9721

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-20-3-77

Office No. H-9721

LOCALITY

State Michigan

General Locality Lake Huron

Locality South of Drummond Island

1977

CHIEF OF PARTY
James S. Midgley

LIBRARY & ARCHIVES

DATE September 22, 1978

☆ U.S. GOV. PRINTING OFFICE: 1976—669-441

9721

NOAA FORM 77-28 (11-72)

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

HYDROGRAPHIC TITLE SHEET

REGISTER NO.

H-9721

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-20-3-77

State: MICHIGAN

General locality: LAKE HURON

Locality: SOUTH of DRUMMOND ISLAND

Scale: 1:20,000 Date of survey: JD 255 260 SEPTEMBER 12 to 17, 1977

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

Vessel: NOAA SHIP MT MITCHELL (S222) and Launches 1002 and 1004

Chief of party: CAPT JAMES S. MIDGLEY, NOAA

Surveyed by: SEE REMARKS

Soundings taken by echo sounder, ~~hand lead, pole~~:

Graphic record scaled by: DRR, EM, RMM, RW

Graphic record checked by: DRR, FS, EM, RMM, RW Verification Branch (AMC)

Protracted by: N/A Automated plot by: ~~NOAA SHIP MT MITCHELL S222 HYDROPLOT SYSTEM~~ CAL COMP - GIS (AMC)

Verification by: N/A L.G. Cram

Soundings in ~~fathoms~~ feet at ~~MLW MLLW~~: LWD (IGLD 1955 : 576.8 ft.)

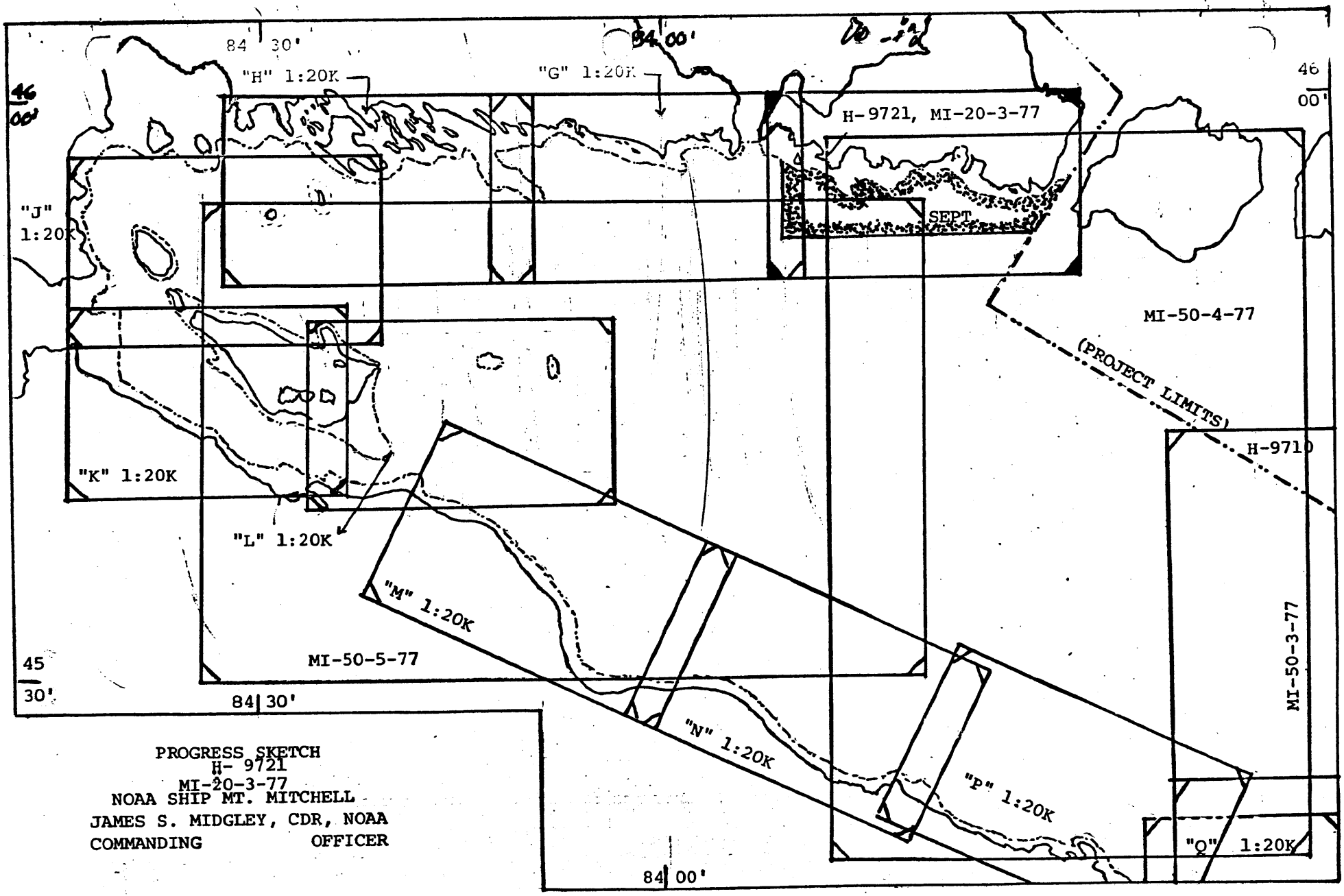
REMARKS: LCDR G. MILLS, LT D. WALTZ, LTjg D. RICE, LTjg M. HENDERSON, ENS P. DAUGHERTY, ENS T. RULON, ENS W. PRINGLE, ENS M. MURPHY

