10489

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-20-10-93

Registry No. H-10489

LOCALITY

State Delaware

General Locality Atlantic Ocean

Sublocality 3.0 NM South of Overfalls Shoal

1993

CHIEF OF PARTY
CDR A.A. Armstrong

LIBRARY & ARCHIVES

DATE March 8, 1994

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

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NOAA FORM 77-28 (11-72)

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

REGISTER NOS.

HYDROGRAPHIC TITLE SHEET

H-10489 (1993)

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-20-10-93

State: Delaware

General locality: ATLANTIC OCEAN ~~Approaches to Delaware Bay~~

Locality: 3.0 NM SOUTH OF OVERFALLS SHOAL ~~3.5 nm East of Cape Henlopen, Delaware~~

Scale: 1:20,000 Date of Survey: July 20 - August 19, 1993

Instructions dated: February 23, 1993 Project No.: OPR-D369-WH-93

Vessel: NOAA Ship WHITING S-329 EDP# 2930

Chief of party: Commander Andrew A. Armstrong III

Surveyed by: A.A. Armstrong, 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, S.R. Parker, E.A. Myers, P.R. White

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: XYNETICS 1201 PLOTTER (AHS) HP 7959B, Bruning (FIELD)

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 1:10,000 scale survey and are plotted at 1:10,000 scale. Detached positions on obstructions meet the accuracy requirements for a 1:10,000 scale survey.

200% side scan sonar coverage.

Time zone used, 0 (UTC).

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

AWOIS/SURF ✓ 3/17/94 SJV

XWW SC1-28-97

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

DESCRIPTIVE REPORT TO ACCOMPANY
HYDROGRAPHIC SURVEY
OPR-D368-WH
1993
W-20-10-93
H-10489

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 survey is to update the existing nautical charts and to locate any wrecks and obstructions located near the approaches to Delaware Bay, and portions of the precautionary and pilotage areas to the north and east of Cape Henlopen, Delaware. Specifically, this survey is in response to a request by the Delaware Bay Pilots and towboat operators to survey this area since it is heavily travelled by tugs-and-tows.

Survey operations were conducted in accordance with Hydrographic Project Instructions OPR-D368-WH, Delaware Bay, dated February 23, 1993, Change No. 1, dated May 13, 1993 and Change No. 2, dated July 23, 1993. Changes to the Automated Wreck and Obstruction Information Service (AWOIS) listing dated May 27, 1993 were issued on July 21, 1993. This survey is registered as a 1:20,000 scale, the data acquired meet the accuracy requirements for a 1:10,000 scale survey except for the positions noted in section I.

Project OPR-D368-WH was divided into nine survey sheets. The survey described in this report was designated "K" Sheet, and assigned field sheet number W-20-10-93 and registry number H-10489.

B. AREA SURVEYED

Hydrographic survey H-10489 is three and one-half nautical miles east of Cape Henlopen, Delaware. This survey covers a portion of the precautionary and pilotage areas at the entrance to Delaware Bay. The survey area is bounded by the following limits:

Latitude	Longitude
38°50'16.92" N	075°03'16.03" W
38°48'34.80" N	074°54'45.96" W
38°48'07.65" N	074°59'25.64" W
38°49'34.85" N	075°03'15.40" W
38°50'13.00" N	075°03'12.99" W

Survey operations began on July 20, 1993 (DOY 201) and ended on August 19, 1993 (DOY 231). Data were acquired on the following days:

DOY	Date
201-203	20-22 July, 1993
210-212	29-31 July, 1993
213-217	1-5 August, 1993
222	10 August, 1993
224-231	12-19 August, 1993

C. SURVEY VESSEL

NOAA Ship WHITING, vessel identification number 2930, NOAA launch 1014, vessel identification number 2932, and launch 1015, vessel identification number 2931 were used for side scan sonar and sounding-data acquisition. Launch 1014 was used as a dive platform for least depth determinations and launch 1015 was used to acquire positions on item investigations. Launch 1014 used an incorrect vessel identification number of 1014 for DOY 228(fixes 6178-6190).

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:

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	15-Jul-93
CLASSIFY	1.00	15-Jul-93
CONTACT	2.09	15-Jul-93
CONVERT	3.54	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	3.10	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	2.05	15-Jul-93
LSTAWOIS	3.04	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	7.04	15-Jul-93
PRINTOUT	4.03	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
SYMBOL	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. All field sheets were made on board WHITING with automated Bruning 936 plotters driven by the HDAPS system, except for the launch 1014 boat sheet which was prepared on the launch. 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. Correctors for settlement and squat and sound velocity were applied during post-processing. 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 sonar equipment used throughout the survey is listed below:

Type		S/N
Towfish	(WHITING)	016630
	(1014)	016835
	(1015)	011902
260 Recorder	(WHITING)	016670
	(1014)	016670
	(1015)	016671
	(1015)	011443

The towfish was deployed from a Reuland winch (model number 8377-XF5461A, S/N 814861A-1) on the stern of WHITING. The SSS towfish was towed with armored cable which was connected to the recorder cabling via a slip-ring assembly. On launches 1014 and 1015, the towfish was towed with Kevlar cable which was connected to the recorder cabling via a slip-ring assembly. The towfish was deployed from a Superwinch Winch Model W115 from an adjustable davit arm on the stern of the launch. The SSS towfish was maintained at a height off the bottom between 8 to 20 percent of the SSS range scale. SSS operations were limited to a speed-over-ground of 5 knots or slower, except where strong currents kept WHITING's minimum speed slightly higher.

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).*

Offsets and laybacks for the davit arm used to tow the SSS towfish from launches 1014 and 1015 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 on file at AHS.*

All side scan sonar data was collected using 50-, 75- and 100-meter range scales and 100-Khz frequency. In order to acquire the required 200% SSS coverage, main-scheme lines were run at a spacing of 60 meters when using the 75-meter range scale and at a spacing of 75 meters when using the 100-meter range scale. These lines were split or re-run in all areas where 200% coverage was questionable due to a degraded sonargram. Degraded sonargrams were usually caused by refraction of the sonar signals passing through the seasonal thermocline in the water column.

*DATA FILED WITH FIELD RECORDS.

Item investigation lines were run at a spacing of 30 meters using the 50- and 75-meter range scales.

Adequate 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 buoy anchors when convenient.

F. SOUNDING EQUIPMENT

A RAYTHEON Digital Survey Fathometer (DSF) 6000N echosounder was the only echo-sounding equipment 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 for sounding-plot purposes. The following is a list of DSF-6000N echosounders used during this survey:

Vessel	S/N
WHITING	C076
Launch 1014	B053N
Launch 1015	A106N

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.

