H10942

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 V

Registry No. H10942

LOCALITY

State Texas

General Locality Gulf of Mexico

Locality 51 Miles SSW of Sabine Pass

1999

CHIEF OF PARTY
Walter S. Simmons

NOAA FORM 77-28
(11-72)

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

REGISTRY NO. **H10942**

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. **V**

State: TEXAS

General locality: GULF OF MEXICO

Locality: 51 MILES SSW OF SABINE PASS

Scale: 1:20,000 Date of survey: 10 Nov 1999 – 18 Dec 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, R. Nadeau, L. McAuliffe, A. Quintal, R. De Keyzer, D. Walker, J. Dietz, L.Gates, S.Lemke, G.Ghiorse

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: HP1055CM (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
HANDWRITTEN NOTES IN THE DESCRIPTIVE REPORT WERE MADE DURING OFFICE PROCESSING

AWOIS ✓ & SURF ✓ 9/25/00 by MBH

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

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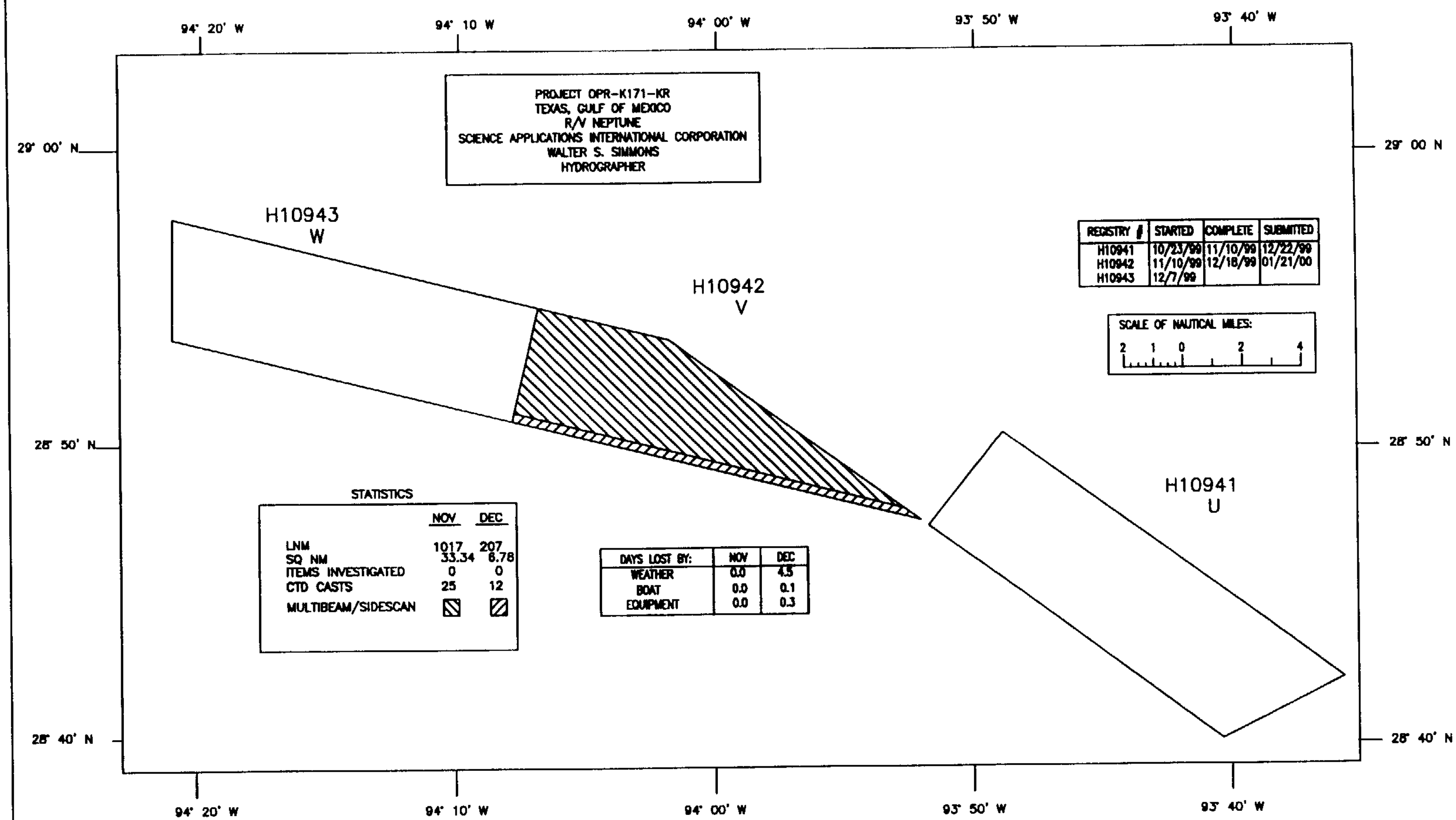
The Progress Sketch on the following page indicates:

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

PROGRESS SKETCH
H10942
MULTIBEAM SONAR – SIDESCAN SONAR



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Descriptive Report to Accompany
Hydrographic Survey H10942
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: V
Registry Number: H10942
Purpose: To provide NOAA with modern, accurate hydrographic survey data acquired using shallow water multibeam and side scan sonar technology with which to update the nautical charts of the assigned area.

B. AREA SURVEYED

Description:

The area surveyed was primarily the Shipping Safety Fairway at the Approach to Galveston, Texas. The following coordinates bound the survey approximately:

28 53 39.30720N	094 01 50.25000W
28 53 39.26274N	094 01 50.02829W
28 47 31.70760N	093 52 03.83520W
28 50 51.56520N	094 07 52.64040W
28 54 42.56280N	094 06 53.10720W

Dates of multibeam acquisition (UTC)

11/10/99 – 11/16/99	JD 314 – 320
11/29/99 – 11/30/99	JD 333 – 334
12/06/99 – 12/07/99	JD 340 – 341
12/14/99 – 12/15/99	JD 348 – 349
12/18/99	JD 352

Dates of sidescan acquisition (UTC)

11/10/99 – 11/16/99	JD 314 – 320
11/29/99 – 11/30/99	JD 333 – 334
12/06/99 – 12/07/99	JD 340 – 341
12/14/99 – 12/15/99	JD 348 – 349
12/18/99	JD 352

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

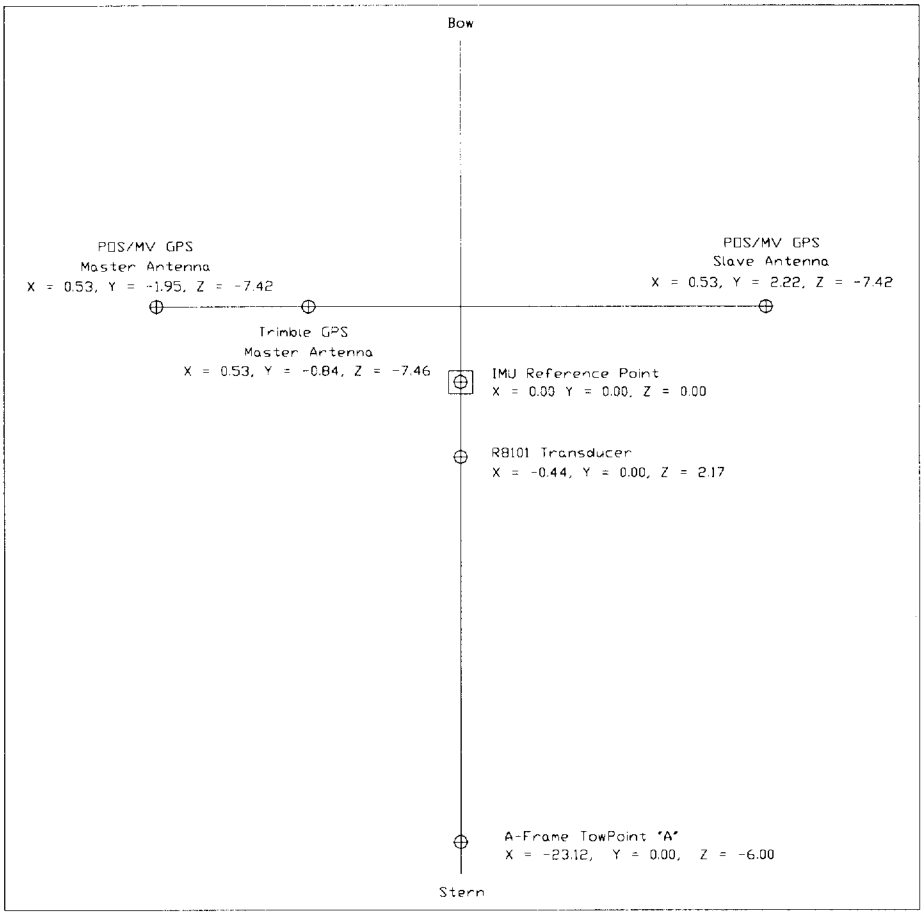
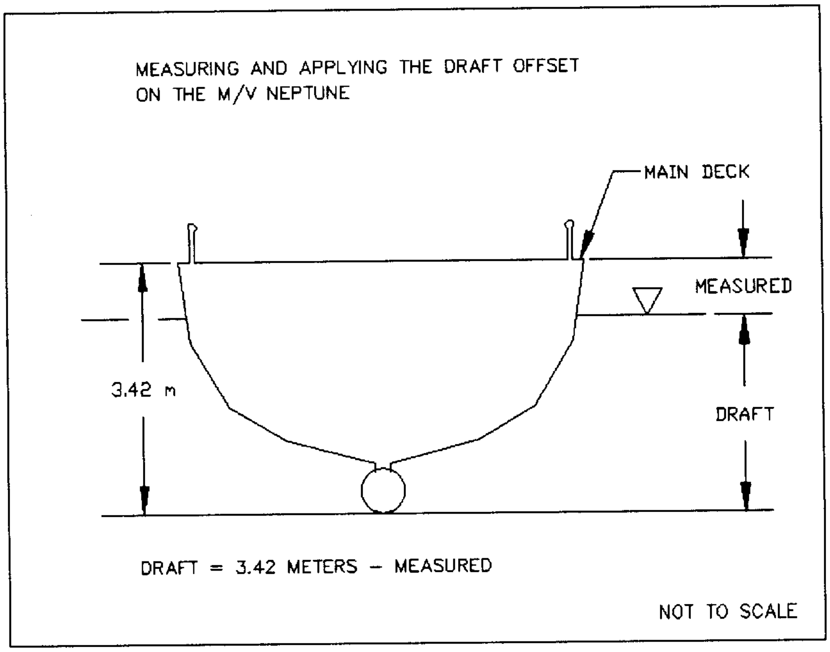