Changes in red ink made during verification by L.G. Cram

Ofish to Atlas. 3-6-79 WT

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

☆ U.S. G.P.O. 1972-769-565/519 REG. #6



PROGRESS SKETCH
H- 9721
MI-20-3-77
NOAA SHIP MT. MITCHELL
JAMES S. MIDGLEY, CDR, NOAA
COMMANDING OFFICER

SCALE OF CHART #14860

DESCRIPTIVE REPORT

TO

ACCOMPANY

HYDROGRAPHIC SURVEY H-9721

MI-20-3-77

1:20,000 SCALE

LAKE HURON, MICHIGAN

SEPTEMBER 12, 1977 to SEPTEMBER 17, 1977

NOAA SHIP MT MITCHELL S222

JAMES S. MIDGLEY

CAPTAIN, NOAA

ACTING COMMANDING OFFICER

TABLE OF CONTENTS

HYDROGRAPHIC TITLE SHEET

APPENDICES

✓ = Misc. items filed in the Cahier

A. PROJECT

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

B. AREA SURVEYED

This survey was conducted in Lake Huron, south of Drummond Island, Michigan. The limits of the survey are described by lines connecting the following points in a clockwise manner:

(1)	45°52.8'N 83°51.8'W	(2)	45°56.5'N 83°51.8'W	(3)	45°54.8'N 83°30.7'W	(4)	45°52.8'N 83°30.7'W

This survey was conducted between 12 September 1977 (JD 255) and 17 September 1977 (JD 260).

C. SOUNDING VESSEL

Soundings for this survey were obtained by Launches 1002 (Vesno 2225) and 1004 (Vesno 2226) utilizing fully automated Hydroplot Systems.

The NOAA SHIP MT MITCHELL S222 (Vesno 2220) was used to obtain bottom samples only.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

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

Launch #1002 Vesno 2225:

Equipment:	Serial No:
Ross Model 5000 Fineline Depth Sounder	1053
Ross 4000 Transceiver	1053
Ross 2000 Power Inverter	1053
Ross 6000 Digitizer	1039

Launch #1004 Vesno 2226:

Equipment:	Serial No:
Ross Model 200C Recorder	1039
Ross 4000 Transceiver	1039
Ross 2000 Power Inverter	1039
Ross 6000 Digitizer	1053

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 1 Nansen Cast and 3 XBT'S at the following locations:

Cast No:	Latitude:	Longitude:	Date:
J4	45°54.6'N	83°42.8'W	9-17-77 (JD 260)
XBT No:			
J1	45°52.8'N	83°46.0'W	9-14-77 (JD 257)
J2	45°53.1'N	83°37.2'W	9-15-77 (JD 258)
J3	45°53.1'N	83°48.9'W	9-15-77 (JD 258)

12 bar checks were taken during the survey showing agreement within 0.5 feet. Since most depths were greater than 50 feet the Nansen Cast and XBT'S were used exclusively in determining velocity correctors using RK 530. An explanation of how the velocities were derived along with printouts of the velocity tapes and all tables is included in the appendices. Salinities determined by salinometer were found to be less than .2 parts per thousand and were negligible in determining sound velocities.

A draft of 1.6 feet was applied to all sounding during the on line process. Changes in draft for both launches were insignificant. Settlement and squat corrections for the launches were determined on 1 September 1977 (JD 244) in Lake Huron at St. Ignace, Michigan. A copy of the field data and settlement and squat correctors versus launch RPM'S is included in the survey support data. This data is incorporated into the TC/TI tape which is also included in the survey data. A printout of this tape is included in the appendices.

The 12 bar checks throughout the survey showed an instrument error of less that 0.2 feet and was considered to be zero. 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 in the appendices.

E. HYDROGRAPHIC SHEETS

This survey was plotted on one mylar complot roll plotter sheet by the MT MITCHELL Hydroplot System. The skew used was 0, 21, 60, for the sheet. 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

The following three shore stations were used for hyperbolic electronic positioning during this survey:

Signal No:	Signal Name:	Latitude:	Longitude:
207	H-17-MI-77 Presque Isle "Turcote"	45°20'56.482"N	83°29'06.080"W
300	H-13-MI-77 40 Mile Pt Hydrotrac	45°29'11.010"N	83°54'48.836"W
400	H-20-MI-77 Lafayette Pt Hydrotrac	45°46'18.807"N	84°21'23.562"W

All shore stations were located by personnel from the Operations Division Atlantic Marine Center with assistance from Mt Mitchell Officers. 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 Hyperbolic mode, was used to provide positioning control during the entire survey. The equipment serial numbers are as follows:

Vessel or Shore Station:	Equipment:	Serial No:
Mt Mitchell (Vesno 2220)	Receiver	328
	Parallel Buffer	102
Launch #1002 (Vesno 2225)	Receiver	327
	Parallel Buffer	107

Launch #1004 (Vesno 2226)	Receiver	326
	Parallel Buffer	106
Slave 1 (207)	SDU	215
	Power Amplifier	539
	Coupler	135
Master (300)	MDU	122
	Power Amplifier	536
	Coupler	133
Slave 2 (400)	SDU	216
	Power Amplifier	538
	Coupler	131

A frequency of 1620.38 Khz was used on the Hydroplot signal tape to compensate for the difference in propagation velocity between salt and fresh water. This dummy frequency corresponds to a propagation velocity of 299350 Km/sec.

When visibility permitted, beginning and end of day calibrations were obtained by using three point sextant fixes with a check angle. Calibration values were obtained by using Geodetic Calibration Program RK 561. Only fixes with inverses of less than 5 meters were accepted. During days of poor visibility whole lane count was obtained from a calibration buoy (MM #4) at the following location:

Latitude: 45°55'23.624"N Longitude: 83°42'49.395'W

Partial values were used from the previous visual calibration.

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 buoy circlings. Any 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.

Three lines of hydrography on JD 258 which were run by launch 1002 (VESNO 2225) were rejected because of poor control and were rerun by launch 1004 (VESNO 2226) on JD 259. On JD 258 slave 1 went off the air at about 1900 making final calibration impossible for both launches. However, since the Hydrotrac was very steady until that time the data was not rejected.

H. SHORELINE ✓ *See Verifier's Report*

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 10.5% of the regular sounding lines. The crossline soundings generally agree within 1 foot of the main scheme soundings with some greater disagreement in areas of very rough bottom topography.

J. JUNCTIONS

This survey junctions with the following surveys:

Area of Junction:	Field No:	Reg No:	Scale:	Date:	Party:
North	- -	1-2258	1:15,000	1965	US Army Corps of Engrs
North	- -	1-2259	1:15,000	1965	US Army Corps of Engrs
North	- -	1-2260	1:15,000	1965	US Army Corps of Engrs
South	MI-50-1-77	H-9720	1:50,000	1977	Mt Mitchell S222
South	MI-50-5-77	H-9718	1:50,000	1977	Mt Mitchell S222
West	MI-20-4-77	H-9719	1:20,000	1977	Mt Mitchell S222
East		1-1371	1:20,000	1917	US Army Corps of Engrs.

Junctions with the Lake Surveys 1-2258 and 1-2259 were generally fair with 2 to 5 foot discrepancies. Junctions with 1-2260 was good with 2-4 foot discrepancies. The discrepancies were attributed to the height of lake water over chart datum during the running of this survey, the inaccuracy of tranferring soundings by hand between different scales and the jagged profile of the bottom. Occassional junction soundings differred considerably from this survey. The improved quality of position control for the present survey is the probable cause of this disagreement.

Junctions with the two 1:50,000 scale sheets were good with discrepancies generally less than 3 feet. Inaccuracy in transferring soundings by hand between scales and the jagged bottom were the reasons for such discrepancies. Depth contours were continuous across junctions. concur

Junctions with MI-20-4-77 was very good with less than 3 foot discrepancies, again due to the jagged bottom topography. Depth contours were continuous across junctions. concur

K. COMPARISON WITH PRIOR SURVEYS

*The only prior survey in the area of this survey was Survey 1-1838 done by the Lake Survey in 1945 at a scale of 1:120,000. Only a few soundings from the prior survey were within the limits of this survey. These soundings are within 400 meters of comparable soundings on this survey. The improved quality of position control for the present survey is the probable cause of this disagreement. concur

* See Section 6 of the Verifiers Report for prior survey comparison.

There were no presurvey review items within the survey limits of this sheet.

L. COMPARISON WITH CHARTS

The following NOAA Charts cover the area of this survey:

Chart No:	Scale:	Edition:	Date:
14880 (Formerly L.S.6)	1:120,000	24	2-05-77
14882 (Formerly L.S.61)	1:40,000	25	4-17-76

Selected soundings from these charts were transferred to the overlay of this survey for comparison purposes.

Agreement with this survey and those chart soundings was very good with only slight positioning differences, again due to the improved quality of this survey's positioning control.

M. ADEQUACY OF THE SURVEY

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

N. AIDS TO NAVIGATION

The red nun buoy "2" marking Big Shoal was the only aid to navigation within the survey limits. This buoy, located during the survey, was at Latitude 45°54'22.935"N and Longitude 83°37'08.238"W. Its location agrees well with the charted position on the two charts of the area and it does mark the limits of Big Shoal. The light list, while not listing its Latitude and Longitude does specify that it is in 14 foot of water. This is erroneous as soundings made during this survey show it to be located in 35 feet of water. Its position was determined by launch 1002 (VESNO 2225). Four passes within 2 meters of the buoy were made from four different directions. D.P.'S were marked when the antenna was abeam the buoy. This buoy is maintained by the U.S. Coast Guard and is removed each winter and replaced again each spring after the thaw. Therefore, a small amount of movement is probable with each buoy placement. concur

O. STATISTICS

Linear Nautical Miles of Main Scheme Hydrography	310.5
Linear Nautical Miles of Crosslines	32.5
Linear Nautical Miles of Development	1.0
Total Linear Miles of Hydrography	344.0
Total Miscellaneous Nautical Miles	86.5

STATISTICS Cont'd

Total To and From Nautical Miles	71.0
Total Nautical Miles	501.5
Nautical Square Miles of Hydrography	34
Total Number of Positions	1079
Nansen Casts	1
XBT'S	3
Bottom Samples	19

P. MISCELLANEOUS

Tape punches on both launches malfunctioned during this survey causing many of the Master Data tapes to be defective. These tapes were corrected using RK 330 - Reformat and Data Check program. The corrected tapes were marked Edited Master tape and the defective tapes were marked Bad Master tapes. Both Edited and Bad Master tapes are included with this survey.

Q. RECOMMENDATIONS

None

R. AUTOMATED DATA PROCESSING

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

Program No:	Program Name:	Version Date:
RK 110	Hyperbolic Real-Time Hydroplot	1-30-76
RK 201	Grid, Signal and Lattice Plot	4-18-75
RK 210	Hyperbolic Non-Real Time Plot	1-15-76
RK 300	Utility Computations	2-05-76
RK 330	Reformat and Data Check	5-04-76
RK 360	Electronic Corrector Abstract	2-03-76
RK 530	Layer Corrections for Velocity	5-10-76
RK 561	H/R Geodetic Calibration	2-19-75
AM 602	Elinore-Line Oriented Editor	5-20-75

S. REFERENCE TO REPORTS

None

Respectfully Submitted:

for Ronald P. Watkins ST

Donald R. Rice
LTjg, NOAA

APPENDIX 2

FIELD WATER LEVEL NOTE

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
NOAA SHIP MT MITCHELL S222
439 West York Street
Norfolk, Virginia 23510

Date : November 20, 1977 Reply to Attn. of:

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

From : LCDR Gerald B. Mills
for Actg Commanding Officer, NOAA SHIP MT MITCHELL S222

Subject: Water Level Data For Survey H-9721

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

Gage:	Latitude:	Longitude:
Presque Isle, Michigan (#907-5069)	45°20'27"N	83°29'10"W
Cheboygan, Michigan (#907-5076)	45°38'50"N	84°28'14"W
De Tour Village, Michigan (#907-5098)	45°59'30"N	83°53'54"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:

(1)	45°52.8'N 83°51.8'W	(2)	45°56.5'N 83°51.8'W	(3)	45°54.9'N 83°30.7'W	(4)	45°52.8'N 83°30.7'W

This information is requested for the following period:

000000 GMT 12 September 1977 to 235959 17 September 1977.

ATLANTIC MARINE CENTER

TIDE NOTE

1. Project No: OPR-520-MI-77 2. Vessel/~~Xxxxxxxxx~~: NOAA Ship MT MITCHELL S222

3. Year: 1977 4. Meridian Time Zone: GMT

5. Tide Station Name: Presque Isle, Michigan (#907-5069)

6. Position: Lat. 45 ° 20.45 ' N. Long. 83 ° 29.17'W

7. Plane of Reference: [XX] ~~MLW~~ LWD, [ ] MLLW corresponds to ___ feet on the tide staff for the period ___

8. Hourly Heights: [XX] Standard Gauge, furnished from Rockvill

[ ] Scaled and logged from field marigrams.

9. Tidal Zoning: [ ] Not applicable.

[XX] By two or more gauges automatically zoned

[ ] By applying tidal differences and const

for the area(s): a. ___

TIME (Hour, Minute)		HEIGHT (Feet)		HEIGHT RATI (If Applicab	
High Water	Low Water	High Water	Low Water	High Water	Low

b. ___

TIME (Hour, Minute)		HEIGHT (Feet)		HEIGHT RATI (If Applicab	
High Water	Low Water	High Water	Low Water	High Water	Low

c. Include additional areas on separate s

10. Remarks: All Times and Dates used on the survey are Gr

Mean Time

ATLANTIC MARINE CENTER

TIDE NOTE

1. Project No: OPR-520-MI-77 2. Vessel/~~Field Unit~~: NOAA Ship MT MITCHELL (MSS-~~22~~)

3. Year: 1977 4. Meridian Time Zone: GMT

5. Tide Station Name: Cheboygan, Michigan (#907-5076)

6. Position: Lat. 45 ° 38.83 ' N. Long. 84 ° 29.17'W

7. Plane of Reference: [XX] ~~MLW~~ LWD, [ ] MLLW corresponds to _____ feet on the tide staff for the period _____.

8. Hourly Heights: [XX] Standard Gauge, furnished from Rockville.

[ ] Scaled and logged from field marigrams.

9. Tidal Zoning: [ ] Not applicable.

[XX] 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.

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

25-72

ATLANTIC MARINE CENTER

TIDE NOTE

1. Project No: OPR-520-MI-772. Vessel/~~Rockwell~~: NOAA Ship MT MITCHELL (S222

3. Year: 1977 4. Meridian Time Zone: GMT

5. Tide Station Name: De Tour Village, Michigan (#907-5098)

6. Position: Lat. 45° 59.5 'N. Long. 83° 53.9'W

7. Plane of Reference: [XX] ~~MLW~~ LWD [ ] MLLW corresponds to ___ feet on the tide staff for the period ___

8. Hourly Heights: [XX] Standard Gauge, furnished from Rockvill

[ ] Scaled and logged from field marigrams.

9. Tidal Zoning: [ ] Not applicable.

[XX] By two or more gauges automatically zo

[ ] By applying tidal differences and cons

for the area(s): a. ___

TIME (Hour, Minute)		HEIGHT (Feet)		HEIGHT RATI (If Applicab	
High Water	Low Water	High Water	Low Water	High Water	Low

b. ___

TIME (Hour, Minute)		HEIGHT (Feet)		HEIGHT RATI (If Applicab	
High Water	Low Water	High Water	Low Water	High Water	Low

c. Include additional areas on separate s

10. Remarks: All Times and Dates used on the survey are G Mean Time

APPENDIX 4

ABSTRACT OF CORRECTIONS TO ECHO SOUNDINGS

DETERMINATION OF VELOCITY CORRECTIONS

Simultaneous Nansen Casts and XBT'S disagreed from -2.2°C to +1.2°C with 70% of all temperatures agreeing within 0.5°C. Since the errors caused by the use of XBT'S were small, they were used alone at some stations for velocity determinations.

Station:	Latitude:	Longitude:	Date:
J1 (XBT)	45°52.8'N	83°46.0'W	9-14-77 (JD 257)
J2 (XBT)	45°53.1'N	83°37.2'W	9-15-77 (JD 258)
J3 (XBT)	45°53.1'N	83°48.9'W	9-15-77 (JD 258)
J4 (Nansen)	45°54.6'N	83°42.8'W	9-17-77 (JD 260)

Data obtained from the two westernmost stations (J1 and J3) were in good agreement and were averaged together to create velocity Table 1. Similarly the two easternmost station's data were averaged to form velocity Table 2. The dividing line between the areas of the two tables is Longitude 83°44'24"W.

VELOCITY TAPE PRINTOUT
MI 20-3-77
TABLE #1 H-9721

VESNO 2225

```
000437 0 0000 0001 000 222500 020377
000632 1 0002
000783 1 0004
000920 1 0006
001051 1 0008
001178 1 0010
001301 1 0012
001530 1 0015
001745 1 0020
001910 1 0025
002130 1 0030
002330 1 0035
999999 1 0040
```

VESNO 2226

```
000437 0 0000 0001 000 222600 020377
000632 1 0002
000783 1 0004
000920 1 0006
001051 1 0008
001178 1 0010
001301 1 0012
001530 1 0015
001745 1 0020
001910 1 0025
002130 1 0030
002330 1 0035
999999 1 0040
```

VELOCITY TAPE PRINTOUT
MI 20-3-77
TABLE #2 H-9721

VESNO 2225

```
000584 0 0000 0002 000 222500 020377
000871 1 0002
001023 1 0004
001152 1 0006
001261 1 0008
001429 1 0010
001657 1 0015
001884 1 0020
002080 1 0025
002310 1 0030
002510 1 0035
999999 1 0040
```

