

10475

10475

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 .. Hydrographic/Side Scan Sonar ..

Field No. WH-20-4-93 ..

Registry No. H-10475 ..

LOCALITY

State Delaware ..

General Locality .. Atlantic Ocean ..

Sublocality 12 NM Southeast of Cape May ..

1993

CHIEF OF PARTY
CDR A.A. Armstrong

LIBRARY & ARCHIVES

DATE February 15, 1994 ..

HYDROGRAPHIC TITLE SHEET

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-20-4-93

State DELAWARE

General locality ATLANTIC OCEAN
-APPROACHES TO DELAWARE BAY

Locality 12 nm southeast of Cape May, New Jersey

Scale 1:20,000 Date of Survey May 23 - August 12, 1993

Instructions dated FEBRUARY 23, 1993 Project No. OPR-D368-WH

Vessel NOAA Ship WHITING S-329 EDP # 2930

Chief of party Commander Andrew A. Armstrong, III
A.A. Armstrong, C.B. Greenawalt, S.R. Barnum, J.S. Verlaque, J.G. Clayton, J.L. Riley, N.O. Silverman, E.W. Berkowitz,
Surveyed by M.P. Zipperer, J.A. Seitz, F.R. Cruz, E.A. Myers, S.R. Parker

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)
XYNETICS 1201 PLOTTER (AHS)

Verification by ATLANTIC HYDROGRAPHIC SECTION

Soundings in MLLW Meters

REMARKS: Registered as a 1:20,000 scale survey. The data meet the accuracy standards for a
1:20,000 scale survey and are plotted at 1:10,000 scale. Detached positions on
wrecks and obstructions meet the accuracy requirements for 1:10,000 scale surveys.
200% side scan sonar coverage.
Time zone used, 0 (UTC).
Junctions with H-10444 and H-10464.
NOTES IN THE DESCRIPTIVE REPORT WERE MADE DURING
OFFICE PROCESSING.

AWOIS / SURK ✓ 3/18/94 SSV

*501-2797
S.N.W.*

DESCRIPTIVE REPORT TO ACCOMPANY
HYDROGRAPHIC SURVEY
OPR-D368-WH-1993
WH-20-4-93
H-10475

NOAA SHIP WHITING
CDR Andrew A. Armstrong, III, NOAA
Commanding Officer

A. PROJECT

Project OPR-D368-WH is a basic hydrographic survey with 200-percent 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 Delaware Bay in order to realign the eastern approach of the traffic separation scheme.

Survey operations were conducted in accordance with Hydrographic Project Instructions OPR-D368-WH dated February 23, 1993 (change No. 1 - May 19, 1993, change No. 2 - July 23, 1993, and change No. 3 - July 30, 1993). A change to the Automated Wreck and Obstruction Information System (AWOIS) listing dated March 18, 1993 was issued on May 27, 1993 (change No. 2 - July 21, 1993.)

Project OPR-D368-WH was divided into nine survey sheets. The survey described in this report was designated "E" Sheet, and assigned field sheet number WH-20-4-93 and registry number H-10475.

B. AREA SURVEYED

Hydrographic survey H-10475 is 12 nautical miles southeast of Cape May, New Jersey. The survey covers the southern 2/5 of the center section of the outbound Cape Henlopen to Five Fathom Bank Traffic lane and adjacent separation zone, bounded by the following limits:

<u>Latitude</u>	<u>Longitude</u>
38°44'40"N	074°41'42"W
38°44'55"N	074°50'41"W
38°45'47"N	074°50'41"W
38°45'47"N	074°41'42"W

Survey operations began on May 21, 1993 (DOY 141) and ended on August 12, 1993 (DOY 224). Data were acquired on the following days:

<u>DOY</u>	<u>Date</u>
141	May 21, 1993
175-177	June 24-26, 1993
195-198	July 14-17, 1993
202-203	July 21-22, 1993
209	July 28, 1993
212-213	July 31-August 1, 1993
223-224	August 11-12, 1993

C. SURVEY VESSEL

NOAA Ship WHITING, vessel identification number 2930, was used for most side scan sonar and sounding data acquisition while surveying this area. NOAA launch 1014, vessel identification number 2932, was used for running splits and item investigation lines on July 31, 1993 (DOY 212). Launch 1014 was also used as a dive platform for least depth determination and for acquiring a position on each item investigated.

