

**H10605**

NOAA FORM 76-35A

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

**DESCRIPTIVE REPORT**

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Type of Survey . . . **HYDROGRAPHIC/  
SIDE SCAN SONAR**

Field No. . . . . **RU-10-2-95**

Registry No. . . . . **H-10605**

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**LOCALITY**

State . . . . . **RHODE ISLAND**

General Locality . . . . . **RHODE ISLAND SOUND**

Sublocality . . . . . **3.5NM SOUTH OF  
SAKONNET POINT**

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**19 95**

CHIEF OF PARTY  
..... **LCDR. S. P. DeBOW, NOAA**

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DATE . . . . . **JUL 22 1996**

NOAA FORM 77-28  
(11-72)

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

REGISTER NO.

H-10605

**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.

RU-10-2-95

State Rhode Island

General locality Rhode Island Sound

Locality 3.5 nm South of Sakonnet Point

Scale 1:10,000 Date of survey May 9 - July 24, 1995

Instructions dated February 16, 1995 Project No. OPR-B302-RU-95

Vessel NOAA Ship RUDE S590 (VESNO 9040)

Chief of party LCDR S.P. De Bow

Surveyed by LCDR S.P. De Bow, LT C.L. Callahan, ENS T.A. Haupt, ENS J.J. Walker, ST M.T. LANTAROP

Soundings taken by:(echo sounder,hand lead,pole) Raytheon DSF-6000N Echosounder, SEABAT

Graphic record scaled by SPD, CLC, TAH, JJW, & MTL

Graphic record checked by SPD, CLC, TAH, JJW, & MTL

Protracted by \_\_\_\_\_ Automated plot by ENCAD NOVAJET III (AHS)

Verification by ATLANTIC HYDROGRAPHIC BRANCH PERSONNEL

Soundings in (fathoms, feet, or meters at MLW or MLLW) <sup>FEET</sup> Meters at MLLW

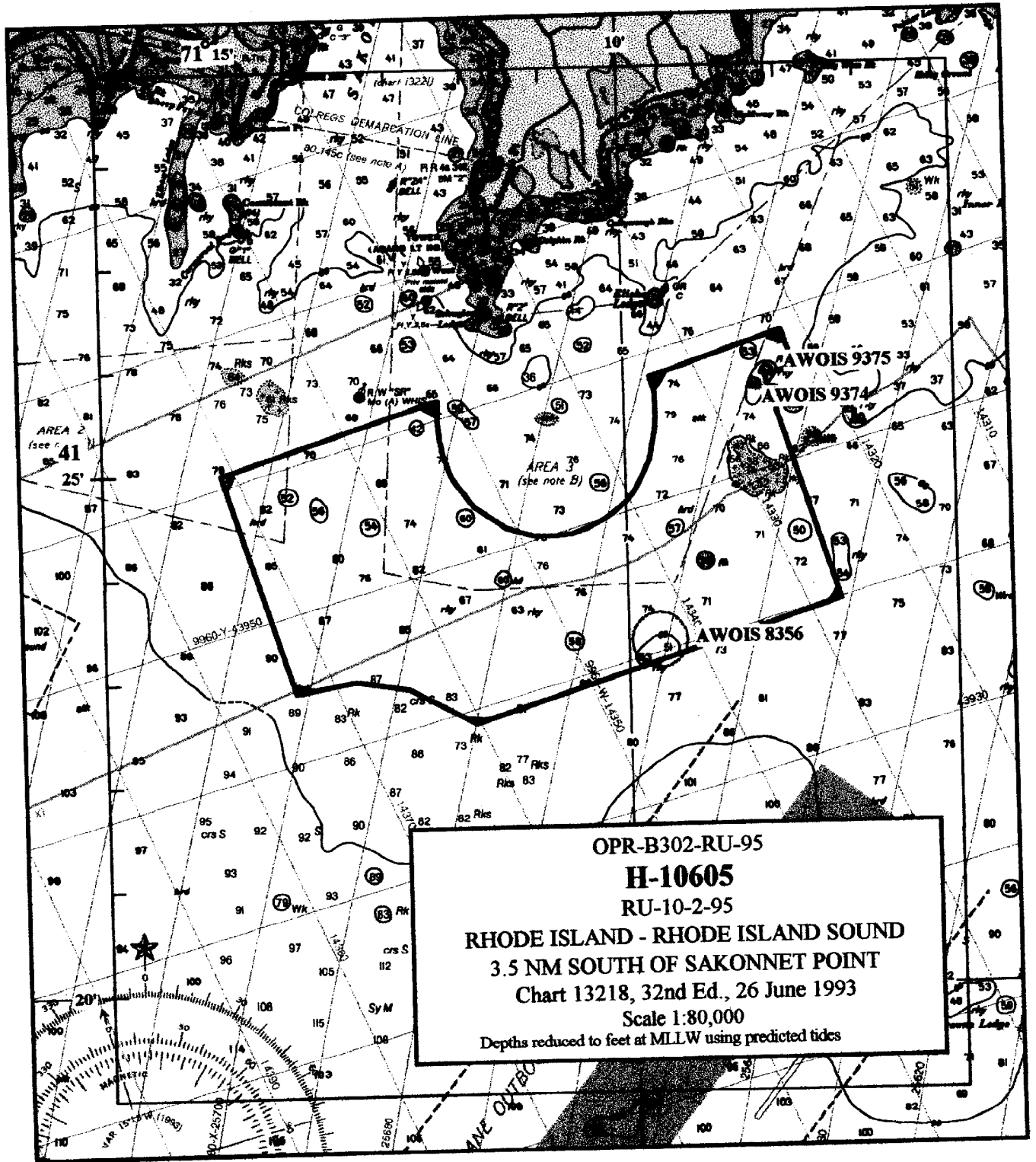
REMARKS: All times recorded in UTC.

The DSF-6000N was used as the primary sounding instrument; however, as the SEABAT 9001 shallow-water multibeam sonar system was employed for distinct item investigations and is documented as such.

NOTES IN THE DESCRIPTIVE REPORT WERE MADE IN RED DURING OFFICE PROCESSING.

AWG/SURE 7/23/96 MGR

JUL 22 1996 *[Signature]*



OPR-B302-RU-95  
H-10605  
RU-10-2-95  
RHODE ISLAND - RHODE ISLAND SOUND  
3.5 NM SOUTH OF SAKONNET POINT  
Chart 13218, 32nd Ed., 26 June 1993  
Scale 1:80,000  
Depths reduced to feet at MLLW using predicted tides

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\* APPENDICIES

\* SEPARATES

\* DATA FILED WITH FIELD RECORDS

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**A. PROJECT**

A.1 This survey was conducted in accordance with Hydrographic Project Instructions OPR-B302-RU, Rhode Island Sound Corridor, Rhode Island.

A.2 The original Project Instructions are dated February 16, 1995.

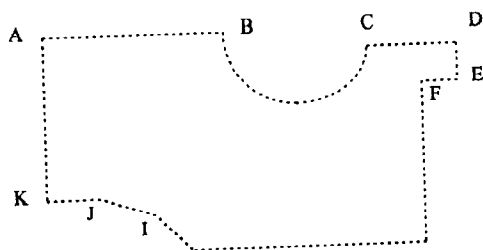
A.3 There have been two changes to the original instructions: Change No. 1, dated May 10, 1995, and Change No. 2, dated July 13, 1995. Neither change affects this survey.

A.4 This Descriptive Report covers the navigable area survey conducted on sheet "B" of project OPR-B302-RU in Rhode Island Sound Corridor as specified in the Project Instructions.

A.5 This portion of project OPR-B302-RU responds to requests from the Northeast Marine Pilots to survey areas in Rhode Island Sound. The Corridor is heavily used by a variety of commercial and pleasure craft with maximum drafts of up to 40 feet. The area was last surveyed by the Coast and Geodetic Survey between 1939 and the mid-1950's.

**B. AREA SURVEYED**

This survey covers an offshore area approximately <sup>3.5</sup>~~3.0~~ NM south of Sakonnet Point, R.I. The survey is comprised of one sheet with the following exact boundaries:



- A: 41°25'00.29"N, 071°15'09.52"W
- B: 41°25'40.47"N, 071°12'<sup>16.88</sup>~~14.58~~"W
- C: 41°25'53.52"N, 071°09'<sup>45.08</sup>~~42.38~~"W  
(The limit between B and C is formed by a circle of radius 2100 meters centered at 41°25'30"N, 071°10'58"W)
- D: 41°26'<sup>24.80</sup>~~18.80~~"N, 071°07'<sup>54.00</sup>~~59.05~~"W
- E: 41°25'57.35"N, 071°07'<sup>40.00</sup>~~49.94~~"W
- F: 41°25'<sup>44.5</sup>~~52.80~~"N, 071°08'<sup>03.8</sup>~~12.80~~"W
- G: 41°23'42.49"N, 071°07'<sup>09.78</sup>~~16.55~~"W
- H: 41°22'<sup>8</sup>~~38~~.11"N, 071°11'57.46"W
- I: 41°22'<sup>58.28</sup>~~58.28~~"N, 071°12'<sup>54.80</sup>~~48.32~~"W
- J: 41°22'<sup>44.00</sup>~~59.63~~"N, 071°13'<sup>38.00</sup>~~28.90~~"W
- K: 41°22'<sup>40.00</sup>~~53.45~~"N, 071°14'<sup>16.84</sup>~~14.97~~"W

Data collection for this survey began on May 9, 1995 (DN 129) and ended on July 24, 1995 (DN 205).

**C. SURVEY VESSELS**

C.1 The following vessels were used during this survey:

Vessel	EDP Number	Primary Function
NOAA Ship RUDE (S590)	9040	Hydrography, Side Scan Operations and SEABAT Investigations
RUDE Launch (SISU)	1290	Diving Operations

C.2 During the ship's January 1994 dry-dock period, the RUDE was outfitted with a pivoting armature to carry the transducers for the Reson SEABAT 9001 shallow-water multibeam sonar system. This armature was mounted on the port side of the ship, approximately midway along the ship's length. The arm was designed to be detached and housed in a cradle on the boat deck when not in use for extended periods of time. Since the transducers were not designed for permanent deployment, the arm was typically deployed only when the SEABAT system was to be used. It was rotated into the down, or operating, position only during times of data acquisition.

**D. AUTOMATED DATA ACQUISITION AND PROCESSING *SEE ALSO THE EVALUATION REPORT***

D.1 All HDAPS data acquisition and processing for this survey was accomplished using the following software versions:

Program	Version	Program	Version
BACKUP	2.00	MAINMENU	1.20
BLKEDIT	2.02	MAN_DATA	3.03
CARTO	2.17	MOD III	2.2
CLASSIFY	2.12	NEWPOST	6.13
CONTACT	2.48	PLOTALL	2.32

CONVERT	3.65	PREDICT	2.01
DAS_SURV	6.80	PRESURV	7.11
DP	2.18	QUICK	2.07
EXCESS	4.32	RAMSAVER	1.02
FILESYS	3.31	REAPPLY	2.12
GRAFEDIT	1.06	SEACAT	2.0
INVERSE	2.02	SEASOFT	3.3M
LSTAWOIS	3.10	ZOOMEDIT	2.33

D.2 Other software used during the survey includes the program **VELOCITY 2.11**, dated September 21, 1994, which generates sound velocity corrector tables for HDAPS data. This version included the **REFRACT** subroutine, which corrects SEABAT multiple slant range depths for sound velocity and corrects position of soundings (cross track distance) for refraction. The SEABIRD SBE-19 sound velocity profile unit was utilized in conjunction with the following software: **SEASOFT 3.3M**, **SEACAT 2.0**, and **VELOCITY 2.11**.

D.3 SEABAT multibeam data were acquired exclusively on the SEABAT 9001 data acquisition 486 personal computer using the Coastal Oceanographics **HYPACK** software package (Version 1.0, dated March 1, 1994). Gyro and predicted tide input were received from HDAPS, heave/roll/pitch data were received directly from the Datawell HRP sensor, and positioning input was received from the Ashtech GPS receivers. SEABAT data were processed on one of two personal computers equipped with the NOAA **LSTDRUD** (Version 3.0, 1995) post-processing software. A single least depth was generated for each SEABAT investigation and later entered into HDAPS via the **MANUAL DATA ENTRY** program.

#### **E. SONAR EQUIPMENT**

E.1 Side scan sonar operations were conducted using an EG&G Model 260 image-corrected side scan sonar recorder and a Model 272-T single frequency towfish. All side scan operations were conducted from the RUDE (vessel # 9040). The following side scan equipment was utilized on the dates specified:

Equipment Type	Serial Number	Dates Used
Recorder	12106	129 - 155
Recorder	12104	156 - 164
Towfish	16696	129 - 164

E.2 The side scan sonar towfish was configured with a 20° beam depression, which is the normal setting and yields the optimum beam correction.

E.3 The 100 kHz frequency was used throughout this survey.

E.4 a. Given the average depth of water in the survey area, the 100-meter range scale was used in order to maximize area coverage and provide optimal contact resolution.

Areas of reduced coverage occasionally occurred when the ship was forced to avoid buoys or lobster pots. These areas were easily recognized because the swath plot clearly showed the lack of overlap between adjoining swaths. Holiday coverage was run to fill in these gaps, and all side scan coverage was ultimately checked with smooth plots to ensure proper overlap between adjoining lines.

The current Field Procedures Manual (FPM) specification was used to determine maximum line spacing with Differential GPS positioning:

$$LS_{max} = 2RS - 2EPE_{max}$$

where: RS = Range Scale

EPE = Expected Position Error

For a 1:10,000-scale survey, a maximum EPE of 15 meters is permitted. Using this value in the above equation, a maximum line spacing of 170 meters for RS = 100 meters is authorized. Data collected with an EPE of 15 or greater were either rejected or smoothed in the post-processing phase of the survey, so the maximum line spacing was never exceeded. In



addition, the actual line spacing for the side scan coverage of this survey was 160 meters. This line spacing was chosen to give an additional margin of coverage and to allow an even number of hydro lines to be run between each set of mainscheme lines.

b. The abundance of contacts due to the extremely rocky terrain eliminated the need for traditional confidence checks. However features such as sand waves or buoy anchors are occasionally annotated on the sonar grams.

c. Two hundred percent side scan coverage was completed for this survey.

d. There were occasions when the side scan sonar towfish became entangled in lobster trap buoy lines, temporarily whiting out the sonagram. On these occasions, the towfish was brought on board, inspected, and serviced as necessary. All affected data were subsequently rejected and re-run.

e. The towfish was deployed exclusively from the stern during this survey.

**E.5** As per the Project Instructions, a 400-meter grid was developed to overlay this survey. The most significant contacts within each of the 400-meter "cells" were investigated by simultaneous echo sounder and SEABAT developments. A diagram of the grid for this survey is included in Section N, page 29. The SEABAT was used passively during echo sounder developments to assist the hydrographer in determining the least depth and then used actively on contacts warranting even more precise depth determination. The data for these investigations are summarized in the Development Abstract and SEABAT Development Addendum in Section N of this report.

**E.6** Overlap was checked on line using the real-time swath plot, with the edited swath plot being used to identify holidays.

## **F. SOUNDING EQUIPMENT**

**F.1** All standard hydrographic soundings were acquired using a Raytheon Model 6000N Digital Survey Fathometer (DSF-6000N) with the following serial numbers and dates:

<b>Serial Number</b>	<b>Dates Used</b>
A118	5/09/95 - 7/24/95

**F.2** When diver investigations were conducted, least depths were measured with a MOD III diver least depth gauge (S/N 68338). This gauge was used for five diver investigations; diver maximum depths ranged from 58 - 84 fsw (feet salt water).

**F.3** There were no faults in sounding equipment which affected the accuracy or quality of the data.

**F.4** Both high (100 kHz) and low (24 kHz) frequency sounding data were recorded during data acquisition. Only high frequency soundings were plotted.

**F.5** As authorized by the Project Instructions, the Reson SEABAT 9001 shallow-water multibeam sonar system was used to determine precise least depths over significant contacts discovered during routine side scan sonar operations.

The Reson SEABAT 9001 produces sixty 1.5 degree beams per swath, yielding an included swath angle of 90 degrees and a swath width which is approximately twice the surrounding water depth. The system operates at a frequency of 455 kHz. It updates at a rate of 13 times per second in 25 meters of water, thus acquiring 780 soundings per second. SEABAT slant ranges and quality factors for each of the 60 beams are acquired through the Coastal Oceanographics **HYPACK** data acquisition system on an IBM-compatible 486 personal computer.

