC3
1315 East-West Highway
Silver Spring, MD 20910

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.

H10805
Texas, Gulf of Mexico, 10 NM SE of Galveston

One Box Containing:
1 original descriptive report for survey H10805

One Tube Containing
1Original smooth sheet for H10805
1 paper composite plot of survey H10805 for chart 11323
1 paper composite plot of survey H10805 for chart 11324
1 mylar H-Drawing of H10805 for chart 11323
1 mylar H-Drawing of H10805 for chart 11324

FROM: (Signature)

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

Atlantic Hydrographic Branch, N/CS33
439 West York Street
Norfolk, Virginia 23510-1114

NOAA FORM 61-29 SUPERCEDES FORM C AND GS 413 WHICH MAY BE USED.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1988 - 554-006-61309

08/07/2000

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H10805

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	55245
NUMBER OF SOUNDINGS	55245

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	10.0	10/25/1999
VERIFICATION OF FIELD DATA	141.5	02/11/2000
QUALITY CONTROL CHECKS	3.0	
EVALUATION AND ANALYSIS	24.0	
FINAL INSPECTION	37.0	12/15/1999
COMPILATION	106.0	07/14/2000
TOTAL TIME	321.5	

ATLANTIC HYDROGRAPHIC BRANCH APPROVAL 08/04/2000

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR H10805 (1998-99)

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.

Additional field work was conducted on items noted by the hydrographer and Atlantic Hydrographic Branch (AHB) personnel. The addendum to the Descriptive Report describes the work.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

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

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

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 0.865 seconds (26.618 meters or 1.33 mm at the scale of the survey) north in latitude, and 0.689 seconds (18.612 meters or 0.93 mm at the scale of the survey) west in longitude.

L. JUNCTIONS

H10835 (1998) to the northeast

A standard junction has been effected between the present survey and survey H10835.

There are no junctional surveys to the northwest,

southwest, or southeast. Present survey depths are in harmony with the charted hydrography to the northwest, southwest, and to the southeast.

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) 11324 (30th Edition, Mar 28/98)

The charted hydrography originates with prior surveys and requires no further consideration. The hydrographer makes an adequate chart comparison in section N. of the Descriptive Report.

The following uncharted features found by the present survey were not discussed by the hydrographer.

Feature	Latitude (N)	Longitude (W)
56 Obstr	29°06'49.4	94°38'27.1"
57 Obstr	29°06'44.1"	94°38'23.1"
53 Obstr	29°08'13.1"	94°40'15.4"
40 Obstr	29°15'39.5"	94°38'36.6"

It is recommended that these features be charted as shown on the present survey should the scale of the chart allow.

It is recommended that the notation for the charted Dump Site in the vicinity of Latitude 29°16'40"N, Longitude 94°39'30"W be revised to Depths from survey of 1998.

During office processing a Danger to Navigation Report containing four items was submitted to Commander (oan), Eighth Coast Guard District Hale Boggs Federal Building, 501 Magazine Street, New Orleans LA,70130-3396, for inclusion to the Local Notice to Mariners. A copy of the Danger to Navigation Report is appended to this report. The following should be noted:

The 29-ft Obstruction in Latitude 29°14'12.7"N, Longitude 94°43'59.3"W and the 51-ft Obstruction in Latitude 29°10'47.0"N, Longitude 94°38'33.4"W are presently shown on the latest edition of chart 11323. It is recommended that

29 and 31 shown on smooth sheet as part of present survey data. SRQ 2-2-01 H10805

they be retained.

at lat 29°17'43.8"N, long 94°39'34.4"W

The 26-ft sounding is shown on the latest edition of chart 11323 as a dangerous 26-ft Obstruction, PA. It is recommended that the dangerous 26 Obstn, PA be deleted and a 26 foot depth be charted as shown on the present survey.

GKM 1/31/01

The following three features are shown on the latest edition of chart 11323 and are subsequent to the present survey.

Feature	Latitude (N)	Longitude (W)
Wreck PA	29°17'00"	94°41'00"
Wreck PA	29°07'00"	94°39'30"
Platform	29°08'32"	94°40'11"

It is recommended that these features be retained as charted.

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

O. RECOMMENDATIONS

It is recommended that reconnaissance hydrography be conducted of possible shoaling southwest of the present survey to determine wether additional surveys are necessary to adequately portray the bottom configuration in the area.

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 were used for compilation of the present survey: 11323 (58th ED., Jun 24/00)
11324 (30th Ed., Mar 28/98)

H10805

Robert Snow

Robert Snow
Cartographic Technician
Verification of Field Data
Evaluation and Analysis

APPROVAL SHEET
H10805 (1998-99)

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.

Date: 1/4/01

Richard H. Whitfield
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.

Date: 1/4/01

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

****

Final Approval:

Approved: Samuel P. De Bow Jr. Date: 2-2-01

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

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE, Office of Coast Survey
Atlantic Hydrographic Branch
439 W. York Street
Norfolk, VA 23510-1114

February 10, 2000

Commander (oan)
Eighth Coast Guard District
Hale Boggs Federal Building
501 Magazine Street
New Orleans LA 70130-3396

Dear Sir,

During office processing of hydrographic survey operations, 10 NM SE of Galveston, Texas (Project OPR-K171-KR, 1998, registry H10805) by Science Applications International Corporation (SAIC), four items have been identified as hazards to navigation. I recommend these items be included in the next Local Notice to Mariners. These items were located using Differential GPS and are based on NAD83 datum. The soundings have been reduced to Mean Lower Low Water (MLLW). All depth data is preliminary pending final office verification.