Table C-2. R/V Neptune Antenna and Transducer Locations Relative To the POS/MV IMU Vessel Reference Point, measurements in meters

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 utilize different coordinate systems, and 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 carried out using 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 WIN/NT machine. The **iss2000** also 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 50 or 75 meters. The data acquisition rate for the R8101 was set at 8 pings per second. 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 and 8 per pings second, the average along track coverage was 4.37 pings per 3 meters. In all instances, the specified average of 3.2 pings per 3 meters was met.

The side scan sonar equipment used throughout the H10942 survey was the Klein 5500 System. The 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. 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 locate 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 or 35 meters, depending on the water depth. Interactive editing was then performed to remove noise, fish, etc. The editing process used the geoswath geo-referenced editor which allows 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 H10942 multibeam data were reprocessed using 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.* FILED WITH THE ORIGINAL FIELD DATA

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

The real time multibeam acquisition system used for the H10942 survey included:

One UNIX workstation – Used for system control, survey operations, real-time quality control.
One personal computer – Used for running POS/MV and Trimble software, for downloading and conversion of sound velocity data from CTD's.

One personal computer – Used for navigation and time syncing on the WIN/NT 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 performed 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 created, verified, and corrected to ensure data coverage and to also check for navigation errors. Next, outer beams of the multibeam data, exceeding the 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 noted 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 H10942 survey:

Klein 5500 Side scan Sonar System towfish
- Serial Number 250
- Vertical beam width 40°, 0° depression, 455kHz.
- K-Wing-II 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 74 to 84 feet. The side scan towfish altitude off the bottom was maintained between eight and twenty meters. The MacArtney Sheave was equipped with 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 positions were calculated. The cable length was manually 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 using the remote controller for the winch. A proprietary software program, which graphically displays the towfish and water depths, aids in monitoring the towfish altitude.

The use of a hydrodynamic depressor allowed the amount of cable out to be kept less than the water depth. Thus permitting turns to be tighter and faster than surveys previously conducted without the use of a depressor. This also removed all concern 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.

Survey line spacing was 65-meters. Survey lines were run at an azimuth of 104° and 284°. Navigation file names were manually changed after each survey line was completed. Because the high data rates of the Klein 5500 side scan, the Klein data logging software automatically changes the file name every ten minutes. The side scan range scale was set to 75-meters.

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 any other geologic features (sand waves) that ran through both channels while on line.

2. Problems Encountered During Side Scan Sonar Survey Acquisition

The Klein 5500 locks on to the strongest signal. In water depths less than 60 feet, this often meant the water surface if Sargasso or wind waves were 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.

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 in Triton Isis.

A side scan processor looked at 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 gaps 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.

On June 16, 1999 a slave IRIG-B card was installed in the TPU to provide accurate time stamping of the ping data in synchronization with the **iss2000** and UTC from the GPS signal. After the IRIG-B card was installed, numerous erroneous dates, times and positions were found in the raw Klein data. The duration of the problem was typically 2 to 3 seconds and could be as large as 6 seconds. The xtf_io program was customized to do an interpolation over these gaps to resolve the problem

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 the **iss2000** system. By viewing the coverage plots in the **iss2000** survey-planning tool, a user can easily plan survey lines to fill in any data gaps. Once the sidescan coverage has been reviewed, a mosaic of the sidescan data is generated for additional verification of these data collected.

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..
5. Slant range to contact (Note: Negative number if contact was detected on port side).
6. Fish altitude when contact was acquired.
7. Shadow length of contact.
8. Contact height, based on length of shadow and geometric calculation using steps 5, 6, and 7.

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.

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, Table App. G-1. Daily comparisons of R8101 nadir soundings to ODOM EchoTrak 200 kHz vertical echo sounder are also summarized in Appendix G, Table App. G-2.*

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 14 September 1999.
- "B" - Sea-Bird Electronics, Inc., Model 19 CTD, Serial Number 2710, Calibration Date 14 September 1999.

The primary unit was SBE19 #0565. Daily confidence checks were obtained using simultaneous casts with the primary CTD and the secondary CTD. 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.

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.

VERIFIED TIDES FROM NOS CO-OPS WEB SITE HAVE BEEN APPLIED TO THE SURVEY

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 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.

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The results of these readings were entered into a spreadsheet along with the draft readings and any settlement 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 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-5.*

5. **Settlement and Squat**

Measurements of settlement were conducted near 29 11 42N 094 28 48W 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.
  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-6.

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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 accuracy of the sensor was five percent of one meter or five centimeters for heave ± 0.10° dynamic accuracy for roll and pitch, and ± 0.05° static accuracy for roll and pitch. 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 bias 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 75-meters. One line was run in opposite directions at the same speed. The width of the swath was measured and entered in a spreadsheet along with paired port and starboard depth measurements. An equal number of pairs were measured from swaths in opposite directions. This was to eliminate any influence from true slope in the bottom. The spreadsheet computed the apparent roll bias from each pair, and the mean and standard deviation of all the computed biases. The spreadsheet allows for entry of the roll bias that was in the **iss2000** system during the test, and outputs the new bias to be entered in the **iss2000.** Roll bias results are shown in Appendix G, Table App. G-4.*

After the roll biases were calculated and applied to the data, a pitch bias test was conducted using the same lines and measuring the change in position of a small obstruction covered by the roll lines. During the test, ship speed was maintained at as constant a rate as possible. Pitch biases were computed by comparing runs in opposite directions. There was no discernable pitch bias as a result of these tests, and a bias of 0.0° was kept in the system for the survey. Pitch bias results are shown in Appendix G, Table App. G-3.

Table App. G-6 contains the results of the Accuracy test conducted on JD 295
Roll, pitch, and heading biases applied in H10942 are shown in Table G-1.*

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

Julian Days	296 - 314
Roll	0.13
Pitch	0.00
Heading	0.00

H. CONTROL STATIONS

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.

*FILED WITH THE ORIGINAL FIELD DATA

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 stations CG-20, 1974, or CG-21, 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 within the allowable inverse distance of less than 15 meters.

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

There were 65 linear nautical miles of crosslines surveyed and 1084 linear nautical miles of mainscheme lines surveyed resulting in 6.0 percent coverage by crosslines.

