

10084

Diagram No. 1218-2

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey .. Hydrographic ..
Field No. PE-20-2-83 ..
Office No..... H-10084 ..

LOCALITY

State Delaware—New Jersey ..
General Locality .. Delaware Bay ..
Locality Fourteen Foot Bank to ..
..... Cross Ledge ..
..... 1983 ..
CHIEF OF PARTY
CDR W.S. Simmons ..

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DATE May 28, 1986 ..

☆U.S. GOV. PRINTING OFFICE: 1980—766-230

Area 1
CHT } CARTOG
12304 } SIGN OFF
ON FORM IN
BACK

10084

HYDROGRAPHIC TITLE SHEET

H-10084

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

FIELD NO.

PE-20-2-83

State DELAWARE/NEW JERSEY

General locality DELAWARE BAY

FOURTEEN FOOT BANK TO CROSS LEDGE

Locality ~~MAUI MAUI SHOAL AND VICINITY~~

Scale 1 : 20,000

Date of survey 6 April to 3 May 1983

Instructions dated 1 December 1982

Project No. OPR-D219-PE-83

vessel Launches 1009 (3281), 1017 (3282) (NOAA ship PEARCE)

Chief of party CDR Walter S. Simmons

Surveyed by LTJG M. Conricote, LT R. Mandzi, LT N. Millet, ENS R. Harris, ENS S. Andreeva

Soundings taken by echo sounder, hand lead, pole Ross Model #5000 Fineline Echo Sounder

Graphic record scaled by MCP, RMM, NGM, SIA, RBH, IPR, WRM, and TO.

Graphic record checked by MPC and GEL.

Protracted by *Doyle V. Mason* Automated plot by *Xynetics 1201 plotter (AMC)*

Verification by *Douglas V. Mason*

Soundings in fathoms feet at ~~MLW~~ MLLW

REMARKS: All times recorded in this survey are Coordinated Universal Time.

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

STANDARDS CC'D 5-29-86

AVOIS/SURF checks *Caloy* MAM 6/3/86

SC 4-20-97

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Descriptive Report
 To Accompany
 Hydrographic Survey H-10084 (PE-20-2-83)
 1:20,000 Scale, 1983
 NOAA Ship PEIRCE
 CDR. Walter S. Simmins, COMDG.

A. PROJECT

This basic survey, a part of OPR-D219-PE-83, was conducted in accordance with Project Instructions dated December 1, 1982; change No. 1 dated December 7, 1982; change No. 2 dated February 25, 1983; change No. 3 dated April 5, 1983; and AMC Memo Order dated February 16, 1983. Project Instructions change No. 4 dated April 15, 1983, was received on May 6, 1983, one day after completion of the survey.

B. AREA SURVEYED

This offshore survey, Delaware Bay, Delaware/New Jersey, ~~Near Mull Shoal and~~ *Fourteen Foot Bank to Oyster Ledge* vicinity, was conducted between April 6, 1983 (JD 096) and May 3, 1983 (JD 126). Because there was not sufficient time this season, the eastern one-third of 3 the sheet, as laid out, was not completed.

The project limit was extended slightly to the south at "Channel Crossing" in order to verify the channel and to aid the U.S. Coast Guard in resetting the buoys. The survey was also extended to the north over the western one-half of the sheet in order to cover more of the discovered major changes in the shoals and channels.

The sheet layout should be changed so that H-10084 covers the area surveyed with a new sheet added to cover the eastern portion of the project. The area surveyed on H-10084 is bounded by the following limits:

<u>Latitude</u>	<u>Longitude</u>
39° 10' 50"	075° 20' 00"
39° 09' 20"	075° 20' 00"
39° 04' 28"	075° 16' 10"
39° 02' 48"	075° 16' 10"
39° 02' 48"	075° 14' 20"
39° 02' 20"	075° 14' 20"
39° 02' 20"	075° 13' 12"
39° 02' 48"	075° 13' 12"
39° 02' 48"	075° 08' 15"
39° 09' 57"	075° 08' 15"
39° 09' 57"	075° 10' 20"
39° 10' 50"	075° 09' 55"

The Delaware Bay ship channel which runs north-south through the middle of the area is well marked by light houses and buoys. To the west of the ship channel, the bay is characterized by bars and channels which approximately parallel the ship channel. These features have, in general, migrated to the east toward the ship channel.

Eastward of the ship channel the shoal/channel system is less defined and the changes are smaller than those to the west. The eastern portion of the area includes commercial oyster bars which are marked by tree limb stakes. No attempt was made to position all these stakes which give the impression of running through a flooded, dead forest.

