

LISA

9690

Diag. Cht. No. LS-5

NOAA FORM 76-35A U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SURVEY DESCRIPTIVE REPORT (HYDROGRAPHIC)	
Type of Survey	Hydrographic
Field No.	MI-50-1-77
Office No.	H-9690
LOCALITY	
State	Michigan
General Locality	Lake Huron
Locality	Offshore Sturgeon Point to Thunder Bay Island
<hr/> 1977	
CHIEF OF PARTY Melvin J. Umbach	
LIBRARY & ARCHIVES	
DATE	August 30, 1978

9690

Area 7

14867

14860

HYDROGRAPHIC TITLE SHEET

H-9690

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.

MI-50-1-77

State MICHIGAN

General locality LAKE HURON

Locality OFFSHORE STURGEON POINT TO THUNDER BAY ISLAND, MICHIGAN

Scale 1:50,000 Date of survey 20 JUNE 1977 (JD 171) TO 30 JULY 1977 (JD 211)

Instructions dated APRIL 21, 1977 Project No. OPR-520-MI-77

Vessel NOAA SHIP MT MITCHELL S222

Chief of party CDR MELVIN J. UMBACH, NOAA

Surveyed by SEE REMARKS

Soundings taken by echo sounder, ~~hand lead, pole~~ ROSS MODEL 5000 FINELINE

Graphic record scaled by DAW, VEN, DRR, MEH, KEO, PMD, TDR, MLM, WDP

Graphic record checked by PWS, NGP, MAW, EEM, JTK, RAK, FDS

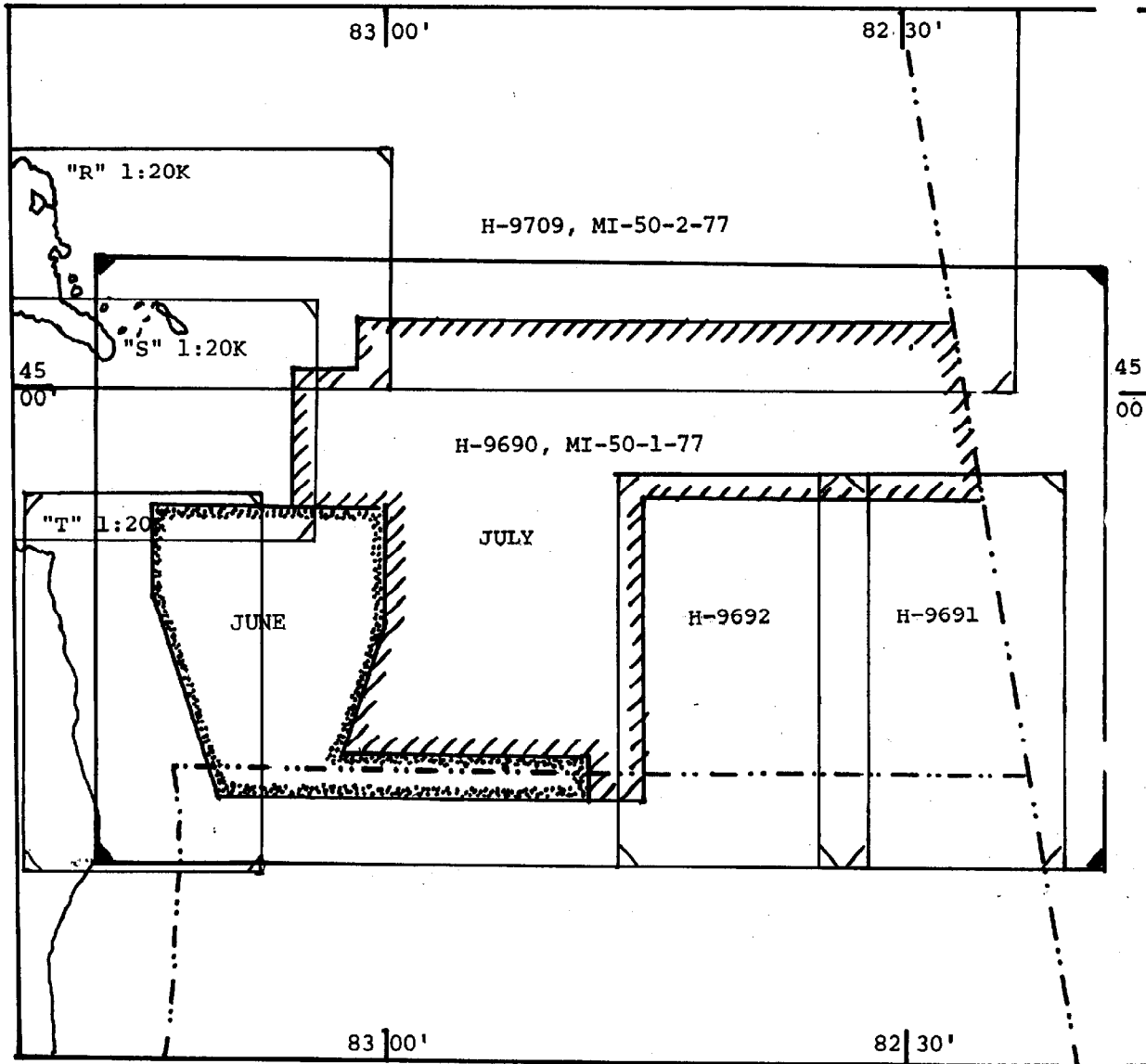
Protracted by N/A Automated plot by CALCOMP - 618 (AMC) HYDROPLOT SURVEY SYSTEM

