9850

Diagram No. LS-5

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. PE-20-3-79

Office No. H-9850

LOCALITY

State Michigan

General Locality Lake Huron

Locality False Presque Isle to South Ninemile Point

1979-80

CHIEF OF PARTY
CDR C.D. North & LCDR G.W. Jamerson

LIBRARY & ARCHIVES

DATE May 5, 1982

☆U.S. GOV. PRINTING OFFICE: 1980—766-230

9850

NOAA FORM 77-28 (11-72) | U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTER NO. H-9850

HYDROGRAPHIC TITLE SHEET

FIELD NO. PE-20-3-79

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 ~~Great Lakes~~, Lake Huron

Locality ~~Middle Island~~ False Presque Isle to South Ninemile Point

Scale 1:20,000 ~~(Development 1:10,000)~~ Date of survey 17 September - 4 October 1979

nstructions dated 2 March 1979 Project No. OPR-X115-PE/HSB-79

Vessel NOAA Ship PEIRCE, Monark Vesno. 2837, Launch Vesno. 2838

Chief of party Commander C. Dale North, JR.

Surveyed by LT Chelgren, LTJG McCann, LTJG DaSilva, ST Morris

Soundings taken by echo sounder, hand lead, pole Raytheon DE-719B, Ross 5000 Fineline

Graphic record scaled by Ship's Personnel

Graphic record checked by LT Pamela Chelgren, LTJG DaSilva

Protracted by Program RK 201, PDP 8/E Hydroplot Automated plot by Complot DP5

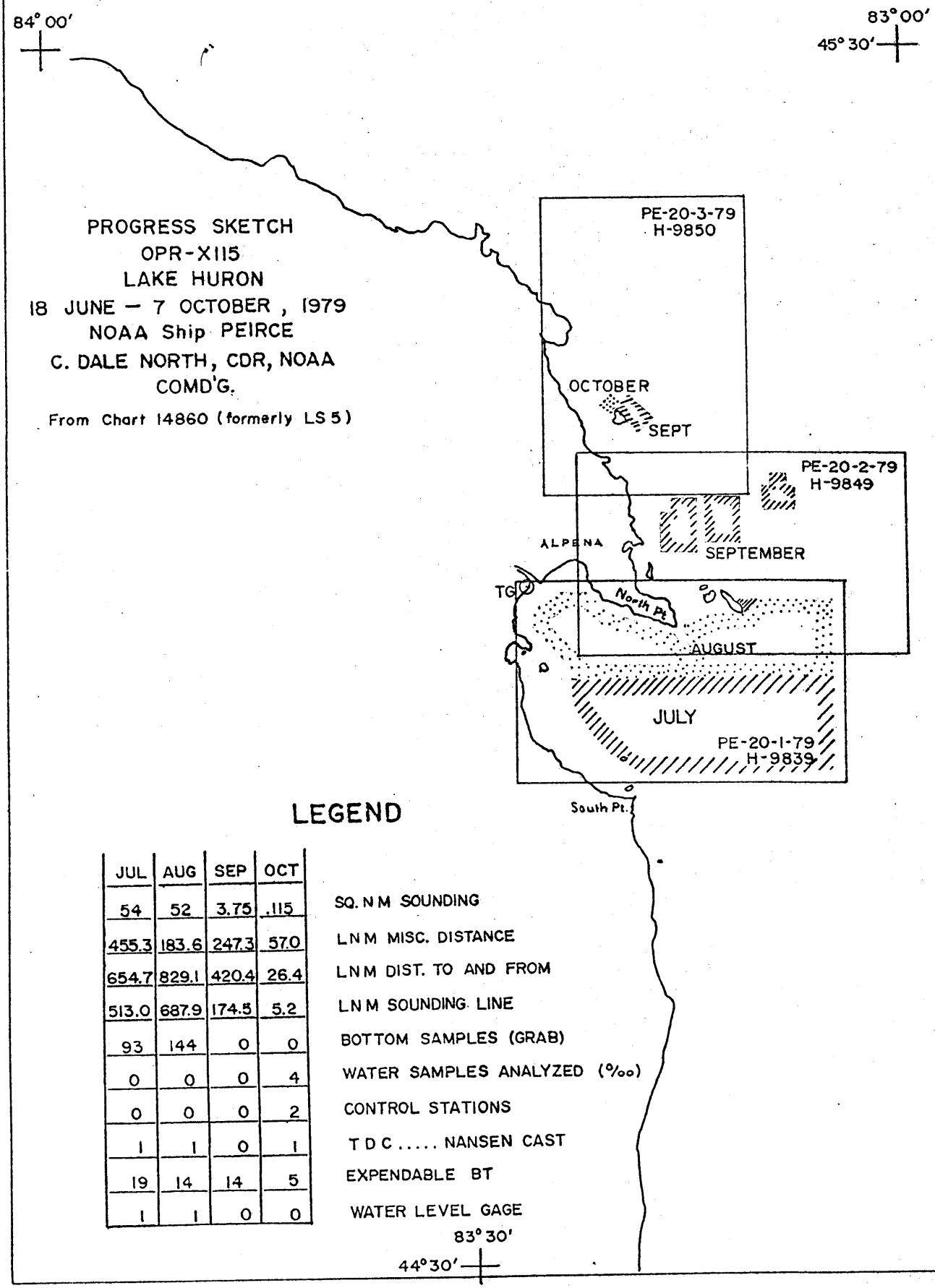
Verification by LT Chelgren, LTJG DaSilva, SAT Thompson

Soundings in ~~fathoms~~ feet at ~~MLW~~ ~~MLLW~~ IGLD, 1955 : 576.8 feet

REMARKS: All times throughout are Greenwich Mean Time. All depths given are reduced for predicted water levels, draft and velocity corrections. Only the shoreline hydrography off Middle Island was surveyed. This was plotted up as a development at a scale of 1:10,000. Field sheet only.

STANDARDS CK'D 1-24-84
C. Loy

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537. ☆ U.S. G.P.O. 1972-769-565/519 REG. #6



LEGEND

JUL	AUG	SEP	OCT	
54	52	3.75	.115	SQ. N M SOUNDING
455.3	183.6	247.3	57.0	L N M MISC. DISTANCE
654.7	829.1	420.4	26.4	L N M DIST. TO AND FROM
513.0	687.9	174.5	5.2	L N M SOUNDING LINE
93	144	0	0	BOTTOM SAMPLES (GRAB)
0	0	0	4	WATER SAMPLES ANALYZED (‰)
0	0	0	2	CONTROL STATIONS
1	1	0	1	T D C ..... NANSEN CAST
19	14	14	5	EXPENDABLE BT
1	1	0	0	WATER LEVEL GAGE

CONTENTS

* lined out material taken out of this report and put in accordian file.

DESCRIPTIVE REPORT

TO ACCOMPANY

HYDROGRAPHIC SURVEY H-9850

FIELD NO. PE-20-3-79

SCALE 1:20,000

SURVEYED SEPTEMBER TO OCTOBER, 1979

BY THE NOAA SHIP PEIRCE

CDR C. DALE NORTH, COMMANDING

DESCRIPTIVE REPORT
TO ACCOMPANY
HYDROGRAPHIC SURVEY H-9850
FIELD NUMBER PE-20-3-79

A. PROJECT

This survey is part of the Lake Huron Project conducted in accordance with Project Instructions OPR-X115-PE/HSB-79, dated 2 March 1979. Project Instructions were received from the Associate Director of Marine Surveys and Maps. This survey was conducted in support of the National Ocean Survey Nautical Charting Program.

B. AREA SURVEYED

This survey covers the area offshore of Middle Island on the western shore of Lake Huron. It extends from the northeast shore of the island to the 90-foot curve, running .4 nm to the northwest and 1.1 nm to the southeast. This area was surveyed at a scale of 1:10,000 because of the sounding density needed to properly delineate the contours over the steeply sloped rocky bottom. This shoreline was run in anticipation of the high-speed Launch 1255 completing the remaining deep water portion of the survey next year. The boundries are as follows:

North	45°12.7'N	West by Northwest 83°20.9'W
Southeast	45°10.9'N	East by Southeast 83°17.5'W

A sketch of the work area is included in the report. Hydrography commenced on 17 September 1979 and was completed on 4 October 1979.

C. SOUNDING VESSEL

All hydrography was performed by the following vessels from the NOAA Ship PEIRCE:

Launch 1008	VESNO 2838	Jensen Aluminum Launch
Skiff PE-7	VESNO 2837	Monark (with hull-mounted transducer)

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

The following sounding instruments were used throughout the survey:

VESNO	ECHO SOUNDER	JULIAN DAY	DEPTHS (Feet)
2837	Raytheon DE-719B, S/N 5497	260 - 268	2' - 99'
2837	Raytheon DE-719B, S/N 5441	269	5' - 74'
2838	Ross Model 5000, S/N 1078	262 - 277	6' - 104'

No other sounding instruments were used.

Corrections to soundings were calculated for the following factors:

1. Corrections for velocity of sound in lake water were computed graphically using Expendable Bathythermographs (XBT's) and barcheck/leadline data. The PEIRCE's XBT system is a Sippican Model No. R603D, S/N 781-209, modified to a 200 meter depth scale. The XBT data was compared to a Martex temperature, depth and conductivity meter (S/N 477) borrowed from Launch 1255. Two comparisons were made (July 26 and August 27, 1979) both comparing within the allowable tolerance.

On 8 October 1979 a Nansen cast was taken and temperatures agreed well with the XBT except for depths over 130 feet. Not enough samples were taken at this depth to properly delineate the temperature vs. depth curve.

Salinities, as determined by the Beckman Salinometer were .28 PPT or less and its affect was found negligible in determining sound velocities. This was proven by comparing the table output of RK530 (Layer Corrections for Velocity) with a salinity input of 00.00 vs. 00.28 PPT for the first 8 meters and 00.13 PPT for the remaining depths. The resulting velocity corrections for the same depths differed by less than 0.2%, which allowed the use of XBT data alone as input for RK530.

