10404

Diagram No. 1210-4

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic/Side Scan Sonar

Field No. RU-10-8-91

Registry No. H-10404

LOCALITY

State Rhode Island

General Locality Rhode Island Sound

Sublocality Southeast Entrance to Narragansett Bay

1991-92

CHIEF OF PARTY
LCDR N.E. Perugini

LIBRARY & ARCHIVES

DATE December 27, 1993

☆U.S. GOV. PRINTING OFFICE: 1987—756-980

10404

NOAA FORM 77-28 (11-72) | U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | REGISTER NO.

HYDROGRAPHIC TITLE SHEET

H-10404

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-10-8-91

State: Rhode Island

General locality: Rhode Island Sound

Locality: Southeast Entrance to Narragansett Bay

Scale: 1:10,000 Date of survey: Sep 30 to Nov 6, 1991

Instructions dated: March 11, 1991 Project No.: OPR-B660

Vessel: NOAA Ship RUDE (9040)

Chief of party: LCDR Nicholas E. Perugini

Surveyed by: N. Perugini, P.L. Schattgen, M.J. Oberlies, J.A. Illg, D.E. Williams

Soundings taken by echo sounder:

Graphic record scaled by: NEP, PLS, MJO, JAI, DEW

Graphic record checked by: NEP, PLS, MJO, JAI, DEW

Protracted by: NA Automated plot by: Xynetics 1201 Plotter ~~NA~~ (AHS)

Verification by: ~~NA~~ Atlantic Hydrographic Section Personnel

Soundings in meters at MLLW

REMARKS: All times recorded in UTC

Notes in the Descriptive Report were made in red during office processing

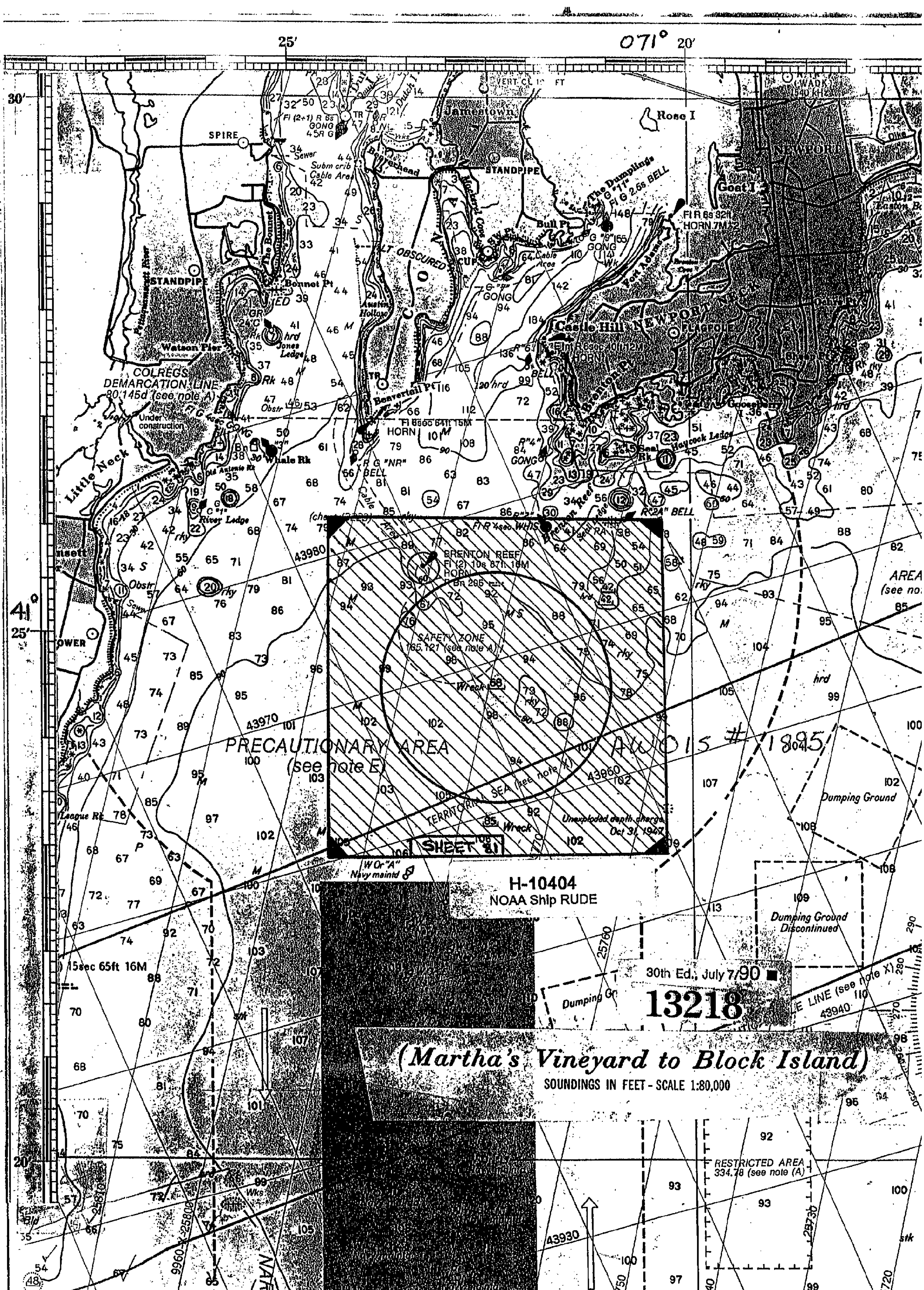
Awois and SURF

MCR 3/7/94

KWW 3/16/94

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

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



25′
071° 20′
30′
41°
25′
20′
Jamestown
Rose I
NEWPORT
Goat I
SPIRE
STANDPIPE
The Dumplings
Bull Pt
Fort Adams
Castle Hill
NEWPORT NECK
Beavertail Pt
Bonnet Pt
Watson Pier
COLREGS DEMARCATION LINE 80.145d (see note A)
Under construction
Whale Rk
Little Neck
River Ledge
LT OBSCURED
BRENTON REEF
SAFETY ZONE 165.121 (see note A)
Wreck
PRECAUTIONARY AREA (see note E)
AWOIS # 1895
TERRITORIAL SEA (see note X)
Unexploded depth charge Oct 31, 1947
SHEET 81
H-10404
NOAA Ship RUDE
Dumping Ground
Dumping Ground Discontinued
30th Ed., July 7/90
13218
(Martha's Vineyard to Block Island)
SOUNDINGS IN FEET - SCALE 1:80,000
RESTRICTED AREA 334.78 (see note (A)

TABLE OF CONTENTS

A. PROJECT

A.1 This survey was conducted in accordance with Hydrographic Project Instructions OPR-B660-RU, Southern New England Coast, Connecticut and New York.

A.2 The original date of the instructions is March 11, 1991.

A.3 The following changes to the original instructions are relevant to this survey:

Change # 1	August 8, 1991
Change # 2	September 3, 1991
Change # 3	October 21, 1991

A.4 A sheet letter was not specified in the project instructions.

A.5 Project OPR-B660-RU-91 responds to requests from the Northeast Marine Pilots, Inc., of Newport, Rhode Island, to verify or disprove and provide least depths for certain wrecks and obstructions in Long Island, Block Island, and Rhode Island Sounds. Also, the U.S. Navy, as well as state and local governments, have requested updated bathymetric and hydrographic survey data of this area for use in proposed studies and in the construction of new charts.

This survey began as a side scan sonar search for the submerged wreck identified in AWOIS item 1895. The search progressed over a circular area with a 2000-meter radius. When it became apparent that the submerged wreck would not be located, the RUDE contacted the Atlantic Hydrographic Section to propose changing the scope of the survey. The area was then reassigned as basic survey H-10404, requiring 200% side scan sonar coverage and standard echo sounding line spacing as specified in the Hydrographic Manual.

