10313

Diagram No. LS-61

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. AHP-10-11-89

Registery No. H-10313

LOCALITY

State Michigan

General Locality St. Marys River

Sublocality De Tour Passage to Sweets Point

1989

CHIEF OF PARTY
LT V.D. Ross

LIBRARY & ARCHIVES

DATE November 13, 1991

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

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CHTS
14882
14880
14860

NOAA FORM 77-28 (11-72)

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

HYDROGRAPHIC TITLE SHEET

REGISTER NO.: H-10313

FIELD NO.: AHP-10-11-89

INSTRUCTIONS - The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State: Michigan

General locality: Saint Marys River

Locality: De Tour Passage to Sweets Point

Scale: 1:10,000 Date of survey: June 21 - Sept. 27, 1989

Instructions dated: April 7, 1989 Project No.: OPR-X278

Vessel: Launches 0518 and 0519

Chief of party: LT V. Dale Ross

Surveyed by: C. Eugene Parker, Michael J. Briscoe, David B. Elliott, Jan L. Budlong.

Soundings taken by echo sounder, hand lead, pole: Raytheon DE719cw/ODOM digitrace

Graphic record scaled by: C. E. Parker, M. J. Briscoe, D. B. Elliott, J. L. Budlong.

Graphic record checked by: C. E. Parker, D. B. Elliott, J. S. Verlaque

Protracted by: HDAPS Automated plot by: ~~AMC~~ XYNETICS 1201 Plotter (AMC)

Verification by: Atlantic Hydrographic Section (AMC)

Soundings in ~~fathoms~~ feet at ~~MKW~~ ~~MKW~~ Low Water Datum

REMARKS: All times are in Coordinated Universal Time.

This survey was designated as "sheet P".

Least depths were measured with sounding poles and leadlines.

Notes in the Descriptive Report in red were made during office processing.

SC 1-30-97

AWOIS + SURF 11/91 RWD

X.W.W. 11/26/91

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

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978-665-010-1174

DESCRIPTIVE REPORT TO ACCOMPANY
HYDROGRAPHIC SURVEY H-10313
(Field No. AHP-10-11-89)
Scale:1:10,000
1989
Atlantic Hydrographic Party Two
Dale Ross, Chief of Party

A. PROJECT

General

This survey was conducted in accordance with Hydrographic Project Instructions OPR-X278-AHP, St. Marys River, Michigan, dated April 7, 1989.

The purpose of project OPR-X278-AHP is to: Provide contemporary hydrography for the maintenance of existing charts and the construction of new large-scale charts; and to fulfill requests by the Lake Carriers Association, Great Lakes Pilots, Canadian Hydrographic Service, U.S. Coast Guard, U.S. Steel Great Lakes Fleet, commercial fishermen, and local marinas.

B. AREA SURVEYED

The area surveyed for H-10313 is from De Tour Passage to Sweets Point and is bounded on the northern limit by latitude 46°03'00" N, on the western limit by longitude 083°56'30" W, on the eastern limit by longitude 83°50'30" W, and on the southern limit by latitude 45°58'30" N, where it junctions with H-10310, sheet "R".

The survey area covers a four mile wide section of the St. Marys River at the northern edge, funnelling down to a one mile wide section of the river at the southern limit. The survey area includes a deep draft channel partially maintained by the U.S. Army Corps of Engineers (C. of E.). The down-bound and up-bound channel section junctions in the northwestern section of the survey area. The down-bound segment is maintained by the C. of E. and is defined by the area east and south of Watson Reefs Light and green can buoy C"7". Portions of the channel are not maintained by the C. of E. due to the fact that soundings in these areas exceed project depth limits. Defined channel sections were surveyed at 50 meter spacing.

The eastern and up-bound channel areas are not as defined as the down-bound channel due to the depths exceeding channel project depths. The channel areas extending north from lighted green buoy (G"1" Fl 6 2.5s) at Pipe Island Shoal was not surveyed at 50-meter spacing due to lack of channel definition on the

eastern edge and due to the hydrographer's descretion based on the width and depth of the area.

Per Section 1.8 of the project instructions, main scheme lines were run to two feet of water under the keel or the 3-foot depth curve.

C. SOUNDING VESSELS

Vessels 0518 (EDP No. 0518) and 0519 (EDP No. 0519) are 21-foot MonArks which were used as sounding vessels during this survey. Sounding lines were run at 100-meter spacing, per Section 4.3 of the hydrographic manual. Field support was provided by a 17-foot MonArk and a 16-foot Zodiac.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

1. SOUNDING EQUIPMENT

The following Raytheon DE-719-C fathometers were used for this survey:

EDP #	S/N	Days
0518	10744	220,222,223,226,227,228
0519	5881 42B	219,220,222,223
	6211	223,226,227,228,229,235, 236,240,249,254
	8652	256,257,258,262

Soundings were recorded in feet using the Raytheon DE-719-C fathometers with an assumed speed of sound through water of 4800 ft/sec. Depths encountered in the survey area range from 1 foot to 137 feet. The 719-C fathometer does not have automatic depth scale adjustment, therefore, depth scale changes must be performed manually by the operator. This procedure occasionally left vacant areas on the sounding record, eliminating the choice of sounding edits and ultimately accepting the digitized soundings if they were reasonable.

In shallow water columns, the digitized soundings matched the fathometer's trace to plus or minus 0.2 foot through constant observation and manipulation of the tide and draft adjustment knob. However, in deeper water columns, there was a noticeable difference of up to 1.0 foot between the trace and the digitized depths. Once the fathometer scale was changed, no manipulations were performed to the tide and draft, gain, speed of sound, nor zero initial knobs in order to prevent over correcting the corresponding soundings in shallow water columns.

Vessel 0519 exchanged fathometers on August 11, 1989 (day 223) and September 13, 1989 (day 256). This switch was necessary due to a 0.5 to 1.0 foot discrepancy between the fathogram trace and the digitized soundings.

2. CORRECTIONS TO ECHO SOUNDINGS

Corrections for the speed of sound through the water column were computed from data obtained with an Applied Microsystems Laboratory (AML) electronic speed of sound probe, Model Number SVP-16. The serial number (s/n) of the instrument used to obtain the speed of sound data is 03003. Program "Velocity" was used for determining the speed of sound correctors.

All speed of sound correctors were applied during semi-smooth and final plotting by the HDAPS. ~~system~~.

Table Applied	Cast	Day	Depth	Location	Days
1	1	220	41 meters	46°00'29" N 83°52'50" W	220-226
2	2	227	46 meters	45°59'38" N 83°53'15" W	227-233
3	3	234	48 meters	45°59'30" N 83°53'00" W	234-242
4	4	243	40 meters	45°56'57" N 83°54'10" W	243-253
5	5	254	40 meters	45°59'45" N 83°53'00" W	254-262

A data quality assurance test (DQA) was performed prior to each speed of sound cast to assure proper working condition of the probe. Speed of sound tables are included in the Separates Following Text. *

Lead line comparisons were performed daily, excluding days of harsh weather, to determine instrument error and to verify static draft. The correctors computed were uniform and consistent, ranging from +0.4 to -0.2 foot. These instrument corrections were not applied to final field sheet soundings and are included in the Separates Following Text, along with lead line comparison logs, for reference.

A static draft correction taken from historical data was applied to all soundings acquired with the Raytheon DE-719-C echo sounders. The 1.2 foot static draft correction was applied to

* Removed from the Descriptive Report and filed with the field records.

all sounding data by the following method. The Hydrographic Data Acquisition and Processing System (HDAPS) methodology uses "height" as the up/down displacement of the sensor from the static waterline, with positive being downward displacement. The location of the high frequency DE-719-C transducer was used as the starting point (0,0) for the on-board coordinate system. Thus, a height of 1.2 feet, or 0.36 meters, was entered into the offset table in the HDAPS to account for the draft of the survey vessel. The offset tables are included with the Separates Following Text.*

Settlement and squat measurements for vessels 0518 were performed on day 122 and for vessel 0519 on day 187 at the De Tour Coal Dock, De Tour Village, Michigan. This procedure entailed setting a Zeiss level (s/n 59891) on shore and having the survey vessel with a level rod held over the transducer pass by the observer. As the vessel approached the level, the observer read the heights to the recorder. A range of survey speeds from idle to 3000 rpm was used to generate a curve comparing speed versus settlement and squat. From this curve settlement and squat correctors were determined for each vessel and applied to all survey data.

Water levels were reduced in the field to low water datum. These unverified water level correctors were applied to all soundings on the final field sheets. Approved water levels applied during office processing.

Per Section 5.7 of the project instructions, low water datum below the locks at Sault Sainte Marie, Michigan is the sloping surface of the river when the gauge below the locks reads 577.5 feet and the elevation of Lake Huron is 576.8 feet. As a reult, low water datum for the De Tour Coal Dock water level station is the interpolated value of the two elevations or 576.8 feet. Water level heights were obtained daily from De Tour Coal Dock water level station (907-5098).

Approved water levels were requested from the Sea and Lake Levels Branch in a letter dated September 29, 1989. A copy of the letter is included in the Separates Following Text.*

* Removed from the Descriptive Report and filed with the field records.

E. HYDROGRAPHIC SHEETS

The survey scale is 1:10,000. All sheets were produced by AHP-2 employees with the HDAPS on the Bruning ZETA 824 plotter. A list of sheets submitted for H-10299 follows:

Sheet	Scale	Quantity
Boat Sheet	1:10,000	1
Edited Trackline	1:10,000	1
Sounding Plot	1:10,000	1
Final Field Sheet	1:10,000	1
Overlay	1:10,000	1
Inset	1:5,000	2

Main scheme hydrography, developments, crosslines, inshore buffer lines, and horizontal control stations used during the survey are plotted on the final field sheet. Channel lines, offshore buffer lines, detached positions, and bottom samples are plotted on the overlay. All soundings on the final field sheet are corrected for draft, water levels, settlement and squat, and speed of sound through water.

Two insets with a scale of 1:5,000 are included with this survey. These two sections (De Tour Harbor and De Tour Coal Dock) were enlarged for legibility. Each inset includes main scheme, inshore and offshore buffer lines, and all detached positions. All shoreline on the insets were manually transferred.

All survey sheets were submitted with the descriptive report to the Atlantic Hydrographic Section in Norfolk, Virginia.

F. CONTROL STATIONS

The horizontal control datum for this project is the North American Datum of 1927.

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 within the Coastal Surveys Unit and was forwarded to the Atlantic Hydrographic Section in Norfolk, Virginia.

Geographic positions for all control stations used on this survey are highlighted and included with the station list in the Separates Following Text.*

* Removed from the Descriptive Report and filed with the field records.

G. HYDROGRAPHIC POSITION CONTROL

Survey Methods

AHP-2 is being outfitted with the Hydrographic Data Aquisition and Position System (HDAPS) for data collection and processing. The HDAPS in use by AHP-2 is a semi-automated data acquisition system which is able to collect sounding data using up to four lines of position for more precise positioning. The hardware on the survey launch for storing the data consists of a Texas Microsystems, Inc. (TMI) computer. Sensor data is received by the vessel's computer through an "intelligent" interface called a Hyflex made by Navitronic.

