10028
A & B

Diagram No. LS-966

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-5-3-82

Office No. H-10028

LOCALITY

State Wisconsin—Minnesota

General Locality Superior Bay

Locality Hog Island to Allouex Bay and Nemadji River

1982

CHIEF OF PARTY
CDR W.S. Simmons

LIBRARY & ARCHIVES

DATE March 18, 1986

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

10028
A&B

Area 7
L-219(86)
CHTS:
14975
14966
14960
14961
} to sign off on
Record of Application

NOAA FORM 77-28 (11-72)

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

REGISTER NO.

H-10028a and H-10028b

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-05-3-82

State WISCONSIN - MINNESOTA

General locality SUPERIOR BAY

Locality HOG ISLAND TO ALLOUEZ BAY (sheet a) NEMADJI RIVER (sheet b)

Scale 1 : 5,000 Date of survey June 26 to October 21, 1982

Instructions dated March 31, 1982 Project No. OPR-Z137-PE-82

Vessel Launches 1009 (2839), 1017 (2837), Monark (2835), and Boston Whaler (2832).

Chief of party CDR Walter S. Simmons

Surveyed by LCDR Armstrong, LT Millett, ENS Harris, and ENS Andreeva

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

Graphic record scaled by NGM, MPC, AAA, LIA, RBH, EK, RH, and IPR.

Graphic record checked by NGM, RBH, IPR, and WRM.

Protracted by _____ Automated plot by Xynetics 1201 Plotter (AMC) ~~Hydroplot DD-3.~~

Verification by _____

Soundings in ~~XXXXXX~~ feet at ~~MLLW~~ ~~MLW~~ Low Water Datum ~~dates of field work water levels.~~ (IGLD 1955 600.0 FEET)

REMARKS: Launch 1017 (2837) was only used to obtain bottom samples on this survey. Soundings have ~~not~~ been reduced to ~~mean~~ low water ~~level~~ datum, International Great Lakes Datum (1955). All times have been recorded in Coordinated Universal Time .

AWOIS and SURF r RWD 5/87

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

☆ U.S. GOVERNMENT PRINTING OFFICE: 1976—665-661/1222 REGION NO. 8

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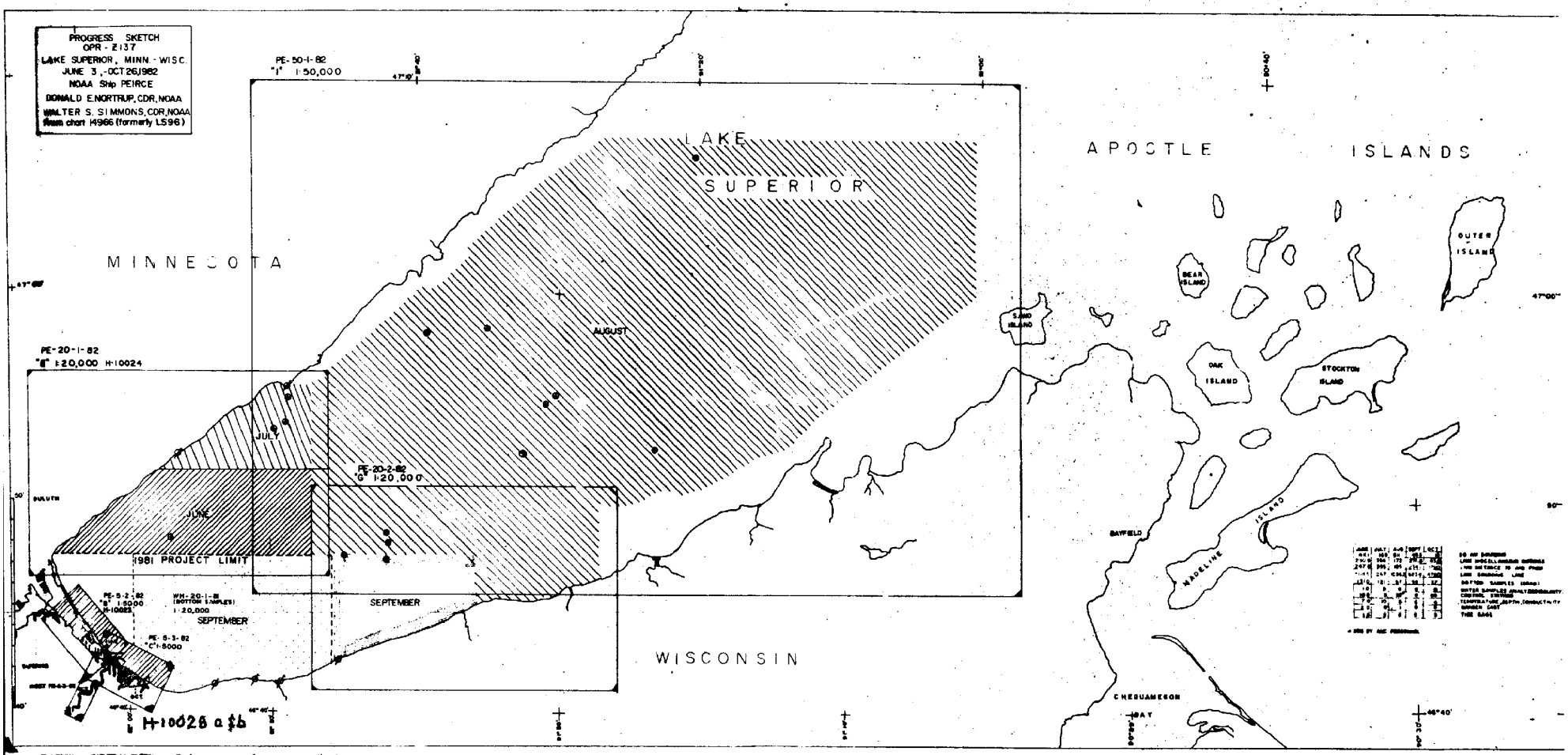
PROGRESS SKETCH
OPR - Z137
LAKE SUPERIOR, MINN. - WISC.
JUNE 3, - OCT 26, 1982
NOAA Ship PEIRCE
DONALD E. NORTRUP, CDR, NOAA
WALTER S. SIMMONS, CDR, NOAA
from chart 14966 (formerly LS96)
PE-50-1-82
"I" 1:50,000
LAKE
SUPERIOR
MINNESOTA
WISCONSIN
APOSTLE
ISLANDS
AUGUST
JULY
JUNE
SEPTEMBER
PE-20-1-82
"B" 1:20,000 H-10024
PE-20-2-82
"C" 1:20,000
1981 PROJECT LIMIT
PE-5-2-82
"B" 1:5000
H-10025
WH-20-1-81
(BOTTOM SAMPLES)
1:20,000
PE-5-3-82
"C" 1:5000
DULUTH
SUPERIOR
BAYFIELD
MADELINE
ISLAND
OUTER
ISLAND
BEAR
ISLAND
SAND
ISLAND
OAK
ISLAND
STOCKTON
ISLAND
CHEQUAMEGON
BAY
H10028 a $b

Descriptive Report
To Accompany
Hydrographic Survey H-10028a&b
(Field Number PE 05-3-82)
1:5,000 Scale, 1982
NOAA Ship PEIRCE
CDR. Walter S. Simmons, COMDG.

A. PROJECT

This survey provides contemporary basic hydrographic coverage of the inshore areas of Western Lake Superior and Superior Bay in the vicinity of Superior Entry, Wisconsin. The survey was conducted in accordance with Hydrographic Project Instructions for project OPR-Z137-PE-82, Lake Superior, dated March 31, 1982, and change No. 1, Supplemental Instructions, dated April 21, 1982, and change No. 2, Amendment to Instructions, dated June 16, 1982.

B. AREA SURVEYED

This survey encompasses a portion of the western areas of Lake Superior bounded by a line drawn from ~~position~~ 46°40'26"N., 91°57'30"W., ~~and~~ 46°41'26"N., 91°57'30"W., to ~~the east,~~ a line drawn ~~from position~~ 46°41'26"N., 91°57'30"W., and 46°43'03"N., 92°01'~~02~~"W., to ~~the north, a line drawn from~~ 46°43'03"N., 92°01'02"W., ~~and 46°42'23"N., 92°02'07"W., to the west~~, and the shoreline of Superior, Wisconsin to the south and Nemadji River.

The survey commenced on June 26, 1982 (JD 177) and was completed on October 21, 1982 (JD 294).

C. SOUNDING VESSEL

Soundings for this survey were taken by echo sounder on survey launches 1009 (2839) and 1017 (2837) and by both echo sounder and sounding pole from skiffs (2835) and (2832). Survey launch 1017 (2837) was used to obtain bottom samples only.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

The following table summarizes all sounding instruments used by each survey vessel:

VESSEL	EQUIPMENT	SERIAL NUMBER	DATES (JD)
2839	Ross 5000 Fineline	1087	177 - 192

VESSEL	EQUIPMENT	SERIAL NUMBER	DATES (JD)
2839	Ross 5000 Fineline	1079	200, 257-258, 266-272
2835	Raytheon DE-719B	5441	209-211, 275-276, 277-291
2837	Ross 5000 Fineline	1087	266, 276-277
2832	Raytheon DE-719B	5441	259-263, 273-274

The Ross fathometer system was used exclusively aboard the survey launches (2837 and 2839) in depths generally ranging from 5 to 52 feet. The Raytheon analog system was used aboard both skiffs: Monark (2835) and Boston Whaler (2832) in depths generally greater than 3 feet and less than 35 feet. In areas to shoal for echo soundings, generally less than 3 feet, pole soundings were read and recorded to the nearest tenth of a foot. Pole soundings were taken from skiffs Monark (2835) and Boston Whaler (2832).

Corrections to echo soundings for both the difference between the calibrated velocity of the instruments and the actual velocity of sound in the water and for instrumental errors were based exclusively on bar checks. Based on favorable wind and current conditions, bar checks were generally taken twice daily, prior to beginning hydrography and at the end of the day. Oceanographic casts were not conducted on this survey since all soundings were from launches and small boats where reliable and accurate bar checks could be made, the project area depths were within bar check range, and the project area was in relatively calm and protected waters.

The portable transducer was mounted to the Boston Whaler (2832) through a bracket that was bolted to the vessel's seat. The position of the transducer was checked each day through bar checks and frequent direct measurements with a steel tape.

Initial checks were conducted on the analog records regularly while on line and complete phase checks were routinely made after each line. The initial and phase checks were annotated on the records and adjusted when necessary.

Settlement and squat tests were conducted on July 2, 1982 for launches 1009 (2839), 1017 (2837), and Monark (2835) from the northwest bulkhead by the northern section of Duluth Harbor Basin. The corrections for the speeds (0-1600 rpms) at which the launches were used on this survey are +0.2 feet or less. The correctors are on the TC/TI tape but were not applied on the final sheet.

Settlement and squat tests were conducted on October 18, 1982 for the Boston Whaler (2832) from the Duluth Arena Pier. The correction for normal sounding speed was +0.05 feet. This correction was not applied.

Abstracts of Corrections to Echo Soundings, copies of Velocity and TC/TI Tables, and the Settlement and Squat Report are appended to this report.

Seperate velocity correctors have been calculated for each launch and have been further subdivided for application to days of hydrography conducted on the open lake and for days of hydrography conducted within Superior Harbor and Allouez Bay.

E. HYDROGRAPHIC SHEETS

The field sheets for this survey were prepared aboard NOAA Ship PEIRCE using a Complot roll-bed plotter, PDP 8/e computer and computer program RK 201. The positions and soundings were plotted utilizing programs RK 216 and RK 211, except for the Nemadji River soundings which were hand plotted. The survey consists of four 1:5,000 scale final field sheets based upon the revised sheet layout, dated June 4, 1982. Two sheets contain all mainscheme sounding lines and splits, and consist of a north sheet (open lake) and a south sheet (Superior Harbor). The second pair of sheets contain all bottom samples, detached positions, crosslines, and developments and consists of north and south sheets covering identical areas as the mainscheme sheets.

Nemadji River sdgs were digitized during processing and are shown on sheet 6.

This survey, including all field records, will be sent to Atlantic Marine Center for verification and final smooth plotting. Included in the field records of this survey are three shoal developments that were plotted on separate plotter sheets at 1:1,000 and 1:2,500 scale. These sheets were used to assist the hydrographer in the field, and were not used to smooth plot the final survey data. All field and smooth sheet parameters are appended to this report.

F. CONTROL STATIONS

The following stations were used to control this survey:

Sig. No.

043- MINNOW, 1982
013- SUPERIOR ST. FRANCIS XAVIER CH, 1952
042- SUPER, 1982
047- OFFSUP, 1982 (Unmonumented, Del Norte offset)
046- OFFRED, 1982 (Unmonumented, Del Norte offset)
041- 457 USE, 1982
051- ROC, 1982 (Unmonumented)

Sig. No.

053- 13A USE, 1982
054- SUPERIOR HARBOR BASIN LT 1, 1982
027- ALLOUEZ, 1980
114- MN PT ARGO, 1980
102- WICK, 1981

— SKY HARBOR AIRPORT BEACON, 1982

In addition, the following stations were used for calibration signals and calibration distances:

040- 319 USE, 1982
— PETRA, 1980
136- SUPERIOR ENTRY S BREAKWATER LT, 1982
044- DULUTH HARBOR N PIER LT, 1982
— DULUTH ENGER MEMORIAL TOWER, 1952
— 461 USE, 1981
— CEMENT, 1980
— ST. CROIX, 1981
— WEST GATE, 1980

Three stations were not monumented because it either was not practical to do so at these locations or the stations were located in unstable areas where they would not be recovered in the future.

All stations are third order, class 1 accuracy or better and are based on the North American Datum, 1927. A complete list of control stations for this survey is appended to this report. All new stations were located during this project using standard traverse and triangulation methods, with checks. Additional information regarding geodetic control for this project is available in the Horizontal Control Report, Lake Superior 1982.

Shoreline maps were not available for the eastern portions of Allouez Bay and horizontal control and shoreline maps were not available for the Nemadji River. It was not practical to establish control to cover the entire meandering river. Therefore, the available aerial photographs were used to photoidentify the survey vessel's position during sounding operations on the Nemadji River. In addition, ground control was established using third order traverse methods and points photoidentified on the aerial photographs to allow for mapping of the Nemadji River and eastern Allouez Bay and remapping of the western Allouez Bay area of Superior Harbor, where substantial distortion of shoreline details has been observed. Seperate requests for mapping these areas have been forwarded to the Photogrammetry Branch.

TP-01254(1980-82) S.L. of Nemadji River is shown on the smooth sheet Eastern portion of survey shoreline is shown in brown ink on the smooth sheet and originates with photo revised U.S.G.S. Quads.

G. HYDROGRAPHIC POSITION CONTROL

With the exception of Julian Days 266 and 277, sounding line position control used in this survey was Del Norte in the Range/Azimuth mode. The position control used on the two days mentioned above is described in the following table:

J.D.	EQUIPMENT	S/N	LOCATION/REMARKS
266	Launch 1017 (2837) R/R ARGO RPU CDU	R0379107 C047524	Bottom Samples North Sheet Left: MN PT ARGO, 1980
	MN PT ARGO: RPU ALU	R047864 A0379120	Right: WICK, 1981
	WICK: RPU ALU	R047855 A0379127	FREQ: 1647.22 MHz (False) 1646. 70 " (ARGO) Nemadji River
277	Monark (2835) Photoidentified Control NOS, 1:5,000 Scale Photographs 5804 and 5806, dated 8/31/80		

The following table summarizes the Del Norte Range/Azimuth positioning equipment used on all other days of hydrography for this survey:

EQUIPMENT	S/N	JULIAN DAYS
DMU MASTER/CODE REMOTE/CODE T2	505 1318/78 249/74 22153	177
DMU MASTER/CODE REMOTE/CODE T2	505 1318/78 221/72 22153	178,179,180 181,182,188 189,192,200
DMU MASTER/CODE REMOTE/CODE T2	192 1318/78 216/76 22153	209,211
DMU MASTER/CODE REMOTE/CODE T2	188 1066/78 221/72 75507	257,258,259 263,266,272 273,274,275,276 (278,281, 289,290,291, T2 22153)

EQUIPMENT	S/N	JULIAN DAYS
DMU	188	
MASTER/CODE	1066/78	
REMOTE/CODE	216/76	260
T2	22153	
DMU	192	
MASTER/CODE	246/74	270
REMOTE/CODE	927/78, 216/76	
T2	75507	

Calibration checks were performed twice daily on the Del Norte positioning equipment using static daily system checks over accurately known distances. Calibration checks performed at the beginning and end of each day remained within acceptable limits at the scale of the survey (±3 meters), except for J.D. 260. Data which was collected using equipment with unacceptable calibrations for J.D. 260 was rejected and run at a later date. Opening and closing baseline calibration data was meaned over the periods of hydrography and was applied to all position data for electronic correctors. The Range/Range Argo data was calibrated using three point sextant fixes with check angles to horizontal control stations and correctors were computed using program RK 561.

Baseline calibrations were performed on the following dates:

DATE	J.E.	LOCATION
7 June 1982	158	Duluth Arena Pier
2 July 1982	183	Duluth Arena Pier
13 Aug 1982	225	Duluth Arena Pier
25 Sept 1982	268	Duluth Arena Pier
27 Sept 1982	270	Duluth Arena Pier
21 Oct 1982	294	Duluth Arena Pier

Calibrations were conducted on the 25th and 27th of September because daily system checks indicated that remote unit 1134 had drifted significantly (-8 meters) within the two calender days.

The T-2 theodolites were set over horizontal control stations and initialed to other control stations in the area. The electronic positioning equipment was set at either the same location or at known offset stations. A list of signals and an abstract of correctors are appended.

While operating at ranges less than 2000 meters from a remote, use of a 30 db attenuator at the master T/R was attempted on several occasions. However, the use of the 30 db attenuator was dropped after the attenuator repeatedly minimized the signal strength to the extent that numerous alarms and range errors were encountered on the DMU while attempting to run sounding lines.

H. SHORELINE

The shoreline details were originally transferred from Class I maps TP-01085/86 for most of the survey area with the exception of the aforementioned Nemadji River and extreme eastern portions of Allouez Bay. As previously mentioned, the shoreline of Nemadji River was transferred from NOS 1:5,000 scale photographs 5804 and 5806, dated 31 August 1980. The shoreline details from the extreme eastern portions of Allouez Bay were transferred from NOS 1:5,000 scale photograph 5764, dated 31 August 1980. Ground control was established by PEIRCE personnel using standard traverse methods and points photo-identified on the above photographs to allow for mapping of these areas.