Data acquired by launch 1015 on DOY 210 were rejected due to a poor echo-sounder trace.

Diver-determined least depths were measured with a pneumatic depth gauge. WHITING's two depth gauges (S/N 13892130 and S/N 406714N) are built according to Hydrographic Guideline No. 55. The gauges were calibrated on January 25, 1993. System checks were performed prior to every dive to ensure the pneumatic depth gauge 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.*

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. The depth data acquired were corrected after acquisition using the proper casts. Velocity cast 36 was performed for reference only and was not applied to any data acquired.

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:

DOY	Vel.Table#	Latitude	Longitude	Depth
203	32	38°49'56"N	075°03'29"W	39.0
213	34	38°50'00"N	075°03'05"W	29.9
222	35	38°49'55"N	075°03'30"W	30.1
231	36	38°48'36"N	074°59'24"W	15.5

The correction for WHITING's static draft is 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.* A transducer-depth determination conducted on May 20, 1993 confirmed the draft measurement of 3.2 meters. These data are on file at AHS.*

The static draft for launches 1014 and 1015 is 0.55 meters which was measured on July 28, 1993. A Transducer Depth Determination Report is on file at AHS.*

Leadlines were made on April 10, 1993 (DOY 120). Calibrations performed on April 26, 1993 (DOY 136) confirmed the leadline error was negligible. A leadline comparison with the DSF-6000N was performed on April 3, 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.

Settlement and squat measurements were conducted and correctors determined on August 5, 1991 for WHITING. Correctors based on

* DATA FILED WITH FIELD RECORDS.

this determination were applied in real time for all survey data. These data are on file at AHS.*

Settlement and squat measurements were conducted and correctors determined on August 15, 1993 for launch 1014 and on August 23, 1993 for launch 1015. These correctors were reapplied during post processing to all data acquired in the launches. These data are on file at AHS.*

All sounding corrections, except heave, were applied on-line to both the narrow (100 kHz) and wide (24 kHz) DSF-6000N beams. For data acquired by WHITING, the HDAPS data-acquisition computer logged heave data from a Heave, Roll, and Pitch sensor (HIPPY, s/n 19109-C). Heave correctors were applied in post-processing to the data acquired by WHITING. The data from launches 1014 and 1015 are uncorrected for heave.

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 Neison, 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:

	Time Correction	Height Ratio
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 predicted 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, Datums Section, N/OES231 on August 25, 1993. APPROVED TIDES AND ZONING WERE APPLIED DURING OFFICE PROCESSING.

The tide station at Breakwater Harbor was leveled on March 8, 1993 and on August 17, 1993. The levels confirmed that the tide staff and marks were undisturbed. The tide note is on file at AHS.*

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 (NAD 83). Two B-order horizontal control stations were used as DGPS reference stations for this survey; one at Cape Henlopen, Delaware and one at Cape Henry, Virginia. The adjusted NAD 83 positions, computed by GPS methods, were provided by Lieutenant Jeffrey Ferguson of the Hydrographic Surveys Branch,

* DATA FILED WITH FIELD RECORDS.

N/CG24, on April 3, 1992. The positions are as follows:

	Latitude	Longitude	Frequency
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.

The serial numbers of the Ashtech Sensor and MX50R receivers were as follows:

	Device	Serial Number
Primary System:	Ashtech Sensor	700417B1055
	Magnavox MX50R	168
Secondary System:	Ashtech Sensor	700417B1129
	Magnavox MX50R	169

Launch 1014 was used as a dive platform for six of the item investigations. An Ashtech Sensor Receiver (S/N 700417B1203) with a Magnavox MX50R (S/N 036) differential radio receiver linked to HDAPS was used for obtaining the positions on the items investigated. Performance checks for the launch's positioning system were conducted with the launch aboard 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. This comparison was conducted on a weekly basis. Performance checks for launches 1014 and 1015 are on file at AHS. DATA FILED WITH FIELD RECORDS.

Satellite coverage during this survey period allowed WHITING, launch 1014 and launch 1015 to operate in the non-altitude constrain mode continuously. The Cape Henlopen DGPS receiver system was used for all data acquisition.

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 are 7.5 and 6.2, respectively. The HDOP limit for a 1:10,000-scale survey for the Cape Henlopen and Cape Henry beacons are 3.7 and 3.1, respectively . Data acquired on DOY 201 (fixes# 32.4-32.8) had a maximum HDOP limit of 5.4; the range was 5.1-5.4. Data acquired on DOY 227 (fixes# 2603.3-2604.1) had a maximum HDOP limit of 7.8; the range was 7.6-7.8. Data collected on DOY 230 (fixes# 6495-6497) had a maximum HDOP limit of 11.5; the range was 9.7-11.5; these data for DOY 230 were rejected.

DGPS positioning was accomplished in accordance with the FPM, section 3.4. When the beacon signal was lost for more than 45 seconds, 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 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 may be found in the separates submitted with this survey.

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) echosounder 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 launches 1014 and 1015 were measured on July 28, 1993 using the 100 kHz (high frequency) echosounder transducer as the reference. Antenna heights were 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 on file at AHS.*

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

There was no shoreline in the survey area.

K. CROSSLINES SEE ALSO SECTION 3.9. OF THE EVALUATION REPORT.

A total of 12.6 nautical miles of crosslines were run on H-10489. This amounted to 14.7 percent of the total linear nautical miles of main-scheme lines needed for the 100-percent coverage.

* DATA FILED WITH FIELD RECORDS.

Crosslines and main-scheme agreement was adequate. The average difference showed crossline soundings generally 0.3 meters deeper than main-scheme soundings. The maximum difference between main-scheme and crossline soundings was 1.2 meters. This large difference is attributed to the irregular bottom in this area characterized by numerous large sand waves.

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

Survey H-10489 junctions with survey H-10446 (W-20-4-92) on the south. Contours and soundings agree well at the junction. The maximum difference between junction soundings is 0.4 meters, except for the following:

Latitude (N)	Longitude (W)	H-10489 Depth	H-10446 Depth
38°49'22.59"	075°01'32.09"	10.~~7~~ 5 m	~~11.7~~ 10.8 m
38°49'27.15"	075°01'47.26"	9.6 m	10.6 m
38°49'46.13"	075°03'06.92"	~~26.2~~ 25.9 m	27.~~9~~ 6 m

These discrepancies can be attributed to the irregular bottom in this area of numerous large sand waves. CONCUR

Survey H-10489 junctions with survey H-10444 (W-20-3-92) on the south and west. Contours and soundings agree well at the junction. The maximum difference between junction soundings is 0.3 meters.