Objects Addressed:

Present survey depths, south of the approaches to Galveston, Texas, indicate that the 30-ft curve has migrated approximately 2000 yards south and east from the charted 30-ft curve. The prudent mariner should exercise extreme caution when transiting this area.

Feature	Latitude	Longitude
26-ft depth	29°17'43.8"N	94°39'34.4"W
29-ft Obstn	29°14'12.7"N	94°43'59.3"W
51-ft Obstn	29°10'47.0"N	94°38'33.4"W

Affected Nautical Charts:

Chart	Edition No.	Date
11323	57th	Mar 27/99
11324	30TH	Mar 28/98

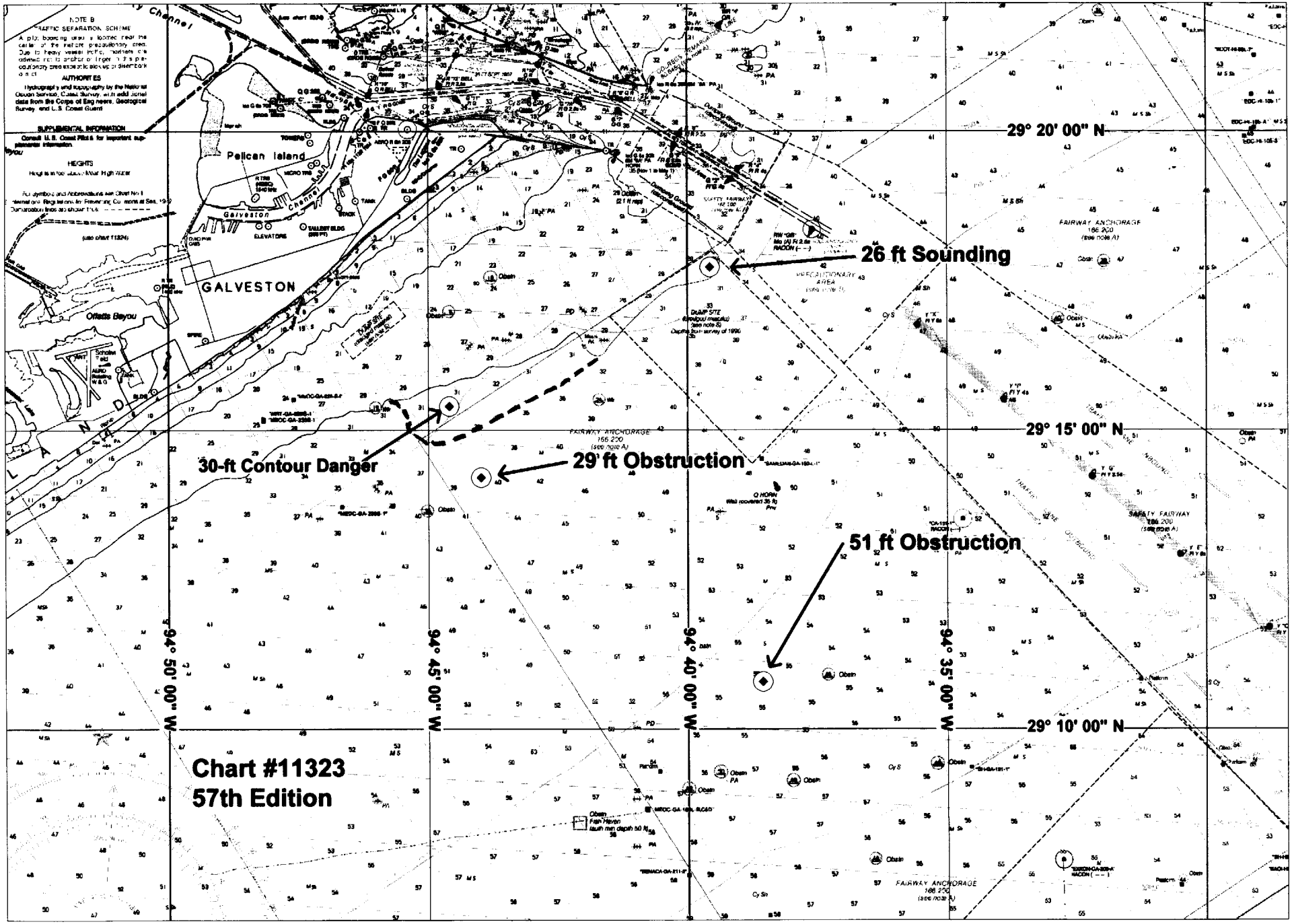
Questions concerning this report should be directed to the Atlantic Hydrographic Branch, by calling (757) 441-6746.

Sincerely,

Andrew L. Beaver

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

Attachment
cc: NIMA-NIS
N/CS26
N/CS31


29° 20' 00" N
29° 15' 00" N
29° 10' 00" N
94° 50' 00" W
94° 45' 00" W
94° 40' 00" W
94° 35' 00" W
26 ft Sounding
30-ft Contour Danger
29 ft Obstruction
51 ft Obstruction
Chart #11323
57th Edition
Pelican Island
GALVESTON
Offatts Bayou
FAIRWAY ANCHORAGE
SAFETY FAIRWAY

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. H10805

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
11324	12/15/00	[illegible signature]	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No.
12323	12/15/00	[illegible signature]	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 C&GS FORM 8352 WHICH MAY BE USED