Nemadji River S.L. transferred to S.S. from TP 01254 (1980) photo corrected U.S.G.S. Quads used for S.L. on S.S.

Comparison of hydrography to the shoreline transferred from Class I maps TP-01085/86 revealed substantial distortion of shoreline in southern Superior Harbor and Allouez Bay which was mapped by cantilevering photographs beyond ground control coverage. Discrete measurements of the shoreline in the vicinity of the Allouez Ore Docks and from Superior Harbor Basin LT 1 to station Allouez, 1980, were conducted on October 21, 1982 (JD 294) using the HP 3810B in the Range/Azimuth mode. Results of these measurements confirmed that the shoreline in the area between Superior Harbor Basin LT 1 and station Allouez, 1980, is subject to significant erosional processes. The shoreline details in the above mentioned area has been revised by the hydrographer on the final field sheet to reflect these changes. Results of the measurements in the vicinity of the Allouez Ore Docks indicates that the shoreline details on the manuscript were verified, but that there is a slight distortion on the final field sheet plotted by the Ships complot plotter. The latitude and longitude grids on the final field sheet must be continually adjusted to fit the grid on the manuscript when transferring the shoreline. As a result, the shoreline on the final field sheet has been drawn from a combination of Class I maps, photographs, and discrete measurements. ✓

The shoreline details from maps TP-01085/86 were field edited in 1981. The field edit changes and Notes to Hydrographer recommendations have been transferred to the field sheet. Although shoreline map TP-01086 was field edited in 1981, six "Notes to the Hydrographer" items were investigated within the survey area with the following recommendations: ✓

ITEM #	ITEM	POSITION
1 (two rocks were charted)	Rocks-Positions differ from chart ✓	46° 42'27" N 92° 01'18" W
2	~~Piling~~ Pile ✓	46° 42'09" N 92° 01'53.5"W
3	Piling along jetty ✓	East Bank Nemadji River
4	Piling ✓	46° 41'20" N 92° 00'51.5"W
5	Subm. Cable Area ✓	Duluth Power Squadron Bunge Corp. to Wisconsin Point
6	Subm. Cable ✓	Wisconsin Point to Superior Entry South Breakwater Light.

ITEM 1 on Discrepancy Print of TP-01086

Numerous rocks were encountered by the hydrographer (JD 260 and 278) in the vicinity of both the charted rock positions and manuscript positions. Six additional detached positions (1894, 1895, 6407-6410) were taken in this area and it is recommended that the entire area from ~~position~~ latitude 46°42'26"N., long. 92°01'16"W., to latitude 46°42'28.7"N., longitude 92°01'23.6"W., be charted with a dashed line and the caption "Foul with Rocks" be added.

Chart positions of rocks as shown on the smooth sheet.

ITEM 2 on Discrepancy Print of TP-01086

Although the charted pile (above sounding datum) was searched for (JD 278) in approximate position latitude 46°42'09"N., longitude 92°01'53.5"W., comparison of the shoreline on the chart enlargement and manuscript indicate that the pile is now shoreward of the shoreline on Hog Island. ~~Until this area is remapped,~~ It is recommended that the pile be deleted and the note "Foul with Logs and Debris" be added to this area as shown on the smooth sheet

concur

ITEM 3 on Discrepancy Print of TP-01086

The entire jetty along the east bank of the Nemadji River consists of piles connected partially by wooden cross members and steel bulkheading. Since the entire jetty is not presently being maintained, the entire area should be charted as "Jetty In Ruins". Expunge the charted solid line & adjacent row of piles and chart jetty ruins as shown on TP-01086 (1980-81)

ITEM 4 on TP-01086 Discrepancy Print

The charted visible piles centered in approximate position lat 46°41'20"N., long 92°00'51.5"W., were searched for and not found on JD 278. On JD 281 a modified chain drag, consisting of a 50 foot section of ½ inch chain with four floats spaced evenly along the entire chain with 4 foot sections of 3/8 inch line, was towed between the Monark and Boston Whaler. The area from about 10 feet to about 130 feet offshore of the Power Squadron pier was swept with a tow run in the southerly direction and a tow run in the northerly direction. Two snags were recorded at positions 6414 and 6416 at lat 46°41'20.8"N., long 92°00'50.5"W., and lat 46°41'19.5"N., long 92°00'50.4"W. The remainder of the area north and south of the two positions was swept clear. Although only two snags were encountered, it is recommended that the piles on the chart and the two new positions be charted with a dashed line encompassing these positions with the caption "Foul with Submerged Piles" added. Do not concur. Chart area as shown on the smooth sheet.

ITEM 5 on TP-01086 Discrepancy Print

The shore ends of the submerged cable between Wisconsin Point and the Duluth Power Squadron Bunge Corp. pier could not be found by the field editor in 1981. An additional search was made by the hydrographer and the south end of the cable was found to be marked by a cable crossing sign (Position 2085, JD 273) and the north end by a sign in ruins on JD 298. Since the shore ends of the cable were found in the charted area, it is recommended that the entire cable area remain as presently charted. Do not concur. See Evaluation Report

ITEM 6

The submerged cable between Wisconsin Point and Superior Entry South Breakwater Light was searched for on JD 281, but could not be found. The U.S. Coast Guard Group Duluth, U.S. Army Corps of Engineers, and Superior Water and Power Company were contacted regarding the cable. None of the agencies listed above could locate any records or drawings on the cable. Therefore, it is recommended that the cable remain as presently charted. Do not concur. See Evaluation Report

It is recommended that the entire shoreline on this survey be remapped using the photographs and the new control mentioned above. concur

I. CROSSLINES

The 195.0 total miles of mainscheme hydrography was supplemented by 15.6 miles of crosslines run in areas of relatively flat bottom at 90 degrees to the regular sounding lines. The crosslines constitute 8% of the total miles of regular sounding lines run. Agreement with the mainscheme was excellent. All crossline soundings agreed within two feet of the mainscheme soundings in depths of 4 to 52 feet. concur

J. JUNCTIONS

This survey junctions to the west in Superior Bay with contemporary 1:5,000 scale survey PE-5-2-82 (H-10023), to the east with 1:20,000 scale survey WH-20-1-81 (H9979), and to the north with 1:10,000 scale survey WH-10-1-81 (H9960). Comparison of soundings with the contemporary surveys H-10023 and H-9979 indicate that the surveys junction favorably, with all depths agreeing to within 0-3 feet. Comparison of soundings with this survey and survey H-9960 indicate that the surveys junction favorably, with 99% of the soundings agreeing to within 0-2 feet. However, one 30 foot sounding in position lat. 46°42'54"N., long. 92°00'52"W., on survey H-9960 differs by 5-7 feet with 35 to 37 foot soundings on this survey. Review of the analog records on this survey between positions 101 and 102 verified depths of 35 to 37 feet. Since there was no indication of shoaling on the current records, it is recommended that the prior survey (H-9960) records be reviewed, and the shoalest verified depth be charted in this location.

There is no 30' sdg at this location on H-9960. 36' depths are in this area on H-9960

K. COMPARISON WITH PRIOR SURVEYS

charted from LS-1824 (1943)

A 21 foot detached shoal in approximate position lat. 46°42'14"N., long. 91°59'14"W., outlined by a dashed line, is the only PSR item located on this survey. This area was developed at 10 meter spacing and review of the analog sounding records indicate no evidence of shoaling with uncorrected depths ranging between 35 and 38 feet. The prior surveys covering this area were then reviewed, but the source of this sounding could not be determined. As was recommended in WHITING Survey WH-10-1-81 (H9960), this 21-foot sounding should be deleted and the chart should be revised to reflect the conditions found during this survey. concur - Chart depths in this area as shown on the present survey.

The depth contours on this section of the lake generally parallel the coastline except in the vicinity of this investigation where the 36 foot countour shifts seaward. Perhaps this 21 foot shoal has slowly been worked by wave action and has been redeposited in this surrounding area of the co ntour shift.

sandy bottom area

Prior surveys LS-360, 1:5,000 scale, dated August 1866; LS-251, 1:16,000 scale, dated September 1861; and LS-1824, scale 1:15,000, dated 1943 were used for comparison during the course of this survey. ✓

Surveys LS-251 and LS-360 could not be accurately compared because these surveys were conducted using different datums and because these surveys were conducted prior to the modern construction of the present breakwaters and jetties and numerous other man made construction and dredging changes. concur

Depths on this survey in Allouez Bay compare to within 1-2 feet with survey LS-251 except in those areas that have been altered by dredging around Allouez Bay Channel and the area in the center of the bay reportedly dredged for fill material during the construction of the Interstate Highway in Superior. Survey LS-1824 compares well with this survey with all soundings agreeing to within 0-3 feet, except as follows:

LS-1824 (Depth in Feet)	POSITION	H-10028 (Depth in Feet)
21-24	lat. 46° 42'24-27"N long. 92° 00'03-06"W	27-29 ✓
31-36	lat. 46° 42'55-58"N long. 92° 00'51-57"W	35-40 ✓
27-31	lat. 46° 42'54-57"N long. 92° 01'03-12"W	32-35 ✓

When compared to the 26th Edition of chart 14975, the 21-24 foot shoal area is centered within a 28 foot charted sounding. Since these shoaler prior survey soundings are not charted, it is recommended that the deeper charted depth be retained as verified by this survey. *Chart depths as shown on the present survey*

Review of the sounding records for this survey in both the 31-36 foot and 27-31 foot shoal areas on the prior survey resulted in no evidence of any shoaling or irregular bottom patterns. ~~It is recommended that these soundings be revised to reflect the new conditions found on this survey~~. *chart depths as shown on the pres. survey.*

L. COMPARISON WITH THE CHART *(14 ft sdg is chtd from a misc. source)*

Survey H-10028 was compared with the 26th Edition of NOS Chart 14975, dated April 26, 1980. The survey depths are 2-3 feet deeper across the open lake which should compare well with the chart when the depths are reduced to lake level datum. The only exception to this statement is a 14 foot charted sounding centered in 21 to 23 foot survey depths in about lat. 46°42'34"N., long. 92°00'50"W. Review of the sounding records between positions 905 and 906 indicated no evidence of shoaling or irregular bottom patterns. Therefore, it is recommended that the chart be revised to reflect these recent findings. *Development on the pres. sur ey is inadequat to disprove the 14 ft sdg. Retain the 14 ft sdg. as charted. Do not concur*

In addition to the aforementioned shoreline problems, the shoreline between Superior Entry and the South Breakwater appears to have eroded significantly southward when compared to the chart. It is recommended that the shoreline in this area be revised to reflect the current conditions. *concur*

Comparison of the chart with the survey soundings south of Minnesota and Wisconsin Points generally agree to within 2 feet, with the uncorrected survey depths consistently 2 feet deeper than the charted soundings. Plus or minus 4ft change is common

The following exceptions to the above statement were noted by the hydrographer during this comparison:

Allouez Bay

1. The entire shoreline of Allouez Bay needs to be remapped as previously mentioned. concur
2. The charted marsh centered in approximate position lat. 46°41'25"N., long. 91°59'21"W., should be revised to reflect the conditions depicted on the final field sheet. Chart area as shown on the present survey.
3. The survey depths in the western part of Allouez Bay are consistently 2 feet deeper than the charted depths. This should result in excellent agreement with the chart when the depths are reduced to mean lake level. However, east of longitude 91°59'48"W., the survey depths are up to 4 feet deeper than the charted depths. Although local meteorological conditions may account for some of this discrepancy, it is recommended that the chart be revised to reflect these deeper soundings. See Section P of this report for a further discussion of surge and seiche in the harbor. Present survey depths are generally 1 to 3 ft deeper than charted depths.

Superior Bay

The survey soundings are generally ~~2~~ 1 ~~feet~~ deeper in Superior Bay than the charted soundings, with the following exceptions:

CHART (Depth in Feet)	POSITION	H-10028 (Depth in Feet)
2	lat. 46° 42'05"N long. 92° 00'51"W	0 5
3	lat. 46° 42'04"N long. 92° 01'12"W	1/3 26
2	lat. 46° 42'08"N long. 92° 01'37"W	9 - 10
28	lat. 46° 42'11"N long. 92° 01'26"W	38 7

All the above areas were developed at 25 meter spacing with no evidence of shoaling to the extent on the chart. Since all these areas are subject to erosional processes, vessel prop wash, and periodic dredging, it is recommended that the chart be revised to reflect these findings. In addition, the 2 foot

charted sounding (lat. 46°42'08"N., long. 92°01'37"W.) is ~~in~~ near the mouth of the Nemadji River where currents and erosion could account for the deeper depths.

Comparison of Non-Sounding Features

The following table summarizes all non-sounding features that should be revised or added on chart 14975.

ITEM	POSITION	REMARKS
U.S. Army Corps of Engineers Pier & Bldg.	46°42'35"N 92°01'18"W	Delete Caption/Revise ✓ Building to in Ruins.
Fixed Bridge Burlington North. R.R. Water lev. corr -1.4'	Mile 0.33 Nemadji River	Revise-Vert Cl 10.5 ft, 1905 GMT 4 Oct 1982 + 1.4' = 11.9' } Vert Cl. 12 ft. at LWD
OVHD PIPE lat. 46° 41.73'N long. 92° 02.20'W	Mile 0.59 Nemadji River	Delete ✓
Stake (Position 930) bare 6 ft at LWD	46°42'35"N 92°01'05"W	Chart, Above Sounding Datum } Chart fish stakes as shown on the pres. survey
Stake (Position 929)	46°42'28"N 92°01'02"W	Chart, Visible above Sounding Datum
Rock (6000)	46°42'40"N 92°01'21"W	Rock Submerged 2.9 ft 1732 GMT 28 July 1982 } with final corrections & cov 2 ft at LWD
Rock (6001)	46°42'40"N 92°01'23"W	Rock Submerged 6.3 ft 1734 GMT 28 July 1982 } 6 Rk
Subm Breakwater (6002 and 6003)	46°42'41"N 92°01'34"W	Chart as Submerged Breakwater shown on S.S. The end is awash at LWD, the remainder of the bkw is bare at LWD
Rock Awash (6016) Topo pos shown on S.S.	46°42'25"N 92°00'46"W	Chart as Rock Awash uncovers 2 ft at LWD
Subm Rocks (6017)	46°42'26"N 92°00'46"W	Chart as ~~Submerged Rocks~~ area foul with rums & rocks - area delimited with dashed line on smooth sheet
Rocks and Piles (6018 and 6019)	46°42'27"N 92°00'48"W	Chart as Foul with Rocks and Piles
Subm Rock (6038)	46°42'23"N 92°00'28"W	Chart as Submerged Rock (end of rock outcrop cov. 4 ft at LWD)
Rocks (Pos 6407-6410) (1894-1895)	See Item #1	Notes to Hydrographer-Shoreline Section of This Report ✓
Subm Piles (6414, 6416)	See Item #4	Notes to Hydrographer-Shoreline Section of This Report ✓

Hwy Fixed Bridge (Rt 2 - 0.45 mile
lat 46° 41.81' N
long. 92° 02.10' W
pos. 6360

Vert Cl. 9 ft at 190245 on Oct 4, 1982
+ 1.6' - Water Lev. correction
10.6' - Vert Cl. at LWD

ITEM	POSITION	REMARKS
Pile (6597) offshore end pile of jetty ruins	46°42'14"N 92°01'39"W	Seaward Limit of Nemadji River W. Jetty (uncovers 4 ft LWD)
Snag (1921)	46°41'18"N 92°00'52"W	Chart as "SNAG" uncovers 1 ft at LWD
Snag (1922)	46°41'25"N 92°00'54"W	Chart as "SNAG" uncov. 1 ft at LWD
Steel Bulkhead Breakwater (1923)	46°41'28"N 92°00'52"W	S.W. Corner (See TP 01086) Chart as shown on smooth sheet
Steel Bulkhead Breakwater (1924)	46°41'31"N 92°00'52"W	N. End (See TP-01086)
Pile (2084) Use TP-01086 delineation	46°41'34"N 92°00'46"W	S. Limit of Piles, Above Sounding Datum ✓
Pile (2085) Use TP-01086 delineation	42°41'29"N 92°00'46"W	N. Limit of Piles, Above Sounding Datum ✓
Floating ~~Dock~~ Pier/Ramp (2092)	46°41'13"N 92°00'47"W	Seaward Limit of Floating Dock - Add Caption Ramp } chg ramp & floating pier as shown on S.S.
Pile (2093) ✓	46°41'20"N 92°00'46"W	S. Limit of Piles Above Sounding Datum ✓
Pipeline Outfall (2094) (end is covered 2 ft at LWD)	46°41'19"N 92°00'47"W	Submerged 2.4 ft 1703 GMT, 30 Sept 1982 ✓
Pipeline Outfall (2097) (end is cov. 1 ft at LWD)	46°40'55"N 92°00'05"W	Submerged 1.4 ft 1725 GMT 30 Sept 1982
Fixed Bridge pos 6565-Bluff Cr. Clearance Data M.L. corr -4.8'	46°41'03"N 92°00'53"W	VT CL 5 FT, HOR CL 12 FT 171730 GMT, 17 Oct 1982 50' Vert Cl +1.8 / 6.8 } 7 ft at LWD
Pile (Photo traverse) ✓	46°42'11.127"N 92°01'34.949"W	Seaward Limit of Nemadji River East Jetty ✓

M. ADEQUACY OF SURVEY

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

N. AIDS TO NAVIGATION

There are 12 floating aids to navigation located on this survey. A comparison of the survey located positions of the buoys was made with the position of the buoys in the 1982 Edition of Great Lakes Light List (Volume IV) and with NOS Chart 14975. Except for the buoys listed below, the positions of the buoys as determined in the field agreed favorably with the charted positions: See Evaluation Report

BUOY	POSITION #	SURVEY POSITION	REMARKS
Burlington Northern Dock Slip "4" Red Nun prv maintd Apr 1 to Dec 1	1883		Approx 60m South east of Charted Position
Burlington Northern Dock Slip "2" Red Nun prv maintd Apr 1 to Dec 1	1884		Approx 60m South east of Charted Position
Allouez Bay Entrance "1" Blk Can	4382		Approx 25m South east of Charted Position Does not adequately mark channel
Allouez Bay Channel "5" BlkCan	4379		Approx 20m South of Charted Position
Allouez Bay Channel "7" Blk Can	4378		Approx 25m SW of Charted Position
Superior Harbor Basin "3" Blk Can	4384		Approx 30m WSW of Charted Position
Superior Harbor Basin Lighted "4" (Red	4385		Approx 40m SW of Charted Position
Superior Harbor Basin Anchorage "A" (White Nun)	4386		Approx 60m WSW of Charted Position Does not accurately mark anchorage area

All aids adequately serve the apparent purpose for which they were established. See Evaluation Report

All fixed aids to navigation were located during the survey. Copies of NOAA form 76-40 are appended to this report. Light List numbers 1791-1792, Superior Entry Inner North Pierhead Light and Inner South Pierhead Light are not charted with the correct Light List names. The chart should be revised to reflect the correct Light List names. Burlington Northern East and West Dock Lights, Light List numbers 1796.10 and 1797, deleted by the Ship WHITING, were found to be rebuilt and should be charted in the position noted on the form 76-40. Bridge and overhead pipe clearance note changes for the lower Nemadji River and Bluff Creek were previously mentioned in the Comparison With the Chart section of this report. The following additional clearance notes for the upper Nemadji River should be added to the new chart covering this section of the river: See Evaluation Report

ITEM	KIND	LOCATION	REMARKS
Overhead Cable pos 6406-w.l. corr.-1.8'	Power Cables	Mile 1.85	15 ft Vert Cl (1956 GMT 4 Oct 1982) 15.0' + 1.6' = 16.6' Vert Cl at LWD
Bardon Ave Bridge w.l. corr -1.6'	Fixed Highway	5.00	16 ft Hor Cl, 11 ft Vert Cl (1800 GMT 4 Oct 1982) 11.0 + 1.6 = 12.6 ft Vert Cl at LWD

ITEM	KIND	LOCATION	REMARKS
Soo Line Bridge W.L. corr. -1.4'	Fixed Railroad	7.40	Approx 23 ft Vert Cl (1630 GMT 4 Oct 1982) 23.0 + 1.4 = 24.4' approx vertcl. at L.W.D.

Submarine cables in the vicinity of Wisconsin Point have been previously mentioned in the Shoreline Section of this report. The charted submarine cables between Hog Island and Superior Front Channel Range Front Light (Light List 1800) and Range Rear Light (1801) were searched for, but the shoreward ends could not be located. It is recommended that these cables continue to be charted. Do not concur - See Evaluation Report

O. STATISTICS

CATEGORY	VESNO 2839	2837	2835	2832	TOTAL
Positions	2,138	67	669	523	3,397
NM of Sounding Lines[1]	128.5	----	28.3	38.2	195.0
Square Miles of hydrography					1.64(S) + 1.43 (N) 3.1 Sq Miles
Bottom Samples		67			67
Water Level Stations					5
Bar Checks	27	----	13	5	45
Magnetic Stations (See Magnetic Report)					(1) Station WESLEY

[1]Note: Crosslines not included

P. MISCELLANEOUS

Local residents in Superior report observing surges and seiche in the harbor fluctuating lake levels up to 2 feet for short periods of time. These fluctuations are generally thought to be results of prevailing winds and other atmospheric conditions and the general shape of the harbor basin and could be a factor in explaining the discrepancies between the charted depths and survey depths in eastern Allouez Bay.

Q. RECOMMENDATIONS

See recommendations in Sections H, J, K, L, and N.

R. AUTOMATED DATA PROCESSING

PROGRAM NO.	DESCRIPTION	VERSION DATE
RK 112	R/R Hydroplot	8-4-81
RK 211	R/R Non-Real Time Plot	2-2-81
RK 201	Grid, Signal, and Lattice Plot	4-18-75
RK 330	Reformat and Data Check	5-4-76
RK 561	H/R Geodetic Calibration	2-19-75
AM 602	Elinore - Line Oriented Editor	5-21-75
RK 216	R/AZ Non-Real Time Plot	2-9-81
RK 612	Line Printer List	3-22-78
RK 116	Range - Azimuth Real-Time Hydroplot	8-24-81
RK 300	Utility Computations	10-21-80
PM 360	Electronic Corrector Abstract	2-2-76

Note: All Nemadji River soundings were manually plotted.

S. REFERRAL TO REPORTS

Magnetic, Coast Pilot, LORAN C Comparisons, and Horizontal Control Reports for OPR-Z137-PE-82

Respectfully submitted,

Neal G. Millett, LT., NOAA

APPENDIX F

LIST OF STATIONS

DULUTH HARBOR SIGNAL LISTING (OPR Z-137-PE-82)

LAKE SUPERIOR

										SOURCE	
~~001~~	~~0~~	~~46~~	~~47~~	~~24342~~	~~092~~	~~04~~	~~48759~~	~~139~~	~~0201~~	~~000000~~ WEBC 1952	~~(NGS)~~
002	0	46	46	34185	092	07	29003	139	0000	000000 DULUTH ENGER MEMORIAL TOWER, 1952	(NGS)*
~~004~~	~~0~~	~~46~~	~~47~~	~~20600~~	~~092~~	~~05~~	~~59841~~	~~139~~	~~0000~~	~~000000~~ DULUTH CENTRAL HS CUPOLA SPIRE, 1905	~~(NGS)~~
~~005~~	~~0~~	~~46~~	~~45~~	~~37248~~	~~092~~	~~05~~	~~59554~~	~~139~~	~~0000~~	~~000000~~ DULUTH PV ELEVATOR FLAGSTAFF, 1952	~~(NGS)~~
~~006~~	~~0~~	~~46~~	~~45~~	~~38602~~	~~092~~	~~05~~	~~55842~~	~~139~~	~~0000~~	~~000000~~ DULUTH PEAVEY ELEVATOR CO STK, 1921	~~(NGS)~~
007	0	46	44	46696	092	06	26542	250	0002	000000 WEST GATE, 1980	(AMC)
~~008~~	~~0~~	~~46~~	~~45~~	~~41758~~	~~092~~	~~04~~	~~46747~~	~~139~~	~~0000~~	~~000000~~ DULUTH POL RAD STA KWA 939 MST, 1952	~~(NGS)~~
~~009~~	~~0~~	~~46~~	~~45~~	~~30810~~	~~092~~	~~04~~	~~41470~~	~~139~~	~~0000~~	~~000000~~ DULUTH PARK POINT SCHOOL STACK, 1921	~~(NGS)~~
~~010~~	~~4~~	~~46~~	~~45~~	~~27978~~	~~092~~	~~04~~	~~42663~~	~~139~~	~~0001~~	~~000000~~ MINNESOTA POINT NG USLS 1870	~~(NGS)~~
011	6	46	43	59977	092	04	28374	250	0001	000000 CEMENT, 1980	(AMC)
~~012~~	~~6~~	~~46~~	~~44~~	~~24692~~	~~092~~	~~06~~	~~05352~~	~~139~~	~~0000~~	~~000000~~ SUPERIOR FARMERS UN ELEV FLAG, 1952	~~(NGS)~~
013	0	46	42	12117	092	02	48974	139	0000	000000 SUPERIOR ST FRANCIS XAVIER CH, 1952	(NGS)*
016	0	46	44	21530	092	05	30565	250	0002	000000 ST CROIX, 1981 field pos	(MH)
017	0	46	45	16591 → 19	092	05	36892 → 4	250	0000	000000 461 USE, 1981 field pos	(MH)
~~019~~	~~4~~	~~46~~	~~47~~	~~47502~~	~~092~~	~~06~~	~~21052~~	~~139~~	~~0000~~	~~000000~~ FIRST UNITED METHODIST CHURCH, 1981	~~(MH)~~
~~021~~	~~0~~	~~46~~	~~50~~	~~46593~~	~~092~~	~~04~~	~~37183~~	~~139~~	~~0000~~	~~000000~~ DULUTH WOODLAND EAST MUN TANK, 1952	~~(NGS)~~
025	5	46	42	46365	092	02	44140	250	0002	000000 PETRA, 1980	(AMC)
027	0	46	41	58053	092	00	39178	250	0001	000000 ALLOUEZ, 1980	(AMC)
028	6	46	43	04575	092	02	05673	250	0000	000000 MN PT ARGO, 1980	(AMC)
~~029~~	~~0~~	~~46~~	~~44~~	~~32970~~	~~092~~	~~06~~	~~23460~~	~~139~~	~~0000~~	~~000000~~ SUPERIOR GLOBE ELEVATOR CO STK, 1952 ***	~~(NGS)~~
~~035~~	~~3~~	~~46~~	~~43~~	~~51765~~	~~092~~	~~04~~	~~16519~~	~~250~~	~~0001~~	~~000000~~ 396 USE	~~(PE)~~
~~036~~	~~7~~	~~46~~	~~43~~	~~55551~~	~~092~~	~~03~~	~~23810~~	~~250~~	~~0001~~	~~000000~~ 391 USE	~~(PE)~~
~~037~~	~~5~~	~~46~~	~~43~~	~~16182~~	~~092~~	~~03~~	~~45948~~	~~250~~	~~0003~~	~~000000~~ BRIDGE	~~(PE)~~
102	0	47	07	31515	091	28	54048	250	0000	164722 WICK, 1981 field pos	(AMC)
138	5	46	42	36746	092	00	22247 → 9	139	0000	000000 SUPERIOR ENTRY S BREAKWATER LT 1982	(PE)

~~046 5 46 42 46747 092 03 10453 250 0002 000000 BURL (PE)~~

~~049 5 46 42 25845 092 02 06872 250 0002 000000 328 USE (PE)~~

040 5 46 42 16119 092 01 43142 250 0002 000000 319 USE, 1982 field pos (PE)

041 4 46 42 29985 092 01 26902 250 0001 000000 457 USE, 1982 field pos (PE)

042 5 46 42 33129 092 00 24829 250 0003 000000 SUPER, 1982 field pos (PE)

043 3 46 42 42149 092 00 27887 250 0003 000000 MINNOW, 1982 field pos (PE)

044 5 46 46 51551 092 05 17035 139 0000 000000 DULUTH HARBOR N PIER LT, 1982 (PE)

046 3 46 42 42119 092 00 27959 250 0003 000000 OFFRED ~~OFF-RED~~, 1982 field pos (PE)

047 46 42 33189 092 00 24789 250 0003 000000 OFFSUP ~~OFF-SUP~~, 1982 field pos (PE)

~~048 5 46 43 16088 092 03 46034 250 0003 000000 BRIDGE NORTE (PE)~~

049 5 46 43 38172 092 02 46257 139 0000 000000 SKY HARBOR AIRPORT BEACON, 1982 (PE)

~~050 5 46 43 01138 092 02 09816 250 0003 000000 318 USE (PE)~~

0[illegible] 7 46 41 52019 092 00 49288 250 0002 000000 ROC, 1982 field pos (PE)

~~052 6 46 42 10681 092 01 28830 250 0002 000000 BOL (PE)~~

053 7 46 42 02349 092 01 05245 250 0002 000000 13AX USE, 1982 field pos (PE)

054 4 46 42 16179 092 01 00548 139 0000 000000 SUPERIOR HARBOR BASIN LT 1, 1982 (PE)

~~5 4 46 42 24736 092 02 30135 250 0004 000000 USE (PE)~~

~~142 4 46 47 25781 092 06 50127 139 0000 000000 DULUTH BELL TEL TOWER CENTER (PE)~~

*** NO CHECK ON POSITION CHECKED BY: IPR

* NGS Data Base for Western Lake Superior

APPENDIX I

LANDMARKS FOR CHARTS

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

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

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

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

(See reverse for responsible personnel)

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

REPORTING UNIT (Field Party, Ship or Office)	STATE	LOCALITY	DATE
NOAA Ship PEIRCE	Wisconsin	Superior Bay	11-19-82

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

OPR PROJECT NO.	JOB NUMBER	SURVEY NUMBER	DATUM
Z 137		H-10028	NA 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
FL	ALLOUEZ ORE DOCK NO. 3 WEST LT (LT LIST #1794) Sig # 150	46 42	07.76	92 01	21.24		F-2-6-L 10-27-82	14975
FL	ALLOUEZ ORE DOCK NO 3 EAST LT (LT LIST #1795) Sig # 151	46 42	07.77	92 01	20.37		F-2-6-L 10-27-82	14975
SPIRE ✓	(SUPERIOR ST. FRANCIS XAVIER CH, 1952) Sig # 013	46 42	12.12	92 02	48.97		Triang. Rec. 10-27-82	14975

(98)616-7

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

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'

(Consult Photogrammetric Instructions No. 64,

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS

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

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

FIELD

I. NEW POSITION DETERMINED OR VERIFIED

Enter the applicable data by symbols as follows:

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

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

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

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

FIELD (Cont'd)

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

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

II. TRIANGULATION STATION RECOVERED

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

EXAMPLE: Triang. Rec.
8-12-75

III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH

Enter 'V-Vis.' and date.

EXAMPLE: V-Vis.
8-12-75

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

NOAA FORM 76-40 (8-74)

SUPERSEDES NOAA FORM 76-40 (2-71) WHICH IS OBSOLETE, AND EXISTING STOCK SHOULD BE DESTROYED UPON RECEIPT OF REVISION.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1974-665-073/1030 Region 6

NOAA FORM 76-40 (8-74)

Replaces C&GS Form 567.

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

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

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
- [X] TO BE REVISED
- [ ] TO BE DELETED

REPORTING UNIT (Field Party, Ship or Office): NOAA Ship PEIRCE

STATE: Wisconsin

LOCALITY: Superior Bay

DATE: 11-19-82

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

OPR PROJECT NO.: Z 137

JOB NUMBER:

SURVEY NUMBER:

DATUM: NA 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	METHOD AND DATE OF LOCATION FIELD	CHARTS AFFECTED
AERO	(SKY HARBOR AIRPORT BEACON, 1982) (aff limits of H-10028)	46 43	38.17	92 02	46.26		F-3-6-L 10-27-82	14975
FG	SUPERIOR FRONT CHANNEL RANGE FRONT LT (LT LIST #1800) Sig # 143	46 42	25.78	92 02	06.75		F-3-6-L 10-27-82	14975
FG	SUPERIOR FRONT CHANNEL RANGE REAR LT (LT LIST #1801) Sig # 144	46 42	16.45	92 01	53.46		F-3-6-L 10-27-82	14975
S Bkw LT FL G	SUPERIOR ENTRY S BREAKWATER LT (LT LIST #1789) Sig # 138	46 42	36.75	92 00	22.25		F-3-6-L 10-27-82	14975
S Pierh LT E Int G	SUPERIOR ENTRY INNER S PIERHEAD LT (LT LIST #1792) Sig # 145	46 42	26.76	92 00	45.05		F-2-6-L 10-27-82	14975
FL	BURLINGTON NORTHERN W DOCK LT (LT LIST #1797) Sig # 146	46 42	16.14	92 01	43.02		F-3-6-L 10-27-82	14975
FL	BURLINGTON NORTHERN E DOCK LT (LT LIST #1796.10) Sig # 147	46 42	15.81	92 01	42.50		F-3-6-L 10-27-82	14975
FL	SUPERIOR HARBOR BASIN LT 1 (LT LIST #1793) Sig # 054	46 42	16.17	92 01	00.54		F-3-6-L 10-27-82	14975
N Pierh LT E Int R	SUPERIOR ENTRY INNER N PIERHEAD LT (LT LIST #1791) Sig # 148	46 42	30.91	92 00	49.26		F-3-6-L 10-27-82	14975
N Bkw LT QK FL R	SUPERIOR ENTRY N BREAKWATER LT (LT LIST #1790) Sig # 149	46 42	42.17	92 00	27.66		F-3-6-L 10-27-82	14975

(93)617-7

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

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'

(Consult Photogrammetric Instructions No. 64,

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS

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

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

FIELD

I. NEW POSITION DETERMINED OR VERIFIED

Enter the applicable data by symbols as follows:

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

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

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

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

FIELD (Cont'd)

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

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

II. TRIANGULATION STATION RECOVERED

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

EXAMPLE: Triang. Rec.
8-12-75

III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH

Enter 'V-Vis.' and date.

EXAMPLE: V-Vis.
8-12-75

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

NOAA FORM 76-40 (8-74)

SUPERSEDES NOAA FORM 76-40 (2-71) WHICH IS OBSOLETE, AND EXISTING STOCK SHOULD BE DESTROYED UPON RECEIPT OF REVISION.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1974-665-073/1030 Region 6

APPENDIX J

DANGERS TO NAVIGATION

DANGERS TO NAVIGATION

NEGATIVE REPORT

APPENDIX K

APPROVAL SHEET

APPROVAL SHEET

H-10028

Field work on this survey was conducted under my supervision with frequent personal examination of the field sheet and records. This report and the final field sheet have been reviewed and found to represent a complete and adequate survey.

No additional field work is required. This survey should supersede all prior surveys and charted information in the common areas.

Walter S. Simmons
Commander, NOAA
Commanding Officer
NOAA Ship PEIRCE

NOAA FORM 61-29
(12-71)

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

LETTER TRANSMITTING DATA

REFERENCE NO.
MOA23-18-86

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

☐ ORDINARY MAIL ☐ AIR MAIL
☒ REGISTERED MAIL ☐ EXPRESS
☐ GBL *(Give number)* _____

TO:

CHIEF, DATA CONTROL SECTION
HYDROGRAPHIC SURVEYS BRANCH, N/CG243
NATIONAL OCEAN SERVICE, NOAA
ROCKVILLE, MD 20852

DATE FORWARDED
10 FEB 86

NUMBER OF PACKAGES
(2) 1TUBE, 1 BOX

NOTE: A separate transmittal letter is to be used for each type of data, as tidal data, seismology, geomagnetism, etc. State the number of packages and include an executed copy of the transmittal letter in each package. In addition the original and one copy of the letter should be sent under separate cover. The copy will be returned as a receipt. This form should not be used for correspondence or transmitting accounting documents.

H-10028 (OPR Z137
LAKE SUPERIOR

PKG #1 (TUBE)

2 Smooth Sheets
2 Position Overlays
2 Excess Overlays
1 Original Descriptive Report

PKG #2 (BOX)

1 Cahier containing Position Printout
1 Cahier containing Sounding Printout + L-File Printout
1 Envelope containing Supplemental Data from Printouts
1 Envelope containing Data Removed from Descriptive Report

FROM: *(Signature)* Doug A. Wike
for CDR David B. MacFarland, NOAA

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

ATLANTIC MARINE CENTER
HYDROGRAPHIC SURVEYS BRANCH (N/MOA23)
439 W. YORK STREET
NORFOLK, VIRGINIA 23510

NOAA FORM 61-29 SUPERSEDES FORM C&GS 413 WHICH MAY BE USED. ☆U.S.GPO:1980-0-665-115/1005

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NO.: H-10028

Number of positions	3452
Number of soundings	16694
Number of control stations	32

	TIME-HOURS	DATE COMPLETED
Preprocessing Examination	47	23 FEB 1983
Verification of Field Data	402	31 JUL 1985
Quality Control Checks	98	
Evaluation and Analysis	99	23 SEP 1985
Final Inspection		30 SEP 1985
TOTAL TIME	666	
Marine Center Approval		30 SEP 1985

Transmittal letter of survey and survey records will be included in the Descriptive Report to identify the records accompanying the survey.

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

WATER LEVEL NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Atlantic Marine Center: MOA231

Hourly heights are approved for

Water Level Station Used: Duluth, Minnesota (909-9068)

Period: June 26, 1982 - October 18, 1982

HYDROGRAPHIC SHEET: H-10028

OPR-Z137-PE-82

Locality: Lake Superior

Plane of reference: Low Water Datum (IGLD 1955 : 600.00 Feet)

Remarks:

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

Philip C. Marris

Chief, Water Levels Section

NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10028a
H-10028b

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	
ALLOUEZ BAY	14975									1
ALLOUEZ BAY CHANNEL	"									2
BEAR CREEK			PARKLAND QUAD							3
BLUFF CREEK	14975									4
HOG ISLAND	"									5
LAKE SUPERIOR	"									6
MINNESOTA POINT	"									7
NEMADJI RIVER	"									8
SUPERIOR ENTRY	"									9
SUPERIOR HARBOR BASIN	"									10
SUPERIOR	"									11
WISCONSIN POINT	"									12
SUPERIOR BAY										13
MINNESOTA (Title)										14
ALLOUEZ										15
WISCONSIN (Title)										16
										17
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										24
										25

Approved:

Chief Geographer

SEP 25 [illegible]

NOAA FORM 76-155 SUPERSEDES C&GS 197

ATLANTIC MARINE CENTER
EVALUATION REPORT

REGISTRY NO.: H-10028a & b FIELD NO.: PE-05-3-82

Wisconsin-Minnesota, Lake Superior, Hog Island to Allouez Bay (Sheet a), Nemadji River (Sheet b)

SURVEYED: June 26 to October 21, 1982

SCALE: 1:5,000 PROJECT NO.: OPR-Z137-PE-82

SOUNDINGS: Ross Model 5000 Fineline and Raytheon Model DE-719B Echo Sounders and Sounding Pole

CONTROL: Range/Azimuth-Del Norte Transponders/ Wild T-2 Theodolite and Range/Range Argo Transponders on Sheet a and "See Boat Sheet" method on Sheet b.

Chief of Party ..... W. S. Simmons

Surveyed by ..... A. A. Armstrong
..... N. G. Millet
..... R. B. Harris
..... S.I. Andreeva

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

1. INTRODUCTION

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

b. Notes in red were appended to Descriptive Report items during office processing.

c. The evaluations of sheets a and b are combined.

2. CONTROL AND SHORELINE

a. Control is adequately addressed in sections F and G of the Descriptive Report.

b. Shoreline is from final reviewed Class I photogrammetric shoreline maps TP-01085 and TP-01086 of 1980-81, final reviewed Class III photogrammetric shoreline maps TP-01254 (1980-82) and from photo revised U.S. Geological Survey Quadrangles. Shoreline of the northwestern portion of Wisconsin Point has eroded since 1980. This was revised by the hydrographer on the final field sheet and is shown in dashed red ink on the smooth sheet. The delineation of

brown shoreline in the vicinity of latitude 46°41.08'N, longitude 91°58.16'W was in conflict with soundings. Shoreline in this area was arbitrarily revised during evaluation and shown in a dashed red ink line to fall shoreward of the soundings.

The marsh island shown on TP-01085 (1980-82) in latitude 46°42.13'N, longitude 92°02.02'W has eroded away. Chart depths in this area as shown on the present survey.

3. HYDROGRAPHY

a. Depths at crossings are in agreement.

b. Bottom coverage and the delineation of the depth curves is adequate except in some low water areas where an absence of soundings precluded the delineation of the low water depth curve. Also, small portions of the 6- and 12-ft. depth curves are not shown in some inshore areas due to a lack of bottom coverage. Depth curves were compiled using all sounding levels, the smooth sheet and excess sounding levels 1, 2, and 3.

4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records, and reports are adequate and conform to the requirements of the project instructions and Hydrographic Manual with the following exceptions:

a. A few charted features, not shown on the contemporary shoreline maps, such as piles, were neither confirmed nor disproved on the present survey. These items are addressed in section 7, "Comparison with Chart", in this report.

b. There is excessive overlap of soundings in the junctional area with H-9979 (1981) in the eastern portion of the survey.

c. Superior Entry Channel, Superior Harbor Basin and Allouez Bay Channel were needlessly surveyed. These channels are maintained and surveyed yearly by the U.S. Army Corps of Engineers.

d. The hydrographer made no chart comparison with chart 14966 which provides chart coverage of the far eastern portion of the present survey.

5. JUNCTIONS

H-10023 (1982) to the west
H-9960 (1981) to the north
H-9979 (1981) to the east

All junctions are adequate.

6. COMPARISON WITH PRIOR SURVEYS

LS-251 (1861) 1:16,000
LS-360 (1866) 1:5,000
LS-1824 (1943) 1:15,000

These prior surveys cover the area of the present survey in its entirety.

The areas of surveys LS-251 of 1861 and LS-360 of 1866 common to the present survey have undergone radical cultural change from the past to the present. Because of this, a comparison between the present and prior surveys is considered meaningless. These early surveys serve only as historical documents.

Present survey depths generally differ by plus or minus 1 to 4 feet with counterpart depths shown on LS-1824 (1943). Maximum change is noted in latitude 46°42.24'N, longitude 91°59.74'W where a former depth of 21 feet has deepened to 34 feet on the present survey.

Present survey depths supersede prior survey depths within the common area. A few bottom characteristics have been carried forward to the present survey (sheet b) in the Nemadji River to identify the character of the bottom.

7. COMPARISON WITH CHART 14975 (26th Edition, April 26, 1980)

a. Hydrography

The charted hydrography originates with the previously discussed prior surveys and miscellaneous sources. Differences between charted and present survey depths of plus or minus 4 feet are common. The area centered in latitude 46°42.24'N, longitude 91°59.74'W has undergone the most change. A former shoal with a charted least depth of 21 feet has dispersed. Present survey depths of 32 to 38 feet now occupy this area. A 14-foot shoal sounding charted from a miscellaneous source in latitude 46°42.57'N, longitude 92°00.84'W was neither verified nor disproved on the present survey and should be retained as charted.

Charted soundings are superseded by present survey soundings except for the 14-foot sounding previously addressed.

b. Shoreline

This area has undergone extensive shoreline change. Considerable erosion of shoreline in Allouez Bay is noted. To a much lesser degree some accretion has also occurred. The southern marshy shoreline of Allouez Bay has eroded as much as 250 meters. The two marsh islands centered approximately in latitude 46°41.40'N, longitude 91°59.35'W are gone. Present survey depths as deep as 5 feet now occupy the area of the former islands. Charted shoreline should be revised throughout the survey area to reflect present conditions.

c. Features other than Soundings

(1) The delineation of the breakwater charted from a miscellaneous source in latitude 46°42.69'N, longitude 92°01.55'W is in conflict with its counterpart delineation shown on the smooth sheet. Chart the breakwater as shown on the present survey.

(2) It is not known what the three diagonal lines charted from a miscellaneous source in latitude 46°42.89'N, longitude 92°00.55'W symbolize. However, no feature other than the breakwater was noted on the present survey. Unless the chart compiler has information to the contrary these three diagonal lines should be expunged from the chart.

(3) The two islets charted from a miscellaneous source in latitude 46°41.18'N, longitude 92°01.43'W are noted on TP-01086 discrepancy print as "no island." There is no bottom coverage of this area on the present survey. A charting resolution is deferred to the chart compiler.

(4) The visible piles charted from a miscellaneous source in latitude 46°41.80'N, longitude 92°02.09'W and latitude 46°41.79'N, longitude 92°02.17'W are not shown on contemporary shoreline map TP-01254 (1980-82) nor on the present survey. These piles were not mentioned in the survey records. The piles should be retained in their charted positions but symbolized as submerged.

(5) The visible pile charted from a miscellaneous source in latitude 46°42.27'N, longitude 92°00.97'W is noted on TP-01086 discrepancy print as "no pile." No additional information was found in the survey records. A charting resolution to chart a submerged pile here is deferred to the chart compiler.

d. Controlling Depths

Tabulated controlling depths and present survey depths within Superior Entry Channel, Superior Harbor Basin, and Allouez Bay Channel are superseded by U.S. Army Corps of Engineers surveys dated subsequent to the present survey.

e. Aids to Navigation

(1) All charted floating aids to navigation were located during the present survey. While some positional conflicts were noted at the time of the survey, they are considered to have no charting significance since these floating aids are removed each winter and replaced each spring. The chart compiler should query the U.S. Coast Guard for positions of all floating aids to navigation.

(2) Fixed Aids to Navigation and Landmarks

(a) Several positional conflicts between the chart and the present survey are noted. See the 76-40 forms inserted in the Descriptive Report for accurate positional data.

(b) The eight landmark towers charted from a miscellaneous source on Burlington Northern Inc. Ore Docks 1 and 2 in the vicinity of latitude 46°42.00'N, longitude 92°01.45'W are noted on TP-01086 discrepancy print to be deleted. Expunge the eight charted landmark towers. Survey information is inadequate to determine if the towers have been removed or are considered to have no landmark value. The chart compiler should ascertain if the towers have been removed. If so, the charted label "(Floodlighted)" should also be deleted.

f. Submerged Cables and Overhead Cables

(1) The positions of the shore ends of the submerged cable area extending northward from Duluth Power Squadron Bunge Corp. Pier in latitude 46°41.54'N, longitude 92°00.79'W to Wisconsin Point, charted from a miscellaneous source, are in conflict with counterpart positions transferred to the smooth sheet from the field sheet. Recommend that charted positions of the shore ends of the submerged cable area be revised accordingly.

(2) The submerged cables charted from a miscellaneous source along the south side of Superior Entry South Breakwater in the vicinity of latitude 46°42.50'N, longitude 92°00.50'W could not be found, despite a diligent search by the hydrographer. As noted on page 9, item 6 of the Descriptive Report, the U.S. Coast Guard Group Duluth, the U.S. Army Corps of Engineers, and the Superior Water and Power Company had no record of submerged cables in this area.

If the chart compiler has no information to the contrary the submerged cables should be expunged from the chart.

(3) Vertical clearances of overhead cables shown on the smooth sheet are in conflict with counterpart clearances shown on the chart. The chart compiler should query the U.S. Army Corps of Engineers regarding cable clearances and chart accordingly.

The Overhead Pipe charted in latitude 46°41.74'N, longitude 92°02.20'W is gone. Expunge the charted Overhead Pipe and clearance label.

g. Bridges

Vertical clearances of bridges shown on the smooth sheet are in conflict with counterpart clearances shown on the chart. The chart compiler should query the U.S. Coast Guard regarding bridge clearances and chart accordingly.

8. COMPARISON WITH CHART 14966, 18th Edition, Dec. 22, 1979

Only two soundings of 47 and 31 feet fall within the area of the present survey not covered by chart 14975. The 47-ft. sounding is in agreement with present survey depths. The 31-ft. sounding falls in present survey depths of 38 to 40 feet. Chart depths as shown on the present survey.

9. Synopsis of Chart Comparison with Chart 14975

In addition to items addressed in sections 7.b through 7.g, a comparison of charted information revealed numerous positional conflicts that are not individually addressed in this report. Shoreline because of natural and cultural change and positional inaccuracy should be recompiled. Generally the positions of fixed aids, landmarks, and offshore features need revision. Multiple positional conflicts, bottom change, and the fact that the chart is based on a 1902 horizontal datum indicate that a complete chart reconstruction based on the North American Datum of 1983 is needed. Charted information is superseded by present survey information with exceptions noted in this report.

The symbolization of rocks on the contemporary shoreline maps and counterpart rocks on the smooth sheet are in conflict. The smooth sheet portrayal follows the conventions shown in figure B-3 of the Hydrographic Manual. Rocks with elevations greater than 4.3 feet are shown on the smooth sheet as bare rocks. Rocks with elevations less than 4.3 feet are shown on the smooth sheet by the "rock awash" symbol.

10. COMPLIANCE WITH INSTRUCTIONS

This survey adequately complies with project instructions except as noted in sections 4 and 7 of this report.

11. ADDITIONAL FIELD WORK

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

F. L. Saunders
Cartographic Technician
Verification of Field Data

Frank Saulsbury
Cartographer
Standards Section (N/CG242)
Evaluation and Analysis

Leroy G. Cram
Supervisory Cartographic Technician
Verification Check

Certification of Digital Data
H-10028

The digital data have been completed and all revisions and additions made to the smooth sheet during survey processing have been entered in the magnetic tape record for this survey. Final control, position, sounding and digitized data printouts of the survey have been made.

Certified: 10 February 1986

Robert G. Roberson
Chief, Evaluation and Analysis Group

Inspection Report
H-10028a & b

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The survey complies with National Ocean Service (NOS) requirements except as noted in the Evaluation Report. The survey records comply with NOS requirements except where noted in the Evaluation Report.

Inspected

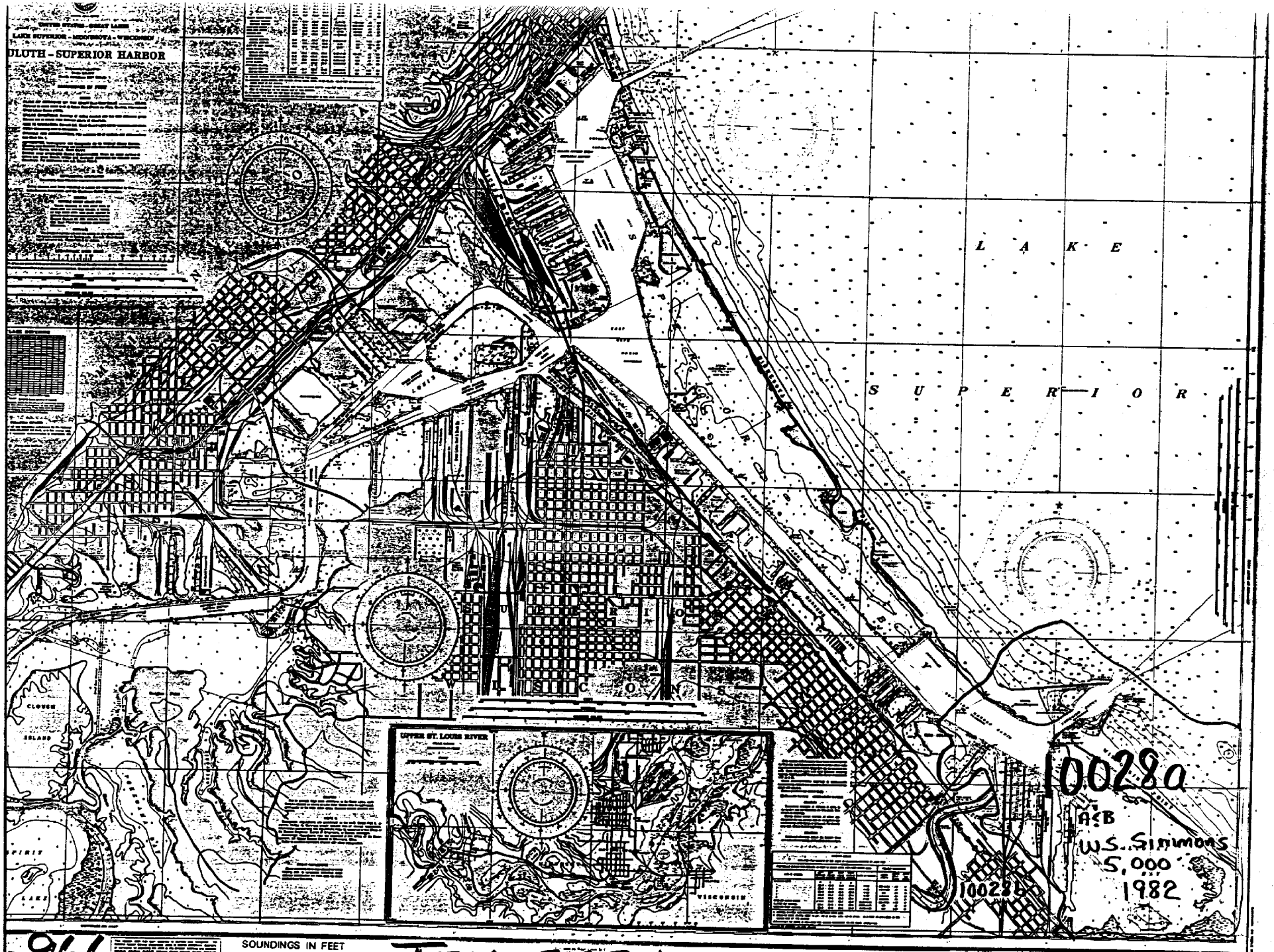
George K. Myers

George K. Myers
Chief, Standards Section (N/CG242)
Hydrographic Surveys Branch

Approved

Arnold L. Newsom For

Wesley V. Hull, RADM, NOAA
Director, Atlantic Marine Center


DULUTH - SUPERIOR HARBOR
LAKE
SUPERIOR
SOUNDINGS IN FEET
TEMORARY
LS-966
100280
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W.S. Simmons
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NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10028

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
14966	6-11-86	Ralph B. Ross	(Full) Part Before (After) Marine Center Approval Signed Via
		Ross	Drawing No. 4 appl'd in full.
RPR 14975	6-18-86	Ralph B. Ross	(Full) Part Before (After) Marine Center Approval Signed Via
			Drawing No. 4 appl'd in full
RPR 14961	6-18-86	Ralph B. Ross	(Full) Part Before (After) Marine Center Approval Signed Via
			Drawing No. 5 appl'd in full
14960 (Cancelled)			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
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			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.