There are no other contemporary surveys that junctioned with H-10489.

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

As depicted in the prior surveys, the bottom in the eastern portion of this sheet is generally smooth and the bottom in the western portion is irregular with several shoal areas.

Survey H-10489 soundings were compared with prior surveys H-9153, H-9154, H-9173WD and H-9723. All prior surveys were referenced to NAD 27; hence, a datum shift was applied to H-10489 for comparison purposes in accordance with section 7.4 of the Field Procedures Manual.

The central to eastern portion of the sheet is covered by H-9153 (1971, scale 1:20,000, MLW). The present survey agrees well and is generally 0.6 meters deeper than the prior survey. CONCUR The exception is latitude 38°48'00" to 38°50'11", longitude

074°58'39" to 075°02'30", where the bottom topography has changed significantly. It is very irregular and contains numerous large sand waves which can be attributed to the strong currents in and out of Delaware Bay. Generally, the sand waves are oriented in a northeast-southwest direction and have shifted since the prior survey. CONCUR

The prior and present-surveys have depths in the same general range and have similar least depths, although the least depths have been displaced by the movement of the sand waves. The areas of shoalest water agree generally with the prior survey in location but not depth. The area of shoals at latitude 38°49'09" to 38°49'45", longitude 074°59'43" to 075°00'54" has changed since the prior survey. The least depth in this area on H-9153 was 20 feet (6.1 meters) at latitude 38°49'30", longitude 075°00'~~54~~48". The least depth for this area from H-10489 ~~was~~ is 6.7 meters (22 feet) at latitude 38°49'28", longitude 075°00'31". CONCUR

The following shoal areas also differed between the surveys:

Latitude	Longitude	H-9153 Depth Feet (Meters)	H-10489 Depth Meters (Feet)
38°48'27"	074°59'37"	29 (8.8)	10.1 (33)
38°49'06"	074°59'19"	29 (8.8)	10.7 (35)
38°48'22"	074°59'15"	31 (9.4)	10.4 (34)
38°49'00"	074°58'40"	32 (9.8)	11.3 (37)
38°48'24"	074°58'~~1~~4"	29 (8.8)	9.1 (30)

The central to western portion of the sheet is covered by H-9154 (1970, scale 1:10,000, MLW). The prior survey had fairly wide line spacing and survey lines run parallel to the sand waves. This resulted in sparsely distributed soundings that missed some shoal areas. DO NOT CONCUR
THE PRESENT SURVEY AGREES WELL WITH THE PRIOR SURVEY AND IS GENERALLY (+/-)0.6m (2FT) DIFFERENCE.
The area of shoals in latitude 38°49'16" to 38°49'52", longitude 075°00'39" to 075°01'35" has changed significantly since the prior survey. This can be attributed to the movement of the numerous large sand waves in the area. The present survey generally has depths in the same range and similar least depths, although the least depths have been displaced by the shifting of the sand waves. The least depth in this area on H-9154 was 2~~0~~3 feet (~~6.1~~ 7.0 meters) at latitude 38°49'~~3~~2"1", longitude 075°~~00'19~~00'34". The least depth in this area from H-10489 was 6.7 meters (22 feet) at latitude 38°49'26", longitude 075°00'55". CONCUR

The eastern edge of the sheet is covered by H-9723 (1977, scale 1:20,000, MLW). The present survey agrees well with the H-9723 soundings. Depths were generally 0.3 meters deeper than those found on the prior survey. CONCUR

The southern to central-eastern portion of the sheet is covered by H-9173WD (scale 1:20,000, MLW). All soundings acquired from H-10489 were deeper than the wire drag cleared areas covered by prior survey H-9173WD. DO NOT CONCUR SEE SECTION 6.D. OF THE EVALUATION REPORT.

WHITING recommends that survey H-10489 supersede all hydrography from prior surveys in the common area. CONCUR

N. ITEM INVESTIGATIONS

Significant contacts located on this survey:

CONTACT NO.	SECTION	STATUS
1451.02S	N1	Diver least depth determined
1267.55S	N2	Diver least depth determined
2461.22S	N3	Diver least depth determined
2421.28S	N4	Diver least depth determined
2432.27S	N5	Diver least depth determined
2447.38S	N6	Diver least depth determined
19.09S, 19.14S	N7	Echosounding least depth determined
1840.09S, 2447.37P, 2447.31S	N8	Diver investigation conducted on FE-386SS

Contacts located on this survey but not found to be significant are recorded in the contact tables submitted in the separates to this survey.

N1. Contact# 1451.02S

Reported Latitude:	38°49'27.6" N
Reported Longitude:	075°01'15.7" W
Datum:	NAD 83
Depth:	13.9 m (SSS estimated depth)

Contact# 1451.02S (DOY 213) was found by side scan sonar on main-scheme during this survey. The contact height from side

scan sonar was computed to be significant, and a diver investigation was conducted.

The contact was investigated and echosounding was used to pinpoint the divers drop position. Once the item was located, a position and least depth (fix# 6175, DOY 225) were determined during dive operations.

Divers located a submerged buoy with a northwest-southeast orientation at latitude 38°49'27.20" N, longitude 075°01'15.74" W with a pneumatic depth gauge least depth of 13.5 meters (corrected to ~~predicted~~ MLLW) taken on the center of the buoy. The buoy stood 1.5 meters off the bottom with approximately 4.6 - 6.1 meters of chain tending into the sand. No anchor block was located.

WHITING recommends that this buoy be charted as an obstruction with a diver known least depth of 13.5 meters* at the position determined by this survey. CONCUR
* (44FT), 134 OBSTR, AND A DANGER CURVE)

N2. Contact# 1267.55S

Reported Latitude:	38°49'37.0" N
Reported Longitude:	075°01'27.3" W
Datum:	NAD 83
Depth:	11.8 m (SSS estimated depth)

Contact# 1267.55S (DOY 211) was found by side scan sonar on main-scheme during this survey. The contact height from side scan sonar was computed to be significant, and a diver investigation was conducted.

The contact was investigated and echosounding was used to pinpoint the divers drop position. Once the item was located, a position and least depth (fix# 6177, DOY 225) were determined during dive operations.

Divers located a dredge pipe and an anchor block at latitude 38°49'37.64" N, longitude 075°01'27.89" W with a pneumatic depth gauge least depth of 12.8 meters (corrected to ~~predicted~~ MLLW) taken on the anchor block. The dredge pipe, capped on the west end, was 0.9 meters in diameter and 18.3 meters in length laying in an east-west orientation. At the east end of the pipe, divers located a chain approximately 3.0-4.6 meters in length that led to an anchor block. The anchor block, 1.0 meters x 1.5 meters, stood approximately 1.0 meters off the bottom in scour. At the west end of the pipe, divers located an armored cable in a north-south orientation, extending approximately 9 meters in both directions and tending into the sand.

