F00499

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic/Side Scan Sonar

Field No.

Registry No. F00499

LOCALITY

State Minnesota/Wisconsin

General Locality Western End of Lake Superior

Sublocality Duluth/Superior and Two Harbors

2004

CHIEF OF PARTY

Kurt Brown

LIBRARY & ARCHIVES

DATE

NOAA FORM 77-28U.S. DEPARTMENT OF COMMERCE (11-72)NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**F00499**
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 NUMBER: N/A

State/Territory:	**Minnesota/Wisconsin**		
General Locality:	**Western End of Lake Superior**		
Sub-Locality:	**Duluth/Superior and Two Harbors**		
Scale:	**1:10,000**	Date of Survey: August 2 to September 16, 2004	
Instructions Dated:	**October 15, 2004**	Project Number:	**OPR-Z486-NRB-2004**
Vessel:	**NOAA S3001**		
Chief of Party:	**Kurt Brown**		
Surveyed by:	**Navigation Response Team 6**		
Soundings by:	**Vertical Beam Echo Sounder**		
Graphic record scaled by:			
Graphic record checked by:	**NRT6**		
Protracted by:	**N/A**	Automated Plot:	***HP DesignJet 2500CP (office)***
Verification by:	**NRT6** ***and Atlantic Hydrographic Branch Personnel***		
Soundings in:	**Meters from MLW** ***(IGLD85)***		

Remarks:

1) All Times are UTC.

2) Projection is UTM Zone 15.

Bold, red, italic notes in the Descriptive Report were made during office processing.

Descriptive Report to Accompany Hydrographic Survey F00499

Project OPR-Z486-NRB-04
Lake Superior-Duluth /Superior Harbor and Two Harbors, MN
Scale 1:10,000
July-September 2004
Navigation Response Team Six
Chief of Party: Kurt Brown, NOAA

A. AREA SURVEYED

F00499 is one of two Field Examinations included in Project Instructions OPR-Z486-NRB. F00499 includes hydrographic data, vector data for S57 products; i.e., electronic navigation charts (ENC), and detached positions.

This hydrographic survey was completed as specified by Hydrographic Survey Project Instructions OPR-Z486-NRB-04, dated October 15, 2004. The survey areas are located in Duluth-Superior Harbor and Two Harbors, Minnesota in the western end of Lake Superior as shown in figures 1 and 2.

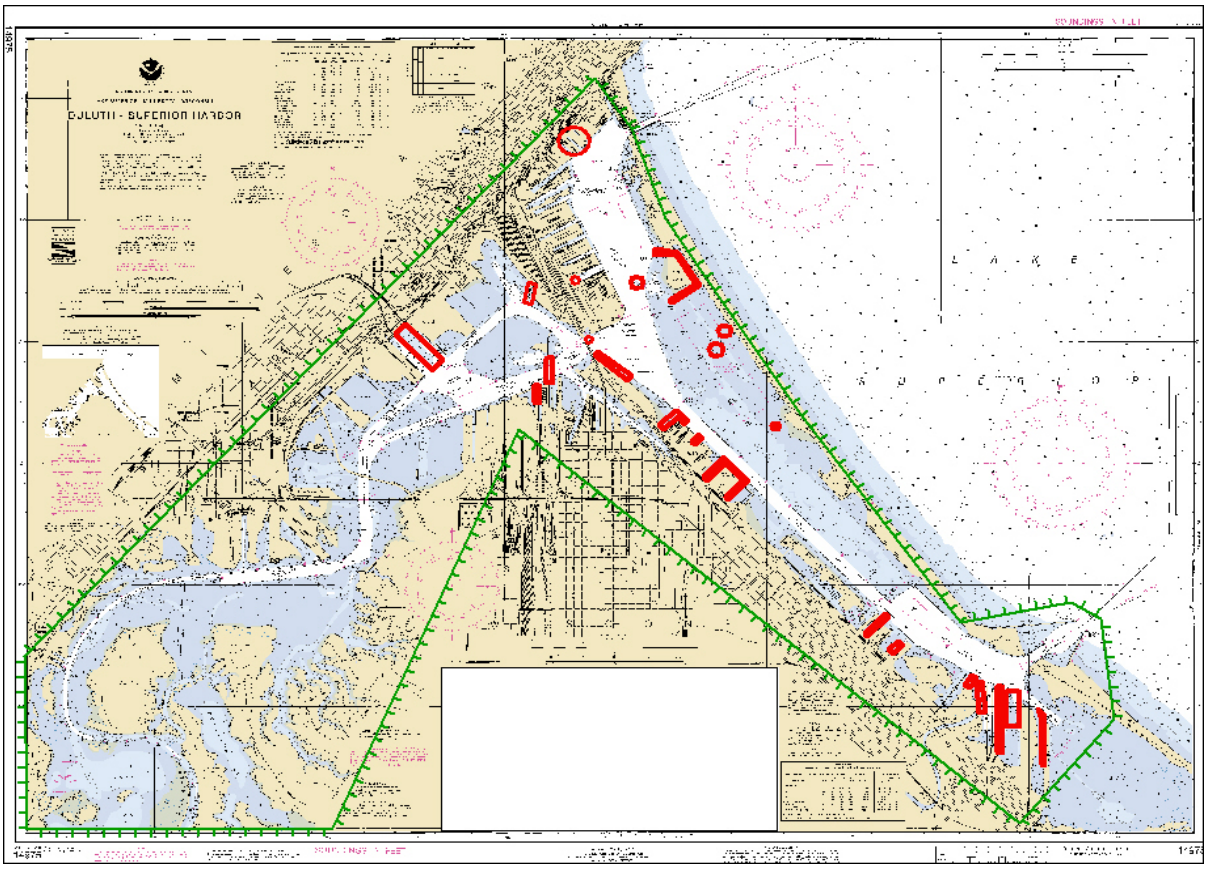

Figure 1. F00499 Survey Limits Duluth and Superior Harbors – Chart 14975

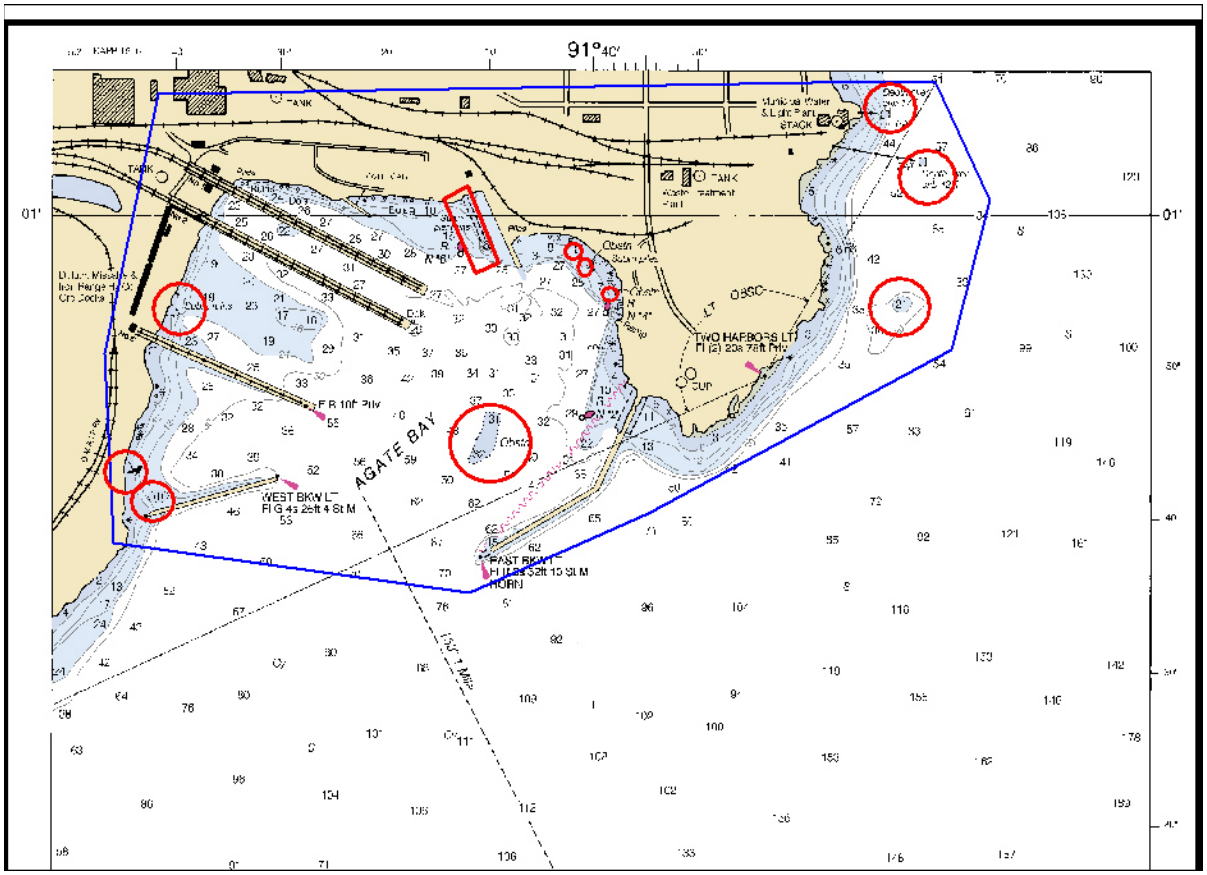

Figure2. F00499 Survey Limits Two Harbors – Chart 14966_5

Data acquisition was conducted from August 2, 2004 to September 16, 2004.

B. DATA ACQUISTION AND PROCESSING *See also the Evaluation Report*

A complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods can be found in the *OPR-Z486-NRB-04 Data Acquisition and Processing Report* (DAPR),* submitted under separate cover. Items specific to this survey, and any deviations from the DAPR* are discussed in the following sections. *** DAPR filed at the Atlantic Hydrographic Branch (AHB)***

B1. Equipment and Vessels

Data were acquired using survey launch S3001, and include vertical-beam echo sounding data (VBES), side scan sonar data (SSS), detached positions (DP), and sound velocity profiles.

Shoreline verification data was collected using a Trimble backpack DGPS unit.

No unusual vessel configurations were used for data acquisition.

B2. Quality Control

Where practical, crosslines were run and comprised over 20% of mainscheme lines. In several areas, no crosslines were run due to the survey area being in the narrow space between piers or to extremely shallow water at the edge of the survey area. No crosslines were run in the area around Hearding Island due to an abrupt end in data collection at the end of the project.

Where crosslines were run, they were in general agreement with mainscheme hydrography.

Lead line checks are performed periodically throughout the project to verify fathometer accuracy and are included in Appendix V. ***Data filed with the original field records***

B3. Corrections to Echo Soundings

Occasional problems with misdigitization or bottom tracking were encountered during this survey. Where the digital data were ambiguous, the screen captures from the echosounder were consulted and the digital record was corrected.

Corrections to echo soundings are as stated in the DAPR. ***DAPR filed at AHB***

C. VERTICAL AND HORIZONTAL CONTROL

Horizontal Control ***See also the Evaluation Report***

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. Differential correctors from U.S. Coast Guard beacon at Wisconsin Point, WI (296 kHz) were used during this survey.

Vertical Control

The vertical datum for this project is low water datum for Lake Superior which is 183.215 meters above the International Great Lakes Datum 1985 (IGLD85). The IGLD is referenced to the mean water level at Rimouski, Quebec. All measurements are in meters.

The operating Center for Operational Oceanographic Products and Services (CO-OPS) tide station at Duluth, MN (9099064) served as the source for preliminary water level observations for survey F00499.

The ~~Pacific~~ ***Atlantic*** Hydrographic Branch will apply final approved (smooth) tides to the survey data during final processing. A request for delivery of final approved (smooth) tides

for survey F00499 was forwarded to N/OPS1 on November 3, 2004. A copy of the request is included in Appendix IV.* ***Approved water levels and zoning were applied in CARIS during office processing.***

Five sound velocity casts were conducted during this survey as shown in the table below:

Day	Latitude/Longitude	Depth (m)	Location
225	46°45'10"N / 092°05'32"W	15.6	Duluth Harbor
230	46°45'06"N / 092°05'33"W	13.0	Duluth Harbor
239	46°44'46"N / 092°06'29"W	10.0	Duluth Harbor
245	47°00'40"N / 091°40'18"W	27.3	Two Harbors
257	46°45'54"N / 092°05'49"W	14.3	Duluth Harbor

Copies of the sound velocity casts are included in Separate III.*

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison *See also the Evaluation Report*

The Hydrographer has determined that data accuracy standards and bottom coverage requirements have been met and survey data are adequate to supersede charted data in their common areas.

Comparison will be limited to the largest scale chart covering the survey area as shown below:

Chart No.	Name	Date	Edition	Scale
14975	Duluth-Superior Harbor	October, 2002	33rd	1:15,000
14966_5	Two Harbors	May, 2003	26th	1:10,000

Comparison with the chart was problematic due to a general shift in the charted shoreline. The reason for the shift is described in a Navigation Services Division Discrepancy Report sent to Nautical Data Branch on 9/30/04. A copy of this report is included in Appendix V.* **** Data filed with original field records.***

Final chart comparisons will be made at the Atlantic Hydrographic Branch after the application of smooth tides.

Chart 14975 – Duluth-Superior Harbor

The charted wreck at position 46°45'30"N, 092°06'12"W was investigated with 200% SSS on DN273. No evidence of the wreck was found at the charted position. The charted wreck may refer to a partially sunken barge located very close to shore ***(see photo244_01.jpg)***, fifty meters west of the charted wreck at detached position 5183, 46°45'30"N, and 092°06'14" W. Move charted wreck to position of DP5183 ***and depth of 11ft. Concur with clarification.***

Delete sunken wreck PA and danger curve in Latitude 46°45'29.9"N, 92°06'12.5"W. Chart 11Wk with danger curve in Latitude 46°45'30.07"N, 92°06'14.83"W.

VBES hydrography using 5 meter line spacing was collected over the 23 ft. shoal charted at position 46°45'00.5"N, 092°06'02.1"W on DN 243. A 23 ft. sounding was recorded at position 46°45'00.1"N, 092°06'03.1"W. Chart new hydrography. ***Concur.***

VBES data was collected in the area surrounding Hearding Island at position 46°45'34"N , 092°05'00"W on DNs 257, 258, and 260. Sounding data is in general agreement with the chart on the west side of the island, between the island and the federal channel. Shoaling to 1 ft. was noted at the southeast edge of the island at position 46°45'25.7"N, 092°04'49"W. Shoaling to 2 ft. was found at the north point of the island over the charted 4 ft. sounding at position 46 °45'43.9"N , 092 °05'03"W. The channel charted around the south and east sides of the island does not exist. Sounding data in this area showed no defined channel, and depths in the channel between the island and the spit were 1-2 ft. Delete charted channel on south and east side of the island. Chart new hydrography. ***Concur with clarification. Defer to the Marine Charting Division (MCD) Source Data Group for review and charting.***

Note: Digital fathogram captures of echosounder data were lost for fixes 5970-6005 on DN 258. The following lines do not have echosounder charts: 109_1752, 107_1800, 105_1807, 103_1815, 101_1823, 107_1831, 105_1839, 103_1848. The digital record in CARIS was edited conservatively for these lines, and only clearly incorrect depths were rejected.

VBES data was collected in St. Louis Bay, north of the South Channel Eastern Section at approximate position 46°44"48"N, 092°06'39"W on DN 260. Shoaling to 2 ft was noted around position 46°44'46.1"N , 092°06'47.2"W in an area with charted 4 ft. soundings. Chart new hydrography. ***Concur.***

VBES data was collected in St. Louis Bay, in the area between the Duluth Missabe & Iron Range Ore Docks at position 46°44'57"N , 092°08'00"W on DNs 230, 232, 240, and 243. Significant shoaling was found inside the 24 ft. contour, with depths three to five feet shoaler than those charted. Four Dangers to Navigation (DTON) were submitted in this area to define the general shoaling in the area. A copy of the DTON report***** is included in Appendix I. Depths along the pier faces generally agreed with charted soundings. Chart new hydrography. ***Concur.***

Note: A new PSS was created subsequent to submission of the DTON report***** which used depth data based on a new vessel config file (changes were made in the dynamic draft and vessel offsets). The new PSS and slight change in depth data prevented the selection of the exact same sounding (Profile/Beam) for the DTON data in the new PSS. The soundings selected in the new PSS are close in depth (within 0.1 meters) and in position (within 5 meters) and therefore the hydrographer does not feel a new DTON submission is necessary. However, since these are not the exact same soundings submitted in the DTON report*****, the "submitted" box in the PSS is not checked. The original DTON xml file and report is included in the submitted digital data under the DTON directory for survey F00499. ***DTON reports were corrected during office processing and the correct data was charted.***
**** DTON report appended to this report.***

VBES hydrography using 10 meter line spacing was collected along the Meehan Seaway Service (MHS) and Continental Grain Co. wharves at position 46 °44'24"N , 092 °05'02"W on DNs 226, 230, and 243. A permanently moored ship prevented collection of sounding data along the MHS NW wharf face. Depths are in general agreement with the chart. ***Concur.***

The 2 ft. sounding at position 46 °44'20.4"N, 092°04'39.5"W was investigated with VBES hydrography using ten meter line spacing on DN 258. Depths over the 2 ft. sounding were 7-~~9~~ ***8*** ft. Delete charted 2 ft. sounding and chart new hydrography. ***Concur.***

The 1 ft. sounding at position 46°44'09.3"N, 092 °04'24.1"W was investigated with VBES hydrography using twenty meter line spacing on DN 258. Depths over the 1 ft. sounding are ~~5~~ ***6***-7 ft. Delete charted 1 ft. sounding and chart new hydrography. ***Concur.***

VBES hydrography using 10 meter line spacing was collected along the Huron Cement Co. wharf at position 46°43'54"N, 092°04'25"W on DN 226. Depths are in general agreement with the chart on the NE face of the wharf. Depths along the SE face of the wharf are 20 -23 ft. Contours along this side of the wharf should be adjusted to reflect new hydrography. ***Concur.***

The 6 ft. shoal at position 46°42'59.3"N, 092°02'32.5"W was investigated with VBES hydrography using twenty meter line spacing on DN 258. New hydrography is in general agreement with charted soundings. ***Concur.***

VBES hydrography using 10 meter line spacing was collected along the pier located at position 46°42'42"N, 092°02'39"W on DN 226. Depths are in general agreement with the chart. ***Concur.***

The 5 ft. shoal at position 46°42'33.6"N, 092°00'57.6"W was investigated with VBES hydrography using ten meter line spacing on DN 260. A least depth of 6 feet was found at position 46°42'32.9"N, 092°00'56.2"W. Chart new hydrography. ***Concur.***

VBES hydrography using 10 meter line spacing was collected along the pier located at position 46°42'15.3"N, 092°01'43.5"W on DN 244. Depths are in general agreement with the chart. ***Concur.***

VBES hydrography using ten meter line spacing was collected along the Burlington Northern Tac Facility (BNTF) pier at position 46°41'49"N , 092°01'00"W and in the area between the pier and ore dock directly west on DNs 226 and 244. Depths along the BNTF pier face were 28 – 34 ft. Depths over the charted 26 ft. sounding at 46°41'50.7"N, 092°01'07.2"W were ~~29~~ ***28***– ~~32~~ ***30*** ft. The northern part of the 6 ft. contour has moved to the south. Depths over the charted 1 ft. sounding at position 46°41'55.7"N, 092°01'11.1"W and the charted 1 ft. sounding directly south are 4 -~~5~~ ***6*** ft. Chart new hydrography. ***Concur.***

VBES hydrography was collected along the Duluth Power Squadron Bunge Corp. pier face at position 46°41'48"N, 092°00'48"W on DN 226. Ten meter line spacing was run in the area between the pier and shoal area directly west of the pier. Depths along the pier are 20 – ~~22~~

24 ft. Depths over the charted 19 ft. sounding at 46°41'49.0"N, 092°00'50.9"W were 22 ***ft.*** ~~23 ft.~~ Depths over the charted 19 ft. sounding at 46°41'54.3"N, 092°00'50.7"W were 25 ***ft.*** ~~26 ft.~~ Chart new hydrography. ***Do not concur. Inadequate disproval from present survey data. Retain as charted.***

Data forwarded to MCD for Quick Verification

The following data have been forwarded to MCD with supporting SSS data, if collected, sent to AHB for verification. Screen captures of these items are included in Appendix V.***

The charted wreck at position 46°45'29"N, 092°05'28"W has been removed. The item was disproved with 200% SSS coverage on DN 224. Several contacts in the SSS area were investigated using VBES, some of which were located inside the federal channel. The contacts located in the channel were found to be below the tabulated depths for the channel and therefore not significant. Also see AWOIS item 12516. This chart update was submitted as Fast Track Item No. 1 ***Concur. No change in charting.***

The bridge ruins extending into the channel at approximate position 46°44'45.5"N, 092°06'30"W were disproved with 200% SSS coverage on DN 239. Several contacts in the SSS area were investigated using VBES, some of which were located inside the federal channel. The contacts located in the channel were found to be below the tabulated depths for the channel and therefore not significant. This chart update was submitted as Fast Track Item No. 2. ***Concur. No change in charting.***

The dols charted in the federal channel at position 46°43'11"N , 092°08'51"W were disproved with 200% SSS coverage on DN 239. Several contacts in the SSS area were investigated using VBES, some of which were located inside the federal channel. The contacts located in the channel were found to be below the tabulated depths for the channel and therefore not significant. This chart update was submitted as Fast Track Item No. 3. ***Concur. No change in charting.***

The submerged obstruction charted near the edge of the federal channel at position 46°43'35.1"N , 092°03'49.7"W was disproved with 200% SSS on DN 237. This chart update was submitted as Fast Track Item No. 4. ***Concur. No change in charting.***

Chart 14966-5 – Two Harbors

VBES hydrography using 10 meter line spacing and 200% SSS were collected between the Duluth, Missabe & Iron Range Ore docks in Two Harbors at position 47°00'57.5"N , 091°40'26.4"W on DNs 245 and 252. Depths over the 22 ft. sounding at position 47°00'59.1"N, 091°40'29.6"W are 28 – 29 ft. Other sounding data are in general agreement with the chart. Chart new hydrography. ***Concur.***

The charted dol at position 47°00'53.1"N, 091°40'17.2"W was investigated with 200% SSS on DN 245. No evidence of the dol(s) was found. Delete charted dol and "dols" notation. ***Concur.***

**** Data filed with original field records.***

AWOIS Items

A total of sixteen AWOIS items were located within the limits of F00499 and are shown in figures 3 and 4. Investigation methods, results, and charting recommendations have been entered into the Microsoft Access AWOIS database and are submitted with the digital data. Printouts of the AWOIS Database forms are included in Appendix VI* of this report. Brief descriptions of the results are included below. **** No Appendix VI submitted with this report.***

Chart 14975 – Duluth Harbor

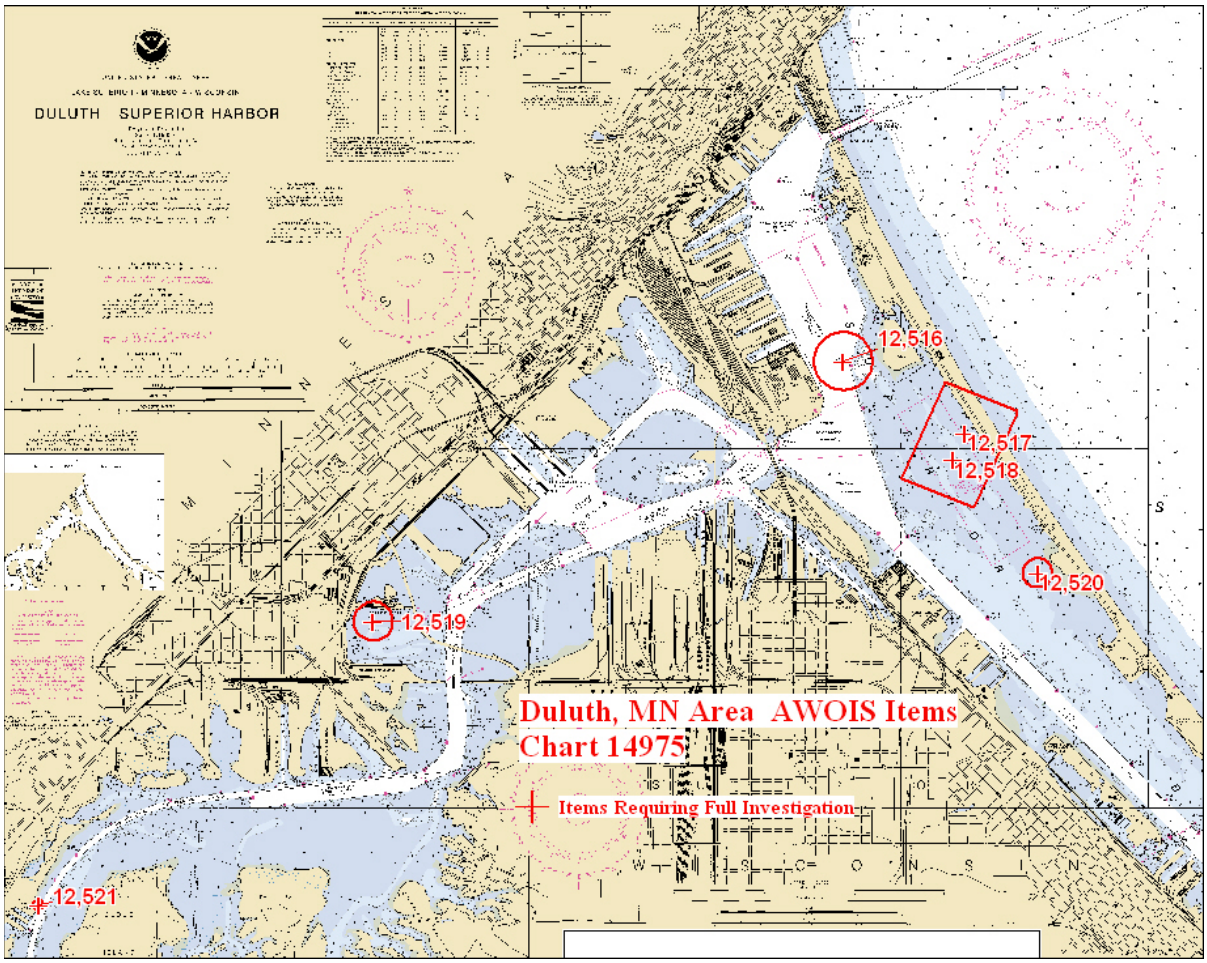

Figure 3. F00499 AWOIS Items – Chart 14975

AWOIS Item Number	Result of Investigation
12516	See fast track item No. 1. ***See page 7 of this report.***
12519	Submerged wreck confirmed at charted location ***Retain as charted.***
12521	Pile confirmed at charted location ***Retain as charted.***
12517, 12518, 12520	Not investigated due to extremely shallow water ***No change in charting.***

Chart 14966_5 - Two Harbors

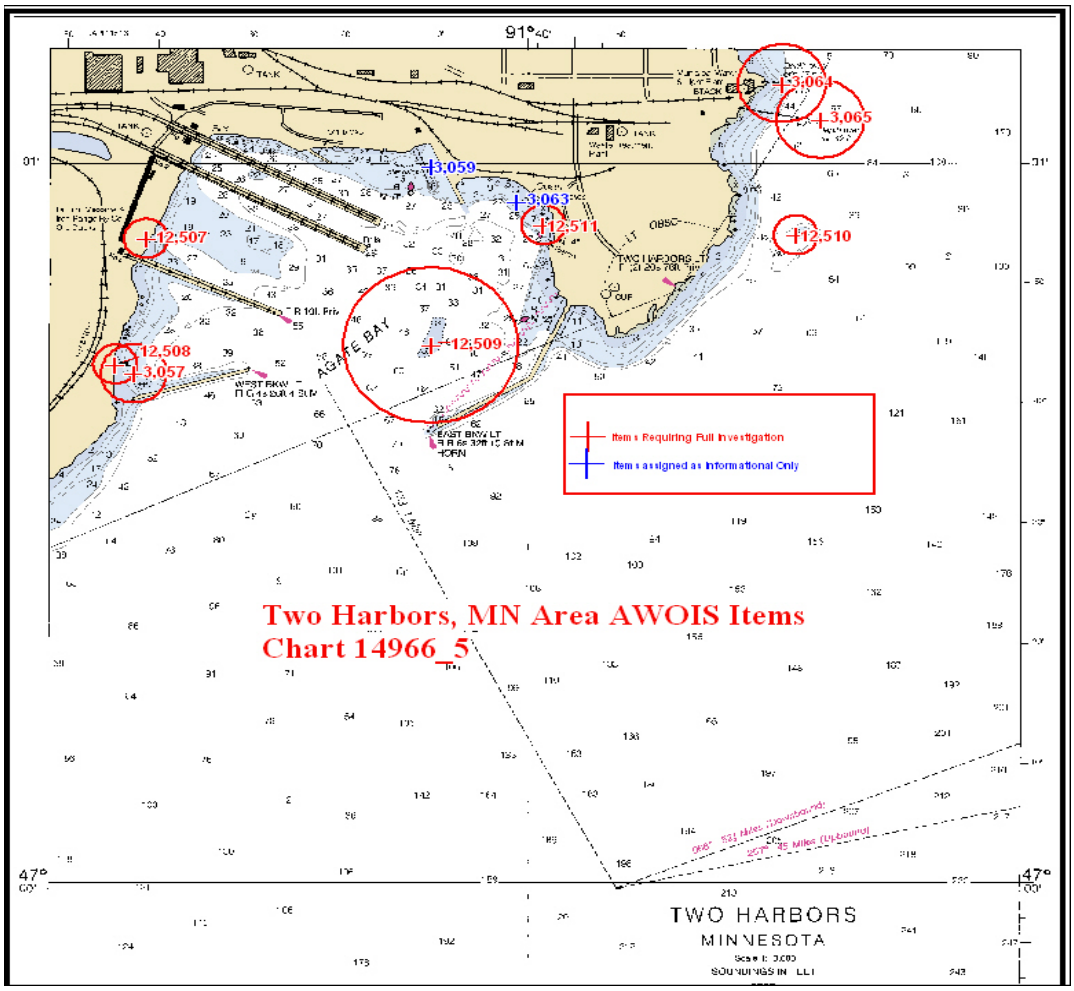

Figure 4. AWOIS Items – Chart 14966_5

AWOIS Item Number	Results of Investigation
3057	Submerged wreck confirmed using VBES ***Retain as charted.***
12508	Confirmed by visual inspection ***Retain as charted.***
12507	Ruins confirmed at charted location ***Retain as charted.***
3059	Submerged pier ruins confirmed using SSS ***Retain as charted.***
3063	Obstruction confirmed by visual inspection ***Retain as charted.***
12511	Submerged obstruction confirmed by visual inspection ***Retain as charted.***
12509	VBES hydrography using 5 meter line spacing was collected over the 31 ft. shoal charted at position 47°00'45.6"N, 091°40'09.8"W. Depths were within 1 ft. of the charted depths. Chart new hydrography. ***Concur.***
3064, 3065, 12510	Not investigated due to weather conditions outside breakwater. ***No change in charting.***

D.2 Additional Results

Shoreline Verification

NRT6 conducted ENC shoreline verification of mean high water (MHW) features in the project area. The ENC of the area was displayed in Hypack and new features were positioned using the Trimble backpack system or DP's.

New MHW structures or changes to existing structures based on Trimble backpack data and DP's, are depicted with a solid red line in the MapInfo F00499_ShorelineUpdates table. Natural shoreline is depicted with a dashed red line. Features that were interpolated between DGPS points or drawn based on IKONOS imagery are depicted by a dashed green line.

Detached positions are shown in the F00499_PSSfeatures table and are fully described in the PSS. ***Concur.***

A complete description of equipment and data collection methods is included in the DAPR. ***DAPR filed at AHB***
Significant changes to the shoreline are described below.

Chart 14975 – Duluth and Superior Harbors

A row of submerged rocks is located at 46°46'50"N, 092°05'26"W on the north side of the north pier at the entrance to Duluth Harbor. The row of rocks is defined by DP's 5181 and 5182. Chart submerged rocks between these positions. ***Concur.***

A row of submerged rocks is located at 46°46'44"N, 092°05'24"W on the south side of the south pier at the entrance to Duluth Harbor. The end of the row of rocks is at DP 5180, which is a rock exposed .25 meters. The remainder of the row of rocks extends northwest and perpendicular to the pier wall and is submerged. Chart rocks as described. ***Concur.***

Several new marina piers were positioned in the Minnesota Slip position 46°46'57"N, 092°05'48"W. The shoreline corrections defining the new piers are shown on the F00499_Shoreline_Updates table. ***Concur. Chart new shoreline. MCD Source Data Group should make final corrections.***

Changes in the charted shoreline in the area from the Minnesota Slip, position 46°46'57"N, 092°05'48"W to the General Mills Inc. pier at 46°46'24"N, 092°06'15"W are shown on the F00499_Shoreline_Updates table. ***Concur. Chart new shoreline. MCD Source Data Group should make final corrections.***

An uncharted ramp ***and three new piers are*** ~~is~~ located at 46°45'05"N, 092°06'05"W , and a second ramp ***and new pier are*** ~~is~~ located south of the charted "Ramp" notation at position 46°45'05"N, 092°06'10W. ~~Both~~ ***All*** are depicted on the F00499_Shoreline_Updates table. Delete charted ramp notation and add "Ramp" notation at new ramp positions. ***Concur with***

clarification. (See photos 238_08, 238_10, 238_16, and 238_19.jpg). Add ramp notations if chart scale allows, and chart all four piers.

The pier charted at the base of the Duluth Missabe & Iron Range Ore Docks at position 46°45'07"N , 092°08'09.5"W was investigated with 200% SSS on DN 232. Several contacts in the area were subsequently investigated with VBES hydrography, but no evidence of the pier was found. Delete charted pier. ***Concur with clarification. No evidence of the charted piles on either side of the pier or the islet southwest of the pier was found. Delete charted piles, the islet and the notation "Ruins".***

A new launch ramp ***and two new piers are*** ~~is~~ located ***in the vicinity of*** ~~at~~ position 46°43'06.4"N, 092°08'39.6"W. Chart according to MapInfo F00499_Shoreline_Updates table. ***Concur with clarification. Delete charted pier ruins (See photo 238_04.jpg). Chart both piers and chart ramp if chart scale allows. Defer shoreline change to MCD Source Data Group for review and charting recommendation.***

An uncharted cement structure on which two charted lights are situated was found at position 46°42'07.8"N, 092°01'21.2"W. Chart according to the F00499_Shoreline_Updates table. ***Concur with clarification. The cement structure is charted on the Jan/05 34th Edition of chart 14975. The MapInfo F00499_Shoreline_Updates table position does not match the charted position. Defer item to MCD Source Data Group for review and charting recommendation.***

Several large dols were positioned beneath each of three bridges located at positions 46°44'57.6"N, 092°06'02.3"W, 46°44'30.8"N , 092°05'51.2"W, 46°43'~~3.6~~***53.6***"N, 092°08'~~5.6~~***35.6***"W. Interference and multipathing from the overhead bridge structure prevented the collection of accurate position data on all the dols. The positions on the dols that did meet accuracy standards were used to position the remainder of the dols using the following method. The IKONOS image, in which all the dols are visible, was displayed in MapInfo and used to draw the dols on the F00499_Shoreline_Updates table. The set of dols was then moved as a group, placing the appropriate dol over the most accurate dgps position taken in the field. The pathfinder positions for each dol are shown the F00499_Points_all table. Chart new dols according to the F00499_Shoreline_Updates table. ***Concur.***

Chart 14966_1 – Two Harbors

A significant change was found in the launch ramp and shoreline surrounding the launch ramp at position 47°00'53.1"N, 091°39'56.8"W. Chart shoreline***, including three new piers,*** according to the MapInfo F00499_Shoreline_Updates table. ***See photo 245_04.jpg. Concur.***

Aids to Navigation

Fixed aids to navigation positioned with the Trimble DGPS receiver are shown in MapInfo F00499_Fixed_Aids table. A listing of these aids has been forwarded to the NOAA's Marine Chart Division. A copy is included in Appendix V.*** ***Concur.***
The following specific changes to the chart have been forwarded as fast track items to Marine Chart Division.
**** Data filed with original field records.***

The South Channel Western Section front range light (LLN 16120, Position: 46.735035207 ***46°44'06.13"N,*** -92.144622518 ***92°08'40.64"W***) has no symbol charted. Add light symbol to chart. A MapInfo screenshot of this change, St._Louis_Bay_Range.jpg is included in Appendix V.***** ***Defer item to MCD Source Data Group for review and charting recommendation.***

The Superior Front Channel rear range (LLN 15700) has been moved to position 46.70536438 ***46°42'19.31"N***, -92.032920197 ***92°01'58.51"W***. The ruins of the old range are not at the charted position of the old light, but at the position of DP 4834, ***Latitude 46°42'16.53"N, Longitude 92°01'53.90"W.*** A disproval DP 4835, ***Latitude 46°42'15.61"N, Longitude 92°01'52.32"W,*** was taken over the position of the old light. A MapInfo screenshot of this change, Superior_range.jpg is included in Appendix V.***** ***Defer item to MCD Source Data Group for review and charting recommendation.***

Buoy N "6" and C "1" at approximate position 46°45'03"N, 092°06'02"W do not exist. ***The buoys are private aids. Delete buoys and characteristics.***

The private light charted at position 46°45'00.5"N, 092°05'59.5"W no longer exists. ***Delete light and characteristics.***

A MapInfo screenshot of the last two changes, Buoy_Lights.jpg is included in Appendix V.***** ***Submitted as photos 218_17.jpg and 218_18.jpg. Defer item to MCD Source Data Group for review and charting recommendation.***

Bridges, Cables, Overhead Pipelines

Trimble backpack line data was run over the three bridges in the project area by placing the Trimble antenna on a vehicle and driving across each bridge. Offsets to the edge of the bridge were estimated and entered into the data logger. ***Concur. Defer item to MCD Source Data Group for review and charting recommendation.***
The line data is included in the MapInfo F00499_Shoreline_Updates table. ***Concur.***

A significant change in bridge shape was noted on the bridge crossing the west side of St. Louis Bay at position 46 °44'06.8"N, 092 °08'55.3"W. Chart new bridge shape according to MapInfo F00499_Shoreline_Updates table. ***Concur. Defer item to MCD Source Data Group for review and charting recommendation.***

Recommendations

The Hydrographer recommends that the shoreline as depicted on the MapInfo F00499_Shorline_Updates table supersede and complement shoreline information on the charts. ***Concur. Defer item to MCD Source Data Group for review and charting recommendation.***

Based on the changes in depths seen in the areas hydrographic data was collected during this project, up-to-date basic hydrography should be acquired for the entire chart. ***Concur.***

The shift in the charted shoreline warrants collection of up-to-date shoreline imagery. ***Concur. Defer item to MCD Source Data Group for review and charting recommendation.***
**** Data filed with the original field records.***

E. APPROVAL

Standard field surveying and processing procedures were followed in producing this survey in accordance with the Navigation Response Branch Operations Manual, the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; and NOS Hydrographic Surveys Specifications and Deliverables.

The digital data and supporting records have been reviewed by me, are considered complete and adequate for charting purposes, and are approved. All records are forwarded for final review and processing to N/CS33, Atlantic Hydrographic Branch.

Survey F00499 is complete and adequate to supersede charted soundings in their common areas. No additional work is required for this survey.

Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

Title	**Date Sent**	**Office**
Data Acquisition and Processing Report for OPR-Z486-NRB-04		N/CS33
Fast Track Items 1-4	11/03/04	N/CS33, MCD
Shoreline Fast Track Items	11/19/04	MCD

Submitted by,

Kurt Brown
Team Leader
Navigation Response Team 6

Title	Date Sent	Office
Data Acquisition and Processing Report for OPR-Z486-NRB-04	12/02/04	N/CS33
Fast Track Items 1-4	11/03/04	N/CS33, MCD
Shoreline Fast Track Items	11/19/04	MCD

Submitted by,

Kurt Brown
Team Leader
Navigation Response Team 6

Figure 1 - Photo 244_01

Figure 2 - Photo 245_01

Figure 3 - Photo 238_08

Figure 4 - Photo 238_10

Figure 5 - Photo 238_16

Figure 6 - Photo 238_19

Figure 7 - Photo 238_04

Figure 8 - Photo 245_04

Figure 9 - Photo 218_17

Danger to Navigation Report

Registry Number: F00499

State: Minnesota / Wisconsin

Locality: Western End of Lake Superior

Sub-locality: Duluth / Superior Harbor and Two Harbors

Project Number: OPR-Z486-NRB-04

Survey Date: August 2, 2004

Shoaling was found in the area between the Duluth Missabe and Iron Range Ry Co Ore Docks. Significant shoal depths are listed below.

Charts Affected

Number	Version	Date	Scale
14975	33rd Ed.	10/01/2002	1:15000
14966	26th Ed.	05/01/2003	1:120000
14961	12th Ed.	11/01/2003	1:600000
14500	27th Ed.	10/01/2002	1:1500000

Features

	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1	Shoal	3.84 m	046° 45' 02.050" N	92° 08' 06.200" W
2	Shoal	4.14 m	046° 44' 56.281" N	92° 07' 58.352" W
3	Shoal	4.34 m	046° 44' 53.815" N	92° 07' 55.464" W
4	Shoal	5.71 m	046° 44' 50.487" N	92° 07' 51.786" W

1. ***Shoal 3.79m 46°45'02.04"N 92°08'06.18"W***
2. ***Shoal 4.14m 46°44'56.27"N 92°07'58.33"W***
3. ***Shoal 4.31m 46°44'53.71"N 92°07'55.24"W***
4. ***Shoal 5.41m 46°44'50.74"N 92°07'51.84"W***

1 - Danger To Navigation

1.1) Profile/Beam - ~~838/1~~ from duluth / 3001sb / 2004-230 / 060_1936

DANGER TO NAVIGATION

Survey Summary

Survey Position: ~~- 046° 45' 02.050" N, 92° 08' 06.200" W~~ *46°45'02.04"N 92°08'06.18"W*

Least Depth: ~~3.84 m~~ *3.79m*

Timestamp: 2004~~-230.19:37:26.987~~ (08/17/2004) *19:37:27.113*

Survey Line: duluth / 3001sb / 2004-230 / 060_1936

Profile/Beam: ~~- 838/1 -~~ *840/1*

Charts Affected: 14975_1, 14966_1, 14961_1, 14500_1

Remarks:

Shoal depth in area of shoaling

Hydrographer Recommendations

Chart new depth. *Concur.* *See also page 5 of the Descriptive Report.*

Cartographically-Rounded Depth (Affected Charts):

12ft (14975_1, 14966_1)

2fm (14500_1)

12ft (14961_1)

Feature Images

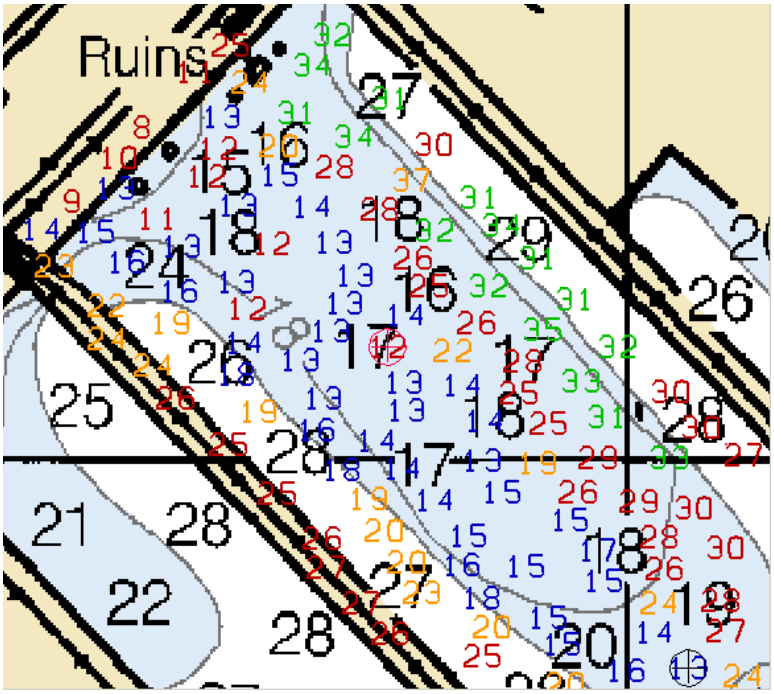

Figure 1.1.1

1.2) Profile/Beam - ~~1671/1~~ from duluth / 3001sb / 2004-230 / 061_1822

DANGER TO NAVIGATION

Survey Summary

Survey Position: ~~-046° 44' 56.281" N, 92° 07' 58.352" W~~ *46°44'56.27"N 92°07'58.33"W*

Least Depth: 4.14 m

Timestamp: 2004-230.~~18:24:20.115~~ (08/17/2004) *18:24:19.929*

Survey Line: duluth / 3001sb / 2004-230 / 061_1822

Profile/Beam: ~~1671/1~~ *1668/1*

Charts Affected: 14975_1, 14966_1, 14961_1, 14500_1

Remarks:

Shoal depth in area of shoaling.

Hydrographer Recommendations

Chart new depth. *Concur. See also page 5 of the Descriptive Report.*

Cartographically-Rounded Depth (Affected Charts):

13ft (14975_1, 14966_1)

2 ¼fm (14500_1)

13ft (14961_1)

Feature Images

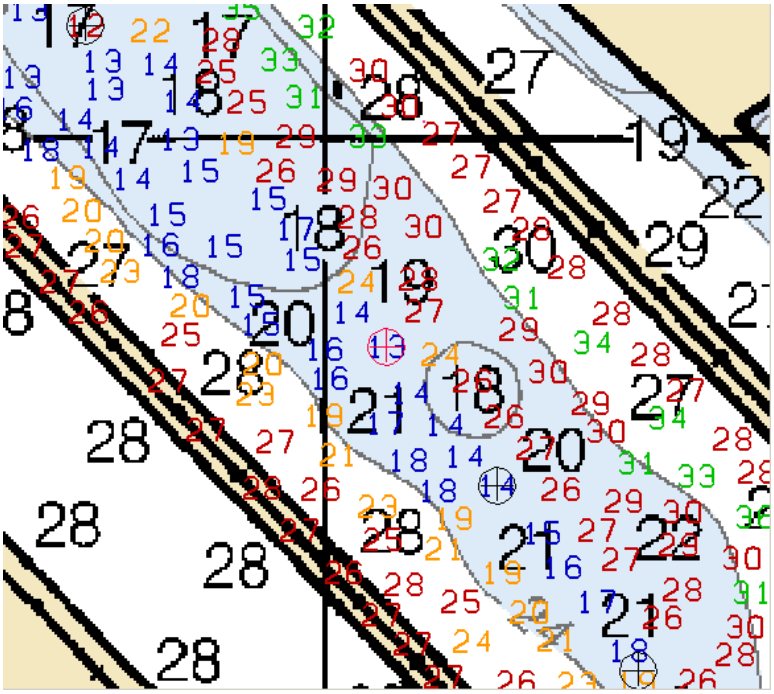

Figure 1.2.1

1.3) Profile/Beam - ~~497/1~~ from duluth / 3001sb / ~~2004-243 / 070_2024~~

DANGER TO NAVIGATION

Survey Summary

Survey Position: ~~046° 44' 53.815" N, 92° 07' 55.464" W~~ *46°44'53.71"N 92°07'55.24"W*

Least Depth: ~~4.34 m~~ *4.31m*

Timestamp: ~~2004-243.20:25:04.394 (08/30/2004)~~ *2004-230.18:21:19.495 (08/17/2004)*

Survey Line: duluth / 3001sb / ~~2004-243 / 070_2024~~ *2004-230/063_1819*

Profile/Beam: ~~497/1~~ *2043/1*

Charts Affected: 14975_1, 14966_1, 14961_1, 14500_1

Remarks:

Shoal depth in area of shoaling.

Hydrographer Recommendations

Chart new depth. *Concur. See also page 5 of the Descriptive Report.*

Cartographically-Rounded Depth (Affected Charts):

14ft (14975_1, 14966_1)

2 ¼fm (14500_1)

14ft (14961_1)

Feature Images

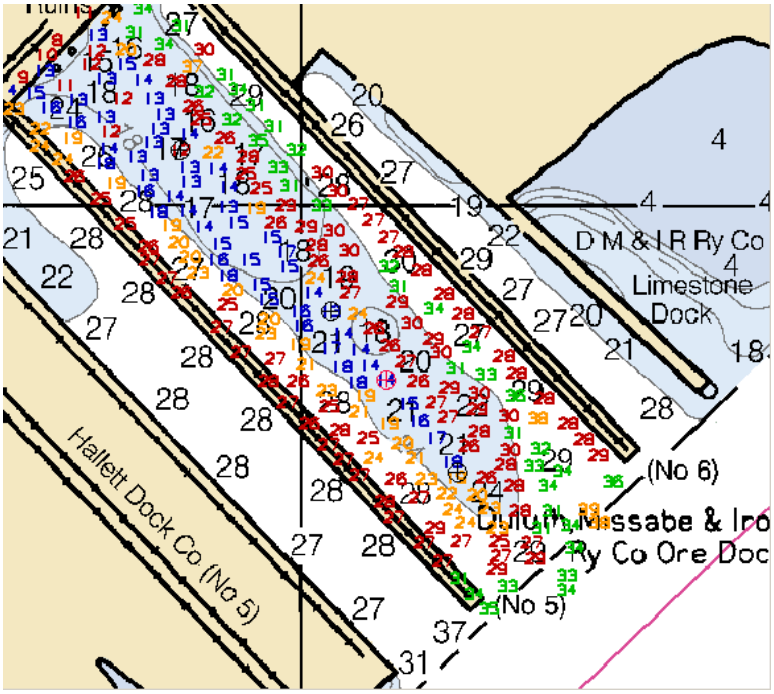

Figure 1.3.1

1.4) Profile/Beam - ~~430/1~~ from duluth / 3001sb / 2004-230 / ~~066_1926~~

DANGER TO NAVIGATION

Survey Summary

Survey Position: ~~046° 44' 50.487" N, 92° 07' 51.786" W~~ *46°44'50.74"N 92°07'51.84"W*

Least Depth: ~~5.71 m~~ *5.41m*

Timestamp: 2004-230.~~19:26:39.860~~ (08/17/2004) *18:15:58.502*

Survey Line: duluth / 3001sb / 2004-230 / ~~066_1926~~ *065_1815*

Profile/Beam: ~~430/1~~ *572/1*

Charts Affected: 14975_1, 14966_1, 14961_1, 14500_1

Remarks:

Shoal Depth in area of shoaling.

Hydrographer Recommendations

Chart new depth. *Concur with clarification. Chart present survey soundings. See also page 5 of the Descriptive Report*

Cartographically-Rounded Depth (Affected Charts):

~~18ft~~ (14975_1, 14966_1) *17 ft*

~~3fm~~ (14500_1) *2 - 3/4 fm*

~~18ft~~ (14961_1) *17 ft*

Feature Images

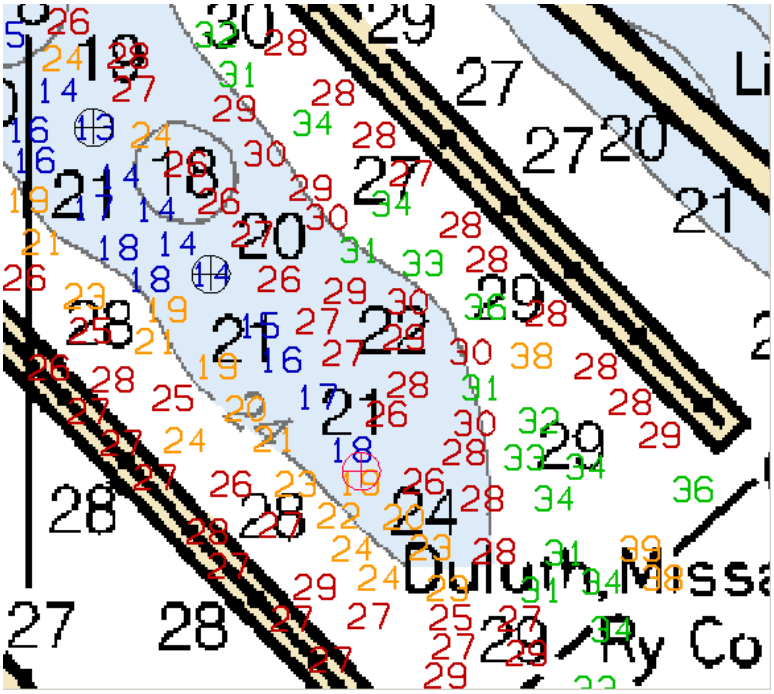

Figure 1.4.1

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Ocean and Earth Sciences
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: April 26, 2005

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-Z486-NRB-2004
HYDROGRAPHIC SHEET: F00499

LOCALITY: Duluth / Superior Harbor and Two Harbors, Western End of Lake Superior, MN
TIME PERIOD: August 13 - September 16, 2004

WATER LEVEL STATION: 909-9064 Duluth, MN
Lat. 46° 46.5'N Lon. 92° 5.6'W
PLANE OF REFERENCE (IGLD 85): 183.20 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: LS101

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to International Great Lakes Datum of 1985 (IGLD 85) and on Greenwich Mean Time.

Thomas N. Meo 4/29/05

CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION

NOAA FORM 61-29
(12-71)

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

LETTER TRANSMITTING DATA

REFERENCE NO.
N/CS 33-11-06

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

- [ ] ORDINARY MAIL
- [ ] AIR MAIL
- [ ] REGISTERED MAIL
- [X] EXPRESS
- [ ] GBL (Give number)

DATE FORWARDED
04/04/2006

NUMBER OF PACKAGES
1

TO:

NOAA / National Ocean Service
Data Acquisition and Control
SSMC3, Station 6704
1315 East-West Hwy.
Silver Spring, MD 20910-3282

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.

F00499
Minnesota/Wisconsin
Western End of Lake Superior
Duluth/Superior and Two Harbors

3 Smooth Plots

1 Mylar H-Drawing for NOS chart 14966_5

1 Mylar H-Drawing for NOS chart 14975

ATTN: 301-713-2698 x 110

FROM: (Signature) Marilyn Schluter

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

Marilyn L. Schluter
Atlantic Hydrographic Branch
439 W. York St.
Norfolk, VA 23510

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR F00499 (2004)

This Evaluation Report has been written to supplement and/or clarify the original Descriptive Report. Sections in this report refer to the corresponding sections of the Descriptive Report.

B. DATA ACQUISITION AND PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

Hydrographic Processing System
MicroStation J, version 7.01.04.16
I/RAS B, version 7.01.000.18
MapInfo, version 6.5
CARIS HIPS/SIPS 2000 version 5.4
PYDRO, version 5.3.3rc5

The smooth sheet was plotted using a Hewlett Packard DesignJet 2500CP plotter.

C. HORIZONTAL CONTROL

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD 83). Office processing of this survey is based on these values.

D.1 CHART COMPARISON 14966-5 (27th Edition, May/05)

Corrected through NM May 7/05
Corrected through LNM May 3/05

14975 (34th Edition, Jan/05)

Corrected through NM Feb 5/05
Corrected through LNM Jan 25/05

Hydrography

The charted hydrography originates with the discussed prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in section D. of the Descriptive Report. Attention is directed to the following:

1. There is now a 24.7 ft depth in the Duluth Harbor Basin-Southern Section, in the left outside quarter, in Latitude 46°45’30.41”N, Longitude 92°05’29.08”W. The

controlling depth for that area is 25.1 ft.

2. The following items were not addressed by the hydrographer. Defer to the Marine Charting Division (MCD) for review and charting recommendation:

Item	Vicinity of Latitude	Longitude	Photo #
bulkhead ruins	46°46’42.00”N	92°05’59.00”W	215_09.jpg
foul area	46°46’39.00”N	92°06’04.00”W	215_10.jpg
foul area	46°46’22.00”N	92°06’31.00”W	218_08.jpg
foul area	46°46’31.00”N	92°06’16.00”W	218_07.jpg
foul area	46°46’26.00”N	92°06’16.00”W	218_11.jpg

3. A pier in Latitude 46°42’16.00”N, Longitude 92°01’00.00”W and a dolphin in Latitude 46°44’21.27”N, Longitude 92°05’37.36”W were located by the hydrographer but not discussed in the Descriptive Report. It is recommended that these items be charted as shown on the present survey.

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

COMPARISON WITH PRIOR SURVEYS

a. Hydrographic

H09953 (1981) 1:10,000
H10023 (1982) 1:5,000
H10153 (1984) 1:5,000

Prior survey H09953 (1981) covers an area in the vicinity of Latitude 46°45’00.00”N, Longitude 92°06’00.00”W. Prior survey depths from H09953 (1981) compare favorably with the present survey and show a general trend of being 2 feet deeper than present survey depths.

Prior survey H10023 (1982) covers an area in the vicinity of Latitude 46°44’00.00”N, Longitude 92°04’30.00”W. Prior survey depths from H10023 (1982) compare favorably with

the present survey and show a general trend of being 2 feet deeper than present survey depths.

Prior survey H10153 (1984) covers an area in the vicinity of Latitude 47°00′50.00″N, Longitude 91°40′15.00″W. Prior survey depths from H10153 (1984) compare favorably with the present survey and show a general trend of being 2 feet deeper than present survey depths.

A comparison with prior surveys and the remaining survey data was not done during office processing in accordance with section 4.of the memorandum titled "Changes to Hydrographic Survey Processing", dated May 24, 1995, and/or the prior survey was not available. The present survey is considered adequate to supersede the prior surveys in the common area.

D.2 Shoreline Verification

The shoreline from the present survey does not match up with the charted shoreline. For this reason, there are places where soundings appear to be plotting on piers. This discrepancy will be resolved when the personnel in the Marine Charting Division (MCD) adjust the charted shoreline. See page 4 of the Descriptive Report under the heading “Chart Comparison” for further explanation.

ADEQUACY OF SURVEY

This is an adequate basic hydrographic/side scan sonar survey. Additional work is recommended as discussed in section D.2 of the Descriptive Report.

MISCELLANEOUS

Chart compilation was done by Atlantic Hydrographic Branch personnel, in Norfolk, Virginia. Compilation data will be forwarded to Marine Chart Division, Silver Spring, Maryland. The following NOS charts were used for compilation of the present survey:

14966_5 (27th Edition, May/05)
Corrected through NM May 7/05
Corrected through LNM May 3/05

14975 (34th Edition, Jan/05)
Corrected through NM Feb 5/05
Corrected through LNM Jan 25/05

Marilyn Schlüter

Marilyn L. Schlüter
Cartographer
Verification of Field Data
Evaluation and Analysis

Figure 1 - Photo 215_09

Figure 2 - Photo 215_10

Figure 3 - Photo 218_08

Figure 4 - Photo 218_07

Figure 5 - Photo 218_11

APPROVAL SHEET
F00499

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. All revisions and additions made to the smooth sheet during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Marilyn Schlüter Date: 4/3/06

Marilyn L. Schlüter
Cartographer,
Atlantic Hydrographic Branch

I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

Approved: Robert E Peterson Date: 3 April 2006

for P. Tod Schattgen
Commander, NOAA
Chief, Atlantic Hydrographic Branch

Chris Hare

Digitally signed by Chris Hare
DN: cn=Chris Hare, c=US, o=Navigation Services Division, ou=Navigation Response Branch, email=christopher.hare@noaa.gov
Reason: AWOIS Check
Date: 2006.05.25 09:19:05 -04'00'