VESNO 2226

```
000584 0 0000 0002 000 222600 020377
000871 1 0002
001023 1 0004
001152 1 0006
001261 1 0008
001429 1 0010
001657 1 0015
001884 1 0020
002080 1 0025
002310 1 0030
002510 1 0035
999999 1 0040
```

APPENDIX 6

LIST OF STATIONS

H-9721

SIGNALS LIST
MI 20-3-77

207	4	45	20	56482	083	29	06080	250	0000	162038
300	4	45	29	11010	083	54	48836	250	0000	162038
400	4	45	46	18807	084	21	23562	250	0000	162038
510	4	45	56	56791	083	54	11207	139	0000	000000
605	4	45	56	13562	083	49	52262	139	0000	000000
610	4	45	55	58549	083	47	09640	139	0000	000000
615	4	45	55	53493	083	46	07375	139	0000	000000
620	4	45	55	49785	083	42	56286	139	0000	000000
625	4	45	56	07276	083	41	14385	139	0000	000000
630	4	45	55	44376	083	37	51647	139	0000	000000
635	4	45	54	56631	083	34	58392	139	0000	000000
640	4	45	54	44340	083	33	43536	139	0000	000000
650	4	45	55	04628	083	31	38761	139	0000	000000

SIGNALS NAMES LIST

SIGNAL	NAME	SOURCE
207	PRESQUE ISLE 'TURCOTTE' HYDROTRAC	AMC OPS (H-17-MI-77)
300	FORTY MILE PT HYDROTRAC	AMC OPS (H-13A-MI-77)
400	BOIS BLANC ISLAND HYDROTRAC	AMC OPS (H-20-MI-77)
510	DETOUR REEF LT	MICH QUAD 450834#1005
605	ESPANORE ISLAND	AMC OPS (H-26-MI-77)
610	CREAM CITY POINT	AMC OPS (H-22-MI-77)
615	GRAVEL ISLAND	AMC OPS (H-27-MI-77)
620	TRAVERSE POINT	AMC OPS (H-23-MI-77)
625	SEAMANS POINT	AMC OPS (H-28-MI-77)
630	SCAMMON POINT	AMC OPS (H-30-MI-77)
635	LONG POINT	AMC OPS (H-00-MI-77)
640	SHELTER ISLAND	AMC OPS (H-32-MI-77)
650	FALSE DETOUR	AMC OPS (H-29-MI-77)

APPROVAL SHEET

MI-20-3-77

H-9721

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, LCDR

for James S. Midgley
Captain, NOAA
Acting Commanding Officer

APPROVAL SHEET
FOR
SURVEY H- 9721

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: 8/28/78

Signed: [signature]

Title: Chief, Verification 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: Cheboygan, Michigan 907-5076

Period: September 12 - 17, 1977

HYDROGRAPHIC SHEET: H-9721

OPR-520-MI-77

Locality: Lake Huron

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

Remarks:

Detour Dock, Michigan gage (907-5098) was inoperative during the survey period.

Presque Isle, Michigan gage (907-5069) was installed by the Hydrographic Field party, but they have been unable to locate any data for the gage for 1977.

Data from other gages on Lake Huron indicates no unusual water level movement during the period of survey.

Philip C. Morris
Chief, Water Level Section

Don M. Spillman 10/16/78
Chief, Tides & Water Levels Branch

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-9721

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	K U.S. LIGHT LIST	
BASS COVE ✓		✓								1
BIG SHOAL ✓		✓								2
BIG SHOAL COVE ✓		✓								3
CANDE POINT ✓		✓								4
DRUMMOND ISLAND ✓		✓								5
ESPANORE ISLAND ✓		✓								6
FALSE DETOUR CHANNEL ✓		✓								7
GRAVEL ISLAND ✓		✓								8
HOLDRIDGE SHOAL ✓										9
HURON BAY ✓		✓								10
LAKE HURON		✓								11
LITTLE SHELTER BAY ✓		✓								12
LONG POINT ✓	?									13
MEADE ISLAND ✓		✓								14
SCAMMON POINT ✓		✓								15
SEAMANS POINT ✓		✓								16
SHELTER ISLAND ✓		✓								17
TRAVERSE POINT ✓		✓								18
WARNERS COVE ✓		✓								19
						APPROVED				20
						Chas. E. Harrington				21
						CHIEF GEOGRAPHER-C3x8				22
						3 Nov. 1978				23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

U.S. GPO: 1972-769-585/[illegible]

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

HYDROGRAPHIC SURVEY STATISTICS

H-9721

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	BOAT SHEETS & PRELIMINARY OVERLAYS: 6 FIELD SHEETS, 4-PAPER & 2-MYLAR	6
DESCRIPTIVE REPORT	1	SMOOTH OVERLAYS: POS. ARC, EXCESS	2

DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/ SOURCE DOCUMENTS
ENVELOPES	1					1-ENVELOPE OF MISC. DATA
CAHIERS	1-with printouts		1			
VOLUMES	3					
BOXES						

T-SHEET PRINTS (List)

SPECIAL REPORTS (List): 1-calibration notebook, 2-junction strips

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			1079
POSITIONS CHECKED		15	
POSITIONS REVISED		7	
SOUNDINGS REVISED		15	
SOUNDINGS ERRONEOUSLY SPACED		0	
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED		0	
	TIME – HOURS		
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)	1		
VERIFICATION OF CONTROL		0	
VERIFICATION OF POSITIONS		10	
VERIFICATION OF SOUNDINGS		80	
COMPILATION OF SMOOTH SHEET		48	
APPLICATION OF TOPOGRAPHY		0	
APPLICATION OF PHOTOBATHYMETRY		0	
JUNCTIONS		8	
COMPARISON WITH PRIOR SURVEYS & CHARTS		8	
VERIFIER'S REPORT		12	
OTHER			
TOTALS	1	166	167