C. SOUNDING VESSEL

All soundings and bottom samples were taken with the ship's two type 1 aluminum survey launches, PE-1 (1009) (VESNO 3281) and PE-2 (1017) (VESNO 3282). Ross 5000 echo sounders were used in both launches. Both the vessels were equipped with the hydroplot system.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

Each launch was equipped with a Ross Model 5000 Fineline echo sounder; launch PE-1 (VESNO 3282) used S/N 1078 and launch PE-2 (VESNO 3282) used S/N 1087. These echo sounders were used in depths from two to fifty feet. Both echo sounders performed satisfactorily throughout the survey. The echo sounder initial was kept at 0.0 feet throughout the survey. Temporary deviations of the initial were accounted for while scanning fathograms. Phase checks were done periodically and the recorder was adjusted when necessary. The draft correction applied on-line was 1.6 feet for both launches.

Corrections to sound velocity were determined from bar checks and Martek casts. Whenever possible, bar checks were taken at the beginning and end of the day. The following table lists the dates and positions of the stations observed for velocity corrections.

<u>Date (JD)</u>	<u>Station</u>	<u>Latitude</u>	<u>Longitude</u>
1 April 83 (091)	Martek 1	39° 02.5'	075° 15.3'
1 April 83 (091)	Martek 2	39° 02.5'	075° 15.3'
17 April 83 (107)	Martek 3	39° 02.4'	075° 15.0'
21 April 83 (111)	Martek 4	39° 02.4'	075° 15.0'
26 April 83 (116)	Martek 5	39° 02.3'	75° 15.0'
29 April 83 (119)	Martek 6	39° 02.3'	75° 15.0'
29 April 83 (119)	Martek 7	39° 02.3'	75° 15.0'

All of the Martek casts were taken from the NOAA Ship PEIRCE (VESNO 3280). The Martek is a Model 167, S/N 177, which was calibrated February 4, 1983.

The velocity tables were derived from graphs of averaged bar check correctors and of averaged Martek correctors.

Separate bar check graphs were prepared for each boat. Correctors were averaged for bar check depth and a single corrector curve was constructed for each boat.

Martek correctors were averaged for each depth and single corrector curve was constructed to be applied to data from both boats.

Velocity correctors for depths of 20 feet and less were determined from the bar check curves. Correctors for depths greater than 20 feet were taken from the Martek curve.

The velocity corrector graphs, tape listings, sounding correction abstracts, and the Martek calibration for the above operations are in Appendix D.

Settlement and squat tests for the launches were run on May 5, 1983 (JD 125). The tests were conducted at Fortescue inlet using the Lietz Level Instrument, S/N 7523 and the Philadelphia Rod positioned over the transducer.

Settlement and squat correctors have not been used in the final field plot. The settlement and squat report and TC/TI tables can be found in Appendix D. No unusual or unique methods or instruments were used for this survey.

E. HYDROGRAPHIC SHEETS

Hydrographic data are presented on four sheets. The mainscheme is depicted on two sheets, north and south. Each of these sheets has an overlay sheet that depicts crosslines, mainscheme splits, and bottom samples. These sheets are at a scale of 1:20,000 with a skew of \emptyset , 19.7, 59 for the north sheet and \emptyset , 19, 48 for the south sheet. An additional sheet depicting the chain drag for PSR item 2946, skew 90, 21.5, 60, is also enclosed. A listing of the sheet parameters is in Appendix A. The final smooth sheet will be compiled at the Atlantic Marine Center (AMC). All field records will be forwarded to AMC for final verification.

F. CONTROL STATIONS

The following third-order stations were used to control this survey:

<u>SIGNAL</u>	<u>STATION NAME</u>	<u>SOURCE</u>	<u>USE</u>
003	MIAH MAULL ^{SHOAL} MR, 1983	PE	MR
004	ELBOW OF CROSS LEDGE LT, 1983	PE	CALIBRATION
005	FOURTEEN FOOT BANK LIGHT, 1933	NGS	CALIBRATION
007	MIAH MAULL SHOAL LIGHT, 1933	NGS	CALIBRATION
009	BRANDYWINE SHOALS LIGHTHOUSE, 1932	NGS	CALIBRATION
021	BRANDYWINE SHOALS MR, 1983	PE	MR
022	FOURTEEN FOOT BANK MR, 1983	PE	MR
023	ELBOW OF CROSS LEDGE MR, 1983	PE	MR
024	EGG MR, 1983	PE	MR

All horizontal control used in this survey is based on the North American Datum of 1927. A complete list of signals is located in Appendix F of this report. Geodetic abstracts and computations for all PEIRCE control work are included in the project's Horizontal Control Report. All stations in this survey meet the required Third-Order, Class 1 accuracy standards. The surveying method used to establish all calibration stations was Third Order Intersection. All MR sites were located by short spur traverses from the third order stations.