Prior to beginning SEABAT data collection on this survey, the RUDE SEABAT-specific offset table/file was updated to define the physical relationship between the various components that comprise the system, including the SEABAT transducer head, Hippo sensor, and GPS antenna. In addition, this offset file

contains heave, roll, and pitch biases determined during a "Patch Test" conducted in Buzzards Bay on March 24, 1995. A copy of the SEABAT offset table is contained in Separate III.\*

During post-processing using the LSTDRUD software, SEABAT position and Hippy data are first viewed graphically and edited as necessary for data quality. After this process is complete the software attaches a position to each of the SEABAT data records. The various heading, Hippy, and sound velocity refraction correctors are then applied to the SEABAT slant range values to create a data record for each individual SEABAT beam (60 data records for each SEABAT swath). The 60 records contain computed positions and depths, cross track distances, and beam quality codes. After the expanded file is created, the data are viewed graphically in three different perspectives to check the consistency of the sounding data, with the option of editing any erroneous or questionable soundings that may exist.

Once the sounding data have been reviewed and edited as necessary, the LSTDRUD software selects a subset of the approximately 14,000 minimum depths contained within the total data set being processed. A file containing the 15 least depths found within that subset is then generated. The single least depth for each SEABAT investigation was obtained from this file and manually entered into HDAPS.

After manually entering the SEABAT data into HDAPS, it was discovered that there were a few discrepancies between SEABAT and HDAPS corrected least depths. It is attributed to a 0.1 meter difference in one of two different correctors: tides or settlement and squat.

A summary of all SEABAT investigations conducted for this survey is contained in the SEABAT 9001 Development Addendum in Section N. Copies of all 15 least depth listings associated with these investigations are included in Separate V.\*

*\* DATA FILED WITH ORIGINAL FIELD RECORDS.*

## G. CORRECTIONS TO SOUNDINGS

G.1 a. The velocity of sound through water was determined using a Sea-Bird SBE 19 Seacat Profiler (s/n 1448). The Seacat was used exclusively to determine sound velocity correctors. Seacat Data Quality Assurance Tests were conducted before each respective velocity cast to ensure that the unit was operating within tolerance. Velocity casts were conducted weekly without exception.

All data were processed using program **VELOCITY**. Computed velocity correctors were entered into the HDAPS sound velocity table and re-applied during post-processing to both high and low frequency soundings. SEABAT sound velocity and refraction correctors were generated through the **REFRACT** subroutine and applied during post-processing.

Sound velocity correctors applied to this survey were obtained from the following casts:

Cast Number	DN	Latitude	Longitude	HDAPS Table	Applied to Days
10	129	41°21'55"N	071°09'21"W	10	129-132
11	135	41°22'00"N	071°08'42"W	11	135-139
12	143	41°28'50"N	071°09'03"W	12	142-14 <del>4</del>
13	151	41°22'07"N	071°08'38"W	13	150-153
14	157	41°21'48"N	071°08'54"W	14	156-157
16	163	41°21'52"N	071°09'28"W	16	164-167
17	171	41°21'59"N	071°09'26"W	17	171-174
19	179	41°22'04'N	071°09'37'W	19	179-181
20	186	41°22'00'N	071°09'20'W	20	186-188
23	199	41°22'04'N	071°09'18'W	23	199,201, 205

b. There was no variation in the DSF-6000N instrument initial.

c. No instrument correctors to the DSF-6000N were required.

d. A dual leadline comparison with the DSF-6000N was conducted during special project S-B900-RU-95 on:

DN 082 at 41°21.53'N and 070°46.91'W (~~41~~<sup>45</sup> ft. depths)

The greatest variation between leadline and DSF soundings was 0.163 meters. Considering the ship's motion and the wire angle (approximately 5°) in the leadline from the current, this was an excellent value agreement and provided an adequate check that the echo sounder was functioning properly. Data from these comparisons can be found in Separate IV.\*

Two types of leadline were used during the leadline-to-DSF-6000N comparison. The starboard leadline was a steel surveyor's tape graduated in feet with a fixed 5 lb. weight at its end. A leadline corrector of 0.0 meters was assumed for this leadline. The port leadline was a traditional leadline made of cotton tiller with a stainless steel cable core. This leadline had a corrector of 0.25 feet up to the 45 foot mark and 0.26 feet for depths greater than 45 feet.

e. All sounding correctors were applied to both the narrow (100 kHz) and wide (24 kHz) DSF-6000N beams.

f. During the ship's winter 1994 dry-dock period, an exact vertical measurement was taken from the DSF transducer to a fixed point on the bridge wing. After the ship was re-floated, the point's height above the waterline was determined. The ship's static draft was thereby calculated to be exactly 2.12 meters (7.0 feet). This draft corrector was applied to all sounding data via the HDAPS offset table.\*

g. Settlement and squat correctors for the RUDE were determined on the Elizabeth River, Norfolk, Virginia on January 25, 1995. An observer, stationed with a level on a pier, measured changes in relative height by sighting to a staff held at the longitudinal position of the ship's transducer. The ship steamed directly toward and then away from the observer. The values obtained from the toward and away runs were averaged and applied to soundings through the HDAPS Offset Table #1.\*

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h. Heave data were acquired by a Datawell heave, roll and pitch sensor (s/n 19128-C), and applied to HDAPS soundings in real time. Only the heave corrections were applied to the plotted soundings. Heave, roll and pitch correctors were collected on line and applied to all SEABAT soundings during post-processing.\* See Separate IV for data records.

G.2 There were no unusual or unique methods or instruments used for correcting echo soundings.

G.3 Generally, sound velocity correctors resulting from weekly velocity casts were re-applied to the HDAPS data acquired that entire week. Section G.1.a. gives the periods during which each set of velocity cast correctors was used.

G.4 The pneumatic depth gauge was not used during this survey due to the implementation of the MOD III diver least depth gauge, supplied by the Electronic Engineering Division at the Atlantic Marine Center.

G.5 Generally, sea conditions greater than one meter affected the graphic sounding record by creating a trace of constant peaks and deeps. Application of heave correctors to raw echo soundings appeared to represent true depths accurately.

G.6 a. The tidal datum for this project is Mean Lower Low Water. The operating tide station at Newport, R.I. (845-2660) served as both direct control for datum determination and as the reference station for predicted tides. Data for predicted tides were provided on floppy disk before the start of the project.

b. Tidal data used during data acquisition were obtained from Table 2 of the East Coast of North and South America Tide Predictions and applied to the digital tide data using HDAPS software. The subordinate station for predicted tides was:

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NO.	PLACE	POSITION	TIME		HEIGHT	
			High Water	Low Water	High Water	Low Water
845-0768	Sakonnet Point	41°27.9'N 71°11.6'W	direct		*0.85	*0.85

Tidal correctors were applied on line using HDAPS predicted tide tables numbers 5, 6 and 7. Tide table 5 was used for the month of May, table 6 for the month of June, and table 7 for the month of July.

c. Zoning for this project is consistent with the Project Instructions.

A request for smooth tides was mailed on August 9, 1995.  
*APPROVED TIDES AND ZONING WERE APPLIED DURING OFFICE PROCESSING*

**H. CONTROL STATIONS** *SEE ALSO THE EVALUATION REPORT*

H.1 The horizontal datum for this survey is the North American Datum of 1983 (NAD 83).

H.2 This survey was conducted exclusively using GPS corrected by the USCG Differential Beacon System, which precluded the need for shore-based horizontal control stations.

H.3 A 2nd Order position disk was used to acquire performance checks on GPS stations. See Section I.5 and I.7 for a full description.

H.4 See Section I.5 and I.7 for full description.

H.5 Verification of horizontal control was not necessary since no shore-based horizontal control stations were used.

H.6 There are no photogrammetric problems, positioning problems or unconventional survey methods pertinent to this survey.

## I. HYDROGRAPHIC POSITION CONTROL

I.1 This survey was conducted exclusively using GPS corrected by the USCG Differential Beacon System.

I.2 Accuracy requirements were met as specified by the Hydrographic Manual and Field Procedures Manual (FPM). The Horizontal Dilution of Precision (HDOP) and Expected Position Error (EPE) specified by the FPM were monitored during on-line data collection. The allowable HDOP limits for the USCG radio beacons used during the survey were: Portsmouth, N.H., 3.30; Montauk Point, N.Y., 3.69; and Chatham, Ma., 3.60. It was standard practice on the RUDE to use the more conservative HDOP limit of the two beacons available. Therefore, the allowable HDOP limit was 3.30 while Portsmouth was used as the secondary radio beacon and 3.60 once Chatham replaced Portsmouth. The EPE during the entire survey was 15. When the allowable HDOP and EPE limits were exceeded, survey operations were suspended until the Differential GPS improved. If the positioning degraded beyond the acceptable limits while on line, the data were either smoothed or rejected, depending on the extent of the affected data.

I.3 Control Equipment:

Differential GPS:

<u>Unit A</u>	<u>Unit B</u>
Ashtech GPS Sensor	Ashtech GPS Sensor
s/n 700417B1083	s/n 700417B1003
Firmware Version 1E89D-P	Firmware Version 1E89D-P
Magnavox MX50R	Magnavox MX50R
DGPS Receiver s/n 078	DGPS Receiver s/n 160

I.4 Correctors were received from the Montauk, N.Y. radio beacon for the entire survey except for two days of scheduled beacon downtime on day numbers 166 and 179. On DN 166, no correctors were received from the secondary station; therefore, **bottom samples were collected using non-differential GPS.** On DN



179, correctors were received from the Chatham, Ma. radio beacon.

I.5 The Differential GPS system requires no calibrations to its equipment from outside sources. However, a daily performance check was conducted whenever two radio beacons were operational. Section 3.4.5 of the FPM states that a DGPS performance check may be conducted when "...two independent reference beacons are receivable, and two remote receivers are available on the ship. Each remote receives correctors from a different reference, then the computed positions are compared." The computed inverse between the check receiver and the reference receiver must not exceed  $\Delta P_{\max}$ , where:

$$\Delta P_{\max} = \text{SQRT} [ (\text{EPE})^2 + (\text{ECR})^2 ]$$

$\Delta P_{\max}$  = Maximum allowable inverse distance  
between the DGPS and check position

EPE = Expected Position Error of the DGPS  
position

ECR = Error Circle Radius of the check position

The Shipboard Data Integrity Monitor program ("SHIPDIM") was used to conduct these performance checks. SHIPDIM compares four sample positions from both the check and reference receivers. Three of the four checks must be less than the  $\Delta P_{\max}$  for a successful performance check. SHIPDIM version 1.2 was used from May 9 - June 18, and version 2.1 was used from June 19 until the end of the survey. See SHIPDIM PERFORMANCE CHECKS in Separate III\* for daily system checks.

Until the Chatham, Ma. radio beacon came on line, there were many days on which a performance check was not obtained due to the intermittent reception of differential correctors from the Portsmouth, N.H. beacon. On June 12 and 19, a performance check on the Montauk beacon was accomplished by running the program MONITOR (version 3.0) on a 2nd Order position disk on the Naval Education Training Center's Pier #2. MONITOR calculates the inverse distance between the known position and

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every position record received from the GPS receiver. In each case, the final statistics showed an excellent correspondence between the received signal and the actual position. MONITOR was also used on June 26 and 27 and July 1-4 to test the differential reference stations at Montauk, N.Y. and Chatham, Ma. See I.7a. for a full description of the procedure; see MONITOR PERFORMANCE CHECKS in Separate III\* for the system checks.

I.6 No calibration data were required to be applied to the raw positioning data because DGPS was the primary positioning system.

I.7 a. The Chatham, Ma. beacon became operational on June 23 (DN 174). Prior to instituting the beacon as the secondary DGPS station, RUDE personnel verified its signal accuracy via the following method:

The ship maneuvered alongside a 2nd Order position disk located on NETC Pier #2. The accuracy of the Montauk, N.Y. DGPS beacon was verified by comparing the known position of the disk to the computed DGPS position. The Ashtech GPS antenna was then placed on the pier at a recoverable point readily accessible from the ship's standard mooring location. MONITOR was run using the Montauk signal to establish a latitude/longitude for that point. In order to check the accuracy of the given position further, MONITOR was run for 24 hours using the Montauk DGPS correctors and the established latitude/longitude position. The verification of the Chatham beacon accuracy was then accomplished by running Monitor for an additional 24 hours using the Chatham beacon signal and the established point position. Results of the monitoring of these two stations were then forwarded to Hydrographic Surveys Division (HSD) in Silver Spring, MD. Analysis completed by HSD shows that the Chatham, Ma. radio beacon is deemed operational for surveying purposes.

b. Correctors from the Portsmouth, N.H. beacon were received only intermittently during its use as a secondary beacon. The removal and replacement of the corresponding shipboard Ashtech receiver failed to improve signal reception. All other shipboard DGPS hardware and firmware were inspected and tested for existing malfunctions. It was subsequently learned that

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the Portsmouth station had experienced degraded transmission strength due to water in the on-site DGPS antenna. The combination of the extreme physical distance from the beacon to the ship and the beacon's hardware problems undoubtedly caused the lack of clear signal reception.

c. During times of heavy rains and/or thunderstorms, the ship would also experience periods of intermittent service from the Montauk, N.Y. beacon. During such instances, survey operations were suspended until service from the beacon resumed.

d. During times of poor satellite coverage or geometry, there was a steady deterioration of the HDOP which could be continuously monitored. When local weather affected the DGPS radio beacons the on-line positioning would unexpectedly "drop out" for a couple of minutes. The outages were separated by only a few minutes of strong signal reception, making it nearly impossible to begin or complete a survey line. These periods of sporadic positioning difficulties occurred infrequently and were associated only with weather-related beacon interference. All data acquired during these time periods were rejected.

e. No systematic errors were detected which required adjustments.

f. Antenna positions were corrected for offset and layback, and referenced to the position of the DSF-6000N fathometer transducer. These correctors are located in HDAPS Offset Table #1, and were applied on line to the positioning algorithm. A copy of Offset Table #1 is contained in Separate III.\*

g. Offset and layback distances for the A-frame (tow point) are located in HDAPS Offset Table #1 and were applied on-line. These offsets, along with the cable length, towfish height, and depth of water, were used by the HDAPS system to compute the position of the towfish. A copy of Offset Table #1 is contained in Separate III.\*

#### J. SHORELINE

No shoreline is contained within the boundaries of this survey.

*\* DATA FILED WITH ORIGINAL FIELD RECORDS.*

## K. CROSSLINES

A combined total of 19.36 nautical miles of crosslines was acquired for this survey, which represents 12.5% of the 154.82 nautical miles of the first 100% side scan mainscheme coverage.

An un-excessed plot of mainscheme soundings with crosslines superimposed was used to conduct mainscheme to crossline comparisons. Soundings at intersections were compared to all other soundings within a 5 mm (50 meter) radius. Based on this procedure, agreement between mainscheme and crossline soundings was found to be excellent, especially in areas of flat or slightly sloping relief. The majority of compared soundings fell within one foot of each other, with only an occasional difference of three feet noted. Most often these larger differences were observed in steeply rising shoal areas characterized by an irregular bottom consisting of large boulders.

## L. JUNCTIONS *SEE ALSO THE EVALUATION REPORT*

L.1 Survey H-10605 junctions with three previously completed surveys. Survey H-10575, a 1:10,000-scale survey completed by the RUDE during the 1995 field season, junctions along the eastern boundary of H-10605. Survey FE-373SS, a 1:20,000-scale survey also completed by the RUDE during the 1992 field season, junctions along its <sup>EASTERN</sup> ~~northeastern~~ boundary. The third junction, along the <sup>WESTERN</sup> ~~southeastern~~ boundary of H-10605, is with survey H-10422, a 1:20,000-scale survey also completed by the RUDE during the 1992 field season.

L.2 Agreement at the junctions of surveys H-10575, H-10422, and FE-373SS with H-10605 is excellent. Agreement between soundings was typically within one foot when compared to other soundings within a 30 to 40-meter radius, and only occasionally differed by three feet within a similar radius of *contour* investigation.

L.3 There were no significant junction discrepancies to be reconciled.

L.4 No recommendations for adjustments to soundings, features or depth curves are appropriate.

**M. COMPARISON WITH PRIOR SURVEYS** *SEE ALSO THE EVALUATION REPORT*

A comparison with prior surveys will be performed by the Atlantic Hydrographic Branch as part of the office verification process.

**N. ITEM INVESTIGATION REPORTS**

**N.1.1 Area of Investigation**

AWOIS 9374

Rhode Island Sound

Reported Position:

41°25'47.17"N

071°08'20.35"W

Datum: NAD83

Reported Depths: 42-foot wire drag clearance

Feature: Obstruction

**N.2.1 Description and Source of Item**

AWOIS 9374 is located in the northeast corner of the sheet. AWOIS 9374 was encountered during survey FE207WD/1966 as a wire drag hang on a rock in position 41°25.78'N and 071°08.37'W. This position has been converted from datum NAD27 to NAD83.

**N.3.1 Survey Requirements**

This item required 200% side scan coverage, echo sounder development and diver investigation.

**N.4.1 Method of Investigation**

Two hundred percent side scan coverage was achieved over the entire AWOIS 9374 100-meter search radius. This item was developed by using echo sounder with 5-meter line spacing. SEABAT was operated passively during the echo sounder development to assist the hydrographer in least depth determination. This contact was later fully delineated with SEABAT and diver investigation.