Verification by N/A B.J. Stephenson

Soundings in ~~feet~~ feet at ~~100m~~ LWD
(IGLD 1955: ~~568.6 ft~~ 576.8 ft)

REMARKS: LCDR G. MILLS, LTJG D. WALTZ, LTJG V. NEWELL, LTJG D. RICE,
ENS M. HENDERSON, ENS K. OLSON, ENS P. DAUGHERTY, ENS T. RULON, ENS W. PRINGLE,
ENS M. MURPHY.

app'd standard
12-29-78
WJT



SCALE OF CHART #14860

PROGRESS SKETCH
 H-9690
 MI-50-1-77
 NOAA SHIP MT. MITCHELL
 JAMES S. MIDGLEY, CDR, NOAA
 COMMANDING OFFICER

A. PROJECT ✓

This survey was carried out in accordance with Project Instructions OPR-520-MI-77 issued 21 April 1977 and amended by Changes 1 through 3 dated 5 May 1977, 24 May 1977, 10 June 1977, respectively.

B. AREA SURVEYED ✓

This survey was conducted in Lake Huron, offshore. The limits of the survey are generally described by lines connecting the following points in a clockwise manner.

(1) 44°43.5'N 82°45.0'W	(2) 44°43.5'N 83°09.0'W	(3) 44°56.0'N 83°13.0'W	(4) 45°02.8'N 83°01.0'W
(5) 45°02.8'N 82°27.0'W	(6) 44°55.5'N 82°25.5'W	(7) 44°55.5'N 82°45.0'W	

This survey was conducted between June 20, 1977 (JD 171) and July 30, 1977 (JD 211).

C. SOUNDING VESSEL ✓

Soundings for this survey were obtained by the NOAA SHIP MT MITCHELL S222 (Vessel Number 2220 for all survey records) utilizing a fully automated Hydroplot System.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS ✓

The following equipment was used to obtain soundings for this survey:

Equipment:	Serial Number:
Ross Model 5000 Fineline Depth Sounder	1053
Ross Model 4000 Transceiver	1050
Ross Digitizer	1050

Soundings were taken with a skeg transducer (antenna distance + 32.0 m. All survey records were scanned by trained Survey Department personnel and checked by the Officer in Charge. Peaks and deeps considered significant that occurred between soundings were inserted, digitizing errors were corrected, and the effects of the seas were meaned and corrected on the electronic corrector tape.

Phase calibration checks were made at frequent intervals. Any necessary adjustments were made and noted in the sounding volume and on the fathogram. In addition, any departures of the trace from the calibration due to phase differences were corrected during the scanning process.

Velocity corrections were obtained from 5 Nansen Casts and 9 XBTS on the following locations:

Cast No:	Latitude:	Longitude:	Date:
C2-1	44°52.1'N	082°56.0'W	6-22-77 (JD 173)
C1-1	44°54.8'N	083°17.1'W	6-29-77 (JD 180)
C2-2	44°52.0'N	082°55.1'W	6-29-77 (JD 180)
C2-3	44°51.8'N	082°55.1'W	7-06-77 (JD 187)
C2-4	44°53.8'N	082°55.2'W	7-13-77 (JD 194)

XBT No:	Latitude:	Longitude:	Date:
C2-2	44°52.2'N	082°55.2'W	6-29-77 (JD 180)
C2-3	44°52.1'N	082°55.0'W	7-06-77 (JD 187)
C2-4	44°53.8'N	082°55.2'W	7-13-77 (JD 194)
C3-4	45°00.3'N	082°43.5'W	7-20-77 (JD 201)
C1-4	44°54.5'N	082°17.5'W	7-21-77 (JD 202)
C2-5	44°52.2'N	082°54.0'W	7-21-77 (JD 202)
C2-6	44°52.0'N	082°55.5'W	7-26-77 (JD 207)
C3-5	45°00.0'N	082°44.0'W	7-26-77 (JD 207)
C2-7	44°52.0'N	082°55.0'W	7-30-77 (JD 211)

Salinities determined by salinometer were found to be less than .2 parts per thousand and were negligible in determining sound velocities. Corrections for velocity were made from the data obtained from these Nansen Casts and XBT's using RK 530. An explanation of how the velocities were derived, along with the printouts of the velocity tapes and all tables, is included at the end of this report.

A draft of 14.0 feet was applied to all soundings during the on line process. To determine the actual drafts for the survey, a straight line plot was constructed using the after draft from the beginning and ending dates of each trip. A draft correction was determined for every 0.2 feet. The draft varied from 14.2 to 13.5 feet for this survey. Settlement and squat corrections for the ship were determined on 25 July 1977 (JD 206) in Lake Huron at St. Ignace, Michigan. A corrector of +0.2 feet is accurate for all survey speeds \pm 0.1 feet. A copy of the data abstract for ship's speed versus the settlement and squat correctors is included in the appendices. The change in the draft along with the settlement and squat is incorporated into the TC/II tape included with the survey data. A printout of this tape is included with this report.

A vertical cast was conducted on June 18, 1977 (JD 169) at Harrisville, Michigan to determine fathometer instrument error. The results are included in this report. The error was less than 0.1 feet and was considered to be zero due to the accuracy of the cast.

Water level corrections were not applied at the time of the survey. A copy of the request for the actual water levels for the area surveyed is included with this report.

E. HYDROGRAPHIC SHEETS ✓

This survey was plotted on two mylar complot roll plotter sheets by the MT MITCHELL Hydroplot System. The skew used was 00, 21, 60, for both sheets. The survey was plotted off line using an electronic corrector tape and a velocity corrector tape. Soundings on the field sheets are corrected for draft, initial and digitizing errors, and sound velocity. They are not corrected for water levels, settlement and squat, and instrument error. The final smooth sheet will be plotted at the Atlantic Marine Center, Norfolk, Virginia.

All field records and the following tapes have been forwarded to the Atlantic Marine Center:

Master Range-Range Data Tapes
Electronic Corrector Tapes
Velocity Correction Tape
Parameter Tapes
ASC II Signal Tapes
Transducer Corrector/Table Indicating Tape

F. CONTROL STATIONS ✓

Electronic control stations used for this survey were:

Signal No:	Signal Name:	Latitude:	Longitude:
100	H-7A-MI-77 (Sturgeon Pt Hydrotrac)	44°42'46.709"N	083°16'19.031"W
105	Sturgeon Pt Lt (Del Norte)	44°42'45.770"N	083°16'21.650"W
125	H-2A-MI-77 (South Pt Del Norte)	44°52'56.290"N	083°18'51.414"W
201	ANTENNA (North Pt Hydrotrac)	45°02'26.767"N	083°16'25.508"W
202	BEACH (North Pt Del Norte)	45°02'27.248"N	083°16'24.808"W

All shore stations except 201 and 202 were located by personnel from the Operations Division, Atlantic Marine Center, with assistance from MT MITCHELL Officers. A three leg traverse was run on June 28-29 by ship's personnel to locate station ANTENNA (201) and BEACH-North Pt Del Norte (202). Neither station was monumented due to their location in the sand dunes but a third station (WOELK) was established at this time on high ground between the dunes and the woods. A copy of the geodetic abstract and computations are included in the survey records. Stations were erected and maintained by ship's personnel.

G. HYDROGRAPHIC POSITION CONTROL

An Odum Offshore Hydrotrac System, operating at a frequency of 1618.650 Khz, in Range-Range mode, was used to provide positioning control on the following days:

1 July 1977 (JD 182) through 30 July 1977 (JD 211)

The following Odum Offshore Hydrotrac equipment was used:

Type:	Serial No:
Shipboard:	
Master MDU	122
Master Receiver	326 (327 on JD 190)
Power Amplifier	539
Coupler	134
Sawtooth	8501
Shore Station 100:	
SDU	216
Power Amplifier	538
Coupler	131
Shore Station 201:	
SDU	214 (214 on JD 175)
Power Amplifier	536 (573 on JD 175)
Coupler	133

A frequency of 1620.38 Khz was used in the parameters to compensate for the difference in propagation velocity between salt and fresh water.

Del Norte positioning was used on the following days:

20 June 1977 (JD 171) through 30 June 1977 (JD 181)

The following Del Norte equipment was used:

Changed:	Station:	Equipment:	Serial No:	Code:
	Ship	DMU	173	
		Master	273A	78
		360° Antenna	056	
		Parallel Buffer	123	
	105	Remote	1064	78
		180° Antenna	125	
	125	Remote	1063	76
		180° Antenna	088	

The following Del Norte equipment was used: Cont'd

Changed:	Station:	Equipment:	Serial No:	Code:
JD 178	105	Remote	248	72
	125	Remote	249	76
JD 186	105	Remote	1135	74
		180° Antenna	127	
	202	Remote	249	76
		180° Antenna	088	
JD 189	202	Remote	1063	76

Initially the Del Norte was calibrated over a measured baseline. To ensure no drift due to movement to the station the Del Norte was calibrated again using three sextant fixes and comparing observed ranges with computed values by use of Hydroplot Calibration Program RK 561. A simultaneous check fix was taken with each calibration. Only those fixes with inverses less than five (5) meters were accepted. On JD 191 the North Pt Del Norte corrector was determined by comparison with the position determined by Del Norte at South Pt and Sturgeon Pt Light. The resultant correctors were used for this entire survey. Land path effects on Hydrotrac precluded calibration by sextant fix. Therefore, calibration was accomplished by comparing Hydrotrac values with values computed from Del Norte positioning at 5 sites (see Calibration Volume).

A whole lane count was established, whenever it was necessary, by a Del Norte Hydrotrac comparison. This was accomplished generally in an area about 6 miles southeast of Thunder Bay Island, either while laying to or underway.

The lane count was constantly monitored by the Survey Department, by comparing the navigation interface readout with a running count on the sawtooth recorder. Lane jumps were thus detected and confirmed at calibrations and offshore Hydrotrac/Del Norte comparisons. Undetected lane jumps were determined by off line rescanning of the sawtooth record. An abstract of the calibration data is included with the records accompanying this report.

H. SHORELINE

There was no shoreline within the limits of this survey.

I. CROSSLINES

Crosslines were run at least 45° to the main scheme sounding lines. Mileage of crosslines amounted to 7.0% of the regular sounding lines. The crossline soundings agree within 1 foot of the main scheme soundings.

J. JUNCTIONS ✓ See Verifier's Report

This survey junctions with the following surveys:

Area of Junction:	Field No:	Reg No:	Scale:	Date:	Ship:
Southeast	MI-20-1-77	H-9691	1:20,000	1977	Mt Mitchell
	MI-20-2-77	H-9692	1:20,000	1977	Mt Mitchell
North	MI-50-2-77	H-9709	1:50,000	1977	Mt Mitchell
South	Canadian (73-6)	3895	1:200,000	1975	N/A

Excellent junctions were made with MI-20-1-77 and MI-20-2-77 and contours continued smoothly to those sheets. The junction with Canadian Survey 3895 was fair with only two soundings differing by more than 10 feet and those were in an area of rough topography. About 80% of the Canadian soundings agreed within 5 feet and were generally shoaler. Soundings from the present survey will be approximately 2 feet shoaler when final water level corrections are applied.

This survey also junctions to the east with a 1977 Canadian Survey being conducted by the CSS Bayfield at a scale of 1:100,000. Junctions with this survey were poor in the areas of rugged bottom (only 25% agree within 10 feet) but in relatively flat bottom 73% agreed within 10 feet. This poor junctioning may come from differing propagation velocities used, as well as sound velocities in water. Reference is made to a report to be submitted at the end of the field season regarding simultaneous positioning and depth measurements made by the Mt Mitchell and the CSS Bayfield. Report unavailable during verification. ROS

K. COMPARISON WITH PRIOR SURVEYS ✓ See Verifier's Report

Prior survey number I-1845 at a scale of 1:120,000 was conducted in 1946 within the area of this survey. Comparison between this prior survey and the present survey is fair in areas of flat bottom and poor in areas of rugged bottom. Two thirds of the soundings in flat areas agree within 5 feet, but in the areas of rugged topography less than one third agree within 5 feet. The improved quality of position control for the present survey is the probable cause of this poor comparison.

There was only one presurvey review item within the survey limits of this sheet. It was presurvey review item number 9 - the wreck of the "MONROVIA" covered by 43 feet of water at latitude 44°59.0'N and longitude 82°55.6'W. An extensive development was run using 25 meter line spacing in the area around the wreck. A least depth of 47² feet was found at latitude 44°59.⁰⁵'N⁰⁰ and longitude 82°55.⁰⁵'W⁰⁰ approximately 200 meters east of the charted position of the wreck. It is recommended that because of this survey's more accurate position control, the wreck should be charted at this new location. Position Line 1965-66

Concur
JRS

Source of wreck identification as "MONROVIA" not ascertained during verification.

L. COMPARISON WITH CHART

The area of this survey is covered by NOAA Chart 14860, 25th Edition (March 12, 1977) at 1:500,000 scale and NOAA Chart 14864, 19th Edition (December 4, 1976 at 1:120,000 scale. As previously stated in comparisons with the prior surveys, depths agree fairly well in areas of flat topography but disagree by as much as 130 feet in areas of rugged topography. Again this disagreement is attributed to the increased accuracy in the survey's positioning control.

M. ADEQUACY OF THE SURVEY

This survey is considered complete and adequate to supersede^s prior surveys for charting.

N. AIDS TO NAVIGATION

There are no aids to navigation within the limits of this survey.

O. STATISTICS

Linear Nautical Miles of Main Scheme Hydrography	1521.5
Linear Nautical Miles of Crosslines	105.7
Linear Nautical Miles of Development	150.3
Total Linear Miles of Hydrography	1777.5
Total Miscellaneous Miles	884.0
Total Miles	2661.5
Square Miles of Hydrography	436.5
Total Number of Positions	2310
Nansen Casts	5
XBT'S	9
Bottom Samples	420

P. MISCELLANEOUS

A dummy position (#2130) was created for bottom sample number 16. (*Rejected by Verifier*)

Q. RECOMMENDATIONS

None

R. AUTOMATED DATA PROCESSING

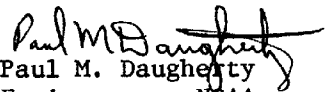
The following Hydroplot Programs were used to acquire and process data for this survey:

	Program Name:	Version Date:
RK 111	Range-Range Real Time	1-30-76
RK 201	Grid, Signal, and Lattice Plot	4-18-75
RK 211	Range-Range Non-Real Time Plot	1-15-76
RK 300	Utility Computations	2-10-76
PM 360	Electronic Tape Abstract	2-02-76
RK 530	Velocity Correction Computations	5-10-76
RK 561	H/R Geodetic Calibration	2-19-75
RK 602	Extended Line Oriented Editor	5-21-75

S. REFERENCE TO REPORTS

Horizontal Control Report - Mt Mitchell--CSS Bayfield Field Comparisons (Both to be submitted at the end of the field season).

Respectfully Submitted:


Paul M. Daugherty
Ensign, NOAA

APPROVAL SHEET

MI-50-1-77

H-9690

The field work on this Hydrographic Survey was under my daily supervision. The boat sheet and records have been reviewed and approved by me.

Gerald B. Mills, CAPT
for Melvin J. Umbach
Commander, NOAA
Commanding

Determination of Velocity Corrections

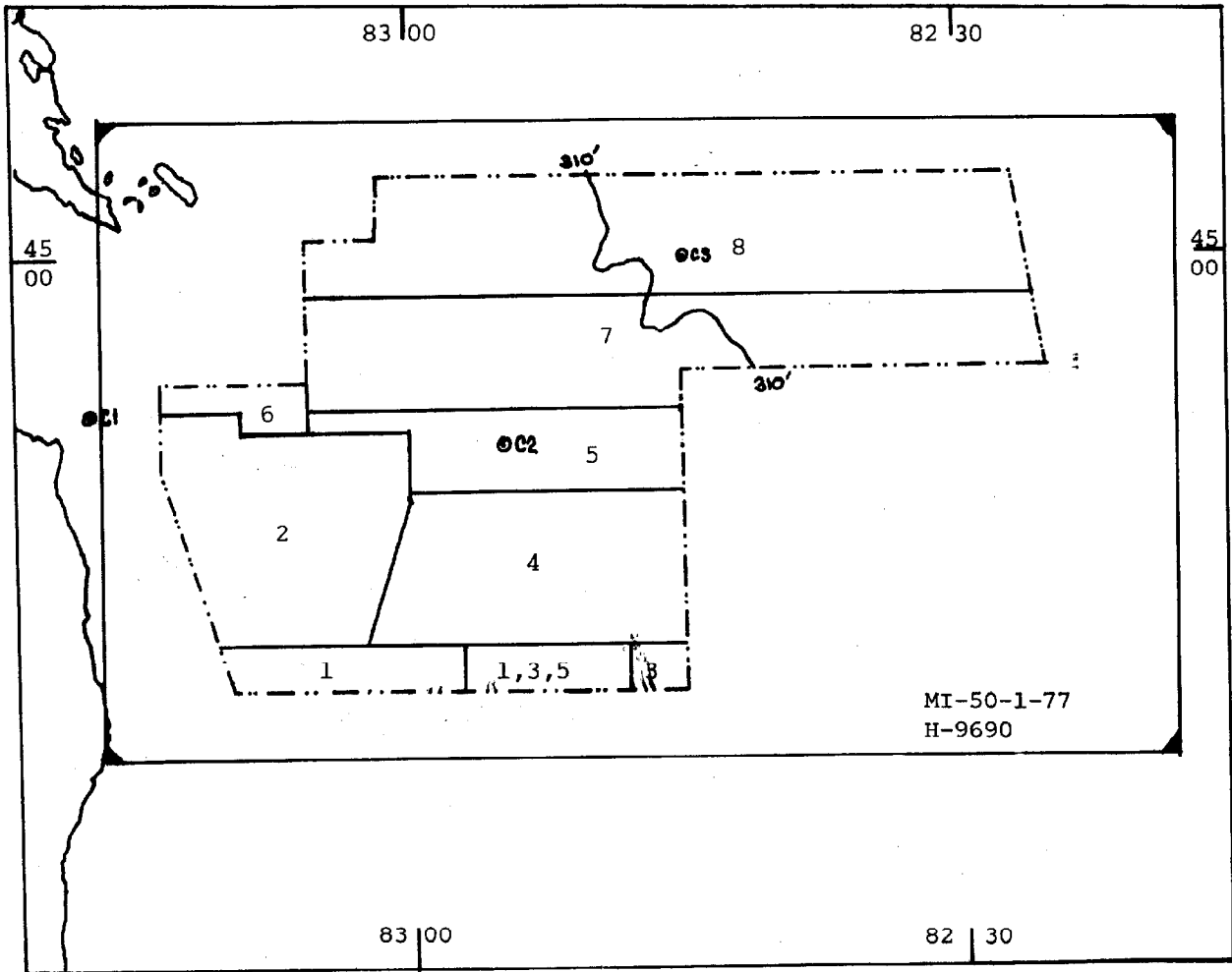
Simultaneous Nansen Casts and XBT'S disagreed from -2.2°C to $+1.2^{\circ}\text{C}$ with 70% of all temperatures agreeing within 0.5°C . Since the errors caused by the use of the XBT'S were small, they were used alone at some stations for velocity determinations. Three basic stations were occupied at approximate 1 week intervals:

Station:	Latitude:	Longitude:
C1	44°54.6"N	83°17.3'W
C2	44°52.0'N	82°55.1'W
C3	45°00.0'N	82°43.8'W

Since significant temperature changes were noted with both time and area, corrections were similarly applied. In areas between station sites temperatures were averaged to determine velocity correctors. The following shows how the velocity tables were determined:

<u>Table:</u>	<u>Survey Dates (JD):</u>	<u>Cast/XBT:</u>	<u>Date (JD):</u>
1	171-172	C2-1	6/22-(173)
2	179-181	C1-1 and C2-2 Avg.	6/29-(180)
3	182	C2-2	6/29-(180)
4	188-189	C2-3	7/06-(187)
5	199-200	C2-5	7/21-(202)
6	200-201 (Inshore)	C1-4 and C2-5 Avg.	7/21-(202)
7	200-201 (Offshore) and 202	C2-5 (less than 310 ft) C3-4 (greater than 310 ft)	7/21-(202) 7/20-(201)
8	207-209	C2-6 (less than 310 ft) C3-5 (greater than 310 ft)	7/26-(207) 7/26-(207)
9	210-211	C2-7	7/30-(211)

See the accompanying illustration for the approximate boundaries of each table.



SCALE OF CHART #14860

The above illustration shows the areas covered by each velocity table and the stations (C1-C3) occupied with XBT'S and Nansen Casts. Table 9 was used only for developments north of station C2.



DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY

Date : September 28, 1977

Reply to Attn. of:

To : Director, National Ocean Survey (Attn: C331)

From : *for* LCDR Donald B. Mills
Commanding Officer, NOAA SHIP MT MITCHELL S222

Subject: Water Level Data For Survey H-9690

It is requested that verified water level stages (using Greenwich Mean Time) from the water level gages listed below be forwarded to the Processing Division (CAM 3), Atlantic Marine Center, Norfolk, Virginia 23510.

Gage:	Latitude:	Longitude:
Harrisville, Michigan (907 - 5059)	44°39.6'N	083°17.2'W
Alpena, Michigan (907 - 5065)	45°03.5'N	083°25.8'W

It is requested that the time and height correctors for each gage be zoned as per Project Instructions for the area described within the following corner points:

45°04.0'N	44°43.0'N
083°14.0'W	083°24.0'W
45°04.0'N	44°43.0'N
083°24.0'W	083°14.0'W

This information is requested for the following periods:

June 20, 1977 (JD 171) - July 30, 1977 (JD 211).

ATLANTIC MARINE CENTER

TIDE NOTE

1. Project No: OPR-520-MI-77 2. Vessel/~~Field Work~~: NOAA Ship MT MITCHELL (MSS-22)
 3. Year: 1977 4. Meridian Time Zone: GMT
 5. Tide Station Name: HARRISVILLE, MICHIGAN (907 - 5059)
 6. Position: Lat. 44° 39.6' N. Long. 083° 17.2' W.
 7. Plane of Reference: ~~MLLW~~ ^{LWD} MLLW corresponds to _____ feet on the tide staff for the period: _____

8. Hourly Heights: Standard Gauge, furnished from Rockville.
 Scaled and logged from field marigrams.
 9. Tidal Zoning: Not applicable.
 By two or more gauges automatically zoned.
 By applying tidal differences and constants for the area(s): a. _____

TIME (Hour, Minute)		HEIGHT (Feet)		HEIGHT RATIO (If Applicable)	
High Water	Low Water	High Water	Low Water	High Water	Low Water

b. _____

TIME (Hour, Minute)		HEIGHT (Feet)		HEIGHT RATIO (If Applicable)	
High Water	Low Water	High Water	Low Water	High Water	Low Water

c. Include additional areas on separate sheet(s).

Remarks: All Times and Dates used on the survey are Greenwich Mean Time

ATLANTIC MARINE CENTER

TIDE NOTE

1. Project No: OPR-520-MI-772 2. Vessel/~~Field Unit~~: NOAA Ship MT MITCHELL (MSS-22)
3. Year: 1977 4. Meridian Time Zone: GMT
5. Tide Station Name: ALPENA, MICHIGAN (907 - 5065)
6. Position: Lat. _____° _____' N. Long. _____° _____' W.
7. Plane of Reference: ~~LWD~~ MLLW corresponds to _____ feet on the tide staff for the period _____.
8. Hourly Heights: Standard Gauge, furnished from Rockville.
 Scaled and logged from field marigrams.
9. Tidal Zoning: Not applicable.
 By two or more gauges automatically zoned.
 By applying tidal differences and constants for the area(s): a. _____

TIME (Hour, Minute)		HEIGHT (Feet)		HEIGHT RATIO (If Applicable)	
High Water	Low Water	High Water	Low Water	High Water	Low Water

b. _____

TIME (Hour, Minute)		HEIGHT (Feet)		HEIGHT RATIO (If Applicable)	
High Water	Low Water	High Water	Low Water	High Water	Low Water

c. Include additional areas on separate sheet(s).

Remarks: All Times and Dates used on the survey are Greenwich Mean Time

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: 'See Remarks'

Period: June 20, 1977 - July 30, 1977

HYDROGRAPHIC SHEET: H-9690

OPR-520-MI-77

Locality: Lake Huron

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

Remarks:

Harrisville, Michigan (907-5059)
Alpena, Michigan (907-5065)

Use linear interpolation between gages when the difference equals or exceeds 0.2 feet.

Philip C. Marcus
Chief, Water Level Section

Don M. Spillman 11/11/78
Chief, Tides & Water Levels Branch

GEOGRAPHIC NAMES

H-9690

Name on Survey	Source of Name											
	A	B	C	D	E	F	G	H	K			
	ON CHART NO.	ON PREVIOUS SURVEY NO.	ON U.S. QUADRANGLE MAPS	FROM LOCAL INFORMATION	ON LOCAL MAPS	P.O. GUIDE OR MAP ATLAS	GRAND NCHALLY	U.S. LIGHT LIST				
MICHIGAN												1
LAKE HURON												2
STURGEON POINT												3
THUNDER BAY ISLAND												4
SIX FATHOM SCARP												5
												6
												7
												8
												9
												10
												11
												12
												13
												14
												15
												16
												17
												18
												19
												20
												21
												22
												23
												24
												25

TITLE

APPROVED

Chas. E. Harrington

CHIEF GEOGRAPHER - C38

23 OCT. 1978

APPROVAL SHEET
FOR
SURVEY H-9690

- 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 Verifier's Report.

Date:

8/16/78

Signed:



Title:

Chief, Verification Branch

REGISTRY NO. H-9690(1977)

No corrections

The Computer and Excess Sounding Cards for this survey have not been corrected to reflect the changes made to the Computer Card and Excess Card Printouts at this time of the review.

When the cards have been updated to reflect the final results of the survey, the following shall be completed:

CARDS CORRECTED

DATE _____ TIME REQUIRED _____ INITIALS _____

REMARKS:

REGISTRY NO. _____

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:

HYDROGRAPHIC SURVEY STATISTICS

H-9690

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT	
SMOOTH SHEET		1	BOAT SHEETS & PRELIMINARY OVERLAYS <i>6 MYLAR & 5-PAPER BOAT SHEETS</i>		11	
DESCRIPTIVE REPORT		1	SMOOTH OVERLAYS: POS. ARC, EXCESS		2	
DESCRIP-TION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/SOURCE DOCUMENTS
ENVELOPES	<i>1/2</i>					1-Misc. data
CAHIERS			<i>1</i>			2 created for for thos. & P.O.S
VOLUMES	2					
BOXES						

T-SHEET PRINTS (Lias) *1-bundle of smooth sheet records*
 SPECIAL REPORTS (Lias) *1-calibration notebook*

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS		
	PRE-VERIFICATION	VERIFICATION	TOTALS
POSITIONS ON SHEET			2310
POSITIONS CHECKED		213	
POSITIONS REVISED		13	
SOUNDINGS REVISED		46	
SOUNDINGS ERRONEOUSLY SPACED		0	
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED		0	
	TIME - HOURS		
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)		2	
VERIFICATION OF CONTROL		2	
VERIFICATION OF POSITIONS		27	
VERIFICATION OF SOUNDINGS		16	
COMPILATION OF SMOOTH SHEET		12	
APPLICATION OF TOPOGRAPHY		NA	
APPLICATION OF PHOTOBATHYMETRY		NA	
JUNCTIONS		4	
COMPARISON WITH PRIOR SURVEYS & CHARTS		4	
VERIFIER'S REPORT		4	
OTHER		0	
TOTALS		71	

Pre-Verification by R. Keene	Beginning Date 01/15/78	Ending Date 01/15/78
Verification by R. Keene, B. Stephenson	Beginning Date 01/15/78	Ending Date 08/08/78
Verification Check by G. Trefethen	Time (Hours) 2	Date 08/14/78
Marine Center Inspection by Hydrographic Inspection Team (AMC)	Time (Hours) 9	Date 08/16/78
Quality Control Inspection by F.P. SAULSBURY	Time (Hours) 25	Date 10/16/78
Requirements Evaluation by A Baumgardner	Time (Hours) 5	Date 11/28/78

Cons. of Mylar 10/17/78 - 1 hr.

ATLANTIC MARINE CENTER
VERIFIER'S REPORT

REGISTRY NO. H-9690

FIELD NO. MI-50-1-77

Michigan, Lake Huron, Offshore Sturgeon Point to Thunder Bay
Island, Michigan

SURVEYED: June 20 through July 30, 1977

SCALE: 1:50,000

PROJECT NO.: OPR-520

SOUNDINGS: Ross Model 5,000
Fineline Recorder

CONTROL: Hydrotrac and
Del-Norte
(Range-Range)

Chief of Party M. Umbach
Surveyed by G. Mills
..... D. Waltz
..... V. Newell
..... D. Rice
..... M. Henderson
..... K. Olson
..... P. Daugherty
..... T. Rulon
..... W. Pringle
..... M. Murphy
Automated Plot by CALCOMP-618 Plotter (AMC)
Verified and Inked by B. Stephenson
August 8, 1978

1. Introduction

a. No unusual problems were encountered during verification of this survey. ✓

b. The projection parameter was revised and notes added to the Descriptive Report in red ink during the verification of this survey. ✓

c. The water level note has been requested but not received prior to verification. It is requested that Quality Control obtain this note from Water Levels Section, C3314. ✓

2. Control and Shoreline

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

b. There is no shoreline on this survey. ✓

3. Hydrography

a. Depths at crossings are in good agreement. ✓

b. The standard depth curves were adequately delineated. ✓
Several brown curves have been added to emphasize other bottom features.

c. The development of bottom configuration and the investigation of least depths is considered adequate. ✓

It should be noted that upon examination of the fathograms two possible indications of sunken wrecks were found: position 805 (third out) at 44° 50' 11.63", 82° 58' 42.86" with a least depth of 200 feet; and position 1925 (second out) at 44° 59' 30.07", 83° 02' 15.33" with a least depth of 133 feet.

These indications were not confirmed as sunken wrecks and investigation was limited to echo sounder only. *See Q.C. Critique*

4. Condition of Survey

The smooth sheet and accompanying overlays, hydrographic records, and reports are adequate and conform to the requirements of the Hydrographic Manual.

5. Junctions

Adequate junctions were effected with the following surveys:

H-9691 (1977) 1:20,000 to the southeast ✓
H-9692 (1977) 1:20,000 to the southeast ✓
H-9709 (1977) 1:50,000 to the north *not registered 10/14/79*

A fair junction was effected with Canadian survey 3895 to the south considering the difference in survey methods; however, no effort was made to join curves since the Canadian survey was in meters. The Canadian survey to the east was not available to make junction during verification. A junction was made in the field with this survey and the results are described in Section J of the Descriptive Report. There are no contemporary surveys that join this survey to the west at this time. *CONCUR 7PS*

6. Comparison With Prior Survey

1-1845 (1946) 1:120,000

This prior survey covers the common area of the present survey.

A comparison between the present survey and prior survey ¹⁻¹⁸⁴⁵⁽¹⁹⁴⁶⁾ reveals a variable pattern of depth differences. Curve and feature displacement are evident. The differences range from as much as 150 feet shoaler to 70 feet deeper than the prior depths. It is evident that some of the soundings on the prior survey were in error because of the erratic depth differences on the same line of hydrography. The differences between the present survey and prior survey can probably be attributed in part to the less accurate positional control and sounding methods used on the older survey. ✓

The present survey is adequate to supersede the prior survey *CONCUR* within the common area.

7. Comparison With Charts 14860 (25th Edition, March 12, 1977)
14864 (19th Edition, December 4, 1976)

a. Hydrography

The charted hydrography originates with the previously discussed prior survey which requires no further consideration. ✓

Presurvey Review Item #9 is adequately described in Section K of the Descriptive Report. ✓

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

b. Aids to Navigation

There are no charted aids to navigation within the area of the present survey. ✓

8. Compliance With Instructions

This survey adequately complies with the Project Instructions. ✓


9. Additional Field Work


This is an excellent basic survey. Additional field work is not recommended. ✓


Inspection Report
H-9690

Any verification errors regarding procedures and presentation of survey data detected during inspection by the Hydrographic Inspection Team have been corrected before submission for administrative approval. HIT comments regarding quality of field work, compliance with instructions, and adequacy of the survey have been incorporated within the Verifier's Report.


Examined and Approved:
Hydrographic Inspection Team
Date:


Robert A. Trauschke, CDR, NOAA
Chief, Processing Division



Charles H. Nixon, CAPT, NOAA
Chief, Operations Division


R. D. Sanocki
Technical Assistant
Processing Division


C. Douglas Mason, LT, NOAA
Chief, Electronic Data
Processing Branch


Guy F. Trefezzen
Team Leader
Verification Branch

Approved/Forwarded


Robert C. Munson
RADM, NOAA
Director, Atlantic Marine Center



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

C352/FPS

October 16, 1978

TO: *A. J. Patrick*
A. J. Patrick
Chief, Marine Surveys Division

THRU: Chief, Quality Control Branch

FROM: F. P. Saulsbury *F. P. Saulsbury*
Quality Evaluator

SUBJECT: Quality Control Report for H-9690 (1977), Michigan, Lake Huron,
Offshore Sturgeon Point to Thunder Bay Island

A quality control inspection of H-9690 was accomplished to monitor the survey for obvious deficiencies with respect to data acquisition, delineation of the bottom, determination of least depths, navigational hazards, junctions, sounding line crossings, smooth plotting, decisions and actions taken by the verifier, and the cartographic presentation of data. In general, it was found to conform to the National Ocean Survey's standards and requirements except as stated in the Verifier's Report, the HIT Report, and as follows:

1. A few depth curves were revised where in conflict with soundings. Some supplemental curves were added to emphasize rises.
2. The 133-foot sounding in latitude $44^{\circ}59.50'$, longitude $83^{\circ}02.30'$ and the 200-foot sounding in latitude $44^{\circ}50.20'$, longitude $82^{\circ}58.70'$ are considered to be least depths obtained on sunken wrecks. Since there was no field confirmation of these alleged sunken wrecks, "obstructions" were annotated to these soundings during quality control inspection.
3. The junctions in the southeastern portion of the survey with H-9691 (1977) and H-9692 (1977) are adequate. The junction on the north with H-9709 (1977) will be addressed in the inspection of that survey.

cc:
C35
C351



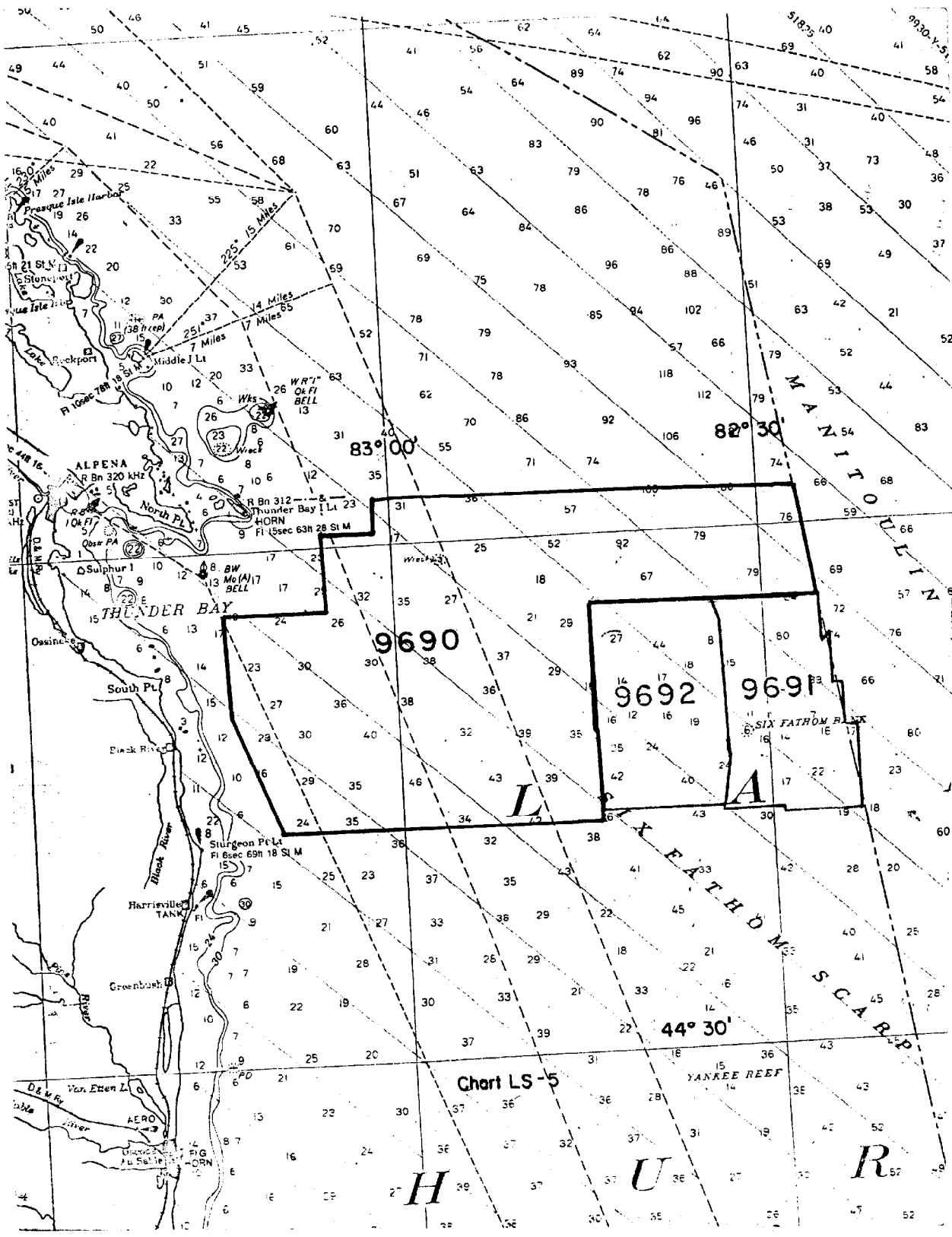


Chart LS-5

H U R