G. HYDROGRAPHIC POSITION CONTROL

The MINI-RANGER Positioning System operated in the range-range mode was used to control sounding operations during the entire Delaware Bay Survey. Although the MINI-RANGER III System has been successfully operated for many years by west coast hydrographic ships, and previously used by three of PEIRCE's officers, the use of this system by PEIRCE during OPR-D219-PE-83 resulted in numerous unexpected operating difficulties. The following paragraphs summarize the difficulties experienced and explain the procedures used to achieve satisfactory data acquisition. The MINI-RANGER did perform better than expected in two areas, range and reliability. The system was used up to a range of 12 nautical miles which was approximately the maximum line of sight even though the MINI-RANGER manual predicts a range cutoff near line of sight conditions. Reliability was also excellent with only one failure for the entire project, a receiver/transmitter. However, Code 5 reference station had erratic readings near the end of the project (see graph) and Code 6 had about 1 inch of water inside when it was removed from Elbow of Cross lighthouse. PEIRCE personnel agree that the aging AMC DEL NORTE equipment could not have come close to the range and reliability of the MINI-RANGER Systems.

(ELECTRONIC) AGING OR CRYSTAL AGING

It has been previously observed that a drift in readings will occur as a result of frequency drift in the magnetron due to crystal aging. This appears to be especially true during the initial period of operation when one unit (Console B0295, R/T C2000, Ref. Sta. C2075, Code 3) drifted ten meters in the first two weeks of operation.

INTERFERENCE

Radar interference is generally minimal with the MINI-RANGER System since this system uses time coded pulses and C-band which is not as commonly used in marine radars as X-band. Although the system uses time coded pulses, numerous erroneous rates were observed during the project, at times approaching 10% of the displayed rates. A possible source of the interference was Dover Air Force Base which was only 3 miles from the project area and which had a C-band weather radar. Another source of interference was other users of MINI-RANGER itself. We knew of three other users, the closest was about 25 miles to the north. MINI-RANGER users without the multiuser option will interfere with all other MINI-RANGER systems within range, even when using different codes. In an attempt to eliminate intermittent long-range erroneous rates, the PEIRCE systems were changed from a range gate of 40 nautical miles to 25nm. There was no perceptible improvement.

SOFTWARE: MINI-RANGER MODE vs RAYDIST MODE

Although the MINI-RANGER System is intended to be interfaced with the computer/hydroplot system using the existing DEL NORTE interrupts, the system appears to perform more satisfactorily in the RAYDIST mode. In the RAYDIST mode, the program assumes the data is continually being updated at one

second intervals. The ranges are obtained from data currently contained in the system. The problem with this method is that the hydroplot assumes the data is up-to-date but in reality, the MINI-RANGER may not be updating. In the DEL NORTE mode, the program requires a separate interrupt for each MINI-RANGER data channel, records a separate time for each channel update, and performs computations by keying interrupt 03. An oscilloscope connected to the system shows that the order in which the interrupts arrive changes frequently with time. This change of sequence will cause a "NAVERR 01" condition. This apparent channel 1 and 2 interrupt timing problem appears to be reduced when the update display rate on the console is reduced from maximum, approximately 2/second, to about 1/second. The advantage of operating in the RAYDIST mode is the elimination of most of the "NAV DOWNS." The disadvantages are that the program does not know if the rates are being updated and that no signal strength is output. The interrupt timing was changed part way through the project by AMC EED.

UNSMOOTHED vs. SMOOTHED DATA MODES

Experience over the duration of this project indicates that the unsmoothed mode is the preferred operating mode since it maximized the "NAV UP" conditions. The advantages are that the steering needle is continually updated and that all data is utilized. The disadvantages are that erroneous rates are accepted by the program and utilized in all computations resulting in the plotter tracking uncontrolled over the entire plotter sheet and the erroneous rates are recorded when they occur on the normal sounding interval. However, when erroneous rates occur on the sampling interval they can be corrected offline by time and course interpolation. This results in a great volume of post processing. In the smoothed data mode 11 sequential "NAVERR 01", or one "NAVERR 02" condition will cause a "NAV DOWN" condition. This results in all 9's being output, loss of plotter tracking, and loss of the steering meter update. Eleven sequential ranges are then required without detection of a "NAVERR 01" condition before "NAV UP" will occur. Therefore, a minimum duration of 11 seconds will occur between "NAV DOWN" and the return of the steering needle. With several 11 second periods occurring in succession, the survey vessel can vary off course sufficiently to require rejection of the line. On some occasions, the "NAV DOWN" condition lasted up to 35 minutes.

RANGE AVERAGING

After experimenting the first few days, the range averaging feature was turned off for the remainder of the project. This seemed to substantially reduce the number of erroneous rates.