**N.5.1 Results of Investigation**

Two significant contacts were logged within the search radius: 932.18P and 1923.39S. Contact 932.18P was determined to be a smaller side scan return of the same item as contact 1923.39S. Contact 1923.39S was the center of investigation of development 5C2. The item was determined by divers to be a large rock amongst four rocks in a boulder field on top of a shoal (refer to the Dive Investigation Report in Separate VI).

AWOIS 9374 was investigated by the RUDE during the 94/95 field season as part of survey H-10575. Echo sounder and SEABAT development found an <sup>approved</sup> predicted tide corrected least depth of 13.<sup>4</sup>/<sub>26</sub> meters (43.<sup>8</sup>/<sub>0</sub> feet) in position 41°25'47.282"N and 71°08'18.437"W (fix ~~13082~~ <sub>13025</sub>).

Results from development 5C2 of the present survey are tabulated below:

METHOD	*DEPTH (m)	*DEPTH (FT)	FIX #	LATITUDE (N)	LONGITUDE (W)
ECHO SOUNDER	13.1	43.0	3256.3	41°25'47.399"	71°08'18.211"
SEABAT	13.0 /	<del>42.6</del> 43.0	13025	41°25'47.331"	71°08'18.332"
DIVER	13.2	43.3	<del>12007</del> 13011	41°25'47.332"	71°08'18.426"

**N.6.1 Comparison with Prior Surveys**

A comparison with prior surveys will be performed by the Atlantic Hydrographic Branch as part of the office verification process.

*\* CORRECTED FOR APPROVED TIDES*

**N.7.1 Comparison with Chart and Charting Recommendations**

Largest scale chart of this portion of the survey area:

Chart 13221  
"Narragansett Bay"  
50<sup>th</sup> ed. April 15, 1995  
Scale: 1:40,000

AWOIS 9374, was located as a rock feature on top of a shoal during echo sounder, SEABAT, and diver investigations. The SEABAT least depth is the shoalest of the three developments.

It is the recommendation of the hydrographer that the wire drag symbol with a clearance depth of 42 feet charted in position 41°25'47.17"N and 071°08'20.35"W be deleted. An <sup>APPROVED</sup> predicted tide corrected depth of <sup>43</sup>42 feet should be charted in position 41°25'47.331"N and 071°08'18.332"W, surrounded with a danger curve and annotated as a rock (Rk).

*CONCUR*  
Chart 43 RK w/ Danger Curve

**N.1.2 Area of Investigation**

AWOIS 9375

Rhode Island Sound

Reported Position:

41°25'55.57"N

071°08'10.75"W

Datum: NAD83

Reported Depths: 42 foot wire drag clearance

Feature: Obstruction

**N.2.2 Description and Source of Item**

AWOIS 9375 was first encountered during survey FE207WD/1966 as a hang on a rock at position 41°25.92'N and 071°08.21'W. This position has been converted from datum NAD27 to NAD83.

### N.3.2 Survey Requirements

This item required 200% side scan coverage, echo sounder development and diver investigation.

### N.4.2 Method of Investigation

Two hundred percent side scan coverage was achieved over the entire 100-meter search radius. Many significant contacts were logged within, and close by, the AWOIS 9375 search radius which were developed with echo sounder. Five echo sounder developments were run: 4B1, 4B2, 4B3, 4B4 and 4B. Development 4B9 yielded the least depth of the five developments. This item was further developed with SEABAT and diver investigation (refer to the Dive Investigation Report in Separate VI).

### N.5.2 Results of Investigation

AWOIS 9375 was investigated by the RUDE during the 94/95 field season as part of survey H-10575 and proven not to exist. That survey yielded an <sup>APPROVED</sup> ~~predicted~~ tide corrected least depth of 14.56 meters (47.89 feet) in position 41°25'55.473"N and 71°08'13.554"W (fix 3490.3). The investigation of AWOIS 9375 from this survey has resulted in ~~the same~~ findings. <sub>SIMILAR</sub>

Results from development 4B9 of the present survey are tabulated below:

METHOD	DEPTH (m)	DEPTH (FT)	FIX #	LATITUDE (N)	LONGITUDE (W)
ECHO SOUNDER	14.84	<del>46.9</del> 47.2	957.3	41°26'00.168"	71°08'07.301"
SEABAT	14.84	47.82	13076	41°26'00.123"	71°08'07.318"
DIVER	14.7	48.2	<del>12002</del> 12012	41°26'00.097"	71°08'07.362"

### N.6.2 Comparison with Prior Surveys

A comparison with prior surveys will be performed by the Atlantic Hydrographic Branch as part of the office verification process.

*\* CORRECTED FOR APPROVED TIDES*



**N.7.2 Comparison with Chart and Charting Recommendations**

Largest scale chart of this portion of the survey area:

Chart 13228  
"Westport River and Approaches"  
9<sup>th</sup> ed. June 13, 1992  
Scale: 1:20,000

AWOIS 9375 has been proven not to exist. The least depth within the area is located close to and north of the 100-meter search radius. The least depth is from a single rock feature on top of a shoal and was obtained from an echo sounder hit inserted during a side scan sonar main scheme line and labeled as 4B9.

The hydrographer recommends that the wire drag <sup>AND Rock</sup> symbol with a clearance depth of 42 feet, charted in position 41°25'55.57"N and 071°08'10.75"W, be deleted, <sup>APPROVED</sup> ~~and~~ predicted tide corrected depth of 47 feet <sup>(14.4 m)</sup> should be charted in position 41°26'00.168"N and 71°08'07.301"W, surrounded by a danger curve and annotated as a rock (Rk).

**N.1.3 Area of Investigation**

AWOIS 8356  
Rhode Island Sound  
Reported Position:  
41°23'20.50"  
071°09'36.30"  
Datum: NAD83  
Reported Depths: Charted 51-foot sounding  
Feature: Obstruction

*RK*  
*Chart 47 ft. ~~Sounding without rock symbol~~*  
*w/ Danger Curve*  
*Do NOT concern*

**N.2.3 Description and Source of Item**

AWOIS 8356 was first encountered during survey H-6445/1939 as a 51-foot sounding in position 41°23'14.77"N and 071°09'28.75"W. This position has been converted from datum NAD27 to NAD83. The item was later determined to be a rock, detected by side

scan sonar on survey D111/1989. The depth was calculated to be 41 feet in position 41°23'20.50"N and 071°09'36.30"W (NAD83).

**N.3.3 Survey Requirements**

This item required 200% side scan coverage, echo sounder development and diver investigation.

**N.4.3 Method of Investigation**

Two hundred percent side scan coverage was achieved over the entire AWOIS 8356 500-meter search radius. The entire search radius was further developed using 40-meter hydro splits. Many significant contacts were logged within the search radius. These contacts were then prioritized according to the authorized 400-meter grid system and developed with echo sounder using 5-meter line spacing. Several of these contacts were further developed through active SEABAT data collection. Development 9N1 yielded the least depth of all of the contacts investigated and was selected for diver investigation (refer to the Dive Investigation Report in Separate VI)\* APPENDED TO THIS REPORT

**N.5.3 Results of Investigation**

Results from development 9N1 of the present survey are tabulated below:

METHOD	DEPTH (m)	DEPTH (FT)	FIX #	LATITUDE (N)	LONGITUDE (W)
ECHO SOUNDER	13.34	43.96	3464.2	41°23'16.283"	71°09'30.500"
SEABAT	13.7	44.9	13042	41°23'16.160"	71°09'30.350"
DIVER	13.8	45.3	12014	41°23'16.332"	71°09'30.642"

**N.6.3 Comparison with Prior Surveys**

A comparison with prior surveys will be performed by the Atlantic Hydrographic Branch as part of the office verification process.

\* CORRECTED FOR APPROVED TIDES

**N.7.3 Comparison with Chart and Charting Recommendations**

Largest scale chart of this portion of the survey area:

Chart 13218  
"Martha's Vineyard to Block Island"  
32<sup>nd</sup> ed. June 26, 1993  
Scale: 1:80,000

It is the recommendation of the hydrographer that the 51-foot sounding in charted position 41°23'14.77"N and 071°09'28.75"W be deleted. An <sup>APPROVED</sup> predicted tide corrected depth of <sup>44</sup> ~~43~~ <sup>(13.4m)</sup> feet should be charted in position 41°23'16.283"N and 71°09'30.500"W, surrounded with a danger curve and annotated as a rock (Rk) <sup>CONCUR</sup>  
Chart 44 RK w/ Danger Curve

**N.1.4 Area of Investigation**

Uncharted Wreck  
Rhode Island Sound

**N.2.4 Description and Source of Item**

The uncharted wreck was discovered during the side scan sonar coverage of this survey.

**N.3.4 Survey Requirements**

Not Applicable.

**N.4.4 Method of Investigation**

An unknown sunken wreck located approximately 4 nm due south of Sakonnet Point was discovered during two hundred percent mainscheme side scan coverage and is logged as contact 1352.12S. Contact 1352.12S was the center of investigation of development 1501 and was developed with echo sounder using 5-meter line spacing. SEABAT was used passively during echo sounder development to assist the hydrographer in least depth determination and later used actively to further delineate the contact. This item was further developed by diver investigation.

#### N.5.4 Results of Investigation

An uncharted sunken wreck discovered during mainscheme side scan sonar coverage, was found by divers to be a sunken stern trawler (refer to the Dive Investigation Report in Separate VI).

Results from development 1501 are tabulated below:

METHOD	DEPTH * (m)	DEPTH *(FT)	FIX #	LATITUDE (N)	LONGITUDE (W)
ECHO SOUNDER	11.8	38.7	3982.1	41°23'09.989"	71°11'08.333"
SEABAT	17.72	56.74	13001	41°23'10.155"	71°11'08.298"
DIVER	11.5	37.87	12013	41°23'09.992"	71°11'08.169"

*\* CORRECTED FOR APPROVED TIDES*

During dive 205.1, divers found the wreck to be a steel-hulled stern trawler lying on its keel in approximately 75 feet of water, on a flat sandy bottom. The least depth was determined to be at the top of the mast of the wreck.

There is a discrepancy in the least depth between SEABAT and diver investigation, as well as with echo sounder development. It is believed that the SEABAT development of the wreck somehow missed the mast of the ship thus causing the large difference in depth. Drift sounding while acquiring SEABAT data could have better delineated the least depth on the mast. However, the diver least depth is deemed to be accurate for charting purposes in this situation.

#### N.6.4 Comparison with Prior Surveys

A comparison with prior surveys will be performed by the Atlantic Hydrographic Branch as part of the office verification process.

**N.7.4 Comparison with Chart and Charting Recommendations**

Largest scale chart of this portion of the survey area:

Chart 13218  
"Martha's Vineyard to Block Island"  
32<sup>nd</sup> ed. June 26, 1993  
Scale: 1:80,000

The hydrographer recommends that a sounding, surrounded by the danger curve and annotated as a wreck (Wk) be charted in position 41°23'09.992"N and 071°11'08.169"W (fix 12013) with <sup>AN</sup> predicted tide corrected least depth of 37 feet. (11.5m)

*Chart 37 WK w/ Danger Curve*

*Concur*

**N.1.5 Area of Investigation**

Uncharted Wreck  
Rhode Island Sound

**N.2.5 Description and Source of Item**

The uncharted wreck was discovered during mainscheme side scan sonar coverage.

**N.3.5 Survey Requirements**

Not applicable.

**N.4.5 Method of Investigation**

An unknown sunken wreck located approximately 3.5 nm southwest of Sakonnet Point was discovered during two hundred percent mainscheme side scan sonar coverage and is logged as contact 2157.32P. Contact 2157.32P was the center of investigation of development 25H1 and was developed with echo sounder using 5-meter line spacing. SEABAT was used passively during echo sounder development to assist the hydrographer in least depth determination and later used actively to further delineate the contact. This item was further developed by diver investigation (refer to the Dive Investigation Report in Separate VI). *DATA APPENDED TO THIS REPORT*

### N.5.5 Results of Investigation

An uncharted sunken wreck discovered during mainscheme side scan sonar coverage, was found by divers to be a sunken steel-hulled fishing vessel lying on its keel in approximately 85 feet of water, on a flat sandy bottom.

Results from development 2H1 are tabulated below:

METHOD	DEPTH (m)	*DEPTH (FT)	FIX #	LATITUDE (N)	LONGITUDE (W)
ECHO SOUNDER	20.8	68.2	3868.2	41°24'39.033"	71°14'07.388"
SEABAT	20.9	68.5	13069	41°24'38.959"	71°14'07.367"
DIVER	20.1	65.9	12010	41°24'38.917"	71°14'07.488"

*\* CORRECTED FOR APPROVED TIDES*

### N.6.5 Comparison with Prior Surveys

A comparison with prior surveys will be performed by the Atlantic Hydrographic Branch as part of the office verification process.

### N.7.5 Comparison with Chart and Charting Recommendations

Largest scale chart of this portion of the survey area:

*13221*  
Chart ~~13218~~  
"Martha's Vineyard to Block Island"  
32<sup>nd</sup> ed. June 26, 1993  
Scale: 1:80,000

The hydrographer recommends that a sounding surrounded by a danger curve and labeled "Wk" for a wreck be charted in position 41°24'38.917"N and 071°14'07.488"W (fix 12010) with ~~AN~~ <sup>APPROVED</sup> predicted tide corrected least depth of 66 feet. (*20.1m*)

*Chart 66 W/K*

*C. Conroy*

**N.1.6 Area of Investigation**

Rhode Island Sound  
Reported Position:  
41°25'15.6"  
071°12'12.9"  
Reported Depth: 19 M (62 FT)  
Feature: Rock

**N.2.6 Description and Source of Item**

A rock was seen on side scan sonar records of junctional surveys FE-373SS/1992, H-10378/1991, and H-10424/1991.

**N.3.6 Survey Requirements**

Least depth on the rock as per projection instructions.

**N.4.6 Method of Investigation**

The rock was developed with the echo sounder and with the SEABAT initially in the passive mode to assist the hydrographer in determining the least depth. The SEABAT was then used actively to further delineate the rock.

**N.5.6 Results of Investigation**

The results from the development of the rock are tabulated below:

METHOD	DEPTH (m)	DEPTH (FT)	FIX #	LATITUDE (N)	LONGITUDE (W)
ECHO SOUNDER	19.88	<del>65.3</del> 64.9	3884.3	41°25'15.568"	71°12'12.817"
SEABAT	19.8	64.9	13070	41°25'15.578"	71°12'12.847"

\* CORRECTED FOR APPROVED TIDES

**N.6.6 Comparison with Prior Surveys**

A comparison with prior surveys will be performed by the Atlantic Hydrographic Branch as part of the office verification process.

**N.7.6 Comparison with Chart and Charting Recommendations**

Largest scale chart of this portion of the survey area:

Chart 13221  
"Narragansett Bay"  
50<sup>th</sup> ed. April 15, 1995  
Scale: 1:40,000

The hydrographer recommends that <sup>\*</sup>a sounding surrounded by a danger curve and labeled "Rk" for a rock be charted in position 41°25'15.518"N and 071°12'12.847"W (fix 13070) with <sup>AN APPROVED</sup> ~~predicted~~ <sup>Do Not</sup> ~~Concur~~ tide corrected least depth of 65 feet.

*\* THAT THE CHARTED SOUNDING 62 REP 1992 BE DELETED FROM CHART 13221*

**N.1.7 Area of Investigation**

*CHART 65 RK W/ DANGER CURVE*

*Chart 65 Pt Sounding without Rock Symbol ✓*

Rhode Island Sound  
Reported Position:  
41°25'36.3"  
071°09'54.3"  
Reported Depth: 19.8 M (65 FT)  
Feature: Rock

**N.2.7 Description and Source of Item**

A rock was seen on side scan sonar records of junctional surveys FE-373SS/1992, H-10378/1991, and H-10424/1991.

**N.3.7 Survey Requirements**

Least depth on the rock as per projection instructions.

**N.4.7 Method of Investigation**

The rock was developed with the echo sounder and initially with the SEABAT in the passive mode to assist the hydrographer in determining the least depth. The SEABAT was then used actively to further delineate the rock.



**N.5.7 Results of Investigation**

The results from the development of the rock are tabulated below:

METHOD	DEPTH (m)	DEPTH (FT)	FIX #	LATITUDE (N)	LONGITUDE (W)
ECHO SOUNDER	20.5	67.2	3894.2	41°25'36.340"	71°09'55.018"
SEABAT	20.85	67.81	13077	41°25'36.298"	71°09'55.212"

*\* CORRECTED FOR APPROVED TIDES*

**N.6.7 Comparison with Prior Surveys**

A comparison with prior surveys will be performed by the Atlantic Hydrographic Branch as part of the office verification process.