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>DATE INSTALLED</u>
AUTOST	3.01	17-Jun-93
BACKUP	2.00	17-Jun-93
BASELINE	1.14	17-Jun-93
BIGABST	2.05	17-Jun-93
BLKEDIT	2.02	17-Jun-93
CARTO	2.08	17-Jun-93
CARTO	2.09	15-Jul-93
CLASSIFY	1.00	15-Jul-93
CONTACT	2.06	17-Jun-93
CONTACT	2.09	15-Jul-93
CONVERT	3.54	17-Jun-93
DAS_SURV	6.38	17-Jun-93
DAS_SURV	6.42	15-Jul-93
DIAGNOSE	3.03	17-Jun-93
DISC_UTIL	1.00	17-Jun-93
DP	2.14	17-Jun-93
EXCESS	4.11	17-Jun-93
FILESYS	3.08	17-Jun-93

FILESYS	3.10	15-Jul-93
GRAFEDIT	1.04	17-Jun-93
HIPSTICK	1.01	17-Jun-93
HPRAZ	1.26	17-Jun-93
INSTALL	4.02	17-Jun-93
INVERSE	2.01	17-Jun-93
LISTDATA	1.02	17-Jun-93
LOADNEW	2.04	17-Jun-93
LOADNEW	2.05	15-Jul-93
LSTAWOIS	3.04	17-Jun-93
MAINMENU	1.01	17-Jun-93
MAINMENU	1.10	15-Jul-93
MAN DATA	2.01	17-Jun-93
NEWPOST	6.01	17-Jun-93
ONETIME	1.00	15-Jul-93
PLOTALL	2.12	17-Jun-93
POINT	2.10	17-Jun-93
PREDICT	2.01	17-Jun-93
PRESURV	7.03	17-Jun-93
PRESURV	7.04	15-Jul-93
PRINTOUT	4.03	17-Jun-93
QUICK	2.03	17-Jun-93
QUICK	2.04	15-Jul-93
RAMSAVER	1.02	17-Jun-93
REAPPLY	2.03	17-Jun-93
RECOMP	2.02	17-Jun-93
SCANNER	1.00	17-Jun-93
SELPRINT	2.03	17-Jun-93
SHEETSPLIT	1.03	17-Jun-93
SYMBOLS	2.00	17-Jun-93
ZOOMEDIT	2.12	17-Jun-93

SHIPDIM (Version 9-22-92 for the Gateway 2000 microcomputer) was also used for DGPS performance checks.

Sound velocity corrections were determined using version 2.00 of program CAT and version 2.00 of VELOCITY.

One field sheet was made on and used by launch 1014 with an automated Bruning 936 plotter driven by the HDAPS system. All other field sheets were made on board WHITING in the same manner. No final field sheets were prepared. All on-line plots for the surveyed area were transmitted to AHS. There were no irregularities in projection or scale during post processing of this survey. All field records and supporting data were sent to AHS per the Processing Partnership Agreement.

E. SIDE SCAN SONAR EQUIPMENT

Side scan sonar (SSS) operations were conducted using an EG&G model 260 slant-range corrected SSS recorder and an EG&G 272-T dual-

channel (single frequency) towfish. The towfish was operated on the 100 kHz frequency and was configured with a 20° beam depression. The following sonar equipment was used throughout the survey:

Type	S/N
Towfish	16835 (1014)
Towfish	16630
Towfish	11902
260 Recorder	16670 (1014)
260 Recorder	11443

The towfish was deployed from a Reuland winch (model number 8377-XF5461A, s/n 814861A-1) on the stern of WHITING and from a W115 Superwinch on the stern of launch 1014. In both setups, the SSS towfish was towed by cable connected to the acquisition computer cabling with a slip-ring assembly. Lightweight Kevlar cable was used on 1014 and armored cable was used on WHITING. The SSS towfish was maintained at a height off the bottom of 8 to 20 percent of the range scale. SSS operations were limited to a speed of 5 knots or slower.

Offsets and laybacks for the WHITING A-frame used to tow the SSS towfish were measured on July 27, 1992 using the forward 100 kHz (high frequency) transducer as the reference. The A-frame height was measured from the water line on the same date. All offset, layback and height data were applied as required by the HDAPS Manual. These data are on file at the Atlantic Hydrographic Section (AHS). *DATA FILED WITH FIELD RECORDS.*

Offsets and laybacks for the davit arm used to tow the SSS towfish from launch 1014 were measured on July 28, 1993 using the 100 kHz (high frequency) transducer as the reference. The davit arm height was also measured from the transducer on the same date. All offset, layback and height data were applied as required by the HDAPS Manual. These data are included in the separates submitted with this survey.

In order to achieve the required 200% SSS coverage, main-scheme lines were run at a spacing of 75 meters when using the 100-meter range scale. SSS data acquired on H-10475 displayed severe distortion on the outer part of the sonargram. This distortion is attributed to refraction of sonar signals passing through the seasonal thermocline. Line spacing was reduced to 37 meters, ensuring 200% SSS coverage. These lines were split or re-run in all areas where 200% coverage was questionable due to refraction. Adequate SSS coverage was determined by producing an 'A' and 'B' swath plot and ensuring 100% coverage on each plot.

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 also taken on buoys or wrecks

when convenient.