NULL ZONES

Null zones were encountered in areas not predicted by the graphs and formulas in the MINI-RANGER Users Manual. Sounding lines were accomplished through these null zones in two different manners, depending upon the proximity of the zone to the beginning or ending points of planned lines. Null zones encountered in the middle of sounding lines were sounded by steering compass courses and plotted by time and course interpolation. Null zones encountered at the edge of the survey area were generally sounded, using a different reference station combination. Six reference stations were operated

simultaneously in order to increase the choice of possible combinations. These null zones occurred with one system Console 911027 and R/T D2128 at ranges between 7600 and 8100 meters from all reference stations. This phenomenon was observed at any state of the tide, at slightly different R/T antenna heights and at reference station antenna heights, varying from 20-23 meters. These null zone bands could be drawn on the boat sheet prior to running sounding lines, enabling launch personnel to anticipate the position where loss of signal would occur. Since multiple reference stations were available, other stations could be selected in advance. The other launch system, Console 824118 and R/T C2096 did not experience null zones at any consistent range or at the regularity experienced on the above system. This particular range hole problem appears to be related to the overall sensitivity of each individual console R/T combination. In addition to null zones, signal strength values occasionally dipped below minimum allowable signal strength values while conducting sounding operations. These soundings were plotted by time and course interpolation when acceptable signal strengths occurred prior to entering and after exiting these low signal strength zones. The following table summarizes the MINI-RANGER equipment used during the project.

BLANK SPACE

TABLE OF MINI-RANGER EQUIPMENT-PE-20-2-83

<u>VESNO 3281</u>	<u>Serial No.</u>	<u>Julian Day</u>
Range Console	B0295	096-104
R/T	C2000	096-104
Range Console	824118	107-124
R/T	C2096	107-124
<u>VESNO 3282</u>		
Range Console	911027	107-124
R/T	D2128	107-124

SHORE STATIONS

<u>Code</u>	<u>S/N</u>	<u>Location Signal No.</u>	<u>Height (M)</u>	<u>Julian Day</u>
1	C 2058	24	21	096-124
2	C 2059	22 3	20 21	096 107-124
3	C 2075	3	21	096-124
4	C 2065	22	20	096-124
6	C 2091	23	20	096-124

CALIBRATION

Daily and baseline calibration work sheets are included with the data package for the survey. Range/range/range non-critical system checks using program RK561 were performed twice daily early in the survey until two weeks into the project when the daily correctors began to differ significantly (5-10m) from the baseline correctors. Thereafter, critical system checks (sextant) were performed prior to and after each day's hydrography, if visibility conditions permitted. Since the ship was anchored adjacent to the work area, the normal procedure was to calibrate while the launches were still in the davits. This method had several advantages: 1) it provided a steady platform for high quality observations; 2) it significantly increased the observer's height of eye (the left check was 8.5 nautical miles from the ship); 3) it permitted one set of angles to be used for both launches, (using the appropriate "antenna data" for each launch); and 4) it permitted shipboard personnel to process the entire calibration network for each launch. Since six MINI-RANGER Reference Stations were in use and each was calibrated twice daily to compile a "history", the calibration calculations amounted to several hours each day, thus freeing the

launches for data gathering. Only sextant calibrations with fix vs. check fix inverses of 5 meters or less were accepted. Even with these inverse conditions, correctors often varied +5 to -5 meters. Correctors greater than 5 meters from the mean were rejected. Also those resulting from the larger inverses were considered suspect. Six fixes were generally recorded to insure that three would satisfy the inverse conditions and would be within 5 meters of the mean. When the first three fixes computed had good inverses and their correctors agreed well, the other three fixes were not computed. However, three fixes were frequently not sufficient to have a reasonable confidence in the value of the corrector. The accompanying graphs show Daily System Checks (sextant fixes in meters) vs. Julian Days. The table in the lower left corner shows the color code and lists the final electronic correctors in terms of which baselines are to be meaned (B1 = Baseline 1, etc.). The colored dots are the values determined from daily (opening and closing are separate) sextant fixes, with check angles. The circled dots are baseline calibration values. The Code One values (Daily and Baseline) are high for both Console/RT combinations. Reference station Code 1, (S/N 2058) was returned to the ship on April 11 after MINI-RANGER and FALCON evaluation testing by AMC and Rockville personnel. After return of this unit, daily correctors indicated that the unit had drifted considerably from the original baseline calibration conducted on March 3, 1983. Perhaps the unit was adjusted during the testing. Daily correctors ranged from -27 to -33 meters for console 911027, R/T2128 and from -36 to -43 meters for console 824118, R/T2096 as compared to -1 and -2 meters from the baseline calibration. The daily correctors were verified by the final baseline calibration conducted on May 6, 1983. Since the date of the drift is well documented by daily correctors, it is recommended that the final baseline correctors be used for this unit in lieu of the mean of the beginning and final baseline correctors. Code Five shows erratic readings during the time period 116-118. This anomaly may be due to the ship's heading during time of calibration on these days. All other correctors are within the +/-10 meters allowed for a 20,000 survey. The fixed point calibration method was used on two days while in the vicinity of the Mispillion River. The launches calibrated at the Mispillion River North and South Jetty Lights which were positioned during this survey.

Another version of the multi-range, non-critical calibration method was used later in the project by processing several observed ranges simultaneously through program GP-05/F on the HP9815A Calculator. By assigning circle standard errors to the reference station positions (0.2 m) and standard errors to the MINI-RANGER ranges (2-5 m), an adjusted vessel position could be determined. Inverses were then computed from this position to each of the reference station locations. The difference between the observed and inversed distances was an approximate daily corrector. These were not used in plotting the graphs nor in determining the final electronic correctors. Since all six of the reference stations were to the north and east of the ship's location, the geometry of the solution was, in our case, somewhat weak. On several days when comparisons were made between these correctors and those determined by sextant fixes the values were very similar. With better geometry, this method could be used in the future as a daily systems (non-critical) check.

H. SHORELINE

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

I. CROSSLINES

A total of 53.6 nautical miles of crossline were run on this survey. This is equal to over 9% of the total mainscheme hydrography. Crossline soundings agreed very well with the mainscheme hydrography. All crossline comparisons fell well within the 1 - 3% of depth criterion (Sec. 1.1.2 of the Hydrographic Manual).

J. JUNCTIONS

This survey junctions ^{H-10079} to the west with contemporary 1:20,000 scale survey PE-20-1-83 (~~H-10024~~) and to the south with 1:20,000 scale survey WH20-2-71 (H-9202). Agreement with both surveys is excellent with 100% of the junction soundings comparing within 0-3 feet. Both surveys junctioned by at least two overlapping soundings. *See Eval. Rpt.*

K. COMPARISON WITH PRIOR SURVEYS

Comparisons were made with the following prior surveys:

<u>SURVEY</u>	<u>SCALE</u>	<u>YEAR SURVEYED</u>
H-1475b ₆	1:20,000	1880
H-1475a	1:20,000	1880
H-1476b	1:10,000	1880
H-1581	1:20,000	1882-83
H-1631	1:20,000	1884
H-1632	1:20,000	1884
H-1679	1:20,000	1885

No one prior survey covers the entire area of this survey.

Prior survey H-1475b covers the ^{edge of} Joe Flogger shoal and the channel. There was excellent comparison south of Joe Flogger Shoal, in the channel, and east of the channel. ~~Joe Flogger Shoal running down the west side of the channel was found to be covered five to six feet in 1880. This survey found the shoal to be covered nineteen to twenty feet. The position of the shoal is still the same.~~
Only east edge of shoal surveyed on H-1475b.

Prior survey H-1476a covers the south end of Joe Flogger Shoal, the channel and Fourteen Foot Bank. Joe Flogger Shoal was found to be covered three to six feet by the prior survey. This survey found the shoal to only be covered fourteen to fifteen feet. The agreement in the channel and east of the channel was found to be good.

Prior survey H-1476b covers the south end of Joe Flogger Shoal and the area west of Fourteen Foot Bank. Joe Flogger Shoal in the area, was found to be

covered fourteen to sixteen feet in 1983. On Fourteen Foot Bank, just north of the lighthouse, the prior survey found depths of twenty to twenty-three feet. The bank is now covered sixteen to eighteen feet.

Prior survey H-1581 covers the area to the west and north of Miah Maul Light, except for the channel. This prior survey found a shoal covered three to six feet running parallel to the west side of the channel. This survey found a valley of thirty-five to forty feet deep where this shoal once was. To the east of this valley is a shoal covered three to six feet where the prior survey found depths of sixteen to twenty feet. To the west of the valley, a shoal covered two to three feet was found where the H-1581 found depths of thirteen to fifteen feet. A two foot sounding was found where the H-1581 and the chart show fifteen feet. To the north of Miah Maul Light, this survey found a narrow shoal covered five to six feet running north and south. The prior survey found a broad shoal covered to five feet in the same place. The rest of the soundings away from the shoals were in excellent agreement.

Prior survey H-1631 covers the area of Blakes Channel and the shoal to the west of Blakes Channel. The shoal was found to be approximately one quarter of a mile to the west of the shoal on H-1631. The size, shape and depth (six feet) of the shoal was found to be almost identical. The comparison of the surveys in Blakes Channel was found to be poor. This survey found most of the depths to be one to six feet shallower than the prior survey. There is no apparent pattern to the discrepancies between the two surveys.

Prior survey H-1632 covers a small area to the southeast corner of this survey. Comparisons were excellent between these two surveys. The bottom was generally flat.

Prior survey H-1679 covers the area to the east of the channel between Fourteen Foot Bank and Miah Maul Shoal. Except for the area around Latitude $39^{\circ}06.5'$ north, Longitude $075^{\circ}10'$ west, the prior survey was in excellent agreement. In this area, mounds rising to as much as five feet from the bottom were found on this survey. These mounds were not reflected in the prior survey.

L. COMPARISON WITH THE CHART

Comparisons were made with chart 12304, 28th Edition, April 17, 1982, scale 1:80,000. There was one presurvey review item (PSR #02946) located within the limits of this survey. This is an unknown wreck sunk in thirty two feet of water.

dangerous

On JD 121, launch 3282 searched for the wreck using the echo sounder at twenty meter spacing. No evidence of the wreck was found. On JD 124, a chain drag was done to search for the wreck. Because of bad weather and shortages of time wire drag was not finished. Approximately fifty percent of the specified search area was covered by the wire drag. No evidence of the wreck was found with the wire drag. It is recommended that the wreck continue to be charted at Latitude $39^{\circ}08'47.00''N$, Longitude $075^{\circ}15'32.00''$. A plotter sheet is included which portrays the coverage of the drag. (AWOIS 02946)

See Eval Rpt

A shoal covered by two feet of water at Mean Lower Low Water (MLLW) was discovered at latitude 39°09.95'N, longitude 075°18.80'W in a charted depth of fifteen feet. Because this sounding was at the north sheet limit, the sheet limits were extended to the north by PEIRCE. The additional coverage northward revealed this shoal to be an extension to the southeast from a charted shoal covered four feet. The discovered shoal extends about 1.7 nautical miles further southeast beyond the two foot sounding. This shoal was reported by message to Commander, U.S. Coast Guard District Three. (See Appendix J.)

✓HR

An obstruction to navigation was discovered in the right outside quarter of Delaware Bay Main Channel, Brandywine Range. Because of the deep draft shipping in the channel, the thirty-eight foot sounding was reported by message to Commander, U.S. Coast Guard District Three. (See Appendix J.) Discussions with the Corps of Engineers later revealed this obstruction as the controlling depth of thirty-nine feet for that section of Brandywine Range. When the final correctors have been applied, this sounding should be reported to U.S. Coast Guard District Three, the Corps of Engineers Philadelphia, and the Marine Charting Division, NOS.

✓HR

See Eval. Rpt

Several mounds were found in the vicinity of latitude 39°06.5'N, longitude 075°10.0'W. These mounds rise as much as five feet above the relatively flat bottom. They were not detected on the prior surveys and do not appear on the chart. This survey agreed well with the prior surveys of the vicinity except for the mounds. Bottom samples in the area were fine sand with broken shells and clay. The chart should be changed to reflect the least depths over the mounds.

✓HR

Of the 393 charted soundings within the project area, 276 (70.2%) agreed with this survey within ± three feet. The following is a list of all the charted soundings which disagree with this survey by over six feet:

LATITUDE 39°N	LONGITUDE 075°W	SURVEY DEPTH (ft) <i>(Uncorrected)</i>	CHARTED DEPTH (ft)	FROM SURVEY
10.00'	18.75'	2	15	H-1581
10.65'	17.55'	33	5	H-1581
10.50'	17.20'	29	3	H-1581
10.20'	17.25'	39	3	H-1581
09.45'	17.15'	19	26	H-1581
06.70'	17.20'	17	10	H-1476
				H-1581
				H-1631
05.75'	17.10'	19	10	H-1631
10.60'	16.85'	6	22	H-1476
10.50'	16.65'	20	8	UNKNOWN
09.75'	16.85'	37	4	H-1581
09.50'	16.60'	31	3	H-1581
09.10'	16.55'	35	28	H-1581
08.70'	16.25'	35	28	H-1581

08.50'	16.85'	18	31	H-1581
08.10'	16.50'	18	35	H-1581
07.65'	16.15'	18	37	H-1581
06.40'	16.30'	18	30	H-1631
06.15'	16.60'	21	14	H-1631
05.90'	16.50'	20	11	H-1631
05.90'	16.85'	14	21	H-1631
05.40'	16.55'	16	9	H-1631
05.35'	16.05'	21	8	H-1631
09.15'	16.25'	21	4	H-1581
08.85'	15.95'	17	6	H-1581
07.25'	15.90'	21	40	H-1631
06.75'	15.50'	30	40	H-1631
05.85'	15.80'	19	29	H-1631
05.35'	15.40'	21	30	H-1631
05.05'	15.90'	14	7	H-1631
04.65'	15.55'	14	4	H-1631
04.10'	15.05'	19	6	H-1631
10.20'	14.60'	13	3	H-1581
07.40'	14.70'	24	11	H-1631
06.95'	14.40'	20	8	H-1631
03.90'	14.70'	20	10	H-1631
06.20'	13.85'	18	7	H-1631
05.80'	13.70'	15	3	H-1476B
05.35'	13.40'	16	6	H-1476B
04.95'	13.90'	49	58	H-1476B
04.10'	13.70'	40	30	UNKNOWN
05.10'	13.25'	15	6	H-1476B
06.60'	14.10'	18	7	H-1631
07.50'	12.60'	24	16	H-1679
06.05'	12.75'	28	21	UNKNOWN
05.80'	12.10'	48	41	H-1476
04.45'	12.65'	21	13	H-1476
06.50'	11.85'	31	38	UNKNOWN
10.50'	10.4'	15	7	H-1581
04.65'	09.45'	18	10	UNKNOWN
09.75'	16.25'	7	14	H-1581
06.80'	16.50'	19	12	H-1476

The majority of the discrepancies appear to be in the vicinity of shoals which have shifted during the hundred years since the previous survey.