Pre-Verification by: F. Saunders	*Beginning Date*: 12-02/77	*Ending Date*: 12/02/77
Verification by: D. Mason, S. Kelley, L. Cram	*Beginning Date*: 12/27/77	*Ending Date*: 08/17/78
Verification Check by: G. Trefethen	*Time (Hours)*: 4	*Date*: 08/22/78
Marine Center Inspection by: Hydrographic Inspection Team (AMC)	*Time (Hours)*: 14	*Date*: 08/23/78
Quality Control Inspection by: R. W. Wellman	*Time (Hours)*: 33 hrs.	*Date*: 11-3-78
Requirements Evaluation by: D Baumgardner	*Time (Hours)*: 2	*Date*: 12/8/78

Carteau 6 hr 11/24/78

REGISTRY NO. _____

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. H-9721

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
VERIFIER'S REPORT

REGISTRY NO. H-9721 FIELD NO. MI-20-3-77

Michigan, Lake Huron, South of Drummond Island

SURVEYED: September 12 through September 17, 1977

SCALE: 1:20,000 PROJECT NO.: OPR-520

SOUNDINGS: Ross Fineline Depth Sounder

CONTROL: Odum Offshore Hydrotrac (Hyperbolic)

Chief of Party ..... J.S. Midgley
Surveyed by ..... G. Mills
..... D. Waltz
..... D. Rice
..... M. Henderson
..... P. Daugherty
..... T. Rulon
..... W. Pringle
..... M. Murphy
Automated Plot by ..... CALCOMP-618 Plotter (AMC)
Verified and Inked by ..... L. Cram
August 17, 1978

1. Introduction

a. The ~~project~~ projection parameters were revised during verification. Changes in the Descriptive Report were made in red by the verifier during verification.

b. 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, C3314.

2. Control and Shoreline

a. The source of control is adequately described in the Descriptive Report, with one exception: stations 610, 615, 620, and 625 were used only as calibration stations. (See Q.C. Report - item 1)

b. No conventional type shoreline was available during verification of this survey. Shoreline was added in brown, for orientation purposes only, from Corp of Engineers surveys 1-2258, 1-2259, and 1-2260 of 1965. The shoreline on these sheets originates with aerial photography of 1964 and 1966.

3. Hydrography

a. The agreement at crossings on this survey is adequate.

b. The standard depth curves were drawn in their entirety. Some brown curves were added to the survey to provide better delineation of the bottom configuration.

c. This survey is considered adequate to delineate the bottom configuration and least depths, due to the better control and closer line spacing as compared to the prior surveys of 1917, with some exceptions. One of these is the shoal charted in latitude 45° 55' 00", longitude 83° 44' 00"; another was a shoal charted in latitude 45° 55' 00", longitude 83° 40' 00" - in both cases soundings from ~~junctional~~ prior surveys were added. A least depth of 51 feet was added from 1-1372 (1917) to better delineate a shoal feature in latitude 45° 55' 06", longitude 83° 48' 02".

4. Condition of Survey

The smooth sheet and accompanying overlays, hydrographic records, and the Descriptive Report are adequate and conform to the requirements and procedures prescribed by the Hydrographic Manual.

5. Junctions

Adequate junctions were effected with the following surveys:

1-2260 (1965) to the northeast
1-2259 (1965) to the north
1-2258 (1965) to the northwest
H-9719 (1977) to the west
H-9718 (1977) to the southwest
H-9720 (1977) to the south and southwest

} Not available during Q.C. inspection

Junctions with the three Corp of Engineers, Lake Survey Center surveys 1-2258, 1-2259, and 1-2260 to the north show differences of 2 to 3 feet in some cases. A good many shoaler soundings were brought forward ~~drom~~ from these surveys to show shoaler depths and to provide better delineation of depth curves. The depth curves were brought into coincidence. (See Q.C. Report-item 3)

It will be necessary for Quality Control to ink the 60-foot curve on the Corp of Engineers surveys as no 60-foot curve was ever added to these surveys.

Junctions with H-9718, H-9719, and H-9720 are complete and no further work on these surveys is necessary.

Canadian surveys 3962 (1977) 1:25,000 and 3967 (to be completed in 1978) 1:25,000 junction with the present survey to the east. They were not available at the time of verification and should be considered as they become available.

6. Comparison With Prior Surveys

1-1371	(1917)	1:20,000
1-1372	(1917)	1:20,000
1-1373	(1917)	1:20,000
1-1838	(1945)	1:120,000
1-2258	(1965)	1:15,000
1-2259	(1965)	1:15,000
1-2260	(1965)	1:15,000

These surveys are the most recent in this area that provide complete coverage.

On the inshore prior ~~(junction)~~ surveys (1-2258, 1-2259, and 1-2260) the basic bottom configuration appears to be in good agreement (+ or - 2 feet), with some in between lines from the prior surveys verifying the existence of shoals and providing additional delineation of others.* It is noted that a great many soundings were brought forward from 1-2259 for these reasons.

*(See supplemental comments in the Q.C. Report-item 3)

On the prior surveys (1-1371, 1-1372, and 1-1373) the basic bottom configuration appears to be within + or - 1 to 4 feet in most cases. There were some 10- to 15-foot differences in offshore areas of 1-1373; this could be attributed to the control and sounding methods used in 1917 as compared to those in use on the present survey. There was no datum adjustment information available for these 1917 surveys. When they were compared with the charted information it was apparent that the chart compiler had made some sort of datum ~~adjustment~~ adjustment. It is further noted that Chart 14880 (25th Edition, April 17, 1976) was compiled using 1927 datum.

The smaller amount of change (1 to 2 feet) can be attributed to more accurate methods used during the present survey and to some natural changes taking place. The prior surveys 1-1371, 1-1372, and 1-1373 appear to be combined hydrographic and wire drag surveys. None of the cleared depth statements on these surveys conflict with information on the present survey. One sounding was brought forward from 1-1372 (1917) to supplement a shoal area.

(See Q.C. Report - item 4)

The present survey is adequate to supersede the prior surveys with the depths brought forward to supplement the present survey in the common area.

7. Comparison With Charts 14882 (25th Edition, April 17, 1976 - 1927 datum) 14880 (24th Edition, February 5, 1977 - 1902 datum)

a. Hydrography

The charted hydrography on Chart 14882 originates with the previously discussed prior surveys. Only four soundings from Chart 14880 source could be identified. It does not appear that this section of the chart has been updated to reflect the most recent prior surveys in the area.

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

b. Aids to Navigation

The charted aids to navigation were adequately discussed under Section N of the Descriptive Report.

8. Compliance With Instructions

This survey adequately complies with the Project Instructions.

9. Additional Field Work

This is an adequate basic survey; no additional field work is recommended.

Inspection Report
H-9721

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

Maureen R. Kenny for
C. Douglas Mason, LT, NOAA
Chief, Electronic Data
Processing Branch

Guy F. Trefethen
Team Leader
Verification Branch

Approved/Forwarded

F Ronald M. Buffington for
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/KWW

November 3, 1978

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

THRU: Chief, Quality Control Branch

FROM: K. W. Wellman
Quality Evaluator

SUBJECT: Quality Control Report for H-9721 (1977), Michigan, Lake Huron, South of Drummond Island

A quality control inspection of H-9721 was accomplished to monitor the survey for obvious deficiencies with respect to data acquisition, delineation of the bottom, determination of least depths and navigation hazards, shoreline transfer, decisions and actions by the verifier, and cartographic presentation of data.

In general, the present survey was found to conform to National Ocean Survey standards and requirements except as discussed in the Verifier's Report, the HIT Report, and as follows:

1. Section 2-a of the Verifier's Report is supplemented by the following:

The status of the control stations (triangulation stations) could not be substantiated by the National Geodetic Survey (NGS). It is assumed, however, that the necessary records and computations will eventually be submitted to the NGS. Ultimately, therefore, it is expected that the triangulation station status of the control stations will be validated. Accordingly, the control stations are symbolized as triangulation stations pending formal processing and acceptance as such by the NGS.

2. When information carried forward from a prior survey displaces a corresponding least depth on the present survey, a note and leader indicating the excessed present survey sounding and position should be lettered on the smooth sheet. (See section 6.3.7.3 of the Hydrographic Manual--Fourth Edition.) Such appropriate lettering was added to the smooth sheet during quality control inspection.

3. Reference sections 5 and 6 of the Verifier's Report:

Three surveys (1-2258, 1-2259, and 1-2260) are inappropriately included in both of the referenced sections. Such duplication is considered

improper and unnecessary. Further, the junctional depth curves are not readily and/or sufficiently reconcilable within the common area to effect the required junctional coincidence of depth curves. In addition, it is not considered appropriate to add the 60-foot depth curves to the adjoining surveys as recommended in the Verifier's Report (section 5). Accordingly, the three listed surveys are considered prior surveys rather than junctional surveys due to the noted depth differences and the elapsed time since the date of the surveys in question. (See the memorandum dated July 26, 1978, from the Marine Surveys Division entitled "Junctional Surveys.") This obviates the need for extensive depth curve manipulation to attain the "adequate" junctions claimed in section 5 of the Verifier's Report. The comments pertaining to the listed 1965 surveys included in section 5 of the Verifier's Report are to be disregarded. Appropriate revisions to the smooth sheet have been effected during quality control inspection.

Section 6 of the Verifier's Report is supplemented by the following:

Scattered depth differences of ± 8 feet, however, were also noted in the common areas between the present survey and the 1965 surveys. The 29-foot sounding from 1-2259 (1965) in latitude 45°55.40', longitude 83°38.89' is considered to be displaced considering the present survey delineation of the bottom in the vicinity. However, since the 29-foot depth comprises the least depth in the vicinity, it was carried forward to provide this information.

4. Comments pertaining to the results of the comparison with prior survey 1-1838 are not included in section 6 of the Verifier's Report.

Section 6 of the Verifier's Report is supplemented by the following:

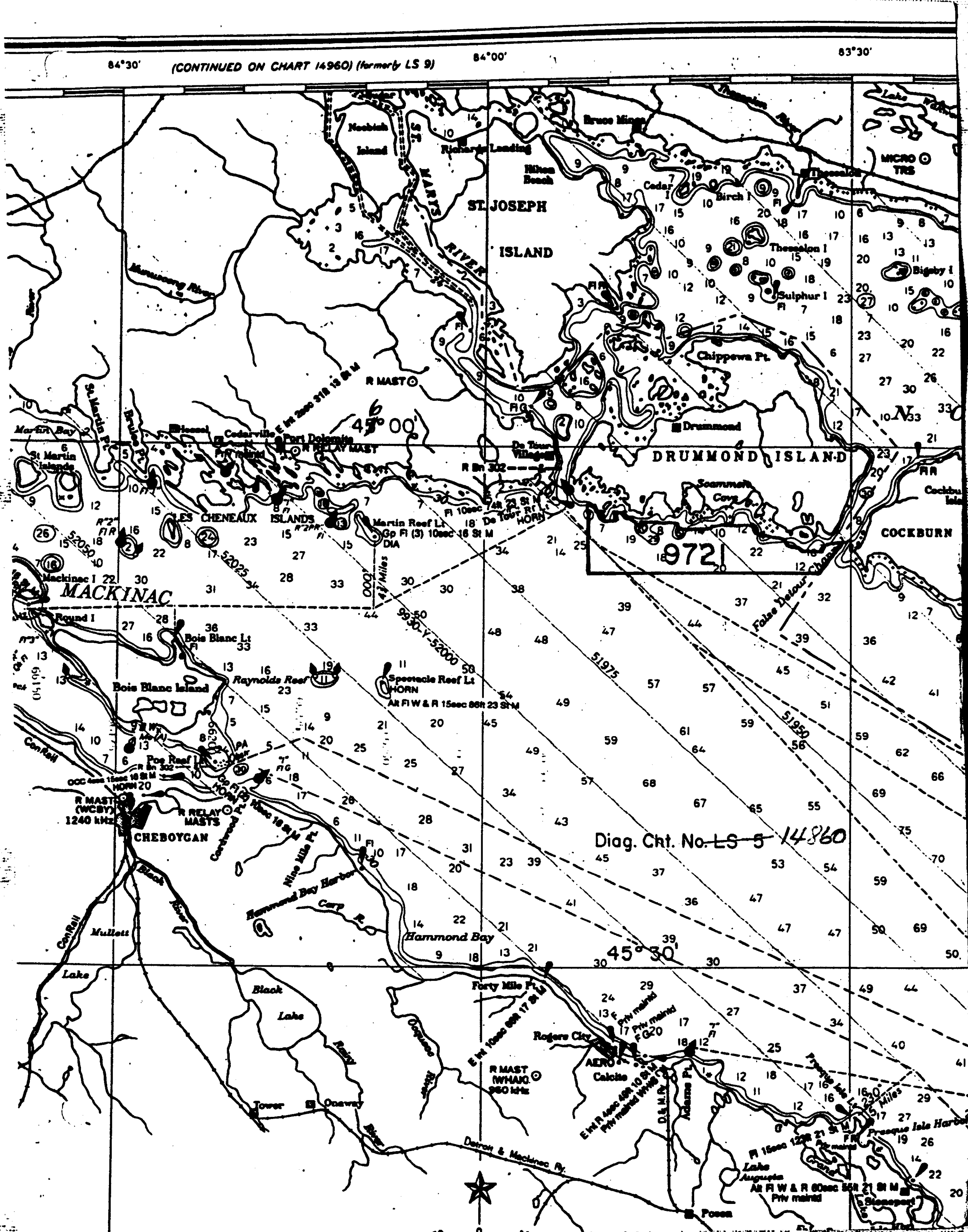
A comparison with prior survey 1-1838 indicates depth differences ranging to ± 8 feet. The easterly line of prior survey soundings intruding into the present survey area appears to be displaced to the south of its most likely position as indicated by similar depths on the present survey. The noted differences are attributed to the combined effects of the limited precision of the prior survey due to the relatively small scale, possible indeterminate control problems on 1-1838, and natural shifting of bottom sediments in the area.

5. Geographic names should have been lettered "lightly in pencil" on the smooth sheet during verification. They were added to the smooth sheet during quality control inspection. (See section 7.3.12.3 of the Hydrographic Manual--Fourth Edition.)

6. In carrying forward soundings from prior surveys the verifier frequently disregarded the least depth on features in favor of deeper

soundings not overlapping the present survey soundings. The least depths were added during quality evaluation.

cc:
C35
C351



84°30'
(CONTINUED ON CHART 14960) (formerly LS 9)
84°00'
83°30'
Neebish Island
Richards Landing
Bruce Mines
Hilton Beach
ST. JOSEPH ISLAND
ST MARYS RIVER
Munuscong River
Cedar I
Birch I
Thessalon
MICRO TRS
Thessalon I
Bigsby I
Sulphur I
Chippewa Pt.
R MAST
Drummond
DRUMMOND ISLAND
De Tour Village
R Bn 302
Scammon Cove
Cockburn Isl
COCKBURN
9721
St Martin Bay
St Martin Islands
Cedarville
Port Dolomite
R RELAY MAST
LES CHENEAUX ISLANDS
Martin Reef Lt
Gp Fl (3) 10sec 16 St M
DIA
De Tour Rf
HORN
Mackinac I
MACKINAC
Round I
Bois Blanc Lt
Bois Blanc Island
Raynolds Reef
Spectacle Reef Lt
HORN
Alt Fl W & R 15sec 86ft 23 St M
False Detour Chan
45°00'
Poe Reef Lt
R MAST (WCBY) 1240 kHz
R RELAY MASTS
CHEBOYGAN
Cordwood Pt
Nine Mile Pt.
Hammond Bay Harbor
Carp R.
Hammond Bay
Diag. Cht. No. LS 5 14860
45°30'
Black River
Mullett Lake
Black Lake
Rainy River
Forty Mile Pt.
Rogers City
AERO
Calcite
R MAST (WHAK) 960 kHz
Presque Isle Harbor
Lake Augusta
Alt Fl W & R 60sec 85ft 21 St M
Priv maintd
Stoneport
Tower
Onaway
Detroit & Mackinac Ry.
Posen

FORM C&GS-8352
(3-26-63)

NAUTICAL CHART DIVISION

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9721

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
14880	3-30-79	K Clark	~~Full Part Before~~ After Verification Review Inspection Signed Via
			Drawing No. 2 FORWARD
14882	8-16-79	Russell Kennedy	Full ~~Part Before~~ After ~~Verification Review Inspection~~ Signed Via
			Drawing No. 3
14860	10-1-81	E. Bodovinac	~~Full~~ Part ~~Before~~ After Verification Review Inspection Signed Via
			Drawing No. 5 - Part applied thru 14880
14860	8-11-87	Joseph Pinno	Full Part Before After Verification Review Inspection Signed Via
			Drawing No. Forward #7
4880	4-20-81	Standard	Full ~~Part~~ Before After Verification Review Inspection Signed Via
			Drawing No. 3
14860	10-17-91	K. Clark	Full ~~Part~~ Before After Verification Review Inspection Signed Via
			Drawing No. 9 thru 14880
			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.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.

FORM C&GS-8352 SUPERSEDES ALL EDITIONS OF FORM C&GS-975.

USCOMM-DC 8558-P63