Comparisons of all crossing data show that more than 97.7 percent of comparisons are within 30 centimeters and 99.9 percent of comparisons are within 40 centimeters. The skew in distribution indicates that the main scheme was slightly deeper than the cross lines

Table K-1. Junction Analysis Cross Lines vs. Main Scheme

Depth Difference Range			All Difference		Positive Difference		Negative Difference		Zero Difference
From		To	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent	Count
00.1cm	->	10.0cm	3014409	48.55	813552	79.91	2050571	40.68	150286
10.1cm	->	20.0cm	2030180	81.24	190744	98.65	1839436	77.17	
20.1cm	->	30.0cm	1023178	97.72	13711	99.99	1009467	97.2	
30.1cm	->	40.0cm	136821	99.93	66	100	136755	99.91	
40.1cm	->	50.0cm	4541	100	0	100	4541	100	
50.1cm	->	60.0cm	7	100	0	100	7	100	
sub-totals ->			6209136		1018073		5040777		150286
			100.00%		16.40%		81.18%		2.42%
H10942 Cross Line Sounding Minus Main Scheme Sounding Junction Analysis									

L. <u>JUNCTIONS</u> SEE ALSO THE EVALUATION REPORT

This survey junctions with H10874 on the north. See Table L-1 for the listing of the Junction Analysis, H10874, Sheet T to H10942, Sheet V. Of the 1287496 comparisons, 85.6% were within 30 centimeters, and more than 99.97% were within 50 centimeters. Differences exceeding 60 centimeters were attributed to Feature #4 where 3 comparisons were between 60 and 70 centimeters, and one comparison was between 80 and 90 centimeters; and to the junction with file hbmba99316.d15 where deep soundings remained in the edges of this line in H10942. The distribution of comparisons indicates that H10874 soundings were deeper than those of H10942.

Table L-1. Junction Analysis H10874, Sheet T vs. H10942, Sheet V

Depth Difference Range			All Difference		Positive Difference		Negative Difference		Zero Difference
From		To	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent	Count
00.1cm	->	10.0cm	276215	21.45	211211	17.34	52270	92.73	12734
10.1cm	->	20.0cm	406608	53.03	403058	50.42	3550	99.03	
20.1cm	->	30.0cm	419463	85.61	419411	84.84	52	99.12	
30.1cm	->	40.0cm	157240	97.83	157222	97.74	18	99.15	
40.1cm	->	50.0cm	27629	99.97	27374	99.99	255	99.6	
50.1cm	->	60.0cm	323	100	114	100	209	99.98	
60.1cm	->	70.0cm	17	100	3	100	14	100	
70.1cm	->	80.0cm	0	100	0	100	0	100	
80.1cm	->	90.0cm	1	100	1	100	0	100	
sub-totals ->			1287496	100.00%	1218394		56368		12734
			100.00%		94.63%		4.38%		0.99%
H10874 Sounding Minus H10942 Sounding Junction Analysis									

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

H10942 was compared to Chart 11330, 12th edition, 08 August 1998, at a scale 1:250,000. All Figures in this Section depict selected soundings from this survey in blue. Figures N-1 through N-3 depict the areas of the three charted soundings in the area of this survey. Surveyed soundings are with one to two feet of the charted soundings. Recommend that charted soundings be replaced by soundings from this survey, and that additional soundings be charted to more fairly represent the bottom in the area covered by this survey. Concur