A list of positions for the XBT and Nansen Cast stations is as follows:

NANSEN CAST	XBT	LATITUDE	LONGITUDE	JULIAN DAY
	1	45°07.7'N	83°08.2'W	261
	2	45°11.7'N	83°17.8'W	264
	3	45°12.0'N	83°17.9'W	268
	4	45°12.0'N	83°18.0'W	271
	5	45°08.0'N	83°09.2'W	271
1	A	44°54.2'N	83°06.4'W	281
	B	44°54.2'N	83°06.4'W	281

Five XBTs were taken during this survey. They were grouped by chronological order into two velocity tables. Each table applies to both VESNO 2837 and VESNO 2838.

Two leadline and two barcheck comparisons were taken during the survey; one of each appears on both velocity tables. All four curves followed the general shape of the XBT curve but were displaced to the right approximately 0.2 feet. A draft correction of +0.2 feet was applied to all barcheck/leadline curves, according to Section 4.9.5.3 of the Hydrographic Manual, to compensate for this difference. This correction was accounted for on the TC/TI tape.

A list of velocity tables follows:

TABLE	XBT	JULIAN DAYS
1	1, 2	260 - 266
2	3, 4, 5	268 - 270

2. Fathometers (Ross and Raytheon) were maintained at a zero initial. Routine phase checks were performed on the Ross.

Two inaccuracies did occasionally occur with the Raytheon. The first was the result of a delayed event mark which had to be manually struck. This was easily corrected for by scaling off the proper location for the sounding using the marks before and after the one in question. The second inaccuracy was caused by a misplaced tide and draft setting normally set equal to zero (the draft being accounted for on the corrector tape). In certain areas, the setting was left on the one foot line (Positions 29 and 146-149). This was corrected for by decreasing the sounding accordingly. One problem arose with the Ross Echo Sounder. The bottom trace and event mark were blanked out between 8 and 10 feet. This problem occurred on Julian Days 262 and 268 and was corrected by a minor adjustment on the fathometer. All sounding data obtained during these days is accurate (since all depths were greater than 10 feet) with one exception. On Julian Day 262, between Position Numbers 2039 and 2040, the trace was broken due to this blanking effect. The entire line was rejected.

3. Settlement and squat corrections were determined in Alpena, Michigan on June 21, 1979. Speed changes were noted in the TRA correction abstract (appended) where settlement and squat corrections are also tabulated.

E. HYDROGRAPHIC SHEETS

The field sheet was plotted aboard the PEIRCE by the ship's PDP8/e computer and Complot roll-bed plotter. Field data is presented on one blow-up at a scale of 1:10,000 (Skew = 0, 21, 24). All hydrography was run as a development to delineate shoreline contours. The smooth sheet (36" x 60"; 1:20,000 scale) will be produced by the Atlantic Marine Center. All field records will be transmitted there for verification. Project parameters are appended to this report.

F. CONTROL STATIONS

Five electronic stations and one visual station were used to control this survey. They are as follows:

STATION NO.	NAME	REFERENCE
20	H-11-MI-77	AMC
21	H-12-MI-77	AMC
22	Misery, 1977	AMC (AMC position on a USLS Disk)
26	H-9-MI-77	AMC
27	H-10-MI-77	AMC
29	Middle LHECC 1979	AMC

The datum is North American 1927. All stations were established by the Atlantic Marine Center, Operations Division and met third order specifications. All electronic control stations were erected and maintained by ship's personnel. A list of geographic positions for each station is included in the appended signal list.

G. HYDROGRAPHIC POSITION CONTROL

Sounding line position control used was Del Norte in the Range/Range and Range/Azimuth (using a T-2 theodolite) mode. The following electronic positioning and related equipment were used during this survey:

EQUIPMENT	S/N	VESNO	JULIAN DAYS
Digital PDP8/e computer	0309219	2838	260 -277
Hydroplot Controller	0700003	2838	260 -277
Ross Echo Sounder Model 5000	1078	2838	260 -277
DMU/Master	190/1066	2838	262, 270 - 277
	173/912	2838	268
DMU/Master	190/1066	2837	260 -269

The DMU's were Model Number RO3C. The master and remote trisponders were Model Number 217C. A listing of the shore station Del Norte codes is as follows:

EQUIPMENT	S/N	SIGNAL NO.	JULIAN DAYS
Remote 72	1320	021	245 - 263 AM
		029	263 PM - 272
		021	273 - 277
Remote 74	1317	022	245 - 266 AM
		027	266 PM - 269
		022	270 - 277
Remote 76	188	020	249 - 263 AM
		026	263 PM - 269
		020	270 - 277

Baseline calibration for the DMU's were carried out over distances measured by Laser Geodimeter (AGA-76) as described in Appendix A, Section 5.1.3 of the Hydrographic Manual. The DMU's were adjusted to read the true baseline distance if they differed from it by more than 4 meters. The following calibrations were performed:

DATE	JULIAN DAY	BASELINE (METERS)
1 September 1979	244	2014
7 October 1979	280	2003

Copies of the calibration abstract are included in the field records. Daily calibrations were taken alongside a calibration pipe approximately 400m east of South Nine Mile Point. The pipe was cut-in by third order techniques (Spur Point off H-11-MI-79) on 12 September 1979 before any hydrogrpahy was run. The pipe was again located (by intersection) at the end of the field season on 5 October 1979. The inverse between the two positions was .65 meters. All records and computations are submitted with the field records. The maximum daily corrector was -60 meters for DMU/Master 190/1066 (JD 260, VESNO, 2837). This occurred because the Del Norte shore station remote being used (Code 74, S/N 1317) was a spare and the DMU was calibrated to the primary (Code 74) remote.

Due to the close proximity of the calibration pipe to the survey area, the calibration data is considered adequate for this survey.

The South Nine Mile Point Calibration Rates are as follows:

STATION NO.	STATION NAME	CODE	CALIBRATION RATE
20	H-11-MI-77	76	3035
21	H-12-MI-77	72	395
22	Misery, 1977	74	6373
26	H-9-MI-77	76	13229
27	H-10-MI-77	74	8086
29	Middle LHECC, 1979	72	5311

The calibration pipe was located as follows:

DATE	POSITION
12 September 1979	45/08/43.76 N 83/19/01.96 W
5 October 1979	45/08/43.74 N 83/19/01.96 W

Arcs were steered with the line spacing as specified in Section 4.3.4.1 in the Hydrographic Manual. South of Middle Island Lighthouse arcs of 100m spacing were steered off Station No. 22, MISERY. North of the light 90m arcs were steered (to allow for a 10 meter overlap) off Station No. 26, H-9-MI-77. Sufficient overlap between the two sets of arcs was run. One control problem was encountered (on JD 266, VESNO 2837) while steering arcs off Station No. 26 (H-9-MI-77) and using Range/Azimuth position control off Station No. 29, (MIDDLE LHECC 1979). This unusual set-up was required because the azimuth off the light was tangent to the arc from H-9-MI-77 which eliminated its use as the range station. The difficulty occurred on in-between sounding for which ranges alone were recorded. When plotted up these soundings were as much as 50 meters offline while all the fixes fell exactly on line. This occurrence seemed questionable and was deemed to be erroneous by the hydrographer. He claimed a maximum drift offline of 10-15 meters and this only occasionally. Further investigation revealed the source of the problem to lie in the unusual geometry of the control and the programming for the Range-Azimuth Position and Sounding Plot (RK 216). For inbetween soundings with range information the program interpolates the azimuth. This method works well when the azimuth station is at the center of the range circle steered but in this case the azimuth station was outside the range circle. In this case, due to geometry, the change in azimuth along the arc is no longer linear and therefore cannot be interpolated. When all range information for inbetween soundings was ignored the outcome was a straighter, more believable sounding configuration. Fixes were checked by time and course techniques and also for agreement with nearby soundings. In both cases, the hydrography checked well and was supported by the Launch OIC. All ranges for inbetween soundings were omitted on the master tape. A fix interval of five minutes was chosen because it met specifications (Section 1.4.5.1, Hydrographic Manual) for a 1:20,000 scale survey. It was decided afterwards to change the scale to 1:10,000.

All hydrography was plotted with an elevation of 23 meters for Middle LHECC 1979. It was later determined from the A point traverse used to cut in the station that the elevation was only 21 meters. The signal tape has been changed to the correct value.

H. SHORELINE

Shoreline on the field smooth sheet was traced from the contemporary survey LS K-1855, 1947 (scale 1:10,000) and is for orientation purposes only. Not on Smooth Sheet

I. CROSSLINES

Only three short crosslines were run along the shoreline. The total mileage amounted to .5 nm or one percent of the hydrography run. The lack of sufficient crosslines was an oversight by the PEIRCE. However, because of the multiple control set-ups required, there are overlap areas in the depths less than 50' where comparisons can be made. The agreement with main scheme is good when allowance is made for the rocky shoreline. 16% crossline with the 1980 work in this general area. Agreement good.

J. JUNCTIONS

This survey junctions with one contemporary survey.

SURVEY REGISTRY NO. See Verifiers Report	SCALE	DATE
LS K-1855	1:10,000	1947

Comparison with the field sheet was good, up to three feet. Allowance was occasionally made for the steep incline inshore and the less accurate position control governing the 1947 survey. Contours were drawn with the assistance of the soundings from the 1947 survey. A few deviations from the 1947 survey were found to exist. These were attributed to the smoothing of contours on the 1947 survey in areas with an insufficient sounding density.

The shoal buoy on the 1947 survey lies 200 meters east of its presently surveyed position. It now lies in 23 feet of water as described in the light list.