Hydrographic position control was accomplished using the Mini-Ranger Falcon 484 system which provided accuracy to meet 1:10,000 scale survey requirements. Range/range positioning using four stations simultaneously was used during this project. A survey network was set up to allow four reference stations to be accessed simultaneously by the HDAPS. The following Falcon Mini-Ranger equipment was used:

VESNO	Equipment	S/N
0518	RPU	D0017
	CDU	E0008
	R/T	E2965
0519	RPU	E0142
	CDU	F0188
	R/T	E2960

Positions which had erratic lines of position indicated by high residuals on the "raw" listing were "smoothed" in post processing. Positions were "smoothed" by dead reckoning between two accurate positions. If more than four consecutive positions had high residuals with an erratic track plot, the data were rejected and later rerun. In areas where only two lines of position were received, the "raw" listing would indicate the angle of intersection between these lines enclosed by brackets. If more than four consecutive positions were outside of the 30 to 150 degree intersection margin, the data were rejected and later rerun. If less than five positions were outside the 30 to 150 degree margin, the positions were smoothed. Occassionally, the residual values were greater than 5 meters, yet the trackline plot showed that the position of the survey vessel was accurate. In those instances, the data were considered adequate and were plotted with the other data on the final field sheet.

Critical System Checks

Critical system checks were performed on days establishing shore stations or when relocating Mini-Ranger reference stations to different locations. These critical checks occurred on days 219, 229, and 240. Stations SWEETS POINT LIGHT (station 106), WATSON REEFS LIGHT (station 170), FRYING PAN LIGHT (station 173), and PIPE ISLAND TWINS LIGHT (station 153) were the points from which all Mini-Ranger codes were checked. All critical checks values were less than 5 meters which is within the required limits in the field procedures manual. Results of the calibrations are included in the Separates Following Text.*

Non-Critcal System Checks

Non-critical system checks were performed by visually observing the error circle radius (ecr) and residual (res) values on the Comflex screen in the survey vessels. The "DUMP ALPHA" and "DUMP GRAPHICS" functions were not installed on these vessels. As a result, if the survey technician did notice continually erroneous error circle radii or residual values, they would stop the vessel and correct the problem by either replacing the batteries at the shore station or by not using that Mini-Ranger code for control. If the residuals were greater than 5 meters, 0.5mm at the scale of the survey, for an extended period of time, 3-5 minutes, the data were rejected and later rerun. The error circle radius was never greater than 15 meters, 1.5 mm at the scale of the survey.

Mini-Ranger Falcon Calibrations

Baseline calibrations were performed to the standards of Section 3.1.2.1 of the field procedures manual. During the first three months of the survey, several new Mini-Rangers were incorporated so that a large area of hydrography could be accomplished without frequently shifting Mini-Ranger stations. As a result, three baseline calibrations were conducted on April 28, June 9, and July 5, 1989 for vessel 0518. Vessel 0519 was used after all mini-rangers had been in use and was baseline calibrated once on August 3, 1989. Baseline calibrations for both vessels were performed at the De Tour Coal Dock, De Tour Village, Michigan. The baseline values were incorporated into the Comflex "C-O" tables on the survey launches so that correctors were applied directly to all "on-line" data. All records of these calibrations are included in the Separates Following Text.*

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

* Removed from the Descriptive Report and filed with the field records.

H. SHORELINE

The aerial photography for TP-00361 was flown in May 1984. Shoreline drawn on the final field sheet originates with a 1:10,000 scale photographic enlargement of topographic map 00361 (TP-00361) and Class III final reviewed shoreline manuscript TP-00361 of 1984.

Detached positions were taken on new piers or other new items located within the survey area along the shoreline. Items located on the shoreline manuscript which still exist, were visually verified and labeled with reference numbers. Reference numbers are labeled on both the final field sheet and boat sheet. The symbol for each item verified along the shoreline was drawn in black ink on the final field sheet. Descriptions and photographs of reference numbers were entered in a journal labled "REF NO. DES" and is included in the accordion file with the survey data for vessel 0519.

Shoreline was verified by its junction with hydrographic data and by visual inspection. Shoreline verification was performed on July 31, 1989 (day 212), August 1, 1989 (day 213), August 4, 1989 (day 216), and August 8, 1989 (day 220) identifying new piers and rocks, confirming the positions of existing piers from the topographic maps and locating those areas where piers no longer exist. On features which no longer exist, if the bottom was visible and there were no indications of salvage operations or ruins of any sort, the hydrographer identified the feature as no longer existing. These changes were noted on the boat sheet. Existing piers were labeled with reference numbers 9000-9060. Echogram annotations of inner-shoreline buffers describe shoreline features. Annotations relating to the outer-buffers are limited as the purpose of the outer-buffer is to create a safe zone for bringing the vessel about to continue main scheme hydrography.

The De Tour Coal Dock pier and the De Tour Harbor pier were both assigned reference numbers by annotating the time and depth taken with a lead line relative to known positions. Similarly, the next reference number was assigned by measuring the distance from the previous reference number and annotating the time and lead line depth until the piers were fully described. These reference data appear in the journal labeled "REF NO. DES". Inner-buffer and outer-buffer lines were also run to ensure the position and surrounding depths of the piers.

The water level in St. Marys River was one to two feet lower than the previous year when hydrography was conducted. As a result the survey vessels were unable to run hydrography near the rocky shoreline. The lower than normal water level in St. Mary's River allowed the MonArks to survey only to the 2-3 foot curve. In most cases, the MonArks were run-in until only one

foot of water was beneath the keel. Several piers alongshore, grassy areas, rocky areas alongshore, and shallow areas alongshore were visually verified and noted on the final field sheet. Those features on the shoreline manuscript already existing were assigned reference numbers when visually verified.

Changes in shoreline are shown in red ink on the final field sheet. Verified shoreline is shown in black ink on the final field sheet. The majority of the shoreline consists of rocks and boulders.

There were ~~two~~ three control stations located seaward of the high water line within the sheet's limits. One station was WATSON REEFS LIGHT (station 170) located at 46°00'23.410" N latitude and 83°53'58.494" W longitude. The second station, SWEETS POINT LIGHT (station 106) was located at 46°02'19.323" N latitude and 83°56'09.665" W longitude. The third station is DIX, 1989 (Station #135) in Latitude 46°01'34.948" N, Longitude 83°50'41.615" W.

I. CROSSLINES

A total of 26.06 linear nautical miles of crosslines were run on H-10313 which equals 8.6% of the main scheme hydrography. The crossline spacing interval is equivalent to 700 meters. These soundings agree to within one foot of the main scheme soundings.

Main scheme hydrography and crosslines were run with two sounding vessels. Depths between the two sounding vessels agreed to within one foot.

J. JUNCTIONS

This sheet junctions with H-10309 (1989) to the north, H-10307 (1989) to the east, H-10310 to the south (1989), and H-10302 to the west (1989), and H-10311 (1989) to the east.

Junction soundings with H-10309, H-10307, and H-10302 all agree to within two feet. Soundings that junction with H-10310 agree to within three feet in the midchannel areas. However, in near shore areas the disagreement increases due to steep inclines of the bottom. Concur A sounding of 26 feet at 45°59'15.6" N latitude and 83°52"47.6" W longitude of H-10313 plots on top of an 8-foot sounding of H-10310 at the same location. This discrepancy was due to different survey vessels with different positioning systems over an irregular bottom profile.

Not exactly on top. There is a steep drop-off in this area.

K. COMPARISON WITH PRIOR SURVEYS

The present survey was compared to prior surveys by coded soundings on a chart blow-up of chart No. 14882. The prior surveys used in this comparison are as follows:

LS-1702A (1936) 1:10,000 ← (Note: LS-1702 (1936) is not common to the present survey.)
LS-1703 (1936) 1:10,000

Prior surveys LS-1702A (1936) and LS-1703 (1936) were supplemented with data from surveys conducted in 1854, 1895, and 1910. This is stated on the prior surveys.

Prior survey LS-1702A (1936) agrees with the present survey H-10313. However, survey H-10313 is generally 1 to 2 feet shoaler than the 1854 survey and 2 to 3 feet shoaler than the 1895 survey over the entire survey area. The following comparisons of prior survey LS-1702A (1936) and H-10313 should be noted: It is not possible to determine on the Bromide copy of LS-1702A which soundings are from 1854, 1895, 1910, or 1936.

1) Survey H-10313 exhibited a shoreline recession on the southwest point of the western island at Pipe Island Twins compared to prior survey LS-1702 (1936). This receding shoreline of 40 meters is most likely due to excessive wave action from passing lake freighters and wind driven currents.

2) Comparison of prior survey LS-1702A (1936) and H-10313 indicates erosion of the shoreline on the southeast point of Pipe Island. A recession of 25 meters is most likely due to wind driven currents and commercial marine traffic.

(See section 6.a. of the Evaluation Report.)

3) Prior surevey LS-1702A (1936) positions an islet at a location of 46°01'32" N latitude and 83°50'55" W longitude. The present survey shows no evidence of an islet. However, a shoal was found in this area with rocks awash and is recommended to be charted as such. ~~foul area~~ — See section 6.a. of the Evaluation Report.

4) A sounding of 29 feet ~~at location~~ in the vicinity of 46°02'51" N latitude and 83°52'00" W longitude, found on survey H-10313, is surrounded by prior survey depths of 38 feet. The present survey sounding is correct and should supersede the LS-1702A sounding. Concur.

5) Survey H-10313 exhibits a 24-foot sounding at location 46°01'06" N latitude and 83°54'14" W longitude surrounded by prior survey depths of 30 feet. The present survey depths should ~~be accepted as the sounding equipment showed no evidence of malfunctioning~~. supersede the LS-1702A data.

Prior survey LS-1703 (1936) agrees well with survey H-10313. H-10313 soundings were two feet shoaler than soundings from LS-1703 (1895) and LS-1703 (1910). Note that survey H-10313 exhibits a 30-foot sounding at location 46°00'50" N latitude and

It is not possible to determine on the bromide copy of LS-1703 which soundings are from 1854, 1895, 1910, or 1936.

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83°54'10" W longitude, which is ~~surrounded by~~ in ~~38-foot~~ 40'-41' soundings from prior survey LS-1703 (1936). The present survey soundings should be accepted. - Concur

The present survey, H-10313, included three Automated Wreck and Obstruction Information System (AWOIS) listings. These wrecks were listed as AWOIS numbers 5591, 5593, and 5594. - See also section 6.a. of the Evaluation Report. Detailed descriptions are as follows:

1) AWOIS No. 5591 originates from prior survey LS-1703 (1936). This item is described as two charted wrecks found to be one large exposed wreck with remains of an old side wheel steamboat. Charted position is 45°59'20" N latitude and 83°53'50" W longitude. This wreck was referenced as reference no. 9021 and includes photographs in the journal entitled "REF NO. DES". Buffer lines were run around the wreck and detached positions were taken at the northern end (pos. no. 5903), west side at the paddle wheel (pos. no. 5902), southwest corner (pos. no. 5901), and southeast (pos. no. 5900) corner. - Concur

The present survey agrees with the position from the prior survey. The LS-1703 survey position is located in the middle of an area between the detached positions of survey H-10313. The wreck is awash at the north end, southwest and southeast corners, whereas the paddlewheel bares 8 ø.0 feet with 1 to 2 feet of shoaling occurring to the west of the paddle wheel. This deposition is probably caused by sediment being transported by the currents in De Tour Passage where the wreck creates a vortex and traps sediments. ~~Maintain the charted position.~~ Show the wreck limits as shown on the present survey - Chart the results of the present survey.

2) AWOIS item no. 5593 originates from the prior survey KIRSCHNER (1944) and was reported as a wreck located at 45°59'56.5" N latitude and 83°53'57.6" W longitude. An echo sounder search conducted on August 24, 1989 (day 236), provided dive site locations from which buoys were situated. The buoy located at the southern end of the wreck 45°59'57.4 N latitude and 83°53'57.1" W longitude, position number 5941, allowed divers to descend on the item and measure length and width. Local knowledge provided the name "Two Myrtles" as the documented name. The "Two Myrtles" rests in 6 to 12 feet of water and is lying on her port side with a heading of 190° S. Length overall is 70 feet with a 15-foot beam. A least depth of 4.2 feet (raw) or 2.7 feet, with lake levels applied, was acquired. Least depths and lengths were determined by lead line.

Chart this wreck as indicated by the findings of the present survey in Lat. 45°59'57.41", Long. 83°53'57.15"

~~The charted position of 45°59'56.5" N latitude and 83°53'57.6" W longitude should remain as charted.~~

3) AWOIS item no. 5594 originates from prior survey KIRSCHNER (1941) and was reported as a submerged wreck located at 45°59'59.0" N latitude and 83°53'56.7" W longitude. An echo sounder search conducted on August 24, 1989 (day 236), provided

dive site locations from which a buoy was deployed. Divers descended on the item and measured the length and width. Local knowledge provided the name "Alice C" as the registered name. The "Alice C" rests in 10 to 16 feet of water. The wreck is lying as scattered debris and is 50 feet long with a 15-foot beam and has a least depth of 11.2 feet (raw) or a 9.~~7~~6 foot least depth, with lake levels applied. ← 10' plotted. Depth and length measurements were acquired by lead line. A detached position was taken (pos. no. 5940) and is located at 45°59'59.1" N latitude and 83°53'56.3" W longitude. ~~Maintain the charted position.~~ Chart this wreck as indicated by the findings of the present survey.

The present survey adequately defines the depths and the bottom configuration and should supersede the prior surveys.

L. COMPARISON WITH THE CHART

Comparisons were made with the following largest scale charts covering the present survey area:

Chart No.	Edition	Edition Date
14882	28th	August 2, 1986

The charted hydrography originates from the previously discussed prior surveys noted in Section K of this report.

1) Soundings in the area of 45°59'45" N latitude and 83°52'15" W longitude differ with the present survey by 6 to 12 feet. At this position, fathograms indicate an irregular profile with a steep incline near shore. Soundings from the present survey supersede the soundings on Chart 14882. — Concur

2) Chart 14882 indicates an islet at 46°01'33" N latitude and 83°50'54" W longitude that should be removed. The present survey shows the area to be a ~~shoal~~ bottom area with rocks awash. — Concur

3) A 10-foot sounding at 46°00'~~33~~32" N latitude and 83°54'~~10~~08.6" W longitude on Chart 14882 should be replaced with a depth of 13 feet found on the present survey: — Do not concur — see sections 6.a. 1) & 3) of the Evaluation Report. 3.C.

4) A charted depth of 11 feet at 46°00'~~45~~42.1" N latitude and 83°53'24.~~9~~ W longitude should be replaced with a depth of 14 feet from the present survey: — Do not concur — See section ~~6.a. 1)~~ 3.C of the Evaluation Report.

5) Charted soundings in the general area of 46°02'15" N latitude and 83°51'15" W longitude vary ~~4~~5 to ~~7~~8 feet with the present survey. The sounding equipment exhibited no evidence of malfunction. Therefore, these soundings should replace the soundings on the latest chart. — Concur — see also section 6.a. of the Evaluation Report.

6) A charted depth of 81 feet at location 45°59'33" N latitude and 83°52'57" W longitude from chart 14882 varies from

the present survey. General bottom depths in the area range from 9~~3~~4 to 1~~03~~0 feet on H-10313. Therefore, 81-foot sounding should be replaced. Concur.

7) A 57-foot sounding on the chart at 46°02'03" N latitude and 83°51'51" W longitude is surrounded by 50-foot to 52-foot soundings on the present survey. The H-10313 soundings supersede the charted sounding. Concur

8) Chart 14882 positions a rock at 46°01'31" N latitude and 83°54'03" W longitude. The present survey shows a rock at 46°01'28.6" N latitude and 83°54'03.8" W longitude. This position is confirmed by the prior survey of 1936 and should replace the position on chart 14882. This discrepancy is due to enlargement distortion of the chart blowup and shoreline manuscript. Chart the foul area as shown on the present survey smooth sheet.

9) The present survey found a ~~submerged~~ boulder at a location of 46°01'27.6" N latitude and 83°53'52.6" W longitude. This new position should replace the charted position and the rock, at 46°01'00" N latitude and 83°53'51" W longitude, on chart 14882. This discrepancy is due to enlargement distortion of the chart blowup and shoreline manuscript. ~~Shoal~~ Chart the boulder and foul limits as shown on the present survey smooth sheet.

10) Rocks charted on chart 14882 near 46°02'00" N latitude and 83°55'57" W longitude were positioned on H-10302 and addressed in the descriptive report for that survey.

11) The bottom sediment description on the present chart at 46°00'45" N latitude and 83°53'30" W longitude does not correspond with the sample found during the present survey. The "rocky" sediment description should be replaced with "soft brown mud with grass and sand" located at position 46°00'48" N latitude and 83°53'33" W longitude. Concur - However, the shoal to the SE of this prior rocky description was not sampled on this survey and could be a rocky shoal.

12) The "rocky" sediment description on chart 14882 at 45°59'45" N latitude and 83°53'40" W longitude should be replaced with a description of "~~soft~~ brown mud" found at the same location during the present survey. Concur also S Grs

13) The sediment description of "sand" positioned at 46°02'30" N latitude and 83°51'25" W longitude on chart 14882 should be replaced by a description of "~~soft~~ brown mud" at a location of 46°02'24" N latitude and 83°51'18" W longitude found during survey H-10313. Concur

14) The sediment description of "clay" found on chart 14882 at 46°01'~~2~~4" N latitude and 83°54'24" W longitude should be replaced by a description of "~~soft~~ brown mud" found during the present survey at position 46°01'18" N latitude and 83°54'27" W longitude. Concur

There are no conflicts between the charted channel controlling depths and present survey depths. — Concur

There are no newly found unreported dangers to navigation within the present survey area.

Three submarine cables were located in the survey area. Two of these cables extend from De Tour Village to Drummond Island and were located north and south of the ferry landings. Both of the cable crossing were listed in the log "REF NO. DES" and detached positions were taken. — See the Evaluation Report. — section 7.a.

The third cable crossing is located between the south side of Pipe Island and Gaffney Point, located southeast of the Detour Coal Dock Pier. The Pipe Island cable sign was referenced, while Gaffney Point had only a utility box and no reference sign. Positions of the cable crossings were acquired by direct horizontal control observations. The observer occupied a horizontal control station and initialed on another horizontal control station, then turned an angle to the desired location and measured the distance from the occupied station to the new location. This was achieved by using the Hewlett Packard EDMI HP-3810 (s/n 59970). The detached positions were listed as position no's. 6297 and 6298. They were recorded in the project tables mini diskette under the "Contact Utility" program in the HDAPS. The position for green can buoy "C7" is also listed in the "Contact Utility" program.

There are no submarine pipelines nor overhead cables in this survey area.

The bottom composition of the survey area is primarily soft mud and fine sand with hard clay near the shoreline. — The alongshore areas are rocky. (in the Evaluation Report)

Except as noted above, the present survey is adequate to supersede the charted hydrography. — See the Evaluation Report.

M. ADEQUACY OF SURVEY

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

See the Evaluation Report.

N. AIDS TO NAVIGATION

~~Seven~~ Eight floating aids to navigation were located in the survey area and are adequate to serve their intended purpose. The LIGHT LIST, Volume VII, GREAT LAKES, 1989 Edition states that three aids are seasonal.

Floating Aids to Navigation

Floating Aid	Survey Position	Light List Position
Watson Reefs Buoy 7 Green can	046°00'16.9" N 083°53'50.2" W	None Listed
Watson Reefs Buoy 9 Green can	046°00'36.4" N 083°54'05.5" W	None Listed
Pipe Island Shoal Lighted Buoy 1 Green can, Fl G 2.5s	046°00'33.0" N 083°53'18.2" W	None Listed (seasonal)
Sims Point Buoy 2 Red nun	046°01'39.1" N 083°51'02.8" W	None Listed
Lighted Buoy 10 nun Fl R 4s	046°00'56.6" N 083°54'07.5" W	None Listed (seasonal)
Twins lighted Buoy 3 Green Can Q G	046°01'39.6" N 083°53'24.5" W	None Listed (seasonal)
Drummond Island Shoal Buoy 8 Red Nun	045°59'15.2" N 083°52'49.4" W	045° 59.3'N 083° 53.8'W
Sweets Point Shoal Buoy 11 green can	046°02'16.9" N 083°56'02.8" W	None Listed

Non-Floating Aids to Navigation

Seven non-floating aids to navigation were located in the survey area and were listed in The LIGHT LIST, Volume VII, GREAT LAKES, 1989 Edition.

Non-Floating Aid	Survey Position	Light List Position
WATSON REEFS LIGHT Fl G 4s	046°00'23.410" N 083°53'58.494" W	None Listed
PIPE ISLAND LIGHT Iso W 6s	046°01'34.346" N 083°53'29.186" W	046° 00.0' N 083° 54.0' W
TWINS LIGHT Fl W 2.5s	046°01'34.328" N 083°53'29.239" W	046° 01.6' N 083° 53.5' W
SQUAW ISLAND LIGHT Fl R 2.5s	046°02'19.699" N 083°54'15.004" W	046° 02.3' N 083° 54.3' W
SWEETS POINT LIGHT Fl G 2.5s	046°02'19.323" N 083°56'09.665" W	046° 02.3' N 083° 56.2' W
DE TOUR HARBOR ENTRANCE LIGHT 2 Fl R 4s	045°59'44.223" N 083°53'56.760" W	045° 59.7' N 083° 54.0' W
FRYING PAN ISLAND LIGHT F G	045°59'09.393" N 083°53'41.264" W	045° 59.2' N 083° 53.7' W

O. STATISTICS

Description	VESNO 0518	VESNO 0519	Total
Total Positions	1470	1299	2769
Detached Positions	2	66	68
Duplicate Positions	1	38	39
Total Nautical Miles of Hydro	226.3	103.6	329.9
Sq. Nautical Miles of Hydrography	-	-	14
Bottom Samples	0	47	47
AML Casts (VESNO 1283)	0	0	5
Tide Stations Leveled	-	-	-
Days of Production	7	17	24

P. MISCELLANEOUS

Bottom samples were taken and submitted to the Smithsonian Institution as directed in Section 6.7 of the project instructions. Twenty-four bottom samples were transmitted on August 24, 1989. Bottom sample positions are plotted on the

overlay and are listed on the Oceanographic Log Sheet - M, NOAA Form 75-44, which may be found in the Separates Following Text.

No anomalous currents were observed in the survey area.

There were several discrepancies on the final field sheet where soundings plotted on other soundings. Other discrepancies occurred during processing. These are listed as follows:

1) A 1.0-foot sounding plotted on Pipe Island may be due to the distoration of the shoreline manuscript when enlarged. Also, note that the shoreline manuscript grid is not uniform. – On the field sheet – OK on the smooth sheet.

2) Position numbers 5570 - 5579 data were unnecessarily "smoothed". Verification needs to "unsmooth" these data because the field party cannot "unsmooth" data.

3) The sounding line beginning at 45°59'14.5" N latitude and 83°53'35.5" W longitude (pos. no. 5950 - 5951) plotted sufficiently, while the data printout listed the angle of intersection as "(999)". Although only two lines of position were used, the error circle radii were within the acceptable limits, the trackline plot appears to be accurate, so the data were accepted.

4) There is a 10-foot sounding at 45°59'20.2" N latitude and 83°52'44.8" W longitude on top of a 17-foot sounding. This discrepency is due to the fact that the survey vessel was rounding the ferry landing where construction was in progress. The survey vessel followed the bulkhead within a 2-foot to 4-foot distance between the bulkhead and the survey vessel. The bottom in this area is subject to change due to propeller wash from the ferries. – Concur – also there is a steep slope in this area.

5) A 27-foot sounding (pos. no. 5720 + 3) located at 45°59'57.9 N latitude and 83°52'22.0 W longitude plots very close to a 23-foot sounding (pos. no. 1465 + 5) with a position of 45°59'57.0" N latitude and 83°52'22.3 W longitude. After looking at the fathogram, the hydrographer decided that both soundings were correct due to different geographic positions. The 23-foot sounding was on a crossline and the survey vessel passed the western edge of the peak extending from shore, and indicated by the depth curves. – Concur

6) An 18-foot sounding at 46°00"46.5" N latitude and 83°54'44.5" W longitude plots very close to a 12-foot sounding near this same location. The positions are near each other, but with different northing values. The bottom slope is irregular and steep. Another cause for this apparent discrepancy may be due to the plotter origin not being lined up in the same location each time a group of data was plotted. – Concur

7) A 3-foot sounding at 46°00'45.6" N latitude and 83°54'46.5" W longitude plots on top of a 14-foot sounding near this same location. Both of these depths have different northing and easting values. The bottom profile is irregular with a steep incline. — Concur (the 12 is in excess and is offshore)

8) A depth of ~~28~~ 32.7 feet, ~~seven~~ Five seconds out of position no. 572 was manually added to the digital data file. The reason for this is that it was overlooked during fathogram scanning and needs to be inserted to agree with position no. 435's 30-foot sounding. — @ Lat. 46° 02'53.07", Long. 83°52'23.36" The 29' sounding @ one before pos# 435 is shown on the smooth sheet.

9) In an area near 46°01'09.3" N latitude and 83°55'36.4" W longitude there is a 3-foot sounding plotting near an 11-foot sounding. These soundings have different positions which are noted on the fathogram (day 220, position no. 5046). During further inspection, the hydrographer noted that the survey vessel passed over what appeared to be a groin ruin extending northward from shore, passing approximately 6 meters from shore heading eastward. The echogram of this area indicates a steep incline which explains the location of the 3-foot sounding next to the 11-foot sounding. — A groin with the offshore end submis being shown on the smooth sheet.

10) A 26-foot sounding at 46°01'19.0 N latitude and 83°54'12.1" W longitude is plotted very close to a 22-foot sounding. Upon further investigation, the 22-foot depth is inserted 2 seconds later on reference line 4600, thus yielding data that appears to be plotting on the same position. — Shown with a 24' curve.

Q. RECOMMENDATIONS

See also the Evaluation Report.

Recommendations may be found in sections H, K, L, and N of this report.

R. AUTOMATED DATA PROCESSING

The HDAPS currently in use, consists of the following system components: A Hewlett Packard (HP) 9000 Model 300 computer, an HP 9153C Disk Drive with a Winchester hard disk with a storage capacity of 20 Mbytes, an HP 98785A Color Monitor, a Bruning ZETA 824 plotter, an HP 82906A Rugged Writer, and an M4 Data Model 9800 9-track tape drive. The interface between the acquisition computer and the hydrographic sensors is the Navitronic's Hyflex 1000. Data were acquired and stored on an IBM compatible computer with a hard disk then transferred to 3-1/2-inch double sided, double density micro-floppy diskettes. A Navitronic Path Guidance Unit (PGU) functions both as a remote steering display for the coxswain and as a remote control keyboard for the acquisition system. All processing programs are written in HP BASIC while all acquisition programs were written in Quick BASIC.

During data acquisition, high frequency digitized depths are recorded while simultaneously applying draft and settlement and squat corrections. Baseline calibration correctors for each line of position were also applied on-line. Actual water levels and speed of sound correctors were applied to the final field sheet soundings from the respective corrector tables. Sounding plots and trackline plots were produced during processing.

Raw data were converted and written to the HP hard drive to generate a master listing which displays data collected for that day. After the data were edited, data abstracts were generated to ensure that all changes were performed prior to plotting the data.

Raw data stored on the $3^{1/2}$-inch microfloppy diskettes were labeled with a five digit code. The first three digits correspond to the day of the year. The last two digits are zeroes. When more than one diskette is used per vessel, the fourth digit is increased sequentially by one. Edited data, stored on magnetic tapes, were also labeled with a five-digit code. The first three digits correspond to the day number, with the fourth and fifth digits arbitrarily labeled with a one denoting an edited tape. Therefore, an edited tape would be labeled as 18211.

In addition to the HDAPS which used program NAVISOFT 300, version 2.47, the following non-HDAPS computer programs were used:

		Version	Date
VELOCITY	Velocity Computations (IBM PC)	1.0 extended	9/89
MTEN3	with enhancements Geodetic (IBM PC) Computations		6/88

S. REFERRAL TO REPORTS

Title	Transmittal Information
*Descriptive Report To Accompany Survey H-10302	Atlantic Hydrographic Section Norfolk, Virginia, 1989
*Descriptive Report To Accompany Survey H-10307	Atlantic Hydrographic Section Norfolk, Virginia, 1989
*Descriptive Report To Accompany Survey H-10309	Atlantic Hydrographic Section Norfolk, Virginia, 1989
*Descriptive Report To Accompany Survey H-10311	Atlantic Hydrographic Section Norfolk, Virginia, 1989

Title	Transmittal Information
Horizontal Control Report for OPR-X278-HFP HC-8711	Field Photogrammetry Branch Norfolk, Virginia, 10/31/89 Written by: C.M. Middleton Jr.
*Chart Sales Agent Report OPR-X278-HFP	Atlantic Hydrographic Section Norfolk, Virginia, 1989
*User Evaluation Report OPR-X278-HFP	Atlantic Hydrographic Section Norfolk, Virginia, 1989
*Chart Inspection Report OPR-X278-HFP	Mr. Rudolph D. Sanocki Atlantic Hydrographic Section Norfolk, Virginia, 1989
*Coast Pilot Report	Coast Pilot Section Mapping and Charting Branch Rockville, MD, 1989

*Reports will be submitted at the end of project OPR-X278 for 1989.

Submitted by:

Castle E. Parker, Launch Hydrographer in Charge

SEPARATES FOLLOWING TEXT

*A. HYDROGRAPHIC SHEET PROJECTION AND ELECTRONIC CONTROL PARAMETERS

B. FIELD WATER LEVEL NOTE

*C. GEOGRAPHIC NAMES LIST (Field)

*D. ABSTRACT OF CORRECTIONS TO ECHO SOUNDINGS

*E. ABSTRACT OF ELECTRONIC CORRECTORS

F. LIST OF STATIONS

*G. ABSTRACT OF POSITIONS

*H. BOTTOM SAMPLES

I. LANDMARKS FOR CHARTS

J. APPROVAL SHEET

* = Data removed from the Descriptive Report and filed with the field records.

LIST OF STATIONS

ST MARYS RIVER 1989
LIST OF GEOGRAPHIC POSITIONS

SPN	STATION NAME	GPN CODE K	LATITUDE DEG	MN	SEC	LONGITUDE DEG	MN	SEC	G-NBR
1	REF MON 9 IWC 1911	9	46	3	47.15300	83	56	56.09400	
2	PAF 32	9	46	1	49.77525	83	58	52.62893	
3	LINK	9	46	3	55.60382	83	58	29.45339	
4	DICK	9	46	2	19.33801	83	56	9.75459	
5	SQUAW ISLAND LIGHT	9	46	2	19.69979	83	54	15.00421	
6	SWEETS POINT LIGHT	9	46	2	19.32374	83	56	9.66544	
7	SWEET	9	46	1	46.67431	83	56	40.73220	
8	POB	5	46	3	57.52803	83	55	46.92495	
9	SKULL	5	46	3	51.47386	83	54	24.16075	
10	REF MON 223 USLS 1894	9	46	2	20.15800	83	54	15.05600	
11	UDP 061 COE								
12	UDP 005 COE								
13	ZEERIP	5	45	59	53.71356	83	52	14.37119	
14	CASS	5	46	4	21.44057	83	52	42.70649	
15	TROUT	5	46	3	33.78874	83	51	13.51870	
16	BUTEND	5	46	4	43.78997	83	51	1.18173	
17	N LONG	5	46	4	40.66012	83	48	35.10492	
18	LONG	5	46	4	23.72729	83	48	45.39005	
19	BACON USLS 1894	9	46	3	28.48800	83	49	35.11500	
20	LUX	5	46	3	12.74618	83	50	46.55025	
21	N GULL	5	46	2	18.13192	83	47	28.28661	
22	KAHN	5	46	1	41.19421	83	49	30.08460	
23	STURGEON	5	46	0	58.17066	83	49	30.20833	
24	NATES	5	46	0	4.96133	83	49	26.59223	
25	FAIR PT	5	46	0	10.20592	83	49	1.90424	
26	FAIRBANK	5	46	0	17.91779	83	48	16.10595	
27	ROPP	5	46	1	39.76642	83	45	20.44431	
28	PICNIC	5	46	0	25.17107	83	47	23.77680	
29	277 USLS 1894	9	46	0	46.63400	83	46	47.95700	
30	CROSS	5	46	2	3.38698	83	47	33.55898	
31	BOW	5	46	2	21.85256	83	49	39.41275	
32	BOUL	5	46	2	11.56729	83	45	24.42405	
33	WILLIAMS	5	45	59	15.16154	83	48	2.70725	
34	HARBOR	5	46	2	55.57951	83	45	37.89724	
35	DIX	5	46	1	34.94788	83	50	41.61470	
36	HAVEN	5	46	1	32.64112	83	44	58.78611	
37	FIRE	5	46	2	27.66839	83	44	17.23790	
38	BALD	5	46	2	47.30356	83	44	25.04261	
39	GRAPE	5	46	2	39.05100	83	43	13.66772	
40	KEMP	5	46	2	8.92268	83	41	37.93343	
41	NOID	5	46	2	19.86234	83	41	.98769	
42	ASH	5	46	2	56.78001	83	42	4.17448	
43	PIZZA	5	46	3	18.06733	83	41	45.36350	
44	PENNER	5	46	3	40.24606	83	42	6.75217	
45	PAW	5	46	3	46.00771	83	40	37.04830	
46	PECK	5	46	4	4.74723	83	42	1.88257	
47	RUNT	5	46	4	50.00968	83	43	16.02438	
48	LAZARZ	5	46	2	11.73134	83	43	29.15512	
49	ARCHIBALD ISLAND LIGHT	9	46	4	30.32878	83	53	11.44943	
50	227 USLS 1894								
51	225 USLS 1894								
52	261 USLS 1894	9	46	3	33.67800	83	51	14.06700	
53	PIPE ISLAND TWINS LIGHT	4	46	1	34.32821	83	53	29.23953	

ST MARYS RIVER 1989
LIST OF GEOGRAPHIC POSITIONS

SPN	STATION NAME	GPN CODE K	LATITUDE DEG	MN	SEC	LONGITUDE DEG	MN	SEC	G-NBR
54	DETOUR VILLAGE WATER TANK	4	45	59	29.34567	83	54	13.86635	
55	PIPE ISLAND LIGHT	4	46	0	58.40368	83	53	58.39359	
56	CHERRY	5	46	5	27.26553	83	45	19.49923	
57	STAND	5	46	4	8.84450	83	46	14.41418	
58	MARE	5	46	3	49.34706	83	47	32.37922	
59	PK BURNT	5	46	5	40.11208	83	48	47.40005	
60	285 USLS 1894	9	46	3	48.76000	83	47	32.52900	
61	231 USLS 1894	9	46	0	32.83900	83	51	58.59300	
62	DETOUR REEF LIGHT	9	45	56	56.79100	83	54	11.20700	
63	PIPE	5	46	1	34.34691	83	53	29.18695	
64	CARR	5	45	59	23.21788	83	53	50.56745	
65	FRY	5	45	59	6.19188	83	53	40.45230	
66	DOG	5	45	58	22.72838	83	53	.43435	
67	PT DETOUR	5	45	57	28.39053	83	54	37.87958	
68	DETOUR SOUTH MICROWAVE MAST	4	45	58	35.47839	83	54	53.66493	
69	DETOUR NORTH MICROWAVE MAST	4	45	59	26.74188	83	54	9.89256	
70	WATSON REEF LIGHT	4	46	0	23.41003	83	53	58.49437	
71	DETOUR ENTRANCE LIGHT 2	5	45	59	44.22379	83	53	56.76002	
72	DRUMMOND DOLOMITE STACK	4	45	59	7.34796	83	52	42.08775	
73	FRYING PAN ISLAND LIGHT	5	45	59	9.39374	83	53	41.26479	
74	ANDREW	5	46	3	21.63139	83	52	38.17979	
75	MACOMB	5	46	4	47.46030	83	51	43.57370	

7/27/89

CONTROL STATIONS

No	Type	Latitude	Longitude	H	Cart	Freq	Vel	Code	MM/DD/YY
101	O	046:03:47.153	083:56:56.094	0	250	0.0	0.0		06/12/89
102	O	046:01:49.775	083:58:52.629	0	250	0.0	0.0		06/12/89
103	O	046:03:55.604	083:58:29.453	0	250	0.0	0.0		06/12/89
104	F	046:02:19.338	083:56:09.755	0	250	0.0	0.0		06/12/89
105	O	046:02:19.700	083:54:15.004	0	250	0.0	0.0		06/12/89
106	O	046:02:19.324	083:56:09.665	0	250	0.0	0.0		06/12/89
107	O	046:01:46.674	083:56:40.732	0	250	0.0	0.0		06/12/89
108	F	046:03:57.528	083:55:46.925	0	250	0.0	0.0		06/12/89
109	F	046:03:51.474	083:54:24.161	0	250	0.0	0.0		06/12/89
110	O	046:02:20.158	083:54:15.056	0	250	0.0	0.0		06/12/89
113	O	045:59:53.714	083:52:14.371	0	250	0.0	0.0		06/12/89
114	F	046:04:21.441	083:52:42.706	0	250	0.0	0.0		06/12/89
115	F	046:03:33.789	083:51:13.519	0	250	0.0	0.0		06/12/89
016	P	046:04:43.790	083:51:01.182	0	250	0.0	0.0		06/12/89
117	O	046:04:40.660	083:48:35.105	0	250	0.0	0.0		06/12/89
018	P	046:04:23.727	083:48:45.390	0	250	0.0	0.0		06/12/89
119	O	046:03:28.488	083:49:35.115	0	250	0.0	0.0		06/12/89
120	O	046:03:12.746	083:50:46.550	0	250	0.0	0.0		06/12/89
121	O	046:02:18.132	083:47:28.287	0	250	0.0	0.0		06/12/89
122	O	046:01:41.194	083:49:30.085	0	250	0.0	0.0		06/12/89
123	O	046:00:58.171	083:49:30.208	0	250	0.0	0.0		06/12/89
124	O	046:00:04.961	083:49:26.592	0	250	0.0	0.0		06/12/89
125	O	046:00:10.206	083:49:01.904	0	250	0.0	0.0		06/12/89
126	O	046:00:17.918	083:48:16.106	0	250	0.0	0.0		06/12/89
127	O	046:01:39.766	083:45:20.444	0	250	0.0	0.0		06/12/89
128	O	046:00:25.171	083:47:23.777	0	250	0.0	0.0		06/12/89
129	O	046:00:46.634	083:46:47.957	0	250	0.0	0.0		06/12/89
130	O	046:02:03.387	083:47:33.559	0	250	0.0	0.0		06/12/89
131	O	046:02:21.853	083:49:39.413	0	250	0.0	0.0		06/12/89
132	O	046:02:11.567	083:45:24.424	0	250	0.0	0.0		06/12/89
133	O	045:59:15.162	083:48:02.707	0	250	0.0	0.0		06/12/89
134	O	046:02:55.580	083:45:37.897	0	250	0.0	0.0		06/12/89
135	F	046:01:34.948	083:50:41.615	0	250	0.0	0.0		06/12/89
136	O	046:01:32.641	083:44:58.786	0	250	0.0	0.0		06/12/89
137	O	046:02:27.668	083:44:17.238	0	250	0.0	0.0		06/12/89
138	O	046:02:47.304	083:44:25.043	0	250	0.0	0.0		06/12/89
139	O	046:02:39.051	083:43:13.668	0	250	0.0	0.0		06/12/89
140	O	046:02:08.923	083:41:37.933	0	250	0.0	0.0		06/12/89
141	O	046:02:19.862	083:41:00.988	0	250	0.0	0.0		06/12/89
142	O	046:02:56.780	083:42:04.174	0	250	0.0	0.0		06/12/89
143	O	046:03:18.067	083:41:45.364	0	250	0.0	0.0		06/12/89
144	O	046:03:40.246	083:42:06.752	0	250	0.0	0.0		06/12/89
145	O	046:03:46.008	083:40:37.048	0	250	0.0	0.0		06/12/89
146	O	046:04:04.747	083:42:01.883	0	250	0.0	0.0		06/12/89
147	O	046:04:50.010	083:43:16.024	0	250	0.0	0.0		06/12/89
148	O	046:02:11.731	083:43:29.155	0	250	0.0	0.0		06/12/89
149	O	046:04:30.329	083:53:11.449	0	250	0.0	0.0		06/12/89
152	O	046:03:33.678	083:51:14.067	0	250	0.0	0.0		06/12/89
153	F	046:01:34.328	083:53:29.240	0	250	0.0	0.0		06/12/89
154	O	045:59:29.346	083:54:13.866	0	250	0.0	0.0		06/12/89
155	O	046:00:58.404	083:53:58.394	0	250	0.0	0.0		06/12/89
156	O	046:05:27.266	083:45:19.499	0	250	0.0	0.0		06/12/89
157	O	046:04:08.844	083:46:14.414	0	250	0.0	0.0		06/12/89
158	O	046:03:49.347	083:47:32.379	0	250	0.0	0.0		06/12/89
159	O	046:05:40.112	083:48:47.400	0	250	0.0	0.0		06/12/89
160	O	046:03:48.760	083:47:32.529	0	250	0.0	0.0		06/12/89
161	O	046:00:32.839	083:51:58.593	0	250	0.0	0.0		06/12/89
162	O	045:56:56.791	083:54:11.207	0	250	0.0	0.0		06/12/89
163	O	046:01:34.347	083:53:29.187	0	250	0.0	0.0		06/12/89
164	O	045:59:23.218	083:53:50.567	0	250	0.0	0.0		06/12/89
165	O	045:59:06.192	083:53:40.452	0	250	0.0	0.0		06/12/89

166	O	045:56:22.726	083:53:00.434	0	250	0.0	0.0	06/12/89
167	O	045:57:28.391	083:54:37.880	0	250	0.0	0.0	06/12/89
168	O	045:58:35.478	083:54:53.665	0	250	0.0	0.0	06/12/89
169	O	045:59:26.742	083:54:09.893	0	250	0.0	0.0	06/12/89
170	O	046:00:23.410	083:53:58.494	0	250	0.0	0.0	06/12/89
171	O	045:59:44.224	083:53:56.760	0	250	0.0	0.0	06/12/89
172	O	045:59:07.348	083:52:42.088	0	250	0.0	0.0	06/12/89
173	O	046:59:09.394	083:53:41.265	0	250	0.0.	0.0	06/12/89
174	F	046:03:21.631	083:52:38.180	0	250	0.0	0.0	07/17/89
175	P	046:04:47.460	083:51:43.574	0	250	0.0	0.0	07/25/89

LANDMARKS FOR CHARTS

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

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

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

ORIGINATING ACTIVITY
- [x] HYDROGRAPHIC PARTY
- [ ] GEODETIC PARTY
- [ ] PHOTO FIELD PARTY
- [ ] COMPILATION ACTIVITY
- [ ] FINAL REVIEWER
- [ ] QUALITY CONTROL & REVIEW GRP.
- [ ] COAST PILOT BRANCH

(See reverse for responsible personnel)

- [x] TO BE CHARTED
- [ ] TO BE REVISED
- [ ] TO BE DELETED

REPORTING UNIT (Field Party, Ship or Office): AHP-2

STATE: MICHIGAN

LOCALITY: ST. MARY'S RIVER

DATE: 8/25/89

The following objects HAVE [x] HAVE NOT [ ] been inspected from seaward to determine their value as landmarks.

OPR PROJECT NO.: X-278-AHP

JOB NUMBER: AHP-10-11-89

SURVEY NUMBER: H-10313

DATUM: NAD, 1927

CHARTING NAME	DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses)	POSITION LATITUDE ° ′	LATITUDE ″ D.M. Meters	POSITION LONGITUDE ° ′	LONGITUDE ″ D.P. Meters	METHOD AND DATE OF LOCATION (See instructions on reverse side) OFFICE	FIELD	CHARTS AFFECTED
STACK	DRUMMOND DOLOMITE INC. STACK	45-59	7.347	83-52	42.087		F-3-6-L	14882
TANK	DETOUR VILLAGE WATER TANK	45-59	29.345	83-54	13.866		F-3-6-L	14882
MAST	DETOUR NORTH MICROWAVE MAST	45-59	26.741	83-54	09.892		F-3-6-L	14882
MAST	Plots on Survey H-10310 DETOUR SOUTH MICROWAVE MAST	45-58	35.476	83-54	53.664		F-3-6-L	14882

RESPONSIBLE PERSONNEL		
TYPE OF ACTION	**NAME**	**ORIGINATOR**
OBJECTS INSPECTED FROM SEAWARD		☐ PHOTO FIELD PARTY ☐ HYDROGRAPHIC PARTY ☐ GEODETIC PARTY ☐ OTHER *(Specify)*
POSITIONS DETERMINED AND/OR VERIFIED		FIELD ACTIVITY REPRESENTATIVE
		OFFICE ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		☐ REVIEWER ☐ QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'

(Consult Photogrammetric Instructions No. 64,

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS

Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object.

EXAMPLE: 75E(C)6042
8-12-75

FIELD

I. NEW POSITION DETERMINED OR VERIFIED

Enter the applicable data by symbols as follows:

F - Field	P - Photogrammetric
L - Located	Vis - Visually
V - Verified	
1 - Triangulation	5 - Field identified
2 - Traverse	6 - Theodolite
3 - Intersection	7 - Planetable
4 - Resection	8 - Sextant

A. Field positions* require entry of method of location and date of field work.

EXAMPLE: F-2-6-L
8-12-75

*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.

FIELD (Cont'd)

B. Photogrammetric field positions** require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object.

EXAMPLE: P-8-V
8-12-75
74L(C)2982

II. TRIANGULATION STATION RECOVERED

When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery.

EXAMPLE: Triang. Rec.
8-12-75

III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH

Enter 'V-Vis.' and date.

EXAMPLE: V-Vis.
8-12-75

**PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.

☆ U.S.GPO:1975-0-665-080/1155

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

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

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

ORIGINATING ACTIVITY
- [x] HYDROGRAPHIC PARTY
- [ ] GEODETIC PARTY
- [ ] PHOTO FIELD PARTY
- [ ] COMPILATION ACTIVITY
- [ ] FINAL REVIEWER
- [ ] QUALITY CONTROL & REVIEW GRP.
- [ ] COAST PILOT BRANCH

(See reverse for responsible personnel)

- [x] TO BE CHARTED
- [ ] TO BE REVISED
- [ ] TO BE DELETED

REPORTING UNIT (Field Party, Ship or Office)	STATE	LOCALITY	DATE
AHP-2	MICHIGAN	ST. MARYS RIVER	8/25/89

The following objects HAVE [x] HAVE NOT [ ] been inspected from seaward to determine their value as landmarks.

OPR PROJECT NO.	JOB NUMBER	SURVEY NUMBER	DATUM
X278-AHP		H-10313	NAD, 1927

CHARTING NAME	DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses)	POSITION LATITUDE ° ′	POSITION LATITUDE ″ D.M. Meters	POSITION LONGITUDE ° ′	POSITION LONGITUDE ″ D.P. Meters	METHOD AND DATE OF LOCATION (See instructions on reverse side) OFFICE	METHOD AND DATE OF LOCATION FIELD	CHARTS AFFECTED
LIGHT	DETOUR ENTRANCE LIGHT 2 USCGLL #12185	45 59	44.223	83 53	56.760		F-3-6-L	14882
LIGHT	DETOUR REEF LIGHT USCGLL #12120	45 56	56.791	83 54	11.207		F-3-6-L	14882
LIGHT	FRYING PAN ISLAND LIGHT USCGLL #12180	45 59	09.393	83 53	41.264		F-3-6-L	14882
LIGHT	PIPE ISLAND LIGHT USCGLL #12220	46 00	58.403	83 53	58.393		F-3-6-L	14882
LIGHT	PIPE ISLAND TWINS LIGHT USCGLL #12230	46 01	34.328	83 53	29.239		F-3-6-L	14882
LIGHT	SQUAW ISLAND LIGHT USCGLL #12240	46 02	19.699	83 54	15.004		F-3-6-L	14882
LIGHT	SWEETS POINT LIGHT USCGLL #12250	46 02	19.323	83 56	09.665		F-3-6-L	14882
LIGHT	WATSONS REEF LIGHT USCGLL #12195	46 00	33.410	83 53	58.494		F-3-6-L	14882

RESPONSIBLE PERSONNEL		
TYPE OF ACTION	**NAME**	**ORIGINATOR**
OBJECTS INSPECTED FROM SEAWARD		☐ PHOTO FIELD PARTY ☐ HYDROGRAPHIC PARTY ☐ GEODETIC PARTY ☐ OTHER *(Specify)*
POSITIONS DETERMINED AND/OR VERIFIED		FIELD ACTIVITY REPRESENTATIVE
		OFFICE ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		☐ REVIEWER ☐ QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'

(Consult Photogrammetric Instructions No. 64,

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS

Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object.

EXAMPLE: 75E(C)6042
8-12-75

FIELD

I. NEW POSITION DETERMINED OR VERIFIED

Enter the applicable data by symbols as follows:

F - Field	P - Photogrammetric
L - Located	Vis - Visually
V - Verified	
1 - Triangulation	5 - Field identified
2 - Traverse	6 - Theodolite
3 - Intersection	7 - Planetable
4 - Resection	8 - Sextant

A. Field positions* require entry of method of location and date of field work.

EXAMPLE: F-2-6-L
8-12-75

*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.

FIELD (Cont'd)

B. Photogrammetric field positions** require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object.

EXAMPLE: P-8-V
8-12-75
74L(C)2982

II. TRIANGULATION STATION RECOVERED

When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery.

EXAMPLE: Triang. Rec.
8-12-75

III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH

Enter 'V-Vis.' and date.

EXAMPLE: V-Vis.
8-12-75

**PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.

APPROVAL SHEET

APPROVAL SHEET

BASIC HYDROGRAPHIC SURVEY
OPR-X278-HFP
AHP-10-11-89
H-10313
1989

This basic hydrographic survey was conducted in accordance with the project instructions for OPR-X278-HFP, the hydrographic manual, the hydrographic survey guidelines, and the field procedures manual. The survey data and reports were completed under daily surpervision. All boat sheets and final field sheets were reviewed in their entirty and all supporting records were also checked.

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

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

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

WATER LEVEL NOTE FOR HYDROGRAPHIC SHEET

Processing Division: N/CG2441-Verification Section

Hourly heights are approved for: See Remarks
Water Level Station

Period: August 8, 1989 to September 19, 1989

HYDROGRAPHIC SHEET: H-10313

OPR-X278-AHP

Locality: St. Mary s River, MI

Plane of reference: Low Water Datum (IGLD ---: --- Feet)

Remarks: Use the following Water Level Station and corresponding Low Water Datum for this survey.

DETOUR DOCK, MI (907-5098) 576.8'

Harry A. Lippincott
Chief, Great Lakes Acquisition Unit

NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10313

Name on Survey	A ON CHART NO. 14882	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	
BLACK ROCK POINT	X									1
DE TOUR PASSAGE (title)	X									2
DE TOUR VILLAGE	X									3
DIX POINT	X									4
DRUMMOND ISLAND	X									5
FRYING PAN ISLAND	X									6
GAFFNEY POINT	X									7
LIME ISLAND CHANNEL	X									8
MICHIGAN (title)	X									9
PIPE ISLAND	X									10
PIPE ISLAND COURSE	X									11
PIPE ISLAND SHOAL	X									12
PIPE ISLAND TWINS	X									13
SAINT MARYS RIVER (title)	X									14
SQUAW ISLAND	X									15
SWEETS ISLANDS	X									16
SWEETS POINT	X									17
WATSON REEFS	X				Approved:					18
										19
					Charles E. Harrington					20
					Chief Geographer - N/CG2x5					21
					JUN 17 1991					22
										23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 61-29
(12-71)

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

REFERENCE NO. N/CG244-76-91

LETTER TRANSMITTING DATA

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

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

TO:

NOAA/NATIONAL OCEAN SERVICE
Chief, Data Control Section, N/CG243
Bldg. WSC-2, Room 151
6015 Executive Blvd.
Rockville, MD 20852

DATE FORWARDED: 12 November 1991

NUMBER OF PACKAGES: Three (3)

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.

H-10313 (AHP-10-11-89)
OPR-X278, MICHIGAN, ST. MARYS RIVER
DE TOUR PASSAGE TO SWEETS POINT

Pkg. 1: (Tube)
- ~~6~~ 6 Original Smooth Field Sheets
- ~~1~~ 1 Original Smooth Sheet
- ~~1~~ 1 Original Smooth Position Overlay
- ~~2~~ 2 Smooth Excess Sounding Overlays
- ~~1~~ 1 Original Descriptive Report

Pkg. 2: (Box)
- ~~1~~ 1 Accordian folder containing echograms and printouts for Year Days 219, 220, 222, 223, 226, 227, 228, 229, 235, 236, 240, 249, 254, 256, 257, 258, 262, 270, a photo record book, and miscellaneous data for Launch #519.
- ~~1~~ 1 Envelope containing data removed from the Descriptive Report.
- ~~1~~ 1 Envelope containing sounding corrector data (TRA, Velocity, and Smooth Tides).

FROM: (Signature) Maurice B. Hickson, III
Maurice B. Hickson, III

Return receipted copy to:

Chief, Atlantic Hydrographic Section,
N/CG244
Atlantic Marine Center
439 West York Street
Norfolk, VA 23510-1114

RECEIVED THE ABOVE
(Name, Division, Date)

Dwayne L. Clark
11/13/91

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

☆U.S.GPO:1978-0-765-092/1248

NOAA FORM 61-29
(12-71)

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

REFERENCE NO. N/CG244-76-91

LETTER TRANSMITTING DATA

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

☐ ORDINARY MAIL ☐ AIR MAIL

☒ ~~REGISTERED MAIL~~ Federal Express ☐ EXPRESS

☐ GBL *(Give number)* _____

TO:

NOAA/NATIONAL OCEAN SERVICE
Chief, Data Control Section, N/CG243
Bldg. WSC-2, Room 151
6015 Executive Blvd.
Rockville, MD 20852

DATE FORWARDED 12 November 1991

NUMBER OF PACKAGES Three (3)

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.

H-10313 (AHP-10-11-89)
OPR-X278, MICHIGAN, ST. MARYS RIVER
DE TOUR PASSAGE TO SWEETS POINT

Pkg. 3: (Box)
✓ Accordian folder containing echograms and printouts for Year Days 220, 222, 223, 226, 227, 228, and 251 for Launch #518.
✓ Cahier of Final Printouts.

FROM: *(Signature)* Maurice B. Hickson, III
Maurice B. Hickson, III

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

Chief, Atlantic Hydrographic Section,
N/CG244
Atlantic Marine Center
439 West York Street
Norfolk, VA 23510-1114

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

☆U.S.GPO:1978-0-765-092/1248

11/06/91

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H-10313

NUMBER OF CONTROL STATIONS		18
NUMBER OF POSITIONS		2600
NUMBER OF SOUNDINGS		13176
	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	28	11/14/89
VERIFICATION OF FIELD DATA	287	10/04/90
ELECTRONIC DATA PROCESSING	88	
QUALITY CONTROL CHECKS	162	
EVALUATION AND ANALYSIS	163	11/04/91
FINAL INSPECTION	21	10/04/91
TOTAL TIME	749	
ATLANTIC HYROGRAPHIC SECTION APPROVAL		11/05/91

COAST AND GEODETIC SURVEY
ATLANTIC HYDROGRAPHIC SECTION
EVALUATION REPORT

SURVEY NO.: H-10313 FIELD NO.: AHP-10-11-89

Michigan, St. Marys River, De Tour Passage to Sweets Point

SURVEYED: June 21 through September 27, 1989

SCALE: 1:10,000 PROJECT NO.: OPR-X278-AHP

SOUNDINGS: RAYTHEON DE-719C Echosounder, Lead Line, and Sounding Pole

CONTROL: MOTOROLA Falcon 484 Mini-Ranger (Range/Range)

Chief of Party.....V. D. Ross

Surveyed by.....C. E. Parker
.....M. J. Briscoe
.....D. B. Elliott
.....J. L. Budlong

Automated Plot by.....XYNETICS 1201 Plotter (AHS)

1. INTRODUCTION

a. No unusual problems were encountered during office processing of this survey.

b. Notes in the hydrographer's report were made in red during office processing.

c. Two insets are plotted on the smooth sheet. Both insets are plotted at the scale of 1:5,000 for clarity only. The data in the insets meet the 1:10,000 scale accuracy requirements.

2. CONTROL AND SHORELINE

a. Horizontal control is discussed in sections F., G., and S. of the hydrographer's report.

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

To place this survey on the NAD 1983 move the projection lines 0.051 seconds (1.6 meters or 0.16 mm at the scale of the

survey) south in latitude, and 0.051 seconds (1.1 meters or 0.11 mm at the scale of the survey) east in longitude.

b. Shoreline for this survey originates with a 1:10,000 scale enlargement of 1:20,000 scale final reviewed, Class III, Shoreline Manuscript TP-00361 of 1984. Shoreline changes found by the field unit survey are shown in red on the present survey. Shoreline features which have been disproved by this survey were not transferred from the shoreline manuscripts to the smooth sheet.

3. HYDROGRAPHY

a. There is adequate agreement at crossings.

b. The standard depth curves were drawn in their entirety with the exception of the zero curve. The zero curve could not be defined in many areas due to the hazardous foul areas along the shoreline. The charted 24-foot curve was drawn in its entirety on the smooth sheet. The supplemental 3-foot curve and a brown curve were added in areas where the bottom topography is not adequately depicted by the standard depth curves.

c. The development of the bottom configuration and investigation of features and least depths is considered adequate except the area of Watson Reefs and as follows:

Item (ft)	Latitude	Longitude	AWOIS
Holiday	45°59'40"N	83°54'00"W	8167
Shoal (6')	46°00'35"N	83°51'47"W	8168
Shoal (12')	46°00'38"N	83°53'20"W	8169
Shoal (30')	46°00'50"N	83°54'13"W	8170
Shoal (31')	46°00'56.5"N	83°54'18.5"W	8171
Shoal (21')	46°01'04.5"N	83°54'10.0"W	8172
Shoal (23')	46°01'05"N	83°54'14"W	8173
Shoal (7')	46°01'09"N	83°53'39"W	8174
Shoal (3')	46°01'12"N	83°51'09"W	8175
Rock (3')	46°01'13"N	83°51'04"W	8176
Shoal (43')	46°01'13"N	83°52'51"W	8177
Shoal (6')	46°01'16"N	83°55'44"W	8178
Shoal (22')	46°01'19"N	83°54'12"W	8179
Shoal (13')	46°01'23"N	83°54'04"W	8180
Shoal (10')	46°01'35"N	83°51'04"W	8181
Rock (7')	46°01'38"N	83°53'28"W	8182
Shoal (21')	46°02'33"N	83°55'03"W	8183
Shoal (17')	46°02'32"N	83°54'37"W	8184
Shoal (29')	46°02'51"N	83°52'01"W	8185
Shoal (29')	46°02'52"N	83°52'23"W	8186
Shoal (29')	46°02'59"N	83°52'03"W	8187

The following soundings brought foward from prior survey LS-1703 (1936) provide the shoalest soundings on four small shoals found by the present survey but not adequately investigated.

Item (ft)	Latitude	Longitude	
Shoal (11')	46°00'42.1"N	83°53'24.9"W	8188
Shoal (18')	46°00'15.2"N	83°53'55.6"W	8189
Shoal (2')	46°00'22.9"N	83°54'00.0"W	
Shoal (11')	46°00'34.5"N	83°54'11.7"W	8190

4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records, and reports adequately conform to the applicable requirements except for the lack of development of the bottom configuration and the lack of investigation of features as noted in section 3.c. of this report. Additionally, bottom samples were not taken on any of the shoal features mentioned in section 3.c. of this report. Whenever possible, least depths should be obtained on shoals located by the field unit.

5. JUNCTIONS

H-10302 (1989) to the west
H-10307 (1989) to the east
H-10309 (1989) to the north
H-10310 (1989) to the south
H-10311 (1989) to the northeast

Adequate junctions were effected between the present survey and surveys H-10302 (1989), H-10307 (1989), H-10309 (1989), H-10310 (1989) and H-10311 (1989).

6. COMPARISON WITH PRIOR SURVEYS

LS-1770 (1941) 1:10,000
LS-1703 (1936) 1:10,000
LS-1702A (1936) 1:10,000
LS-111 (1854) 1:15,840
LS-106 (1853) 1:15,840

The prior surveys listed above cover the present survey area in its entirety.

a. Prior surveys LS-1770 (1941), LS-1703 (1936), and LS-1702A (1936) are the most recent prior surveys common to the present survey. These prior surveys agree generally very well with the present hydrography, indicating little change in the bottom topography. The hydrographic features within the common areas such as shoals and natural channels compare well in regard

to size, shape, and least depths. Agreement between present and prior soundings is generally within 2 feet. However, in areas where the bottom has a steep slope, the agreement is not as good. The lack of agreement in these areas is considered largely due to the more accurate and sophisticated positioning and sounding equipment employed on the present survey. Additionally, these prior surveys have been supplemented with soundings from surveys of 1854, 1895, 1910, and 1938. It is impossible to positively identify the older prior soundings on the bromide copies provided. However, the soundings that appear to possibly originate with the 1854, 1895, and 1910 surveys do not agree well (6-10 feet deeper) with the present survey. Many shoreline features such as piers, jettys, groins, bulkhead, and breakwaters presently exist but were not in existence at the time of the prior surveys. It appears that the shoreline, particularly the small islands, are eroding or receding. One small island on prior survey LS-1702A (1936) in latitude 46°01'32"N, longitude 83°50'55"W was found to be a rocky shoal (foul area) by the present survey. There is no indication of how or when the shoreline was surveyed on these prior surveys. Additionally, the following should be noted:

1) A charted 10-foot sounding, in latitude 46°00'32.0"N, longitude 83°54'08.6"W, shown on LS-1703 (1936) with an 1895 source is considered disproved by the present survey.

2) AWOIS Items 5589, 5590, and 5591 originate with prior survey LS-1703 (1936). AWOIS Items 5589 and 5590 are in the vicinity of latitude 45°59'13"N, longitude 83°53'50"W and are adequately addressed in the Evaluation Report for junctional survey H-10310 (1989). AWOIS Item 5591 was investigated by the present survey and is adequately addressed in section K. of the Descriptive Report for this survey.

3) A charted area of ruins and piles, in the vicinity of latitude 45°59'40"N, longitude 83°53'53"W, originate with LS-1703 (1936) as a structure which appears to be a dock facility. This facility is portrayed as partially submerged at the north end with three rows of eight piles at the south end. Additionally, a pier leading to the facility is shown as submerged or in ruins. This feature was not found by the field unit and hydrography was conducted in the area of this feature. The portrayal on the main portion of chart 14882 is in error both in its representation and in its position. This feature was not addressed by the hydrographer and although no evidence of this feature was found, it is not considered disproved. This feature was brought forward to the present survey. It is recommended that this feature be revised to submerged ruins and submerged piles. Additional field work is recommended to verify or disprove the existence of this feature. # 8191

4) In the vicinity of latitude 45°59'35"N, longitude 83°53'55"W there are two rows of four piles on prior survey LS-1703 (1936). This feature is not charted on the main chart and apparently was removed from the main chart from some source not available to the evaluator. However, on the chart inset, two piles and a submerged rock are charted in the location of this prior feature. The present survey found a pier with the offshore end in ruins at this location. It is recommended that the findings of the present survey be charted in this area unless subsequent information indicate otherwise. Additional field work is recommended to determine what features, if any, exist in this area.

5) A "T" pier in ruins is shown on prior survey LS-1703 (1936) in latitude 46°00'02"N, longitude 83°54'00"W. This feature is not charted and apparently was removed from the chart from a source not available to the evaluator. The present survey found only a crib uncovering 2 feet at LWD in this area. This crib is presently charted as a submerged crib. It is recommended that the results of the present survey be charted in this area unless subsequent information indicate otherwise.

6) Five charted piles, in latitude 46°00'24"N, longitude 83°54'16"W, originate with LS-1703 (1936) as a pier with offshore piles (3 rows of 11 piles). The present survey found the area to be foul with crib ruins and a pile. It is recommended that the results of the present survey be charted in this area.

b. Prior surveys LS-111 (1854) and LS-106 (1853) are older prior surveys that provide only three charted soundings and four charted bottom characteristics within the common area of the present survey. LS-106 (1853) was not available for comparison during evaluation and since only one of the charted soundings originate with this prior survey, it was not ordered. The comparison of the present survey with LS-111 (1854) is of little value since this prior has no latitude/longitude grid and no horizontal or vertical datum information. A general comparisons was accomplished by aligning like features (such as small islands) as they would best fit. The comparison indicates poor agreement between present and prior hydrography. However, the topographic and hydrographic features within the common areas such as the main shoreline, small islands, shoals, and natural channels show that the basic structure of this area remains similar.

Except as noted above, the present survey is adequate to supersede the above prior surveys within the common area.

7. COMPARISON WITH CHART 14882 (28th Ed., Aug. 2, 1986)

a. Hydrography

The charted hydrography within the common area originates with the previously addressed prior surveys and from sources not readily available. The previously addressed prior surveys require no further consideration.

Chart 14882 was compiled from many sources with datums that are unspecified or not readily adjusted. Thus, many features, both exposed and submerged, show varying positional displacement.

Charted features which were found by the field unit and are verified as being correctly charted are not discussed in this report.

Chart 14882 has an inset of De Tour Passage at the scale of 1:20,000. The inset and the main chart differ in regard to several features within the common area. These differences are noted in the following discussions.

The alongshore areas and the offshore islands common to the present survey are charted with only a few isolated rocks being apparent. This survey shows that the shoreline (including the small islands) in this area is mostly rocky.

Attention is directed to section L. of the Descriptive Report where charting issues are addressed by the hydrographer. AWOIS Items 5591, 5593 and 5594 are common to this survey and are discussed in section K. of the Descriptive Report. Additionally, the following should be noted:

1) The field unit's note on the "Notes to Hydrographer" copy of TP-00361 submitted with the field records states that two piers exist in the vicinity of latitude 46°00'32"N, longitude 83°51'53"W, on the east side of Black Rock Point. The shoreline manuscript shows no piers in this area, and the hydrographer positioned only one pier. The pier located by the present survey corresponds to a charted pier. It is recommended that this area be charted as shown on the present survey smooth sheet and that additional field work be accomplished to resolve this discrepancy.

D N Pier

2) A charted pier in the vicinity of latitude 46°00'35"N, longitude 83°51'56"W was not investigated by the field unit and was not addressed by the hydrographer. This pier is not shown on TP-00361. It is recommended that this charted pier be charted as submerged pier ruins unless subsequent information indicates otherwise. Additional field work is

8192

recommended to verify or disprove the existence of submerged pier ruins.

3) A charted* crib in latitude 45°59'49.0"N, longitude 83°52'05.4"W is shown only on the chart inset. The "Notes to Hydrographer" copy of the shoreline manuscript indicates that a rock pile was found in this area. The hydrographer did not locate nor address this feature. No change in charting status is recommended. Additional field work is recommended to resolve this discrepancy. #8193

* From Feldschers Revisory Survey 1963

4) Two charted piers, in latitude 45°59'40"N, longitude 83°52'13"W and latitude 45°59'41"N, longitude 83°52'08"W, were not investigated by the field unit and were not addressed by the hydrographer. These piers are shown only on the chart inset. These piers are not shown on TP-00361. It is recommended that these charted piers be charted as submerged pier ruins unless subsequent information indicates otherwise. Additional field work is recommended to verify or disprove the existence of the submerged pier ruins. #8194 8195

5) The submerged cable crossing area between De Tour Village and Drummond Island was found to be significantly smaller than presently charted. The present survey noted the boundaries of this area by positioning four cable crossing signs. These signs are plotted on the smooth sheet. It is recommended that the chart compiler examine the source for charting the cable crossing area to ensure its correctness. Additionally it is noted that the cable crossing area on the chart inset are approximately 100 meters south of the boundary lines shown on the main chart.

6) A charted submerged rock in latitude 45°59'28.8"N, longitude 83°53'50.5"W, is shown only on the main chart. This submerged rock originates with an unknown source. The hydrographer did not locate nor address this feature, and the hydrography is not sufficient to disprove a submerged rock. It is recommended that this charted submerged rock be retained as charted. Additional field work is recommended to verify or disprove this feature. #8196

7) A charted pier in latitude 45°59'33.8"N, longitude 83°53'54.5"W is shown only on the main chart. The present survey did not find this charted pier. It is recommended that this pier be removed from the main chart.

8) A submerged rock is charted in latitude 45°59'35.6"N, longitude 83°53'54.5" on the chart inset but not on the main chart. The hydrographer did not locate nor address this feature. It is recommended that this submerged rock be retained as #8197

Bull. #7

Pier ~~[illegible]~~ Prev
not on Prev area
Ed.s - Topo in area
Changed Pier
not charted (inset)
~~brought main chit. into~~
agreement
Eli

charted. Additional field work is recommended to verify or disprove this feature.

9) At the entrance to De Tour Harbor, in the vicinity of latitude 45°59'42"N, longitude 83°53'54"W, a sunken wreck is noted on the "Notes to Hydrographer" copy of TP-00361. This sunken wreck appears to be near the charted ruins in this area which is discussed in section 6.a.4) of this report. This wreck was neither investigated nor addressed by the hydrographer. It is recommended that this sunken wreck be charted in the approximate position noted above as a dangerous sunken wreck, PA. Additional field work is recommended to accurately position and obtain a least depth on this wreck. # 8198

10) A potable water intake and a crib are charted in the vicinity of latitude 45°59'58"N, longitude 83°53'55"W. These features were neither investigated nor addressed by the hydrographer. It is recommended that the potable water intake and the crib be retained as charted. Additional field work is recommended to verify or disprove these features. # 8199 From CL 1417/75 COE PERMIT

11) Two charted piles, in latitude 46°00'53.0"N, longitude 83°55'01.0"W and latitude 46°00'53.5"N, longitude 83°55'02.0"W, were neither investigated nor addressed by the hydrographer. The hydrography in the area is not sufficient to disprove submerged piles. It is recommended that these two piles be retained on the chart but as submerged piles. Additional field work is recommended to verify or disprove the existence of these piles. # 8200 From Feldschers Revisory Survey 1954

12) A charted submerged crib, in latitude 46°01'10.8"N, longitude 83°55'34.9"W, was neither investigated nor addressed by the hydrographer. It is recommended that this charted submerged crib be retained as charted. Additional field work is recommended to verify or disprove this feature. # 8201

The present survey is adequate to supersede all charted hydrography within the common areas except as noted in section 6. of this report.

b. CONTROLLING DEPTHS

There are no conflicts between the present survey depths and the charted project depths of the Lime Island Channel and the Pipe Island Course.

c. AIDS TO NAVIGATION

Eight floating and seven fixed aids to navigation are plotted on the smooth sheet. All of these aids to navigation appear to adequately serve their intended purposes.

8. COMPLIANCE WITH INSTRUCTIONS

This survey adequately complies with the Project Instructions except as noted elsewhere in this report.

9. ADDITIONAL FIELD WORK

Except as noted elsewhere in this report, this is an adequate basic survey. Additional field work is recommended in sections 3.c., 6., and 7. of this report.

Douglas V. Mason
Cartographic Technician
Verification of Field Data

Maurice B. Hickson, III
Cartographer
Evaluation and Analysis

Robert R. Hill, Jr.
Senior Cartographic Technician
Verification Check

APPROVAL SHEET
H-10313

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 magnetic tape record for this survey. Final control, position, and sounding printouts of the survey have been made. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Robert G. Roberson Date:_____

Robert G. Roberson
Chief, Evaluation and Analysis Team
Atlantic 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.

Christopher B. Lawrence Date: 5 November 1991

Christopher B. Lawrence, CDR, NOAA
Chief, Atlantic Hydrographic Section

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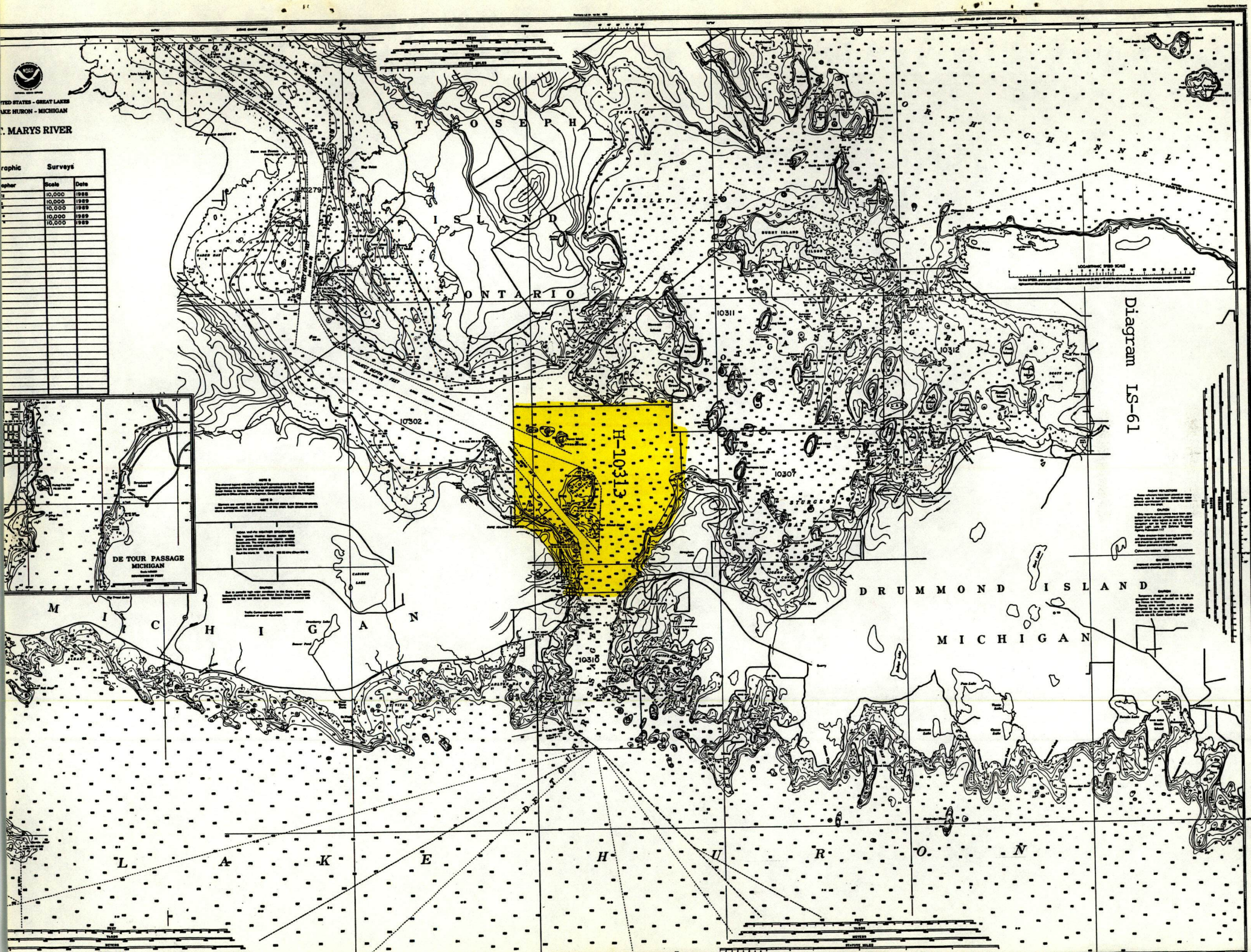
Final Approval:

Approved: J. Austin Yeager Date: Nov. 18, 1991

J. Austin Yeager
Rear Admiral, NOAA
Director, Coast and Geodetic Survey


UNITED STATES - GREAT LAKES
LAKE HURON - MICHIGAN
ST. MARYS RIVER
Surveys
Scale
Date
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10,000
1989
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1989
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1989
H-10313
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ST JOSEPH ISLAND
ONTARIO
NORTH CHANNEL
DRUMMOND ISLAND
MICHIGAN
LAKE HURON
DE TOUR PASSAGE
MICHIGAN
Diagram LS-61

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-10313

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
14882	2-4-91	Eli N Bodounac	Full ~~Part Before~~ After Marine Center Approval Signed Via Drawing No. 7 main cht. and inset
14881	3-26-92	Thomas J. Finnahan	Full ~~Part Before~~ After Marine Center Approval Signed Via Drawing No. 7 Applied thru 14882 #7
14880	5-22-92	Holly Clark	Full ~~Part Before~~ After Marine Center Approval Signed Via Drawing No. 6 appl'd thru 14881
			Full Part Before After Marine Center Approval Signed Via Drawing No.
			Full Part Before After Marine Center Approval Signed Via Drawing No.
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