F. SOUNDING EQUIPMENT

A Raytheon Digital Survey Fathometer (DSF) 6000N echo sounder was used to measure water depths during the survey. The DSF-6000N produced a graphic record of the high frequency (100 kHz) and low frequency (24 kHz) depth. The high and low frequency digital depths were recorded by the HDAPS acquisition system. The high frequency depths were selected as the primary depths as shown on the sounding plots. The following is a list of DSF-6000N echosounders used during this survey:

<u>S/N</u>	<u>DOY</u>
A111N	141
A105N	175-177, 195
C076	195-198, 202-203, 209
B053N	212, 213, 223

Echograms were carefully reviewed for significant features along the track line. Any features on the graphic record that were not selected as primary soundings were manually selected. Electronic technicians performed daily accuracy checks and preventive maintenance on the DSF-6000N.

Diver-determined least depths were measured with a pneumatic depth gauge. WHITING's pneumatic depth gauges (S/N 13892130 and 8406714N) were built according to Hydrographic Guidelines No. 55. Gauge 13892130 was calibrated on January 25, 1993 and gauge 8406714N was calibrated on October 9, 1992. System checks were performed prior to every dive to ensure the pneumatic depth gauge being used was within tolerance.

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 December 16, 1992 during WHITING's winter inport period. A copy of the calibration report is on file at AHS. DATA FILED WITH FIELD RECORDS.

The CTD, mounted in a cage, was lowered through the water column to obtain 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 velocity correctors were manually entered into an HDAPS velocity table. The correctors were applied to both high and low frequency beams during acquisition. Velocity profile data can be found in the separates submitted with this survey.

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

A summary of sound velocity casts follows:

<u>DOY</u>	<u>Vel.Table#</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Depth</u>
140	17	38°46'30"	074°34'27"	33.9 m
175	24	38°46'12"	074°39'48"	32.3 m
194	29	38°45'50"	074°43'14"	37.4 m
209	33	38°45'42"	074°43'24"	24.7 m

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.

Settlement and squat measurements for WHITING were conducted and correctors determined on August 5, 1991. Correctors based on this determination were entered in Offset Table 1 and applied in real time throughout the survey. Settlement and squat correctors are on file at AHS.*

Settlement and squat measurements for launch 1014 were conducted and correctors determined on August 15, 1993. Correctors based on this determination were entered in Offset Table 4 and reapplied to all data collected by 1014. Settlement and squat correctors are on file at AHS.*

For data acquired by WHITING, the HDAPS data acquisition computer logged, in real-time, heave data from a heave, roll, and pitch sensor (HIPPI, s/n 19109-C). Heave correctors were applied in post-processing. There were no heave, roll, and pitch correctors for data acquired by launch 1014. Launch 1014 is not equipped with a heave sensor. Depth data acquired with 1014 was not scanned for heave, nor was it fully processed. Launch 1014 data were collected only as SSS item investigation lines and as splits to achieve 200% SSS coverage. The depth data acquired is superfluous to the survey and should not be included in sounding plots or on the smooth sheet.

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:

* DATA FILED WITH FIELD RECORDS.

	<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 taken from table 2 of the East Coast of North and South America Tide Tables and were applied on-line to the digital data using HDAPS software. The tidal data, in digital form, were received on floppy disk from N/CG24, Hydrographic Surveys Branch. Request for smooth tides was submitted to Product and Services Branch, Datum Section, N/OES231 on August 20, 1993.

Opening and closing levels were conducted at the Breakwater Harbor tide station on March 8, 1993 and August 17, 1993, respectively. The levels confirmed that the tide staff and marks were undisturbed. The final Tide Note for this survey is on file at AHS. DATA FILED WITH FIELD RECORDS.

All sounding corrections, except heave, were applied on-line to both the narrow (100 kHz) and wide (24 kHz) DSF-6000N beams. Heave corrections were applied to WHITING data in post-processing.

New leadlines were made on April 10, 1993 and calibrations performed on April 26, 1993 confirmed the leadline error was negligible. A leadline comparison with the DSF-6000N was performed on April 23, 1993 (DOY 113). The difference between the leadline and the high frequency reading was -0.07 meter and the difference between the leadline and the low frequency reading was -0.18 meter. These differences may be attributable to the soft mud bottom at the comparison site. No correction for this difference was applied to the survey data.

H. CONTROL STATIONS SEE ALSO SECTION 2.9. 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 horizontal control station list is on file at AHS. The positions are as follows: DATA APPENDED TO THIS REPORT.

	<u>Latitude</u>	<u>Longitude</u>	<u>Frequency</u>
Cape Henry	36°55'37.580"N	076°00'23.884"W	289 kHz
Cape Henlopen	38°46'36.421"N	075°05'15.667"W	298 kHz

I. HYDROGRAPHIC POSITION CONTROL SEE ALSO SECTION 2.9. 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. WHITING used two Ashtech Sensor GPS receivers for DGPS navigation with two Magnavox MX50R differential radio receivers supplying correctors to the Ashtech receivers. Both MX50R and Ashtech receivers were initialized by HDAPS, with only the primary receiver sending navigational output to HDAPS.

Launch 1014 was used to run splits and investigation lines, and as a dive platform for three item investigations. An Ashtech Sensor receiver with a Magnavox MX50R differential radio receiver linked to HDAPS was used for navigation and positioning on the items investigated. Performance checks for the launch's positioning system were conducted with the launch in the davits by comparing an instantaneous HDAPS position of the launch with the WHITING's HDAPS position and calculating an offset in distance and azimuth between the two systems. Checks were conducted on a weekly basis with an error of no more than 4 meters.

The serial numbers of the Ashtech Sensor and MX50R receivers were as follows (WHITING's Ashtech Sensor receivers were replaced on July 9, 1993):

<u>Item</u>	<u>Serial Number</u>
<u>Primary System:</u>	
Ashtech Sensor	700417B1055
Ashtech Sensor (7/9/93)	700417B1193
Magnavox MX50R	168
<u>Secondary System:</u>	
Ashtech Sensor	700417B1129
Ashtech Sensor (7/9/93)	700417B1194
Magnavox MX50R	169
<u>Launch 1014 System:</u>	
Ashtech Sensor	700417B1203
Magnavox MX50R	036

Satellite coverage during this survey period required WHITING to operate in both the non-altitude and altitude constrain mode. One DGPS receiver system was used for acquisition at a time. 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 a 1:20,000-scale survey for the Cape Henlopen and Cape Henry beacons were 7.5 and 6.2, respectively.

DGPS positioning was accomplished in accordance with the FPM, section 3.4. When the beacon signal was lost for more than 45 seconds (1:20,000 scale) or 30 seconds (1:10,000 scale), the survey line was broken and the line was rerun where control had been unacceptable. Cape Henry was used as the check station

when acquiring performance checks for WHITING to ensure proper operation of the Cape Henlopen beacon. Performance checks were conducted on a Gateway 2000 386/33c microcomputer (S/N 402208) using program SHIPDIM. SHIPDIM uses the two reference station method as described in FPM section 3.4.5. All DGPS performance checks confirmed that the DGPS positioning systems were operating properly and accurately. A summary of the DGPS performance checks are on file at AHS.*

DGPS antenna offsets and laybacks were measured on March 19, 1993 as WHITING converted from Magnavox to Ashtech receivers and antennas. Offsets and laybacks were measured using the forward 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 are on file at AHS.*

DGPS antenna offsets and laybacks for launch 1014 were measured on July 28, 1993 using the 100 kHz (high frequency) echo-sounder transducer as the reference. Antenna heights was also measured from the transducer on the same date. All offset, layback and height data were applied as required by the HDAPS Manual. This data is included in the separates submitted with this survey.

A software deficiency was identified during post-processing, whereby the data abstracts incorrectly flagged all positions in certain data sets as having high HDOP values or DR'd positions. The HDAPS office, N/CG24, was notified of this problem. All affected data sets were inspected ensuring adequate positional data were obtained.

** DATA FILED WITH FIELD RECORDS.*

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

There is no shoreline in this survey.

K. CROSSLINES SEE ALSO SECTION 3.A OF THE EVALUATION REPORT.

A total of 6.0 nautical miles of crosslines were run on H-10475. This amounted to 6.7 percent of the total linear nautical miles of main-scheme lines needed for 100 percent SSS coverage.

Crossline and main-scheme agreement, with predicted tides applied, was adequate. The maximum difference was a crossline sounding being 0.6 meters deeper than the nearest main-scheme sounding. The average difference showed crossline soundings generally 0.3 meters deeper than main-scheme soundings.

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

H-10475 junctioned with H-10444 (WH-20-3-92) to the west and H-10464 (WH-20-1-93) to the east. Contours and soundings agreed very well at the junctions. The maximum difference between junction soundings was 0.2 meters on H-10444, and 0.3 meters on H-10464. Smooth tides have been applied to H-10444 but not to H-10475 and H-10464. *SMOOTH TIDES APPLIED DURING OFFICE PROCESSING TO H-10475 AND H-10464.*

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

As depicted on the prior surveys, the bottom in the area surveyed was generally smooth; echosounder and SSS records showed the same for this survey area. Survey H-10475 soundings were compared with prior surveys H-9173 WD, H-9175, H-9294 WD, and H-9723. All prior surveys were referenced to NAD 27. For comparison purposes, a datum shift was applied to H-10475 in accordance with section 7.4 of the FPM.

The western edge of the survey area was covered by wire drag survey H-9173 (1970, scale 1:20,000). Sounding comparisons between present survey depths and H-9173 clearances showed no conflicts.

The western portion of the survey area was covered by survey H-9175 (1970, scale 1:10,000). Sounding comparisons between present survey depths and H-9175 agree very well, *WITH PRESENT SURVEY SOUNDINGS GENERALLY 0.2m (1FT) DEEPER THAN PRIOR SURVEY DEPTHS.*

The survey area was covered fully by the wire drag survey H-9294 (1972, scale 1:20,000). Present survey soundings from H-10475 did not conflict with clearances found on H-9294. *DO NOT CONCUR SEE SECTION 6.b.2) OF THE EVALUATION REPORT.*

The survey area was covered fully by H-9723 (1977, scale 1:20,000). There is excellent agreement of bottom contours and soundings between H-9723 and H-10475, *WITH NO DIFFERENCE IN DEPTHS BETWEEN THE PRIOR AND PRESENT SURVEY.*

WHITING recommends survey H-10475 supersede all hydrography from all prior surveys in the common area. *CONCUR*

N. ITEM INVESTIGATIONS

Summary of items investigated:

<u>CONTACT NO.</u>	<u>SECTION</u>	<u>STATUS</u>
496.26S, 532.34S, 587.07S, 624.66P, 625.40P, 629.37P, 697.79S, 845.72P, 846.56P, 625.73P, 629.08S, 848.73P, 1596.28S	N1.	Insignificant
267.33P, 1158.06S, 1250.68P	N2.	Insignificant

275.67S	N3.	Diver least depth determined
532.60P	N4.	Diver least depth determined
704.83S	N5.	Diver least depth determined

N1. Contacts #496.26S, 532.34S, 587.07S, 624.66P, 625.40P, 629.37P, 697.79S, 845.72P, 846.56P, 625.73P, 629.08S, 848.73P, 1596.28S

These contacts were located during survey H-10475 and deemed insignificant by WHITING. The records show that the contacts stand less than 1 meter above the bottom or are less than 10 percent of the depth in depths greater than 20 meters of water; the contacts do not meet the significance criteria specified in the Field Procedures Manual. WHITING recommends that these contacts not be charted. *CONCUR*

N2. Contacts #267.33P, 1158.06S, 1250.68P

These contacts were initially detected during survey H-10475 (DOY 175, 195 and 196, respectively). These contacts were investigated further with additional side scan sonar lines run at 50 meter range scale; nothing was found. Based on the characteristics of the sonar return, contacts #267.33P and 1158.06S were evaluated as sonar returns of fish in the water column, and contact #1250.68P as change in bottom texture (CIBT). WHITING recommends that none of these contacts be charted. *CONCUR*

N3. Contact #275.67S

Contact #275.67S was located during survey H-10475 (DOY 175). Additional SSS investigation lines were run at 50-meter range scale (cross reference #3052.18P and 3057.70P). Contact #3057.70P gave the best sonar return. Contacts #3052.18P, 275.67S and 256.60S are cross references.

After SSS investigation, echosounding was used to pinpoint the divers' drop position. The contact, a cluster of three boulders, was located at latitude 38°44'59.⁷⁸688"N and longitude 074°48'21.209"W with a least depth of 18.9 meters (fix #6014, DOY 213) during dive operations.

WHITING recommends that this rock cluster be charted as a rock

with known least depth of ^{18.9}~~17.7~~ meters, determined by diver at the position determined on this survey. CONCUR
* (62 FT), 18⁹ BK, AND A DANGER CURVE

N4. Contact #53³~~2~~.60P

Contact #53³~~2~~.60P was located during survey H-10475 (DOY 176). Additional SSS investigation lines were run at 50-meter range scale (cross reference #3045.25S and 3048.73S). Contact #3048.73S gave the best sonar return. Contacts #3045.25P and 532.60P are cross references.

After SSS investigation, echosounding was used to pinpoint the divers' drop position. The contact, an anchor block, was located at latitude 38°45'20.4¹⁸"N and longitude 074°48'08.6¹⁴"W with a least depth of 19.8 meters (fix #6029, DOY 224) during dive operations.

WHITING recommends that this anchor block be charted as an obstruction with known least depth of ^{19.5}~~20.1~~ meters, determined by diver at the position determined on this survey. CONCUR
* (44 FT), 19⁵ OBSR, AND A DANGER CURVE,

N5. Contact #704.83S

Contact #704.83S was located during survey H-10475 (DOY 176). Additional SSS investigation lines were run at 50-meter range scale (cross reference #3012.86P and 3015.64S). Contact #3015.64S gave the best sonar return. Contacts #3012.86P, 704.83S and 759.19S are cross references.

After SSS investigation, echosounding was used to pinpoint the divers' drop position. The contact, an anchor block, was located at latitude 38°45'32.4³⁷"N and longitude 074°42'57.6⁴⁴"W with a least depth of 20.8 meters (fix #6023, DOY 223) during dive operations.

WHITING recommends that this anchor block be charted as an obstruction with known least depth of ^{20.8}~~19.8~~ meters, determined by diver at the position determined on this survey. CONCUR
(66 FT), 20⁸ OBSR,

O. COMPARISON WITH THE CHART SEE ALSO SECTION 7.9. OF THE EVALUATION REPORT.

Chart 12214, 37th edition, 27 June 1992, is a 1:80,000 scale chart that covers the survey area. Soundings on this chart originate with prior surveys, and are discussed in Section M. CONCUR

P. ADEQUACY OF SURVEY SEE ALSO SECTION 9. OF THE EVALUATION REPORT.

This survey is a basic hydrographic survey, adequate to supersede all prior surveys of the common area. *CONCUR*

Q. AIDS TO NAVIGATION

There were no floating aids to navigation in the survey area.

R. STATISTICS

Number of Positions.....	2363
Main-scheme Sounding Lines (Nautical Miles).....	181.4
Crosslines (Nautical Miles).....	6.0
Square Nautical Miles Surveyed.....	8.4
Days of Production.....	15
Detached Positions.....	21
Bottom Samples.....	11
Tide Stations Installed.....	None
Current Stations.....	None
Number of CTD Casts.....	4
Magnetic Stations.....	None

S. MISCELLANEOUS

No anomalies in either tide or current and/or unusual magnetic variations were encountered in the survey area. Eleven bottom samples were taken to supplement survey H-10475. The oceanographic log sheet is included in the separates submitted with this survey. Bottom samples were not submitted to the Smithsonian Institution.

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

T. RECOMMENDATIONS *SEE ALSO SECTION 9. OF THE EVALUATION REPORT.*

Recommendations concerning specific items are located in section N of this report. Positions of wrecks and obstructions located on this survey meet the accuracy requirements for a 1:10,000 scale survey and can be used on charts requiring that accuracy. *CONCUR*

U. REFERRAL TO OTHER REPORTS

The following reports have been submitted to N/CG244 and will be forwarded to N/CG243 as part of OPR-D368-WH-93:

Coast Pilot Report

Chart Inspection Report
User Evaluation Report

Submitted By:

Nan O. Silverman, ENS, NOAA

Nan O. Silverman
Ensign, NOAA

ITEM INVESTIGATION REPORT

SURVEY H-10475
 Item Number N/A Danger to Nav. Letter Issued (Y/N) N
 Charted (Y/N) N
 Chart No. (largest scale) 12214 Edition 37th Date 6/92

DESCRIPTION/SOURCE: 256.60s 275.67s

Located during survey ops
HISTORICAL POSITION: Latitude NO HISTORICAL **SSS POSITION:** Lat 38/44/59
 Longitude _____ Long 074/48/21
 Datum _____ Easting 27380
 Northing 18490

SURVEY REQUIREMENTS: 3052.18p
256.60s
275.67s
3057.70p
METHOD OF INVESTIGATION:
 Echosounder _____ Side Scan _____ Diver Other (specify) _____

DIVE DATA: Divers VERLAQUE/SEITZ
 Time of Dive: Commenced 1909 Completed 1914
 Current 0.25 FL Visibility 20 FT Bottom Type SAND/SHELL

RESULTS OF INVESTIGATION: DIVERS DESCENDED BUOY LINE DROPPED AT ABOVE SSS POSITION AND FOUND 3 BOULDERS IN AN E-W ORIENTATION. LEAST DEPTH TAKEN ON WESTERN MOST BOULDER DIVER GAUGE LD. 43 FT IN 46 FT OF WATER. TOTAL LENGTH OF GROUP 8 FT.

POSITION: Date (M/D/Y) 8-1-93 Time (UTC) 185602 Position No. FK 6014
 Latitude 38° 44' 59.188" N Longitude 67° 48' 21.209" W 59259.0
 LORAN-C: GRI (9960) W: 1574.0 X: 27050.8 Y: 42614.1 Z: 42614.1
 MASTER 914 450 580 730 720
LEAST DEPTH: Date (M/D/Y) 8-1-92 Time (UTC) 1912
 Method of Least Depth: 2NDND
 Measured Least Depth: 1. 43.1 2. 43.2 3. 42.9 Avg. 43.1 Units FT
 Uncorrected Depth 19.2 (meters)
 Tide Corrector +1.5 -0.3 Corrected Least Depth 17.7 (meters)
 (62 FT)

Recorder NOJ Checked By NOJ
 SEE SECTION N3, PAGES 11-12, OF THIS REPORT FOR CHARTING RECOMMENDATION ... 15

E
ITEM INVESTIGATION REPORT

80'
D

SURVEY H-10475
Item Number N Danger to Nav. Letter Issued (Y/N) N
Charted (Y/N) N
Chart No. (largest scale) 12214 Edition 37th Date 6/92

DESCRIPTION/SOURCE: 704-835 (H-10475); OBSERVE ON 2K

HISTORICAL POSITION: Latitude _____ SSS POSITION: Lat 38°45'32"N
Longitude _____ Long 74°42'58"W
Datum _____ E: Easting 35195.5 35193
Northing 19307.3 19316

SURVEY REQUIREMENTS: DIVER LEAST DEPTH

METHOD OF INVESTIGATION:
Echosounder _____ Side Scan _____ Diver Other (specify) _____

DIVE DATA: Divers VERLAQUE/SEITZ
Time of Dive: Commenced 1511 Completed 1527
Current 0.2 K F Visibility 5 FT Bottom Type SAND & SHELL

RESULTS OF INVESTIGATION: DIVERS DESCENDED BUOY DROPPED AT ABOVE SSS POSITION AND FOUND A 6' BY 6' ANCHOR BLOCK IN 72 FT OF WATER. ANCHOR BLOCK STOOD APPROXIMATELY 2 FT OFF THE BOTTOM. ANCHOR BLOCK HAD A PAD EYE AT THE TOP CENTER. DIVER GAUGE LEAST DEPTH 70 FT.

