10367

Diagram No. 1285-2

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. AHP2-10-3-91

Registery No. H-10367

LOCALITY

State Texas

General Locality Aransas Bay

Sublocality Vicinity of Mud Island

19 91

CHIEF OF PARTY
LCDR V.D. Ross

LIBRARY & ARCHIVES

DATE July 8, 1992

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

PRODS

CP-5
11314 'A'
11312
11309

10367

NOAA FORM 77-28 (11-72)

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

HYDROGRAPHIC TITLE SHEET

REGISTER NO.

H-10367

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.

AHP2-10-3-91

State Texas

General locality Aransas Bay

Locality Vicinity of Mud Island

Scale 1:10,000 Date of survey 01/31/91 to 03/13/91

Instructions dated September 14, 1990 Project No. OPR-K229-AHP2

Vessel NOAA Launch 1292

Chief of party V. Dale Ross, LCDR, NOAA

Surveyed by Brian A. Link, Michael J. Briscoe, Guy Van Tassel

Soundings taken by echo sounder, hand lead, pole Echo Sounder, Pole

Graphic record scaled by MJB, LJG, GVT

Graphic record checked by BAL

Evaluation by: R.N. Mihailov Automated plot by PHS Xynetics Plotter

~~Protracted by~~

Verification by R.N. Mihailov

Soundings in meters ~~fathoms~~ feet at ~~MLW~~ MLLW

REMARKS: Time meridian used was UTC. Least depths were with lead line. The sheet letter is designated as "H". Revisions and marginal notes in black were generated during office processing.

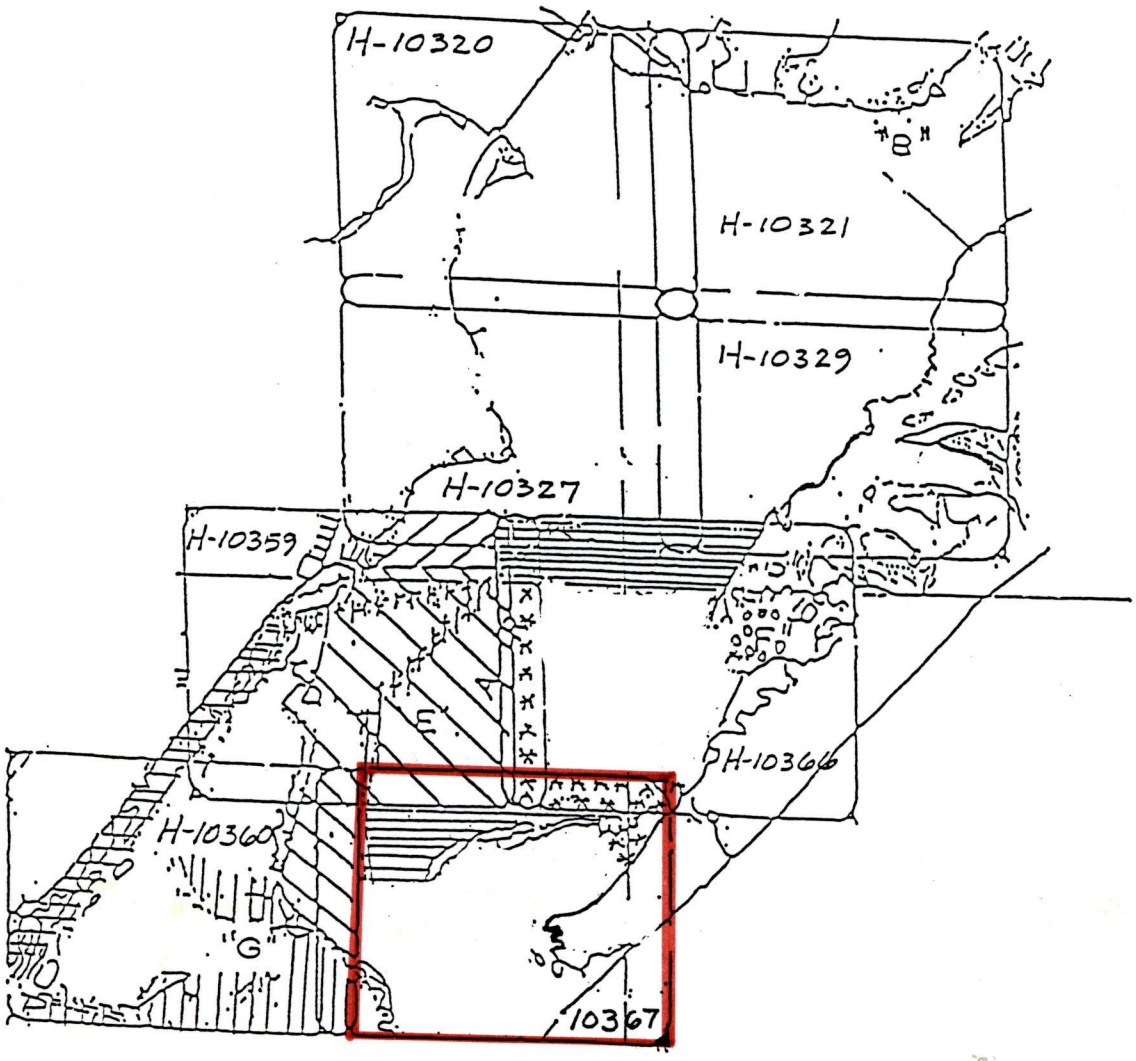
AWOIS/SURF 7/22/92 SJV

KWW

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

U.S. GOVERNMENT PRINTING OFFICE: 1986 - 652-007/41215

SHEET INDEX ORP-K229-AHP 2



DESCRIPTIVE REPORT TO ACCOMPANY
HYDROGRAPHIC SURVEY H-10367
Field No. AHP2-10-3-91
OPR-K229-AHP2
Scale: 1:10,000
Atlantic Hydrographic Party Two
Chief of Party: LCDR. V.Dale Ross, NOAA
1991

A. PROJECT ✓

This survey was conducted in accordance with Hydrographic Project Instructions OPR-K229-AHP2, Corpus Christi and Aransas Bays, Texas, dated September 14, 1990.

The purpose of project OPR-K229-AHP2 is to provide contemporary hydrography for the maintenance of existing charts and to compile a new chart for the naval base at Ingleside, Texas.

The sheet letter is "H" as specified by the project instructions.

B. AREA SURVEYED - See Evaluation report, Section 1

The area surveyed for H-10367 covers the southern end of Aransas Bay between Mud Island and San Jose Island. Survey limits are as follows:

North - Latitude 27°56'30"N (Mud Island)
South - Latitude 27°53'45"N (N. end of Lydia Ann Channel)
East - Longitude 096°59'30"W (Blind Pass at San Jose Island)
West - Longitude 097°03'30"W (vicinity of Aransas Bay Alternate Route Channel)(Intracoastal Waterway Alternate Route)

This survey was conducted from January 31, 1991 (DN 031) to March 13, 1991 (DN 072).