WHITING recommends that this pipe be charted as an obstruction with a diver known least depth of 12.8 meters at the position determined by this survey. DO NOT CONCUR AHS RECOMMENDS THAT THE PIPE NOT BE CHARTED BECAUSE OF SHOALER DEPTHS RANGING FROM 9.6m, (13FT), TO 10.7m, (35FT). IT IS RECOMMENDED THAT A SOUNDING BE CHARTED FROM THE AREA.

N3. Contact# 2461.22S

Reported Latitude:	38°48'49.5" N
Reported Longitude:	075°00'51.1" W
Datum:	NAD 83
Depth:	13.9 m (SSS estimated depth)

Contact# 2461.22S (DOY 226) was found by side scan sonar on main-scheme during this survey. The contact height from side scan sonar was computed to be significant, and a diver investigation was conducted.

The contact was investigated and echosounding was used to pinpoint the divers drop position. Once the item was located, a position and least depth (fix# 6180, DOY 228) were determined during dive operations.

Divers located a round metal obstruction at latitude 38°48'50.18" N, longitude 075°00'51.06" W with a pneumatic depth gauge least depth of 16.9 meters (corrected to ~~predicted~~ MLLW). The object was 1.8 meters in diameter and 1.2 meters high with a padeye at the top.

WHITING recommends that this object be charted as an obstruction with a diver known least depth of 16.9 meters,* at the position determined by this survey. CONCUR
* (55FT), 16TH OBSTR, AND A DANGER CURVE,

N4. Contact# 2421.28S

Reported Latitude:	38°49'09.4" N
Reported Longitude:	075°00'18.7" W
Datum:	NAD 83
Depth:	13.5 m (SSS estimated depth)

Contact# 2421.28S (DOY 226) was found by side scan sonar on main-scheme during this survey. The contact height from side scan sonar was computed to be significant, and a diver investigation was conducted.

The contact was investigated and echosounding was used to pinpoint the divers drop position. Once the item was located, a position and least depth (fix# 6182, DOY 228) were determined during dive operations.

Divers located a spherical metal obstruction at latitude 38°49'09.79" N, longitude 075°00'18.79" W with a pneumatic

depth gauge least depth of 12.2 meters (corrected to ~~predicted~~ MLLW). The obstruction was 2.4 meters in diameter and 1.2 meters high with a padeye at the top.

WHITING recommends that this object be charted as an obstruction with a diver known least depth of 12.2 meters at the position determined by this survey. CONCUR (39FT), 12 OBSTR, AND A DANGER CURVE

N5. Contact# 2432.27S

Reported Latitude:	38°49'29.6" N
Reported Longitude:	075°01'30.1" W
Datum:	NAD 83
Depth:	12.2 m (SSS estimated depth)

Contact# 2432.27S (DOY 226) was found by side scan sonar on main-scheme during this survey. The contact height from side scan sonar was computed to be significant, and a diver investigation was conducted.

The contact was investigated and echosounding was used to pinpoint the divers drop position. Once the item was located, a position and least depth (fix# 6188, DOY 228) were determined during dive operations.

Divers located a metal obstruction at latitude 38°49'29.68" N, longitude 075°01'30.16" W with a pneumatic depth gauge least depth of 11.6 meters (corrected to ~~predicted~~ MLLW). The obstruction, 2.4 m x 1.8 m, was standing 1.2 meters off the bottom with a padeye at the top.

WHITING recommends that this object be charted as an obstruction with a diver known least depth of 11.7 meters at the position determined by this survey. DO NOT CONCUR AHS RECOMMENDS THAT THE OBSTRUCTION NOT BE CHARTED BECAUSE OF SHOALER DEPTHS RANGING FROM 9.9m (32 FT), TO 13m, (42 FT). IT IS RECOMMENDED THAT A SOUNDING BE CHARTED FROM THE AREA.

N6. Contact# 2447.38S

Reported Latitude:	38°49'19.8" N
Reported Longitude:	075°01'38.4" W
Datum:	NAD 83
Depth:	12.2 m (SSS estimated depth)

Contact# 2447.38S (DOY 226) was found by side scan sonar on main-scheme during this survey. The contact height from side scan sonar was computed to be significant, and a diver investigation was conducted.

The contact was investigated and echosounding was used to pinpoint the divers drop position. Once the item was located, a position and least depth (fix# 6190, DOY 228) were

determined during dive operations.

Divers located an anchor block at latitude 38°49'19.76" N, longitude 075°01'38.84" W with a pneumatic depth gauge least depth of ~~14.0~~ 13.9 meters (corrected to ~~predicted~~ MLLW). The block, 1.5 m x 1.8 m, was standing 1.2 meters off the bottom.

WHITING recommends that this anchor block be charted as an obstruction with a diver known least depth of ~~14.0~~ 13.9 meters at the position determined on this survey. DO NOT CONCUR AHS RECOMMENDS THAT THE OBSTRUCTION NOT BE CHARTED BECAUSE OF SHOALER DEPTHS RANGING FROM 10m, (33FT), TO 10.7m, (35FT). IT IS RECOMMENDED THAT A SOUNDING BE CHARTED FROM THE AREA.

N7. Contacts# 19.09S, 19.14S

Contact# 19.09S (Anchor)

Reported Latitude:	38°49'34.9" N
Reported Longitude:	075°02'34.7" W
Datum:	NAD 83
Depth:	26.6 m (SSS estimated depth)

Contact# 19.14S (Buoy)

Reported Latitude:	38°49'35.8" N
Reported Longitude:	075°02'34.1" W
Datum:	NAD 83
Depth:	26.4 m (SSS estimated depth)

Contacts# 19.09S and 19.14S (DOY 201) were found by side scan sonar on main-scheme during this survey. The contact heights from side scan sonar were computed to be significant.

Contact# 19.14S was deemed to be the most significant contact and was further investigated by echosounding. A detached position and depth were acquired (fix# 6324, DOY 230). The contact is located at latitude 38°49'35.80" N, longitude 075°02'34.26" W with a least depth of 21.9 meters (corrected to ~~predicted~~ MLLW). This depth can confidently be considered a least depth because the object is small and of known shape (no masts or other difficult to detect vertical members). The low-frequency echo return and the high frequency echo return coincide at the point of least depth on the echogram.