Figure N-1. Charted 77 Feet in Surveyed 78 to 79 Feet

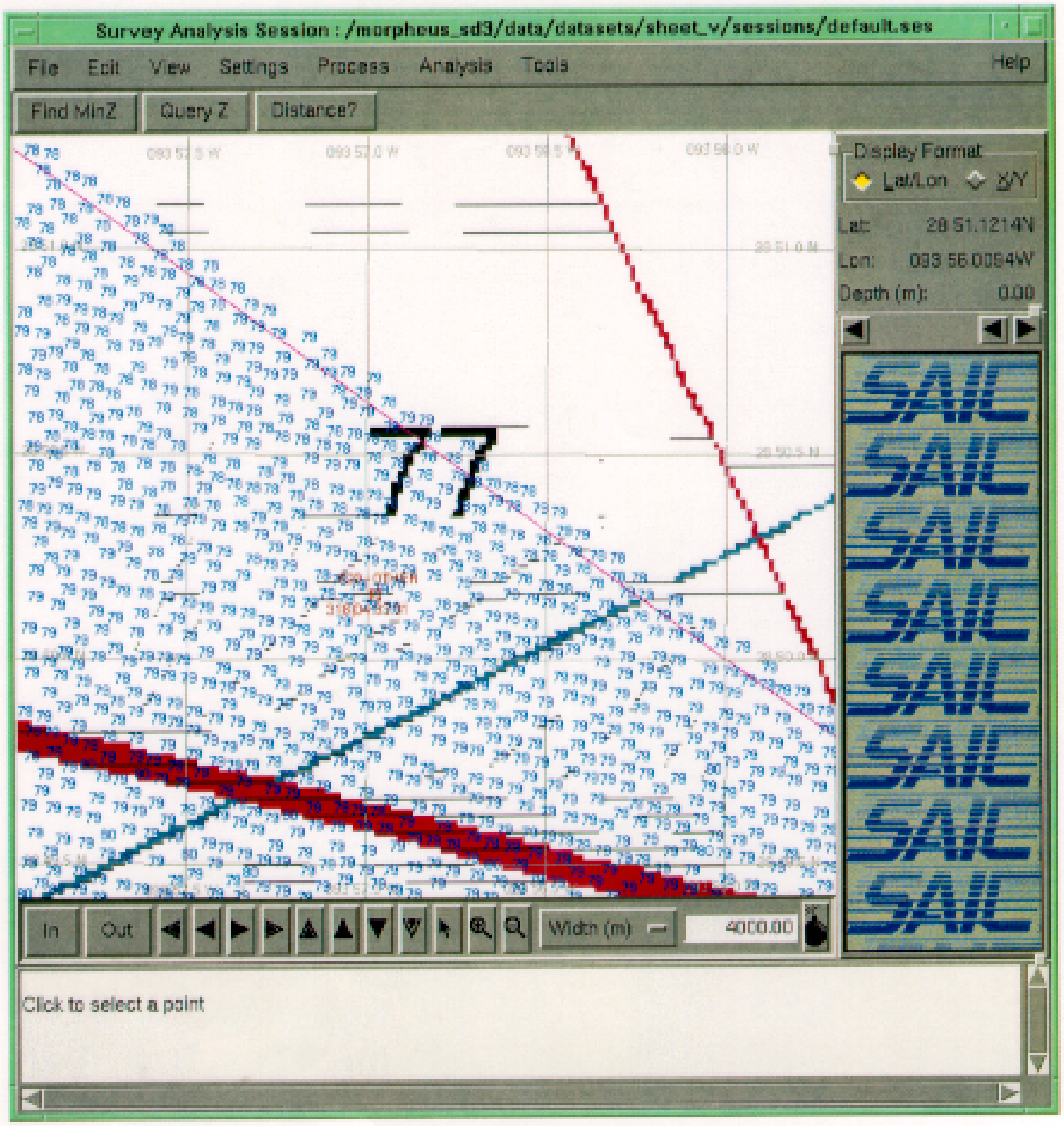


Figure N-2. Charted 80 Feet in Surveyed 78 to 79 Feet

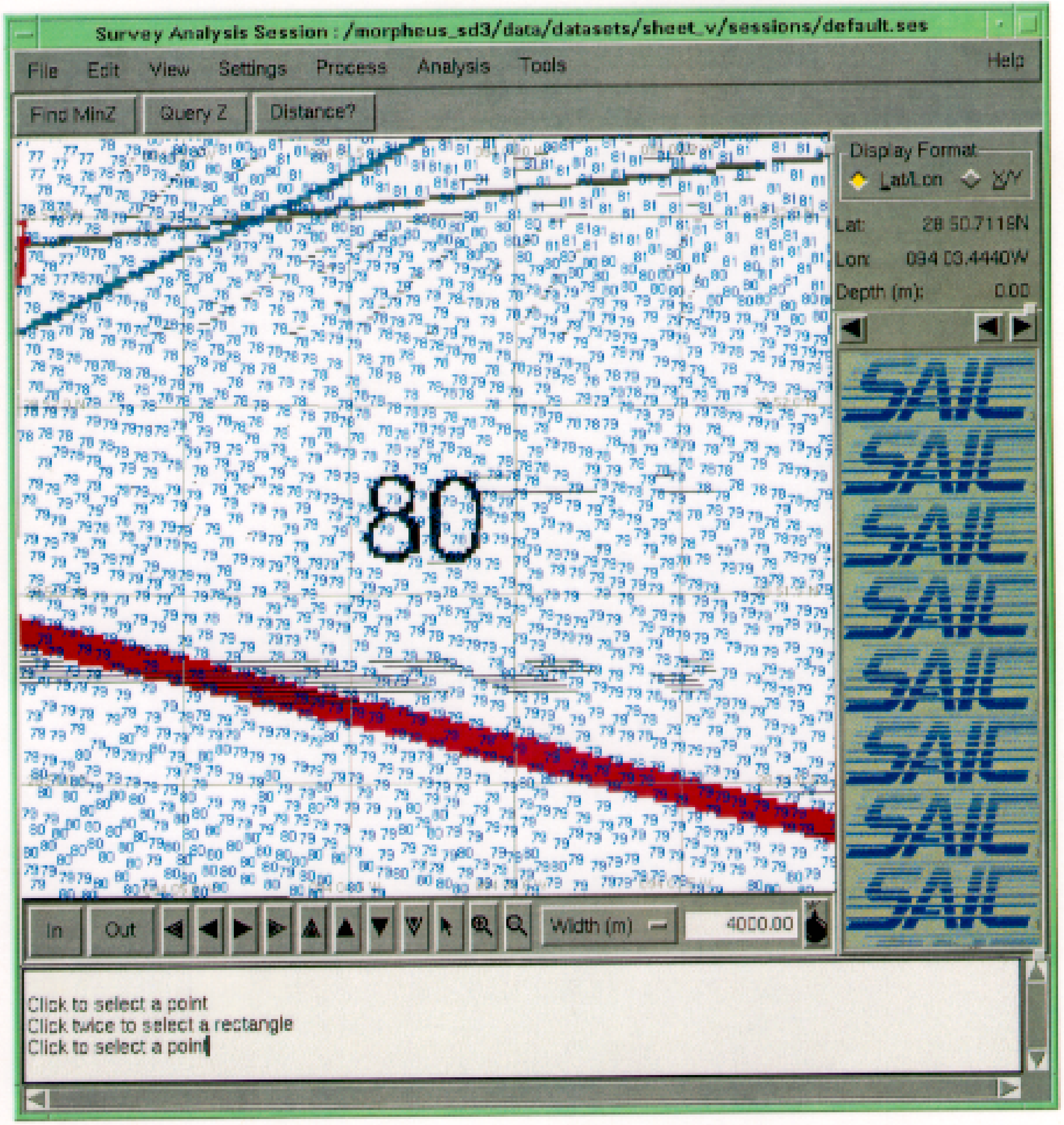
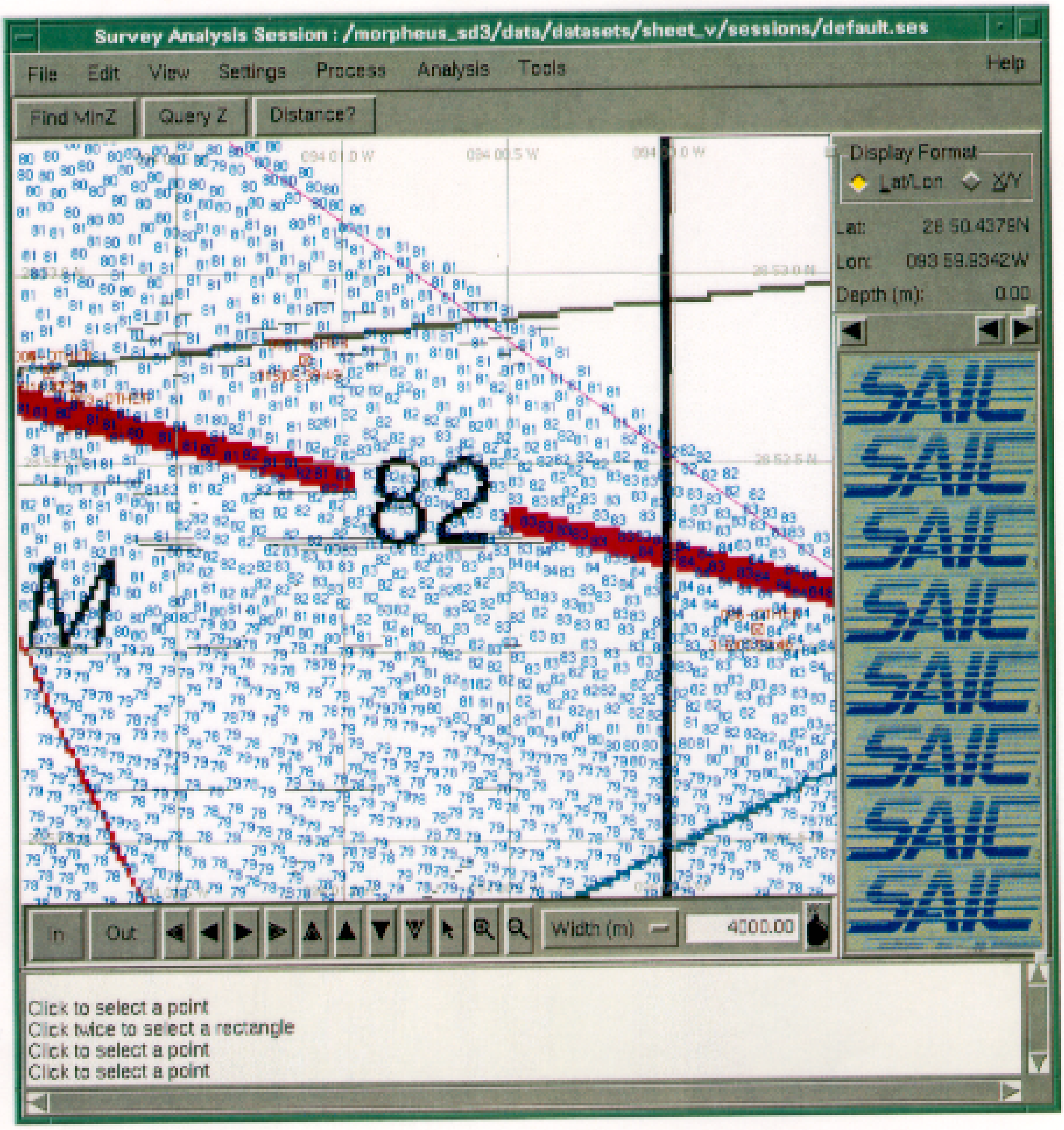


Figure N-3. Charted 82 Feet in Surveyed 82 to 84 Feet



In the area depicted in Figure N-4, fifteen obstructions were designated. Because of the limitations of plotting at 1:20000 scale only feature #4, 79 feet, and feature #6, 78 feet, were plotted. The designator for each was shown as **Obstns**. Features numbered 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 were not plotted on the smooth sheet. Concur

Figure N-4. Obstructions

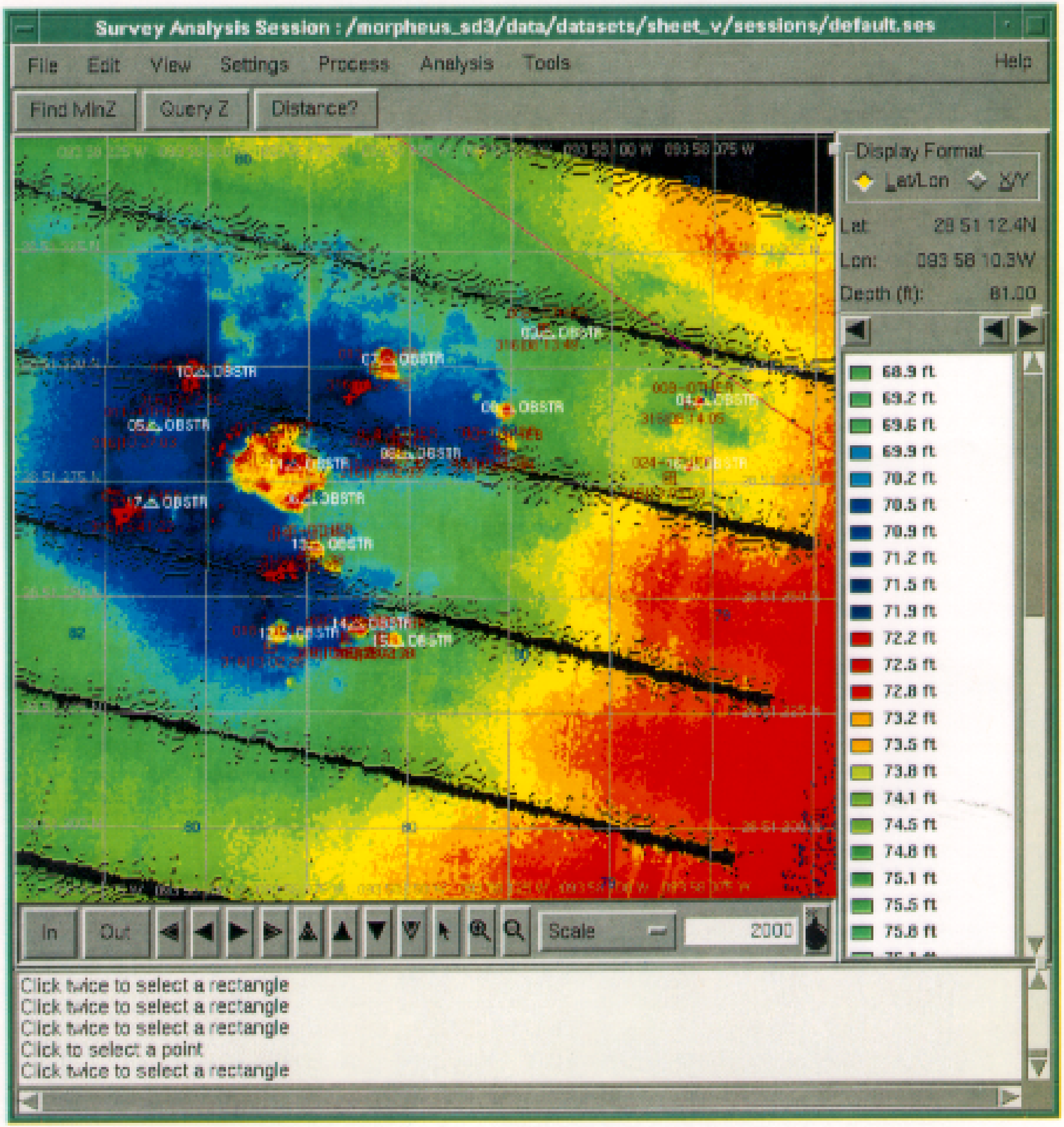
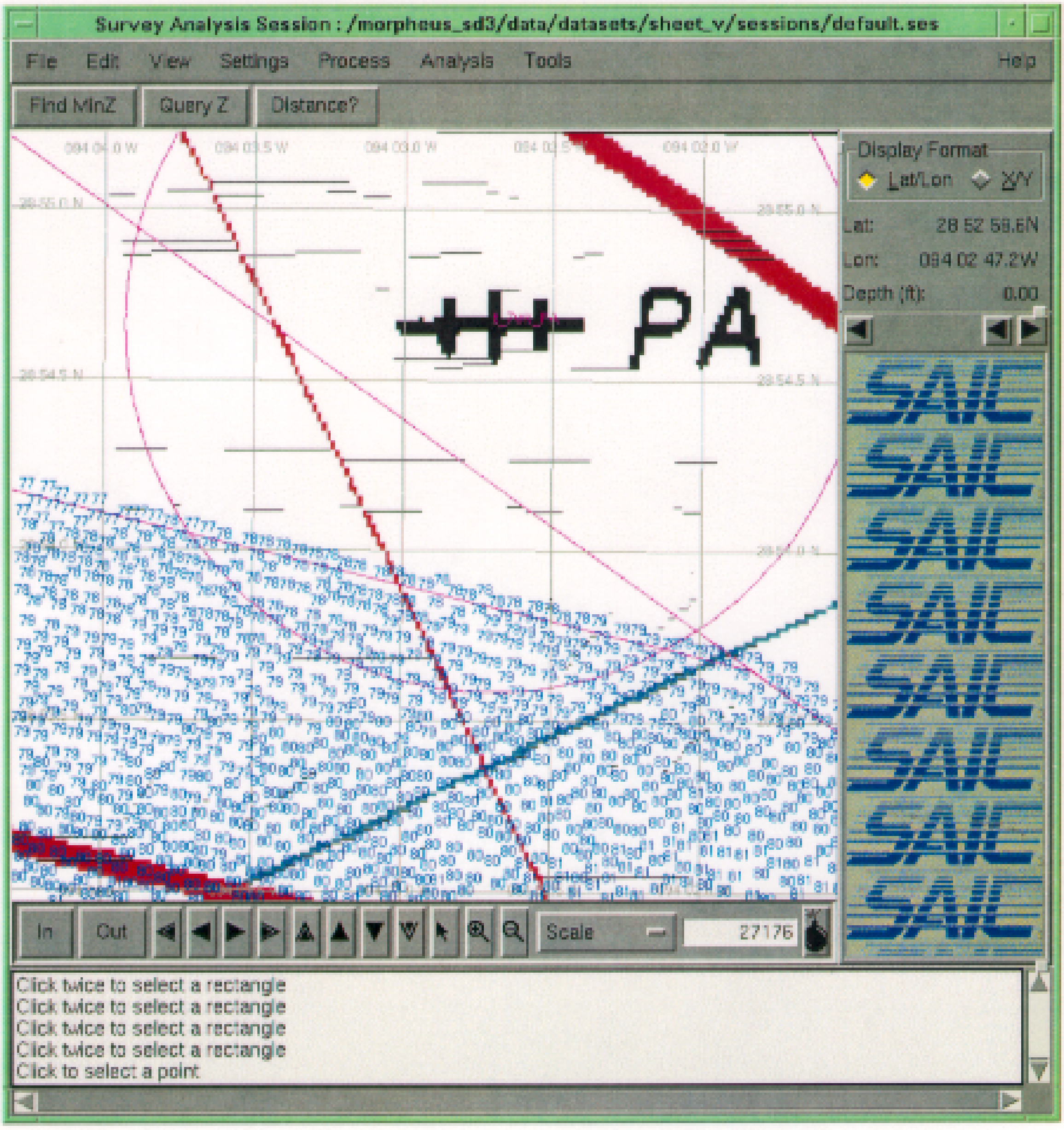


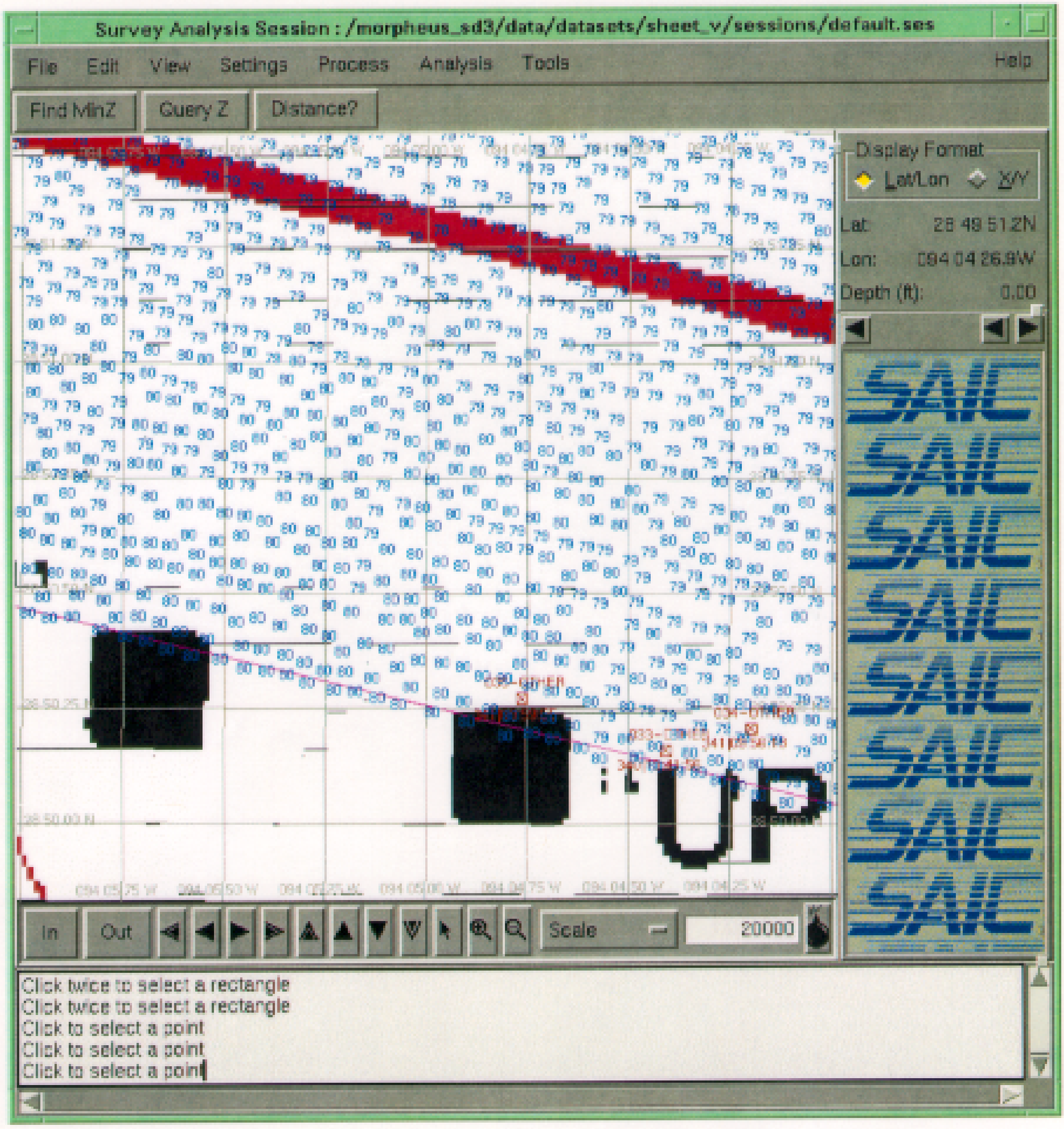
Figure N-5 shows the charted wreck PA at 28 54 40N 094 02 42W with a 2000 meter radius circle around it. There were no features detected within the circle segment covered by this survey. The Feature nearest this wreck was approximately 3800 meters distant. A CHARTING RECOMENDATION TO DELETE THE WRECK IS DISCUSSED IN THE D.R FOR SHEET "V"; H10874