C. SURVEY VESSELS ✓

NOAA launch 1292 (EDP No. 1292), a 21-foot MonArk, was used to collect all data on this survey. No problems were encountered with the vessel.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

Hewlett-Packard HDAPS Programs:

Program	Version	Date
Survey	4.61	11/28/90
Constat	2.05	11/28/90
Postsur	4.14	7/20/90
Postsur	5.00	2/20/91
Printout	2.23	7/12/90
Baseline	1.01	6/15/90
Backup	1.03	11/28/90
Quick	1.04	11/28/90
Conplot	1.02	6/25/90
Diagnostic	2.50	3/9/90
Conpute	2.03	11/28/90
Point	1.20	7/27/90
Install	1.31	11/28/90
Plotall	1.77	11/28/90
Loadnew	1.22	11/28/90
Convert	2.36	11/28/90
Filesys	1.72	11/28/90
Inverse	1.21	7/27/90
Bigabst	1.01	2/20/91
Listawois	1.10	11/20/90
Reject	1.00	11/20/90
Carto	1.12	2/20/91
DP Editor	1.00	2/20/91

PC-DAS program, NOAAEXE directory, Version 3.6 was used for on-line data acquisition on the survey vessel.

In addition to the HDAPS, the following non-HDAPS computer programs were used:

VELOCITY (IBM PC)	Version 1.11 (3/9/90)
MTEN 3 with enhancements (IBM PC)	Version 6/88
NADCON	Version 1.01 (1/9/89)
Wordperfect	Version 5.1
Volkswriter Deluxe	Release 2.0

On-line data collected on days 31-45 had the wrong transducer draft value entered in the offset table for launch 1292. These data were plotted on the final field sheet using the correct offset table values from the processing HDAPS. Data on the smooth sheet was plotted using TRA values determined during office processing.

On several occasions, listed in the table which follows, problems occurred with position numbering and timekeeping by the depth sounder relative to the PC-DAS. On most occurrences, the problem was caused by speed-interval changes, and caused the fixes to be one selected interval earlier than shown on the graphic record. On three occasions, the depth sounder lost count of position numbers for no apparent reason. There was one occurrence of a speed change causing both a position and time error on the graphic record. In all cases, the scanning was re-checked for accuracy and the graphic records were made to coincide with the printouts, which are correct in all cases. The problems occurred at: ↳ concur

DN	PN	to	PN	PROBLEM
031	90		93	Speed Change affected fix numbers - fix #'s OK
042	110		114	Unknown D.S. count error
043	271		276	Speed Change affected fix numbers
045	417		425	Speed Change affected fix numbers
058	738		744	Speed Change affected time/fixes
060	747		761	Unknown D.S. count error
060	803		807	Speed Change affected fix numbers
060	815		826	Unknown D.S. count error

D.S.- Depth Sounder

E. SONAR EQUIPMENT ✓

Not applicable. side scan sonar was not used on this survey.

F. SOUNDING EQUIPMENT

An Innerspace depth sounder, model 448, serial number 188, was used for data collection for the entire survey. While running hydrography on day 031, the trace was getting progressively lighter. This problem was eventually traced to the power supply of the depth sounder. The unit was sent for repair on day 032 and received back on day 037. No further problems were encountered with the depth sounder.

Depths on this survey ranged from ~~0-6~~ 0.4 to 6 meters.

G. CORRECTIONS TO SOUNDINGS

Weather permitting, lead line comparisons were conducted each day of hydrography to determine an instrument corrector. The average corrector for depth sounder S/N 188 was zero. A lead line calibrated in feet and used until 2/28/91 was measured for accuracy on 29 October 1990. A lead line calibrated in meters was constructed and checked on 2/28/91. No lead line corrections were necessary. A lead line comparison form, as well as the lead line calibration form for the metric lead line, can be found in the "Separates to be Included With Survey Data".* The lead line calibration form for the lead line calibrated in feet was submitted with survey H-10359 from OPR-K229.

Survey records were scanned by AHP-2 employees in accordance with the hydrographic manual. With the digital reading taking precedence over the analog trace, significant peaks and deeps which occurred between selected soundings, missed depths, incorrectly digitized soundings, and effects of sea and swell action were inserted or corrected, as appropriate, while scanning.

The depth sounder was calibrated for a speed of sound through water of 1500 m/sec. Corrections for the speed of sound through water were computed from data obtained with Odom Hydrographic Systems, Inc. DIGIBAR electronic speed of sound probe serial number 155. Data quality assurance tests were performed prior to each cast. Program "Velocity" version 1.11 was used for the speed of sound corrections computations.

The following casts were taken:

Cast	Day	Depth (m)
6	010	6.0
7	035	6.0
8	043	6.0
9	058	4.0
10	072	4.0

A zero speed of sound correction was obtained for depths averaging 6.1 meters or less. There were no depths greater than 6.0 meters on this survey. No speed of sound correctors were applied on the final field sheet. Copies of the tables and support documentation are in the "Separates to be Included With Survey Data". *

A static draft of 0.3 meter was applied to the final field sheet soundings through the processing HDAPS offset table. This was measured from a punch mark on the side of launch 1292, 0.6 meters above the transducer, to the water surface, then subtracting the difference. As mentioned in section D, the value in the offset table used on-line for days 31-45 was in error. corrections determined and applied during office processing.

* Filed with the survey records.

Settlement and squat measurements for vessel 1292 were performed on October 4, 1990 (day 277). The level method was used. Settlement and squat correctors were applied to all survey data. Data from the settlement and squat test are included in the "Separates to be Included With Survey Data". *

settlement and squat correctors were determined during office processing.

The final field sheet was plotted using predicted tides determined from the Galveston, Texas permanent tide station using time and height correctors furnished with the Project Instructions.

Actual tide heights were requested from the Sea and Lake Levels Branch, N/OMA12, in a letter dated April 1, 1991. A copy of the letter is included in the appendices of this report. *

H. CONTROL STATIONS - See Evaluation Report, Section 2

The horizontal control datum for this project is the North American Datum of 1983. Stations 110, 114, 120, 124 and 126 were used to control this survey. A signal list as well as a copy of the PC-DAS Control Station Table is included in the appendices of this report.

The Coastal Surveys Unit from Norfolk, Virginia used third order, class I traverse and intersection methods to establish horizontal control for this project. The horizontal control report was written and submitted by the Coastal Surveys Unit employees for OPR-K229-AHP2.