WHITING recommends that this contact be charted as an obstruction with known depth in the position determined by this survey. DO NOT CONCUR
THE CONTACT WAS DIVER INVESTIGATED DURING SURVEY H-10446 (1992-93). OPERATIONS. SEE DESCRIPTIVE REPORT OF H-10446 (1992-93), PAGES 47-48, SECTION N8., FOR DISCUSSION AND CHARTING RECOMMENDATION.

N8. Contacts# 1840.09S, 2447.37P, 2447.31S

Contact# 1840.09S (DOY 222)

Reported Latitude: 38°49'16.2" N
Reported Longitude: 075°01'34.1" W
Datum: NAD 83
Depth: 14.9 m (SSS estimated depth)

Contact# 2447.37P (DOY 226)

Reported Latitude: 38°49'20.9" N
Reported Longitude: 075°01'38.3" W
Datum: NAD 83
Depth: 10.6 m (SSS estimated depth)

Contact# 2447.31S (DOY 226)

Reported Latitude: 38°49'20.0" N
Reported Longitude: 075°01'39.7" W
Datum: NAD 83
Depth: 15.3 m (SSS estimated depth)

Each of the above contacts were found by side scan sonar on main-scheme during this survey. The contact heights from side scan sonar were computed to be significant.

Diver investigations were conducted on each of these contacts during survey ~~FE-386SS~~ H-10446(1992-93). The contact names, fix numbers and day of the year from ~~FE-386SS~~ H-10446(1992-93) that refer to each H-10489 contact are listed below:

H-10489 Contact Name	~~FE-386SS~~ H-10446(1992-93) Contact Name	~~FE-386SS~~ H-10446(1992-93) DOY	~~FE-386SS~~ H-10446(1992-93) Fix#
1840.09S	3183.56S	161	506
2447.37P	3183.72S	179	519
2447.31S	2593.82P	179	520

SEE DESCRIPTIVE REPORT FOR H-10446(1992-93) FOR CHARTING RECOMMENDATIONS.
~~The charting recommendations from FE-386SS are adequate for each contact.~~

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

This survey was compared with chart# 12214, 37th edition, June 27, 1992 (scale 1:80,000). The soundings were taken from the chart, placed in a carto table and plotted on a boat sheet (scale 1:10,000) for comparison purposes. No changes in the Notice Mariners affected this sheet. All charted soundings in

the survey area were compared and generally agreement was adequate. The following charted positions and soundings did not originate from prior surveys H-9153 and H-9154, and do not agree with the present survey:

Latitude	Longitude	Chart# 12214 Depth Feet (Meters)	H-10489 Depth Meters (Feet)
38°49'27"	075°00'09"	23 (7.0)	9.7 (32)
38°48'29"	075°00'00"	29 (8.8)	14.2 (47)
38°49'12"	074°59'50"	25 (7.6)	9.0 (30)
38°48'39"	074°59'48"	30 (9.1)	10.0 (33)
38°49'06"	074°59'18"	28 (8.5)	10.7 (35)
38°48'28"	074°59'34"	28 (8.5)	11.7 (38)
38°49'08"	074°58'29"	28 (8.5)	11.7 (38)

These soundings occur in an area of numerous large sand waves that have apparently shifted in position and depth since the charted soundings were obtained. These charted soundings should have been superseded by H-9153 or H-9154 and have been further disproved by the present survey. All charted soundings in the area covered by the present survey should be removed and replaced by depths from the present survey.

There were no previously unknown dangers to navigation warranting a Notice to Mariners located during this survey.

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 and charted data in the common area.

Q. AIDS TO NAVIGATION SEE ALSO SECTION 7.C. OF THE EVALUATION REPORT.

There are five floating aids to navigation in the survey area, Entrance Channel Lighted Buoy '8', South Shoal Lump Lighted Buoy '8A', South Shoal Lump Buoy '8B', North Approach Lighted Bell Buoy '2', and North Approach Lighted Buoy '4'. A detached position was taken by launch 1015 for each of the buoys and the buoy positions were compared to positions on chart# 12214.

The following detached positions were determined for the buoys:

Buoy	Detached Position Latitude	Longitude	Chart# 12214 GP Latitude	Longitude
Entrance Channel Lighted Buoy '8'	38°49'~~.4~~ 21.60" N (Fix# 2834, DOY 228)	075°02'~~.4~~ 25.99" W	38°49.4'N	075°02.5'W

Buoy	Detached Position Latitude	Longitude	Chart# 12214 GP Latitude	Longitude
South Shoal Lump Lighted Buoy '8A'	38°49'~~.3~~ 16.62" N	075°01'~~.6~~ 33.27" W (Fix# 2833, DOY 228)	38°49.2'N	075°01.6'W
South Shoal Lump Buoy '8B'	38°~~50.0~~ 49' 59.52" N	075°02'~~.1~~ 04.43" W (Fix# 2835, DOY 228)	38°50.0'N	075°02.1"W
North Approach Lighted Bell Buoy '2'	38°48'~~.3~~ 20.83" N	074°55'~~.2~~ 13.62" W (Fix# 2089, DOY 224)	38°48.0'N	074°55.3'W
North Approach Lighted Buoy '4'	38°48'~~.1~~ 07.77" N	074°58'~~.5~~ 28.93" W (Fix# 2088, DOY 224)	38°48.1'N	074°58.5'W

Buoy '8' characteristics were observed as a red buoy with a flashing red light every two and one-half seconds. This verified both the charted and Light List characteristics.

Buoy '8A' characteristics were observed as a red buoy with an occulting red light every four seconds. This verified both the charted and Light List characteristics.

Buoy '8B' characteristics were observed as a red nun buoy. This verified both the charted and Light List characteristics.

Buoy '2' characteristics were observed as a red buoy with a quick flashing red light. This verified both the charted and Light List characteristics.

Buoy '4' characteristics were observed as a red buoy with a red light flashing every four seconds. This verified the charted characteristics. The Light List characteristics are listed as a red buoy with a quick flashing red light.

R. STATISTICS

Number of Positions	2,693
Main-scheme Sounding Lines (Nautical Miles)	185.5
Crosslines (Nautical Miles)	12.6
Square Nautical Miles Surveyed	4
Days of Production	20
Detached Positions	25
Bottom Samples	6
Tide Stations Installed	None
Current Stations	None
Number of CTD Casts	4
Magnetic Stations	None

S. MISCELLANEOUS

Bottom samples were obtained during prior survey H-9153 in 1971. Six bottom samples, taken during this survey, confirmed the bottom type has not changed since the prior survey. The oceanographic log sheet is included in the separates submitted with this survey. Bottom samples were not submitted to the Smithsonian Institution.