POSITION: Date (M/D/Y) 8-11-93 Time (UTC) 155536 Position No. _____
Latitude 38°45'32.437"N Longitude 074°42'57.644"W
LORAN-C: GRI (9960) W: 15727.0 X: 27021.4 Y: 42623.4 Z: 59277.6
888 876 893 883 720

6023
FIX 6049 no

LEAST DEPTH: Date (M/D/Y) 8-11-93 Time (UTC) 1523
Method of Least Depth: PNEUMO
Measured Least Depth: 1.69.2 2.69.3 3.69.2 Avg. 69.2 Units FT
Uncorrected Depth 21.1 (meters) 20.3
Tide Corrector -1.3-0.8 Corrected Least Depth 19.8 (meters)
(66 FT)

Recorder EMB Checked By WJH/mj/mos

SEE SECTION NO. 5, PAGE 12, OF THIS REPORT FOR CHARTING RECOMMENDATION. 16

E
ITEM INVESTIGATION REPORT

76' ±

SURVEY H-10475

Item Number N Danger to Nav. Letter Issued (Y/N) N

Charted (Y/N) N

Chart No. (largest scale) 1244 Edition 37th Date 6/92

DESCRIPTION/SOURCE: 537.607 (H-10475), OBSTR on R/L

HISTORICAL POSITION: Latitude _____ SSS POSITION: Lat 38° 45' 20" N
Longitude _____ Long 79° 48' 08.3" W
Datum _____ Easting 27693.5

X: Northing 19124.6 19127

SURVEY REQUIREMENTS: DIVER LEAST DEPTH

METHOD OF INVESTIGATION:

Echosounder _____ Side Scan _____ Diver Other (specify) _____

DIVE DATA: Divers CRESWELL
VERLAQUE/SETTE
Time of Dive: Commenced _____ Completed _____
Current 3 KTF Visibility 8 FT Bottom Type SAND/SHELL

RESULTS OF INVESTIGATION: DIVERS DESCENDED BUOY DROPPED AT ABOVE EASTING NORTHING AND FOUND A 4' X 4' ANCHOR BLOCK, 2.5' OFF THE BOTTOM IN 72 FT OF WATER, DIVER GAUGE LEAST DEPTH 69 FT.

POSITION: Date (M/D/Y) 8-12-93 Time (UTC) 191832 Position No. _____
Latitude 38° 45' 20.418" N Longitude 079° 48' 08.614" W
LORAN-C: GRI (9960) W: 15740.4 X: 27050.3 Y: 42618.0 Z: 59261.1
910 459 886 886 715

6029
FIX 6023 nos

LEAST DEPTH: Date (M/D/Y) 8-12-93 Time (UTC) 1903
Method of Least Depth: PNEUMO
Measured Least Depth: 1.68.8 2.68.6 3.68.5 Avg. 68.6 Units F
Uncorrected Depth 20.9 (meters) 19.5
Tide Correction 0.8-1.4 Corrected Least Depth 20.1 (meters) (64 FT)


Recorder cup/ms Checked By gjf/nor

SEE SECTION 4.1, PAGE 12, OF THIS REPORT FOR CHARTING RECOMMENDATION.

APPROVAL SHEET
FIELD EXAMINATION SURVEY
OFR-D368-WH
1993
WH-20-4-93
H-10475

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. This survey is complete and adequate for the intended purpose of delineating bottom topography and determining depths and identifying all potential dangers to navigation. No final field sheets were prepared for this survey. The survey data in accompanying records are complete for the preparation of the smooth sheet.

Approved By:


Andrew A. Armstrong, III
Commander, NOAA
Commanding Officer



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: October 19, 1993

MARINE CENTER: Atlantic

HYDROGRAPHIC PROJECT: OPR-D368-WH

HYDROGRAPHIC SHEET: H-10475

LOCALITY: Approaches to Delaware Bay

TIME PERIOD: May 21 - August 12, 1993

TIDE STATION USED: 855-7380 Lewes (Ft. Miles), Breakwater Harbor,
Delaware Lat. $38^{\circ} 46.9'N$ Lon. $75^{\circ} 07.2'W$

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.


ACTING CHIEF, DATUMS SECTION



GEOGRAPHIC NAMES

H-10475

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 MENALLY ATLAS	U.S. LIGHT LIST			
ATLANTIC OCEAN (title)											1
DELAWARE (title)											2
											3
											4
											5
											6
											7
											8
											9
											10
											11
											12
											13
											14
											15
											16
											17
											18
											19
											20
											21
											22
											23
											24
											25

Approved:

Charles B. Harrington
Chief Geographer - N/CG 215

SEP 17 1993

02/01/94

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H-10475

NUMBER OF CONTROL STATIONS		2
NUMBER OF POSITIONS		2273
NUMBER OF SOUNDINGS		18031
	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	191	10/18/93
VERIFICATION OF FIELD DATA	219	01/12/94
ELECTRONIC DATA PROCESSING	122	
QUALITY CONTROL CHECKS	36	
EVALUATION AND ANALYSIS	52	01/20/94
FINAL INSPECTION	16	01/25/94
TOTAL TIME	636	
ATLANTIC HYDROGRAPHIC SECTION APPROVAL		01/31/94

COAST AND GEODETIC SURVEY
ATLANTIC HYDROGRAPHIC SECTION
EVALUATION REPORT

SURVEY NO.: H-10475

FIELD NO.: WH-20-4-93

Delaware, Atlantic Ocean, 12 NM Southeast of Cape May

SURVEYED: 21 May through 12 August 1993

SCALE: 1:10,000

PROJECT NO.: OPR-D368-WH-93

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

CONTROL: ASHTECH GPS Sensor/MAGNAVOX MX50R Beacon Receiver (DGPS)

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

Surveyed by.....C. B. Greenawalt
.....S. R. Barnum
.....J. S. Verlaque
.....J. G. Clayton
.....J. L. Riley
.....N. O. Silverman
.....M. P. Zipperer
.....E. W. Berkowitz
.....J. A. Seitz
.....F. R. Cruz
.....E. A. Myers
.....S. R. Parker

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

1. INTRODUCTION

a. This is a combined basic hydrographic/side scan sonar survey. A RAYTHEON DSF-6000N fathometer was operated concurrently with the side scan sonar. Significant side scan sonar contacts located by the field unit during hydrographic operations were investigated. A pneumatic depth gauge was used to determine least depths during dive operations.

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 datum move the projection lines 0.406 seconds (12.52 meters or 1.252 mm at the scale of the survey) north in latitude, and 1.403 seconds (33.87 meters or 3.387 mm at the scale of the survey) east in longitude.

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.

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, SIDE SCAN SONAR MANUAL, and FIELD PROCEDURES MANUAL.

5. JUNCTIONS

H-10444 (1992) to the west
H-10464 (1993) to the east

A standard junction was effected between the present survey and surveys H-10444 (1992) to the west.

A standard junction could not be effected with junctional survey H-10464 (1993) to the east. The junctional survey is

archived at National Ocean Service (NOS) Headquarters, Silver Springs, Maryland. Any adjustments to the depth curves in the junctional area will have to be made at headquarters on the chart during compilation.

There are no contemporary surveys to the north or south. Present survey depths are in harmony with the charted hydrography to the north and south.

6. COMPARISON WITH PRIOR SURVEYS

a. Hydrography

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

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

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

b. Wire Drag

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

1) There are no hangs or groundings originating with prior survey H-9173WD (1970) that fall within the common area of the present survey.

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

2) One uncharted 48 ft hang, cleared by wire drag to 44 ft, in Latitude 38°45'46"N, Longitude 74°45'40"W, originates with prior survey H-9294WD (1970) and falls in and area common to the present survey. A side scan sonar/fathometer investigation was conducted on the hang with negative results. No change in charting is recommended.

There are conflicts between the prior survey effective clearance depths and the present survey soundings, in the vicinity of Latitude 38°45'15"N, Longitude 75°46'42"W. These conflicts may be attributed to natural changes in the bottom configuration; these conflicts can be disregarded.

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. The hydrographer makes an adequate chart comparison on pages 12 of the Descriptive Report.

b. Dangers to Navigation

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

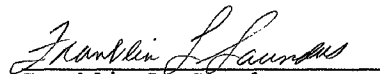
8. COMPLIANCE WITH INSTRUCTIONS

This survey complies with the Project Instructions.

9. ADDITIONAL FIELD WORK

This is an adequate basic hydrographic/side scan sonar survey. No additional work is recommended for this report.

WHITING Processing Team
Verification and Evaluation and Analysis

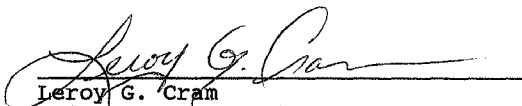

Franklin L. Saunders
Cartographic Technician


Norris A. Wike
Cartographer

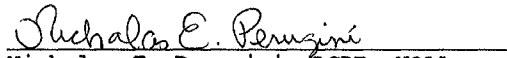
APPROVAL SHEET
H-10475

Initial Approvals:

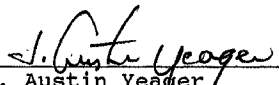
The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disapproval of charted data. The digital data have been completed and all revisions and additions made to the smooth sheet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


Date: 01/25/94
Leroy G. Cram
Chief, Hydrographic Processing Team B
Atlantic Hydrographic Section

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


Date: 01/31/94
Nicholas E. Perugini, LCDR, NOAA
Chief, Atlantic Hydrographic Section

Final Approval:

Approved: 
Date: 5/11/94
J. Austin Yeager
Rear Admiral, NOAA
Director, Coast and Geodetic Survey