I. HYDROGRAPHIC POSITION CONTROL ✓

Range/range positioning methods were used to control this survey. Multiple lines of position, up to four, using Motorola Falcon 484 Mini-Rangers, were used for the range/range method. The following Falcon Mini-Ranger equipment was used:

VESNO	Equipment	S/N	Code
1292	RPU	E0154	
	RT	F2919	
	R/S	G3572	1
	R/S	F3180	2
	R/S	F3290	3
	R/S	E2977	4
	R/S	C2059	6

* Filed with survey records.

Baseline calibrations of the Motorola Falcon 484 equipment were performed on October 3, 1990. The correctors were applied on-line through the Comflex "C-O" tables. Baseline calibration forms and the "C-O" tables are included in the "Separates to be Included With Survey Data".*

When using three or four lines of position, a critical system check is continuously being obtained by observing the error circle radius (ecr) and residual (res) values on the Comflex screen on the survey vessels. When the error circle radius (ecr) is greater than 15m (1.5m at the survey scale) or the residuals are greater than 5m (.5m at the survey scale) for more than three to five minutes, survey operations are suspended in the area until the problem can be resolved. Any positions which had high error circle radii or residuals, in an otherwise good line, were smoothed during processing. See Evaluation Report Section 2

A closing baseline calibration was not performed since the survey was conducted in less than a six month period.

J. SHORELINE ✓

Shoreline shown on the final field sheet was transferred by hand from TP-01198 and 01197. These shoreline manuscripts were compiled on NAD 1927. NAD 1983 corrections were made to the grid ticks on these manuscripts for transferring the shoreline to the NAD 1983 grid on the final field sheet, using PC program NADCON, to obtain conversion values.

The shoreline manuscripts were compiled at 1:20,000 scale. They were enlarged to 1:10,000 scale for use with this survey.

Shoreline verification was accomplished by comparison of the main scheme hydrography which junctions at shore, or by visual inspections. Verified shoreline is shown in black ink on the final field sheet. There were no shoreline changes identified by this survey.

No ~~shoreline detail~~ cultural features are shown on the T-maps, however ~~one~~ two ~~shoreline detail~~ changes ~~was~~ were identified by this survey. ~~This is~~ These are shown in red ink on the final field sheet. ~~This~~ These changes ~~is~~ are described as follows:

A wharf in ruins was located by detached position at latitude 27° 56′ 08.2"N, longitude 097° 00′ 00.7"W (south end) and latitude 27° 56′ 10.1"N, longitude 096° 59′ 59.7"W (north end). A finger pier extends from the wharf ruins at latitude 27° 56′ 09.8"N, longitude 097° 00′ 00.36"W. This pier extends into shore on a 90°T bearing. Wharf ruins shown as ruins in black on the smooth sheet.
pier (18) shown in red on smooth sheet.

* Filed with the hydrographic records.

Field notes regarding this shoreline detail were recorded directly on the graphic records.

Four obstructions shown on TP-01198 were located by detached positions as gas platforms at:

PN 1420> latitude 27° 55′ 22.0" N, longitude 097° 01′ 37.7" W
PN 1437> latitude 27° 56′ 01.5" N, longitude 097° 00′ 39.0" W
PN 1438> latitude 27° 55′ 48.6" N, longitude 097° 00′ 39.0" W
PN 1439> latitude 27° 55′ 48.3" N, longitude 097° 00′ 24.1" W
Shown as oil platform (lighted) on smooth sheet

These four gas platforms are recommended for charting.
Platforms to be charted as a note per N/CG 221

Two obstructions shown on TP-01198 at latitude 27° 55′ 26"N, longitude 097° 02′ 13.2"W and latitude 27° 55′ 57"N, longitude 097° 01′ 33.0"W were visually searched for in depths to 1.5 meters with good bottom visibility, and nothing was found. These are not recommended for charting. CONCUR

Another obstruction shown on TP-01198 at latitude 27° 55′ 34.8"N, longitude 097° 03′ 14.4"W was investigated as part of survey H-10360 from OPR-K229. This obstruction was also not found nor is it recommended for charting. - concur, see survey H-10360 report, AWOIS 5065 investigation form.

K. CROSSLINES ✓

A total of 12.6 linear nautical miles of crosslines were run on H-10367 which equals 12.2% of the main scheme hydrography. Crosslines agree with the main scheme to within 0.3 meter throughout the entire survey.

L. JUNCTIONS ✓

This survey junctions with H-10360 to the west, with H-10322 to the south, and with H-10359 and H-10366 to the north. These are all 1:10,000 scale contemporary surveys assigned to project OPR-K229.

with survey H-10360

The agreement to the west ✓ is excellent, within 0.2 meter. The agreement to the south with H-10322 is within 0.3 meter. The agreement to the north is also good, ranging from 0.2-0.3 meters. No problems were seen drawing a continuous depth curve in any of these junction areas.

Northwest H-10359
Northeast H-10366

M. COMPARISON WITH PRIOR SURVEYS - See Evaluation Report, Section 6

This survey was compared with survey H-5693, a 1:20,000 scale hydrographic survey from 1935.

None of the five AWOIS items addressed as part of this survey originated from the prior surveys.

Sounding agreement between prior survey H-5693 and survey H-10367 is excellent, within 0.2 meter throughout the common areas. The only significant difference seen between the two surveys is in the area bounded by latitude 27° 55′ 30"N on the south, latitude 27° 56′ 00"N on the north, longitude 97° 01′ 00"N on the west, and longitude 97° 00′ 15"N on the east. This area contains numerous shoals, shown on chart 11314 as spoil areas, which are not seen on the prior survey. These shoals have depths 2-3 feet shoaler than depths shown on the prior survey. Bottom characteristics on both the prior survey and H-10367 show soft gray mud as the predominant material.

N. COMPARISON WITH THE CHART - See Evaluation Report, Section 7

This survey was compared to the 16th edition of chart 11314, dated January 20, 1990. An enlargement of the 15th edition was used for direct comparison with the final field sheet. No significant changes within the survey area exist between the two editions.

Five items from sources other than prior surveys, were addressed on this survey. These are discussed on item investigation report forms in the "Separates to be Included With ~~Survey Data~~" this report. AWOIS ITEMS 5060, 5068, 5069, 5073 and 5076

No dangers to navigation were identified on this survey.

General sounding comparison results between the charted soundings and those found by survey H-10367, are the same as those discussed in section M of this report.

The most prominent discrepancy seen between survey H-10367 and chart 11314 is in the Lydia Ann Island-Murray Shoal area. As shown correctly on TP-01198, Lydia Ann Island no longer exists, having shoaled in on the east side to join it as part of San Jose Island.

Murray Shoal, charted at latitude 27° 54′ 06"N, longitude 97° 02′ 57"W was developed with reduced line spacing at no greater than 50-meter line spacing. The chart shows this area uncovering, while survey H-10367 found a least depth of 1.6 meters at latitude 27° 54′ 03"N, longitude 97° 02′ 58"W. Murray Shoal has virtually disappeared, leaving several isolated 2-meter depth curves in this area.

Least depth of 1.8 (Meters, with smooth tides applied) shown on smooth sheet at lat. 27/54/03.19 N long. 97/02/57.99 W

A submerged pipe charted at latitude 27° 55′ 22"N, longitude 97° 01′ 08"W, not assigned as an item, was searched for by bottom drag at no greater than 10 meter line spacing. Nothing was found. The submerged pipe is recommended for deletion from chart 11314. - concur
200 meter search conducted

A submerged pipe charted at latitude 27° 55′ 07"N, longitude 97° 01′ 32"W, not assigned as an item, was searched for by bottom drag at no greater than 10 meter line spacing. Nothing was found. The submerged pipe is recommended for deletion from chart 11314. - concur
200 meter search conducted

A submerged pipe charted at latitude 27° 55′ 16"N, longitude 97° 02′ 23"W, not assigned as an item, was searched for by bottom drag at no greater than 10 meter line spacing. Nothing was found. The submerged pipe is recommended for deletion from chart 11314. - concur
200 meter search conducted

All other charted features were assigned and addressed as AWOIS items. See AWOIS item investigation forms included with this report.

Four oil or gas well platforms, averaging approximately 10 meters wide by 30 meters long were located and recommended for charting in section J. of this report. Positions for these platforms are also listed in section J. These platforms were not reported as dangers to navigation because of the charted magenta note which warns of obstructions, wells and pipelines on chart 11314.

The channel limits shown on chart 11314 through Blind Pass, running along the west shore of San Jose Island, thence bending due west at latitude 27° 55′ 54"N, longitude 97° 00′ 12"W are recommended for deletion from chart 11314. This charted channel area was thoroughly developed with main scheme and development hydrography. A natural channel is evident in the area running along the west shore of San Jose Island, however, with no channel markers, it is extremely difficult to navigate. No evidence of a channel exists in the charted east-west section, which is also unmarked and traverses the spoil areas mentioned in section M. This area should be charted with representative soundings from survey H-10367 in the charted channel limit as well as in the spoil areas. Per telephone conversation with Domingo Galindo, Corpus Christi Area Engineer for the U.S. Army Corps of Engineers, Galveston district (512-884-3385), these spoil areas are no longer considered active. Refer to AWOIS items 5073 and 5076 item investigation reports attached to this report. Concur, see Evaluation Report Section 7c

Channel limits are recommended for charting to connect the north end of the Lydia Ann channel with the Aransas Bay Alternate Route channel. *Chart depiction in this area shows the latter apparently ending at latitude 27° 55′ 30"N, longitude 97° 03′ 27"W, which is not the case. The limits should be charted to show a continuous channel from latitude 27° 55′ 30"N, longitude 97° 03′ 27"W, southward to latitude 27° 53′ 30"N, longitude 97° 03′ 00"W. No recommendation, left to the discretion of that chart compiler.

*Intracoastal Waterway Alternate Route.

A ~~position approximate (PA)~~ tank symbol charted at latitude 27° 56′ 10"N, longitude 96° 59′ 55"W as (SE of 2) should be charted as two tanks as shown on TP-01197. — concur, delete the tank symbol charted.

O. ADEQUACY OF SURVEY ✓

This survey is a complete basic hydrographic survey and is adequate to supersede all prior surveys within the common area. — concur

P. AIDS TO NAVIGATION See Evaluation Report Section 7d

All fixed and floating aids to navigation were located by detached position. All of the fixed aids in the survey area are single pile structures, subject to frequent destruction by barge traffic. For this reason, no third order positions were obtained on the fixed aids to navigation, with the exception of Aransas Bay Aternate Route Light 83. A third order position was obtained on this light because of it's possible use as a control station. A detached position was also taken on this light as a check. The positions agree by 0.33" of latitude and .09" of longitude. There is no NOAA form 76-40 included as part of this survey. Light 83 was used as a control station and is included in the control file

A comparison was made between the surveyed position and the charted position for all fixed and floating aids to navigation. All aids were found serving the purpose for which they were established. Concur ✓

The following table lists the discrepancies found with the distance and direction from the charted location shown:

NAVAID	DISTANCE/DIRECTION	LL NUMBER	G.P.
CC-AB Cut Off Channel Light "79"	100 ~~75m~~ / NNW	36220	27/54/42.05 97/03/09.49
CC-AB Cut Off Channel Buoy "80"	50m / N	36225	27/54/26.24 97/03/10.02
CC-AB Cut Off Channel Buoy "81"	On Station	36230	27/54/17.19 97/03/04.20
CC-AB Cut Off Channel Buoy "81A"	On Station	36235	27/54/07.39 97/03/02.24
CC-AB Cut Off Channel Light "83"	100 ~~85m~~ / NNW	36240	27/54/00.84 97/02/58.38
CC-AB Cut Off Buoy "84"	On Station	36250	27/53/49.13 97/03/02.17
CC-AB Cut Off Buoy "83A"	On Station	36245	27/53/50.42 97/02/58.52

Position numbers and descriptions for all aids to navigation are entered on the graphic records for this survey. Geographic positions are entered on the detached position listing in the cahier for H-10367. Positions added to table on previous page.

Numerous pipelines exist in the survey area, however only three were evident. These are marked by pipeline crossing signs along the natural channel which runs along the west shore of San Jose Island. Other pipelines lead away from the gas platforms listed in section J. No recommendation is made to chart the pipelines. Per a telephone conversation with Mr. James Dailey in the Mapping and Charting Branch (N/CG2222) the current NOAA policy regarding charting of the pipelines in this survey area is to let the magenta note warning of obstructions, wells, and pipelines suffice.

There are no bridges, overhead cables, overhead pipelines, submarine cables, nor ferry routes within the limits of this survey.

Q. STATISTICS ✓

Description	
Total Positions	~~1451~~ 1407
Detached Positions	32
Duplicate Positions	5
Omitted Positions	4
Total Miles of Hydrography	121.5
Sq. Nautical Miles of Hydrography	4
Bottom Samples	16
Total Miles of Bottom Drag	16.1
Velocity Casts	5
Tide Stations	1
Days of Production	11

R. MISCELLANEOUS ✓

No anomalous currents were observed in the survey area.

Bottom samples were taken and submitted to the Smithsonian Institution as directed in Section 6.7 of the project instructions. Bottom sample positions were plotted on the overlay with the other detached positions. The bottom samples were listed on the Oceanographic Log Sheet - M, NOAA form 75-44, and may be found in the Separates Following Text.*

Geographic positions for all detached positions are shown on the detached position listing from the HDAPS DP editor program. This listing is included in the cahier for H-10367.

* Filed with survey records.

S. RECOMMENDATIONS ✓

Not applicable.

T. REFERRAL TO REPORTS ✓

Title	Transmittal Information
Descriptive Report for H-10359	Pacific Hydrographic Section (N/CG245) Seattle, Washington
Descriptive Report for H-10360	Pacific Hydrographic Section (N/CG245) Seattle, Washington
Descriptive Report for H-10366	Pacific Hydrographic Section (N/CG245) Seattle, Washington
Descriptive Report for H-10322	Pacific Hydrographic Section (N/CG245) Seattle, Washington
Horizontal Control Report for OPR-K229-AHP2	Field Photogrammetry Section Norfolk, VA (N/CG233)
Chart Sales Agent Report for OPR-K229-AHP2	Chart Distribution Branch (N/CG33) Rockville, MD.
User Evaluation Report OPR-K229-AHP2	Atlantic Hydrographic Section (N/CG244) Norfolk, Va.
Chart Inspection Report OPR-K229-AHP2	Atlantic Hydrographic Section (N/CG244) Norfolk,Va.
Coast Pilot Report	Coast Pilot Section Mapping and Charting Branch (N/CG22) Rockville, MD

Submitted by: Brian A. Link, Launch Hydrographer in Charge

CHART #11314

PRE-SURVEY REVIEW ITEM 5060
Obstr (1½ ft rep)

SOURCE: NM13/64(2/64)--COE

INVEST. DATE: 3/12/91 (DN 071) TIME: 1857-1924Z VESSEL #1292

CHIEF OF PARTY: LCDR. V. DALE ROSS

REFERENCE: OPR-K229 (H-10367) POSITION: 1204-1227

CORRECTORS APPLIED: None

VELOCITY: TRA CORRECTORS:

PREDICTED TIDES:

GEODETIC POSITION:	LATITUDE (N)	LONGITUDE (W)
CHARTED:	27° 55' 07.1"	097° 01' 51.0"
OBSERVED:	-Nothing Found-	

POSITION DETERMINED BY: Mutiple LOP, Falcon Mini Rangers

METHOD OF ITEM INVESTIGATION: A bottom drag of the required 50-meter radius area was done at no greater than 10-meter line spacing. No snags were found in the area, which had an average depth of 1.5 meters. Thirty feet of scope on the drag lines was used.

CHARTING RECOMMENDATIONS: Delete obstruction with 1½ ft rep notation from chart 11314. — concur, chart soundings according to survey.

COMPILATION USE

CHART: APPLIED AS:

CHART #11314

PRE-SURVEY REVIEW ITEM 5068
Marker

SOURCE: CL1695/73 -- USPS

INVEST. DATE: 3/7/91 (DN 066) TIME: 1758-1914Z VESSEL #1292

CHIEF OF PARTY: LCDR. V. DALE ROSS

REFERENCE: OPR-K229 (H-10367) POSITION: 1032-1073

CORRECTORS APPLIED: None

VELOCITY: TRA CORRECTORS:

PREDICTED TIDES:

GEODETIC POSITION:	LATITUDE (N)	LONGITUDE (W)
CHARTED:	27° 56' 00.6"	097° 00' 55.0"
OBSERVED:	- Nothing Found -	

POSITION DETERMINED BY: Mutiple LOP, Falcon Mini Rangers

METHOD OF ITEM INVESTIGATION: A bottom drag of the required 100-meter radius area was done at no greater than 10-meter line spacing. No snags were found in the area, which had an average depth of 1.5 meters. Thirty feet of scope on the drag lines was used.

CHARTING RECOMMENDATIONS: Delete Marker from chart 11314. - concur chart area according to the survey.

COMPILATION USE

CHART: APPLIED AS:

CHART #11314

PRE-SURVEY REVIEW ITEM 5069
SUBM WRECK ED

SOURCE: CL1815/72--USPS

INVEST. DATE: 3/7/91 (DN 066) TIME: 1918-2044Z VESSEL #1292

CHIEF OF PARTY: LCDR. V. DALE ROSS

REFERENCE: OPR-K229 (H-10367) POSITION: 1074-1115

CORRECTORS APPLIED: None

VELOCITY: TRA CORRECTORS:

PREDICTED TIDES:

GEODETIC POSITION:	LATITUDE (N)	LONGITUDE (W)
CHARTED:	27°56'01.1"	97°00'02.0"
OBSERVED:	- Nothing Found -	

NM 34/L3 - 27°56'N, 97°01'W (7/22/92, SJV)

POSITION DETERMINED BY: Mutiple LOP, Falcon Mini Rangers

METHOD OF ITEM INVESTIGATION: A bottom drag of the required 100-meter radius area was done at no greater than 10-meter line spacing. No snags were found in the area, which had an average depth of 1.5 meters. Thirty feet of scope on the drag lines was used. 200 meter wire drag search accomplished.

CHARTING RECOMMENDATIONS: Delete the Wreck Existence Doubtful from chart 11314. - concur, chart representative soundings found within the survey area.

COMPILATION USE

CHART: APPLIED AS:

CHART #11314

PRE-SURVEY REVIEW ITEM 5073
SHOALING rep 1972

SOURCE: CL1815/72--USPS

INVEST. DATE: 3/1/91 (DN 060) TIME: 1912-1929Z VESSEL #1292

CHIEF OF PARTY: LCDR. V. DALE ROSS

REFERENCE: OPR-K229 (H-10367) POSITION: 851-860
887-893

CORRECTORS APPLIED:

VELOCITY: YES TRA CORRECTORS: YES

PREDICTED TIDES: YES

GEODETIC POSITION:	LATITUDE (N)	LONGITUDE (W)
CHARTED:	27°56'14.1"	96°59'58.0"
OBSERVED:	27° 55' 57"	97° 00' 11"

POSITION DETERMINED BY: Mutiple LOP, Falcon Mini Rangers

METHOD OF ITEM INVESTIGATION: Lines of mainscheme hydrography were run across the axis of the very narrow and unmarked channel through Blind Pass. A centerline along the axis of the channel was also run. The area between latitude 27° 55' 54"N, longitude 97° 00' 12"W and latitude 27° 56' 03"N, longitude 97° 00' 06"W was found to be shoaling with depths to 0.9 meter. This area is just north of the point where the channel turns from south to due west, south of Mud Island. Item 5076 is related and should be reviewed along with this item.

CHARTING RECOMMENDATIONS: Chart representative soundings from survey H-10367 in this item area. Delete the "Shoaling rep 1972" notation. — concur, see ANOIS item 5076 for further discussion.

COMPILATION USE

CHART: APPLIED AS:

CHART #11314

PRE-SURVEY REVIEW ITEM 5076
SOUNDING

SOURCE: CL1297/82--USPS

INVEST. DATE: 3/1/91 (DN 060) TIME: 1912-2028Z VESSEL #1292

CHIEF OF PARTY: LCDR. V. DALE ROSS

REFERENCE: OPR-K229 (H-10367) POSITION: 851-893

CORRECTORS APPLIED:

VELOCITY: YES TRA CORRECTORS: YES

PREDICTED TIDES: YES

GEODETIC POSITION:	LATITUDE (N)	LONGITUDE (W)
CHARTED:	27°56'43.1"	96°59'41.0"
OBSERVED:	- See method of investigation -	

POSITION DETERMINED BY: Mutiple LOP, Falcon Mini Rangers

METHOD OF ITEM INVESTIGATION: Lines of mainscheme hydrography were run across the axis of the very narrow and unmarked channel through Blind Pass. A centerline along the axis of the channel was also run. A least depth of 0.9 meter was found in the Blind Pass channel marked by the limits shown on chart 11314, as discussed in the report for item 5073. No evidence of the east/west portion of the channel marked on chart 11314 could be found by development of this section.

CHARTING RECOMMENDATIONS: Since the channel is so obscure and difficult to navigate, a recommendation is made to delete the marked channel limits from chart 11314, and show representative soundings from survey H-10367 in the affected areas. - concur, chart soundings found on the smooth sheet within the common area. However, until the channel can be removed from the chart, delete the "3 ft rep 1982" note and chart a note "2 ft 1991" in the vicinity of lat 27/56/10 N.

COMPILATION USE

CHART: APPLIED AS:

NAVISOFT 1000	PRE-SURVEY: CONTROL STATION TABLE					04-01-1991
Station No	T	C	Number Carto ?	Latitude	Longitude	H	Freq	Vel	Date
110	F	1	250	27:59:23.706	96:58:52.815	0	0.0	0	10/10/90
114	F	3	250	28: 1:27.412	97: 1:14.362	0	0.0	0	10/10/90
120	F	4	250	27:53:27.057	97: 6:40.209	0	0.0	0	10/10/90
124	F	6	250	27:57: 7.493	97: 4:21.062	0	0.0	0	10/10/90
126	F	2	250	27:51:50.992	97: 3:22.978	0	0.0	0	10/10/90

110 - Allyn 1989
114 - Nine Mile Point Light 2 1990
120 - Draw 1989
124 - Traylor 1989
126 - Aransas Pass Lighthouse 1989

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE

APPROVAL SHEET
BASIC HYDROGRAPHIC SURVEY
OPR-K229
AHP2-10-3-91
H-10367

This basic hydrographic survey was conducted in accordance with the project instructions for OPR-K229-AHP2, the hydrographic manual, the hydrographic survey guidelines, and the field procedures manual. The survey data and reports were completed and reviewed in their entirety and all supporting records were also checked.

This survey is a complete basic hydrographic survey for the area described in Section B of this report.

V. Dale Ross
LCDR NOAA
Chief, Atlantic Hydrographic Party Two

ORIGINAL

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: Jun 11, 1991

MARINE CENTER: Pacific

OPR: K229

HYDROGRAPHIC SHEET: H-10367

LOCALITY: Aransas Bay, vicinity of Mud Island, TX

TIME PERIOD: January 31 - March 13, 1991

TIDE STATION USED:
877-4770 Rockport $28^{\circ}01.4'N$ $97^{\circ}02.8'W$

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 5.81 feet

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.4 feet

REMARKS: RECOMMENDED ZONING

1. North of $27^{\circ}55.5'N$, apply a x1.14 range ratio to all heights and a -60 min time correction.

2. South of $27^{\circ}55.5'N$, apply a x1.14 range ratio to all heights and -90 min time correction.

Note: Times are tabulated in Local Standard Time.

CHIEF, TIDAL DATUM QUALITY
ASSURANCE SECTION

NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10367

Name on Survey	A ON CHART NO. 11314	B ON PREVIOUS SURVEY NO. T-9180, H-5693	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	
ARANSAS BAY	X									1
BLIND PASS	X	9180 5693								2
MUD ISLAND	X	9180 5693								3
MUD ISLAND POINT	X									4
MURRAY SHOAL	X	5693								5
QUARANTINE SHORE	X									6
SAN JOSE ISLAND	X	*								7
TEXAS (TITLE)										8
* as St. Joseph Island on T-9180 and H-5693										9
										10
										11
										12
										13
										14
										15
										16
										17
				Approved:						18
				Charles E. Harrington						19
				Chief Geographer — NCG 2x						20
										21
				JUN 17 1991						22
										23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 77-27(H)
(9-83)

U.S. DEPARTMENT OF COMMERCE

HYDROGRAPHIC SURVEY STATISTICS

REGISTRY NUMBER
H-10367

RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed.

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	SMOOTH OVERLAYS: POS., ARC, EXCESS	6
DESCRIPTIVE REPORT	1	FIELD SHEETS AND OTHER OVERLAYS	2

DESCRIPTION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS	
ACCORDION FILES	1					
ENVELOPES						
VOLUMES						
CAHIERS						
BOXES						

SHORELINE DATA

SHORELINE MAPS (List):

PHOTOBATHYMETRIC MAPS (List):

NOTES TO THE HYDROGRAPHER (List):

SPECIAL REPORTS (List):

NAUTICAL CHARTS (List):

OFFICE PROCESSING ACTIVITIES

The following statistics will be submitted with the cartographer's report on the survey

PROCESSING ACTIVITY	AMOUNTS VERIFICATION	AMOUNTS EVALUATION	AMOUNTS TOTALS
POSITIONS ON SHEET			1407
POSITIONS REVISED			
SOUNDINGS REVISED			
CONTROL STATIONS REVISED			
	TIME-HOURS VERIFICATION	TIME-HOURS EVALUATION	TIME-HOURS TOTALS
PRE-PROCESSING EXAMINATION			
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS	30		30
VERIFICATION OF SOUNDINGS	61		61
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	28		28
COMPARISON WITH PRIOR SURVEYS AND CHARTS		5	5
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		36	36
GEOGRAPHIC NAMES			
OTHER*			
*USE OTHER SIDE OF FORM FOR REMARKS — TOTALS	119	41	160

Pre-processing Examination by M. Brown	*Beginning Date* 5/6/91	*Ending Date* 1/15/91
Verification of Field Data by R. Mihailov	*Time (Hours)* 119	*Ending Date* 1/30/92
Verification Check by J. Green	*Time (Hours)* 12.0	*Ending Date* 6/04/92
Evaluation and Analysis by R. Mihailov	*Time (Hours)* 41.0	*Ending Date* 6/8/92
Inspection by D. Hill	*Time (Hours)* 2.0	*Ending Date* 6/23/92

EVALUATION REPORT
H-10367

1. INTRODUCTION

Survey H-10367 is a basic hydrographic survey accomplished by the Atlantic Hydrographic Party 2 under the following Project Instructions.

OPR-K229-AHP2, dated September 14, 1990
CHANGE NO. 1, dated February 12, 1991

This survey occurred in Texas and covers the southern portion of Aransas Bay. The survey limits extend from the north end of Lydia Ann Channel to Mud Island, and from Blind Pass to the vicinity of Intracoastal Waterway Alternate Route Channel. The bottom consists of mud and sand. Depths range from 0 meters to 6.0 meters.

Predicted tides for Galveston Channel, Texas, were used for the reduction of soundings during field processing. Approved hourly heights from the Rockport gage (877-4770), utilizing two zones, were used during office processing.

The field sheet parameters have been revised to center the hydrography on the smooth sheet and to change the projection to polyconic. The TRA, sound velocity and electronic control correctors are adequate. An accompanying computer printout contains the parameters and the correctors.

A digital file has been generated for this survey as required by the specifications contained in Hydrographic Survey Guideline No. 52, Standard Digital Data Exchange Format, April 15, 1986. Certain descriptive information, however, may not be in the digital record due to the restrictions of the presently available cartographic codes. The user should refer to the smooth sheet for complete depiction of survey data.

2. CONTROL AND SHORELINE

Sections H and I in the hydrographer's report, contain adequate discussions of horizontal control and hydrographic positioning. More detailed information on horizontal control is found in the following:

Geodetic Control Report for CM-8716 and
Geodetic Control Survey Job-HC-9901.

Positions of horizontal control stations used during hydrography are 1989 and 1990 field and published values based on NAD 83. These values were used during office processing. The smooth sheet and accompanying overlays are annotated with NAD 27 adjustment ticks based on values determined with the NGS program NADCON. Geographic positions based on NAD 27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections.

Latitude: 1.075 seconds (33.1 meters)
Longitude: 0.982 seconds (26.8 meters)

The year of establishment of control stations shown on the smooth sheet originates with the horizontal control data for this project and published NGS data.

The quality of several positions exceeds limits in terms of error circle radius and residual or have angles of intersection less than 30 degrees or more than 150 degrees. A review of the data, however, indicates that none of these fixes are used to position dangers to navigation. The soundings associated with these fixes are consistent with surrounding data and are considered acceptable.

The following shoreline maps apply to this survey.

Map Number	Photo date	Class
TP-01197	November 1984	III
TP-01198	November 1983	III

Shoreline drawn on the smooth sheet originates from 1:10,000 scale photographic enlargements of the above shoreline manuscripts, which were compiled on NAD 27. A grid adjustment to NAD 83 was performed during office processing using datum values as provided by the NGS program NADCON.

The following shoreline change was determined with supporting positional information. The revision is adequate to supersede the common photogrammetrically delineated shoreline.

Feature	Latitude(N)	Longitude(W)
pier	27/56/10	97/00/01

3. HYDROGRAPHY

Except for the delineation of the zero curve, hydrography is adequate to:

a. delineate the bottom configuration, determine least depths, and draw the standard depth curves;

b. reveal there are no significant discrepancies or anomalies requiring further investigation; and

c. show the survey was properly controlled and soundings are correctly plotted.

4. CONDITION OF SURVEY

The hydrographic records and reports received for processing are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change No. 3; the Hydrographic Survey Guidelines; and the Field Procedures Manual, April 1990 Edition.

5. JUNCTIONS

Survey H-10367 junctions with the following surveys.

Survey	Year	Scale	Area
H-10322	1989-90	10,000	South
H-10359	1990-91	10,000	Northwest
H-10360	1991	10,000	West
H-10366	1991	10,000	Northeast

The junctions with surveys H-10359, H-10360 and H-10366 are complete and the soundings are in good agreement.

The junction with survey H-10322 has not been formally completed since the survey was previously processed and forwarded for charting. The junction comparison was made using a copy. Survey H-10322 is plotted in feet and survey H-10367 is plotted in meters. Soundings are in good agreement, however, the depth curves shown on this survey delineate different depths and therefore, do not agree.

6. COMPARISON WITH PRIOR SURVEYS

H-5613 (1934)1:20,000
H-5693 (1935)1:20,000

Survey H-5613 covers the southwest portion of survey H-10367. Extensive dredging has occurred in the last 58 years since the prior survey was accomplished. A comparison with the prior survey reveals that present depths are generally deeper by 0.5 meters throughout the common area. In addition, the mean highwater line has generally shifted in a easterly direction approximately 300 meters, south of latitude 27/54/20.

Survey H-5693 covers the entire area of the present survey except for a small portion to the southwest. Some cultural development alongshore has occurred since the prior survey was accomplished. A comparison with prior survey H-5693 reveals that present depths are generally deeper by 0.5 meter throughout the common area. Shoreline changes can be largely attributed to frequent storms and constant strong winds that move across the low barren sand beaches. Some discrepancies between the two surveys were noted, however, and are discussed in section M of the hydrographer's report.

Survey H-10367 is adequate to supersede surveys H-5693 and H-5613 within the common area.

T-9179 (1948) 1:20,000

Shoreline map T-9179 covers the entire area of the present survey. Changes to the shoreline have been due to both natural and man made activities. Murray Shoal, at approximate latitude 27/54/06N, longitude 97/02/57W, has decreased in size and no longer uncovers within the limits of this survey.

Survey H-10367 is adequate to supersede prior shoreline map T-9179 as a source for charted hydrography for the area of common coverage.

There are no AWOIS items originating from prior surveys H-5613, H-5693 and shoreline map T-9179 that apply to the present survey.

7. COMPARISON WITH CHART

Chart	Edition	Date	Scale	Datum
11314	16th	January 20,1990	1:40,000	NAD 83

a. Hydrography

Charted hydrography originates with the prior surveys and prior shoreline map discussed in section 6 of this report and miscellaneous sources and requires no further discussion.

Survey H-10367 is adequate to supersede charted hydrography within the common area.

b. AWOIS

There are 5 AWOIS items originating from miscellaneous sources within the area of this survey. These items are addressed in the item investigation forms attached to this report.

c. Controlling Depths

A portion of the Intracoastal Waterway Alternate Route which is Federally maintained is within the area limits of this survey. The depths found during this survey are consistent with or deeper than the charted controlling depths.

Additionally, a privately maintained channel exists on chart 11314 leading through Blind Pass. Soundings in the area of the charted channel have shoaled significantly. It is recommended that the channel be removed from chart 11314. Refer to section N and the item investigation forms for AWOIS items 5073 and 5076 in the hydrographer's report for additional discussion.

d. Aids to Navigation

There are five floating and three non-floating aids to navigation located within the area of this survey. Aransas Bay Alternate Route Lights 79 and 83 are located 100 meters to the north of the charted positions. These aids were located and serve their intented purpose.

The following additional fixed and floating aids to navigation fall within the survey area but were not positioned on survey H-10367. These aids were transferred from junction survey H-10360.

Light List Name	Latitude(N)	Longitude(W)
Aransas Bay Alternate Route Buoy 73	27/55/34.09	97/03/26.16
Aransas Bay Alternate Route Light 75	27/55/20.53	97/03/20.67
Aransas Bay Alternate Route Buoy 76	27/55/03.73	97/03/21.23
Aransas Bay Alternate Route Buoy 77	27/54/52.82	97/03/14.80

There is one charted landmark (tanks) at latitude 27/56/10N, longitude 96/59/58W that was transferred from shoreline map TP-01197. There are no other landmarks or features of landmark value within the limits of this survey.

e. Geographic Names

Names appearing on the smooth sheet and in the survey title have been approved by the Chief Geographer.

f. Dangers to Navigation

No reports of dangers to navigation were generated during the survey or office processing.

8. COMPLIANCE WITH INSTRUCTIONS

Survey H-10367 adequately complies with the Project Instructions.

9. ADDITIONAL FIELD WORK

This is an good hydrographic survey. No additional field work is recommended.

R.N. Mihailov

Robert N Mihailov
Cartographer

APPROVAL SHEET
H-10367

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, comparison with prior surveys and verification or disproval of charted data. The digital data have been completed and all revisions and processing have been entered in the magnetic tape record for this survey. Final control, position, and sounding printouts have been made and are included with the survey records. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

for [signature] Date: 6/23/92
Dennis J. Hill
Chief, Hydrographic Processing Unit
Pacific Hydrographic Section

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.

Douglas G. Hennick Date: 6/24/92
Commander Douglas G. Hennick, NOAA
Chief, Pacific Hydrographic Section

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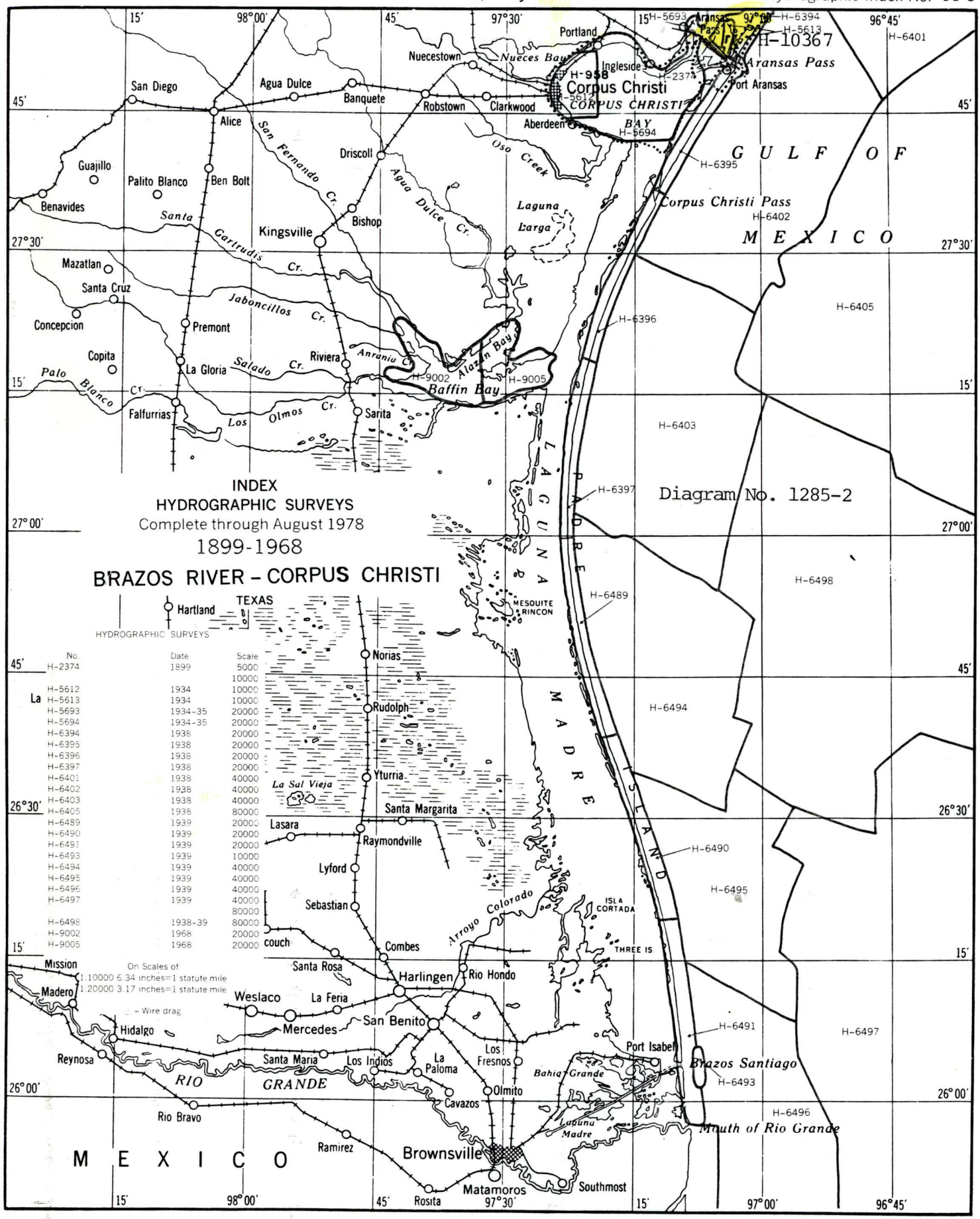
Final Approval

Approved:

for [signature] Date: 12-12-94
J. Austin Yeager
Rear Admiral, NOAA
Director, Coast and Geodetic Survey

DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Survey
Rockville, Maryland

Hydrographic Index No. 91 C



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. H-10367

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
11314	5/24/91	LE Kay/Russ Davis	~~Full~~ Part Before ~~After~~ Marine Center Approval Signed Via Partial application
			Drawing No. of sndgs from field sheet
11300	6-11-91	Janssen	~~Full~~ Part Before ~~After~~ Marine Center Approval Signed Via Examined. No sndgs.
			Drawing No. or Corrns. applied.
11309	7/28/92	L. McKenzie	~~Full~~ Part Before ~~After~~ Marine Center Approval Signed Via
			Drawing No. 51 APPD Thru H-DW6 (not signed)
11309	9/20/93	L. Ashman	Full ~~Part~~ Before ~~After~~ Marine Center Approval Signed Via
			Drawing No. 52, APPD in Full, No further Application.
11314	12-1-93	RB Rose	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 18 appd in full with ch 11309
11312	11-18-96	Travis Neuman	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 2
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.