**N.7.7 Comparison with Chart and Charting Recommendations**

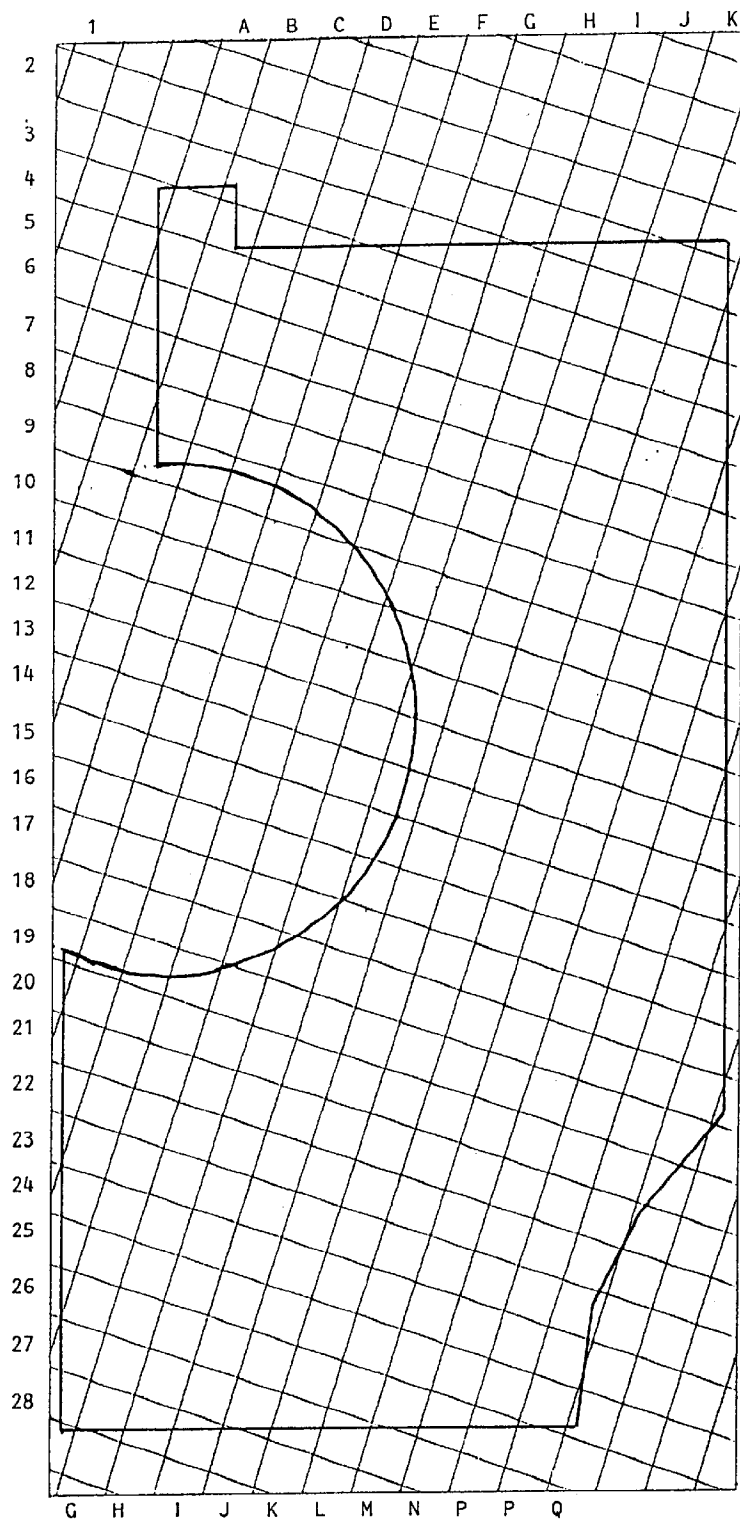
Largest scale chart of this portion of the survey area:

Chart 13221  
 "Narragansett Bay"  
 50<sup>th</sup> ed. April 15, 1995  
 Scale: 1:40,000

The hydrographer recommends that <sup>\*</sup>a sounding surrounded by a danger curve and labeled "Rk" for a rock be charted in position 41°25'36.340"N and 071°09'55.018"W (fix 3894.2) with <sup>AN APPROVED</sup> predicted <sup>Do Not</sup> tide corrected least depth of 67 feet. (20.5m) <sub>CONCUR</sub>

*\* THE CHARTED SOUNDING 65 RK REP 1992 BE DELETED FROM CHART 13221  
 CHART A ~~65~~ 67 RK W/ DANGER CURVE A 67 FT SOUNDING WITHOUT ROCK SYMBOL.*

Information pertaining to the hydrographic development of significant side scan sonar contacts, including SEABAT 9001 multibeam sonar investigations, is contained in the following Development Abstract and SEABAT 9001 Development Addendum.



Survey H-10605 400-Meter Contact Development Grid

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth * (m)	LD Pos	Geographic Position	Remarks
1I1	1485.22S	2344-2345	20.5	2344.3	41°24'22.591"N 71°07'22.437"W	
1I2	1485.39S	2346-2355	20.4	2352.4	41°24'22.990"N 71°07'17.248"W	
1J1	137.15P	2356-2363	17.8	2358.3	41°24'07.639"N 71°07'17.509"W	
1J2	136.59S	2364-2369	17.6	2364.3	41°24'03.669"N 71°07'21.487"W	
1K1	1330.06S	2370-2377	17.8	2372.4	41°24'01.828"N 71°07'18.027"W	
1L1	1270.28S	2378-2383	22.16	2378.2	41°23'46.851"N 71°07'15.966"W	
2H1	1555.31S	2998-3005	19.45	2998.2	41°24'31.060"N 71°07'34.414"W	
2H2	1555.43S	3006-3009	<del>19.9</del> 20.0	3008.3	41°24'31.087"N 71°07'31.469"W	
2I1	203.57P	3010-3013	17.74	3012.2	41°24'16.910"N 71°07'35.527"W	SEABAT - HDAPS FIX #13004
2I2	267.19S	3014-3019	18.6	3018.2	41°24'23.036"N 71°07'35.309"W	
2I3	1484.26P	3020-3025	17.86	3024.2	41°24'21.371"N 71°07'35.749"W	
2J1	139.44S	3026-3033	19.45	3028.2	41°24'09.308"N 71°07'30.075"W	
2J2	135.59P	3034-3039	17.4	3034.3	41°24'04.114"N 71°07'34.655"W	SEABAT - HDAPS FIX #13005
2K1	1328.03S	3040-3043	19.4	3040.2	41°23'54.723"N 71°07'28.804"W	
2K2	1327.34S	3052-3053	19.43	3052.2	41°23'52.928"N 71°07'34.871"W	SEABAT - HDAPS FIX #13006
2K3	1331.29P	3054-3057	19.0 18.9	3056.2	41°23'59.349"N 71°07'31.243"W	SEABAT - HDAPS FIX #13007
2K4	1328.17S	3044-3051	17.84	3050.2	41°23'55.154"N 71°07'25.415"W	

\* CORRECTED FOR APPROVED TIDES

DEVELOPMENT ABSTRACT  
H-10605

NOAA Ship RUDE  
OPR-B302-RU-95

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth * (m)	LD Pos	Geographic Position	Remarks
2K9	FATHO HIT	SEABAT	<del>17.0</del> 16.9	SEABAT	SEE SEABAT ADDENDUM	SEABAT - HDAPS FIX #13073
2L1	1269.16P	3058-3059	20.76	3058.2	41°23'44.815"N 71°07'33.175"W	
3E1	582.17P	3106-3111	17.87	3106.2	41°25'09.784"N 71°07'51.551"W	
3F1	582.11P	3096-3097	18.73	3096.2	41°25'08.626"N 71°07'52.498"W	
3F2	1843.39S	3098-3099	17.73	3098.5	41°25'08.199"N 71°07'58.502"W	
3F3	1843.47P	3100-3105	17.74	3104.2	41°25'08.020"N 71°07'56.595"W	
3I1	265.45S	3092-3093	18.78	3092.3	41°24'18.341"N 71°07'54.608"W	SEABAT - HDAPS FIX #13013
3I2	270.19S	3094-3095	19.0	3094.3	41°24'26.350"N 71°07'47.113"W	
3I3	50' CHARTED SOUNDING	4038-4059	18.98	4044.5	41°24'20.018"N 71°07'42.741"W	
3J1	1419.43P	3074-3075	19.5	3074.2	41°24'07.408"N 71°07'49.514"W	SEABAT - HDAPS FIX #13010
3J2	1424.58P	3086-3091	18.8	3078.4	41°24'12.565"N 71°07'45.667"W	SEABAT - HDAPS FIX #13012
3J3	1424.38P	3076-3085	19.0	3084.2	41°24'12.842"N 71°07'42.971"W	SEABAT - HDAPS FIX #13011
3K1	1327.02P	3068-3073	19.85	3070.3	41°23'52.550"N 71°07'41.166"W	SEABAT - HDAPS FIX #13009
3L1	1326.09S	3064-3067	20.71	3064.2	41°23'48.893"N 71°07'53.334"W	SEABAT - HDAPS FIX #13008
3L9	FATHO HIT	SEABAT	<del>18.0</del> 17.9	SEABAT	SEE SEABAT ADDENDUM	SEABAT - HDAPS FIX #13074
3M1	1222.10S	3060-3063	20.71	3062.2	41°23'33.990"N 71°07'54.358"W	
4A1	1954.01P	3112-3115	18.74	3114.3	41°26'05.901"N 71°08'11.996"W	SEABAT - HDAPS FIX #13014

\* CORRECTED FOR APPROVED TIDES

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DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth (m)	Ld Pos	Geographic Position	Remarks
4B1	1930.18P	3116-3121	15.78	3120.2	41°25'55.171"N 71°08'11.468"W	SEABAT - HDAPS FIX #13015 AWOIS 9375
4B2	1924.33S	3122-3123	15.72	3122.3	41°25'51.201"N 71°08'06.364"W	SEABAT - HDAPS FIX #13016 AWOIS 9375
4B3	1175.03P	3124-3125	15.5	3124.3	41°25'57.386"N 71°08'06.638"W	SEABAT - HDAPS FIX #13017 AWOIS 9375
4B4	FATHO HIT	3896-3897	15.6	3896.3	41°26'00.298"N 71°08'07.047"W	AWOIS 9375
4B9	FATHO HIT	949-960*	14.74	957.3	41°26'00.168"N 71°08'07.301"W	SEABAT - HDAPS FIX #13076 AWOIS 9375,*Least depth from mainscheme hydro
4C1	914.38S	3126-3127	19.74	3126.2	41°25'35.703"N 71°08'11.919"W	
4C2	914.29S	3128-3129	19.4	3128.2	41°25'35.619"N 71°08'11.967"W	
4D1	897.21S	3130-3135	18.75	3132.4	41°25'34.039"N 71°08'01.993"W	
4D2	1180.41P	3136-3139	17.9	3138.2	41°25'24.791"N 71°07'58.046"W	
4D3	893.54S	3140-3143	17.9	3142.2	41°25'26.178"N 71°08'12.654"W	
4E1	1843.46P	3144-3147	17.5	3146.2	41°25'11.365"N 71°07'58.298"W	
4F1	515.57S	3148-3149	15.89	3148.3	41°24'59.263"N 71°08'08.666"W	SEABAT - HDAPS FIX #13018
4F2	515.45P	3150-3151	16.9 17.0	3150.2	41°24'58.979"N 71°08'05.829"W	
4F3	581.31P	3152-3155	17.78	3154.2	41°25'07.252"N 71°08'00.253"W	
4G1	510.25P	3156-3161	17.73	3160.1	41°24'54.938"N 71°08'09.747"W	
4G2	1775.01S	3162-3165	17.9 18.0	3164.2	41°24'55.648"N 71°08'06.420"W	
4H1	376.12P	3166-3167	19.86	3166.2	41°24'34.727"N 71°08'13.847"W	

\* CORRECTED FOR APPROVED TIDES

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth * (m)	LD Pos	Geographic Position	Remarks
4I1	1489.44P	3168-3175	19.8	3174.2	41°24'20.099"N 71°07'57.190"W	
4I2	1490.11S	3176-3177	19.1	3176.2	41°24'20.346"N 71°08'03.200"W	SEABAT - HDAPS FIX #13019
4I3	271.31P	3178-3181	19.6	3178.2	41°24'21.549"N 71°08'03.162"W	
4I4	FATHO HIT	3898-3901	18.72	3900.3 /553 r d	41°24'24.756"N 71°08'03.948"W	SEABAT - HDAPS FIX #13075
4J1	205.35S	3182-3187	19.9	3186.2	41°24'13.468"N 71°07'58.102"W	
4J2	264.23P	3188-3189	21.78	3188.1	41°24'14.034"N 71°08'10.366"W	
4J3	1482.28S	3190-3193	19.74	3190.4	41°24'13.734"N 71°07'59.677"W	
4K1	1334.44S	3194-3197	19.9 20.0	3196.2	41°23'52.132"N 71°08'05.214"W	SEABAT - HDAPS FIX #13020
4K2	1334.55S	3198-3199	20.72	3198.2	41°23'52.532"N 71°08'07.551"W	
4L1	1276.33P	3200-3203	18.87	3200.3	41°23'41.725"N 71°07'58.397"W	SEABAT - HDAPS FIX #13021
5A1	980.51P	3274-3275	15.2	3274.4	41°26'06.235"N 71°08'25.524"W	SEABAT - HDAPS FIX #13029
5B1	956.27P	3264-3267	18.8 17.5	3266.3 /947.7	41°25'59.987"N // 8 71°08'18.858"W // 60	SEABAT - HDAPS FIX #13026
5B2	2340.10P	3268-3271	14.5	3270.3	41°25'50.654"N 71°08'18.063"W	SEABAT - HDAPS FIX #13027
5B3	964.41P	3272-3273	18.8	3272.3	41°26'00.017"N 71°08'19.125"W	SEABAT - HDAPS FIX #13028
5C1	914.14P	3254-3255	17.45	3254.2	41°25'35.816"N 71°08'17.440"W	SEABAT - HDAPS FIX #13024
5C2	1923.39S	3256-3259	13.1	3256.76	41°25'47.399"N 71°08'18.211"W	SEABAT - HDAPS FIX #13025 AWOIS 9374
5C3	1909.08S	3260-3263	18.74	3262.2	41°25'44.297"N 71°08'16.183"W	

\* CORRECTED FOR APPROVED TIDES

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth * (m)	LD Pos	Geographic Position	Remarks
5C4	53' CHARTED SOUNDING	4060-4087	17.7	4074.2	41°25'35.835"N 71°08'17.324"W	
5D1	1887.15S	3244-3247	19.1	3246.2	41°25'27.465"N 71°08'14.605"W	
5D2	914.11S	3248-3253	19.45	3250.3	41°25'32.901"N 71°08'16.893"W	
5E1	1848.26S	3236-3241	19.87	3238.2	41°25'11.415"N 71°08'17.944"W	
5E2	1864.54P	3242-3243	17.84	3242.2	41°25'14.617"N 71°08'31.107"W	
5F1	579.27P	3232-3235	11.87	3234.2	41°25'01.935"N 71°08'24.186"W	SEABAT - HDAPS FIX #13023
5G1	1774.15S	3230-3231	15.9 16.1	3230.2	41°24'53.294"N 71°08'17.158"W	
5H1	1638.21P	3220-3223	18.9 19.0	3222.3	41°24'34.520"N 71°08'29.128"W	
5H2	377.11S	3224-3225	19.74	3224.2	41°24'34.209"N 71°08'27.157"W	
5H3	376.40P	3226-3229	18.75	3226.2	41°24'32.147"N 71°08'19.262"W	SEABAT - HDAPS FIX #13022
5I1	330.11P	3208-3211	19.4	3210.2	41°24'26.460"N 71°08'18.810"W	
5I2	1561.46S	3212-3215	20.7	3212.2	41°24'26.420"N 71°08'23.611"W	
5I3	1562.16P	3216-3219	20.46	3216.3	41°24'22.129"N 71°08'27.959"W	
5J1	1492.48P	3206-3207	22.72	3207.0	41°24'10.967"N 71°08'31.066"W	
5L1	84.13S	3204-3205	22.81	3205.0	41°23'45.756"N 71°08'24.377"W	
6C1	1910.42P	3276-3281	19.1	3278.2	41°25'38.741"N 71°08'33.177"W	SEABAT - HDAPS FIX #13030
6E1	1864.38S	3282-3285	14.72	3284.3	41°25'11.698"N 71°08'33.885"W	

\* CORRECTED FOR APPROVED TIDES

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DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth (m)	LD Pos	Geographic Position	Remarks
6E2	876.26S	3286-3287	17.6	3286.3	41°25'14.575"N 71°08'31.112"W	
6E3	876.43P	3288-3295	14.6 14.2	3292.3 3284.3	41°25'11.653"N <sup>198</sup> 71°08'33.889"W <sup>285</sup>	
6F1	578.31P	3296-3301	15.34	3300.2	41°24'59.052"N 71°08'35.046"W	
6F2	578.26P	3302-3303	15.8	3302.2	41°24'58.297"N 71°08'35.759"W	
6F3	578.06S	3304-3305	17.76	3304.2 3311.0	41°24'56.371"N <sup>26</sup> 71°08'39.265"W <sup>277</sup>	
6G1	1773.05S	3306-3309	17.3	3308.3	41°24'49.841"N 71°08'32.149"W	
6G2	518.07S	3310-3311	17.89	3310.2	41°24'54.697"N 71°08'38.361"W	
6G3	517.43P	3312-3313	16.72	3312.2	41°24'51.272"N 71°08'31.210"W	
6H1	1701.08S	3314-3317	19.72	3316.2	41°24'39.635"N 71°08'31.318"W	
6H2	1639.49P	3318-3321	19.8 20.0	3320.2	41°24'31.307"N 71°08'42.791"W	
6H3	1713.06P	3322-3325	19.2	3322.1	41°24'40.055"N 71°08'48.118"W	
6I1	378.35S	3326-3327	17.89	3326.3	41°24'29.680"N 71°08'44.699"W	SEABAT - HDAPS FIX #13031
6I2	FATHO HIT	3902-3905	19.7	3904.3	41°24'22.045"N 71°08'38.129"W	
6J1	1550.24P	3328-3335	20.2	3334.2	41°24'15.530"N 71°08'44.412"W	
6J2	1493.13S	3336-3341	20.73	3340.3	41°24'13.248"N 71°08'34.551"W	
6J3	1550.36S	3342-3345	21.74	3344.3	41°24'14.818"N 71°08'40.948"W	
6K1	192.29P	3346-3347	21.89	3346.0	41°24'00.529"N 71°08'48.412"W	

\* CORRECTED FOR APPROVED TIDES



DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth * (m)	LD Pos	Geographic Position	Remarks
7G1	519.51S	3394-3395	18.86	3394.2	41°24'46.907"N 71°08'59.913"W	SEABAT - HDAPS FIX #13035
7G2	1786.08P	3396-3401	19.45	3398.2	41°24'47.746"N 71°09'01.466"W	
7G3	519.37S	3402-3403	19.42	3402.2	41°24'48.313"N 71°08'57.490"W	
7H1	1713.09S	3378-3383	18.8	3380.2	41°24'41.656"N 71°08'49.620"W	
7H2	1770.53S	3384-3389	16.87	3388.3	41°24'41.190"N 71°09'00.726"W	SEABAT - HDAPS FIX #13033
7H3	449.34S	3390-3393	18.23	3392.3	41°24'35.119"N 71°08'52.825"W	SEABAT - HDAPS FIX #13034
7I1	1623.58S	3368-3371	21.45	3370.2	41°24'33.723"N 71°08'52.550"W	
7I2	1624.04S	3372-3375	20.87	3374.2	41°24'22.542"N 71°08'50.798"W	
7I3	379.10S	3376-3377	20.4	3376.2	41°24'27.355"N 71°08'54.040"W	
7J1	1495.11P	3366-3367	12.45	3366.3	41°24'05.905"N 71°08'55.599"W	SEABAT - HDAPS FIX #13032
7K1	209.32P	3362-3365	19.3	3364.2	41°23'58.761"N 71°08'49.824"W	
7L1	1384.27P	3360-3361	19.9	3360.2	41°23'45.102"N 71°09'00.023"W	
7N1	1228.22S	3348-3355	21.84	3352.3	41°23'17.190"N 71°09'00.936"W	
7N2	1228.43P	3356-3359	19.9	3358.4	41°23'15.601"N 71°09'04.483"W	
8B1	1964.14S	3404-3407	21.74	3406.2	41°25'52.896"N 71°09'21.461"W	
8C1	1942.31P	3408-3409	23.87	3408.0	41°25'40.074"N 71°09'16.367"W	
8G1	1838.19S	3410-3415	19.89	3410.2	41°24'48.973"N 71°09'13.183"W	SEABAT - HDAPS FIX #13036

\* CORRECTED FOR APPROVED TIDES

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DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth (m)	ID Pos	Geographic Position	Remarks
8G2	520.23P	3416-3421	17.72	3420.4	41°24'43.060"N 71°09'06.374"W	SEABAT - HDAPS FIX #13037
8H1	505.21P	3422-3425	18.75	3422.3	41°24'38.198"N 71°09'12.489"W	SEABAT - HDAPS FIX #13038
8H2	1769.45P	3426-3429	22.73	3426.2	41°24'41.369"N 71°09'17.169"W	
8L1	149.17P	3476-3477	21.72	3476.2	41°23'39.306"N 71°09'22.660"W	
8M1	68.51P	3474-3475	19.89	3474.2	41°23'27.385"N 71°09'21.969"W	AWOIS 8356
8N1	1261.53S	3472-3473	18.76	3472.2	41°23'17.508"N 71°09'09.251"W	SEABAT - HDAPS FIX #13043
8O1	1229.57P	3468-3471	19.79	3468.2	41°23'10.988"N 71°09'16.844"W	
9B1	1964.55S	3430-3435	21.74	3430.3	41°25'52.607"N 71°09'25.756"W	
9C1	1942.05S	3436-3437	21.75	3436.3	41°25'39.065"N 71°09'34.570"W	
9C2	1961.02P	3438-3441	21.75	3440.2	41°25'46.180"N 71°09'28.397"W	
9H1	451.45S	3442-3445	18.74	3444.2	41°24'31.093"N 71°09'23.373"W	SEABAT - HDAPS FIX #13039
9J1	1621.37P	3446-3449	19.76	3448.2	41°24'16.997"N 71°09'24.417"W	
9L1	1411.55P	3450-3453	21.78	3452.2	41°23'45.134"N 71°09'31.348"W	
9M1	127.00P	3454-3455	20.74	3454.2	41°23'33.942"N 71°09'34.348"W	AWOIS 8356 SEABAT - HDAPS FIX #13040
9M2	90.08P	3456-3459	19.77	3456.1	41°23'28.340"N 71°09'27.145"W	AWOIS 8356
9M3	1343.28S	3460-3461	20.74	3460.3	41°23'31.206"N 71°09'35.905"W	AWOIS 8356 SEABAT - HDAPS FIX #13041
9N1	36.33P	3462-3465	13.74	3464.2	41°23'16.283"N 71°09'30.500"W	AWOIS 8356 SEABAT - HDAPS FIX #13042

\* CORRECTED FOR APPROVED TIDES

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth X (m)	LD Pos	Geographic Position	Remarks
9N2	1317.58S	3490-3491	17.45	3490.4	41°23'21.229"N 71°09'38.704"W	AWOIS 8356
9N3	FATHO HIT	3912-3917	15.7	3916.2	41°23'12.463"N 71°09'27.429"W	SEABAT - HDAPS FIX #13078 AWOIS 8356
9O1	13.03PB	3466-3467 3516-3519	18.4 17.0	3518.1 3515.1	41°23'12.977"N 71°09'32.855"W	AWOIS 8356
9O2	13.03PA	3698-3699	16.4	3698.4	41°23'09.324"N 71°09'45.626"W	SEABAT - HDAPS FIX #13059 AWOIS 8356
10C1	PI REQUIRED SOUNDING DEV.	3886-3895	20.5	3894.2	41°25'36.340"N 71°09'55.018"W	SEABAT - HDAPS FIX #13077
10H1	572.08P	3510-3515	20.2	3514.2	41°24'41.835"N 71°09'49.014"W	
10L1	1435.57S	3508-3509	19.74	3508.2	41°23'40.845"N 71°09'54.773"W	
10L2	FATHO HIT	3906-3909	19.8	3908.2	41°23'43.987"N 71°09'55.708"W	
10L3	FATHO HIT	3910-3911	21.12	3910.0	41°23'39.867"N 71°09'57.845"W	
10M1	1380.17S	3500-3501	18.73	3500.2	41°23'30.850"N 71°09'51.536"W	AWOIS 8356 SEABAT - HDAPS FIX #13046
10M2	1409.58S	3502-3503	19.9 20.0	3502.2	41°23'35.392"N 71°09'54.740"W	
10M3	1380.12P	3504-3507	18.9	3505.0	41°23'33.702"N 71°09'53.672"W	SEABAT - HDAPS FIX #13047
10N1	37.53P	3480-3481	20.81	3480.3	41°23'12.435"N 71°09'47.637"W	AWOIS 8356 SEABAT - HDAPS FIX #13045
10N2	1288.03P	3482-3489	20.78	3482.2	41°23'12.735"N 71°09'52.741"W	AWOIS 8356
10N3	1316.42S	3492-3499	20.87	3496.2	41°23'18.620"N 71°09'56.027"W	AWOIS 8356
10O1	1259.08S	3478-3479	16.84	3478.4	41°23'09.350"N 71°09'45.742"W	AWOIS 8356 SEABAT - HDAPS FIX #13044
11G1	1857.22P	3550-3551	21.3	3550.2	41°24'44.069"N 71°10'00.759"W	SEABAT - HDAPS FIX #13052

\* CORRECTED FOR APPROVED TIDES

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DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth * (m)	LD Pos	Geographic Position	Remarks
11H1	1835.02P	3548-3549	21.78	3548.2	41°24'42.222"N 71°10'00.949"W	
11I1	1694.44S	3540-3541	21.86	3540.3	41°24'18.308"N 71°09'57.673"W	
11I2	454.33P	3542-3547	21.73	3546.3	41°24'19.620"N 71°09'59.250"W	
11J1	1570.15S	3538-3539	21.86	3538.2	41°24'04.386"N 71°09'57.786"W	
11M1	1408.32P	3530-3531	20.9	3530.2	41°23'32.665"N 71°10'13.941"W	
11M2	1408.27S	3534-3535	20.81	3534.3	41°23'30.120"N 71°10'13.951"W	SEABAT - HDAPS FIX #13051
11M3	1409.42S	3536-3537	20.9	3536.2	41°23'34.600"N 71°09'58.086"W	
11N1	65.21S	3526-3527	19.73	3526.2	41°23'13.033"N 71°10'08.209"W	SEABAT - HDAPS FIX #13049
11N2	1289.15S	3528-3529	19.89	3528.2	41°23'12.362"N 71°10'06.093"W	SEABAT - HDAPS FIX #13050
11N3	FATHO HIT	3920-3923	21.0	3922.2	41°23'12.909"N 71°10'00.918"W	
11O1	38.44P	3520-3521	20.72	3520.2	41°23'09.618"N 71°09'58.370"W	SEABAT - HDAPS FIX #13048
11O2	1290.06S	3522-3525	22.12	3524.2	41°23'10.341"N 71°10'14.422"W	
11O3	FATHO HIT	3918-3919	20.5	3918.3	41°23'09.456"N 71°09'58.233"W	SEABAT - HDAPS FIX #13079
12H1	595.26S	3552-3553	19.6	3552.2	41°24'37.966"N 71°10'21.877"W	SEABAT - HDAPS FIX #13053
12I1	500.19P	3554-3555	19.5	3554.5	41°24'23.048"N 71°10'13.957"W	SEABAT - HDAPS FIX #13054
12J1	1692.24S	3556-3557	18.6 18.5	3556.2 1692.2	41°24'11.254"N 71°10'29.503"W	SEABAT - HDAPS FIX #13055
12J9	FATHO HIT	SEABAT	18.6	SEABAT	SEE SEABAT ADDENDUM	SEABAT - HDAPS FIX #13080

\* CORRECTED FOR APPROVED TIDES

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth * (m)	LD Pos	Geographic Position	Remarks
12K1	387.10S	3558-3561	21.45	3560.2	41°24'03.438"N 71°10'31.394"W	
12K2	1617.22P	3562-3563	20.78	3562.2	41°24'03.672"N 71°10'19.796"W	
12M1	184.57S	3564-3565	20.74	3564.3	41°23'30.863"N 71°10'23.441"W	
12M2	184.27S	3566-3567	20.4	3566.2	41°23'29.388"N 71°10'30.457"W	
12M3	FATHO HIT	3924-3929	20.9	3928.2	41°23'24.976"N 71°10'18.716"W	
12M4	FATHO HIT	3930-3931	21.0	3930.3	41°23'30.830"N 71°10'27.793"W	
12N1	94.39P	3568-3569	21.5	3568.2	41°23'16.197"N 71°10'18.097"W	
12O1	1290.58S	3570-3571	18.2	3570.2	41°23'07.909"N 71°10'22.886"W	SEABAT - HDAPS FIX #13056
13I1	1831.35P	3596-3597	19.9 20.0	3596.2	41°24'30.009"N 71°10'48.501"W	
13J1	1692.08S	3594-3595	22.9 23.0	3595.0	41°24'12.226"N 71°10'33.780"W	
13M1	183.32S	3588-3589	22.0 21.7	3588.1 183.2	41°23'28.565"N 71°10'42.563"W	
13M2	1439.24P	3590-3593	21.2	3592.2	41°23'31.241"N 71°10'34.305"W	
13M3	FATHO HIT	3932-3933	20.1	3932.2	41°23'28.747"N 71°10'35.757"W	
13N1	155.51P	3576-3579 3992-3993	19.0	3578.1	41°23'21.850"N 71°10'41.223"W	SEABAT - HDAPS FIX #13003
13N2	1373.30P	3580-3583	20.89	3582.2	41°23'18.765"N 71°10'46.998"W	
13N3	1373.45S	3584-3587 3986-3989	17.6	3586.2	41°23'18.363"N 71°10'44.537"W	SEABAT - HDAPS FIX #13002
13N4	FATHO HIT	3934-3935	21.5 20.9	3934.2 2595.7	41°23'23.251"N 71°10'32.542"W	

\* CORRECTED FOR APPROVED TDES

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth * (m)	LD Pos	Geographic Position	Remarks
13N5	FATHO HIT	3936-3941	20.1	3940.2	41°23'17.541"N 71°10'38.474"W	
13P1	1254.45S	3572-3575	22.7	3574.3	41°22'56.249"N 71°10'44.055"W	
14I1	597.56P	3598-3599	18.7	3598.2	41°24'28.413"N 71°10'54.778"W	SEABAT - HDAPS FIX #13057
14N1	1405.34S	3608-3611	22.0	3610.2	41°23'21.049"N 71°10'50.729"W	
15H1	634.46S	3600-3603	20.45	3602.2	41°24'30.332"N 71°11'09.894"W	
15H2	634.41P	3604-3607	20.89	3606.2	41°24'32.791"N 71°11'11.426"W	
15K1	FATHO HIT	3944-3945	23.3	3944.0	41°23'53.247"N 71°11'23.508"W	
15N1	1403.55P	3612-3613	22.9	3612.2	41°23'18.034"N 71°11'12.946"W	
15N2	180.44S	3614-3617	21.89	3616.2	41°23'17.457"N 71°11'20.540"W	
15N3	158.58S	3618-3623	22.0	3620.2	41°23'13.996"N 71°11'18.933"W	
15N4	FATHO HIT	3942-3943	21.2	3942.3	41°23'24.119"N 71°11'18.420"W	SEABAT - HDAPS FIX #13081
15O1	1352.12S	3624-3631 3982-3985	11.8 11.5	3982.1 /20/3	41°23'09.989"N 71°11'08.333"W	SEABAT - HDAPS FIX #13001 WRECK
16J1	563.20S	3632-3637	22.86	3634.2	41°24'14.207"N 71°11'31.724"W	
16J2	494.05P	3638-3643	19.0	3642.1	41°24'04.660"N 71°11'31.289"W	
16K1	493.57S	3644-3649	19.86	3648.2	41°24'03.385"N 71°11'32.777"W	
16K2	422.55P	3650-3655	17.0	3654.1	41°23'54.271"N 71°11'34.040"W	
16K3	422.34S	3656-3657	18.78	3656.1	41°23'52.993"N 71°11'38.055"W	

\* CORRECTED FOR APPENDED TIDES

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth <del>X</del> (m)	LD Pos	Geographic Position	Remarks
16L1	1656.12S	3658-3659	18.81	3658.2	41°23'51.372"N 71°11'32.815"W	
16L2	1611.42P	3660-3661	20.86	3660.2	41°23'46.284"N 71°11'34.096"W	
16L3	1611.59S	3662-3665	20.1	<del>3662.2</del> 393.1	41°23'48.111"N 71°11'30.455"W	
16L9	FATHO HIT	SEABAT	20.1	SEABAT	SEE SEABAT ADDENDUM	SEABAT - HDAPS FIX #13082
16M1	315.33S	3666-3671	21.5	3670.2	41°23'37.773"N 71°11'26.508"W	
16M2	249.08S	3672-3677	22.3	3676.2	41°23'26.172"N 71°11'27.240"W	
16M3	1537.33S	3678-3683	23.1	3680.1	41°23'32.638"N 71°11'34.104"W	
16N1	180.21P	3684-3687	23.2	3684.2	41°23'17.749"N 71°11'26.006"W	
16O1	159.29P	3688-3691	21.9	3694.2	41°23'10.654"N 71°11'23.929"W	SEABAT - HDAPS FIX #13058
16P1	58.32P	3700-3705	22.4	3702.2	41°22'51.851"N 71°11'40.734"W	SEABAT - HDAPS FIX #13060
16P2	1309.01S	3706-3707	23.45	3706.2	41°22'53.516"N 71°11'37.020"W	
17G1	FATHO HIT	3960-3961	19.12	3960.2	41°24'47.551"N 71°11'54.766"W	
17H1	FATHO HIT	3954-3957	20.3	<del>3954.2</del> 727.4	41°24'33.367"N 71°11'47.807"W	
17J1	1827.14S	3752-3753	23.4	3752.0	41°24'10.938"N 71°11'46.473"W	
17J2	562.31P	3754-3755	20.6	3754.2	41°24'13.645"N 71°11'41.602"W	
17K1	1758.26S	3748-3751	20.5	3750.2	41°24'03.376"N 71°11'44.448"W	SEABAT - HDAPS FIX #13063
17L1	2306.37P	3738-3739	21.24	3738.2	41°23'39.743"N 71°11'49.995"W	

\* CORRECTED FOR APPROVED TIDES

DEVELOPMENT ABSTRACT  
H-10605

NOAA Ship RUDE  
OPR-B302-RU-95

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth (m)	LD Pos	Geographic Position	Remarks
17L2	420.56S	3740-3743	20.6	3742.2	41°23'46.034"N 71°11'57.782"W	
17L3	1205.33S	3744-3747	20.1	3746.2	41°23'51.085"N 71°11'45.072"W	
17M1	2306.12S	3714-3717	21.9	3714.2	41°23'37.712"N 71°11'54.162"W	
17M2	1581.01P	3736-3737	<del>19.9</del> 19.0	3736.2	41°23'31.634"N 71°11'54.247"W	SEABAT - HDAPS FIX #13062
17M3	FATHO HIT	3946-3949	19.8	3948.2	41°23'31.524"N 71°11'53.998"W	SEABAT - HDAPS FIX #13083
17P1	1308.13S	3708-3709	22.7	3708.2	41°22'51.160"N 71°11'48.155"W	SEABAT - HDAPS FIX #13061
17P2	1308.07S	3710-3713	23.7	3712.2	41°22'50.526"N 71°11'49.176"W	
18E1	PI REQUIRED SOUNDING DEV.	3884-3885	19.88	3884.3	41°25'15.568"N 71°12'12.817"W	SEABAT - HDAPS FIX #13070
18G1	873.30S	3756-3759	20.3	3758.2	41°24'45.333"N 71°12'02.302"W	SEABAT - HDAPS FIX #13064
18H1	FATHO HIT	3958-3959	18.2	3958.2	41°24'36.318"N 71°12'07.784"W	
18L1	420.37P	3760-3763	19.6	3762.2	41°23'46.892"N 71°12'02.528"W	
18L2	420.25S	3764-3769	<del>17.9</del> 18.5	<del>3766.2</del> 3768.2	41°23'45.039"N 71°12'03.867"W	SEABAT - HDAPS FIX #13065
18L3	420.09S	3770-3771	23.4	3770.2	41°23'43.980"N 71°12'07.618"W	
18L4	FATHO HIT	3950-3953	23.2 22.8	3952.2 /6845	41°23'47.407"N 71°12'07.805"W	
18M1	1582.12S	3718-3723	21.3 20.3	3718.2 /581.6	41°23'31.274"N 71°12'08.177"W	
18M2	1582.08S	3724-3731	20.4	3730.2	41°23'30.920"N 71°12'07.666"W	
18M3	1606.40S	3732-3735	23.84	3734.2	41°23'36.158"N 71°12'06.751"W	

\* CORRECTED FOR APPROVED TIDES



DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth (m)	LD Pos	Geographic Position	Remarks
19D1	1119.59P	3790-3791	18.1	3790.2	41°25'26.864"N 71°12'29.414"W	SEABAT - HDAPS FIX #13066
19E1	2238.20S	3782-3785	19.4	3784.2	41°25'19.830"N 71°12'26.628"W	
19E2	2238.03S	3786-3789	19.4	3788.2	41°25'19.211"N 71°12'29.678"W	
19N1	1513.36S	3772-3775	22.6	3774.2	41°23'19.412"N 71°12'21.631"W	
19R1	1.06P	3776-3777	23.7	3776.2	41°22'33.084"N 71°12'21.325"W	
20D1	1120.38P	3792-3795	12.9	3794.2	41°25'25.353"N 71°12'38.292"W	SEABAT - HDAPS FIX #13067
20E1	2180.43P	3796-3797	16.6	3796.2	41°25'11.441"N 71°12'38.922"W	SEABAT - HDAPS FIX #13068
20F1	2174.52P	3798-3801	19.8	3798.3	41°25'08.918"N 71°12'37.247"W	
20G1	1029.32S	3802-3805	20.86	3802.2	41°24'54.874"N 71°12'42.182"W	
21D1	2242.22S	3808-3813	19.74	3808.2	41°25'26.635"N 71°12'54.703"W	
21D2	2267.39S	3814-3817	19.6	3814.2	41°25'30.683"N 71°12'51.504"W	
21E1	2236.19S	3806-3807	18.3	3806.3	41°25'14.862"N 71°12'49.436"W	
21E9	FATHO HIT	SEABAT	18.8	SEABAT	SEE SEABAT ADDENDUM	SEABAT - HDAPS FIX #13071
21M1	1209.50P	3780-3781	25.0	3780.2	41°23'31.297"N 71°13'06.215"W	
21N1	1602.33S	3778-3779	25.1	3778.2	41°23'21.744"N 71°12'59.358"W	
22E1	1124.19S	3818-3819	20.6	3818.2	41°25'16.866"N 71°13'21.864"W	
22F1	1080.54S	3820-3821	19.5	3820.2	41°25'01.485"N 71°13'08.334"W	

\* CORRECTED FOR APPROVED TIDES

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth (m)	LD Pos	Geographic Position	Remarks
22F2	1061.41S	3822-3825	20.8	3824.2	41°24'57.059"N 71°13'14.401"W	
22G1	2153.56S	3826-3827	20.3	3826.2	41°24'53.016"N 71°13'19.919"W	
22G2	1061.49P	3828-3829	20.7	3828.2	41°24'53.530"N 71°13'14.756"N	
22G3	FATHO HIT	3962-3967	21.9 21.0	3967.0	41°24'50.756"N 71°13'12.168"N	
22H1	1019.28S	3830-3831	20.6	3830.3	41°24'36.238"N 71°13'20.241"W	
22I1	54' CHARTED SOUNDING	3994-4015	21.87	4002.0	41°24'27.869"N 71°13'10.615"W	
22J1	FATHO HIT	3968-3969	21.7 21.8	3968.2 3969.5	41°24'08.535"N <sup>240</sup> 71°13'18.217"W <sup>601</sup>	
23E1	2245.26P	3844-3845	20.4	3844.2	41°25'14.503"N 71°13'35.700"W	
23F1	1091.32S	3846-3849	19.6	3846.2	41°25'04.940"N 71°13'28.589"W	
23G1	FATHO HIT	3970-3971	21.9 21.0	3970.0	41°24'48.550"N 71°13'30.541"W	
24F1	2212.29P	3850-3851	22.6	3850.1	41°25'06.781"N 71°13'49.191"W	
24G1	FATHO HIT	3972-3975	20.4 20.4	3974.3 2185.4	41°24'56.114"N 71°13'46.612"W	
24H1	1034.51P	3834-3835	19.74	3834.3	41°24'34.889"N 71°13.50.043"W	
24H2	1034.46S	3836-3839	20.1	3838.3	41°24'37.485"N 71°13'49.884"W	
24H3	2139.47S	3840-3843	20.89	3840.3	41°24'38.910"N 71°13'48.882"W	
24H4	FATHO HIT	3976-3979	13.76	3976.2	41°24'42.220"N 71°13'56.770"W	
24I1	2110.33P	3832-3833	20.7	3832.2	41°24'30.027"N 71°13'47.002"W	

\*CORRECTED FOR APPROVED TIDES

DEV	Side Scan Contact Number	Hydro Dev Positions	Least Depth * (m)	ID Pos	Geographic Position	Remarks
25E1	1140.26P	3852-3859	20.1	3858.3	41°25'11.366"N 71°14'02.637"W	
25F1	FATHO HIT	3980-3981	<del>20.4</del>	3980.2	41°24'59.564"N 402	
25H1	2157.32P	3860-3875	20.2 <del>20.1</del>	1105.4	71°14'06.061"W 218	
26G8	52' CHARTED SOUNDING	4016-4037	20.8 <del>20.1</del>	3868.2 12010	41°24'39.033"N 71°14'07.388"W	SEABAT - HDAPS FIX #13069
27K1	826.32P	3876-3879	23.72	4024.1	41°24'48.492"N 71°14'22.367"W	SEABAT - HDAPS FIX #13072
27L1	2001.37S	3880-3883	24.7	3878.2	41°23'58.084"N 71°14'43.870"W	
			24.9	3882.2	41°23'41.313"N 71°14'36.058"W	

\* CORRECTED FOR APPROVED TIDES

FIX #	CONTACT	DEV.	AWOIS	FILE	VELCAST	DN	GMT	RAW DEPTH	TIDE CORR.	* LEAST DEPTH	LATITUDE	LONGITUDE
13001	1352.12S	1501		1867734M	95186145	186	212914	17.5	-0.43	17.72	41°23'10.155"N	71°0'11.08.298"W
13002	1373.45S	13N3		18667878M	95186145	186	215316	17.6	-0.42	17.74	41°23'18.325"N	71°0'10.44.636"W
13003	155.51P	13N1		186680252	95186145	186	221745	19.4	-0.2	19.2	41°23'21.801"N	71°0'10.41.244"W
13004	203.57P	211		18744666	95186145	187	122436	17.3	-0.1	17.2	41°24'16.933"N	71°0'07.35.639"W
13005	135.59P	2J2		18745084	95186145	187	12136	17.4	-0.1	17.3	41°24'04.156"N	71°0'07.34.655"W
13006	1327.34S	2K2		18745059	95186145	187	124754	19.5	-0.1	19.4	41°23'52.789"N	71°0'07.34.863"W
13007	1331.29P	2K3		18746377	95186145	187	125310	19.3	-0.1	19.2	41°23'59.492"N	71°0'07.31.247"W
13008	1326.09S	3L1		18746752	95186145	187	125922	20.2	-0.1	20.1	41°23'48.811"N	71°0'07.53.132"W
13009	1327.02P	3K1		18747114	95186145	187	130526	19.7	-0.1	19.6	41°23'52.751"N	71°0'07.41.170"W
13010	1419.43P	3J1		18747835	95186145	187	131727	19.3	-0.4	19.72	41°24'07.587"N	71°0'07.49.716"W
13011	1424.36P	3J3		18748111	95186145	187	132210	19.0	-0.4	18.89	41°24'12.794"N	71°0'07.43.022"W
13012	1424.58P	3J2		18748450	95186145	187	132742	19.2	-0.4	19.6	41°24'12.623"N	71°0'07.45.675"W
13013	265.45S	3I1		18748826	95186145	187	133359	18.7	-0.4	18.86	41°24'18.325"N	71°0'07.54.608"W
13014	1954.01P	4A1		18749878	95186145	187	135130	18.6	-0.4	18.45	41°26'05.895"N	71°0'08.12.061"W
13015	1930.18P	4B1	9375	18750227	95186145	187	135720	15.9	-0.42	15.67	41°25'55.168"N	71°0'08.11.533"W
13016	1924.33S	4B2	9375	18750687	95186145	187	140500	15.3	-0.42	15.6	41°25'51.198"N	71°0'08.06.407"W
13017	1175.03P	4B3	9375	18751263	95186145	187	141437	15.5	-0.42	15.73	41°25'57.447"N	71°0'08.06.482"W
13018	515.75S	4F1		18752280	95186145	187	143133	16.1	-0.43	15.78	41°24'59.348"N	71°0'08.08.795"W
13019	1490.11S	4I2		18752929	95186145	187	144224	19.4	-0.43	19.8	41°24'20.469"N	71°0'08.03.153"W
13020	1334.44S	4K1		18753990	95186145	187	150004	19.8	-0.44	19.74	41°23'52.337"N	71°0'08.05.334"W
13021	1276.33P	4L1		18754512	95186145	187	150845	19.1	-0.44	18.87	41°23'41.803"N	71°0'07.58.350"W
13022	376.40P	5H3		18755569	95186145	187	152623	19.1	-0.45	18.86	41°24'32.059"N	71°0'08.19.130"W
13023	579.27P	5F1		1875601M	95186145	187	153820	12.5	-0.45	12.92	41°25'01.857"N	71°0'08.24.203"W
13024	914.14P	5C1		18757063	95186145	187	155117	18.1	-0.45	17.86	41°25'35.784"N	71°0'08.17.272"W
13025	1923.39S	5C2	9374	18757500	95186145	187	155828	13.7	-0.46	13.8	41°25'47.331"N	71°0'08.18.332"W
13026	956.27P	5B1		18758131	95186145	187	160856	18.7	-0.46	18.8	41°26'00.011"N	71°0'08.17.622"W
13027	2340.10P	5B2		18758479	95186145	187	161453	14.6	-0.46	13.4	41°25'50.705"N	71°0'08.17.964"W
13028	964.41P	5B3		18758868	95186145	187	162110	19.0	-0.46	18.74	41°26'00.141"N	71°0'08.17.643"W
13029	980.51P	5A1		18759216	95186145	187	162714	15.6	-0.47	14.89	41°26'06.157"N	71°0'08.25.365"W
13030	1910.42P	6C1		18759918	95186145	187	163854	19.7	-0.47	18.9	41°25'38.663"N	71°0'08.33.207"W
13031	378.35S	6I1		18760711	95186145	187	165205	18.7	-0.8	17.9	41°24'29.641"N	71°0'08.44.836"W

\* CORRECTED FOR APPROVED TIDES & SEIT + SQUAT

FIX #	CONTACT	DEV.	AWOIS	FILE	VELCAST	DN	GMT	RAW DEPTH	TIDE CORR.	*LEAST DEPTH	LATITUDE	LONGITUDE
13032	1495.11P	7J1		18761155	95186145	187	165929	12.8	-0.8	12.0	41°24'05.992"N	71°08'55.512"W
13033	1770.53S	7H2		18761655	95186145	187	170750	17.3	-0.98	16.45	41°24'41.100"N	71°09'00.718"W
13034	449.34S	7H3		18762031	95186145	187	171417	19.1	-0.98	18.73	41°24'35.116"N	71°08'53.045"W
13035	519.51S	7G1		18762355	95186145	187	171927	19.1	-0.98	18.73	41°24'46.910"N	71°09'00.004"W
13036	1838.19S	8G1		18762769	95186145	187	172622	20.8	-0.9	19.9	41°24'48.922"N	71°09'13.149"W
13037	520.23P	8G2		18763954	95186145	187	174608	18.2	-0.9	17.3	41°24'43.099"N	71°09'06.280"W
13038	505.21P	8H1		18764288	95186145	187	175139	18.7	-0.9	17.78	41°24'38.317"N	71°09'12.330"W
13039	451.45S	9H1		18764714	95186145	187	175851	19.5	-0.9	18.86	41°24'31.083"N	71°09'23.088"W
13040	127.00P	9M1	8356	18764596	95186145	187	181147	21.2	-0.9	20.73	41°23'34.088"N	71°09'34.387"W
13041	1343.28S	9M3	8356	18765854	95186145	187	181749	21.3	-1.0	20.3	41°23'31.254"N	71°09'35.733"W
13042	36.33P	9N1	8256	18766269	95186145	187	182443	14.7	-1.0	13.7	41°23'16.160"N	71°09'30.350"W
13043	1261.53S	8N1		18766679	95186145	187	183130	19.5	-1.0	18.5	41°23'17.531"N	71°09'09.247"W
13044	1259.08S	10O1	8356	18767132	95186145	187	183905	17.8	-1.0	16.8	41°23'09.347"N	71°09'45.760"W
13045	37.53P	10N1	8356	18768202	95186145	187	185656	20.9	-1.0	19.9	41°23'12.215"N	71°09'47.448"W
13046	1380.17S	10M1	8356	18768601	95186145	187	190335	19.4	-1.0	18.4	41°23'30.820"N	71°09'51.403"W
13047	1380.12P	10M3		18768816	95186145	187	190713	19.6	-1.0	18.6	41°23'33.708"N	71°09'53.517"W
13048	38.44P	11O1		18769165	95186145	187	191258	21.4	-1.0	20.4	41°23'09.521"N	71°09'58.258"W
13049	35.21S	11N1		18769532	95186145	187	191907	20.2	-1.0	19.2	41°23'12.822"N	71°10'08.059"W
13050	1289.15S	11N2		18769742	95186145	187	192239	20.6	-0.9	19.97	41°23'12.469"N	71°10'06.050"W
13051	1408.27S	11M2		18770217	95186145	187	193034	21.4	-0.9	20.45	41°23'30.260"N	71°10'13.882"W
13052	1857.22P	11G1		18770922	95186145	187	194216	22.0	-0.9	21.81	41°24'44.137"N	71°10'00.612"W
13053	595.26S	12H1		18771727	95186145	187	195540	20.4	-0.9	19.45	41°24'38.115"N	71°10'21.790"W
13054	500.19P	12I1		1877211M	95186145	187	200538	21.3	-0.9	20.4	41°24'33.689"N	71°10'13.899"W
13055	1692.24S	12O1		18772807	95186145	187	201340	19.4	-0.98	18.56	41°24'11.141"N	71°10'29.477"W
13056	1290.58S	12O1		18773654	95186145	187	202745	18.2	-0.98	17.74	41°23'07.960"N	71°10'22.610"W
13057	597.58P	14I1		18774471	95186145	187	204126	19.4	-0.97	18.98	41°24'28.530"N	71°10'54.730"W
13058	159.29P	16O1		18775233	95186145	187	205407	22.5	-0.97	21.79	41°23'10.580"N	71°11'23.938"W
13059	13.03PA	9O2	8356	18776001	95186145	187	210651	17.5	-0.76	16.89	41°23'09.350"N	71°09'45.794"W
13060	58.32P	16P1		18776779	95186145	187	211954	23.1	-0.76	22.46	41°22'51.789"N	71°11'40.656"W
13061	1308.13S	17P1		18777238	95186145	187	212730	23.4	-0.6	22.8	41°22'50.962"N	71°11'47.850"W
13062	1581.01P	17M2		18777809	95186145	187	213703	19.6	-0.85	19.91	41°23'31.624"N	71°11'54.148"W

\* Corrected for Approved tides and S&H & Slight

FIX #	CONTACT	DEV.	AWOIS	FILE	VELCAST	DN	GMT	RAW DEPTH	TIDE CORR.	LEAST DEPTH	LATITUDE	LONGITUDE
13063	1758.26S	17K1		18778266	95186145	187	214435	21.4	-0.65	20.89	41°24'03.402"N	71°11'44.465"W
13064	873.30S	18G1		18778827	95186145	187	215401	21.7	-0.5	21.2	41°24'45.355"N	71°12'02.405"W
13065	420.25S	18L2		1877959M	95186145	187	221031	18.8	-0.84	18.84	41°23'45.315"N	71°12'03.771"W
13066	1119.54P	19D1		18780907	95186145	187	222840	18.1	-0.43	17.78	41°25'26.958"N	71°12'29.383"W
13067	1120.38P	20D1		1878119M	95186145	187	224357	16.5	-0.3	16.2	41°25'11.416"N	71°12'38.986"W
13068	2180.43P	20E1		18782073	95186145	187	224809	16.9	-0.3	16.6	41°25'11.474"N	71°12'39.909"W
13069	2157.32P	25H1		18783727	95186145	187	231541	21.1	-0.2	20.9	41°24'38.959"N	71°14'07.367"W
13070	PID-1	18E1		18785795	95186145	187	235016	20.0	-0.2	19.8	41°25'15.578"N	71°12'12.847"W
13071	FATHOIT	21E9		1878491M	95186145	187	233532	19.0	-0.2	18.8	41°25'17.564"N	71°12'50.602"W
13072	52' CS	26G8		1878405M	95186145	187	232455	23.3	-0.2	23.1	41°24'47.499"N	71°14'17.469"W
13073	FATHOIT	2K9		18844453	95186145	188	122107	17.0	-0.8/	<del>17.0</del>	41°23'57.304"N	71°07'26.105"W
13074	FATHOIT	3L9		18844835	95186145	188	122730	18.0	-0.8/	<del>18.0</del>	41°23'46.476"N	71°07'52.541"W
13075	FATHOIT	4I4		18845665	95186145	188	124121	18.4	-0.8/	<del>18.4</del>	41°24'24.743"N	71°08'03.862"W
13076	FATHOIT	4B9	9375	18846762	95186145	188	125934	14.5	-0.8/	14.84	41°26'00.123"N	71°08'07.318"W
13077	PID-2	10C1		18847642	95186145	188	131417	20.6	-0.8/	20.85	41°25'36.298"N	71°09'55.212"W
13078	FATHOIT	9N3		1884975M	95186145	188	134932	15.4	-0.1	15.3	41°23'12.593"N	71°09'27.510"W
13079	FATHOIT	11O3		18850294	95186145	188	135830	20.5	-0.1	20.4	41°23'09.615"N	71°09'58.452"W
13080	FATHOIT	12J9		18851063	95186145	188	141116	18.7	-0.1	18.6	41°24'11.199"N	71°10'29.464"W
13081	FATHOIT	15N4		18851913	95186145	188	142526	19.8	-0.2/	19.87	41°23'24.177"N	71°11'18.274"W
13082	FATHOIT	16L9		18852371	95186145	188	143308	20.3	-0.2/	20.22	41°23'42.357"N	71°11'27.622"W
13083	FATHOIT	17M3		18853213	95186145	188	144707	19.2	-0.2	19.0	41°23'31.621"N	71°11'54.217"W

NOTE: ALL DEPTHS ARE IN METERS.

\* CORRECTED FOR APPROVED TIDES AND SETTY SQUAT

**O. COMPARISON WITH THE CHART** *SEE ALSO THE EVALUATION REPORT*

0.1 Charts affected by this survey are as follows:

Chart 13218

"Block Island to Martha's Vineyard"

32<sup>nd</sup> ed. 26 June 1993

Scale: 1:80,000

Chart 13221

"Narragansett Bay"

50<sup>th</sup> ed. 15 April 1995

Scale: 1:40,000

Chart 13228

"Westport River and Approaches"

9<sup>th</sup> ed. June 13, 1992

Scale: 1:20,000

0.2 On August 11, 1995, a Danger to Navigation Report was sent to the Chief, Atlantic Hydrographic Branch outlining charting discrepancies found during this survey. The digression from the standard practice of first notifying the Coast Guard was due to the imminent completion of a new edition of Chart 13218. The report data were slated for immediate application to the new Chart.

See Appendix I for a complete copy of the Danger to Navigation Report. *DATA APPENDED TO THIS REPORT*

0.3 The overall correlation between charted soundings and survey depths is considered excellent, with average differences of approximately one foot in flat and slightly sloping areas and no more than two to three feet in areas with irregular bottoms.

0.4 The correlation between charted shoal areas and corresponding soundings from this survey is excellent. See Section 0.2 for discrepancies and additions to the chart.

O.5 Chart 13218 (32nd ed. 26 June 1993) is the main operating chart used in this section of Rhode Island Sound. Since the primary navigation system in this area is still LORAN-C, it would be beneficial to retain the LORAN-C time delay grid overlaid on this chart.

**P. ADEQUACY OF SURVEY** *SEE ALSO THE EVALUATION REPORT*

P.1 All items investigated during this survey have been addressed. This survey is considered complete and adequate to supersede prior surveys in common areas.

P.2 This survey is complete and contains no substandard data.

**Q. AIDS TO NAVIGATION**

Q.1 The RUDE conducted no correspondence with the U.S. Coast Guard regarding floating aids to navigation.

Q.2 There are no floating aids to navigation located within the boundaries of this survey.

Q.3 There are no floating aids to navigation located within the boundaries of this survey. *FIXED ?*

Q.4 No bridges, overhead cables or overhead pipelines are located within the survey area.

Q.5 No pipelines or designated ferry routes are located within the survey area.

Q.6 No ferry terminals are located within the survey area.





S.2 Forty-three (43) bottom samples were obtained during this survey. As directed by the Project Instructions, all bottom samples were inspected and recorded, but none were submitted to the Smithsonian Institution.

**T. RECOMMENDATIONS**

T.1 See Section O.2 for dangers to navigation noted during this survey.

T.2 RUDE is aware of no construction or dredging that will affect results of this survey.

T.3 No further investigation of the survey area is recommended.

**U. REFERRAL TO REPORTS**

No reports have been published which are not contained within this Descriptive Report.

APPENDIX III

LIST OF HORIZONTAL CONTROL STATIONS

One 2nd Order position disk was used for GPS performance checks during times when no other option was available. See Separate III for a detailed description of this 2nd Order position disk.

GPS corrected by the USCG Differential Beacon system was employed exclusively for all positioning control. The geographic positions for the Differential GPS radio beacons used during this survey are as follows:

Montauk Point, N.Y.	41°04'02.05"N 071°51'38.27"W
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Portsmouth, N.H.	43°04'15.06"N 070°42'36.80"W
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Chatham, Ma.	41°40'16.30"N 069°57'00.16"W
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**U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
Office of NOAA Corps Operations  
NOAA Ship RUDE S-590  
439 W. York Street  
Norfolk, VA 23510-1114**

August 11, 1995

MEMORANDUM FOR: Commander Nicholas E. Perugini, NOAA  
Chief, Atlantic Hydrographic Branch

FROM: Lieutenant Commander *Samuel P. De Bow* Samuel P. De Bow, NOAA  
Commanding Officer, NOAA Ship RUDE

SUBJECT: Report of Dangers to Navigation, H-10605

Per our telephone conversation this morning, attached is an updated Report of Dangers to Navigation that was in the process of being sent to the Coast Guard. Since the compilation for a new edition of Chart 13218 is nearing completion, per your suggestion, I am forwarding this report to you rather than sending it off to the Coast Guard. Although these data are based on predicted tides, I fully agree that application to a new edition of the chart is the highest priority at this time. If after office review, and the application of smooth tides, substantial differences are noted then a Notice to Mariners can be created at that time.

For the record, I fully endorse this proactive method of getting timely hydrographic data to the newest edition of the chart. Since chart edition cycles are getting longer, this is a very efficient way of ensuring the quality of the charting product to the customer.

Attachments



\* THESE DEPTHS AFFECT THE FOLLOWING CHARTS:

Chart 13218 (32<sup>nd</sup> ed. 26 June 93)  
Chart Scale 1:80,000

Chart 13221 (50<sup>th</sup> ed. 15 April 95)  
Chart Scale 1:40,000

** DEPTH (ft)	LATITUDE	LONGITUDE	ITEM
47	41°26'00.168"	071°08'07.301"	ROCK
62	41°25'38.661"	071°08'33.206"	ROCK
54	41°24'41.100"	071°09'00.718"	ROCK
<del>43</del> 44	41°23'16.283"	071°09'30.500"	ROCK
60	41°24'11.264"	071°10'29.378"	ROCK
61	41°24'28.530" .413	071°10'54.730" .778	ROCK
37	41°23'09.992"	071°11'08.169"	WRECK
56	41°23'54.271"	071°11'34.040"	ROCK
62	41°23'31.634" .621	071°11'54.247" .219	ROCK
60	41°23'45.316"	071°12'03.771"	ROCK
64	41°25'04.940"	071°13'28.589"	ROCK
44	41°24'42.220"	071°13'56.770"	ROCK
66	41°25'11.366"	071°14'02.637"	ROCK
66	41°24'38.917"	071°14'07.488"	WRECK

\* Updated depths should be viewed as preliminary information, subject to office review.

\*\* Depth reduced to feet at MLLW using predicted tides.

The investigation was performed in support of the following hydrographic survey:

Hydrographic Survey Registry No.: H-10605  
 State: Rhode Island  
 General Locality: Rhode Island Sound  
 Locality: 3.5nm South of Sakonnet Point  
 Project No: OPR-B302-RU-95  
 Surveyed by: NOAA Ship RUDE





least depth of 20.1 meters (65.9 feet). The Detached Position (fix #12000) was taken immediately following the dive. This position and the MOD III least depth were entered into HDAPS via the Manual Data Entry program as fix #12010. See attached MOD III least depth computation sheet.

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LEAST DEPTH USING SMLGAUGE PROGRAM, VERSION 2.2

NOAA UNIT: RUDE                      YEAR: 1995  
AWOIS NUMBER: WRECK (N)              CONTACT NUMBER: 2157.32P  
DAY-OF-THE-YEAR: 201                  LATITUDE: 41/24/39 N  
START TIME: 16:04                      LONGITUDE: 071/14/07 W

CAST MEASUREMENT INSTRUMENT      SEACAT S/N: 1448 CD: 07/28/93  
LEAST DEPTH DIVER GAUGE, SERIAL NUMBER 68338

DIVER'S PREDIVE GAUGE PRESSURE                      15.06 psia  
DIVER'S GAUGE PRESSURE AT DESIGNATED LEAST DEPTH 44.69 psia

COMPUTED PRESSURE AT DESIGNATED LEAST DEPTH 20.38 decibars  
COMPUTED LEAST DEPTH                                  20.39 meters

Time of LD Measurement (UTC): 1709  
LD Measurement                      (m): 20.39  
Tide Corrector                      (m): -0.3  
Corrected Least Depth              (m): 20.09

Comments: DIVE # 201.1 UNCHARTED WRECK (N)  
CONTACT 2157.32P  
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Recommendation: \_\_\_\_\_  
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Manual Data Entry program as fix #12011. See attached MOD III least depth computation sheet.

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B302-RU-95  
H-10605  
DIVE INVESTIGATION REPORT  
AWOIS 9375  
HDAPS Fix 957.3 (Fatho Hit)  
DIVE 201.3

DATE: July 20, 1995 DN: 201

DIVEMASTER\TENDER - LT CALLAHAN DIVERS - LCDR De Bow

COXSWAIN\TENDER - SS BRAWLEY - ENS HAUPT

VISIBILITY: 10 FEET CURRENT: 0.5 KTS

MAXIMUM DEPTH: 60 FEET BOTTOM TIME: 12 MIN.

METHOD OF POSITION DETERMINATION: DETACHED POSITION

HDAPS POSITION: DSF FIX - 12002 MOD III DIVER L.D. GAUGE: DSF FIX - 12012

EASTING: 38545.1 NORTHING: 20382.6

LATITUDE: 041°26'00.097"N LONGITUDE: 071°08'07.362"W

MOD III DIVER LEAST DEPTH GAUGE COMPUTED DEPTH: 15.6 meters

TIME OF READING: 1838 UTC

~~PREDICTED~~ TIDAL ZONE CORRECTOR: -0.9 meters

LEAST DEPTH DETERMINED AT MLLW: 14.7 meters (48 Ft.)

NARRATIVE REPORT: The object of this dive was a fatho hit (HDAPS fix #957.3) which had been inserted during mainscheme side scan sonar coverage. This item was later developed with the SEABAT shallow water multibeam sonar system as contact 4B9. This contact is AWOIS 9375, a charted wire drag depth of 42 feet.

The dive buoy was dropped in position E=38546.5 and N=20384.8, obtained from HDAPS fix number 957.3. Upon descending the buoy line, divers found that the buoy anchors had landed 3 feet from the base of a large rock. The rock was located on top of a gently rising shoal and surrounded by other, smaller boulders. The base of the rock was approximately 15 feet in diameter and had an angular, irregular shape. It tapered to a pinnacle at the top, which rose up off the seafloor 10 feet by diver's depth gauge. This pinnacle was the least depth location. The dive buoys were relocated to this point and tied off. The MOD III diver least depth gauge yielded a ~~predicted~~ <sup>APPROVED</sup> tide corrected least depth of 14.7 meters (48.2 feet) at the pinnacle. The Detached Position (fix #12002) was taken immediately following the dive. This position and the MOD III least depth were entered into HDAPS via the Manual Data Entry program as fix #12012. See attached MOD III least depth computation sheet.



B302-RU-95  
H-10605  
DIVE INVESTIGATION REPORT  
Uncharted Wreck (S)  
HDAPS Fix 3982.1  
DIVE 205.1

DATE: July 24, 1995 DN: 205

DIVEMASTER\TENDER - LCDR DE BOW

DIVERS - LT CALLAHAN

COXSWAIN\TENDER - SS BRAWLEY

- ENS HAUPT

VISIBILITY: 20 FEET

CURRENT: 0.5 KTS

MAXIMUM DEPTH: 75 FEET

BOTTOM TIME: 19 MIN.

METHOD OF POSITION DETERMINATION: DETACHED POSITION

HDAPS POSITION: DSF FIX - 12003 MOD III DIVER L.D. GAUGE: DSF FIX - 12013

EASTING: 34356.3

NORTHING: 15126.5

LATITUDE: 041°23'09.992"N

LONGITUDE: 071°11'08.169"W

MOD III DIVER LEAST DEPTH GAUGE COMPUTED DEPTH: 11.7 meters

TIME OF READING:

1448 UTC

~~PREDICTED~~ TIDAL ZONE CORRECTOR:

-0.2 meters

LEAST DEPTH DETERMINED AT MLLW:

11.5 meters (37 Ft.)

NARRATIVE REPORT: The object of this dive was side scan sonar contact 1352.12S, which was investigated by echosounder and SEABAT during development 1501. This contact was not associated with an AWOIS item.

The dive buoy was dropped in position <sup>4/23/09.989</sup> E=34352.5 and <sup>7/11/08.333</sup> N=15126.4, taken from HDAPS fix number 3982.1. Upon descending the buoy line, divers found that the buoy anchors had landed approximately 3 feet from the bow of a well preserved steel-hulled wreck that was encrusted with marine growth. Further investigation revealed that the wreck was lying on its keel in approximately 75 feet of water (by divers depth gauge), rising up approximately 35 feet off the seafloor and listing slightly to port. The overall condition of the wreck indicated that it sank approximately 3 - 5 years ago. The wreck is a steel-hulled stern trawler intact with superstructure, pilot house, deck machinery and outriggers. The outriggers were in the up position and contained their rigging. The shaft is believed to be still intact and buried into the surrounding sandy bottom. The overall length was measured to be about 120 feet, with a beam of 25-30 feet.

The least depth was determined to be at the top of the mast of the wreck. The divers relocated the dive buoy and tied it off on this least depth location.

Least depth readings were taken at this point with the MOD III diver least depth gauge, which yielded a ~~predicted~~<sup>APPROVED</sup> tide corrected least depth of 11.5 meters (37.7 feet). The Detached Position (fix #12003) was taken immediately following the dive. This position and the MOD III least depth were entered into HDAPS via the Manual Data Entry program as fix #12013. See attached MOD III least depth computation sheet.

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LEAST DEPTH USING SMLGAUGE PROGRAM, VERSION 2.2

NOAA UNIT: RUDE                      YEAR: 1995  
AWOIS NUMBER: WRECK (S)            CONTACT NUMBER: 1501  
DAY-OF-THE-YEAR: 205                LATITUDE: 41/23/10 N  
START TIME: 16:04                    LONGITUDE: 071/11/08 W

CAST MEASUREMENT INSTRUMENT    SEACAT S/N: 1448 CD: 07/28/93  
LEAST DEPTH DIVER GAUGE, SERIAL NUMBER 68338

DIVER'S PRE-DIVE GAUGE PRESSURE                      14.90 psia  
DIVER'S GAUGE PRESSURE AT DESIGNATED LEAST DEPTH    31.85 psia

COMPUTED PRESSURE AT DESIGNATED LEAST DEPTH    11.64 decibars  
COMPUTED LEAST DEPTH                              11.68 meters

Time of LD Measurement (UTC): 1448  
LD Measurement (m): 11.68  
Tide Corrector (m): -0.20  
Corrected Least Depth (m): 11.48

Comments: DIVE #205-1 UNCHARTED WRECK (S)

Recommendation: \_\_\_\_\_

B302-RU-95  
H-10605  
DIVE INVESTIGATION REPORT  
AWOIS 8356  
HDAPS Fix 3464.2  
DIVE 205.2

DATE: July 24, 1995 DN: 205

DIVEMASTER\TENDER - LCDR De Bow

DIVERS - LT CALLAHAN

COXSWAIN\TENDER - SS BRAWLEY

- ENS HAUPT

VISIBILITY: 8 FEET

CURRENT: 0.5 KTS

MAXIMUM DEPTH: 58 FEET

BOTTOM TIME: 7 MIN.

METHOD OF POSITION DETERMINATION: DETACHED POSITION

HDAPS POSITION: DSF FIX - 12005 MOD III DIVER L.D. GAUGE: DSF FIX - 12014

EASTING: 36621.8

NORTHING: 15326.3

LATITUDE: 041°23'16.332"N

LONGITUDE: 071°09'30.642"W

MOD III DIVER LEAST DEPTH GAUGE COMPUTED DEPTH: 14.1 meters

TIME OF READING:

1720 UTC

PREDICTED TIDAL ZONE CORRECTOR:

-0.3 meters

LEAST DEPTH DETERMINED AT MLLW:

13.8 meters (45 FT)

NARRATIVE REPORT: The object of this dive was side scan sonar contact number 36.33P, which was investigated by echo sounder and SEABAT during development 9N1. This object is AWOIS 8356, a large rock represented by a charted 51 foot depth.

The dive buoy was dropped in position E=36625.1 and N=15324.8, taken from HDAPS fix number 3464.2. Upon descending the buoy line, divers found that the buoy anchors had landed at the base of very large rock surrounded by a flat sandy bottom. The base of the rock was approximately 15 feet in diameter and rose up off the seafloor 25 feet by divers' depth gauge. The rock was rounded in shape and tapered slightly to a broad, flat top covered with marine growth. The dive buoys were relocated to the top and tied off. The MOD III diver least depth gauge yielded a <sup>41/23/16.283</sup> ~~predicted~~ <sup>71/09/30.50</sup> tide corrected least depth of 13.8 meters (45.3 feet) at the top. The Detached Position (fix #12005) was taken immediately following the dive. This position and the MOD III least depth were entered into HDAPS via the Manual Data Entry program as fix #12014. See attached MOD III least depth computation sheet.

LEAST DEPTH USING SMLGAUGE PROGRAM, VERSION 2.2

NOAA UNIT: RUDE                                 YEAR: 1995  
AWOIS NUMBER: 8356                             CONTACT NUMBER: 9N1  
DAY-OF-THE-YEAR: 205                         LATITUDE: 41/23/16 N  
START TIME: 16:04                             LONGITUDE: 071/09/31 W

CAST MEASUREMENT INSTRUMENT   SEACAT S/N: 1448 CD: 07/28/93  
LEAST DEPTH DIVER GAUGE, SERIAL NUMBER 68338

DIVER'S PREDIVE GAUGE PRESSURE                                 14.82 psia  
DIVER'S GAUGE PRESSURE AT DESIGNATED LEAST DEPTH   35.30 psia

COMPUTED PRESSURE AT DESIGNATED LEAST DEPTH   14.07 decibars  
COMPUTED LEAST DEPTH                                 14.11 meters

Time of LD Measurement (UTC): 1720

LD Measurement (m): 14.11

Tide Corrector (m): -0.30

Corrected Least Depth (m): 13.81

Comments: DIVE # 205.2   AWOIS 8356   CONTACT # 9N1

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Recommendation: \_\_\_\_\_

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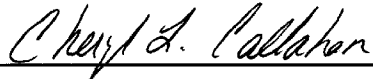
**APPENDIX VII**

**APPROVAL SHEET**

LETTER OF APPROVAL

REGISTRY NO. H-10575

This report and the accompanying field sheets are respectfully submitted.



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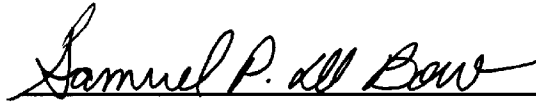
Cheryl L. Callahan, LT, NOAA



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Todd A. Haupt, ENS, NOAA  
Field Operations Officer  
NOAA Ship RUDE

Field operations contributing to the accomplishment of this survey were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and field sheets have been closely reviewed and are considered complete and adequate for nautical charting.



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Samuel P. De Bow, LCDR, NOAA  
Commanding Officer  
NOAA Ship RUDE



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:** September 27, 1995

**HYDROGRAPHIC BRANCH:** Atlantic

**HYDROGRAPHIC PROJECT:** OPR-B302-RU

**HYDROGRAPHIC SHEET:** H-10605

**LOCALITY:** Rhode Island, Rhode Island Sound 3.5 Nautical Miles south  
of Sakonnet Point

**TIME PERIOD:** May 9 - July 24, 1995

**TIDE STATION USED:** 845-0768 Sakonnet Yacht Club, R.I.  
Lat. 41° 27.9'N Lon. 71° 11.6'W

**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 2.60 ft.

**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 3.4 ft.

**REMARKS:** RECOMMENDED ZONING

Times are direct, and apply a X0.92 range ratio to heights using  
Sakonnet Yacht Club, R.I. (845-0768).

- Notes:**
1. Times are tabulated in Greenwich Mean Time.
  2. Data for Sakonnet Yacht Club, R.I. (845-0768), are temporarily stored in file #645-0768.

  
CHIEF, DATUMS SECTION



GEOGRAPHIC NAMES

Name on Survey

A ON CHART NO. 13218, 13221, 13228  
 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

Name on Survey	A	B	C	D	E	F	G	H	K
RHODE ISLAND (title)	X		X						1
RHODE ISLAND SOUND	X		X						2
SAKONNET POINT (title)	X		X						3
									4
									5
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Approved

*Arthur C. Gray*  
Chief Geographer

JAN 17 1996

07/17/96

HYDROGRAPHIC SURVEY STATISTICS  
REGISTRY NUMBER: H-10605

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	4171
NUMBER OF SOUNDINGS	19061

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	51	10/27/95
VERIFICATION OF FIELD DATA	64.50	01/16/96
QUALITY CONTROL CHECKS	0	
EVALUATION AND ANALYSIS	34.50	
FINAL INSPECTION	3	03/04/96
COMPILATION	78	07/12/96
TOTAL TIME	231	
ATLANTIC HYDROGRAPHIC BRANCH APPROVAL		03/08/96

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**ATLANTIC HYDROGRAPHIC BRANCH  
EVALUATION REPORT FOR H-10605 (1995)**

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.

**D. AUTOMATED DATA ACQUISITION AND PROCESSING**

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

Hydrographic Processing System (HPS)  
NADCON, version 2.10  
AUTOCAD Release 12  
QUICKSURF, version 5.1  
MicroStation, version 5.0  
I/RAS-B, version 5.01

The smooth sheet was plotted using an ENCAD NovaJet III plotter.

**H. CONTROL STATIONS**

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD 83). The smooth sheet has been annotated with ticks showing the computed mean shift between the North American Datum of 1983 (NAD 83) and the North American Datum of 1927 (NAD 27).

To place the smooth plots on the NAD 27, move the projection lines 0.377 seconds (11.618 meters or 1.16 mm at the scale of the survey) north in latitude and 1.841 seconds (42.753 meters or 4.27 mm at the scale of the survey) east in longitude.

**L. JUNCTIONS**

FE-373SS	(1992)	1:20,000	north
H-10422	(1992)	1:20,000	to the southwest
H-10575	(1994-95)	1:10,000	to the east
<u>H-10648</u>	<u>(1995)</u>	<u>1:10,000</u>	<u>to the west</u>

A standard junction could not be effected between the present survey and FE-373SS (1992) and H-10422 (1992). The junctional surveys are archived at National Ocean Service (NOS) headquarters, Silver Spring, Maryland. Any adjustments to the depth curves will have to be made during chart compilation.

A standard junction was effected between H-10575 (1994-95) and the present survey.



Survey H-10648 (1995) has not reached an appropriate stage in office processing for comparison. The junction between the present survey and H-10648 (1995) will be addressed in the Evaluation report for H-10648.

There are no junctional surveys to the southeast. Present survey depths are in harmony with the charted hydrography to the southeast.

#### M. COMPARISON WITH PRIOR SURVEYS

A comparison with prior surveys was not made in accordance with section 4. of the memorandum titled, "Changes to Hydrographic Survey Processing," dated May 24, 1995. Attention should be directed to the following:

The following soundings on rocks from prior survey FE-374SS (1992) were brought forward to supplement the present survey:

<u>Ft / M</u>	<u>Latitude</u>	<u>Longitude</u>
51 / 15 <sup>7</sup>	41° 24' 58.85"N	71° 08' 35.25"W
45 / 13 <sup>9</sup>	41° 25' 00.42"N	71° 08' 29.72"W
55 / 16 <sup>8</sup>	41° 24' 57.43"N	71° 08' 13.88"W

#### O. COMPARISON WITH CHART

13218 (32<sup>nd</sup> Edition June 26/93) 20

13221 (50<sup>th</sup> Edition April 15/95) 40

13228 (9<sup>th</sup> Edition June 13/92) 20

The charted hydrography originates with prior surveys and other miscellaneous sources and requires no further consideration. The hydrographer makes adequate chart comparisons in sections N. and O. of the Descriptive Report. Attention is directed to the following:

1. A minor discrepancy was noted on chart 13221 in reference to a charted 38 foot (11<sup>6</sup>m) depth with danger curve and geographic name *Pinnacle Rk*. This feature originates with prior survey H-6445 (1939), and is located in the vicinity of Latitude 41° 24' 06"N, Longitude 71° 09' 00"W. Chart 13221 was recently re-schemed to cover an area farther south than was formerly covered by previous chart editions. After consulting with Hydrographic Surveys Division, it appears that the annotation *Pinnacle Rk* was mistakenly added to the 38 foot (11<sup>6</sup>m) feature as a geographic name. It has since been determined that *Pinnacle Rk* is not a valid geographic name. It is recommended that the name *Pinnacle Rk* be deleted from the chart. Chart a 39 foot (11<sup>9</sup>m) sounding on a rock, with a "Rk" symbol and danger curve, in Latitude 41° 24' 05.99"N, Longitude 71° 08' 55.51"W, obtained from the

present

survey. This rock is charted correctly on chart 13218. It is recommended that the depth be changed to 39 foot (11<sup>9</sup>m), as shown on the present survey.

2. The following charted rocks with soundings originate with prior surveys FE-374SS (1992) and should be removed from the chart:

<u>Ft / M</u>	<u>Latitude</u>	<u>Longitude</u>
47 / 14 <sup>5</sup>	41° 25' 11.40"N	71° 08' 33.67"W
38 / 11 <sup>7</sup>	41° 25' 02.09"N	71° 08' 24.22"W
48 / 14 <sup>8</sup>	41° 25' 05.12"N	71° 08' 22.21"W
52 / 15 <sup>9</sup>	41° 24' 50.50"N	71° 08' 17.38"W
53 / 16 <sup>3</sup>	41° 25' 02.02"N	71° 08' 13.45"W

It is recommended that the above rocks should be superseded by present survey depths in the area.

3. The following charted rocks with soundings originate with prior surveys FE-373SS (1992) and should be removed from the chart:

<u>Ft / M</u>	<u>Latitude</u>	<u>Longitude</u>
42 / 12 <sup>8</sup>	41° 25' 25.32"N	71° 12' 38.27"W
59 / 18	41° 25' 26.48"N	71° 12' 29.61"W
67 / 20 <sup>5</sup>	41° 24' 41.99"N	71° 12' 02.31"W
66 / 20 <sup>3</sup>	41° 24' 48.87"N	71° 11' 53.07"W
68 / 20 <sup>8</sup>	41° 24' 30.45"N	71° 11' 09.75"W
61 / 18 <sup>8</sup>	41° 24' 28.30"N	71° 10' 54.18"W
63 / 19 <sup>4</sup>	41° 24' 38.21"N	71° 10' 21.71"W
68 / 20 <sup>8</sup>	41° 24' 44.14"N	71° 10' 00.35"W

It is recommended that the above rocks should be superseded by present survey depths in the area.

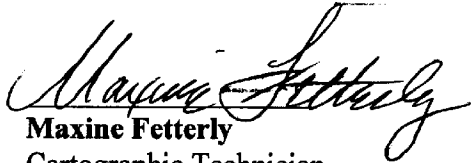
#### **P. ADEQUACY OF SURVEY**

This is an adequate hydrographic/side scan sonar survey. No additional work is recommended.

#### **S. MISCELLANEOUS**

Chart compilation was done by Atlantic Hydrographic Branch personnel in Norfolk, Virginia. Compiled data will be forwarded to Marine Chart Division, Silver Spring, Maryland.

**RUDE Processing Team**



**Maxine Fetterly**  
Cartographic Technician  
Verification of Field Data  
Evaluation and Analysis

APPROVAL SHEET  
H-10605

**Initial Approvals:**

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disapproval of charted data. The digital data have been completed and 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.

Robert G. Roberson Date: 8 MARCH 1996  
Robert G. Roberson  
Cartographer  
Chief, Cartographic Section

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.

Nicholas E. Perugini Date: 8 March 1996  
Nicholas E. Perugini  
Commander, NOAA  
Chief, Atlantic Hydrographic Branch

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**Final Approval:**

Approved: Andrew A. Armstrong, II Date: Jul 29, 1996  
Andrew A. Armstrong, II  
Captain, NOAA  
Chief, Hydrographic Surveys Division

MARINE CHART BRANCH  
**RECORD OF APPLICATION TO CHARTS**

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10605

**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
13228	7-5-96	Robert White	Full <del>Part Before</del> After Marine Center Approval Signed Via Drawing No.
13221	7-5-96	Robert White	Full <del>Part Before</del> After Marine Center Approval Signed Via Drawing No.
13218	9/27/96	Kum F J	Full <del>Part Before</del> After Marine Center Approval Signed Via Drawing No. 71/Apply through AMC through digital files 13221H10.605 and 13228H10.605
12300	7/24/97	B. Stearns	Full <del>Part Before</del> After Marine Center Approval Signed Via Drawing No. 59 (APPLIED THRU 13221 DRG # 63)
			Full Part Before After Marine Center Approval Signed Via Drawing No.
			Full Part Before After Marine Center Approval Signed Via Drawing No.
			Full Part Before After Marine Center Approval Signed Via Drawing No.
			Full Part Before After Marine Center Approval Signed Via Drawing No.
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