Figure N-5. Charted Wreck PA



Platforms charted at 28 50 17.6N 094 05 41.3W and 28 50 07.4N 094 04 47.5W were not seen on the surface or in the survey records. These positions are outside the survey area. Figure N-6 depicts the area of these platforms. Side scan contacts in the area may be debris from the removal of the platforms. Recommend removal of these charted platforms. CONCUR UNLESS OTHER INFORMATION INDICATES OTHERWISE.

Figure N-6. Charted Platforms



O. NOT USED BY CONTRACTOR

P. AIDS TO NAVIGATION

There were no charted pipelines within this survey, and no new pipelines were detected. There are no aids to navigation in this survey.

Q. STATISTICS

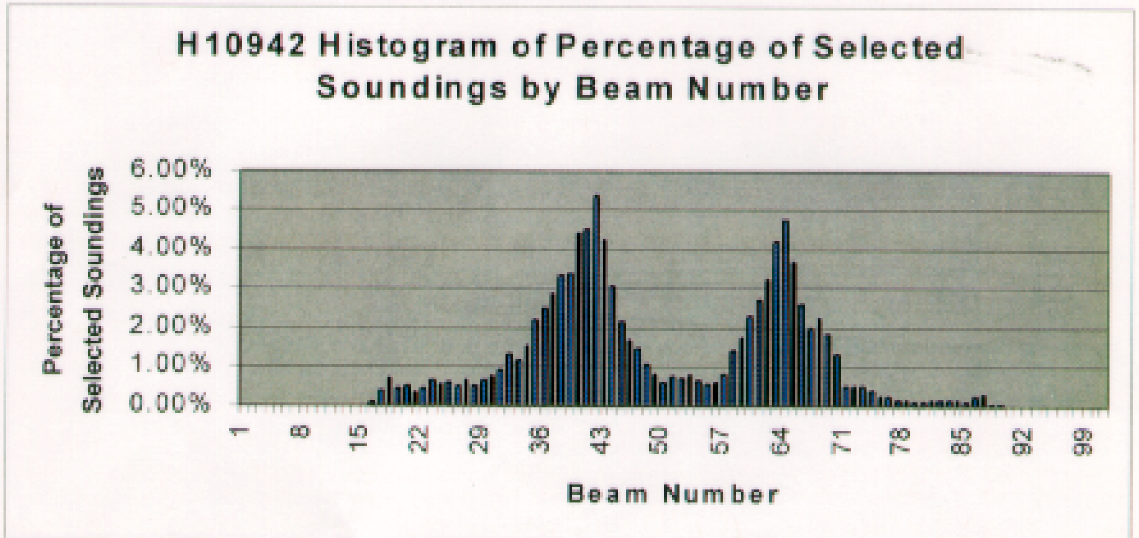
Survey statistics are as follows:

1224 nm	Linear nautical miles of sounding lines (multibeam and side scan)
40.1nm^2	Square nautical miles of multibeam and side scan
37	Number of sound velocity casts
0	Number of items investigated

R. MISCELLANEOUS SEE ALSO THE EVALUATION REPORT

Figure R-1 shows the distribution by beam number of the 14,037 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. All of the soundings selected meet the position and depth accuracy specifications (position error not to exceed 10 meters at 95% confidence, depth error not to exceed 0.3 meter at 90% confidence).

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



S. RECOMMENDATIONS

Recommend the entire common area of charts 11330, 11300, and 11340 be reconstructed with data from this survey. Concur

There are no additional recommendations for further investigation. Concur

T. REFERRAL TO REPORTS

None.

January 15, 2000

LETTER OF APPROVAL

REGISTRY NUMBER H10942

This report and the accompanying smooth sheet are respectfully submitted.

Field operations contributing to the accomplishment of survey H10942 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
January 15, 2000

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

Pier 15:
Latitude: 29 18 49.0409
Longitude: 094 47 10.5748
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
Longitude: 094 47 22.07144
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

NOAA FORM 76-155 (11-72) | U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

GEOGRAPHIC NAMES

SURVEY NUMBER: H10942

Name on Survey	A ON CHART NO.	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
Gulf of Mexico	11330									1
Sabine Pass	11330									2
Texas	11330									3

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.

Table App. E-1. Abstract of Times of Hydrography

1999/314	02:39:37.02	1999/314	02:43:10.02	1999/314	02:52:48.05	1999/314	02:58:09.03
1999/314	03:06:51.03	1999/314	03:12:33.62	1999/314	03:25:41.03	1999/314	03:32:25.02
1999/314	03:41:19.02	1999/314	03:50:04.02	1999/314	03:57:26.07	1999/314	04:07:21.02
1999/314	04:16:02.03	1999/314	04:28:16.02	1999/314	04:35:58.01	1999/314	04:49:17.03
1999/314	04:58:00.02	1999/314	05:13:03.03	1999/314	05:20:43.02	1999/314	05:37:43.01
1999/314	05:45:55.02	1999/314	06:04:21.03	1999/314	06:11:58.02	1999/314	06:32:06.02
1999/314	06:40:19.02	1999/314	07:03:01.07	1999/314	07:10:43.03	1999/314	07:34:04.02
1999/314	07:42:17.06	1999/314	08:07:33.03	1999/314	08:15:12.01	1999/314	08:41:58.11
1999/314	08:50:00.01	1999/314	09:17:11.03	1999/314	10:05:50.02	1999/314	10:33:27.03
1999/314	10:41:19.02	1999/314	11:08:07.03	1999/314	11:15:37.02	1999/314	11:43:28.06
1999/314	11:51:04.03	1999/314	12:17:34.02	1999/314	12:25:28.03	1999/314	12:53:26.03
1999/314	13:02:41.02	1999/314	13:29:03.02	1999/314	13:40:42.03	1999/314	14:08:44.01
1999/314	14:32:06.03	1999/314	15:09:20.06	1999/314	15:30:20.03	1999/314	16:05:44.02
1999/314	16:10:39.01	1999/314	16:49:13.03	1999/314	16:56:54.03	1999/314	17:32:36.02
1999/314	17:38:07.03	1999/314	18:17:40.05	1999/314	18:25:47.07	1999/314	19:01:43.07
1999/314	19:06:44.03	1999/314	19:46:49.03	1999/314	19:56:43.02	1999/314	20:33:14.02
1999/314	20:38:06.02	1999/314	21:18:49.08	1999/314	21:42:34.02	1999/314	21:50:58.61
1999/314	21:53:53.02	1999/314	21:54:34.15	1999/314	21:59:10.03	1999/314	22:36:43.02
1999/314	22:42:25.01	1999/314	23:27:40.02	1999/314	23:32:20.02	1999/315	00:11:04.03
1999/315	00:16:16.03	1999/315	01:01:35.02	1999/315	01:06:25.03	1999/315	01:46:03.03
1999/315	01:51:19.02	1999/315	02:37:05.01	1999/315	03:04:43.01	1999/315	03:45:20.02
1999/315	03:50:54.01	1999/315	04:37:34.01	1999/315	04:45:40.06	1999/315	05:31:16.01
1999/315	05:37:06.02	1999/315	06:24:16.02	1999/315	06:31:52.02	1999/315	07:18:08.01
1999/315	07:23:55.02	1999/315	08:11:30.02	1999/315	08:19:12.02	1999/315	09:06:02.02
1999/315	09:25:38.04	1999/315	10:14:11.02	1999/315	10:21:51.02	1999/315	11:09:01.02
1999/315	11:14:12.02	1999/315	11:15:02.22	1999/315	11:22:18.02	1999/315	11:22:44.72
1999/315	11:31:01.02	1999/315	12:25:22.02	1999/315	12:30:34.05	1999/315	13:17:55.02
1999/315	13:23:02.03	1999/315	14:18:32.03	1999/315	14:23:11.03	1999/315	15:10:23.02
1999/315	15:15:22.03	1999/315	16:12:21.03	1999/315	16:28:35.02	1999/315	17:15:40.02
1999/315	17:20:51.03	1999/315	18:20:17.03	1999/315	18:27:41.01	1999/315	19:19:27.02
1999/315	19:25:18.01	1999/315	20:25:43.08	1999/315	20:33:45.02	1999/315	21:37:40.02
1999/315	21:42:45.03	1999/315	22:43:06.02	1999/315	23:01:55.03	1999/315	23:54:58.07
1999/316	00:00:15.02	1999/316	00:59:53.02	1999/316	01:07:57.07	1999/316	02:02:39.02
1999/316	02:08:34.17	1999/316	03:12:19.06	1999/316	03:18:36.02	1999/316	04:14:31.06
1999/316	04:19:34.02	1999/316	05:23:16.03	1999/316	05:46:10.34	1999/316	06:44:00.80
1999/316	06:50:45.46	1999/316	07:03:41.41	1999/316	07:08:58.19	1999/316	08:14:12.30

1999/316	08:19:07.38	1999/316	09:16:43.33	1999/316	09:21:55.37	1999/316	10:28:44.39
1999/316	10:36:41.26	1999/316	10:38:50.56	1999/316	10:48:07.76	1999/316	11:50:25.36
1999/316	11:56:15.37	1999/316	13:04:34.28	1999/316	13:25:18.36	1999/316	14:28:06.32
1999/316	14:33:38.35	1999/316	15:44:34.36	1999/316	15:52:17.30	1999/316	16:55:33.37
1999/316	17:01:39.37	1999/316	18:13:53.46	1999/316	20:44:14.38	1999/316	21:52:23.24
1999/316	22:03:46.31	1999/316	23:26:24.33	1999/316	23:31:50.37	1999/317	00:40:39.33
1999/317	00:46:26.30	1999/317	02:06:29.38	1999/317	02:30:16.31	1999/317	03:40:35.27
1999/317	03:46:21.29	1999/317	05:05:27.35	1999/317	05:07:23.50	1999/317	05:09:23.33
1999/317	05:07:23.50	1999/317	05:09:43.04	1999/317	05:23:26.42	1999/317	06:34:43.41
1999/317	06:40:15.34	1999/317	08:00:31.34	1999/317	08:20:31.29	1999/317	09:37:31.33
1999/317	09:43:45.29	1999/317	11:05:49.31	1999/317	11:14:08.42	1999/317	12:31:29.32
1999/317	12:37:40.24	1999/317	14:01:33.14	1999/317	15:02:43.33	1999/317	15:51:01.13
1999/317	16:10:29.90	1999/317	17:05:57.32	1999/317	17:12:05.30	1999/317	18:39:02.27
1999/317	18:47:25.33	1999/317	20:03:31.39	1999/317	20:09:32.40	1999/317	21:43:50.36
1999/317	22:05:50.27	1999/317	23:22:21.32	1999/317	23:28:09.27	1999/318	00:58:59.34
1999/318	01:05:32.31	1999/318	02:26:46.29	1999/318	02:32:46.31	1999/318	04:02:18.35
1999/318	04:25:33.41	1999/318	05:48:28.30	1999/318	05:54:12.33	1999/318	07:25:00.42
1999/318	07:33:26.32	1999/318	09:00:59.39	1999/318	09:07:21.38	1999/318	10:39:15.33
1999/318	10:57:38.37	1999/318	12:26:18.32	1999/318	12:32:37.39	1999/318	14:11:56.29
1999/318	14:20:29.32	1999/318	15:47:03.32	1999/318	15:53:31.32	1999/318	17:36:55.39
1999/318	17:56:09.37	1999/318	19:21:25.32	1999/318	19:28:27.23	1999/318	21:18:10.34
1999/318	21:23:09.38	1999/318	22:48:18.43	1999/318	22:53:44.46	1999/319	00:40:27.38
1999/319	01:06:16.34	1999/319	02:36:57.48	1999/319	02:43:16.41	1999/319	04:24:15.34
1999/319	04:30:25.33	1999/319	06:04:25.43	1999/319	06:10:08.26	1999/319	07:48:21.32
1999/319	08:07:13.32	1999/319	09:47:39.30	1999/319	09:53:36.36	1999/319	11:33:05.40
1999/319	11:41:40.41	1999/319	13:21:09.31	1999/319	13:40:25.33	1999/319	15:21:36.42
1999/319	15:41:56.40	1999/319	17:21:55.40	1999/319	17:27:40.35	1999/319	19:10:41.31
1999/319	19:30:08.35	1999/319	21:08:23.30	1999/319	21:13:37.34	1999/319	23:02:08.36
1999/319	23:07:02.48	1999/320	00:44:22.36	1999/320	00:50:36.37	1999/320	02:38:13.37
1999/320	03:01:04.32	1999/320	04:41:45.31	1999/320	04:47:09.30	1999/320	06:33:42.45
1999/320	06:39:53.43	1999/320	08:22:32.36	1999/333	20:42:57.39	1999/333	22:26:17.33
1999/333	22:33:28.31	1999/334	00:09:25.32	1999/334	00:16:33.33	1999/334	01:57:15.35
1999/334	02:17:09.33	1999/334	03:56:30.32	1999/334	04:03:07.31	1999/334	05:06:06.96
1999/334	02:30:53.25	1999/340	04:33:23.35	1999/340	04:44:27.35	1999/340	07:35:39.29
1999/340	08:13:08.47	1999/340	10:20:26.34	1999/340	10:31:06.20	1999/340	12:24:17.52
1999/340	12:30:28.77	1999/340	13:05:55.34	1999/340	13:12:34.40	1999/340	14:37:05.58
1999/340	14:43:06.57	1999/340	15:34:01.31	1999/340	15:57:10.38	1999/340	18:03:23.37
1999/340	18:10:01.24	1999/340	19:41:41.01	1999/340	18:10:01.24	1999/340	20:22:15.25
1999/340	20:30:58.34	1999/340	22:32:28.29	1999/340	22:54:18.31	1999/341	00:41:34.34
1999/341	00:52:22.19	1999/341	02:39:52.39	1999/341	02:47:26.36	1999/341	04:31:48.32
1999/341	05:00:07.26	1999/341	06:40:17.30	1999/341	06:46:46.37	1999/341	08:33:16.23
1999/341	08:38:40.35	1999/341	10:20:09.33	1999/341	10:26:40.31	1999/341	12:14:47.24
1999/341	12:14:49.32	1999/341	12:14:50.39	1999/341	12:49:18.70	1999/341	12:51:51.35
1999/341	12:57:27.45	1999/341	12:59:38.33	1999/341	13:00:52.44	1999/341	13:00:54.57
1999/341	13:05:57.88	1999/341	13:06:31.35	1999/341	13:27:56.30	1999/341	13:29:49.29
1999/341	13:41:31.28	1999/341	13:44:57.31	1999/341	14:06:06.51	1999/341	14:07:16.29
1999/341	14:11:40.32	1999/341	14:15:51.24	1999/341	14:21:57.33	1999/341	14:23:46.28
1999/341	14:36:52.34	1999/341	14:38:50.31	1999/341	14:50:21.25	1999/341	14:52:37.38
1999/341	15:01:58.19	1999/341	15:05:14.22	1999/341	15:14:28.29	1999/341	15:15:49.22
1999/341	15:24:00.50	1999/341	15:33:16.34	1999/341	15:39:31.46	1999/341	15:41:34.36
1999/341	16:11:27.45	1999/341	16:17:40.30	1999/341	16:23:48.68	1999/341	16:27:46.30
1999/341	16:32:42.51	1999/341	16:38:37.31	1999/341	16:43:21.36	1999/341	16:45:09.37
1999/341	16:53:50.34	1999/341	17:00:47.34	1999/341	17:07:27.37	1999/341	17:13:26.24
1999/341	17:20:34.38	1999/341	17:23:47.32	1999/341	17:32:27.26	1999/341	17:35:19.34
1999/341	17:42:50.38	1999/341	17:48:55.34	1999/341	17:55:04.33	1999/341	18:00:18.62
1999/341	18:09:56.19	1999/341	18:27:10.42	1999/341	18:36:04.44	1999/341	18:46:56.38

1999/341	18:53:53.38	1999/341	18:59:40.29	1999/341	19:05:24.33	1999/341	19:07:09.23
1999/341	19:12:39.24	1999/341	19:15:10.23	1999/341	19:25:08.24	1999/341	19:27:51.30
1999/341	19:32:01.18	1999/341	19:33:57.30	1999/341	19:49:08.30	1999/341	19:51:26.25
1999/341	19:56:52.44	1999/341	19:57:33.30	1999/341	20:07:18.30	1999/341	20:18:48.28
1999/341	20:31:23.30	1999/341	20:33:25.32	1999/341	20:43:57.24	1999/341	20:53:17.24
1999/341	21:00:16.37	1999/341	21:11:06.27	1999/341	21:00:16.37	1999/342	00:14:53.28
1999/342	00:21:45.36	1999/342	00:48:12.37	1999/342	00:55:50.39	1999/342	01:22:24.43
1999/342	01:29:25.30	1999/342	01:55:56.35	1999/342	02:02:35.29	1999/342	02:29:07.28
1999/342	02:35:47.31	1999/342	03:02:32.30	1999/342	03:09:23.31	1999/342	03:35:59.30
1999/342	03:42:28.39	1999/342	04:09:25.30	1999/342	04:24:41.34	1999/342	04:51:25.17
1999/342	04:58:02.48	1999/342	05:25:21.28	1999/342	05:31:46.38	1999/342	05:58:51.38
1999/342	06:05:49.34	1999/342	06:33:08.34	1999/342	06:39:37.27	1999/342	07:06:57.33
1999/342	07:13:57.25	1999/342	07:42:29.36	1999/342	07:49:24.37	1999/342	08:16:56.36
1999/342	08:23:51.34	1999/342	08:45:09.94	1999/342	08:51:07.82	1999/342	08:58:47.36
1999/342	09:08:33.31	1999/342	09:36:22.29	1999/342	09:43:05.10	1999/342	10:09:28.30
1999/348	20:49:33.37	1999/348	22:29:19.35	1999/348	22:42:49.31	1999/348	22:43:22.36
1999/348	22:53:21.37	1999/348	22:54:29.34	1999/348	23:28:01.35	1999/348	23:29:08.29
1999/348	23:51:57.35	1999/348	23:53:29.36	1999/349	00:21:03.37	1999/349	00:22:17.43
1999/349	00:44:24.38	1999/349	01:59:06.32	1999/349	02:10:16.37	1999/349	03:57:25.31
1999/352	00:56:31.2	1999/352	01:29:36.3	1999/352	01:37:45.3	1999/352	02:10:02.4
1999/352	02:19:56.4	1999/352	02:21:30.3	1999/352	02:41:44.3	1999/352	02:43:56.3
1999/352	02:58:22.3	1999/352	02:58:51.3	1999/352	03:10:03.3	1999/352	03:10:38.3

APPENDIX F: SUPPLEMENTAL CORRESPONDENCE

NOAA Memorandum: Final Water Level Data for Application to Hydrographic Survey OPR-K171-KR-1998, eight pages follow.

NOAA FORM 76-155 (11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER H-10942

Name on Survey	A ON CHART NO. 11300, 11340	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
GULF OF MEXICO	X		X							1
SABINE BANK (title)	X		X							2
TEXAS (title)	X		X							3
										4
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Approved:

AUG 23 2000

NOAA FORM 76-155 SUPERSEDES C&GS 197

09/06/2000

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H10942

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	14044
NUMBER OF SOUNDINGS	14044

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	7.0	08/09/2000
VERIFICATION OF FIELD DATA	28.0	08/14/2000
QUALITY CONTROL CHECKS	0.0	
EVALUATION AND ANALYSIS	20.0	
FINAL INSPECTION	4.0	08/18/2000
COMPILATION	21.0	08/28/2000
TOTAL TIME	80.0	

ATLANTIC HYDROGRAPHIC BRANCH APPROVAL 08/24/2000

NOAA FORM 61-29
(12-71)

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

LETTER TRANSMITTING DATA

REFERENCE NO.

N/CS33-64-00

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

- [ ] ORDINARY MAIL
- [ ] AIR MAIL
- [ ] REGISTERED MAIL
- [x] EXPRESS
- [ ] GBL *(Give number)* ____________

TO:

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

DATE FORWARDED

9-6-0

NUMBER OF PACKAGES

1 Box and 1 tube

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

H10942
Texas, Gulf of Mexico

One Box containing:
1 Original Descriptive Report for survey H10942

1 Tube containing:
1 Original smooth sheet for H10942
1 Paper composite plot of survey H10942 for chart 11330
1 Mylar H-Drawing of H10942 for chart 11330

FROM: *(Signature)*

Richard H. Whitfield

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

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

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR H10942 (1999)

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

D. AUTOMATED DATA ACQUISITION AND PROCESSING

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

CARIS HIPS/SIPS
AutoCAD, Release 14
Hydrographic Processing System (HPS)
MicroStation 95, version 5.05
NADCON, version 2.10
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). 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 datum, move the projection lines 0.895 seconds (27.56 meters or 1.38 mm at the scale of the survey) north in latitude and 0.616 seconds (16.68 meters or 0.83 mm at the scale of the survey) west in longitude.

L. JUNCTIONS

H10943 (1999) to the west
H10874 (1999-2000) to the northeast

Standard junctions were effected between the present survey and H10943 (1999) and H10874 (1999-2000). Present survey depths are in harmony with the charted hydrography to the south and north.

M. COMPARISON WITH PRIOR SURVEYS

A comparison with prior surveys was not done during office processing. This is in accordance with section 4. of the memorandum titled, *Changes to Hydrographic Survey Processing*, dated May 24, 1995. This also applies to 100% side scan sonar coverage with 100% multibeam coverage.

The present survey is adequate to supersede the prior surveys in the common area.

N. COMPARISON WITH CHARTS 11330 (12th Edition, Aug. 08/98)

Hydrography

The charted hydrography originates with prior surveys and requires no further discussion. The hydrographer makes an adequate chart comparison in section N. of the Descriptive Report. The following should be noted:

The following four obstructions located by the present survey are not recommended for charting because of equal or shoaler depths in the respective areas:

Obstn ft/m	Latitude (N)	Longitude (W)
$79/24^{1}$	28°49'58.93"	94°00'37.67"
$78/23^{8}$	28°51'16.24"	93°58'10.50"
$79/24^{1}$	28°51'17.56"	93°58'04.66"
$78/23^{8}$	28°52'18.81"	94°02'24.80"

An obstruction with a depth of 77-ft (23^{5} m) was located by the hydrographer in Latitude 28°52'44.51"N, Longitude 94°01'53.41"W. It is recommended that the obstruction be charted as shown on the present survey.

The present survey is adequate to supersede the charted hydrography in the common area ~~, except as noted in this report~~. GKM 9/26/00

O. ADEQUACY OF SURVEY

This is an adequate hydrographic survey and should supersede all prior surveys within the common area ~~with the exception of those items noted above~~. GKM 9/26/00

R. MISCELLANEOUS

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

The following NOS chart was used for compilation of the present survey: 11330 (12th Edition, Aug. 08/98)

H10942

Marilyn Schlüter

Marilyn L. Schlüter
Cartographic Technician
Verification of Field Data
Evaluation and Analysis

APPROVAL SHEET
H10942 (1999)

Initial Approvals:

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

Robert G. Roberson
Cartographer Team Leader
Atlantic Hydrographic Branch

Date: 24 Aug 2000

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

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

Date: 24 AUG 00

****

Final Approval:

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

Date: October 2, 2000