B. AREA SURVEYED

B.1 The center of the survey area is located 2.3 nautical miles South of Brenton Point, Rhode Island, in the middle of the inbound Narragansett Bay traffic lane. Charted depths in this area are between 61 and 102 feet (18 to 31 meters), and a wreck (cleared by wire drag to 68 feet) is shown at the center of the circular area.

The primary commercial traffic in the area is deep-draft vessels heading into or out of Narragansett Bay. Large Naval vessels also transit the area.

A circular safety zone is charted in the Northwest quadrant of the area, where traffic is restricted near Brenton Tower. The zone marks the center of the traffic separation scheme established for vessels heading in and out of Narragansett Bay.

For several days of survey operations, a liquid natural gas (LNG) tanker was anchored in the Southwest quadrant of the survey area, while it awaited clearance for transit and eventual cargo transfer in Providence, RI. No indication of this area as a special anchorage is found on the chart.

B.2 The area is shown on the pre-survey review chart as AWOIS item 1895 with a search radius of 2000 meters in GP:

latitude 41° 24, 30.37" N
longitude 071° 22' 28.18" W.

The survey area has the following bounds:

East:	071° 20.9' W
West:	071° 24.0' W
North:	41° 25.6' N
South:	41° 23.4' N

B.3 Data acquisition began on September 30, 1991 (DOY 273) and concluded on November 6, 1991 (DOY 310).

C. SURVEY VESSELS

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

VESSELS	ELECTRONIC DATA PROCESSING NUMBER	PRIMARY FUNCTION
NOAA Ship RUDE (S590)	9040	Hydrography/ Side Scan Operations

C.2 No unusual vessel configurations or problems were encountered.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

D.1 Survey data acquisition and processing were accomplished using the HDAPS system with the following software versions:

Program	Version	Dates Used
SURVEY	6.03	Sep 30 - Nov 6
DAS_SURV	6.04	Sep 30 - Nov 6
POSTSUR	5.14	Sep 30 - Nov 6

D.2 Other software includes VELOCITY 1.11 dated March 9, 1990, used to generate sound velocity corrector tables, and MTEN (dated between 1985 and 1986) for horizontal control verification and establishment.

D.3 Refer to section G for a discussion on problems with the dynamic draft correctors and their reapplication. Refer to section I.5 for a discussion on problems with the Computed-Observed (C-O) table.

E. SONAR EQUIPMENT

E.1 Side scan sonar operations were conducted using an EG&G Model 260 slant range 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 list shows equipment serial numbers and corresponding dates used:

Equipment Type	Serial Number	DOY Used
Recorder	0012105	273 - 280
Recorder	0011443	281 - 310
Towfish	0011908 (Single Freq)	Entire Survey

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

E.3 The 100 Khz frequency was used throughout this entire survey.

E.4 a) The 100 meter range scale was used for all main scheme side scan coverage. The depth of water encountered throughout the survey area always exceeded 20 meters, allowing excellent imagery on the 100 meter range scale.

DGPS was used as the primary positioning system for the majority of this survey. Section 7.3.2.1 of the Field Procedures Manual specifies that side scan sonar line spacing be computed as a function of ECR. Because the ECR has no relevance to DGPS positions and no other specific guidance was offered in Change #2 to the project instructions, a different specification was invoked.

RUDE used a swath overlap of 2 mm at the scale of the survey (20 meters) as the minimum overlap requirement. This specification was taken from an older version of the FPM and has more relevance to DGPS positioning data. In order to meet or exceed this specification, a basic line spacing of 170 meters was used. This provided for a 3 mm (30 meter) swath overlap throughout the survey area.

For positioning controlled by Falcon, the current FPM line spacing specification was utilized:

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

where RS = range scale (100 m)
and ECR = error circle radius.

The predicted ECR did not exceed 10 meters within the survey area, yielding a maximum line spacing of 180 meters. So a conservative spacing of 170 meters was used for all main scheme

coverage when Falcon was the primary positioning system.

b) Daily confidence checks were obtained by either towing the fish past a previously located feature, or by noting recognizable bottom characteristics at the edges of the sonar trace.

c) Two hundred percent side scan sonar coverage was achieved over the entire area. A North-south line scheme achieved the first 100 percent, while an East-west scheme achieved the second 100 percent.

d) No other factors affected the sonar imagery.

e) The towfish was deployed from the stern during the entire survey.

E.5 Due to the number of large ridge-like ("non-point") features located in the survey area, the contact processing procedure was altered for this survey. Instead of logging the large features as individual contacts (which would produce great variations in the contact positions and heights), the general areas of numerous features were noted and targeted for echosounder development.

These areas were then developed by echosounder, using a 42 meter line spacing, and split again (where necessary) to produce an effective line spacing of 22 meters. This process exposed many features, and two particularly prominent ridges were targeted for further development. Final least depths were determined on these features (labeled Developments 1 and 2) by taking detached positions (DP) as the ship held station over their locations.

Using the procedure outlined above, the RUDE is confident that all significant features were adequately developed.

E.6 Coverage was checked "on-line" using the real-time plot, and the edited swath plot for holidays. All holidays were filled in by running additional side scan sonar lines.

F. SOUNDING EQUIPMENT

F.1 All hydrographic soundings were acquired using a Raytheon 6000N digital survey fathometer (DSF). One DSF 6000N was used during the entire survey: S/N A106N.

F.2 No other sounding equipment was used during this survey.

F.3 No faults/defects in sounding equipment affected the quality of sounding data.

F.4 Both the high (100 kHz) and the low (24 kHz) frequency sounding data were recorded during data acquisition. Only high frequency soundings were selected for plotting.

G. CORRECTIONS TO SOUNDINGS

G.1 a) The velocity of sound through water was determined using a Digibar Sound Velocity Probe (S/N 169), made by Odom. A Data Quality Assurance Test was conducted before each velocity cast to ensure the meter was within tolerance.

All data were processed using Velocity 1.11 software. The computed velocity correctors were entered into the HDAPS sound velocity tables and applied on-line to both high and low frequency soundings. Sound velocity correctors applied to this survey were obtained on the following dates:

Cast Number	Date	Latitude	Longitude	HDAPS Table #
15	10-03-91	41° 23.4'N	71° 23.6'W	15
17	10-21-91	41° 22.7'N	71° 19.1'W	17
18	11-04-91	41° 22.4'N	71° 19.9'W	18

b) There were no variations in the DSF-6000N instrument initial.

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

d) Two dual lead line comparisons with the DSF-6000N were made:

April 25, 1991 at 41° 35.6'N 71° 21.3'W (25 ft depths) off sheet limits
July 22, 1991 at 41° 20.9'N 71° 29.1'W (35 ft depths) off sheet limits

The greatest variation between leadline and DSF soundings was less than 0.2 meters for both comparisons. Considering the ship's motion and scope in the leadline from current, this is excellent agreement and provides an excellent check that the echosounder was functioning properly.

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

f) During the winter 1988 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 height above the waterline was determined for this point. The ship's static draft was thereby calculated to be exactly 2.26 meters (7.4 feet). This draft value was applied to the sounding data via the HDAPS offset table.

g) Settlement and squat correctors for the RUDE were determined on the Elizabeth River, Norfolk, Virginia on March 13, 1991. 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. Both runs were averaged and applied to soundings through the HDAPS offset table.

However, the actual corrector values derived from these data were computed incorrectly and consequently used for this survey. This problem was resolved by using the HDAPS program "REAPPLY". See section G.2 for a detailed explanation of this situation.

h) Heave data were acquired by a Datawell heave, roll and pitch sensor (S/N 19128-C), and were applied to soundings in real time. Only the heave corrections were applied to the plotted soundings. Filed with original field records

See SEPARATE IV for all data records concerning corrections to soundings.

G.2 The HDAPS program "REAPPLY" was used for the first time this season to reapply corrector tables to soundings. An evaluation of the most appropriate tables for each day's data was made, and compared to the tables actually used. New tables were then applied to those days which differed.

As stated in section G.1.g settlement and squat values were computed incorrectly and used in all HDAPS offset tables for the season. The "REAPPLY" program was used to correct this problem. Offset table #3 was changed to show the adjusted settlement and squat correctors, and then the table was reapplied to all soundings acquired during this survey.

G.3 As stated in paragraph G.2, corrector tables were reapplied to soundings during processing, so that the most relevant correctors were applied to plotted soundings. The corrected offset table #3 was reapplied to all soundings.

G.4 Pneumatic depth gauges were not used during this survey.

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

G.6 a) The tidal datum for this project is mean lower low water. The operating tide station at Newport, Rhode Island (845-2660) served as direct control for datum determination. This station also served as the reference station for predicted tides. Data for Newport tides was provided on floppy magnetic disk before the start of the project, and input into the HDAPS tide tables for application to soundings.

b) Since the survey area was geographically close to the Newport tide gauge, no height and time corrections were applied to the (Newport) digital tide data. Therefore, predicted tide values are consistent with the uncorrected data from station # 1157 found in Table 2 of the East Coast of North and South America Tide Predictions, and were applied on-line through HDAPS tide tables 9, 10, and 11.
Approved tides & zoning were applied during office processing

c) Zoning for this project is consistent with the project instructions.

A request for smooth tides was mailed on December 6, 1991.

*Copies of all data sheets, tables, calibrations, etc., referred to in this section are provided in APPENDIX V.

* Removed from original Descriptive Report (filed with field records)

H. CONTROL STATIONS See also Section 2.a. of the Evaluation Report

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

H.2 The list of Horizontal Control Stations is located in Appendix III. Appended to this report

H.3 Newly established horizontal control stations were surveyed using standard NGS approved surveying techniques, primarily the "Geodetic Direct" and "Resection" procedures. The data were then entered into the NGS software "MTEN", which computed the latitude and longitude of the new station (referred to the NAD 83 ellipsoid).

Existing stations were verified by comparing observed horizontal angles and distances (to known stations) with angles and distances provided by inverse computations using "MTEN".

The following list describes the origins of the horizontal positions used for each of the 4 stations on which (positioning) equipment was located:

3 stations - Offsets from Lighthouses with NGS positions (sta 120, 121, 122)

1 station - Established by a Direct computation from an NGS station (sta 125)

All NGS horizontal control stations used during this survey are Third-order.

H.4 All horizontal control stations are within the two Quadrants 410712, and 410713. All are referenced to NAD 83.

H.5 Refer to the Horizontal Control Report (submitted to N/CG 233 under separate cover) for specific procedures and sites surveyed by the RUDE.

H.6 No photogrammetric problems or positioning anomalies were encountered during this survey.

I. HYDROGRAPHIC POSITION CONTROL

See also Section 2.9. of the Evaluation Report

I.1 Two systems were used for vessel positioning during the survey: Falcon Mini-Ranger, and the Differential Global Positioning System (DGPS). A detailed discussion of DGPS navigation is contained in Section I.4. The operating dates of the systems are as follows:

DGPS	(with 2-3 Falcon LOP check)	DOY 273 - 277 DOY 280 (fix #'s: 589-612 and 800-840) DOY 296
Falcon	(3-4 LOP's)	DOY 280 (fix #'s: 566-588 and 613-799) DOY 281 - 290 DOY 308 & 310

I.2 Accuracy requirements were met when either positioning system was primary, as specified by the Hydrographic Manual, Field Procedures Manual (FPM), and change # 2 to the project instructions regarding DGPS.

I.3 Control Equipment:

Mini-Ranger:
Falcon 484 by Motorola Inc.
Serial Numbers:

RPU	F-0246	
R/T	F-3409	
R/S:	E-2926	(code 8)
	E-2969	(code 6)
	F-3241	(code 4)
	F-3297	(code 2)

GPS:
Both by Magnovox: MX 4200D Differential GPS Receiver S/N 199
MX 50R DGPS Receiver (correctors) S/N 036

I.4 Calibration descriptions for each of the two positioning systems follow:

Falcon:

As stated in section 3.1.3.3 of the Field Procedures Manual for Hydrographic Surveying, a continuous critical system check is obtained "when data are acquired with three or more LOP's and ECR and maximum residual criteria are being met as required in section 3.1.3.1" (of the same manual). RUDE routinely conducted survey operations using at least three LOP's (when Falcon was primary), and all other positioning criteria were met as required (see section I.2).

A pre-project baseline calibration of the Mini-Ranger system was conducted at the Atlantic Marine Center on March 6, 1991. Two baseline calibrations were conducted in Bristol, RI on June 2 and July 14, 1991 and one in Newport, RI on October 19, 1991. See the Electronic Control Report submitted under separate cover for data records of the calibrations.

* Calibrations are filed with the original field records

GPS

As stated in section 6.2 of the Project Instructions (change No. 2 dated 3 September 1991), "Differential GPS ... can be used for this project as the Primary positioning system" with the following 1:10,000-scale accuracy requirements:

1. As a DGPS system check, at least one Falcon range is to be recorded twice daily in a static mode, and must agree within 5 meters of the DGPS position.
2. During data acquisition, at least one Falcon range must be recorded and the computed residual must be less than 10 meters.
3. Survey operations may not be conducted when the HDOP exceeds 3.0.
4. Four satellites must be used for the DGPS position computation.

As DGPS was still new (during this survey) as the primary positioning system, extreme care was taken by the RUDE to insure the above requirements were met. The following are some observations on the acquisition procedures and actual performance of the DGPS system:

1. The HDAPS survey acquisition program (DAS_SURV) was modified by LCDR Perugini so that the HDOP was recorded and printed out with every selected sounding. Also, an extra line was added to the header information preceding each survey line, stating that DGPS is the primary positioning system. This information is found on the raw data printout.

2. One to three Falcon ranges were recorded simultaneously with all data collected when DGPS was the primary positioning system. The maximum residual of these ranges was recorded on the raw data printout (as well as electronically), and scanned off-line for residuals greater than 10 meters. Normally, the maximum residual was below 5 meters and never consistently exceeded 10 meters.

3. Survey operations were suspended when the HDOP value consistently exceeded 3.0. Generally, whenever this value exceeded 2.5, the position would begin to deteriorate. High HDOP values were not a significant positioning problem, as the duration was relatively short (several seconds) and the condition would correct itself.

4. Whenever less than four satellites were being tracked by the DGPS unit, the HDOP would normally rise above 3.0, the

residuals would climb, and the position would generally degrade. Generally, 5 to 6 satellites were visible and the same number were used in the position solution. Rarely were there too few satellites to survey.

5. Overall, it was obvious when the DGPS position was in error, because any (usually several) of the following conditions would occur: the position would jump, the HDOP would climb, the residuals would climb, the number of satellites would drop below four, or the DGPS system would switch from "NAV" (navigating) to "TRK" (tracking). However, these conditions were not overly common, and rarely did a positioning problem with this system cause substantial "downtime". Whenever poor DGPS positioning was persistent, the Falcon system was selected as primary or operations were suspended until the DGPS system was operational.

See SEPARATE III for all positioning calibration data.
* Removed from original D.R., filed with field records

I.5 Only the Falcon system required calibration data to be applied to raw ranges. The range corrector and minimum acceptable signal strength (MASS) for each Mini-Ranger Reference Station was entered into the HDAPS system using the Pre-Survey Computed-Observed (C-O) table. These tables provided the mechanism by which HDAPS automatically applies the proper range corrector and removes from the position computation those LOP's with signal strengths below MASS.

Problems were encountered in the application of correctors to the Falcon ranges when the C-O table was not updated after DOY 292 (the fourth baseline calibration). Prior to DOY 292 when Falcon was the primary positioning system (specifically DOY's 280, 281, and 290), sounding positions were accurate since proper correctors were applied. The following table illustrates the problem data:

HDAPS Sheet #	DOY	Codes with Incorrect Correctors	Primary Navigation System	Remarks
81	296	4,6,8	DGPS	no effect on positioning
	308	4,6,8	Falcon	positioning in error (bottom samples only)
	310	4,6,8	Falcon	positioning in error (bottom samples only)

When DGPS was the primary navigation system (DOY 296), positioning was unaffected by erroneous correctors, since the Falcon ranges were used solely for comparison. Therefore, only DOY's 308 & 310 were affected by incorrect C-O values. Only bottom samples were acquired on these days.

To determine the magnitude of positioning error on these two

days, the HDAPS utility "PREDICT ECR'S" was utilized. Four positions were entered separately using the "Go to a Point" function key, and the difference between range corrector values was entered using the "Select Bias" function key. The program then computed a second position using the bias values, and displayed the differences between actual and biased positions. The following table shows the bias value computations, positions used, and differences in positions for the four positions tested:

Bias Computation:

Station Number	Code	Applied Corrector	Actual Corrector	Diff	Bias Value
120	8	-3.36	-1.88	-1.48	+2
121	4	-3.94	-2.00	-1.94	+2
122	6	-3.5	-2.26	-1.24	+1

Position Difference:

DOY	Fix Number	Delta Position
308	1115	3.2 m
	1117	4.0 m
310	1118	3.9 m
	1125	3.6 m

Average = **3.7 meters**

As shown above, the position error caused by bad corrector values is less than 5 meters. Again, since these are non-sounding positions used solely for bottom samples, the positions have not been recomputed.

I.6 a) See section I.4 for DGPS operating procedures and adequacy standards.

b) There were no occurrences of equipment malfunctions or substandard operation.

c) There were no occurrences of unusual atmospheric conditions that may have affected data quality.

d) There were no occurrences of weak signals or poor geometric configurations of a duration to significantly compromise data quality.

e) Refer to section I.5 for an explanation of problems encountered due to incorrect C-O table values.

f) Antenna positions were corrected for offset and layback, and referenced to the position of the DSF 6000N transducer. These correctors were entered in the HDAPS Offset table, and

applied on-line to the positioning algorithm. Refer to SEPARATE III for a copy of offset table 3, which was the only table used during this survey.

g) Offset and layback distances for the A-frame (tow point) were entered in the HDAPS Offset table and 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. *Refer to SEPARATE III for offset table number 3.

* Removed from original D.R., filed with ~~field~~ field records

J. **SHORELINE** See Section 2, b, in the Evaluation Report

No shoreline areas are present within the limits of this survey.

K. **CROSSLINES** See Section 3, a. in the Evaluation Report

K.1 30% of all lines are crosslines, the remainder are mainscheme (this high percentage is because a full 100% side scan coverage was run in the East-West direction).

K.2 The agreement between mainscheme and crosslines is very good, generally less than 0.2 meters (0.6 feet), and rarely exceeding 0.3 meters (1 foot).

K.3 No significant differences between mainscheme and crosslines were noted.

K.4 The same sounding equipment was used to run both the mainscheme and crosslines.

L. **JUNCTIONS** See Section 5. in the Evaluation Report

This survey does not junction with any current basic survey.

M. COMPARISON WITH PRIOR SURVEYS See Section 6. in the Evaluation Report

M.1 The following prior surveys are applicable to this survey:

Survey #	Scale	Year
H-8315	1:12,500	1956
H-6444	1:40,000	1939

M.2 AWOIS item 1895 is the only item that lies within the survey area, but does not originate with a prior survey and is addressed in section N.2.

M.3 To facilitate the comparison with the prior survey, a sounding plot was drawn at a 1:12,500 scale (with NAD 27 ticks) to be overlaid on survey H-8315. The quality of agreement between the surveys is very good - within 0.9 meters (3 feet) overall, and the majority within 0.6 meters (2 feet). All depths acquired during this survey are deeper than those of survey H-8315.

M.4 Soundings from this survey are generally 0.6 meters (2 feet) deeper than depths from prior surveys. The differences tend to increase moving North to South (1-2 feet increasing to 2-3 feet). The "90 feet" curve which passes through both the current survey and the prior survey has shifted North, approximately 100-200 meters.

M.5 Located within the survey area are two shoals from prior survey H-8315, one in the Northwest quadrant (Development # 1) and one in the Southeast quadrant (Development # 2). Both shoals were found during the current survey with the least depths corresponding as follows: See also Section 6.A.2. in the Evaluation Report

Dev #	Prior Depth	Current Depth	Fix Number	Latitude	Longitude
1	61	62	~~1087~~ 1084	41° 25' 15.061"N	071° 23' 20.641"W
2	72	72	1106	41° 24' 15.660"N	071° 21' 55.082"W

Present survey soundings should supersede prior survey depths.

M.6 All features and significant depths from prior surveys (which lie within this survey's area) were found during this survey.

M.7 There are no known authoritative non-NOS surveys which cover the area within this survey.

N. COMPARISON WITH THE CHART See also Section 7. in the Evaluation Report

N.1 The following charts are affected by this survey:

Chart #	Edition	Date	Scale
13218	~~33~~ 30	7 Jul, 1990	1:80,000
13221	46	4 Nov, 1989	1:40,000

The above charts have had no notice to mariner updates affecting the survey area.

N.2 The boundaries of this survey were determined from the 2000 meter search radius of AWOIS item 1895. This item is the only one within the survey area.

AWOIS 1895

Charted Feature: "Wreck" cleared to 68 feet by wire drag

Charted Position: 41° 24' 30.37" N 071° 22' 28.18" W

Source: Reported sunk by Marine Casualty on 12 July, 1943.
Prior surveys:

H-7029/48WD, 1:20,000
H-8315/56, and 1:12,500
FE-194WD/64 & 03 1:20,000, 1:40,000, 1:80,000
H-6444 (1939) 1:40,000

It should be noted that all of the above surveys found no indication of the wreck, although it remained charted. The cleared depth of 68 feet was taken from survey FE-194WD/64, but both wire drag surveys reported no hangs in the area.

Investigation Description: The entire area was covered by 200 percent side scan sonar coverage, the first 100% in the North-South direction, and the second 100% in the East-West direction.

Investigation Results: Many large irregular rocky features were discovered with the side scan sonar, and eventually developed by echosounder. However, none of these features resembled a barge and were not considered to be AWOIS item 1895.

Charting Recommendation: Delete the currently charted "Wreck" and cleared depth of 68 feet from the chart.

The three prior surveys of the area (two wire drag and ~~one~~ two basic) have shown no indication of a wreck - the wire drag surveys cleared with no hangs. For this survey, the wreck was not seen on the full 200% side scan sonar search of the area, and is therefore either nonexistent or insignificant. – wreck found during verification
* See addendum to this report (section N.)

N.3 There were no dangers to navigation reported during this survey.

N.4 No chart mark-up was supplied for this survey, so the exact

origin of charted depths was unknown, but was assumed to be from the most recent prior survey (H-8315). Soundings from the current survey were compared to charts 13221 and 13218, and were generally 0.6 meters (2 feet) deeper than charted depths. No discrepancies greater than 0.9 meters (3 feet) were noted, and depths from the two charted shoals agreed within 0.3 meters (1 foot) of echosounder least depths.

N.5 Features originating with prior survey H-8315 are discussed in section M.5. No other non-sounding features were discovered during this survey.

N.6 No changes to the scale, coverage, or format of the published charts of the survey area are recommended.

O. ADEQUACY OF SURVEY See also Section 9 of the Evaluation Report

O.1 This survey is complete and adequate to supersede prior surveys. All assigned AWOIS Items and newly discovered features within the boundaries of this survey have been resolved.

O.2 When reviewing the sonargrams of this survey, some question may be raised as to whether or not all the features seen on the side scan trace were adequately depicted by echosounder (without actually entering any contacts).

The heights of all "stand-alone" (point) features were computed from the side scan record. None of these features met the "significant" criteria (height greater than 10% of the water depth), and were ignored. For larger features, side scan height and position computations are inaccurate, because of their size and shadow distortion due to slope.

The RUDE feels that through the echosounder development process outlined in section E.5, the numerous large features within this survey area have been adequately developed, and that no part of this survey is incomplete or substandard.

P. AIDS TO NAVIGATION See also Section 7.b. of the Evaluation Report

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

P.2 No aids to navigation were investigated for positioning during this survey.

P.3 No other aids were located during the survey.

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

P.5 No submarine cables, pipelines or ferry routes are located within the survey area.

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

Q. STATISTICS

Q.1	a. Number of positions:	1125
	b. Lineal nautical miles of sounding lines:	152
Q.2	a. Total square nautical miles of hydrography	4
	b. Total days of production	10
	c. Detached positions	31
	d. Bottom samples	16
	e. Tide stations	1
	f. Current stations	0
	g. Velocity casts	3
	h. Magnetic stations	0
	i. XBT drops	0

R. MISCELLANEOUS

R.1 No information resulting from this survey is considered to be of significant scientific or practical value.

R.2 Bottom samples were not submitted to the Smithsonian Institution. Filed with original field records

S. RECOMMENDATIONS

S.1 No survey inadequacies have been noted.

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

S.3 Survey soundings should supersede all other prior survey depths. No further investigation of this area is recommended.

T. REFERRAL TO REPORTS

RUDE Electronic Control Report - 1991 Field Season
(submitted to N/CG244 concurrent with this survey)

Horizonal Control Report - 1991 Field Season
(submitted by N/CG23322)

A. PROJECT

A.1 This survey was conducted under project number OPR-B660-RU-92 and Change No. 1 to that project.

A.2 The original date of the project instructions is February 12, 1992.

A.3 The following changes are relevant to this project:

Change No. 1, dated April 2, 1992, updated the AWOIS printout, dated March 1, 1991 to address the additional work required for AWOIS item 1895. This change also authorized the implementation of the Pilot Partnership Processing Project.

Change No. 2, dated April 14, 1992, states that all AWOIS item surveys shall be at the scale of 1:20,000 when the largest scale chart of the area is smaller than 1:20,000. When the largest scale chart of the area is 1:20,000 or larger, the scale of the survey shall be 1:10,000.

Although this survey was authorized to be conducted at a scale of 1:20,000, it was conducted at 1:10,000. That (1:10,000) was the scale of the original survey H-10404 and for purposes of uniformity this survey was conducted at that scale.

A.4 There is no sheet letter.

A.5 This survey originally began in 1991 as a side scan sonar search for the submerged wreck identified in AWOIS item 1895. The search progressed over a circular area with a 2000-meter radius. When it became apparent that the submerged wreck would not be located, the RUDE contacted the Atlantic Hydrographic Section to propose changing the scope of the survey. The area was then reassigned as basic survey H-10404.

This 1992 survey consisted of additional work resulting from preprocessing of survey H-10404 completed by the NOAA Ship RUDE during the 1991 field season. The Atlantic Hydrographic Section found during preprocessing of that survey evidence on sonargrams of what appeared to be AWOIS item 1895.

B. AREA SURVEYED

B.1 This survey consists of one item located approximately 0.5 nautical miles south of Brenton Reef Tower at the entrance to Narragansett Bay, Rhode Island. This item is identified on the chartlet preceding the table of contents of this descriptive report.

B.2 The approximate limits of this survey are within a one hundred meter radius of 41° 25' 00.5" N and 071° 23' 25.5" W.

B.3 Data acquisition began and was completed on July 7, 1992 (DN 189).

C. SURVEY VESSELS

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

VESSELS	ELECTRONIC DATA PROCESSING NUMBER	PRIMARY FUNCTION
NOAA Ship RUDE (S590)	9040	Hydrography/ Side Scan Operations
RUDE Launch (RU3)	1290	Diving Operations

C.2 No unusual vessel configurations or problems were encountered.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

D.1 Survey data acquisition and processing were accomplished using the HDAPS system with the following software versions:

Program	Version	Dates Used
SURVEY	6.10	Entire Survey
DAS_SURV	6.20	Entire Survey
POSTSUR	5.20	Entire Survey

D.2 Other software includes VELOCITY 1.11 dated March 9, 1990 used to generate sound velocity corrector tables.

D.3 There was no nonstandard automated data acquisition or processing methods used.

E. SONAR EQUIPMENT

E.1 Side scan sonar operations were conducted using an EG&G Model 260 slant range corrected side scan sonar recorder and a Model 272-TD (dual frequency) towfish. All side scan operations were conducted from the RUDE (vessel #9040). The corresponding dates used:

Equipment Type	Serial Number	Dates Used
Recorder	10823	DN 189
Towfish	0012104 (Dual Freq.)	DN 189

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

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

E.4 **a)** The side scan sonar towfish was used on a very limited basis for this survey and exclusively with the use of the 100 meter range scale. Only two side scan sonar lines were run. The first was made past the geographic position of this item to initially locate it. The only other line was run by the deployed dive buoy and the 100 kHz pinger to check the position of it in proximity to the item. The total amount of side scan sonar lines run was 0.25 NM.

b) No confidence checks were obtained.

c) Only very limited coverage was obtained with the use of side scan sonar. It was not intended to be used for any significant coverage, only to find an item whose geographic position was considered very reliable.

d) The only towfish aboard was marginally operable. It had no port channel, only a starboard channel. This was compensated for by selecting survey lines that would place the item on the starboard channel.

e) The towfish was deployed from the stern for this entire survey.

E.5 This item was investigated by divers.

E.6 Processing procedures were straight forward since only one distinct contact, AWOIS 1895, was found during this survey.

F. SOUNDING EQUIPMENT

F.1 All hydrographic soundings were acquired using a Raytheon 6000N Digital Survey Fathometer (DSF). One DSF 6000N was used during the entire survey: S/N A106N.

F.2 One diver investigation was conducted during this survey. Divers did not determine a least depth on it by use of a pneumatic depth gauge.

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

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

G. CORRECTIONS TO SOUNDINGS

G.1 a) The velocity of sound through water was determined using a Digibar Sound Velocity Probe (S/N 169), made by Odom. A Data Quality Assurance Test was conducted before the velocity cast to ensure the meter was within tolerance.

All data were processed using Velocity 1.11 software. The computed velocity correctors were entered into the HDAPS sound velocity table and applied on-line to both high and low frequency soundings. The sound velocity correctors applied to this survey are based on the cast recorded on the following date:

Cast Number	Date	Latitude	Longitude	HDAPS Table #	Applied to Days
10	183	41° 25.9' N	70° 59.8' W	10	189

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

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

d) A dual lead line comparison with the DSF-6000N was made in the project area.

DN 097 at 41° 26.0' N 71° 15.0' W (75 ft depths)

The greatest variation between leadline and DSF soundings was 0.2 meters. Considering the ship's motion and the wire angle in the leadline from current (approximately 5°), this is excellent agreement and provides an adequate check that the echosounder was functioning properly. Data from these comparisons are found in Separate IV.

Both of the leadlines used in the leadline to DSF 6000 comparison were calibrated by steel tape prior to the above comparison. An average leadline correction of -0.3 feet was applied in comparisons between the DSF-6000 and the ship's leadlines.

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

f) During the winter 1988 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 height above the waterline was determined for this point. The ship's static draft was thereby calculated to be exactly 2.26 meters (7.4 feet). This draft value was applied to the sounding data via the HDAPS offset table.

g) Settlement and squat correctors for the RUDE were determined on the Elizabeth River, Norfolk, Virginia on March 13,

1991. 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 toward and away runs were averaged and applied to soundings through the HDAPS offset table.

h) Heave data were acquired by a Datawell heave, roll and pitch sensor (S/N 19128-C), and were applied to soundings in real time.

See Separate IV for data records. Filed with original field records

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

G.3 No correctors needed to be reapplied after the survey.

G.4 A pneumatic depth gauge was not used in conjunction with this survey.

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

G.6 a) The tidal datum for this project is Mean Lower Low Water. The operating tide station at Newport, Rhode Island (845-2660) served as direct control for datum determination. This station also served as the reference station for predicted tides. Data for predicted tides were provided on floppy magnetic 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 the HDAPS software. The subordinate station for predicted tides was:

NO.	PLACE		TIME		HEIGHT	
			High water	Low water	High water	Low water
1149	Sakonnet	41°28'N 71°12'W	-0 13	-0 01	*0.88	*0.86

* Tidal correctors were applied on-line using the HDAPS predicted tide table number 7.

c) Zoning for this project is consistent with the project instructions.

A request for smooth tides was mailed on July 8, 1992.

* Approved tides & zoning were applied during office processing

H. CONTROL STATIONS See also Section 2.a. of the Evaluation Report

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

H.2 This survey was conducted solely with the use of Differential Global Positioning System (DGPS).

H.3 No horizontal control stations were established for this survey.

H.4 DGPS was used for the entire survey area.

H.5 No horizontal control report will be submitted for this survey.

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

I. HYDROGRAPHIC POSITION CONTROL

See also Section 2.a. in the Evaluation Report

I.1 This survey was conducted entirely with the use of the DGPS.

I.2 Accuracy requirements were met as specified by section 3.4 of the Field Procedures Manual (FPM). Never during survey activities did the expected positional error (EPE) exceed 13.3 meters. An EPE of that value occurred for only one selected sounding. Other than that exception, the EPE never exceeded 8.9 meters. This is within the authorized maximum of 1.5 mm at the scale of the survey or 15 meters for this survey. The HDOP never exceeded 3.3 while the authorized maximum is 3.7 as derived by the formula in the FPM. An HDOP value of 3.3 occurred for only one selected sounding. Other than that exception, the HDOP never exceeded 2.2. At all times at least four satellites were used for positioning.

I.3 Control Equipment:

Ashtech GPS Sensors (1)
S/N CD0000458769
Firmware Version: 1E03 Receiver Version: TD08

Magnavox MX50R DGPS Receiver
S/N 036

I.4 A DGPS system performance check was conducted with correctors received from Montauk Point on DN 189, the day of data acquisition for this survey. This procedure was completed approximately 20 nautical miles to the east in an area with an established Falcon Mini-Ranger network. By using HDAPS's Position Data and Quality Figures program within the Survey environment, three consecutive DGPS performance checks were obtained. All three recorded DGPS/Falcon positions compared to each other within the maximum allowable inverse distance (delta P_{max}) between the two as computed by HDAPS. The results of this performance check are included in SEPARATE III.

I.5 No calibration data were applied to the raw positioning data.

I.6 **a)** See section I.2 and I.4 for DGPS operating procedures and adequacy standards.

b) There were no occurrences of equipment malfunctions or substandard operation.

c) There were no occurrences of unusual atmospheric conditions that may have affected data quality.

d) Never did the DGPS position degrade beyond the authorized limits outlined in section I.2.

e) No systematic errors were detected that required adjustments.

f) Antenna positions were corrected for offset and layback, and referenced to the position of the DSF 6000N transducer. These correctors were located in the HDAPS Offset table, and applied on-line to the positioning algorithm. Refer to Separate III for a copy of offset table 1.

g)* Offset and layback distances for the A-frame (tow point) were located in the HDAPS Offset table and 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. Refer to Separate III for a copy of Offset Table 1.

* Filed with original field records

J. **SHORELINE** See section 2.b. in the Evaluation Report

No field sheets encompassed any shoreline.

K. **CROSSLINES** See section 3.a. in the Evaluation Report

A very limited amount of soundings were acquired during this survey. However, a comparison of crossline (east-west) and mainscheme (north-south) soundings was made. The results show the soundings to agree by 0.2 meters within a 10 to 15 meter radius of the scale of the field sheet (1:2,500).

L. **JUNCTIONS** See Section 5. in the Evaluation Report

This survey does not junction with any current surveys.

M. **COMPARISON WITH PRIOR SURVEYS** See Section 6. in the Evaluation Report

The comparison between soundings from this survey and prior surveys is to be addressed by the Atlantic Hydrographic Section.

N. COMPARISON WITH THE CHART See also section 7.a. in the Evaluation Report

AWOIS 1895

N.1 The object of this investigation was a barge that was originally investigated during 1991 survey H-10404. It was considered disproved and recommended that the wreck notation and cleared to 68 feet symbol be removed from the chart. During office processing of that survey by AHS, a wreck-like feature was found on the sonargrams. The AWOIS description was updated to reflect this new information and the geographic position was changed based on those sonargrams. Change No. 1 to the project instructions for OPR-B660-RU-92 mandated further investigation of what was thought to be AWOIS item 1895.

N.2 Item Location

Geographic position provided was: 41° 25' 00.50" N
71° 23' 25.50" W

N.3 Source of Item

Originally reported in 1943 and subsequently investigated in surveys; H7029/48WD, H8315/56, FE194WD/64, and H10404/91. Change No. 1 to the project instructions for OPR-B660-RU-92 updated the AWOIS description for this item.

N.4 Largest Scale Chart Affected

Chart 13221, scale 1:40,000, edition 47 dated March 23, 1991.

-the search area is **not** fully contained on this chart

Chart 13218, scale 1:80,000, edition 31 dated January 11, 1992.

-the search area is fully contained on this chart

N.5 Investigation Procedures

This item was investigated by first making one side scan sonar pass past the geographic position of the item. It was located on this pass. The towfish was recovered, a position was computed and several echosounder lines were run over the position to facilitate deploying a dive buoy. No evidence of the item was found on the echogram making it difficult to deploy the dive buoy with confidence. Finally, the dive buoy was dropped based on the computed position of the item rather than by its image on the echogram. After the buoy (and 100 kHz pinger) was deployed a side scan sonar pass was made to verify that the position of the dive buoy was on the wreck.

The next phase was a diver investigation. Divers found and investigated the wreck and then placed the buoy in a central location on the wreck. The divers found a very deteriorated barge approximately 6 meters wide by 25 meters long. It rose

above the bottom no more than 1/3 meter. The AWOIS description for this item describes it only as a barge. In that respect, the wreck the divers investigated is consistent with the description of AWOIS 1895. No pneumatic depth gauge was used to determine a least depth on this item. Given the depth of the water at over 100 feet and the very little rise above the bottom of the wreck, a least depth by pneumatic depth gauge was deemed to be unnecessary.

Later, once the divers were recovered, the ship was maneuvered next to the dive buoy and several detached positions were obtained. The item presented no image on the echogram due to its insignificant height. Instead, the position of the pinger, which is tethered only four feet above the dive buoy anchors, was ensonified. This presented an image on the echogram and provided an accurate position for the wreck. The results of the diver investigation is included in Separate VI.

A least depth was determined for this item by subtracting 0.3 meters, the height above the bottom of the wreck as reported by the divers, from the corrected depth (with predicted tides) for the detached position considered most representative for the item. Fathometer L.D. used (w/approved Smooth Tides)

N.6 Investigation Results

This item was found very close to the geographic position provided.

N.7 Explanation for Position Difference

Difference in position is insignificant.

N.8 Least Depth Information

Least depth information for the item is as follows:

FIX NUMBER- **5019**

LATITUDE- **41° 25' 02.~~044~~06" N**

LONGITUDE- **71° 23' 25.~~792~~8" W**

LEAST DEPTH (MLLW)- 29.~~5~~3 Meters (9~~6~~7.8 feet)
~~(with predicted tides)~~

Loran Coordinates:

Master	9960	W-14422.2	X-25789.5	Y-43973.3	Z-60164.1
SNR:	840	766	945	730	310

N.9 Charting Recommendation

STET, however apply 97 Wk MCR

Delete ~~the presently charted symbol and chart a symbol for sunken wreck, not dangerous to surface navigation.~~
~~This is not a hazard to navigation and is not recommended for charting~~

N.10 Danger to Navigation Report

None submitted.

N.11 Comparisons were made between this survey and charted depths. The average survey sounding acquired during this survey was 30.0 meters (98.4 feet). This compares well with the charted depths found in and around the search radius. These charted depths range within the 95 to 98 foot range.

N.12 This section is not applicable given the limited extent of this item. It has been addressed in section N.11. This section is reserved for basic survey items.

O. ADEQUACY OF SURVEY See also Section 9. of the Evaluation Report

O.1 All items investigated during this survey have been addressed.

O.2 There is no part of this survey that is considered incomplete or substandard.

P. AIDS TO NAVIGATION See also Section 7. b. of the Evaluation Report

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

P.2 No aids to navigation were investigated for positioning during this survey.

P.3 No aids not already listed in the Light List were located during this survey.

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

P.5 No submarine cables, pipelines or ferry routes are located within the survey area.

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

Q. STATISTICS

Q.1	a)	Number of positions	21
	b)	Lineal nautical miles of sounding lines -nautical miles of survey with the use of the side scan sonar	0.25
		-nautical miles of survey without the use of the side scan sonar	0.58
Q.2	a)	square nautical miles of hydrography	0
	b)	days of production	1
	c)	detached positions -1 for diver investigation	1
	d)	bottom samples	0
	e)	tide stations	0
	f)	current stations	0
	g)	velocity casts	0
	h)	magnetic stations	0
	i)	XBT drops	0

R. MISCELLANEOUS

R.1 **a)** No evidence of silting was found during this survey.

b) No evidence of unusual submarine features was found during this survey.

c) No evidence of anomalous tidal conditions was found during this survey.

d) No evidence of unusual currents was found during this survey.

e) No evidence of magnetic anomalies was found during this survey.

R.2 Bottom sampling was not required for this project.

S. RECOMMENDATIONS

S.1 No survey inadequacies have been noted.

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

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

T. REFERRAL TO REPORTS

No other reports have been submitted in conjunction with this survey.

APPENDIX VII. APPROVAL SHEET

LETTER OF APPROVAL

REGISTRY NO. H-10404

Field operations contributing to the accomplishment of this survey were conducted under my 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 charting.

Nicholas E. Perugini, LCDR, NOAA

Nicholas E. Perugini, LCDR NOAA
Commanding Officer
NOAA Ship RUDE

CONTROL STATIONS as of 6 Feb 1992

CARTO CODE

No	Type	Latitude	Longitude	H	Cart	Freq	Vel	Code	MM/DD/YY	Station Name
120	F	041:21:39.717	071:28:52.946	20	250	0.0	0.0	8	09/27/91	PT JUDITH LIGHT OFFSET 3
121	F	041:26:57.711	071:23:57.797	20	250	0.0	0.0	4	09/27/91	BEAVERTAIL LIGHT OFFSET
122	F	041:27:43.708	071:21:46.539	12	250	0.0	0.0	6	09/30/91	CASTLE HILL LIGHT OFFSET
125	F	041:27:42.566	071:10:22.144	12	250	0.0	0.0	2	10/21/91	WARREN OFFSET

ALL STATIONS ARE FIELD POSITIONS

ANTENNA HEIGHT

APPENDIX II. NON-FLOATING AIDS AND LANDMARKS FOR CHARTS

NOAA Form 76-40 is not submitted since there are no non-floating aids or landmarks within the confines of the final field sheet.

AWOIS 1895
ADDENDUM TO H-10404
DIVE INVESTIGATION REPORT

DATE: 7 JULY 92 DOY: 189 TIME: 1523Z

PERSONNEL:

DIVEMASTER- LTJG SCHATTGEN DIVERS- LT SCHATTGEN

TENDER- ENS BRENNAN - ENS ILLG

COXSWAIN\TENDER- J. BRAWLEY

VISIBILITY: 15 FEET CURRENT: 1 KNOT

MAXIMUM DEPTH: 102 FEET BOTTOM TIME: 18 MIN.

METHOD OF POSITION DETERMINATION: DETACHED POSITIONS

HDAPS POSITION: FIX 5019

EASTING: 145221.0 NORTHING: 268402.7

LATITUDE: 41° 25' 02.044" N LONGITUDE: 71° 23' 25.792" W

AVERAGE LEAST DEPTH BY PNEUMATIC DEPTH GAUGE: Not Obtained

TIME OF READING:

PNEUMATIC DEPTH GAUGE CORRECTOR:

PREDICTED TIDAL ZONE CORRECTOR:

LEAST DEPTH DETERMINED @MLLW Insignificant

NARRATIVE REPORT: The object of this investigation was a very deteriorated wooden barge. It was approximately 6 meters wide and 25 meters long. The longitudinal members of the barge were flush with the bottom. There were three athwartships members which extended less than one third meter above the bottom. A small amount of fishing net was snagged on the wreck. The appearance of the shadow on the side scan sonar trace was due to the slight scouring around the edges of the barge and the crevasses in the longitudinal members. Many of the crevasses had bottom fish living in them.

No least depth was obtained on the barge as its height was insignificant. Nothing of the wreck extended more than 1/3 meter above the sea floor.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Ocean and Earth Sciences
Rockville, Maryland 20852

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: March 14, 1992

MARINE CENTER: Atlantic

OPR: B660-RU-91

HYDROGRAPHIC SHEET: H-10404

LOCALITY: Rhode Island, Rhode Island Sound, Southeast Entrance to Narragansett Bay

TIME PERIOD: September 30 - November 6, 1991

TIDE STATION USED: 845-2660 Newport, Rhode Island
Lat. 41° 30.3'N Lon. 71° 19.6'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 1.67 ft.

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.7 ft.

REMARKS: RECOMMENDED ZONING

Apply a -6 minute time correction and a x0.92 height ratio to Newport, Rhode Island (845-2660).

Note: Times are tabulated in Eastern Standard Time.

CHIEF, DATUMS SECTION

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-10404

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO. 13218	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	
NARRAGANSETT BAY (title)	X									1
RHODE ISLAND (title)	X									2
RHODE ISLAND SOUND (title)	X									3
										4
										5
										6
										7
										8
										9
										10
										11
										12
										13
										14
				Approved:						15
										16
				Charles Le Schaffer Jr						17
				Chief Geographer - N/CG2x5						18
				SEP 28 1993						19
										20
										21
										22
										23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

12/17/93

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H-10404

NUMBER OF CONTROL STATIONS	4
NUMBER OF POSITIONS	1109
NUMBER OF SOUNDINGS	5660

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	67	04/02/92
VERIFICATION OF FIELD DATA	94	09/16/93
ELECTRONIC DATA PROCESSING	49	
QUALITY CONTROL CHECKS	69	
EVALUATION AND ANALYSIS	54	10/01/93
FINAL INSPECTION	8	12/09/93
TOTAL TIME	341	

ATLANTIC HYDROGRAPHIC SECTION APPROVAL 12/13/93

COAST AND GEODETIC SURVEY
ATLANTIC HYDROGRAPHIC SECTION
EVALUATION REPORT

SURVEY NO.: H-10404 FIELD NO.: RU-10-8-91

Rhode Island, Rhode Island Sound, Southeast Entrance to Narragansett Bay

SURVEYED: September 30 through November 6, 1991 and July 7, 1992

SCALE: 1:10,000 PROJECT NO.: OPR-B660-RU-91

SOUNDINGS: EG&G Model 260 Side Scan Sonar, and RAYTHEON DSF 6000N Fathometer

CONTROL: MOTOROLA Falcon 484 Mini-Ranger (Range-Range), and MAGNAVOX MX4200D and MX50R Differential Global Positioning Systems

Chief of Party.....N. E. Perugini

Surveyed by.....P. L. Schattgen
.....M. J. Oberlies
.....J. A. Illg
.....R. T. Brennan
.....D. E. Williams

Automated Plots by.....XYNETICS 1201 Plotter (AHS)

1. INTRODUCTION

a. This is primarily a side scan sonar survey. A RAYTHEON DSF-6000N fathometer was operated concurrently with the side scan sonar. The hydrography acquired by this survey is considered suitable for charting.

b. Notes in the Descriptive Report were made in red ink during office processing.

2. CONTROL AND SHORELINE

a. Control is adequately discussed in Sections H., I. and Appendix III. of the Descriptive Reports.

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD83). Office processing of this survey is based on these values. The smooth sheet has been annotated with ticks showing the computed mean shift between the North American

Datum of 1983 (NAD83) and the North American Datum of 1927 (NAD27).

To place the smooth plots on the NAD27 move the projection lines 0.371 seconds (11.441 meters or 1.14mm at the scale of the survey) north in latitude and 1.813 seconds (42.119 meters or 4.21mm at the scale of the survey) east in longitude.

b. There is no shoreline within the limits of this survey.

3. HYDROGRAPHY

a. Where crossings occur in the area investigated, there is adequate agreement.

b. Standard depth curves were drawn in their entirety.

c. The development of the bottom configuration and determination of least depths of bottom features located and shown on this smooth sheet is considered adequate.

4. CONDITION OF SURVEY

The smooth plots and accompanying overlays, survey records, and reports adequately conform to the requirements of the HYDROGRAPHIC MANUAL, the FIELD PROCEDURES MANUAL, and the SIDE SCAN SONAR MANUAL.

5. JUNCTIONS

There are no junctional surveys or junctional requirements in the Project Instructions.

6. COMPARISON WITH PRIOR SURVEYS

a. Hydrographic Surveys

H-6444 (1939) 1:40,000
H-8315 (1956) 1:12,500

1) Prior survey H-6444 (1939) is common to the present survey area in the southern half. In general, the present survey soundings are 0^6 m (2-ft) deeper than the prior survey.

2) Prior survey H-8315 (1956) is common to the present survey in the northern portion of the survey area. In general, the present and prior hydrography within the common area agrees within 0^6 m (2-ft) with the prior soundings usually being the shoaler. Attention is directed to the following:

A charted 76-ft (23² m) sounding in the vicinity of Latitude 41°25'04.8"N, Longitude 71°23'34.0"W originates with prior survey H-4006WD (1917) and was subsequently brought forward to supplement H-8315 (1956). Present survey soundings in the common area are 6⁴ m (21-ft) deeper. No indication of shoaling in this area were noted on side scan sonar or fathometer records. It is recommended that the charted 76-ft (23² m) depth be deleted and the area charted as shown on the present survey.

The differences noted above are attributed to a far more accurate, detailed, and sophisticated present survey.

The present survey is considered adequate to supersede the prior surveys within the common area.

b. Wire Drag Surveys

H-7029WD (1948) 1:20,000
FE-194 (1963) 1:20,000, 1:40,000, and 1:80,000
(Formerly FE No. 1, 1964)

1) Prior wire drag survey H-7029WD (1948) is common to the present survey in the area of Automated Wreck and Obstruction Information System (AWOIS) Item #1895. This AWOIS Item is adequately discussed in section N.2. of the Descriptive Report and section N.of the Addendum to the Descriptive Report, and requires no further consideration. No hangs or groundings are within the common area.

No conflicts exist between the present survey and the prior survey's effective depths.

2) Prior survey FE-194 (1963) is common to the present survey in the area of AWOIS Items #1895. No hangs or groundings are within the common areas.

No conflicts exist between the present survey and the prior survey's effective depths.

7. COMPARISON WITH CHARTS 13218 (30th Edition, July 7, 1990)
13221 (46th Edition, Nov. 4, 1989)

a. Hydrography

The charted hydrography originates with the previously discussed prior surveys. The previously addressed prior surveys require no further consideration. The charting recommendation concerning AWOIS Item #1895 is adequately

discussed in section N.2. of the Descriptive Report and section N. of the Addendum to the Descriptive Report. Attention is directed to the following:

An uncharted obstruction with a depth of 30³ meters (99 ft) was found by the present survey in latitude 41°24'27.92"N, longitude 71°23'52.32"W. Surrounding depths are 31 meters (102 ft.). This item is not considered a hazard to navigation and is not recommended for charting.

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

b. Aids to Navigation

There are no fixed or floating aids to navigation within limits of this survey.

8. COMPLIANCE WITH INSTRUCTIONS

This survey complies with the Project Instructions.

9. ADDITIONAL FIELD WORK

This is an adequate side scan sonar survey. No additional field work is recommended for this survey.

Franklin L. Saunders
Cartographic Technician
Verification of Field Data

Robert R. Hill Jr.
Cartographer
Evaluation and Analysis

Leroy G. Cram
Supervisory Cartographer
Verification Check

APPROVAL SHEET
H-10404

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 disproval 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 magnetic tape record for this survey. Final control, position, and sounding printouts of the survey have been made. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Leroy G. Cram Date: 12/13/93

Leroy G. Cram
Chief, Hydrographic Processing Team B
Atlantic Hydrographic 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: 12/13/93

Nicholas E. Perugini, LCDR, NOAA
Chief, Atlantic Hydrographic Section

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Final Approval:

Approved: J. Austin Yeager Date: 3/15/94

J. Austin Yeager
Rear Admiral, NOAA
Director, Coast and Geodetic Survey

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10404

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
13221	3/24/94	L. Arkman	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 62
13218	3/24/94	L. Arkman	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 70
12300	1/19/95	R Bloss	(Full) ~~Part~~ Before (After) Marine Center Approval Signed Via
			Drawing No. 57 app'd in full thru 13221 & 13218
13221 (extension)	2/14/95	[illegible signature]	(Full) Part Before (After) Marine Center Approval Signed Via
			Drawing No. 62 App'd in full to extension
			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
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			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED