

10340

Diagram No. 1227-3

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Side Scan Sonar
Field No. WH-10-2-90
Registry No. H-10340

LOCALITY

State Virginia
General Locality Atlantic Ocean
Sublocality 5 NM East of Cape Henry

1990

CHIEF OF PARTY
CDR R.P. Floyd

LIBRARY & ARCHIVES

DATE September 25, 1991

10340

EC/G

CHTS
12220
12221
12222
12207
12208
12205 418
12200
13003 n/r

H-10340

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.

WH-10-2-90

State VIRGINIA

General locality ATLANTIC OCEAN

Locality 5 NM EAST OF CAPE HENRY

Scale 1 : 10,000 Date of survey 25 April - 7 June 1990

Instructions dated 19 March 1990 Project No. OPR-D111-WH-90

Vessel NOAA SHIP WHITING 2930

Chief of party CDR. RICHARD P. FLOYD

Surveyed by Kathy Timmons, Richard B. Koehler, Nancy L. Crews, Lee M. Cohen,
Matthew J. Wingate, Kim T. McDonough, Katharine A McNitt, Kelly G. Taggart

Soundings taken by echo sounder, hand lead, pole DSF 6000N

Graphic record scaled by Officers, Survey Technicians and AMC Cartographers and Technicians

Graphic record checked by Officers, Survey Technicians and AMC Cartographers and Technicians

Protracted by _____ Automated plot by BRUNING ZETA 936
XYNECTICS 1241 PLOTTER (AAS)

Verification by _____

Soundings in meters ~~fathoms~~ ~~feet~~ at ~~MLW~~ MLLW _____

REMARKS: JUNCTIONS WITH H-10337, ^{H-10356} H-10341, H-10343, H-10372 *92nd
9/26/91*

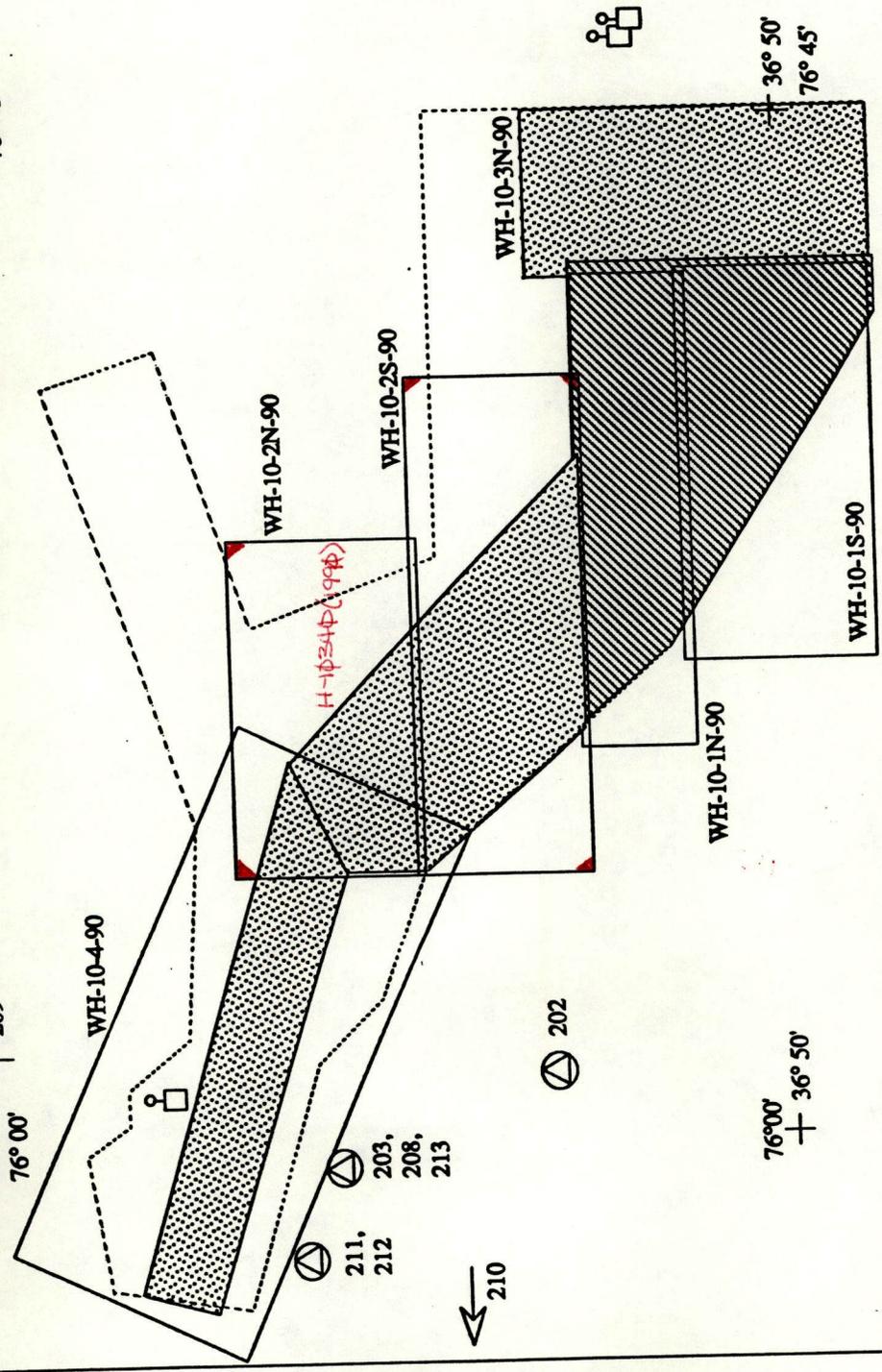
NOTES IN THE DESCRIPTIVE REPORT WERE MADE IN RED DURING OFFICE PROCESSING.

NOVOIS/SURF ✓ 11/30/91 SJV

R.W.W 10/30/91

+ 37° 00'
76° 45'

37° 00' +
76° 00'



Legend	April	May
[Dotted pattern]	389.0	575.1
[Diagonal lines]	10.0	21.5
[Horizontal lines]	1	2
Bottom samples	24	75

PROGRESS SKETCH, OPR-D111-WH-90
Entrance to Chesapeake Bay, Virginia, April 1990
NOAA SHIP WHITING
RICHARD P. FLOYD, COMMANDER, NOAA
COMMANDING

Scale 1:160,000
from HDAPS
planning sheet

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* DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH
FIELD RECORDS.

SEPARATES TO BE INCLUDED WITH SURVEY DATA

- * I. Hydrographic Sheets and Parameters
- * II. Bottom Samples
- * III. Horizontal Control and Corrections to Position Data
- * IV. Sounding Equipment Calibrations and Corrections
- * V. Side Scan Sonar Data
- VI. Item Investigations

* DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH
FIELD RECORDS.

**DESCRIPTIVE REPORT TO ACCOMPANY
HYDROGRAPHIC SURVEY
OPR-D111-WH-90
FIELD NUMBER WH-10-02-90
REGISTRY NUMBER H-10340
NOAA SHIP WHITING
CDR Richard P. Floyd, Commanding Officer**

A. PROJECT

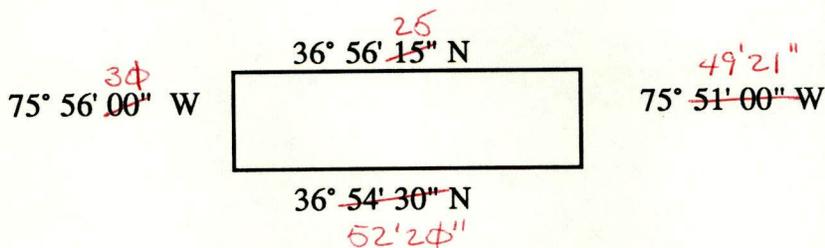
Survey operations were conducted in accordance with the March 19, 1990 Hydrographic Project Instructions, OPR-D111-WH-90, Change No. 1 to Hydrographic Project Instructions, OPR-D111-WH-90 dated ~~March 19, 1990~~^{2 MAY 1990} and Change No. 2 to Hydrographic Project Instructions dated May 25, 1990.

This Project was in response to a request by the Fifth Coast Guard District as a result of a Port Access Route Study.

This survey was designated Sheet "C" and the survey was assigned registry number H-10340.

B. AREA SURVEYED

The survey was conducted in the southern sea-lanes approaching Chesapeake Bay Entrance, approximately 5 nautical miles East of Cape Henry, Virginia. The survey area was separated into two sheets, designated by C-North and C-South, due to HDAPS plotter sheet size limits limitations. Sheet "C" was bounded by:



Survey operations began on April 25, 1990 (Day Number 115) and ended on June 7, 1990 (Day Number 158). Thirteen days were used to conduct survey H-10340. There were seven distinct periods of survey operations:

April 25 1990 (Day Number 115)

April 29 1990 (Day Number 119)

May 8 to May 11, 1990 (Day Number 128 to 131)
May 16 to May 18, 1990 (Day Number 136 to 138)
May 21 1990 (Day Number 141)
May 23 to May 24, 1990 (Day Number 143 to 144)
June 7 1990 (Day Number 158).

A port call for potable water and a change of survey areas explains the break from April 25, 1990, (Day Number 115) to April 29, 1990, (Day Number 119). WHITING shifting survey areas and a ships port call explain the break from April 29, 1990, (Day Number 119) to May 8, 1990, (Day Number 128) and the break from May 11, 1990, (Day Number 131) to May 16, 1990, (Day Number 136). WHITING changing survey area and holiday identification explain the break from May 18, 1990, (Day Number 138) to May 21, 1990, (Day Number 141). Adverse weather forcing WHITING to suspend survey operations and go to anchor caused the break from May 21, 1990 (Day Number 141) to May 23, 1990 (Day Number 143). A ships port call and WHITING changing sheet areas explain the break from May 24, 1990 (Day Number 144) to June 7, 1990 (Day Number 158).

C. SURVEY VESSEL

The NOAA ship WHITING S-329, EDP number 2930, was the only sounding vessel used to gather data for this survey.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

A Hydrographic Data Acquisition and Processing System (HDAPS) computer was used to collect and process data for H-10340. The HDAPS system is a semi-automated data acquisition system whose main advantage lies in its ability to acquire and store quantities of sounding and sonar data, utilizing multiple lines of position (MLOP) for precise positioning, and combining data input into a workable format.

Program titles and version numbers were:

Post Survey	version 4.14
Constat	version 2.05
Plottall	version 1.65
File System	version 1.55
Survey	version 4.3

All sound velocity calculations were determined using program VELOCITY. Version, 1.11, dated March 9, 1990, was used by WHITING for use with the SEACAT profiler.

E. SIDE SCAN SONAR EQUIPMENT

On-line operations were conducted exclusively from WHITING. Twenty-four hour shipboard data acquisition and processing was the mode of operation. To insure that 200% side scan coverage was obtained, sounding lines were run at 85-meter line spacing for the 100-meter range scale. (Range scale refers to the swath width on only one side of the fish. Thus it is half the swath width.) This line spacing insured that the required effective swath overlap of 2 mm at the scale of the survey, as per the Side Scan Sonar Manual, dated September 30, 1988.

Survey personnel found four gaps in side scan coverage. A gap in coverage is on reference line 1615 between position 1560 and 2648. This gap is due to positions 1559 and 1560 being rejected due to bad side scan fish cable causing excessive noise on the sonargram. A gap in coverage exists on reference line 2210 between positions 950 and 2670. This gap is due to positions 950 thru 963 being rejected because the side scan sonar lost contact with the bottom. A gap in coverage is on reference line 2125 between positions 1560 and 2648. This gap is due to WHITING being off line while maneuvering around channel buoy "CBF". A gap in coverage on reference line 2635 between positions 1201 to 2900. This gap is due to excessive fish height from the bottom causing lost of signal from the starboard channel.

Project instructions did not specify a minimum depth limit. In most cases adequate side scan coverage was not obtainable in depths of 11 meters or less. The minimal height of the sonar fish off the bottom is 8 meters (8% of the 100 meter range scale). At a depth of 11 meters, the fish was towed 3 meters below the surface of the water. Since WHITING has a draft of 3.2 meters, cavitation from the screws would degenerate the sonar trace in water 11 meters or less in depth. It was found that by varying towing speeds and fish cable lengths WHITING could adequately obtain sonar coverage in depths of 12 meters or greater. The HDAPS on-line swath plot reduces the effective scanning swath whenever the height of the fish off the bottom is less than 8% of the range scale in use. In areas where the effective height was less than 8%, the swath plots were examined to ensure adequate coverage was maintained. In areas where swath plots did not adequately overlap to obtain 200% coverage, data was rejected. WHITING did not reduce the side scan range to it's

minimum, 50 meters, thus allowing swath coverage in 7.2 meters of water because it would have reduced progress, preventing the survey of more important areas.

Side scan operations were run at a speed less than or equal to 6 knots with the 100 meter range scale. Two off-line swath plots were plotted for each 100% coverage (alternating reference lines, one set each on a separate sheet) to determine if complete coverage was achieved.

An EG&G model 272 dual-channel image correcting side scan sonar unit, towed behind WHITING, was the only type of side scan unit used for the survey. Two side scan fish of this type were used interchangeably. The operating frequency of the side scan sonar was 100 kHz. All significant objects located were plotted and the height off the bottom calculated. Items deemed significant enough for further investigation are included in Separate V. *

The side scan sonar ^{FISH} unit was towed by WHITING from a custom made block attached to an A-frame support mounted on the fantail of the ship. Side scan data was recorded on a EG&G model 260 recorder located in WHITING's plot room. Two recorders of this type were used interchangeably.

The following is a list of serial numbers, and days of use:

<u>Type</u>	<u>S/N</u>	<u>Day Number</u>
EG&G Towfish	011902	119-139
EG&G Towfish	011904	139-158
EG&G 260 Recorder	0012105	119-139
EG&G 260 Recorder	0012106	139-158

The confidence check method used during H-10340 was to tow the side scan fish past a buoy keeping the fish 70 to 90 meters from the buoy. Sonargrams would show the buoy anchor. Checks were run at least once per 24 hour period and two times per day when feasible. Both the port and starboard channel sonargrams were examined by survey personnel to insure proper side scan sonar operation.

Side scan sonar records were scanned by WHITING and Cartographic personnel from ^{THE HYDROGRAPHIC PROCESSING UNIT HYDROGRAPHIC SECTION} ~~Verification Branch~~, Atlantic ~~Marine Center~~, Norfolk VA. While scanning records, significant contacts were flagged and logged in the side scan sonar list. The HDAPS Contact Utility Program generated the contact's true height off the bottom and it's position.

The contact was assigned a index number, placed in a contact table and plotted.

* DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH FIELD RECORDS.

F. SOUNDING EQUIPMENT

A RAYTHEON DSF 6000N echo sounder was the only sounding equipment used to determine water depth during the survey. The DSF 6000N operated on a high frequency of 100 kHz and a low frequency of 24 kHz. A hard copy of the soundings showing both the high and low frequency traces is included with the survey data.

The following is a list of serial numbers and days of use:

<u>S/N</u>	<u>Day Number 1990</u>
A122N	115-136
A111N	137-138
A122N	139-158

G. CORRECTIONS TO ECHO SOUNDINGS

Two velocity tables were used during H-10340 survey using a SEACAT STD profiler (s/n 286). Salinity, temperature and depth (STD) casts were made on April 20, 1990 (Day Number 110), May 7, 1990 (Day Number 127) and May 30, 1990 (Day Number 150). All casts were verified by using a second SEACAT profiler (s/n 284). A summary of SEACAT STD casts locations is as follows:

<u>Day Number</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Depth</u>	<u>Velocity Table #</u>
(Day Number 110)	36° 51' 44" N	75° 43' 54" W	22 meters	01
(Day Number 127)	36° 51' 38" N	75° 43' 59" W	22 meters	02
(Day Number 150)	36° 57' 12" N	76° 00' 28" W	22 meters	

The velocity program picked twenty significant depths to describe the water column sound velocity profile. These values were entered into a HDAPS velocity table and applied to the sounding data during post processing. The velocity cast May 30, 1990 (Day Number 150) showed no correctors needed to be applied within the depth limits of survey H-10340 and no HDAPS velocity table was created for this cast.

A vertical cast was made on June 8, 1990 (Day Number 159) to compare DSF-6000N to Leadline. A -0.06 meter instrument correction was calculated in a water depth of 17.4

meters. Cast data is included in Separate IV. DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH FIELD RECORDS.

Settlement and Squat was determined April 26, 1990 (Day Number 116) in Thimble Shoal Channel between the Chesapeake Bay Bridge and Buoy 12. Settlement and Squat values were measured by echo-sounder and buoy or marker method. Settlement and Squat data is included in Separate IV*1988 historical values were used during data acquisition.

WHITING's draft correction was 3.2 meters. This value was obtained from historical data.

Predicted tide correctors were applied on-line by HDAPS to all soundings that were acquired with the DSF 6000N. All echo sounding data plotted on the final field sheet were plotted with predicted tide correctors applied. Two tide stations were available for H-10340. They were Chesapeake Bay Bridge Tunnel, VA, and Hampton Roads, VA.

Predicted tides from NOAA Tide Tables, Hampton Roads, VA (station number 863-8610) were used as a reference for this project. Verbal contact was made with Mr. Jim Dixon of the Atlantic Operations Group (N/OMA1213) before transiting to the work area. Mr. Dixon confirmed the tide gages were working properly.

Third order levels were run from tide station 863-8863, Chesapeake Bay Bridge Tunnel, VA on April 16, 1990. Closing levels were run on June 11, 1990, and the difference between opening and closing level was found to be 1mm, which is within the Manual of Geodetic Leveling specifications.

Tidal datum for project OPR-D111-WH-90 was mean lower low water. Predicted tides were calculated using Hampton Roads, VA tide station as the reference station. Time and height correctors were:

	Time Correctors	Height Correctors
High Water	-1 hr 30 min	x1.35
Low Water	-1 hr 30 min	x1.35

The time and height correctors were entered in the predicted tides tables and applied to the data during the shipboard post processing phase of the project.

An incorrect time corrector was used from DAY 115 thru DAY 133. Soundings plotted on line were incorrect. Tide tables were adjusted on DAY 134. All final sounding plots have corrected predicted tides applied. APPROVED TIDES APPLIED DURING OFFICE PROCESSING.

* DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH FIELD RECORDS.

H. CONTROL STATIONS SEE SECTION 2.9. OF THE EVALUATION REPORT.

All geodetic positions are referenced to the North American Datum (NAD) 83 geodetic datum. A total of three horizontal control stations were occupied with Mini-Ranger positioning equipment to support operations.

Station descriptions and Geographical Positions (GP) are included for each site in appendix III. Control station DAM NECK BOQ 1981 did not have a published GP in the Geodetic Control Data. However, the Atlantic Marine Centers Coastal Surveys Unit, N/CG 23322, provided WHITING with a GP from previous surveys in the area.

I. HYDROGRAPHIC POSITION CONTROL SEE SECTION 2.9. OF THE EVALUATION REPORT

The Mini-Ranger Falcon 484 microwave system was the positioning system used for H-10340. Range-Range was the positioning method used throughout the survey.

Positioning equipment included:

Range Processing Unit	s/n D 0004
Control Display Unit	s/n E 0013
Receiver Transmitter	s/n E 2914
Remote Code 5	s/n F 3292
Remote Code 6	s/n F 3296
Remote Code 7	s/n E 2889

An opening baseline calibration was performed on 18 April 1990, (Day Number 108) at the Atlantic Marine Center, Norfolk, Virginia. Baseline calibrations were performed to the standards of the AMC OPORDER 86 (Falcon 484 Calibration Procedures and Standard Forms). Correctors were placed into HDAPS C-O table # 1 before survey H-10340 began. The critical systems checks were performed by multiple LOP's (MLOP) and by sextant fixes. MLOP were used for the majority of project H-10340. Day Number 143, 144 and 158 had only two lines of position available because of a system failure of the station 202, RAMADA miniranger, remote code 6. A total of 229 position fixes were effected, of these 135 were rejected. Positions effected were 2830 thru 3057. A closing baseline calibration was determined not to be necessary.

RT antenna and A-frame offset and layback were computed by WHITING personnel before the start of H-10340. RT antenna offset was 2.04 m and antenna layback was 2.87 m. A-frame offset was 1.35 m and layback 23.30 m. Values for RT antenna and A-frame offset and layback were entered into the HDAPS offset table. A table of offsets is included in Separate III. DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH FIELD RECORDS.

J. SHORELINE SEE SECTION 2.D OF THE EVALUATION REPORT.

No shoreline existed in the survey area.

K. CROSS-LINES SEE ALSO SECTION 3.A OF THE EVALUATION REPORT.

A total of 62.9 nautical miles of crosslines were run on "C" sheet and amounted to 20% of mainscheme hydrography acquired. C-North crosslines totaled 26.3 miles. C-South crosslines totaled 36.6. All soundings at cross lines agreed to within one half meter.

L. JUNCTIONS SEE SECTION 5. OF THE EVALUATION REPORT.

Survey area H-10340, C-South, 1:10,000 scale, will junction with three other WHITING surveys: H-10337, ~~H-10341~~ and H-10343. Checks between adjoining sheets were not possible because processed survey data were not available for comparison.

AKM
9-26-91

Survey H-10340, will junction with H-10337 at the southern edge of the survey area. The junction area lies along latitude 36° 52' 00" N, between longitude 75° 54' 30" W and 75° 49' 00" W.

Survey H-10340, will also junction with H-10341^{*} at the southwest edge of the survey area. The junction area lies along longitude 75° 54' 30" W, between latitude 36° 54' 30" N and 36° 55' 00" N. * H-10341 (1990) DOES NOT JUNCTION WITH PRESENT SURVEY.

Survey H-10340, will junction with H-10343 at both the northwest and the north edge of the survey area. The northwest junction area lies along longitude 75° 56' 40" W, between latitude 36° 54' 00" N and 36° 57' 00" N. The northern junction lies along latitude 36° 57' 00" N, between longitude 75° 54' 40" W and 75° 56' 40" W.

M. COMPARISONS WITH PRIOR SURVEYS SEE ALSO SECTION 6. OF THE EVALUATION REPORT

A comparison with prior surveys showed excellent agreement with H-10340. ^{FOUR (4)} Seven prior surveys with soundings in H-10340 sheet area were compared but only ^{THREE} two, H-9814 ⁹⁰⁵

H-9919, and H-9922, had considerable overlap within the sheet boundaries. The prior surveys compared are:

<u>Registry Number</u>	<u>Scale</u>	<u>Year Surveyed</u>
H-9814	1:10,000	1980
H-9871WD	1:20,000	1976
H-9901	1:10,000	1980
H-9905	1:10,000	1980
H-9919	1:20,000	1980
H-9922	1:20,000	1980
H-9959	1:20,000	1981

Sixty soundings from H-10340 were compared with soundings from H-9814 and H-9922 of which five had a difference greater than half a meter. Prior surveys depths were processed in English units causing a calculation using a conversion factor of 3.28 feet per meter to be necessary to convert previous data to the metric system. The conversion factor was applied to all prior survey soundings compared with H-10340. Five soundings which differed from previous surveys by a half meters or more were located at: *DO NOT CONCUR SEE DEPTHS BELOW AFTER ALL APPROPRIATE CORRECTIONS APPLIED.*

<u>Depth (meters) H-10340</u>		<u>Latitude</u>	<u>Longitude</u>	<u>Depth Difference (meters)</u> H-10340 minus prior survey depth
H-10340	<i>H-9922</i>			
18.9 ⁴	18.8	36° 55' 00" N	75° 55' 30" W	<i>-.6 0.4</i>
13.7 ^{14.1}	14.1	36° 55' 00" N	75° 54' 00" W	<i>.9 0.0</i>
16.5 ⁴	16.1	36° 53' 30" N	75° 54' 30" W	<i>-.5 0.3</i>
13.4^{14.0}	—	36° 53' 00" N	75° 52' 00" W	<i>.6 NO SOUNDING ON H-9922 (1980)</i>
15.2 ⁸	15.8	36° 52' 30" N	75° 52' 00" W	<i>.7 0.0</i>

The difference in survey depths should not be considered unusual in this area because of the strong currents and sandy bottom. Bottom depths could change since the early 1980's survey.

AWOIS 808

AWOIS 808 is listed as a obstruction at 36° 54' 16" N, 75° 53' 30" W with a minimum depth of 12.2 meters (40 feet). Existence of the obstruction was shown by wire drag hung at 41 feet and 43 feet as reported in the 1945-47 survey H-6976.*WD*

A significant contact with wreck-like characteristics was located on Day Number 129, at fix number 1152.11, Lat. 36° 54' 13.74" N, Long. 75° 53' 28.51" W, and recorded in contact table 30 as index number 29. The wreck itself did not have an accurate position

since electronic positioning was not available and a very approximate sounding least depth determined. The wreck was calculated to be 2.8 meters (9.2 feet) off the bottom in 16.2 meters (53 feet) of water.

WHITING divers investigated the wreck on May 16, 1990 (DOY136) and visually verified the obstruction as a wreck of an aged vessel. Divers determined a ^{14.1}uncorrected least depth of ~~15.5~~ meters (^{46.2}50.8 feet), and an overall length of 17.1 meters (56.1 feet). The wreck was deemed to be a hazard to navigation. A divers investigation report is included with this report in Separate IV. *SEE ALSO SECTION 6.D. OF THE EVALUATION REPORT.*

AWOIS 7522

AWOIS 7522 is listed as the fishing vessel BEAUTY sunk at 36° 54' 42" N, 75° 54' 00" W and cleared to 47 feet by wire drag. The 1980 survey H-9922 found no wreck and further investigation was not warranted.

WHITING found several insignificant side-scan contacts in a 1200 meter radius from the listed position, none could be identified as the BEAUTY. *SEE ALSO SECTION 7.9.2) OF THE EVALUATION REPORT.*

N. COMPARISON WITH THE CHART *SEE SECTION 7. OF THE EVALUATION*

H-10340 was compared to the largest scale chart of the survey area, 12207, 16th edition, August 3, 1985 and showed excellent agreement. Two other charts were compared:

- 12205, 20th edition, January 21, 1989
- 12221, 57th edition, January 28, 1989.

Again, sixty soundings from H-10340 were compared, of which three had a difference greater than half a meter. Chart depths are in English units causing a calculation using a conversion factor of 3.28 feet per meter to be necessary to convert soundings to the metric system. The conversion factor was applied to all soundings compared with H-10340. The soundings greater than half a meters were located at: *DO NOT CONCUR*

NO SOUNDING ON CHART 12221 57th Ed., JAN. 28/89 AT THE FOLLOWING LOCATIONS

<u>Depth (meters) H-10340</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Depth Difference (meters)</u> H-10340 minus charted depth
10.9 ^{12.4}	36° 54' 40" N	75° 53' 30" W	.7
18.9 ⁴	36° 55' 00" N	75° 55' 30" W	.9
12.3 ⁵	36° 55' 15" N	75° 54' 00" W	.7

O. ADEQUACY OF SURVEY SEE SECTIONS 6., 7., AND 9. OF THE EVALUATION REPORT.

This hydrographic survey is adequate to supersede prior surveys of the area. No part of this survey is considered to be substandard.

This survey is a complete basic hydrographic survey, with the exception that contacts identified by 200% side scan coverage have been left for further investigation and least depth determination by a future field unit. SEE ALSO SECTION T.a.5) OF THE EVALUATION REPORT.

P. AIDS TO NAVIGATION SEE ALSO SECTION T.C. OF THE EVALUATION REPORT.

Although floating aides to navigation did exist in the survey area, Project Instructions, section 4.2, stated data on the aids was not applicable to survey H-10340.

Q. STATISTICS

Number of Positions	3057
Nautical Miles of Main-Scheme Sounding Lines	316.7
Nautical Miles of Cross-Line Sounding Lines	62.9
Square Nautical Miles Surveyed	22.4
Days of Production	13
Detached Positions	0
Bottom Samples	58
Tide Stations	1
Current Stations	0
Number of STD Casts	3
Magnetic Stations	0

R. MISCELLANEOUS

The length of time allotted to WHITING to conduct this survey was far too short. Several factors might not have been considered in estimating the time needed. These include:

1. It had been 2 years since WHITING conducted this type of survey. Corporate knowledge was lacking and equipment did not operate properly. Substantial time was needed to learn and perfect procedures, and to restore the side scan sonar system to a properly functioning condition.

2. In water depths of 11 meters or less, the ship must run at a slower speed and/or the side scan range must be reduced. Both of these measures cause a substantial decrease in the rate of production.
3. Vessel traffic in the survey area was very congested. This required that special schemes be utilized to run with the general flow of the traffic. The schemes required more time to complete than the usual "mowing the grass" method. Heavy traffic also caused WHITING to abort lines and to veer off line in order to comply with nautical Rules of the Road.

Side scan sonar operations are limited to a speed of 6 knots or slower. WHITING's main engines were not designed to run for prolonged periods under such a light load. Excessive engine wear results, as well as a heavy build up of oil in the exhaust piping, which increases the chance of stack fire. For this reason, WHITING suspended side scan operations twice daily to run the engines under full load. All of this time was used to advantage in such tasks as running crosslines, repairing equipment, transiting and processing survey data.

Project instructions did not provide a clear and accurate objective of the project. Priorities were indicated by survey sheet layout, rather than by the actual areas of importance (i.e., about 1/2 mile either side of the mid channel buoys for the southeast sea lane, and pilotage and precaution areas).

Data processing takes an enormous amount of time. The ratio of processing to acquisition time is on the order of 3:1.

All bottom samples from H-10340 were submitted to the Smithsonian Institution. The Oceanographic Log Sheet is included in Separate II. *

S. RECOMMENDATIONS

The shoal areas located in the northeast region of Sheet "C", should be surveyed by small boat equipped for sidescan survey. WHITING propeller wash interfered with the sidescan trace, rendering the data unacceptable. A small boat with considerable less draft would not have this difficulty and would have little trouble surveying in these waters well out of the main ship approach channels. CONCUR

Side scan sonar contacts which are recommended for further investigation are included in Separate V. *

In estimating the time required to complete this type of survey, consider not only the size of the area, but also:

1. Start-up time

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2. Depth of water
3. Traffic density
4. Extra sea days at sea needed for processing

If 24-hour per day acquisition is expected, the vessel will need two independent processing systems and more people to run the survey. Otherwise a 12-hour acquisition period followed by a 12-hour processing period (or similar routine) will be needed. WHITING was very fortunate to have personnel from the Atlantic Hydrographic Section and from the Mapping and charting Branch who assisted with data acquisition and processing.

T. REFERRAL TO OTHER REPORTS

The following reports will be submitted as part of OPR-D111-WH-90.

Electronic Control Report
Horizontal Control Report
Dive Report

USED ON OPENING CALIBRATION
MICROVAXII STATION TABLE
Station Table 4/20/90

5/30/90

!OPR-D111

! !

! \$SET HOST WHDAS

! \$SHLOG OPR-D111

! !

! +--- Octant

!Sta | Latitude Longitude Cart
Code Elev Freq Description

201	6 036/47/18.059N	075/57/33.734W	250 0015	0000.00	DAM NECK BOQ, 1981
202	6 036/52/58.936N	075/59/04.040W	250 0020	0000.00	RAMADA 1980
203 7	6 036/55/34.911N	076/00/25.834W	250 0047	0000.00	DEL NORTE SITE, 1977
204	6 037/07/22.465N	075/54/23.424W	250 0052	0000.00	CP CHARLES LH ECC
205	6 036/54/16.697N	075/42/45.856W	250 0024	0000.00	CHES LIGHT 1966
206	6 036/46/14.233N	075/57/50.724W	139 0040	0000.00	DAM NECK MILLS TANK, 1953
207	6 036/55/34.865N	076/00/25.973W	139 0047	0000.00	CAPE HENRY LH 1887
208	6 036/55/32.862N	076/00/29.270W	139 0030	0000.00	CAPE HENRY LH OLD

DIVE INVESTIGATION REPORT
PROJECT NUMBER OPR-D111
SURVEY SOUTHERN APPROACH TO CHESAPEAKE BAY
FIELD NUMBER WH-10-01-90

DIVE NUMBER 1

DIVE DATE 5-16-90

I. AREA OF INVESTIGATION

- A. State/Country VA/USA Sub-Locality "CBH" SOUTHERN APPROACH TO CHESAPEAKE BAY
- B. Position: Latitude 36° 54' ^{14.31} 14.5 Longitude 075° 53' ^{28.94} 30.1
(Dive site or center of search area)
- C. Method of Positioning HDAPS/FALCON MINIRANGER

II. PURPOSE OF INVESTIGATION

- A. AWOIS item number: 808
- B. Source of item being investigated (if other than AWOIS listing): AWOIS
- C. Contacts (e.g. USCG, C of E, Harbor Masters, Owners, etc.):

N/A

- D. Names, Addresses and Phone Numbers etc. of contacts:

N/A

III. SURVEY PROCEDURES

- A. Determination of dive site (e.g. wire drag, side scan, development): SIDE SCAN
- B. Search Procedure (e.g. following a groundwire, circle search, sweep along known feature, etc.)

CIRCLE SEARCH: FOUR DIVERS AT 25 FT INTERVALS

- C. Known reference to features nearby: NONE (BUOY "CBH")
- D. Area and depths covered: MAX DEPTH 60 FT

1990

IV. DIVE DATA

- A. Divers: TIMMONS, MCDONOUGH, COHEN, MCNITT
- B. Time of Dive (in UTC) - Real 1020-1040, 1129-1150
Elapsed 90 MINUTES
- C. General Bottom Depths (units and method of determination):
60 FEET - HAND HELD DEPTH GAUGES ON CONSOLES
- D. Current and conditions: .25 KT CURRENT 063°, TEMP 62°F,
VISIBILITY 10-15 FEET
- E. Visibility (number of feet - horizontally and vertically):
HORIZONTALLY 15-20 VERTICALLY 10-15
- F. Bottom type (mud, sand, rocks, etc.): SAND, FLAT BOTTOM

IV. RESULTS

- A. Detached Positions Number(s): FIX # 1885
Time of D.P.'s (UTC): Describe if other time zone: 1629 UT
Least Depth and Fix Numbers (raw depth): 11.8m DSF 6000
Method of determining depth (The raw sounding should be recorded. The reduced least depth should be plotted on the field sheet.) 15.5m measuring tape
11.8m
- B. Description of findings:
DISPERSED WRECK
- C. Dimensions of item or feature (attach sketch if appropriate):
LENGTH 17.1m
- D. Unusual Conditions:

VI. CHARTING RECOMMENDATIONS

Position Lat. 36° 54' ^{14.31} 14.5" Long. 075° 53' ^{28.90} 30.08"
Reduced Depth 15.5m
14.1

Type of Feature (Reference Chart No. 1) ~~submerged wreck, not~~
~~hazardous to navigation.~~

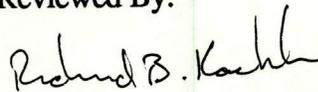
SEE ALSO SECTION 6.b. OF THE EVALUATION REPORT.

Submitted By:



ENS Kim T. McDonough, NOAA

Reviewed By:



LT Richard B. Koehler, NOAA
Field Operations Officer

Approved By:



CDR Richard P. Floyd, NOAA
Commanding Officer

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: July 25, 1990

MARINE CENTER: Atlantic

OPR: D111-WH-90

HYDROGRAPHIC SHEET: H-10340

LOCALITY: Chesapeake Bay Entrance, VA.

TIME PERIOD: April 24 - June 7, 1990

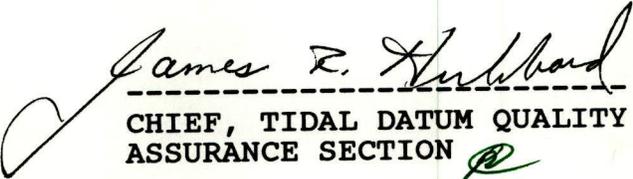
TIDE STATION USED: 863 8863 Chesapeake Bay Bridge Tunnel, VA.

PLANE OF REFERENCE (MEAN LOWER LOW WATER): = 24.84 ft.

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: = 2.7 ft.

REMARKS: RECOMMENDED ZONING

South of latitude 36 53.0'N apply a x1.26 range ratio to all heights, and a -0 hr. 40 min. time correction, and north of latitude 36 53.0'N apply a X1.23 range ratio to all heights, and a -0 hr 30 min time correction for Chesapeake Bay Bridge Tunnel.



CHIEF, TIDAL DATUM QUALITY
ASSURANCE SECTION 

GEOGRAPHIC NAMES

H-10340

Name on Survey	Source of Name										
	A	B	C	D	E	F	G	H	K		
	ON CHART NO.	ON PREVIOUS SURVEY NO.	ON U.S. QUADRANGLE MAPS	FROM LOCAL INFORMATION	ON LOCAL MAPS	P.O. GUIDE OR MAP	GRAND McNALLY ATLAS	U.S. LIGHT LIST			
ATLANTIC OCEAN (title)	X										1
HENRY, CAPE (title)	X										2
VIRGINIA (title)	X										3
											4
											5
											6
											7
											8
											9
											10
											11
											12
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											23
											24
											25

Approved:

Charles E. Harrington
Chief Geographer - N/CG 2x5

JUN 24 1991

N/CG244-64-91

LETTER TRANSMITTING DATA

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

- ORDINARY MAIL
- AIR MAIL
- REGISTERED MAIL
- EXPRESS
- GBL (Give number) _____

TO:

Chief, Data Control Section, N/CG243
 NOAA/National Ocean Service
 Room 151, WSC-1
 Rockville, MD 20852

DATE FORWARDED

11 September 1991

NUMBER OF PACKAGES

2 box, 1 tube

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

H-10340

Virginia, Atlantic Ocean,
5 NM East of Cape Henry

Pkg. 1 Tube:

- 1 Smooth Sheet
- 1 Smooth Position Overlay
- 2 Smooth Sounding Overlays
- 2 Smooth Field Sheets
- 2 Smooth Field Sheet Excess Overlays
- 1 Original Descriptive Report

Pkg. 2 Box

- 2 Accordion file containing Echograms, Data Printouts, Corrector Tape Printouts for VESNO 329 for JD's--115*, 119*, 128*, 129-131, 136-137
- 1 Cahier containing Position printout, and Control File Listing,
 *No sonargrams

Pkg. 3 Box

- 2 Accordion file containing Echograms, Data Printouts, Corrector Tape Printouts for VESNO 329 for JD's--137-138, 141, 143-144, 158
- 1 slot containing on line survey log
- 1 slot containing side scan sonar contact data
- 1 Cahier containing Sounding printout, L-File
- 1 Envelope containing supplemental data from printouts
- 1 Binder containing data removed from original Descriptive Report
- 1 Binder containing sounding equipment calibration and correction data

FROM: (Signature)



Norris A. Wike

RECEIVED THE ABOVE
(Name, Division, Date)

D. S. Clark
 9/25/91

Return receipted copy to:

Atlantic Hydrographic Section, N/CG24411
 439 W. York Street
 Norfolk, VA 23510-1114

09/10/91

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H-10340

NUMBER OF CONTROL STATIONS

4

NUMBER OF POSITIONS

2148

NUMBER OF SOUNDINGS

9886

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	35	09/28/90
VERIFICATION OF FIELD DATA	183	03/28/91
ELECTRONIC DATA PROCESSING	50	
QUALITY CONTROL CHECKS	51	
EVALUATION AND ANALYSIS	87	09/03/91
FINAL INSPECTION	18	08/09/91
TOTAL TIME	424	
ATLANTIC HYROGRAPHIC SECTION APPROVAL		09/05/91

**COAST AND GEODETIC SURVEY
ATLANTIC HYDROGRAPHIC SECTION
EVALUATION REPORT**

SURVEY NO.: H-10340

FIELD NO.: WH-10-2-90

Virginia, Atlantic Ocean, 5 NM East of Cape Henry

SURVEYED: 25 April through 7 June 1990

SCALE: 1:10,000

PROJECT NO.: OPR-D111-WH-90

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

CONTROL: MOTOROLA Falcon 484 Mini-Ranger (Range/Range)

Chief of Party.....R. P. Floyd

Surveyed by.....K. A. Timmons
.....R. B. Koehler
.....N. L. Crews
.....L. M. Cohen
.....M. J. Wingate
.....K. T. McDonough
.....K. A. McNitt
.....K. G. Taggart

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

1. INTRODUCTION

a. This is a combined basic hydrographic/side scan sonar survey. Side scan sonar was operated simultaneously with the fathometer during survey operations. Side scan sonar contacts located by the field unit during hydrographic operations were not investigated by the field unit. In cases where the side scan sonar was used to determine the estimated depth of an item or object, the item is shown on the present survey with the upper case letter 'A' in parenthesis. Depths on these obstructions were estimated by scaling heights off the bottom from side scan sonar records. Positions were determined by computing offsets from the vessel's track. This note is shown on the present survey smooth sheet in proximity to the title block. See also the memorandum titled: "Showing Estimated Side Scan Sonar Depths on Smooth Sheets":, dated 23 February 1989, for an explanation of the note shown on the survey smooth sheet. This survey has been processed before the results of the recommended additional investigations are available. Refer to subsequent survey FE-353SS (1990) for more definitive information on these features.

b. No unusual problems were encountered during office processing.

c. East of a line extending from Latitude 36/56/23.75"N, Longitude 75/55/06.02"W to Latitude 36/52/25.72"N, Longitude 75/51/03.16"W only bottom samples were collected, and crosslines run. Four (4) AWOIS items are located in this area. It should also be noted that junctional survey H-10356 (1990) completed the main scheme hydrography east of the line to a point, located in Latitude 36°55'30"N, Longitude 75°50'00"W. There is no contemporary junction to the east of the line south of this point. Finally, it should be noted that the disposition of these four (4) AWOIS items and any obstructions seen on the side scan sonargrams in this area will be addressed in the descriptive report or evaluation report for H-10356 (1990) or subsequent field examinations.

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

2. CONTROL AND SHORELINE

a. Control is adequately discussed in sections H., I., and T. of the Descriptive Report.

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD 83). Office processing of this survey is based on these values. The smooth sheet has been annotated with ticks showing the computed mean shift between the survey datum and the North American Datum of 1927 (NAD 27). To place this survey on the NAD 27 datum move the projection lines 0.534 seconds (16.45 meters or 1.64 mm at the scale of the survey) north in latitude, and 1.269 seconds (31.42 meters or 3.14 mm at the scale of the survey) east in longitude.

All geographic positions listed from sources other than the present survey are on NAD 27 datum unless otherwise specified. All inverse distance computations are made after geographic positions have been converted to the present survey datum, NAD 83.

b. There is no shoreline within the area surveyed.

3. HYDROGRAPHY

a. Soundings at crossings are in excellent agreement and comply with the criteria found in sections 4.6.1 and 6.3.4.3. of the HYDROGRAPHIC MANUAL.

b. The standard fifteen (15) and twenty (20) meter depth curves were drawn in their entirety.

c. The development of the bottom configuration and determination of least depths is considered adequate.

4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records and reports conform to the requirements of the HYDROGRAPHIC MANUAL and the SIDE SCAN SONAR MANUAL.

5. JUNCTIONS

H-10337 (1990) to the south
 H-10343 (1990) to the northwest
 H-10356 (1990) to the northeast
 H-10372 (1990) to the north

Standard junctions were effected with all junctional surveys and the present survey.

There are no contemporary junctional surveys to the southwest or east of the present survey. Charted hydrography to the southwest and east is in harmony with the present survey.

6. COMPARISON WITH PRIOR SURVEYS

a. Hydrographic

H-9098 (1969) 1:10,000
 H-9905 (1980) 1:10,000
 H-9919 (1980) 1:20,000
 H-9922 (1980) 1:20,000

Prior survey depths from H-9098 (1969) show a general trend of being 0² meters deeper than the present survey soundings.

Prior survey depths from H-9905 (1980) show a general trend of varying plus or minus (\pm) 0² meters from the present survey soundings.

Prior survey depths from H-9919 (1980) show a general trend of being 0² meters deeper than the present survey soundings.

Prior survey depths from H-9922 (1980) show a general trend of varying plus or minus (\pm) 0² meters from the present survey soundings. There are some scattered depths from H-9922 (1980) that vary a plus or minus (\pm) 0³ to 0⁵ meters from the

present survey soundings.

The differences between the above prior surveys and the present survey depths may be attributed to natural changes and improved hydrographic surveying methods and equipment.

The present survey is adequate to supersede the above prior surveys in the common area.

b. Wire Drag

H-6976WD (1945-47) 1:40,000
H-9871WD (1976) 1:20,000

There are five (5) hangs that originate with H-6976WD (1945-47) and fall in the area common to the present survey. Each hang has been assigned an AWOIS item number and is discussed in the following paragraphs.

AWOIS item #808, a charted dangerous submerged obstruction with a wire drag clearance depth of 40 feet (12² meters) and a danger curve, in Latitude 36°54'16"N, Longitude 75°53'30"W (NAD 27), originates with H-6976WD (1945-47). The obstruction was previously hung at 41 (12⁵ meters) and 43 feet (13¹ meters) and subsequently cleared by 40 feet (12² meters). The present survey located a dangerous sunken wreck with a diver least depth of 14¹ meters (46 feet), in Latitude 36°54'14.31"N, Longitude 75°53'28.90"W. The dive report states that the dangerous sunken wreck is dispersed over a 17¹ meter area. It is recommended that the charted dangerous submerged obstruction with a wire drag clearance depth of 40 feet (12² meters) and a danger curve be deleted. It is also recommended that a dangerous sunken wreck with a least depth of 14¹ meters (14¹ Wk) and a danger curve be charted in present survey location.

AWOIS item #823, a charted dangerous submerged obstruction with a wire drag clearance depth of 30 feet (9¹ meters) and a danger curve, in Latitude 36°56'00"N, Longitude 75°54'18"W (NAD 27), originates with H-6976WD (1945-47). The obstruction was previously hung at 34 feet (10³ meters) and subsequently cleared by 30 feet (9¹ meters). During survey operations no contacts were found in the area common to the present survey and the AWOIS item. The obstruction was brought forward from H-6976WD (1945-47) to supplement the present survey. It is recommended that a charting recommendation for this item be deferred until the completion of office processing of junctional survey H-10356 (1990), and a final disposition of the investigated item has been made.

AWOIS item #824, a charted dangerous submerged obstruction with a wire drag clearance depth of 30 feet (9¹ meters) and a danger curve, in Latitude 36°56'05"N, Longitude 75°54'00"W (NAD 27), originates with H-6976WD (1945-47). The obstruction was previously hung at 32 feet (9⁷ meters) and subsequently cleared by 30 feet (9¹ meters). During survey operations no contacts were found in the area common to the present survey and the AWOIS item. The obstruction was brought forward from H-6976WD (1945-47) to supplement the present survey. It is recommended that a charting recommendation for this item be deferred until the completion of office processing of junctional survey H-10356 (1990), and a final disposition of the investigated item has been made.

AWOIS item #828, a charted dangerous submerged obstruction with a wire drag clearance depth of 32 feet (9⁸ meters) and a danger curve, in Latitude 36°56'24"N, Longitude 75°54'24"W (NAD 27), originates with H-6976WD (1945-47). The obstruction was previously hung at 34 feet (10³ meters) and subsequently cleared by 32 feet (9⁸ meters). During survey operations no contacts were found in the area common to the present survey and the AWOIS item. The obstruction was brought forward from H-6976WD (1945-47) to supplement the present survey. It is recommended that a charting recommendation for this item be deferred until the completion of office processing of junctional survey H-10356 (1990), and a final disposition of the investigated item has been made.

AWOIS item #7550, a charted dangerous submerged obstruction with a wire drag clearance depth of 29 feet (8⁸ meters) and a danger curve, in Latitude 36°54'30"N, Longitude 75°52'30"W (NAD 27) originates with H-6976WD (1945-47). The obstruction was previously hung at 30 feet (9¹ meters) and subsequently cleared by 29 feet (8⁸ meters). During survey operations no contacts were found in the area common to the present survey and the AWOIS item. The obstruction was brought forward from H-6976WD (1945-47) to supplement the present survey. It is recommended that the dangerous submerged obstruction with a wire drag clearance depth of 29 feet (8⁸ meters) and a danger curve be retained as charted. It is also recommended that further discussion and a charting recommendation for this item be deferred until the completion of office processing of survey FE-353SS (1990), and a final disposition of the investigated item has been made.

There are no conflicts between effective depths of H-6976WD (1976) and the present survey soundings.

There are no hangs or groundings that originate with H-9871WD (1976) within the common area of the present survey. There are no conflicts between effective depths of H-9871WD (1976) and the present survey soundings.

7. COMPARISON WITH CHART 12205 (20th Ed., 21 January 1989)
12207 (16th Ed., 3 August 1985)
12221 (57th Ed., 28 January 1989)

a. Hydrography

The charted hydrography originates with the previously discussed prior surveys and miscellaneous sources not readily available. The previously discussed prior surveys require no further consideration. The hydrographer makes adequate chart comparisons in section N. of the Descriptive Report. In addition to the recommendations in the Descriptive Report the following should be noted:

1) AWOIS item #3081, a charted shoal with a depth to 30 feet (9¹ meters) and a danger curve, in Latitude 36°56'12"N, Longitude 75°53'21"W originates with Chart Letter 310 of 1940 (CL 310/40). Two subsequent prior surveys, FE-77 (1949) and H-9905 (1980) investigated this shoal with negative results. During survey operations no indication of the shoal was seen; however, the charted shoal falls between lines run during survey operations. The shoal does not appear on Chart 12221 (58th Ed., Sept. 15/90). It is recommended that discussion, and a charting recommendation for this item be deferred until the completion of office processing of junctional survey H-10356 (1990), and a final disposition of the investigated item has been made.

2) AWOIS item #7522, a dangerous sunken wreck is charted as a wire drag clearance depth of 47 feet (14³ meters) and a danger curve, in Latitude 36°54'42"N, Longitude 75°54'00"W originates with Notice to Mariners 8 of 1931 (NM 8/31). The 47 foot wire drag clearance depth was acquired by H-6976WD (1945-47) during an item investigation. During survey operations two (2) contacts were located within the 2000 meter search radius. Two (2) significant contacts were found within the 2000 meter search radius and several contacts were found outside the radius (within 700 meters). Approximately 10% of the search radius was not covered by side scan sonar (to the northeast). Additional work was requested on all significant contacts. It is recommended that the dangerous sunken wreck charted as a wire drag clearance depth of 47 feet (14³ meters) be retained as charted. It is also recommended that further discussion and a charting

deferred until the completion of office processing of survey FE-353SS (1990), and a final disposition of the investigated item has been made.

3) AWOIS item #7549, a charted non-dangerous sunken wreck, in Latitude 36°54'09"N, Longitude 75°51'30"W originates with Chart Letter 347 of 1958 (CL 347/58). The item was listed as an information item in the AWOIS listing. During survey operations no contacts were found. It is recommended that the non-dangerous sunken wreck be retained as charted.

4) The field unit initially noted 117 uncharted obstructions, of which 48 were recommended for further investigations by the field unit. During office processing only eleven (11) contacts noted by the field unit were submitted for additional work; contacts appeared to be the same item or were not considered significant enough to warrant further investigation. Ten (10) additional contacts were noted on the sonagrams during office processing. The following contacts are shown on the present survey:

<u>Contact Nos.</u>	<u>Depth/Feature</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>
. 777.49s	14 ⁶ Obstr (A)	36°53'26.89"	75°54'42.99"
908.36p	16 ⁷ Obstr (A)	36°54'10.52"	75°53'50.11"
1082.39s	14 ² Obstr (A)	36°52'34.06"	75°53'22.01"
1275.09s	14 ⁶ Obstr (A)	36°52'45.80"	75°53'16.81"
1312.41s	13 ³ Obstr (A)	36°53'43.45"	75°54'10.99"
1574.40p	15 ² Obstr (A)	36°52'36.69"	75°52'38.92"
. 2026.13s	15 ⁴ Obstr (A)	36°54'29.32"	75°55'34.22"
. 2099.48s	14 ⁴ Obstr (A)	36°54'57.39"	75°55'46.96"
. 2101.48s	15 ⁵ Obstr (A)	36°54'45.25"	75°55'32.52"
. 2102.05s	15 ⁸ Obstr (A)	36°54'44.30"	75°55'31.82"
. 2121.01p	18 Obstr (A)	36°55'26.24"	75°55'23.52"
. 2132.13p	16 ⁴ Obstr (A)	36°54'51.60"	75°55'32.37"
. 2488.45p	13 Obstr (A)	36°55'49.29"	75°54'50.26"
. 2753.41s	13 ³ Obstr (A)	36°55'58.56"	75°54'56.59"

While there are only fourteen (14) contacts plotted on the present survey the remaining contacts were of a questionable nature at best and/or did not meet the 1 meter height off of the bottom requirement stated in section 7.1.1. of the Project Instructions. It is recommended that further discussion and a charting recommendations for these items be deferred until the completion of office processing of survey FE-353SS (1990), and a final disposition of the investigated items has been made.

Except as noted above the present survey is adequate to supersede the charted hydrography within the common area.

b. Dangers to Navigation

There were no dangers to navigation submitted by the field unit. No dangers were discovered during office processing.

c. Aids to Navigation

There were no fixed or floating aids to navigation verified or located within the limits of the present survey.

8. COMPLIANCE WITH INSTRUCTIONS

This survey complies with the Project Instructions.

9. ADDITIONAL FIELD WORK

This is a good basic hydrographic/side scan sonar survey. With the exception of the items listed in section 7.a.5) of this report, no other field work is recommended.

Reginald L. Keene
Reginald L. Keene
Cartographic Technician
Verification of Field Data

Norris A. Wike
Norris A. Wike
Cartographer
Evaluation and Analysis

Robert R. Hill
Robert R. Hill
Senior Cartographic Technician
Verification Check

APPROVAL SHEET
H-10340

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 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.

Robert G. Roberson

Robert G. Roberson
Chief, Evaluation and Analysis Team
Atlantic Hydrographic Section

Date: 9/3/91

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.

Christopher B. Lawrence

Christopher B. Lawrence, CDR, NOAA
Chief, Atlantic Hydrographic Section

Date: 5 Sept. 1991

Final Approval:

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

Date: 10/25/91

DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Survey
Rockville, Maryland

Hydrographic index No. 70