K. COMPARISON WITH PRIOR SURVEYS

There were no prior surveys available for comparison within the limits of the survey.

No presurvey review items were investigated but information was obtained on PSR #7, a dangerous submerged wreck at 45°14.0'N, 83°19.8'W (PA) with a reported depth of 38 feet. This wreck, a 300-foot steel barge lost by the tug Wilfred M. Cohen in 1976, was reported raised. An interview was held with Robert Massey, President of Pan Oceanic (a salvage company based out of Alpena). The insurance company, Lloyd's of London, commissioned Pan Oceanic to raise the barge. A motion picture documentary was made of the salvage. The Alpena newspaper carried the story at the time. It took several months to raise and is now being used on the Great Lakes. It is recommended this wreck be removed from the charts. Concur.

AWOIS #3200 RWD

L. COMPARISON WITH THE CHART

This survey was compared with NOS Charts 14864, 25 March 1978, Scale 1:120,000 and 14869, 25 November 1978, Scale 1:60,000.

Chart 14864 was enlarged six times and overlaid on the survey at a scale of 1:20,000. Distortion of the chart was considerable causing the results of the comparison to be questionable in accuracy. *The general layout of the contours appeared to be accurate as was the position of the shoal buoy. A discrepancy was discovered at the 31-foot sounding (45°11.4'N, 83°18.0'W) which plotted up in 76 feet of water.

Comparisons with Chart 14869 were made by transferring soundings using manual techniques. The shoal buoy and soundings agreed within 2' of the survey except for the following. It is recommended that these soundings be changed.

CHART SOUNDING	SURVEY SOUNDING	CHARTED LATITUDE/LONGITUDE	REMARKS
* 31' *from LS 1191*	60'	45°11.4'N 83°18.2'W	Charted sounding is .1 nm north of surveyed depth *See Verifiers Report 6. A. 1.*
* 27' *from LS 1191*	60'	45°11.5'N 83°18.6'W	Charted sounding .2 nm north of surveyed depth
9' *from LS 1855*	15'	45°11.2'N 83°18.7'W	Insufficient soundings to determine position error *falls off limits of present survey*

M. ADEQUACY OF SURVEY

This survey is complete and adequate to supercede the presently charted soundings except as noted in Section I. The survey is deficient in bottom samples as none were taken.

N. AIDS TO NAVIGATION

One buoy was located during this survey, MIDDLE ISLAND Buoy "13" (Position No. 2041). Although the Great Lakes Light List (Volume IV, 1979) describes the buoy (L.L. No. 1315) as just black can "13" it was found to have a green light and whistle. No position was listed so a position was scaled off Chart 14869 (Scale 1:60,000, 11/78) for comparison purposes. The positions agreed within the accuracy of the chart scale. *1982 LL updated to "13" Fl G*

The buoy adequately serves its intended purpose of marking the one-foot shoal southeast of Middle Island.

E reef awash shown on smooth sheet from LS-1855 (1947)

SURVEYED POSITION	CHARTED POSITION
45°11'1~~2~~*5*.2"N 83°18'1~~3~~*6*.0"W	45°11.25'N 83°18.20'W

There is a charted submerged cable on the west side of the island although it was not verified by the hydrographer.

O. STATISTICS

CATEGORY	VESNO 2837	VESNO 2838	VESNO 2830	TOTAL
Position Nos.	158	139	0	297
Nautical miles of sounding lines	20.4	31.9	0	52.3
Sq. nm. of sounding lines	.7	1.1	0	1.8
Nansen casts	0	0	1	1
XBT's	0	5	2	7
Water Level Stations				1
Bottom Samples	0	0	0	0

P. MISCELLANEOUS

The rocky irregular shoreline posed some difficulty when scanning. Constant peaks and deeps resulted from the rocky bottom which if scanned religiously, would have confused the plot with extraneous information. A good example are small pinnacles (e.g. Position 76, 175407 GMT) that lie along sharply rising slopes. Those that were towered over by the adjacent slope which had a shoaler depth only a few seconds away were not considered a hazard to navigation and not plotted. Consideration was given to developing the general contour without sacrificing both accuracy and least depth determinations.

On Julian Days 260 and 269 for VESNO 2837, inbetween soundings were rejected because the sounding interval was too close for a 1:20,000 scale survey. Only later on was a blow-up at 1:10,000 decided upon due to the rugged bottom profile.

Junction soundings between the two vessels were good, allowing for bottom characteristics. Many of the excessive junction sounding were rejected for the clarity of the plot. However, these soundings are available on the master tapes to be used at the discretion of the verifier.

Q. RECOMMENDATIONS

It is recommended that the vessel completing this sheet run the crosslines which were overlooked. It is recommended that only the deep water (greater than 50 feet) crosslines be run. The overlap of soundings inshore from two different boats and from different control set-ups is sufficient for comparison purposes.

From Section K, it is recommended the dangerous submerged wreck at Lat. $45^{o}14.0'$N, Long. $83^{o}19.8'$W (PA) with a reported depth of 38 feet be removed from the charts. Concur

R. AUTOMATED DATA PROCESSING

The following programs were used in acquiring and processing data:

PROGRAM NUMBER	PROGRAM NAME	VERSION
RK111	Range-Range Real Time Hydroplot	1/30/76
RK201	Grid, Signal & Lattice Plot	4/18/75
RK211	Range-Range Non-Real Time Plot	1/15/76
RK212	Visual Station Table Load	4/01/74
RK216	Range-Azimuth Non-real Time Plot	2/05/76
RK300	Utility Computations	2/05/76
RK330	Reformat & Data Check	5/04/76
PM360	Electronic Corrector Abstract	2/02/76
AM401	Transverse Mercator State Plane Coordinates - Forward & Inverse	4/01/73
AM405	Plane Coordinate Utility	7/01/69
AM406	Intersection Position Computation for Plane Coordinates	4/06/71
RK407	Geodetic Inverse/Direct Computation	9/25/78
RK530	Layer Corrections for Velocity	5/10/76
AM602	Elinore-Extended Line Oriented Editor	5/20/75

S. REFERENCE TO REPORTS

All data and field records are transmitted as part of this report.

Respectfully submitted for approval,

Gregory Da Silva

Gregory A. DaSilva
LTJG, NOAA

APPROVAL SHEET
PE-20-3-79
H-9850

The field work on this hydrographic survey was conducted under by routine supervision. The boat sheet and records have been reviewed and approved by me. The survey is complete and adequate for the area investigated with the exception of details mentioned to the contrary in Sections I and M. See Section Q for recommendations.

C Dale North

C. Dale North, Jr.
CDR, NOAA
Commanding Officer
NOAA Ship PEIRCE S-328

INDEX

* Material lined out taken out of this report and put in Accordian file.

NOAA FORM 77-28 (11-72)

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

REGISTER NO.

H-9850

HYDROGRAPHIC TITLE SHEET

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

FIELD NO.

PE-20-3-79

State Michigan

General locality ~~Great Lakes~~, Lake Huron

Locality ~~Middle Island~~ False Presque Isle to South Nine Mile Point (one word)

Scale 1:20,000 Date of survey 7 AUG - 29 SEP 1980

Instructions dated March 31, 1980 Project No. OPR-X115-WH/HSB-80

Vessel NOAA Launch 1255, VESNO 1255

Chief of party LCDR George W. Jamerson, NOAA

Surveyed by LT David A. Waltz, NOAA

Soundings taken by echo sounder, ~~hand lead, pole~~ Raytheon 723-D

Graphic record scaled by SW, RLK, RFT, DAW, JSB

Graphic record checked by SW, RLK, RFT, DAW, JSB

Protracted by _____ Automated plot by Field - Hydroplot AMC-Xynetics 1200

Verification by Verification Branch, AMC

Soundings in ~~fathoms~~ feet at ~~MLW~~ ~~MLLW~~ IGLD, LWD 576.8 feet

REMARKS: SW - Steve Weisner RLK - Reginald Keene

RFT - Randy Trefethen DAW - David A. Waltz

JSB - Scott Bradford

NOTE: This descriptive report covers work done during the 1980 Field Season. Survey H-9850 was begun in 1979 by NOAA Ship PEIRCE. A separate report was prepared by that unit and is appended to this report.