No anomalies in either tide or current nor any unusual magnetic variations were encountered in the survey area.

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

Recommendations concerning specific items are located in section N of this report. The data meets the 1:10,000 scale accuracy requirements (except as noted in section I) and can be used on charts requiring that accuracy.

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-W-93:

Coast Pilot Report
Chart Inspection Report
User Evaluation Report

Submitted By:

Michelle Zipperer

Michelle P. Zipperer
Ensign, NOAA

K

ITEM INVESTIGATION REPORT

SURVEY H-10489
Item Number N/A
Charted (Y/N) N
Chart No. (largest scale) 12216 Edition 23rd Date 2/22/92

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

DESCRIPTION/SOURCE: 1451.02S (H-10489)

HISTORICAL POSITION: Latitude _____
Longitude _____
Datum _____

SSS POSITION: Lat 38°49'27.6" N 46
Long 075°01'15.7" W 26
Easting 8694.80
Northing 26769.75
1494.745
(1461.02S)

SURVEY REQUIREMENTS:

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

DIVE DATA: Divers CRESWELL / VERLAQUE
Time of Dive: Commenced 1654 Completed 1721
Current .75 KT F Visibility 3 Bottom Type SAND

RESULTS OF INVESTIGATION: DIERS DESCENDED ABOVE EASTING & NORTHING AND FOUND SUBMERGED BUOY, FOR ORIENTATION NW-SE, TOP END AT NW. LEAST DEPTH TAKEN AT ~~TOP END~~ CENTER OF BUOY. BUOY STOOD 5 FT OFF THE BOTTOM IN 50 FT OF WATER. DIVER GUAGE LD 45 FT. CHAIN TENDED TO THE SE INTO THE SAND FOR 15-20 FT. NO ANCHOR BLOCK WAS FOUND AT END OF CHAIN.

POSITION: Date (M/D/Y) 8-13-93 Time (UTC) 175342 Position No. 6175 FIX-6176
Latitude 38°49'27.20"N Longitude 075°01'15.74"W
LORAN-C: GRI (9960) W: 15804.6 X: 27133.7 Y: 42656.9 Z: 57239.9
SNR 890 349 870 930 570

LEAST DEPTH: Date (M/D/Y) 8-13-93 Time (UTC) 1710
Method of Least Depth: ~~ECHO~~ DIVER
Measured Least Depth: 1. 46.2 2. ~~46.3~~ 16.1 3. 46.2 Avg. 46.2/4 Units FT
Uncorrected Depth 14.1 (meters)
Tide Corrector - 46.7 Corrected Least Depth 13.5 (44 FT) (meters)

Recorder GWB/NPB **Checked By** _____

SEE SECTION N1., PAGE 13, OF THIS REPORT FOR CHARTING RECOMMENDATION.

K

ITEM INVESTIGATION REPORT

SURVEY H-10489
Item Number N/A — Danger to Nav. Letter Issued (Y/N) N
Charted (Y/N) N
Chart No. (largest scale) 12216 — Edition 23rd — Date 2/22/92

DESCRIPTION/SOURCE: 1267.555 (H-10489)

HISTORICAL POSITION: Latitude _____ Longitude _____ Datum _____

SSS POSITION: Lat 38° 49' 37.0" N Long 075° 01' 27.8" W Easting 8454.65 Northing 27062.15

SURVEY REQUIREMENTS: 1315.40S (1267.55S)

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

DIVE DATA: Divers CRESWELL / VERLAQUE
Time of Dive: Commenced 1837 Completed 1859
Current 1.0 kt EBF Visibility 5 FT Bottom Type SAND

RESULTS OF INVESTIGATION: DIVERS DESCENDED BUOY DROPPED AT ABOVE SSS EASTING, ~~NORTHING~~ NORTHING AND FOUND A DREDGE PIPE, 3 FT IN DIAMETER ORIENTATED E-W, LENGTH 60 FT. DIVER GUAGE LEAST DEPTH WAS 45 FT UNDER THE DREDGE PIPE WAS AN 8 INCH BLACK PIPE RUNNING THE LENGTH OF DREDGE PIPE. AT EAST END OF PIPE DIVERS FOUND 4 CHAIN 10-15' TENDING TO THE NE. AT THE END OF THE CHAIN WAS AN ANCHOR BLOCK 3'6" BY 5' 3-4' OFF THE BOTTOM IN A SCOUR HOLE. LEAST DEPTH TAKEN ON ANCHOR BLOCK. AT WEST END OF DREDGE PIPE DIVERS FOUND A 1/2" ARMOURED CABLE

POSITION: Date (M/D/Y) 8-13-93 Time (UTC) 172403 Position No. FIX ~~6176~~ 6177 (ARMORED)
Latitude 38° 49' 37.64" N Longitude 075° 01' 27.89" W
LORAN-C: GRI (9960) W: 15805.6 X: 27135.2 Y: 42658.7 Z: 57239.9
SNR 882 364 860 888 608

LEAST DEPTH: Date (M/D/Y) 8-13-93 Time (UTC) 1850
Method of Least Depth: ENSMO
Measured Least Depth: 1. 45.6 2. 45.7 3. 45.8 Avg. 45.7 Units FT
Uncorrected Depth 13.9 (meters) 7
Tide Corrector - 1.1 Corrected Least Depth 12.8 (41 FT) (meters)

Recorder EWB/MDS **Checked By** _____

TENDING N-S, EXTENDING 30 FT IN BOTH DIRECTIONS INTO THE SAND. WEST END OF DREDGE PIPE WAS CAPPED. DIVER GUAGE LEAST DEPTH ON BLOCK WAS 45 FT. (22)

SEE SECTION N.2.1) PAGE 14 OF THIS REPORT FOR CHARTING RECOMMENDATION.

ITEM INVESTIGATION REPORT

SURVEY H-10489
Item Number N/A
Charted (Y/N) N
Chart No. (largest scale) 12266 Edition 23rd Date 2/22/92

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

DESCRIPTION/SOURCE: H-10489 (2461.225)

HISTORICAL POSITION: Latitude ____
Longitude ____
Datum ____

SSS POSITION: 2458.485 / (2461.225) / 6120.04P / 6146.12P
Lat 38/48/49.5 N
Long 75/00/51.1 W
Easting 9295.8
Northing 25614.2

SURVEY REQUIREMENTS:

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

DIVE DATA: Divers VERLAQUE / CRESWELL
Time of Dive: Commenced ____ Completed ____
Current SLACK Visibility 5 Bottom Type SAND

RESULTS OF INVESTIGATION: DIVERS DESCENDED BUOY DROPPED AT ABOVE CASTING NORTHING AND FOUND A ROUND METAL OBJECT 6 FT ROUND 4 FT HIGH WITH A PADEYE AT THE TOP IN 62 FT OF WATER DIVER GAUGE LEAST DEPTH 58 FT

6180
FIX 542

POSITION: Date (M/D/Y) 8-16-93 Time (UTC) 134532 Position No. ____
Latitude 38° 48' 50.18" N Longitude 076° 00' 51.06" W
LORAN-C: GRI (9960) W: 15802.5 X: 40650.1 Y: 27129.5 Z: 59238.1
SNR - 574 389 930 511 744

LEAST DEPTH: Date (M/D/Y) 8-16-93 Time (UTC) 1337
Method of Least Depth: PNEUMO
Measured Least Depth: 1. 57.9 2. 580 3. 580 Avg. 58.0 Units ft
Uncorrected Depth 17.7 (meters)
Tide Corrector -.8-1.0 Corrected Least Depth 16.9 (55FT) (meters)

Recorder EVB / NRS **Checked By** ____

SEE SECTION N3.) PAGE 14 OF THIS REPORT FOR CHARTING RECOMMENDATION.

ITEM INVESTIGATION REPORT

SURVEY H-10489
Item Number N/A Danger to Nav. Letter Issued (Y/N) N
Charted (Y/N) N
Chart No. (largest scale) 12266 Edition 23rd Date 2/22/92

DESCRIPTION/SOURCE: H-10489 (2421.285)

277

HISTORICAL POSITION: Latitude ____
Longitude ____
Datum ____

SSS POSITION: Lat 38/49/09.4 N
1540.69P
1558.50P
(2421.285)
2424.415
Long 075/00/18.7 W
Easting 10078.5
Northing 26214.5

SURVEY REQUIREMENTS:

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

DIVE DATA: Divers VERLAQUE/CRESWELL
Time of Dive: Commenced 1424 Completed 1438
Current 0.5 KT E Visibility 0 Bottom Type SAND/SHELL

RESULTS OF INVESTIGATION: DIVERS DESCENDED BUOY LINE DROPPED AT ABOVE SSS EASTING NORTHING AND FOUND AN 8 FT DIAMETER METAL ~~SPERE~~ SPHERE ~~STANDING~~ STANDING 4 FT OFF THE BOTTOM IN 45 FT OF WATER. DIVER GAUGE LEAST DEPTH 41 FT. SPERE HAD A PADEYE AT THE TOP.

6182
FK 844

POSITION: Date (M/D/Y) 8-16-93 Time (UTC) 14445 Position No. ____
Latitude 38°49'09.79"N Longitude 075°00'18.79"W
LORAN-C: GRI (9960) W: 15806.5 X: 42654.1 Y: 27127.6 Z: 59241.3
SNR- 914 442 864 852 677

LEAST DEPTH: Date (M/D/Y) 8-16-93 Time (UTC) 1434
Method of Least Depth: PNEUMO
Measured Least Depth: 1. 41.8 2. 41.8 3. 41.8 Avg. 41.8 Units ft
Uncorrected Depth 12.7 (meters)
Tide Corrector -.5.7 Corrected Least Depth 12.2 (meters)
(39 FT)

Recorder EWB/NPB **Checked By** ____

SEE SECTION N4, PAGE 15, OF THIS REPORT FOR CHARTING RECOMMENDATION.

ITEM INVESTIGATION REPORT

SURVEY H-10489
Item Number N/A
Charted (Y/N) N
Chart No. (largest scale) 12216 Edition 23rd Date 2/22/92

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

DESCRIPTION/SOURCE: H-10489 (2432.275)

HISTORICAL POSITION: Latitude ~~_____~~
Longitude ~~_____~~
Datum ~~_____~~

SSS POSITION: Lat 38/49/29.6 N
1450.145 Long 075/01/30.1 W
1495.665 Easting 8350.6
2428.135 Northing 26830.2
(2432.275)

SURVEY REQUIREMENTS:

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

DIVE DATA: Divers VERLAQUE / CRESWELL
Time of Dive: Commenced 1758 Completed 1805
Current 0.5 KT E Visibility 2-3 Bottom Type SAND / SHELL

RESULTS OF INVESTIGATION: DIVERS DESCENDED BUOY DROPPED AT ABOVE SSS EASTING-NORTHING AND FOUND AN 8 FT BY 6 FT PIECE OF METAL WITH A PADEYE, 4 FT OFF THE BOTTOM IN ± 42 FT OF WATER. DIVER GAVE LEAST DEPTH 38 FT.

6188

POSITION: Date (M/D/Y) 8-16-93 Time (UTC) 181611 Position No. FIX 580
Latitude 38° 49' 29.68" N Longitude 075° 01' 30.16" W
LORAN-C: GRI (9960) W: 15805.4 X: 42657.2 Y: 27135.1 Z: 59239.2
SNR 852 415 802 849 599

LEAST DEPTH: Date (M/D/Y) 8-16-93 Time (UTC) 1801
Method of Least Depth: PNEUMO
Measured Least Depth: 1. 38.3 2. 38.4 3. 38.2 Avg 38.3 Units FT
Uncorrected Depth 11.7 (meters)
Tide Corrector -0.01 Corrected Least Depth 11.7 (38FT) (meters)
6

Recorder EWB/MPB **Checked By** _____

SEE SECTION N5, PAGE 15 OF THIS REPORT FOR CHARTING RECOMMENDATION

ITEM INVESTIGATION REPORT

SURVEY H-10489
Item Number N/A Danger to Nav. Letter Issued (Y/N) N
Charted (Y/N) N
Chart No. (largest scale) 12216 Edition 23rd Date 2/22/93

DESCRIPTION/SOURCE: 2447.385 H-10489

HISTORICAL POSITION: Latitude _____ SSS POSITION: Lat _____
Longitude _____ Long _____
Datum _____ EASTING 8152.3
2447.83 NORTHING 26535.6

SURVEY REQUIREMENTS:

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

DIVE DATA: Divers CRESWELL / VERLAQUE
Time of Dive: Commenced 1845 Completed 1854
Current 0.25 kt E Visibility 0-1 Bottom Type SAND & SILT

RESULTS OF INVESTIGATION: DIVERS DESCENDED BUOY LINE DROPPED AT ABOVE SSS EASTING NORTHING AND FOUND AN ANCHOR BLOCK 5'X6', 4' OFF THE BOTTOM IN 51 FT OF WATER. DIVER GAUGE LEAST DEPTH 47 FT.

6190

POSITION: Date (M/D/Y) 8-16-93 Time (UTC) 190242 Position No. FIX 552
Latitude 38°49'19.76"N Longitude 075°01'38.84"W
LORAN-C: GRI (9960) W: ~~13884.1~~ 13884 X: 42855.2 Y: 27135.5 Z: 59237.9
SNR 683 251 772 450 548

LEAST DEPTH: Date (M/D/Y) 8-16-93 Time (UTC) 1850
Method of Least Depth: PNEUMO
Measured Least Depth: 1. 46.6 2. 46.5 3. 46.6 Avg. 46.6 Units ft
Uncorrected Depth 14.2 (meters) 13.9
Tide Corrector -.23 Corrected Least Depth 14.0 (meters)
(45 FT)

Recorder EVB/NRZ **Checked By** _____

SEE SECTION No.) PAGE 16, OF THIS REPORT FOR CHARTING RECOMMENDATION

Station No ?

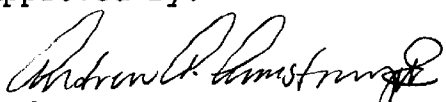
No	Type	Lat	Lon	H	Cart	Freq	Vel Code	MM/DD/YY	Station Name
1	G	038:46:36.421	075:05:15.667	0	250	298.0	0	09/03/92	CAPE HENLOPEN (DGPS)
2	G	036:55:37.530	076:00:23.334	0	250	289.0	0	09/03/92	CAPE HENRY (DGPS)
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	
		000:00:00.000	000:00:00.000	0	0	0.0	0	03/01/91	

Control Station Table saved to disk

APPROVAL SHEET
HYDROGRAPHIC SURVEY
OPR-D368-WH
1993
W-20-10-93
H-10489

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

03/01/94

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H-10489

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	2668
NUMBER OF SOUNDINGS	16321

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	101	12/03/93
VERIFICATION OF FIELD DATA	143	02/09/94
ELECTRONIC DATA PROCESSING	68	
QUALITY CONTROL CHECKS	35	
EVALUATION AND ANALYSIS	45	02/14/94
FINAL INSPECTION	13	02/14/94
TOTAL TIME	405	

ATLANTIC HYDROGRAPHIC SECTION APPROVAL 02/28/94

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-10489

LOCALITY: Approaches to Delaware Bay

TIME PERIOD: July 20 - August 19, 1993

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 -0 hr 30 min time correction and a x0.96 range ratio to Lewes Breakwater Harbor, Delaware (855-7380).

Note: Times are tabulated in Eastern Standard Time.

William M. Stanton

ACTING CHIEF, DATUMS SECTION

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-10489

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO.	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
ATLANTIC OCEAN (title)										1
DELAWARE (title)										2
OVERFALL SHOALS (title)										3
										4
										5
										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
				Approved:						16
										17
				Chief Geographer						18
										19
				JAN 5 1994						20
										21
										22
										23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

COAST AND GEODETIC SURVEY
ATLANTIC HYDROGRAPHIC SECTION
EVALUATION REPORT

SURVEY NO.: H-10489 FIELD NO.: WH-20-10-93

Delaware, Atlantic Ocean, 3 NM South of Overfalls Shoal

SURVEYED: 20 July 1993 through 19 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.....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
.....P. R. White

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 determined, were investigated during present survey operations. 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 0.404 seconds (12.46 meters or 1.246 mm at the scale of the survey) north in latitude, and 1.367 seconds (32.97 meters or 3.297 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. Some brown curves were added to better delineate bottom configuration.

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 (1992-93) to the southeast
H-10446 (1992-93) to the southwest

A standard junction was effected between the present survey and surveys H-10444 (1992-93) and H-10446 (1992-93).

There are no contemporary surveys to the north, northeast, or northwest that junction with the present survey. Present survey depths are in harmony with the charted hydrography to the north, northeast, and northwest.

6. COMPARISON WITH PRIOR SURVEYS

a. Hydrography

H-9153	(1970)	1:20,000
H-9154	(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., pages 10 through 12, 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

1) There are eight uncharted groundings that originate with prior survey H-9173WD (1970) and fall within the common area of the present survey. The groundings were investigated by present survey side scan sonar with negative results. The groundings are considered disproved. No change in charting is recommended.

There are several conflicts between the prior survey effective clearance depths and present survey soundings. Due to sandwaves, shoal soundings from the present survey are in conflicts with the prior survey effective depths. These conflicts are considered disproved by the present survey.

7. COMPARISON WITH CHART 12304, (34th. Ed., 24 October 1992)
12214, (37th. Ed., 27 June 1992)
12216, (23rd. Ed., 22 February 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 17-18 of the Descriptive Report.

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 five floating aids to navigation shown on the present survey. These aids appear adequate to serve their intended purpose.

Delaware Bay Entrance Channel Lighted Buoy 8, charted in Latitude 38°50'00.0"N, Longitude 75°02'54"W has been moved. The present survey located the buoy in Latitude 38°49'21.60"N, Longitude 75°02'25.99"W. A telephone conversation with Mr. John Walters, (804)-398-6230, Fifth Coast Guard District, Aids to Navigation office, confirmed that the aid had been moved. It is recommended that the charted Delaware Bay Entrance Channel Lighted Buoy 8 be moved to the present survey location.

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 survey.

WHITING Processing Team
Verification and Evaluation and Analysis

Franklin L. Saunders
Cartographic Technician

Norris A. Wike
Cartographer

APPROVAL SHEET
H-10489

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The digital data have been completed and all revisions and additions made to the smooth sheet during survey processing have been entered in the magnetic tape record for this survey. Final control, position, and sounding printouts of the survey have been made. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Leroy G. Cram Date: 28 Feb. 1994
Leroy G. Cram
Chief, Hydrographic Processing Team B
Atlantic Hydrographic Section

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

Nicholas E. Perugini Date: 28 Feb 1994
Nicholas E. Perugini, LCDR, NOAA
Chief, Atlantic Hydrographic Section

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Final Approval:

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

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10489

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.
1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
12200	5-12-94	John Barbour	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 55 Exam. no correction - 3E Area - consider fully app'd.
12216	6-28-94	John Barbour	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 32 APP'd in full
12214	6-29-94	John Barbour	Full Part ~~Before~~ After Marine Center Approval Signed Via
			Drawing No. 50 APP'd in full, partially app'd thru cht 12216
12304	1-31-95	Ralph B. Rass	Full Part Before After Marine Center Approval Signed Via
			Drawing No. 60 appd in full thru 12214 & 12216
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED