

10440

Diagram No. 1219-3

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-20-2-92
Registry No. H-10440

LOCALITY

State New Jersey
General Locality . . . Atlantic Ocean
Sublocality 9 NM ESE of Cape May

1992

CHIEF OF PARTY
CDR A.A. Armstrong

LIBRARY & ARCHIVES

DATE June 21, 1993

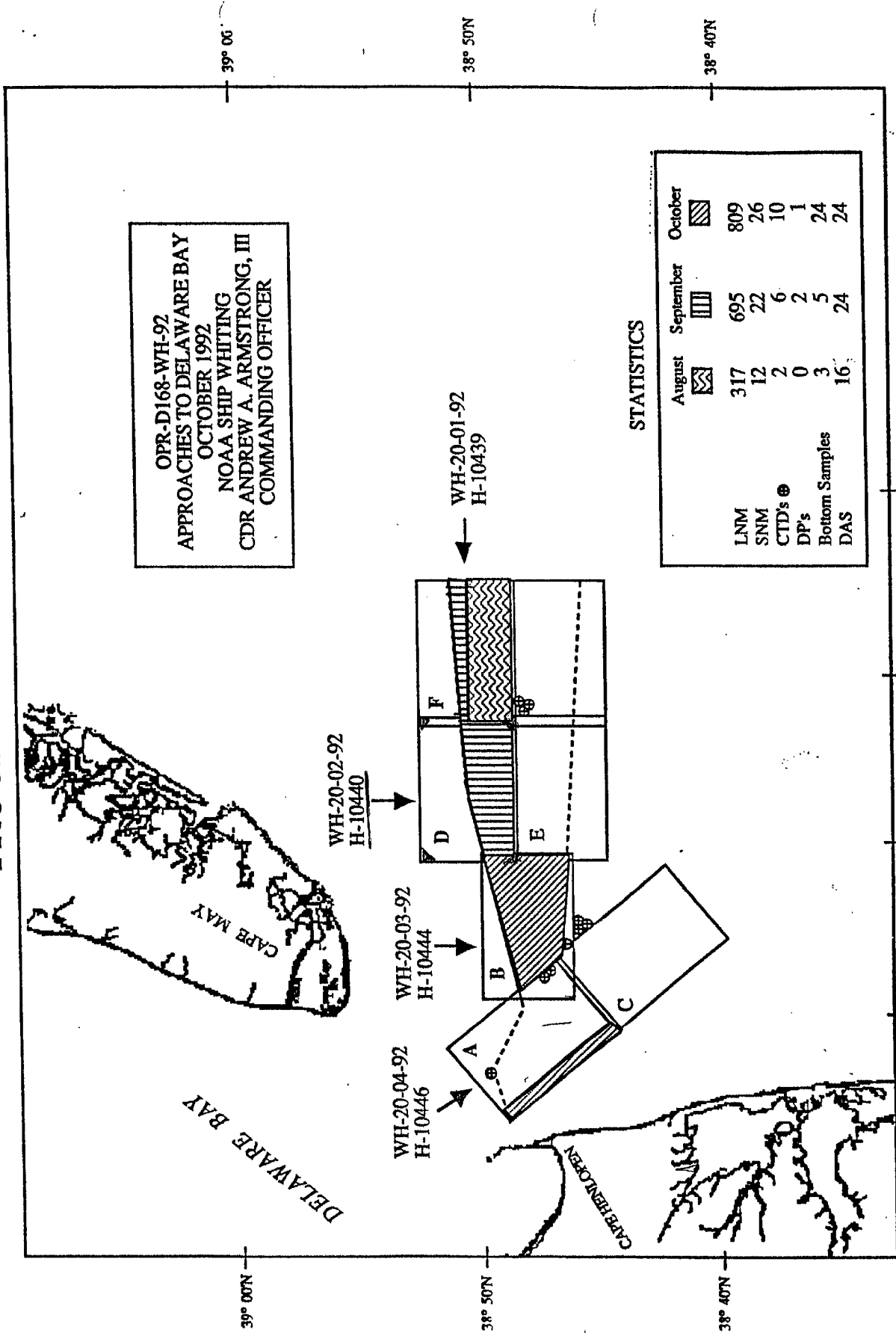
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☆ U.S. GOV. PRINTING OFFICE: 1987-756-980

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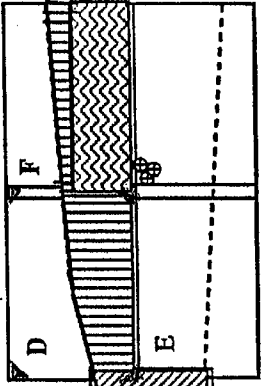
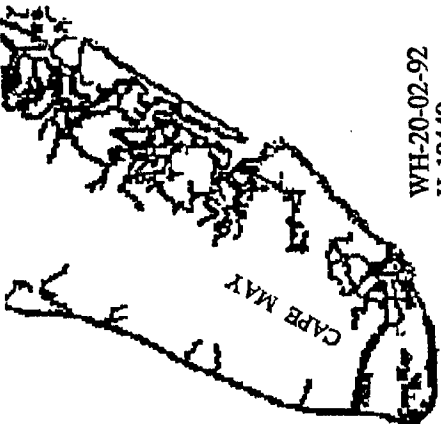
NOAA SHIP WHITING PROGRESS SKETCH



OPR-D168-WH-92
APPROACHES TO DELAWARE BAY
OCTOBER 1992
NOAA SHIP WHITING
CDR ANDREW A. ARMSTRONG, III
COMMANDING OFFICER

STATISTICS

	August	September	October
LNM	317	695	809
SNM	12	22	26
CTDs	2	6	10
DP's	0	2	1
Bottom Samples	3	5	24
DAS	16	24	24



WH-20-02-92
H-10440

WH-20-03-92
H-10444

WH-20-04-92
H-10446

WH-20-01-92
H-10439

DELAWARE BAY

CAPE MAY

39° 00'N

38° 50'N

38° 40'N

75° 00'W

74° 30'W

39° 00'

38° 50'N

38° 40'N

HYDROGRAPHIC TITLE SHEET

H-10440

INSTRUCTIONS - The Hydrographic Sheet should be accompanied by this form, filled in completely as possible, when the sheet is forwarded to the Office.

FIELD NO.
WH-20-2-92

State DELAWARE

General locality APPROACHES TO DELAWARE BAY

Locality 9 NAUTICAL MILES ^{NM} ^{SE} SOUTHEAST OF CAPE MAY, NEW JERSEY

Scale 1:20,000 Date of Survey Sept. 3 - Oct. 28, 1992

Instructions dated JULY 16, 1992 Project No. OPR-D168-WH-92

Vessel NOAA Ship WHITING S-329 EDP # 2930

Chief of party Commander Andrew A. Armstrong III

Suveyed by A.A. Armstrong, C.B. Greenawalt, N.C. Crews, J.S. Verlaque, R.A. Fletcher,
D.E. Bixby, L.P. Henn, J.L. Riley, J.A. Seitz, F.R. Cruz, E.A. Myers, R.L. Harris

Soundings taken by echo sounder DSF-6000N

Graphic record scaled by WHITING survey personnel

Graphic record checked by WHITING survey personnel

Protracted by N/A Automated plot by HP 7959B, Bruning (FIELD)

Verification by Atlantic Hydrographic Section Personnel

Soundings in MLLW Meters

REMARKS: Surveyed by 1:20,000-scale standards, plotted at 1:10,000

Junctions with H-10439 and H-10441

200% side scan sonar coverage

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

News/SURP ✓ 6/20/93 SSV

SC 12-13-96

DESCRIPTIVE REPORT TO ACCOMPANY
HYDROGRAPHIC SURVEY
OPR-D168-WH
1992
WH-20-2-92
H-10440
NOAA SHIP WHITING
CDR Andrew A. Armstrong, III, NOAA
Commanding Officer

A. PROJECT

Project OPR-D168-WH is a basic hydrographic survey with side scan sonar (SSS) bottom coverage of the approaches to Delaware Bay.

The purpose of this project is to update the existing nautical charts and to locate any wrecks and obstructions in or near the approaches to Delaware Bay. Specifically, this project is in response to a request by the Fifth Coast Guard District to survey the approaches to the Delaware Bay in order to realign the eastern approach to the traffic separation scheme.

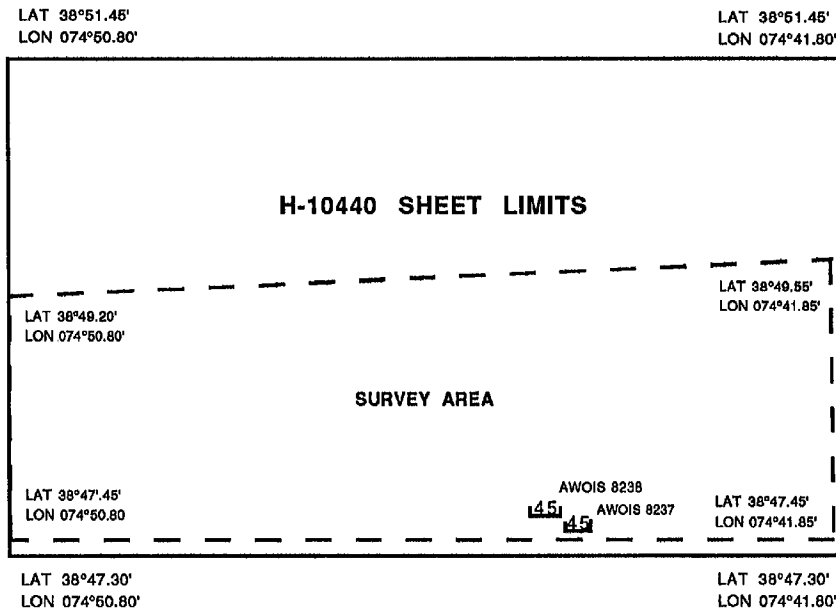
Survey operations were conducted in accordance with Hydrographic Project Instructions OPR-D168-WH dated July 16, 1992. No changes to the project instructions were issued. A change to the Automated Wreck and Obstruction Information System (AWOIS) listing dated August 5, 1992 was issued on October 5, 1992.

Project OPR-D168-WH was divided into seven survey sheets. The survey described in this report was designated "D" Sheet, and assigned field sheet number WH-20-2-92 with registry number H-10440. (1992)

B. AREA SURVEYED

Hydrographic survey H-10440⁽¹⁹⁹²⁾ is 9 nautical miles southeast of Cape May, New Jersey at the eastern approaches to Delaware Bay. The survey covers a section of the Five Fathom Bank to Cape Henlopen inbound traffic lane and a northern portion of the separation zone.

The survey area is shown in the following diagram:



Survey operations began on September 3, 1992 (DOY 247) and ended on October 28, 1992 (DOY 302). Data were acquired on the following days:

<u>DOY</u>	<u>Date</u>
247	September 3
253-255	September 9-11
259-261	September 15-17
266-267	September 22-23
273-275	September 29 - October 1
282	October 8
302	October 28

C. SURVEY VESSEL

NOAA Ship WHITING, vessel identification number 2930, was used for all data acquisition during survey H-10439.

No unusual vessel configurations were used nor were any problems encountered.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

Survey data acquisition and processing were accomplished using the HDAPS system with the following software:

<u>PROGRAM NAME</u>	<u>VERSION</u>	<u>VERSION DATE</u>
AUTOST	3.00	24-Sep-92
BACKUP	2.00	27-Dec-90
BASELINE	1.13	09-Jul-92
BIGABST	2.02	05-Mar-92
BIGABST	2.03	11-Sep-92
BLOCKEDIT	2.00	15-Jun-92
BLKEDIT	2.01	29-Sep-92
CARTO	2.02	21-May-92
CARTO	2.03	23-Sep-92
CARTO	2.04	21-Oct-92
CONTACT	2.00	18-Jun-92
CONTACT	2.01	23-Sep-92
CONTACT	2.01	21-Oct-92
CONVERT	3.50	14-Jul-92
CONVERT	3.51	11-Sep-92
CONVERT	3.52	21-Oct-92
COPRINTOUT	2.01	03-Aug-92
DAS_SURV	6.32	16-Jul-92
DIAGNOSE	3.01	21-May-92
DISC_UTIL	1.00	03-Aug-92
DP	2.11	11-Jun-92
DP	2.12	01-Oct-92
EXCESS	4.00	07-Jul-92
EXCESS	4.10	23-Sep-92
FILESYS	3.00	01-Aug-92
FILESYS	3.01	09-Sep-92
FILESYS	3.02	20-Oct-92
GRAPHEDIT	1.00	03-Aug-92
GRAFEDIT	1.01	22-Oct-92
GRAFEDIT	6.00	06-Jul-92
GRAFEDIT	6.00	09-Oct-92
HIPSTICK	1.01	28-Jul-92
HPRAZ	1.26	22-May-92
INSTALL	4.00	09-Jul-92
INVERSE	2.00	10-Jul-92
LOADNEW	2.00	22-Jul-92
LOADNEW	2.01	09-Sep-92
LOADNEW	2.02	29-Sep-92
LISTAWOIS	3.00	10-Jul-92
LISTAWOIS	3.01	03-Sep-92
LISTAWOIS	3.02	07-Oct-92
LIST_DATA	1.00	03-Aug-92
MAINMENU	1.00	10-Jul-92
MAN_DATA	2.00	09-Jul-92

<u>PROGRAM NAME</u>	<u>VERSION</u>	<u>VERSION DATE</u>
NEWPOST	6.00	not listed
PLOTALL	2.05	19-Aug-92
PLOTALL	2.06	22-Sep-92
PLOTALL	2.07	21-Oct-92
POINT	2.10	10-Jun-92
PREDICT	1.12	21-May-92
PREDICT	2.00	09-Jul-92
PRESURVEY	7.00	23-Sep-92
PRINTOUT	4.00	18-May-92
PRINTOUT	4.01	09-Sep-92
PRINTOUT	4.02	13-Oct-92
QUICK	2.00	20-Aug-92
QUICK	2.01	29-Sep-92
RAMSAVER	1.01	21-May-92
REAPPLY	2.00	10-Jul-92
REAPPLY	2.01	10-Sep-92
RECOMP	2.02	03-Aug-92
SCANNER	1.00	10-Jul-92
SELPRINT	2.02	31-Aug-92
SHEETSPLIT	1.01	30-Sep-92
SHEETSPLIT	1.02	22-Oct-92
ZOOMEDIT	2.00	10-Jul-92
ZOOMEDIT	2.10	23-Sep-92
ZOOMEDIT	2.11	01-Oct-92

NADCON (version 1.01 for IBM compatible computer) was used to calculate the datum shift from the North American Datum of 1983 (NAD 83) to NAD 27 for comparisons with prior surveys.

NAVUTL (version 6.00 for the MicroVAX computer) was used to compute inverses for DGPS performance checks.

MAGDIM (Version 1.2 for the Gateway 2000 microcomputer, modified for HDAPS by LCDR Minkle aboard WHITING on October 2, 1992) was also used for DGPS performance checks.

Sound velocity corrections were determined using version 1.00 of program CAT and version 1.11 of VELOCITY.

E. SIDE SCAN SONAR EQUIPMENT

Side scan sonar (SSS) operations were conducted using one of two EG&G model 260 slant-range corrected SSS recorders and one of two EG&G 272-T dual-channel (single frequency) towfish. The towfish was operated on the 100 KHz frequency and was configured with a 20 degree beam depression for optimum coverage. Armored towing cable was used. The following sonar equipment was used throughout the survey:

<u>Type</u>	<u>S/N</u>
Towfish	11904
Towfish	10823
260 Recorder	10884
260 Recorder	12102

The towfish was deployed from a slip-ring winch at the stern of WHITING and was generally maintained at a height between 8 and 20 meters off the bottom. Side scan sonar operations were limited to an approximate speed of 5 knots.

Offsets and laybacks for the A-frame used to tow the SSS towfish were measured on July 27, 1992 using the 100 kHz (high frequency) echo sounder transducer as the reference. The A-frame height was measured from the waterline on the same date. All offset, layback and height data were applied as defined by the HDAPS Manual. This data is on file at the Atlantic Hydrographic Section (AHS). *Filed WITH THE ORIGINAL FIELD RECORDS.*

Confidence checks were performed on a routine basis, primarily by noting changes in bottom texture on the outer edges of the sonargram. Confidence checks were taken on buoys when convenient.

Main-scheme lines were spaced 75 meters apart, using the 100-meter range scale, to obtain the required 200% SSS coverage. These lines were split in all areas where 200% coverage was questionable due to refraction, noise, or inadequate swath overlap. Some propeller wash was evident on the sonargram trace in areas where the water depths were less than 15 meters. This did not interfere with the legibility of the trace. SSS data gathered on the southern half of survey H-10440 displayed severe refraction. Line spacing was reduced to 37 meters, ensuring 200% SSS coverage. Reduced coverage lines were run on September 22-23 (DOY 266-267) and September 29 - October 1 (DOY 273-275). Adequate coverage was determined by producing an 'A' and 'B' swath plot and ensuring 100% coverage on each plot.

Additional lines, spaced at 75-meters, were run normal to the main-scheme lines to disprove AWOIS items requiring 400% coverage. The HDAPS Contact Utility Program was used to compute the location and

approximate height of contacts. Contacts with measurable height and those with a distinct shape were considered significant and were listed in the HDAPS contact table. Final determination of "significant" contacts will be made by the Atlantic Hydrographic Section.

In accordance with the project instructions section 1.3, WHITING did not develop or investigate contacts discovered during this survey. This work is scheduled for a later date.

F. SOUNDING EQUIPMENT

A Raytheon Digital Survey Fathometer (DSF) 6000N echo sounder was the only sounding equipment used to determine water depth during the survey. The DSF-6000N produced a graphic record of the high frequency (100 KHz) and low frequency (24 KHz) depth which were digitally recorded by the HDAPS acquisition system. The high frequency depths were selected as the primary depths as shown on the sounding plots. DSF-6000N fathometers, s/n A122N and B050N, were used during this survey.

Echograms were carefully reviewed for significant features along the track line. Electronic technicians performed daily accuracy checks and preventive maintenance of the DSF-6000N.

G. CORRECTIONS TO SOUNDINGS

Sound velocity profiles of the water column were determined using a Seacat Conductivity, Temperature and Depth (CTD) profiler (model SBE-19, s/n 286). The profiler was calibrated on January 29, 1992. Calibration coefficients were applied via program VELOCITY. A copy of the calibration report may be found in the supplemental data cahier submitted with this survey.

The CTD, mounted on a rosette, was lowered through the water column to collect data for sound velocity corrections. Programs CAT and VELOCITY were used to process the data, select significant data points, and create a corrector table. The corrector table was manually entered into an HDAPS velocity table. All corrections were applied to soundings on line. Velocity profile data can be found in the supplemental data cahier submitted with this survey.

Data Quality Assurance (DQA) for the Seacat was performed by using a salt water hydrometer and a thermometer to measure the density and temperature of a surface water sample taken during the CTD cast. The Seacat program CAT compared these values to the CTD surface values, and confirmed that the velocity probe was working properly. Depth comparisons of the CTD with a leadline and

DSF6000N confirmed the depth sensor was operating within acceptable tolerances.

A summary of sound velocity casts follows:

<u>DOY</u>	<u>Vel.Table#</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Depth</u>
245	3	38°47'11" N	74°32'51" W	24.1 m
253	4	38°47'06" N	74°40'48" W	28.4 m
259	5	38°47'07" N	74°40'57" W	32.3 m
266	6	38°46'57" N	74°40'58" W	28.7 m
272	7	38°46'54" N	74°40'53" W	29.9 m
282	9	38°45'33" N	74°56'02" W	37.2 m
301	15	38°46'00" N	74°56'45" W	36.4 m
302*	16	38°47'00" N	74°40'57" W	24.5 m

*Included for reference, not applied on line.

Settlement and squat determination was conducted on August 5, 1991. Correctors based on this determination were applied in real time throughout the survey. During work on survey H-10440 settlement and squat correctors were recomputed based on the August 5, 1991 determination. The new correctors were applied to data acquired on or after DOY 295. Differences between correctors applied before DOY 295 and those applied after are insignificant. Settlement and squat correctors are on file at the Atlantic Hydrographic Section (AHS). *FILED WITH THE ORIGINAL FIELD RECORDS*

Heave correctors were applied by HDAPS. The HDAPS data acquisition computer logged heave data from a Heave, Roll, and Pitch sensor (HIPPY, s/n 19109-C) while on line.

The tidal datum for this project was Mean Lower Low Water. The operating tide station at Breakwater Harbor (Lewes), Delaware (855-7380) served as direct control for datum determination. Mr. Larry Nieson, Atlantic Operations Group, N/OES213, confirmed the proper operation of the tide station during the survey. This station also served as the reference station for predicted tides. Time and height correctors for the project were as follows:

	<u>Time Correction:</u>	<u>Height Ratio:</u>
High Water:	-1 hr 00 min	x0.94
Low Water:	-1 hr 00 min	x0.94

Tidal data used during data acquisition were from table 2 of the East Coast of North & South America Tidal predictions, and were applied on line to the digital data using HDAPS software. The tidal data, in digital form, were received on floppy disk from Hydrographic Surveys Branch N/CG24. Request for smooth tides was submitted to Sea and Lake Levels Branch N/OMA12 on

Approved tides were applied during office processing.

October 30, 1992.

The correction for WHITING's static draft was 3.2 meters, a historical value that WHITING divers confirmed by pneumatic depth gauge on October 28, 1991. The Transducer Depth Determination Report is on file at AHS. *Filed with the original field records.*

All sounding corrections were applied to both the narrow (100kHz) and wide (24kHz) DSF6000N beams.

A leadline comparison with the DSF6000N was performed on September 27, 1992 (DOY 271). The difference in the high frequency reading was 0.1 meter and the difference in the low frequency reading was -.06 meter. This difference is attributable to the swell action at the time the comparison was performed. No correction for this difference was applied to the survey soundings.

H. CONTROL STATIONS *See also section 2.2. of the Evaluation Report*

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Two B-order horizontal control stations were used as DGPS reference stations for this survey; one at Cape Henlopen and one at Cape Henry. The adjusted NAD83 positions, computed by GPS methods, were provided by Lieutenant Jeffrey Ferguson of the Hydrographic Surveys Branch, N/CG24 on April 3, 1992. The positions are as follows:

	<u>Latitude</u>	<u>Longitude</u>
Cape Henry	36°55'37.580"N	076°00'23.884"W
Cape Henlopen	38°46'36.421"N	075°05'15.667"W

Computations for these stations are on file at the Atlantic Hydrographic Section. *Filed with the original field records.*

I. HYDROGRAPHIC POSITION CONTROL *See also section 2.2. of the Evaluation Report.*

A Differential Global Positioning System (DGPS) was used as the primary navigation system for this survey. WHITING monitored two U.S. Coast Guard DGPS beacons; Cape Henlopen, Delaware and Cape Henry, Virginia. Two Magnavox MX4200 DGPS satellite receivers were used to compute geographic positions. Two MX50R beacon receivers were used to monitor the differential correctors.

The primary DGPS receiver system was initialized by HDAPS to monitor the Cape Henlopen beacon (298 kHz). The second DGPS receiver system was initialized by the Magnavox-supplied control display program, "4200" (version 2.21, dated March 11, 1992) on a Gateway 2000 386/33c microcomputer (S/N 402208) to monitor Cape

Henry (289kHz). Neither receiver was operated in altitude constrain mode, although an altitude of 22.1 meters (antenna height above sea level) was entered in case only four satellites were in view and HDAPS defaulted into the 2-DGPS mode.

The serial numbers of the Magnavox MX4200 and MX50R receivers were as follows:

<u>Item</u>	<u>Part Number</u>	<u>Serial Number</u>
Primary System:		
Magnavox MX4200D	707361-803	537
Magnavox MX50R	627188-1	060
Secondary System:		
Magnavox MX4200D	707361-803	681
Magnavox MX50R	627188-1	036

Magnavox MX4200D software was upgraded on March 25, 1992. The firmware revision was A1 REV_E/H D030 / B030.

Horizontal Dilution of Precision (HDOP) limits were computed for each station as required in section 3.4.2 of the Field Procedures Manual (FPM) for Hydrographic Surveying. The HDOP limit for the Cape Henlopen and Cape Henry beacons were 7.4 and 6.2, respectively. No data were acquired at HDOP values exceeding these thresholds.

DGPS positioning was accomplished in accordance with the Field Procedures Manual, section 3.4. Cape Henlopen was used as the primary station throughout the project. Cape Henry was used as a back-up when the Cape Henlopen signal was intermittent or erratic. When the beacon signal was lost for more than 45 seconds, the survey line was broken and rerun where control had been unacceptable.

Performance checks were conducted on survey H-10440 using the two reference station method (FPM section 3.4.5). Cape Henlopen was the primary reference station and Cape Henry was the check station for programs NAVUTL and MAGDIM. Program NAVUTL was used from September 3 - October 1, 1992. Simultaneous printing of the HDAPS screen (Cape Henlopen) and the Gateway 2000 screen (Cape Henry) yielded a minimum of three simultaneous positions which were recorded and inverse computations were made using program NAVUTL. Program MAGDIM compares the EPE computations and the HDOP of each beacon automatically, revealing only the success of the performance check. Program MAGDIM was used on October 8 and October 28, 1992.

All DGPS performance checks confirmed that the DGPS positioning systems were operating properly and accurately. A summary of the

DGPS performance checks may be found in the supplemental data cahier submitted with this survey.

DGPS antenna offsets and laybacks were measured on July 27, 1992 using the 100 kHz (high frequency) echo sounder transducer as the reference. Antenna heights were measured from the waterline on the same date. Offsets and laybacks were applied by HDAPS on line. All offset, layback and height data is on file at the Atlantic Hydrographic Section (AHS). *Filed with original field data.*

J. SHORELINE *See also section 2.b. of the Evaluation Report*

There was no shoreline in this survey area.

K. CROSSLINES *See also section 3.a. of the Evaluation Report*

A total of 10 nautical miles of crosslines were run on H-10440. This amounted to 5.5% of the total linear nautical miles of mainscheme lines. Although survey H-10440 required 200% SSS coverage, the crossline percentage requirement is based on 100% SSS coverage.

Crossline and mainscheme agreement was excellent. The maximum difference between mainscheme and cross-line soundings was 0.4 meters.

L. JUNCTIONS *See also section 5. of the Evaluation Report*

Good contour agreement was found at the junctions of survey H-10440 with WHITING's contemporary surveys H-10439 (WH-20-1-92) to the east and H-10441 (WH-20-3-92) to the west. The maximum difference between survey and junction soundings was 0.4 meters.

At the completion of survey H-10440, there were no other contemporary junction surveys.

M. COMPARISONS WITH PRIOR SURVEYS *See also section 6. of the Evaluation Report.*

Survey H-10440 soundings were compared with prior surveys H-9723, H-9175, H-9173 WD, and H-9294 WD. All prior surveys were referenced to NAD 27 with Mean Low Water as the tidal datum. For comparison purposes, a datum shift was applied to H-10440 in accordance with the Field Procedures Manual for Hydrographic Surveying.

Survey H-9723, scale 1:20,000, completed in 1977, covered the entire contemporary survey area. A 1:20,000 scale, NAD 27,

sounding plot of survey H-10440 was compared with survey H-9723. Soundings compared favorably, indicating that the general contours have remained unchanged since the prior survey. The shallowest depth on survey H-9723, carried forward from survey H-9173 WD, was 11.9 meters (39 feet). WHITING conducted a shoal development on October 1, 1992 to disprove this depth by running closely spaced lines in the vicinity of 38°48.9'N, 074°50.0'W. Depths were 1.1 meters deeper on the contemporary survey. The shallowest depth on survey H-10440 was 12.4 meters (40.7 feet), 741 meters northwest of the shallowest depth on survey H-9723. Soundings on ^{prior} survey H-9723 ~~agreed within 0.6 meters.~~ *SHOW A GENERAL TREND OF BEING 0.1 TO 0.3 (0 TO 1 FT) SHOALER THAN PRESENT SURVEY SOUNDINGS.*

A small portion of this survey coincided with survey H-9175, scale 1:10,000, completed in 1970. ~~Soundings compared between these surveys agreed within 0.7 meters.~~ *Prior survey soundings show a general trend of being 0.34 (1 FT) deeper than present survey soundings.* Survey H-9294 WD, scale 1:20,000, completed in 1972, included a 51-foot (15.6 meter) hang and a 57-foot (17.4 meter) hang which were both cleared at 45 feet (13.7 meters). These wire drag hangs are AWOIS items 8237 and 8238, respectively. WHITING disproved these depths with 400% SSS coverage over a 200-meter radius about the charted position. No significant contacts were found. The SSS was supplemented with closely spaced lines in the vicinity of 38°47.6'N, 074°45.2'W. Depths were 12 feet (3.7 meters) deeper on survey H-10440 in the vicinity of the 51-foot hang and were 4.5 feet (1.1 meters) deeper in the vicinity of the 57-foot hang. WHITING recommends deleting both wire drag groundings from the chart and updating the chart with the contemporary survey's soundings. *See also sections 6.b.2)a) and 6.b.2)b) of the Evaluation Report.*

Survey H-9173 WD, scale 1:20,000, completed in 1970 shows a 39-foot (11.9 meter) ^{GROUNDING} hang cleared at 39 feet (11.9 meters) and a 48-foot (14.6 meter) ^{GROUNDING} hang cleared at 41 feet (12.5 meters). The 39-foot ^{GROUNDING} hang was disproved as stated previously. The 48-foot ^{GROUNDING} hang, approximate position 38°49.1'N, 074°48.8'W, agrees with the contemporary survey's surrounding depths. *Concur. See also sections 6.b.1)a) and 6.b.1)b) of the Evaluation Report.*

The bottom in the survey area was generally smooth. SSS records showed a variety of bottom textures.

WHITING recommends survey H-10440 supersede all hydrography from prior surveys in the common area. *Concur.*

N. COMPARISON WITH THE CHART *See also section 7, a, of the Evaluation Report.*

This survey was compared with an enlargement (1:10,000) of chart 12214, 36th ed., February 24/90, scale 1:80,000. Depths on the new edition of chart 12214 (37th ed., June 27/92, scale 1:80,000) were the same as the depths on the previous edition. No Notices to Mariners had been issued for the survey area. All charted

soundings in the area covered by this survey were compared and agreement was good. Surveyed soundings were generally one meter deeper than charted soundings. WHITING recommends that depths from H-10440 supersede all charted soundings in the common area.

Based on the preliminary shipboard review, there were no dangers to navigation found in the survey area. *Concur. See also section 7, b. of the Evaluation Report.*

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

This survey is a complete basic hydrographic ¹⁹⁵⁵ survey, adequate to supersede all prior surveys of the common area. No part of this survey is considered to be substandard. Final determination of sonar contacts requiring further investigation will be made during post-survey processing at AHS. Any required investigation will be scheduled as a separate FE survey. *See also section 7, a. of the Evaluation Report*

P. AIDS TO NAVIGATION *See also section 7, c. of the Evaluation Report.*

There were no aids to navigation in this survey.

Q. STATISTICS

Number of Positions.....	2725
Nautical Miles of Main-scheme Sounding Lines.....	183
Nautical Miles of Cross-lines.....	10
Square Nautical Miles Surveyed.....	17
Days of Production.....	14
Detached Positions.....	0
Bottom Samples.....	5
Tide Stations Installed.....	0
Current Stations.....	0
Number of CTD Casts.....	8
Magnetic Stations.....	0

R. MISCELLANEOUS

Adequate bottom samples were collected during a prior survey in 1977. Five bottom samples, taken during this survey, confirmed that the bottom type has not changed since the prior survey. The oceanographic log sheet is included in the supplemental cahier submitted with this survey. Bottom samples were not submitted to the Smithsonian Institution.

Tidal currents observed by WHITING agreed well with the predicted tidal current tables. No magnetic anomalies were observed.

Side scan operations were suspended twice daily to run the engines under full load. This time was used to run crosslines, service equipment, or transit between survey areas.

S. RECOMMENDATIONS *See also sections 6. AND 7. of the Evaluation Report*

See sections M. and N.

T. REFERRAL TO OTHER REPORTS

The following reports will be submitted to N/CG244 and forwarded to N/CG243 as part of OPR-D168-WH-92:

Coast Pilot Report
Chart Agent Visit Report
Chart Inspection Report
User Evaluation Report

Submitted By:

Lisa P. Henn
Lisa P. Henn
Ensign, NOAA

Reviewed By:

James S. Verlaque
James S. Verlaque
Lieutenant, NOAA
Operations Officer

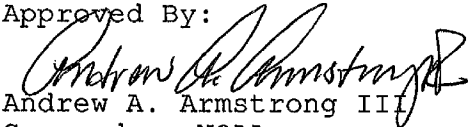
APPROVAL SHEET

HYDROGRAPHIC AND
SIDE SCAN SONAR SURVEY
OPR-D168-WH
1992
WH-20-2-92
H-10440

The data for this survey were acquired and checked under my daily supervision. Position and sounding accuracy meet the requirements specified in the Hydrographic Manual, the Hydrographic Survey Guidelines, and the Field Procedures Manual for Hydrographic Surveying. The survey is complete and adequate for the intended purpose of delineating bottom topography and determining depths and identifying (but not fully investigating) all potential dangers to navigation. No final field sheets were prepared for this survey. The survey data and accompanying records are complete and adequate for the preparation of the smooth sheet.

In accordance with section 6.14.1 of the Project Instructions, this survey is being processed under a partnership program with the Atlantic Hydrographic Section. The final designation of significant side scan sonar contacts that may represent dangers to navigation will be made by the Atlantic Hydrographic Section. The investigation of any significant contacts will be assigned as a separate survey.

Approved By:


Andrew A. Armstrong III
Commander, NOAA
Commanding Officer



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Coast and Geodetic Survey
Rockville, Maryland 20852

APR 3 1992

TO: Mike McKinney
FROM: Lieutenant *Jeffrey Ferguson* Ferguson, NOAA
Operations Section
Hydrographic Surveys Branch

SUBJECT: Cape Henlopen DGPS reference position

The position of the GPS antenna mount at the Cape Henlopen beacon site is:

38° 46' 36.42091" N
75° 05' 15.66618" W
Ellipsoidal Height = -6.01 meters.

The position was determined by observing the vector between station GPS S 5 and the antenna mount with two Trimble 4000SST GPS receivers. As a data quality check, vectors were also observed between station GPS S 5 A and the antenna mount, and between station GPS S 5 and station GPS S 5 A. The three vectors formed a 7.9 km loop that closed to 0.027 meters.

GPS S 5 and GPS S 5 A were existing stations in the NGS data base, descriptions and positions of these stations are attached.

The manufacturer of the survey poles I used is,
Hixon Mfg. and Supply Company
1400 Webster Ave
Fort Collins, CO 80524
(303) 482-0111

They call the item the "Constant Height Global Positioning System Survey Pole".

If any additional information is needed please call me at 301-443-8752.





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Coast and Geodetic Survey
Rockville, Maryland 20852

NOV 25 1992

MEMORANDUM FOR: The Record
FROM: Lieutenant Jeffrey Ferguson, NOAA
Operations Section
Hydrographic Surveys Branch
SUBJECT: Cape Henry DGPS Reference Station

On June 9 and June 10, 1992, Lieutenant Commander David Minkel and Lieutenant Jeffrey Ferguson of the Nautical Charting Division positioned the reference station at the Cape Henry beacon. The final NAD83 position for the reference station follows:

Cape Henry, Virginia
36° 55' 37.580" N
76° 00' 23.884" W
Ellipsoidal Height = -17.2 Meters

The survey was conducted using two Ashtech M-XII geodetic receivers. A total of three vectors were observed. One second order horizontal control station (NORF), a B order horizontal control station (HENRY) and the Cape Henry antenna mount (CAPE) were occupied.

All vectors were reduced using Ashtech post processing software LINECOMP version 4.0.01. Fixed integer solutions were obtained in all cases.

As a data quality check, program SHOOTER was used to compute a loop closure. The loop (NORF-HENRY-CAPE-NORF) had a length of 20 km and a closure of 1.6 ppm.

Program FILLNET version 2.0 was used to perform a 3-D least squares adjustment and compute a final position for the antenna mount. The horizontal and vertical constraints were station NORF.



ITEM INVESTIGATION REPORT

AW015
ITEM NO.: 8237

CHART NO.: 12214
EDITION: 37th
CHART DATE: June 27/92

SURVEY: H-10440

SOURCE: H-9294 WD (1970)

SOURCE POSITION: LAT 38°47'36.40"N LON 074°45'01.59"W

BRIEF DESCRIPTION OF ITEM:

57-foot (17.4 meter) wire drag ^{bottom} hang cleared at 45 feet (13.7 meters)

METHOD OF INVESTIGATION:

WHITING disproved this depth with 400% SSS coverage over a 200-meter radius about the charted position. No significant contacts were found. The SSS was supplemented with closely spaced lines in the vicinity of 38°47'36.40"N, 074°45'01.59"W.

RESULTS OF INVESTIGATION:

Depths were generally ~~4-5~~ ^{1 foot} feet (^{0.3} 1.1 meters) deeper on survey H-10440 in the vicinity of the 57-foot hang.

REDUCED LEAST DEPTH	POSITION NO.	LATITUDE	LONGITUDE	DESCRIPTION
N/A	N/A	N/A	N/A	N/A

SUPPORTING POSITION NO'S:

N/A

CHARTING RECOMMENDATION:

WHITING recommends deleting the wire drag ^{bottom hang} grounding cleared to 45 feet from the chart at position 38°47'36.40"N, 074°45'01.59"W and updating the chart with the contemporary survey's soundings.

Concur. See also section 6.b.2)a) of the Evaluation Report.

ITEM INVESTIGATION REPORT

AWOIS
ITEM NO.: 8238

CHART NO.: 12214
EDITION: 37th
CHART DATE: June 27/92

SURVEY: H-10440

SOURCE: H-9294 WD (1970)

SOURCE POSITION: LAT 38°47'40.40"N LON 074°45'07.59"W

BRIEF DESCRIPTION OF ITEM:

51-foot (15.⁵/₈ meter) wire drag, ^{Bottom} hang cleared at 45 feet (13.7 meters)

METHOD OF INVESTIGATION:

WHITING disproved this depth with 400% SSS coverage over a 200-meter radius about the charted position. No significant contacts were found. The SSS was supplemented with closely spaced lines in the vicinity of 38°47'40.40"N, 074°45'07.59"W.

RESULTS OF INVESTIGATION:

Depths were 1⁶/₂ feet (~~3.7~~⁵ meters) deeper on survey H-10440 in the vicinity of the 51-foot hang. *Clearance depth*

REDUCED LEAST DEPTH	POSITION NO.	LATITUDE	LONGITUDE	DESCRIPTION
N/A	N/A	N/A	N/A	N/A

SUPPORTING POSITION NO'S:

N/A

CHARTING RECOMMENDATION:

WHITING recommends deleting the wire drag, ^{Bottom hang} ~~grounding~~ cleared to 45 feet from the chart at position 38°47'40.40"N, 074°45'07.59"W and updating the chart with the contemporary survey's soundings. *Concor. See also section 6.b.2)b) of the Evaluation Report.*



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: December 29, 1992

MARINE CENTER: Atlantic

HYDROGRAPHIC PROJECT: OPR-D168-WH

HYDROGRAPHIC SHEET: H-10440

LOCALITY: New Jersey, Atlantic Ocean, 9 NM SE of Cape May

TIME PERIOD: September 3 - October 28, 1992

TIDE STATION USED: 855-7380 Lewes (Ft. Miles), Breakwater Harbor,
Delaware Lat. 38° 46.9'N Lon. 75° 07.2'W

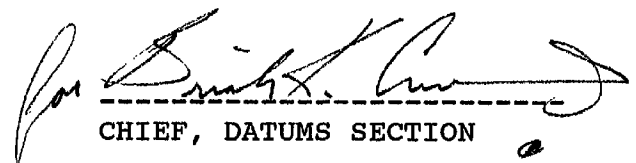
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 2.51 ft.

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.3 ft.

REMARKS: RECOMMENDED ZONING

Apply a -1 hr 00 min time correction and a x0.94 range ratio
to Lewes Breakwater Harbor, Delaware (855-7380).

Note: Times are tabulated in Eastern Standard Time.


CHIEF, DATUMS SECTION



GEOGRAPHIC NAMES

H-10440

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)											1
DELAWARE BAY (title)											2
NEW JERSEY (title)											3
											4
											5
											6
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											25

Approved:

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

JAN - 4 1993

N/CG244-66-93

LETTER TRANSMITTING DATA

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

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

TO:

NOAA/National Ocean Service
 Chief, Data Control Branch
 N/CG243, Station 6813, SSMC3
 1315 East-West Highway
 Silver Spring, MD 20910

DATE FORWARDED

7 June 1993

NUMBER OF PACKAGES

1 tube, 3 boxes

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-10440

New Jersey, Atlantic Ocean, 9 NM SE of Cape May

1 Tube containing:

- 1 Original Descriptive Report for H-10440
- 1 Original Smooth Sheet for H-10440
- 1 Smooth Position Overlay
- 2 Excess Sounding Overlays

Box 1 of 3 containing:

- 1 Cahier with Position Printout and Control File
- 2 Accordian Files with fathograms, side scan sonargrams and field printouts for JD's: 247, 253, 254, 255, 259, 260, and 320 (splits)

Box 2 of 3 containing:

- 1 Cahier with Sounding Printout and Line File
- 1 Accordian File with fathograms, side scan sonargrams and field printouts for JD's: 260, 261, 266, and 267

Box 3 of 3 containing:

- 1 Envelope with Miscellaneous Data removed from original Descriptive Report
- 1 Envelope with supplemental data removed from Printouts
- 2 Accordian Files with fathograms, side scan sonargrams and field printouts for JD's: 267, 273, 274, 275, and 282

FROM: (Signature)

Richard H. Whitfield
 Richard H. Whitfield

RECEIVED THE ABOVE
 (Name, Division, Date)

D. S. Clark

Return receipted copy to:

Atlantic Hydrographic Section, N/CG244
 439 W. York Street
 Norfolk, VA 23510-1114

JUN 21 1993

06/14/93

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H-10440

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	2579
NUMBER OF SOUNDINGS	21258

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	127	01/05/93
VERIFICATION OF FIELD DATA	76	03/17/93
ELECTRONIC DATA PROCESSING	83	
QUALITY CONTROL CHECKS	20	
EVALUATION AND ANALYSIS	17	04/09/93
FINAL INSPECTION	27	05/25/97
TOTAL TIME	350	
ATLANTIC HYDROGRAPHIC SECTION APPROVAL		05/27/93

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

SURVEY NO.: H-10440

FIELD NO.: WH-20-2-92

New Jersey, Atlantic Ocean, 9 NM SE of Cape May

SURVEYED: 3 September through 28 October 1992

SCALE: 1:20,000

PROJECT NO.: OPR-D168-WH-92

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

CONTROL: MAGNAVOX MX4200 Satellite Receiver/MAGNAVOX MX50R Beacon Receiver (Differential Global Positioning System)

Chief of Party.....A. A. Armstrong III

Surveyed by.....C. B. Greenawalt
.....N. C. Crews
.....J. S. Verlaque
.....R. A. Fletcher
.....D. E. Bixby
.....L. P. Henn
.....J. A. Seitz
.....F. R. Cruz
.....R. L. Harris
.....A. A. Myers
.....J. L. Riley

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 present survey during hydrographic operations were not investigated by the present survey. In cases where the side scan sonar was used to determine the estimated depth of a feature, the item is shown on the present survey with the upper case letter 'A' in parenthesis. This note is shown on the present survey smooth sheet in proximity to the title block. See also 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. 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.

b. No unusual problems were encountered during office processing.

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

2. CONTROL AND SHORELINE

a. Control is adequately discussed in sections H. and I. 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 move the projection lines 0.406 seconds (12.5 meters or 0.62 mm at the scale of the survey) north in latitude, and 1.404 seconds (33.9 meters or 1.70 mm at the scale of the survey) east in longitude.

All geographic positions listed in this report are on the NAD 83 unless otherwise specified.

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

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 depth curves were drawn in their entirety. Brown curves have been added to better delineate bottom relief.

c. The development of the bottom configuration and determination of least depths is considered adequate. With the exception of seven side scan sonar contacts noted during office processing (see section 7.a. of this report).

4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records and reports conform to the requirements of the

HYDROGRAPHIC MANUAL, SIDE SCAN SONAR MANUAL, and FIELD PROCEDURES MANUAL.

5. JUNCTIONS

H-10439 (1992) to the east
H-10444 (1992) to the west

Standard junctions were effected between the present survey and surveys H-10439 (1992) and H-10444 (1992). Present survey depths are in harmony with the charted hydrography to the north and south.

6. COMPARISON WITH PRIOR SURVEYS**a. Hydrographic**

H-9175 (1970) 1:10,000
H-9723 (1977) 1:20,000

The prior surveys listed above cover the present survey in its entirety. These prior surveys are adequately discussed in section M., pages 10 and 11, of the Descriptive Report and need no further discussion.

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

b. Wire Drag

H-9173WD (1970) 1:20,000
H-9294WD (1970) 1:20,000

1) Two groundings originating with H-9173WD (1970) fall within the common area of the present survey. The following should be noted:

a) An uncharted 39-ft grounding (11^9 m), in Latitude $38^{\circ}48'52.00''N$, Longitude $74^{\circ}50'05.00''W$ (NAD 27), originating with the prior survey was subsequently cleared by 39 feet (11^9 m). The grounding is considered disproved by a fathometer investigation conducted during present survey operations. Present survey depths range from 13 to 13^5 meters (42 to ~~42~~ ft). No change in charting is recommended.

⁴⁴
 b) An uncharted 48-ft grounding (14^6 m) in Latitude $38^{\circ}49'07.30''N$, Longitude $74^{\circ}48'50.0''W$ (NAD 27), originating with the prior survey was subsequently cleared by 41 feet (12^5 m). Present survey depths range from 15 to 16

meters (49 to 52 ft). The grounding is considered disproved because of the present survey depths coupled with 200% side scan sonar coverage of the area. No change in charting is recommended.

There are no conflicts between the prior survey effective clearance depths and present survey soundings.

2) Twelve hangs that originate with prior survey H-9294WD (1970) fall within the present survey area. Two of the hangs are charted Automated Wreck and Obstruction Information System (AWOIS) items #8237 and #8238. The following should be noted:

a) AWOIS item #8237, a charted wire drag clearance depth of 45-ft (13^7 m), in Latitude $38^{\circ}47'36.40''$ N, Longitude $74^{\circ}45'01.59''$ W, originates with the prior survey as a 57 ft (17^4 m) bottom hang subsequently cleared by 45 feet (13^7 m). The AWOIS item was investigated with negative results. Present survey depths range from 17^3 to 17^8 m (57 to 58 ft). It is recommended that the charted wire drag clearance depth of 45-ft (13^7 m) be deleted and the area charted as shown on present survey.

b) AWOIS item #8238, a charted wire drag clearance depth of 45-ft (13^7 m), in Latitude $38^{\circ}47'40.40''$ N, Longitude $74^{\circ}45'07.59''$ W, originates with the prior survey as a 51 ft (15^5 m) bottom hang subsequently cleared by 45 feet (13^7 m). The AWOIS item was investigated with negative results. Present survey depths range from 18^4 to 18^9 m (60 to 62 ft). It is recommended that the charted wire drag clearance depth of 45-ft (13^7 m) be deleted and the area charted as shown on present survey.

c) The following uncharted hangs are considered disproved by 200% side scan sonar coverage conducted during present survey operations:

<u>Hang (ft/m)</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>	<u>Present Depths (m)</u>
55/16 ⁷	38°47'47.5"	74°48'33.0"	17 ⁹ -18 ²
56/17 ¹	38°47'54.3"	74°48'22.5"	18 ⁴ -18 ⁶
56/17 ¹	38°48'03.0"	74°48'03.0"	16 ⁹ -18
56/17 ¹	38°48'33.0"	74°47'42.0"	16 ⁹ -18 ⁸
56/17 ¹	38°48'29.0"	74°47'13.5"	16 ⁷ -17 ³
54/16 ⁴	38°48'34.5"	74°47'06.0"	16 ³ -16 ⁸
58/17 ⁶	38°47'46.0"	74°44'44.0"	18 ² -18 ⁹
58/17 ⁶	38°48'19.0"	74°43'54.0"	18 ⁷ -19
55/16 ⁷	38°48'36.0"	74°43'34.0"	17 ⁴ -18 ¹
58/17 ⁶	38°48'48.0"	74°43'18.0"	17 ⁸ -18

No contacts were located by the present survey in the vicinity of the hangs. No change in charting is recommended.

There are no conflicts between the prior survey effective clearance depths and present survey soundings.

7. COMPARISON WITH CHART 12214 (37th Ed., 27 June 1992)

a. Hydrography

The charted hydrography originates with the previously discussed prior surveys and requires no further consideration. An adequate chart comparison is discussed in section N. of the Descriptive Report. The following should be noted:

Seven significant side scan sonar contacts were noted during office processing. The positions and heights of the contacts were scaled from the side scan sonargrams and are listed below.

<u>Contact (m/ft)</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>	
14 ⁸ Obstr(A)/48	38°47'50.01"	74°50'10.78"	859 ^{AW 01 5}
17 ⁷ Obstr(A)/58	38°47'54.74"	74°47'24.21"	8600
17 ⁴ Obstr(A)/57	38°48'11.57"	74°46'12.96"	8601
12 ⁹ Obstr(A)/42	38°48'23.65"	74°49'46.08"	8602
18 Obstr(A)/59	38°48'38.90"	74°43'45.85"	8603
18 ⁶ Obstr(A)/61	38°48'55.40"	74°44'53.42"	8604
17 ³ Obstr(A)/57	38°47'57.72"	74°44'17.08"	8605

It is recommended that these obstructions with estimated depths be charted in accordance with Cartographic Order 004/89, dated 3 July 1989. The obstructions have been recommended for additional work during the 1993 field season.

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 noted during office processing.

c. Aids to Navigation

There are no aids to navigation within the limits of the present survey.

8. COMPLIANCE WITH INSTRUCTIONS

This survey complies with the Project Instructions.

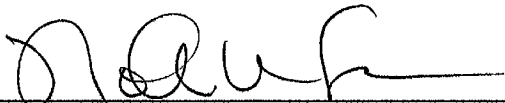
9. ADDITIONAL FIELD WORK

This is an adequate basic hydrographic/side scan sonar survey. Additional work is recommended for items discussed in section 7.a. of this report.

WHITING Processing Team
Verification and Evaluation and Analysis



Franklin L. Saunders
Cartographic Technician



Norris A. Wike
Cartographer

APPROVAL SHEET
H-10440

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.

Richard H. Whitfield Date: 27 May 1993
Richard H. Whitfield
Cartographer, Evaluation and Analysis Team
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.

Christopher B. Lawrence Date: 27 May 1993
Christopher B. Lawrence, CDR, NOAA
Chief, Atlantic Hydrographic Section

Final Approval:

Approved: J. Austin Yeager Date: 12/8/94
for J. Austin Yeager
Rear Admiral, NOAA
Director, Coast and Geodetic Survey

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

Hydrographic Index No. 66 L