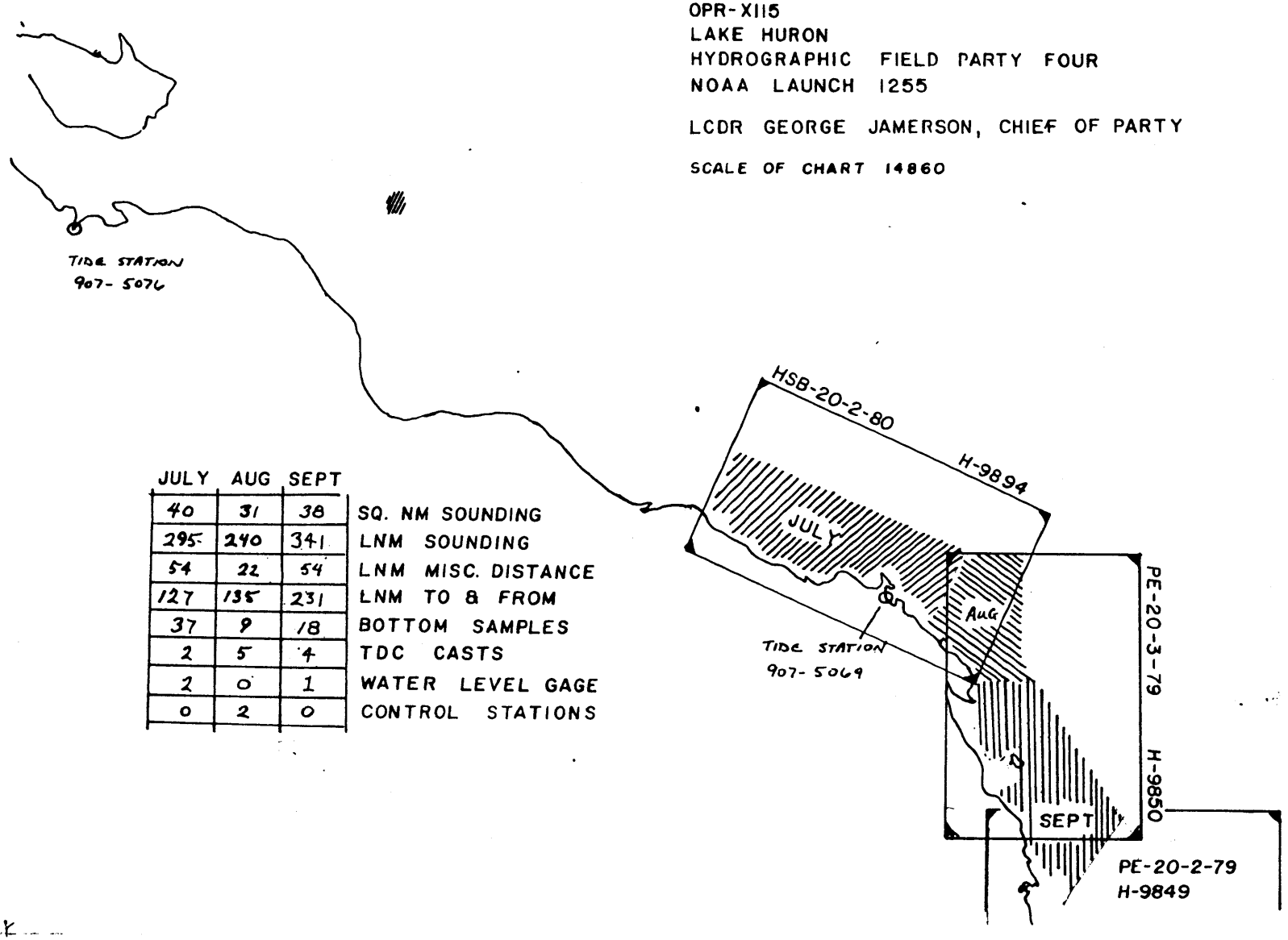
all times are GMT.

☆ U.S. GPO: 1974-0-768-081/1207

PROGRESS SKETCH
OPR-X115
LAKE HURON
HYDROGRAPHIC FIELD PARTY FOUR
NOAA LAUNCH 1255

LCDR GEORGE JAMERSON, CHIEF OF PARTY

SCALE OF CHART 14860



JULY	AUG	SEPT	
40	31	38	SQ. NM SOUNDING
295	240	341	LNM SOUNDING
54	22	54	LNM MISC. DISTANCE
127	135	231	LNM TO & FROM
37	9	18	BOTTOM SAMPLES
2	5	4	TDC CASTS
2	0	1	WATER LEVEL GAGE
0	2	0	CONTROL STATIONS

DESCRIPTIVE REPORT
TO ACCOMPANY
HYDROGRAPHIC SURVEY H-9850
PE-20-3-79

Scale: 1:20,000
Chief of Party: Lt. Cdr. George W. Jamerson
Officer-in-Charge: Lt. David A. Waltz
Hydrographic Surveys Branch
Hydrographic Field Party Four
NOAA Launch 1255

A. PROJECT

This survey was begun during the 1979 field season by NOAA Ship PEIRCE, which accomplished inshore hydrography in areas unreachable by the high speed Launch 1255. Work done by the PEIRCE was governed by Project Instructions OPR-X115-PE/HSB-79. A separate descriptive report was prepared for this work, and is appended to the present report. Due to the inability of Launch 1255 to work in areas done by PEIRCE boats, only junctional hydrography was made with this work.

This survey was accomplished under Project Instructions OPR-X115-WH/HSB-80, dated March 31, 1980, and amended by the following changes:

Change No. 1 dated April 4, 1980
Change No. 2 dated April 11, 1980
Change No. 3 dated April 23, 1980
Change No. 4 dated May 21, 1980
Change No. 5 dated July 16, 1980
Change No. 6 dated July 23, 1980
Change No. 7 dated September 9, 1980

B. AREA SURVEYED

The survey area was in Lake Huron, in the vicinity of Middle Island, and was bounded by the following points:

1.	45°09.0'N	83°13.8'W
2.	45°09.0'N	83°20.0'W
3.	45°17.6'N	83°24.5'W
4.	45°22.8'N	83°20.0'W
5.	45°16.5'N	83°20.0'W

C. SOUNDING VESSEL

All soundings obtained on this survey were obtained from NOAA Launch 1255. (Vesno 1255). All survey records are annotated with the vessel number 1255.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

The following Raytheon fathometer equipment was used during the survey:

JD 220 - 273

Recorder	Model DE-723D
	Serial #37018
ECU	Model DE 723D
	Serial #2132
Digitizer	Model DDM
	Serial #1907

The fathometer was monitored continuously while sounding and was under constant adjustment to insure that no initial corrections were necessary. A digital phase checker was used at the beginning of the survey to adjust all depth scales.

One equipment problem occurred which requires note. On several days, distinctive paired spikes appeared on the fathogram. These spikes occurred at somewhat regular intervals and were more pronounced at deeper depth scales. The problem could not be corrected by swapping either ECU or recorder, and so was assumed to be caused by some electrical or acoustic interference from other systems on the sounding vessel. The frequency and voltage meters on the fathometer recorder showed steady readings while the spikes were occurring. An example of the spikes are found between positions 60 and 62 on JD 220.

Settlement and squat tests on Launch 1255 were run on July 8, 1979, at Calcite, Michigan. The results of these tests are included in the appendices to this report. Settlement and squat corrections will be applied via the TC/TI tape during plotting of the smooth sheet at the Atlantic Marine Center, and were not applied to the field sheets.

Velocity and instrument corrections were determined by bar check and TDC casts. TDC casts were taken at the following locations and dates:

JULIAN DAY	LATITUDE	LONGITUDE
220	45°17.4'N	083°21.8'W
235	45°15.9'N	083°20.5'W
252	45°16.2'N	083°19.5'W
259	45°14.8'N	083°19.0'W
263	45°10.8'N	083°15.0'W
268	45°12.6'N	083°17.1'W
269	45°11.5'N	083°16.0'W
274	45°09.1'N	083°15.8'W

Velocity corrections from these casts were curved and abstracted. From the abstracted data, corrections were grouped such that no sounding would be in error by more than 0.25% from velocity causes. All correctors below depths actually observed were extrapolated from straight line extensions of the velocity curves. Supporting velocity correction printouts and curves are included in the survey records. The velocity correction abstract and printouts of the correction tables used are included in the appendices of this report.

Days of hydrography were grouped with velocity data in the following manner:

TDC CAST	DAYS OF HYDRO
JD 220	JD 220, 221
JD 235	JD 235
JD 252	JD 252, 254
JD 259	Not Used
JD 263	JD 262, 263
JD 268	JD 267, 268
JD 269	Not Used
JD 274	JD 273

A bar check taken in calm water was graphed against a TDC (velocity) curve of the same date and location, on JD 252. A displacement of the two curves of about 0.2 foot was observed. This displacement is equal to the combined residual instrument error plus draft error and will be applied as a correction via the TC/TI tape.

The TDC used for this survey was a Martec Model 101-10, serial 477. The bar check apparatus used chain to suspend the bar and was measured against a steel tape at the beginning and end of the field season. A zero chain correction resulted from these measurements.

E. SURVEY SHEETS

The field sheets were prepared in the field using a PDP8/e computer and a DP-3 complot plotter. Work sheets, field sheets, and overlay sheets are included with this survey. Mainscheme hydrography is plotted on the smooth field sheet while crosslines, developments and bottom samples are shown on the overlay sheets. A printout of the parameter tapes for the field sheets are included in the appendices. The smooth sheet will be plotted and verification accomplished for this survey at the Atlantic Marine Center using the Harris/7 computer and the Xynetics 1201 plotter.

F. CONTROL STATIONS

Horizontal control stations used during this survey were either existing geodetic control published by NGS or were established by Hydrographic Surveys Branch or Operations Division, AMC, to third order standards or better. All stations are referred to the North American 1927 datum. A list of all control stations used during this survey is included in the appendices.

G. HYDROGRAPHIC POSITION CONTROL

The method used to control this survey was the Argo DM-54 medium range system, operating in the range-range mode. The following equipment was used:

Mobile Station - Launch 1255:

ALU Serial #A047851
RPU Serial #R0379121

CDU Serial #CO37940
Power Supply Serial #V0379112
Strip Chart Serial #S097960

Pattern One Station - (Hydroplot Station No. 200)
ALU Serial #A0379119
RPU Serial #R0379116
Power Supply Serial #V0478108

Pattern Two Station - Tour (1980) (Hydroplot Station #100)
ALU Serial #A047849
RPU Serial #R0377107
Power Supply Serial #V0379122

All Argo stations used 37-foot Shakespeare whip antennas. Smoothing code two was used throughout the survey. The Argo system worked extremely well, with no equipment failure at all. The only problems encountered were due to electrical interference from thunderstorms.

The control equipment was calibrated by twice daily sextant calibrations, visibility permitting. Hydroplot program RK561 was used to compute calibration fixes. An average of four fixes with less than five meter inverse was required for a complete calibration.

Daily calibration of the Argo system was done off Rogers City, Michigan, which is about 20 miles west of the survey area. When horizontal control stations became available on JD 221, calibration was made in the survey area off Presque Isle Harbor, Michigan. A difference in partial correctors between the two locations was observed to be about 0.12 lane for Pattern One, and 0.18 lane for Pattern Two. These differences were confirmed by further calibration on JD 225.

Partial correctors used for plotting the field sheet were those obtained from calibrations in the survey area off Presque Isle Harbor. Printouts of the RK561 program are included with the survey records, including JD 225 which confirms the partial corrector differences.

The cause of these differences is not known. The signal path from Pattern One did cross a small land area (the Presque Isle Pennisula), but Pattern Two involved no land path at all, and the difference was greater for that station.

No equipment change or malfunction occurred during the survey that would affect the problem. Brief experimentation was made "off-line" on changes to signal propagation velocity that might affect the observed difference in calibrations. No changes in the calibration difference was observed for different propagation velocities.

The signal propagation velocity used for this survey was 299,350 km/sec, as directed by the Hydrographic Manual. The actual

Argo frequency used was 1648.60 KHz. A dummy frequency of 1650.36 KHz was used on the hydroplot signal tape, and was derived by the method given in the Hydrographic Manual, Section 4.4.3.4.

An abstract of all calibration values is included in the appendices, and actual calibration printouts are located in the survey records.

All hydrography after Julian Days 220 and 221 was controlled by the Del Norte trisponder system, operating in a range-range mode. The master unit on the sounding vessel was mounted on a pipe mast about 30 feet in height. Remote units on shore were mounted on aluminum tower sections from 10 to 20 feet high.

The following equipment was used:

EQUIPMENT	SERIAL	
DMU	179	JD 235 - 273
Master	1070	JD 235 - 273
Buffer	123	JD 235 - 273
Master Antenna	121	JD 235 - 273
Remote Code 72	245	JD 235 - 273
Remote Code 76	217	JD 235 - 273
Remote Code 78	667	JD 235 - 273
180° Atennna	345	JD 235 - 273
180° Antenna	344	JD 235 - 273
90° Antenna	12	JD 235 - 273
90° Antenna	08	JD 235 - 273

As with the Argo system, the Del Norte control was calibrated with twice daily sextant calibrations using Program RK561. Only calibrations with an inverse of five meters or less were used, and four calibrations were averaged each morning and afternoon. The final field sheet was plotted using an average of morning and afternoon correctors.

In addition to sextant calibration, each Del Norte remote unit was baseline calibrated between stations H-17A-MI-78 (1979) and Calcite Breakwater Light #813 (1956). The initial baseline calibration was made prior to use of the equipment. Subsequent calibrations were made on JD 266 to confirm a drift in sextant calibration readings. Remote units were undergoing rough use at this time in the rugged shoreline of the area, and this is assumed to be the cause of the drift. A final baseline calibration was made after the survey was completed.

A Del Norte calibration abstract is appended to this report. RK561 printouts are filed with the survey records, and baseline calibration data is located on Page 72 of the sounding volume.

H. SHORELINE

There was no shoreline delineated on this survey.

I. CROSSLINES

Crosslines constitute 16% of the mainscheme hydrography. 90% of all crossings agree within one foot, and 99% within three feet. No soundings disagree at crossing by more than six feet. The reason for these disagreements is believed to be due to unapplied changes in water level because of wind set-up, and to steep bottom topography in areas of larger disagreement.

J. JUNCTIONS

This survey junctions with the following surveys:

H-9720 (1977) to the north
H-9894 (1980) to the northwest
H-9709 (1977) to the east
LS-1854 (1947) to the west
LS-1855 (1947) to the west
LS-1856 (1947) to the southwest
LS-1855 (1947) to the southwest

The present survey junctions well with the Lake Survey Center surveys. Of 107 soundings compared, 70% agree within one foot, and 92% agree within three feet. The reason for the disagreements is believed to be due to steep bottom topography and unapplied changes in water level due to wind setup.

Survey H-9894 (1980) was done by NOAA Launch 1255 and junctions well with the present survey. 86% of the soundings compared agree within one foot, and 98% within three feet. MT MITCHELL surveys H-9709 and H-9720 (1977) also agree well. 65% of the soundings compared from these surveys agree within one foot, and 96% within three feet.

The hydrographer recommends that in the junction areas, the soundings from the present survey be charted.

K. COMPARISON WITH PRIOR SURVEYS

The survey area was covered by two prior surveys, both from the Lake Survey Center:

LS-1190 (1910) 1:20,000 scale
LS-1191 (1910) 1:20,000 scale

Of 162 soundings compared from these two surveys, 55% agree within one foot, and 81% within three feet. Most of the disagreement with these surveys occurred in depths greater than 100 feet and is believed to be due to the relative inaccuracy of the methods used in 1910.

The following presurvey review items fell within the survey limits. Reference the presurvey review OPR-520-MI-77 dated May 10, 1977, updated through March 5, 1980, by OPR-X115-WH/HSB-80, Change One.

✓ - charted 32' 8/1945

ITEM 6: A 32-foot shoal, charted in the vicinity of Lat. 45°15.0'N, Long. 83°20.0'W. This item was developed with north-south lines run normal to the mainscheme lines. Mainscheme east-west lines were run at 100m spacing over the shoal. A least depth of 33 feet (using approximate water level correctors) was found over this shoal. This depth was found at position no. 916 +1, and again at position no. 791 between the second and fourth sounding out. In addition, at the end of the day on JD 262, a drift investigation using the fathometer was made over these positions. No further least depth was found. The surveyed least depths are located approximately 50 to 75 yards east of the 32-foot depth of Survey L-1191.

AWOIS #3198

Recommendation: Chart soundings from the present survey only if smooth water level correctors reduce the least depth to 32 feet or less, otherwise retain the 32-foot sounding from L-1191.

The 32-foot sounding from LS-1191 was brought forward to supplement this survey.

ITEM 7: A submerged dangerous wreck, PA, charted in Lat. 45°14.0'N, Long. 083°19.8'W. This item is addressed in the descriptive report written by the PEIRCE, which is appended to this report. A dashed circle item over a 27-foot shoal was located at approximate position 45°12.5'N, 083°21.2'W. This item was investigated on JD 262. Development lines at right angles to the mainscheme lines were run, and the mainscheme lines were split to 100m spacing. A 27-foot sounding was obtained at position no. 659 +4, about 200m northwest of the 27.3 foot sounding obtained from prior survey L-1191. Two 28-foot soundings were found in the area of the prior survey 27.3-foot sounding.

Recommendation: Chart soundings from the present survey if smooth water level corrections reduce these soundings to 27 feet or less. Otherwise, chart the 27-foot sounding from survey L-1191.

concur

L. COMPARISON WITH THE CHART

This survey was compared to Charts 14860 (26th Edition), 14864 (20th Edition), 14880 (25th Edition) and Chart 14869 (21st Edition). Chart 14864 was enlarged to 1:20,000 scale for a direct overlay comparison.

This survey is in good agreement with charted features. A charted 31-foot sounding in the vicinity of 45°15.4'N, 083°21.7'W was investigated on JD 262. This sounding ~~appears to~~ originates from a 31-foot depth from Survey L-1191 of 1910. The present survey obtained a 32-foot least depth over this position. The present survey's soundings should be charted over this feature if smooth water level correctors reduce the least depth to 31 feet or less. Otherwise the 31-foot sounding from L-1191 should be charted.

31-foot sounding carried forward.

A charted 15-foot sounding in the vicinity of 45°14.6'N, 083°22.0'W was the subject of a limited investigation on JD 262. 100m spaced lines were run over the position. Further investigation was not made because the feature lies in the junctional area covered by survey L-1854 (1947). An 18-foot least depth was found at position no. 485 +1, JD 252. The 15-foot sounding from Lake Survey Center L-1854 should be charted.

15' sounding is from LS 1191 (1910) and has been carried forward to the present survey.

Two areas of Chart 14864 show the positions of stakes. One area in the vicinity of 45°12.5'N and 083°22.5'W is labeled "Stakes", while the other area in the vicinity of 45°10.0'N and 083°20.4'W is labeled "Submerged Net Stakes". These features were outside the survey area and not specifically investigated, but no evidence of any stakes either above or below the water surface was found. Local knowledge in the area indicates that any net stake left untended for more than a few winters would be destroyed by ice if it were located in water less than 20 feet deep. The hydrographer recommends that the charted stakes remain as charted until disproved by wire drag techniques. concur

M. ADEQUACY OF SURVEY

This survey is complete and adequate to supersede prior surveys for charting in the common areas.

N. AIDS TO NAVIGATION

Two floating aids to navigation were ~~located~~ charted in the survey area. One of these, Stoneport Approach Buoy "1", a black, unlighted can, was not located. This aid will be located during the 1981 field season.

Middle Island Lighted Bell Buoy "13", LL No. 1315.50, was located on JD 263. The buoy was as described in the Light List, and adequately serves the purpose for which it was intended. No position was listed in the Light List, but a scaled position from Chart 14864 compared well with the surveyed position.

Fixed aids to navigation are reported on NOAA Form 76-40, included in the appendix.

O. STATISTICS

Number of Positions	1351
Nautical Miles Sounding Line	292
Nautical Miles of Crossline	48
Nautical Miles of Development	15
Total Miles of Hydrography	355
Bottom Samples	27
Bar Checks	1
TDC Casts	6

P. MISCELLANEOUS

None.

Q. RECOMMENDATIONS

See Section K & L for specific recommendations.

R. AUTOMATED DATA PROCESSING

The following Hydroplot system programs were used during this survey:

PROGRAM		VERSION
RK111	Range-range Real Time Hydroplot	1/30/76
RK201	Grid, Signal and Lattice Plot	4/18/75
RK211	Range-range Non-real Time Plot	1/15/76
RK300	Utility Computations	2/05/76
RK330	Data Reformat and Check	5/04/76
PM360	Electronic Corrector Abstract	2/02/76
RK530	Layer Corrections for Velocity	5/10/76
RK561	H/R Geodetic Calibration	2/19/75
AM602	Extended Line Oriented Editor	5/20/75

S. REFERENCE TO REPORTS

Horizontal Control Report, OPR-X115-HFP-79.

Respectfully submitted,

Robert Lewis

Lt. David A. Waltz, NOAA
OIC, Hydrographic Field Party #4

PE-20-3-79
H-9850
PEIRCE WORK

SIGNAL TAPE LISTING

020	3	45	09	40925	083	20	55022	250	0000	000000	H-11-MI-77, 1977, AMC
021	3	45	08	31220	083	18	58489	250	0000	000000	H-12-MI-77, 1977, AMC
022	3	45	05	23944	083	17	53719	250	0000	000000	MISERY, 1977 USLS
024	3	45	11	35470	083	19	15701	139	0023	000000	MIDDLE IS. LT. HSE. 1956, NOS
026	3	45	14	37279	083	24	44529	250	0000	000000	H-9-MI-77, 1977, AMC
027	3	45	12	11242	083	22	47977	250	0000	000000	H-10-MI-77, 1977, AMC
029	1	45	11	35516	083	19	15589	250	0001	000000	MIDDLE LHECC, 1979, AMC

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)

TO BE CHARTED / TO BE REVISED / TO BE DELETED	REPORTING UNIT (Field Party, Ship or Office)	STATE	LOCALITY	DATE
[X] / [ ] / [ ]	NOAA Ship PEIRCE	Michigan	Alpena	Sept. 21,79

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
OPR-X115-PE/HSB-79	N.A.	H-9850	North American 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
MIDDLE ISLAND LIGHT	White conical tower - no strip L.L. NO. = 1315, 1905 (Middle Island Lighthouse) (1915)	45-11	35.470	83-19	15.701		F-2-6-V 9/12/79	14869 14864 14860
	Removed from Ch. L-810 (84)							

RESPONSIBLE PERSONNEL		
TYPE OF ACTION	**NAME**	**ORIGINATOR**
OBJECTS INSPECTED FROM SEAWARD	G. DaSilva, LTJG, NOAA	☐ PHOTO FIELD PARTY ☒ HYDROGRAPHIC PARTY ☐ GEODETIC PARTY ☐ OTHER *(Specify)*
POSITIONS DETERMINED AND/OR VERIFIED	C. Dale North, CDR, C.O. NOAA Ship PEIRCE	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. GOVERNMENT PRINTING OFFICE: 1974-665-073/1030 Region 6

SIGNAL TAPE PRINTOUT H-9850 1980 WORK VESNO 1255

001	7	45	24	55069	083	49	11739	139	0000	000000 ROGERS CITY MUNICIPAL WATER TANK (1956)
004	7	45	25	02997	083	46	22979	139	0000	000000 CALCITE BREAKWATER LT. NO. 813 (1956)
005	7	45	24	36049	083	47	12012	139	0000	000000 CALCITE LT. NO. 816 (1956)
008	7	45	26	01865	083	49	50657	139	0000	000000 H-17-MI-78 (1978)
100	7	45	57	49261	083	59	37629	250	0000	165036 TOUR (1980)
200	7	45	29	11010	083	54	48836	250	0000	165036 H-13A-MI-77 (1980)
546	7	45	21	23359	083	29	32378	139	0000	000000 PRESQUE ISLE LT. (1979)
548	7	45	19	50497	083	27	48878	139	0000	000000 H-22B-MI-79 (1979)
551	7	45	20	31213	083	28	41766	139	0000	000000 OLD PRESQUE ISLE LT. (1980)
554	7	45	17	48480	083	25	07935	250	0000	000000 H-23-MI-79 (1979)
555	7	45	17	48152	083	25	08801	139	0000	000000 STONEPORT LIGHT (1980)
557	7	45	16	35062	083	23	15492	250	0000	000000 H-27-MI-79 (1979)
560	7	45	16	10797	083	22	53978	250	0000	000000 H-30-MI-79 (1979)
561	7	45	12	11230	083	22	47972	250	0000	000000 H-10-MI-77 (1979)
562	7	45	09	40913	083	20	55018	250	0000	000000 H-11-MI-77 (1979)
564	7	45	05	23032	083	17	53720	250	0000	000000 MISERY USCS
568	7	45	02	14215	083	11	39305	250	0000	000000 THUNDER BAY LT. ECC. (1979)
569	7	45	02	14167	083	11	39325	139	0000	000000 THUNDER BAY LT.
570	7	45	08	30953	083	18	58464	250	0000	000000 H-12-PtA
572	7	45	11	35470	083	19	15701	139	0000	000000 MIDDLE ISLAND LT.

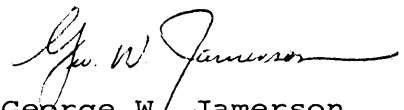
FOR VERIFICATION OF THE ABOVE POSITIONS SEE AMC OPERATIONS (Jim SHEA) OR HYDROGRAPHIC SURVEYS BRANCH SUPPORT SECTION.

APPROVAL SHEET
SURVEY H-9850 (PE-20-3-79)

The hydrographic records transmitted with this report are complete and adequate to supersede prior surveys for charting with no additonal field work recommended.

Direct daily supervision was not given by me during the field work.

Approved and forwarded,



George W. Jamerson
Lt. Cdr. NOAA
Chief, Hydrographic Surveys Branch

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

WATER LEVEL NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Atlantic Marine Center: CAM3

Hourly heights are approved for

Water Level Station Used: Presque Isle, Michigan (907-5069)

Period: Sept. 17 - 27, 1979

HYDROGRAPHIC SHEET: H-9850

OPR-X115-PE/HSB-79

Locality: Lake Huron

Plane of reference: Low Water Datum (IGLD 1955 : 576.8 Feet)

Remarks:

Zoning not required. Data from other gages on Lake Huron indicates no unusual water level movement during the survey period.

Philip C. Morris 3/25/80
Chief, Water Level Branch

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

WATER LEVEL NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Atlantic Marine Center: CAM3

Hourly heights are approved for

Water Level Station Used: Presque Isle, Michigan (907-5069)

Period: August 7, 1980 - September 29, 1980

HYDROGRAPHIC SHEET: H-9850

OPR- X115-WH/HSB-80

Locality: Lake Huron

Plane of reference: Low Water Datum (IGLD 1955 : 576.8 Feet)

Remarks:

Zoning not required. Data from other gages on Lake Huron indicated no unusual water level movement during the survey period.

for Richard Goodnough
Philip C. Morris
Chief, Water Level Branch

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-9850

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO.	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
~~BEEL~~ BOLTON POINT	14864									1
~~DEVILS LAKE~~	14864									2
FALSE PRESQUE ISLE	14860 14864									3
FERRON PT.	14864									4
~~LONG LAKE CREEK~~	14864									5
MIDDLE ISLAND	14860 14864									6
ROCKPORT	14864									7
SOUTH NINE (one word) MILE PT	14864									8
LAKE HURON	14869									9
~~MICHIGAN~~ ~~MIDDLE ISLAND~~	14869									10
MORRIS BAY	14869									11
FALSE PRESQUE ISLE HARBOR	14869									12
										13
										14
										15
										16
										17
										18
					Approved:					19
					Chas. C. Harrington					20
					Chief Geographer ~~CG2x5~~					21
					2 MARCH 1983					22
										23
										24
				(16.)						25

NOAA FORM 76-155 SUPERSEDES C&GS 197

APPROVAL SHEET
FOR
SURVEY H-9850

A. All revisions and additions made on the smooth sheet during verification have been entered in the magnetic tape records for this survey. A new final position printout has/~~has not~~ been made. A new final sounding printout has/~~has not~~ been made.

B. The verified smooth sheet has been inspected, is complete, and meets the requirements of the HYDROGRAPHIC MANUAL. Exceptions are listed in the Verification Report.

Date: April 19, 1982

for Leroy G. Crane

Chief, Verification Branch

NOAA FORM 77-27 (5-77) | U. S. DEPARTMENT OF COMMERCE NOAA | HYDROGRAPHIC SURVEY NUMBER H-9850

HYDROGRAPHIC SURVEY STATISTICS

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	BOAT SHEETS & PRELIMINARY OVERLAYS	6
DESCRIPTIVE REPORT	1	SMOOTH OVERLAYS: POS. ARC, EXCESS	1, 2, 3

DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/ SOURCE DOCUMENTS
ENVELOPES	X					
CAHIERS			2 - Bar			
VOLUMES	X					
BOXES			1 - am. Plo, misc data, 3 sound. Vol.			

T-SHEET PRINTS (List)

SPECIAL REPORTS (List)

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

PROCESSING ACTIVITY	AMOUNTS: PRE-VERIFICATION	AMOUNTS: VERIFICATION	AMOUNTS: TOTALS
POSITIONS ON SHEET			1648
POSITIONS CHECKED		15	
POSITIONS REVISED		0	
SOUNDINGS REVISED		30	
SOUNDINGS ERRONEOUSLY SPACED			
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED			
	TIME – HOURS		
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)	21		
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS		66	
VERIFICATION OF SOUNDINGS		163	
COMPILATION OF SMOOTH SHEET		48	
APPLICATION OF TOPOGRAPHY			
APPLICATION OF PHOTOBATHYMETRY			
JUNCTIONS		4	
COMPARISON WITH PRIOR SURVEYS & CHARTS		36	
VERIFIER'S REPORT		12	
OTHER			
TOTALS	21	329	350

Pre-Verification by LGC, RLK	*Beginning Date* 4/21/81	*Ending Date* 4/27/81	
Verification by JL, RLK, LGC	*Beginning Date* 9/15/81	*Ending Date* 4/7/82	
Verification Check by H.R. Smith	*Time (Hours)* 10	*Date* 12/15/82	
Marine Center Inspection by HYDROGRAPHIC INSPECTION TEAM	*Time (Hours)* 10	*Date* April 14, 1983	
Quality Control Inspection by L. Quinlan	*Time (Hours)* 113	*Date* 9/15/82	
Requirements Evaluation by R.W. Derkazarian	*Time (Hours)* 6	*Date* 12/12/83	

G. Myers 4 hrs. 2/8/83

REGISTRY NO. H-9850

The magnetic tape containing the data for this survey has not been corrected to reflect the changes made during evaluation and review.

When the magnetic tape has been updated to reflect the final results of the survey, the following shall be completed:

MAGNETIC TAPE CORRECTED

DATE_____ TIME REQUIRED_____ INITIALS_____

REMARKS:

ATLANTIC MARINE CENTER
VERIFICATION REPORT

REGISTRY NO.: H-9850 FIELD NO.: PE-20-3-79

Michigan, Lake Huron, False Presque Isle to South Nine Mile Point

SURVEYED: September 17 through October 4, 1979 and August 7 through September 29, 1980

SCALE: 1:20,000 PROJECT NO.: OPR-X115

SOUNDINGS: DE-723 B&D Fathometers
Ross Digital Echo Sounder

CONTROL: ARGO (Range-Range)
Del Norte (Range-Range)
Del Norte/Theodolite
(Range/Azimuth)

Chief of Party . . . . . George W. Jamerson
. . . . . C. Dale North

Surveyed by . . . . . D. A. Waltz
. . . . . P. R. Chelgren
. . . . . R. X. McCann
. . . . . G. A. DaSilva

Automated Plot by . . . . . Xynetics 1201 Plotter (AMC)

1. INTRODUCTION

a. Unusual problems that were encountered on this survey are as follows:

1) Two different field units (NOAA Ship PEIRCE and HFP-4) worked on this survey in two different years (1979 and 1980). There are two sets of records (Field Sheets, Descriptive Reports, etc.) for this survey. The Descriptive Reports were combined under one cover.

2) One area of hydrography on this sheet is in question. There are three lines of hydrography in the vicinity of Latitude 45°11'54", Longitude 83°19'39" which do not appear to agree with the hydrography on either side of these lines. These lines fall nearly one atop one another. The position numbers for these lines are as follows: 2077 through 2079, 2080 to 2081 and 3096 to 3097. All these lines were run by a NOAA Ship PEIRCE launch close to Middle Island. One line was controlled by range-azimuth (3096 to 3097) and the other two lines were run using Del Norte in the range-range mode. The control and fathograms were closely examined but nothing could be found that would explain the seemingly abnormal appearance of the depths and curves in this area. The charted data and the prior survey data is sparse in this area and does not help in explaining this apparent problem. The field may have been able to assure that this data isn't an apparent discrepancy by running a crossline close into shore in this area (See Section 4 of this report).

Soundings are considered valid

b. Notes and changes were made in red ink in the Descriptive Report during verification.

2. CONTROL AND SHORELINE

a. The source of control is adequately described in Sections F and G of the Descriptive Report.

b. No contemporary shoreline maps were available for this survey.

3. HYDROGRAPHY

a. The agreement at crossings on this survey is adequate; depths agree within the limits prescribed by the Hydrographic Manual.

b. The standard depth curves generally could be adequately drawn. Supplemental curves were used to better delineate some features. The 30-foot curve which was the general inshore limit of the survey could not be fully delineated and small portions of the inshore limits of the 60-foot curve could not be fully delineated.

c. This survey is considered adequate to delineate the basic bottom configuration and to determine least depths with the below listed exception and when consideration is given to the supplemental data from prior surveys that were brought forward to the present survey.

1) A 27-ft. shoal depth in Latitude 45°10'41", Longitude 83°18'08" rising from surrounding depths of 33 to 42 feet was not sufficiently developed to insure the least depth was obtained on this feature. Survey LS-1190 (1910) identified this area as having a rocky bottom.

2) A shoal feature with survey depths to 22 feet extending into surrounding deeper depths of 33 to 39 feet was not sufficiently developed to delineate its maximum extent and to insure that least depths were found. ~~Same shoal as #4 below~~

3) Survey shoaling to 35 feet in Latitude 45°13'17", Longitude 83°21'32", falling in surrounding depths of up to 50 feet was not sufficiently developed to insure that the least depths were obtained. ~~Disregard~~ 35' depth ~~as it~~ is ~~only~~ an extension of a known shoal. 34

4) A shoal with survey depths to 19 feet in Latitude 45°14'54", Longitude 83°22'03", falls in surrounding survey depths of over 30 feet was not sufficiently developed to insure that least depths were obtained. See also Section G. of this report. (1973)

4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records and reports comply with the Hydrographic Manual with the following exceptions:

a. The lack of notes in the sounding volumes and the incomplete nature of the notes found on the raw data printouts detracted from the completeness of the survey. (No detached positions were abstracted.)

b. Bar checks for the 1980 (HFP-4) work were not taken in accordance with Sections 1.5.2. and 4.9.5.1.1. of the Hydrographic Manual. The bar checks (if) were not used for the determination of sound velocity; however, they should have been used to ascertain there was no instrument error.

c. The field failed to run a crossline close inshore on the 1979 (PEIRCE) work. While there are no specific areas of the Hydrographic Manual that address the running of along shore crosslines, it does address the importance of using crosslines (check lines) to check apparent discrepancies in the main line system (Section 4.3.6.). The problem discussed in Section 1.a.2) of this report could have been resolved by using a check line to verify or disprove this apparent discrepancy.

5. JUNCTIONS

H-9707 (1977)	to the east
H-9720 (1977)	to the north
H-9894 (1980)	to the northwest
H-9849 (1980)	to the south (NOT IN HQ)

The junction with H-9894 (1980) and H-9720 (1977) is complete and requires no further work. The junction with H-9707 (1977) should be inked to agree with the curves on H-9850 (1979). The junction with H-9849 (1980) will be considered with that survey.

There were no contemporary junctional surveys to the west of the present survey. The three surveys; LS-1854 (1947), LS-1855 (1947), and LS-1856 (1947) were not considered as contemporary junctional surveys and were discussed under Section 6. of this report.

6. COMPARISON WITH PRIOR SURVEYS

LS-1181	(1909)	1:20,000
LS-1190	(1910)	1:20,000
LS-1191	(1910)	1:20,000
LS-1838	(1945)	1:120,000
LS-1845	(1946)	1:120,000
LS-1854	(1947)	1:10,000
LS-1855	(1947)	1:10,000
LS-1856	(1947)	1:10,000

The above prior surveys from the U.S. Army Corps of Engineers, Lake Survey Center, were determined to be the most appropriate for comparison purposes in the area common to the present survey.

The prior surveys earlier than 1946 are generally in agreement within 1 to 3 feet (75%), with the present survey being shoaler by these amounts. There are differences (25%) for from 4 to 10 feet with the present survey being shoaler by these amounts. These greater differences are generally from the 60 ft. curve offshore to the limits of the hydrography. The prior surveys later than 1946 appear to be shoaler by from 1 to 2 feet.

The basic bottom configuration and least depths are in fair agreement, with the present survey generally providing much better delineation of the bottom configuration.

It is reasonable to attribute these differences to improved methods of obtaining soundings and to improved positioning methods.

A large number of bottom characteristics and some ~~six~~ several soundings were carried forward to the present survey from these prior surveys. The soundings carried forward are as follows:

1) Three soundings and a sunken rock were carried forward from LS-1191 (1910) in the vicinity of Latitude 45°11'10", Longitude 83°18'28". These shoal soundings are a 1, 7 and 3-ft. used to supplement a shoal area not well developed by the field in this area. Two other soundings were considered in this area for possible inclusion on the smooth sheet. A charted 31-ft. sounding in Latitude 45°11'21", Longitude 83°18'11" which falls close to a 56-ft. depth on the present survey. The other was a 27-ft. charted sounding in Latitude 45°11'29", Longitude 83°18'36" which falls close to a 49-ft. depth on the present survey. These soundings were not carried forward to the present survey ~~because of the following reasons. There is some question as to the source as the black and white copy available at this time has soundings from 1858 surveys (LS-184 and LS-185) in blue and soundings taken in 1925 (red) by M. S. MacDiarmid. Also, these soundings~~ fall in an area of relatively steep bottom configuration where any positional error could explain the large differences between the present survey and the prior survey soundings. concur

It is recommended that the 27-ft. and 31-ft. soundings described above be evaluated by the chart compiler as to source and reliability of positional information on the source documents before making a selection of soundings for future charting. ✗ see below

2) A reef awash symbol was added to the present survey in the vicinity of Latitude 45°11'06", Longitude 83°18'30" from LS-1855 (1947). This prior survey had four rocks awash with the notation, "reef awash" in this area. The charted data showed three of the rocks awash with no notation. The hydrographer did not address this item and the hydrography was run on the north and south side of the feature. The reef symbol appears to better portray the probable condition in this area.

3) Three soundings were carried forward from LS-1191 (1910) in the vicinity of Latitude 45°14'33" Longitude 83°22'00". These soundings include a charted 15-ft. and two 16-ft. soundings. The 15-ft. depth was addressed in the Descriptive Report (HFP-4) under Section L.

Additional items were adequately addressed in Section K of the Descriptive Report and should be viewed in conjunction with this report.

With the addition of the bottom characteristics and the soundings described above to supplement the present survey, the present survey is considered adequate to supersede the prior surveys in the common area.

b. Wire Drag Surveys

LS-1181 (1909)
LS-1190 (1910)
LS-1191 (1910)

These surveys are basically hydrographic surveys with wire drag swept areas portrayed on the most inshore areas of these surveys. There are no conflicts between the effective depths of these wire drag areas and the present survey.

7. COMPARISON WITH CHARTS #14869 (21st EDITION, NOVEMBER 25, 1978)

✗ Shoal sndgs were not addressed by the hydrographer, soundings were not disproved. Sndgs 31 & 27 are from LS-1191 (1909-10) survey. Sndgs & curve were retained on chart.

Ralph B. Ross (Compiler)
7-25-85

a. Hydrography

All of the charted hydrography originates with the previously discussed prior surveys and no further consideration is required.

Additional information on some of the charted information can be found in the Descriptive Report for this survey.

The present survey is considered adequate to supersede the charted hydrography with consideration of the recommendations made in this report and the Descriptive Report.

b. Aids to Navigation

The aids to navigation appear to adequately mark the intended feature. One aid to navigation, Stoneport Approach Buoy "1" was never located. This aid was to be located in the 1981 field season and was not.

8. COMPLIANCE WITH INSTRUCTIONS

This survey adequately complies with the Project Instructions with the exceptions listed elsewhere in this report and the following:

a. The verification of charted features were not investigated in accordance with Section 4.12. of the Project Instructions dated March 2, 1979 (Item 6.a.2.) of this report is an example).

b. The landmarks were not investigated in accordance with Section 4.2.2. of the Project Instructions, dated March 31, 1980.

9. ADDITIONAL FIELD WORK

This is an adequate basic survey. Additional field work is recommended on the shoal features discussed in Section 4 of this report when and if the inshore area is resurveyed.

Reginald L. Keene
R. L. Keene
Cartographic Technician
Verification of Data

Leroy G. Cram
Leroy G. Cram
Cartographer
Evaluation and Analysis

April 7, 1982

Harry R. Smith
Harry R. Smith
Senior Cartographic Technician
Verification Check

INSPECTION REPORT
H-9850

The completed survey has been inspected by the Hydrographic Inspection Team with regard to survey coverage, delineation of depth contours, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The Verification Report has presented the facts accurately and properly, the procedures used were appropriate, and the recommendations are logical and justifiable. The survey complies with National Ocean Survey requirements except as noted in the Verification Report. The survey records comply with NOS requirements except where noted in the Verification Report. The Hydrographic Inspection Team concurs with the verifier's findings, actions, and recommendations.

Examined and Approved
Hydrographic Inspection Team

Karl Wm. Kieninger, CDR, NOAA
Chief, Processing Division

R. D. Sanocki
Chief, Verification Branch
Processing Division

Evelyn J. Fields, LT, NOAA
Field Procedures Officer
Operations Division

Approved/Forwarded
April 15, 1982

Richard H. Houlder, RADM, NOAA
Director, Atlantic Marine Center

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
CHARTING AND GEODETIC SERVICES
Rockville, Md. 20852

N/CG242:LQ

November 30, 1983

TO: Roy K. Matsushige
Chief, Hydrographic Surveys Branch

THRU: Chief, Quality Control Section

FROM: Lisa Quinlan
Quality Evaluator

SUBJECT: Quality Control Report for Survey H-9850 (1979-80), Michigan, Lake Huron, False Presque Isle to South Ninemile Point

A quality control inspection of H-9850 was accomplished to monitor the survey for adequacy with respect to data acquisition, delineation of the bottom, determination of least depths, navigational hazards, junctions, sounding line crossings, smooth plotting, decisions made and actions taken by the verifier, and the cartographic presentation of data. In general, the survey was found to conform to National Ocean Service standards and requirements except as stated in the Verifier's Report.

The following statement supplements section 5 of the Verifier's Report:

No contemporary surveys junction with the present survey on the west. However, survey depths are in harmony with charted depths in these areas.

cc:
N/CG241

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
CHARTING AND GEODETIC SERVICES
Rockville, Md. 20852

N/CG241:RWD

JAN 3 1984

TO: N/MOA - Wesley V. Hull

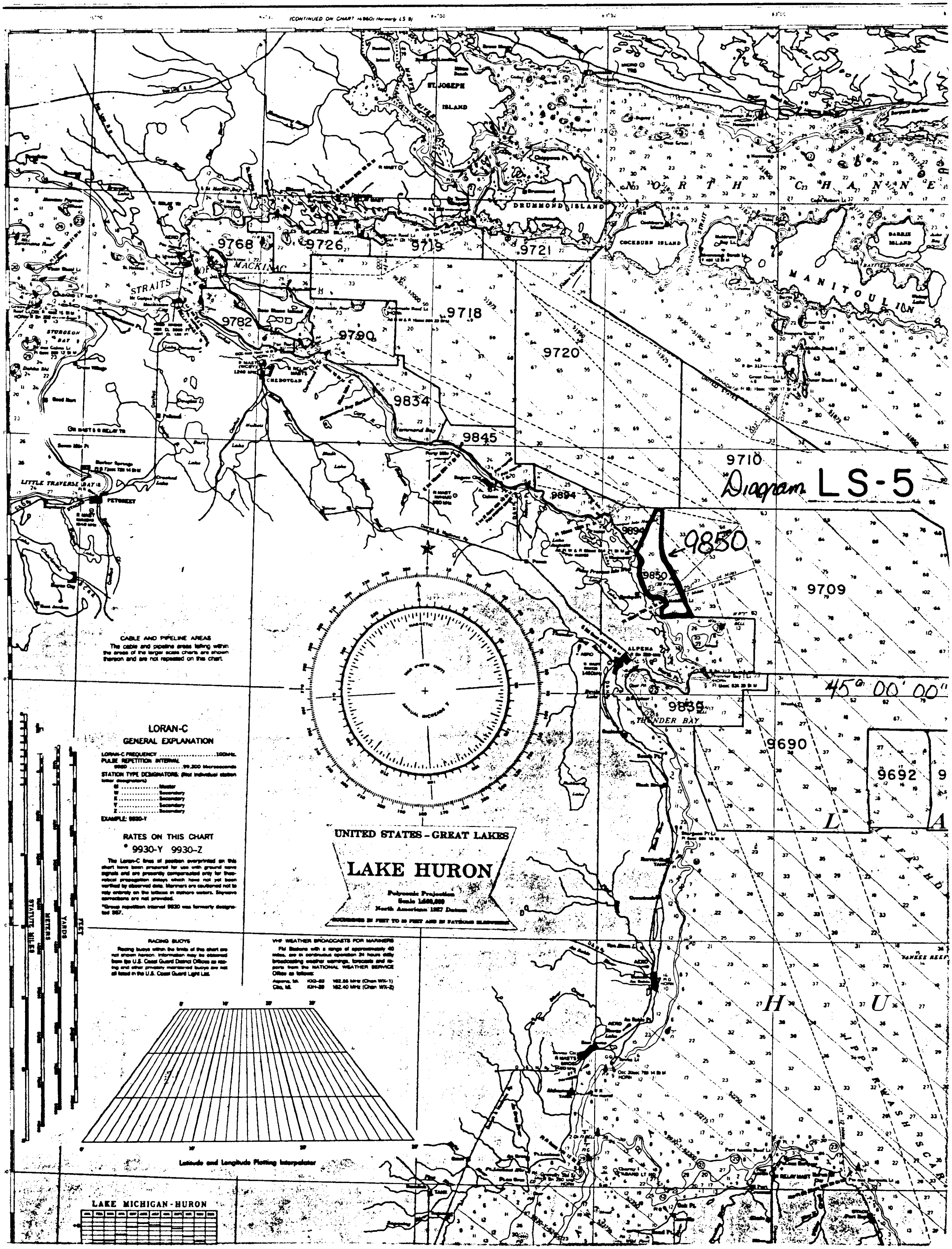
FROM: for N/CG2 - C. William Hayes Signed R. Peters

SUBJECT: Report of Compliance for Survey H-9850

The smooth sheet and Descriptive Report for survey H-9850 (1979-80), Michigan, Lake Huron, False Presque Isle to South Ninemile Point, have been reviewed. This survey, except as noted in the Quality Control Report, dated November 30, 1983 (copy attached), and the Hydrographic Survey Inspection Team Report, dated April 15, 1982, is complete and adequate for the purposes intended and is in compliance with Project Instructions OPR-X115-PE/HSB-79, dated March 2, 1979.

Attachment

cc:
N/CG242 w/o att.


(CONTINUED ON CHART 14860)
Diagram LS-5
9850
9768
9726
9719
9721
9718
9720
9782
9790
9834
9845
9894
9710
9709
9690
9692
9835
45° 00' 00"
ST. JOSEPH ISLAND
DRUMMOND ISLAND
COCKBURN ISLAND
NORTH CHANNEL
MANITOULIN
MACKINAC
STRAITS
CHEBOYGAN
LITTLE TRAVERSE BAY
PETOSKEY
ALPENA
THUNDER BAY
CABLE AND PIPELINE AREAS
The cable and pipeline areas falling within the areas of the larger scale charts are shown thereon and are not repeated on this chart.
LORAN-C
GENERAL EXPLANATION
RATES ON THIS CHART
9930-Y 9930-Z
UNITED STATES - GREAT LAKES
LAKE HURON
Polyconic Projection
North American 1927 Datum
RACING BUOYS
VHF WEATHER BROADCASTS FOR MARINERS
Latitude and Longitude Plotting Interpolator
LAKE MICHIGAN-HURON
STATUTE MILES
METERS
YARDS
FEET
L
A
H
U

FORM C&GS-8352
(3-25-63)

NAUTICAL CHART DIVISION

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9850

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
14869	7-25-85	Ralph B. Ross	Full ~~Part Before~~ After Verification Review Inspection Signed Via
	8/85	[illegible]	Drawing No. 5 applied in full
14864	7-29-85	Ralph B. Ross	Full ~~Part Before~~ After Verification Review Inspection Signed Via
	8/85	[illegible]	Drawing No. 5 applied in full.
14860	8-2-85	Ralph B. Ross	Full ~~Part Before~~ After Verification Review Inspection Signed Via
	8/85	[illegible]	Drawing No. 7. Converted to fathoms and applied in full.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.
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