Five of the disputed soundings could not be found on any of the prior surveys. These soundings may have been added to the chart by chart letter.

A charted depth of 8 feet is shown as ~~P~~^D at latitude $39^{\circ}10.50'N$, longitude $075^{\circ}16.65'W$. This survey found depths of 15 to 20 feet in the area of this charted sounding. The shoal to the west of this charted sounding has migrated eastward and is covered 8 feet at a distance less than one-tenth mile from

✓HR

he charted sounding. It is recommended that the charted ^D 8 foot sounding be removed from the chart and that soundings from this survey be applied. *CONCUR*
See Eval. Rpt

The chart shows a depth of 30 feet at latitude 39°04.10'N, longitude 075°13.70'W. This survey found a depth of 40 feet. Development of the area with echo sounder did not reveal any sign of shoaling. Prior survey H-1631 found depths of 40 to 43 feet in the area of the charted sounding. It is recommended that the 30 foot sounding be removed from the chart and that soundings from this survey be applied. ✓HR

The chart shows a depth of 21 feet at latitude 39°06.65'N, longitude 075°12.75'W. The survey found a depth of 40 feet. Prior survey H-1476 found depths of 25 to 30 feet in the area of the charted soundings. It is recommended that the 21 foot sounding be removed from the chart and a sounding from this survey be applied. *No 21-ft depth charted.*

A depth of 38 feet is charted at latitude 39°06.50'N, longitude 075°11.85'W. — ? ✓HR
A development of this area found depths of 31 to 33 feet. Prior survey H-1476 found depths of 28 to 32 feet in the area of the charted sounding. It is recommended that the 38 foot sounding be removed from the chart and replaced with a sounding from this survey.

A depth of 10 feet is charted at latitude 39°06.50'N, longitude 075°11.85'W. — ? ✓HR
This survey found depths of 18 to 20 feet in this area. Prior survey H-1632 shows a depth 14 to 16 feet in the area of the charted sounding. It is recommended that the 10 foot sounding be removed from the chart and that soundings from this survey be applied. *No 10-ft depth charted.*

In the case of all discrepancies, the chart was thoroughly disproved and the soundings from this survey should be used. *CONCUR*

M. ADEQUACY OF SURVEY

This survey is complete and adequate to supersede presently charted soundings and prior surveys of the area. It is recommended that presently charted depths be replaced completely with depths from this survey. *CONCUR*

The sunken dangerous wreck symbol at latitude 39°04^B'47.00"N, longitude 075°15'32.00"W, should continue to be charted. Bottom drag investigation of this item was curtailed by weather and shortage of time, and was not adequate to disprove this wreck. *CONCUR* ✓HR

N. AIDS TO NAVIGATION

The following landmarks and fixed aids were verified during the survey:

MIAH MAULL SHOAL LIGHT
FOURTEEN FOOT BANK LIGHT
BRANDYWINE SHOALS LIGHT

FOURTEEN FOOT BANK LIGHT, MIAH MAULL SHOAL LT, AND ELBOW OF CROSS LEDGE LIGHT were located by USC&GS in 1933. Positions for these aids were checked by PEIRCE. PEIRCE determined a 1983 position for ELBOW OF CROSS LEDGE LIGHT and found it to be 0.37 meters west of the published 1933 position.

This light was destroyed in 1947 and rebuilt in the present position in 1954. During hydrographic operations, PEIRCE used the 1933 position. The final signal tapes submitted with H-10084 reflect the 1983 position of the rebuilt structure. The 0.37m difference in position will have no significant effect on the hydrographic data.

The eight U.S. Coast Guard floating aids to navigation within the area of this survey were checked and their positions entered into the hydrographic record. All except "Channel Crossing" buoys one and two (~~Light List number 2155-20~~) were found to be on station. The correct positions for the "Channel Crossing" buoys were marked and the U.S. Coast Guard was notified. After the Coast Guard moved the buoys, the positions were redetermined and entered into the hydrographic record to show the "Channel Crossing" buoys on station. *See Eval. Rpt.*

An underwater cable runs from Fortescue, New Jersey to ELBOW OF CROSS LEDGE LIGHT to power the light. A cable then runs from ELBOW OF CROSS LEDGE LIGHT to MIAH MAULL SHOAL LIGHT along the east side of the channel. The cable does not power MIAH MAULL SHOAL LIGHT because of a break in the line. It is recommended that the cable continue to be charted as shown since the cable still exists. *con cur*

O. STATISTICS

	<u>VESNO</u> <u>3281</u>	<u>VESNO</u> <u>3282</u>	<u>TOTAL</u>
Total Number of Positions	1533	3068	4601
Nautical Miles of Sounding Lines	489.0	486.6	975.6
Square Miles of Hydrography	---	---	61.6
Bottom Samples	36	27	63
Tide Stations	---	---	5
Martek Casts	---	---	7

P. MISCELLANEOUS

Q. RECOMMENDATIONS

It is recommended that the sheet layout be changed to shift the sheet northward to accommodate the area surveyed within a normal sheet width. This survey should be processed as complete. A sheet should be added to the project diagram to cover the area to the east of this survey.

The charted wreck at latitude $39^{\circ}04'47.00''N$, longitude $075^{\circ}15'32.00''W$. (PSR item number 02946) should be assigned as an item investigation when this project resumes. It is also recommended that any side scan sonar assigned for the area covered by this survey be treated as a separate survey. *Reassigned in 1984.* ✓HR

It is recommended that the priority for work on resumption of this project be assigned to the area immediately north of this survey. First priority should include the shoals and channels westward and immediately eastward of the Delaware Bay Main Channel from the junction with this survey northward to junction with the contemporary Delaware River surveys. Lower priorities should be assigned to the near shore areas.

Recommendations are also made in sections L and M of this report.

There is no known plan for construction or dredging in the area which would affect the results of this survey.

R. AUTOMATED DATA PROCESSING

<u>PROGRAM</u>	<u>PROGRAM NAME</u>	<u>VERSION</u>
112	Hyperbolic R/R Hydroplot	8/ 4/81
201	Grid, Signal and Lattice Plot	4/18/81
211	Range/Range Non Real Time Plot	2/ 2/81
300	Utility Computations	10/21/80
330	Reformat and Data Check	5/ 4/76
360	Electronic Corrector Abstract	2/ 2/76
407	Geodetic Inverse/Direct Computation	9/25/78
530	Layer Corrections for Velocity	5/10/76
561	H/R Geodetic Calibration	12/ 1/82
602	ELINORE - Extended Line Oriented Editor	12/ 8/82
612	Line Printer List	3/22/78

S. REFERRAL TO REPORTS

Tide records have been submitted to Tide and Water Levels Branch, Rockville, Maryland. A Coast Pilot report was submitted 2 June 1983. The Horizontal Control report was submitted to Operations Division, Atlantic Marine Center, 16 May 1983.

Respectfully submitted:


MARTIN P. CONRICOTE, LTJG, NOAA

75° 16' 00"

75° 15' 30"

39° 09' 30"

39° 09' 30"

PSR Item 02946

Chain Drag

Scale 1:10,000

Position Overlay

To Accompany H-10084

39° 09' 00"

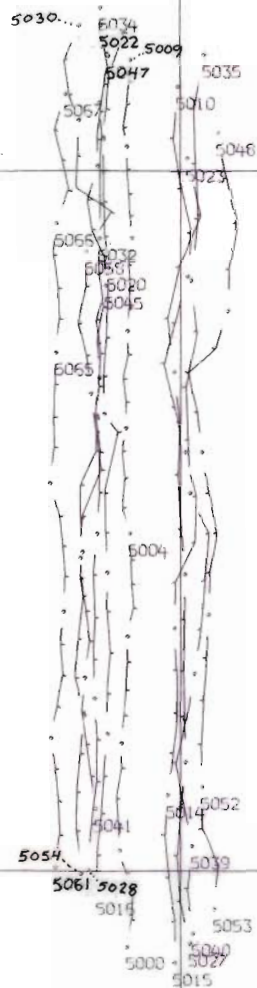
39° 09' 00"

39° 08' 30"

39° 08' 30"

75° 16' 00"

75° 15' 30"



charted submarine wreck

75° 10' 00"

75° 09' 30"

39° 03' 30"

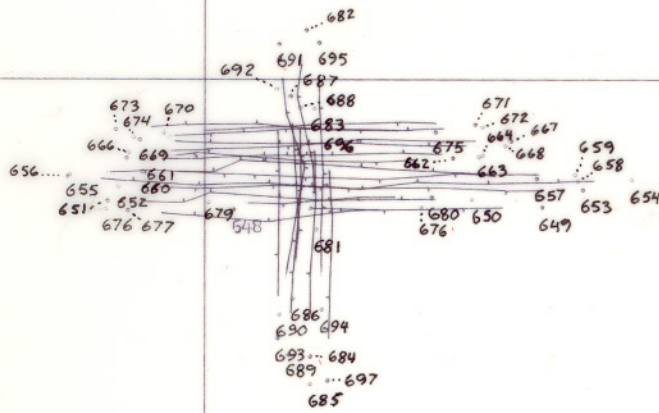
39° 03' 30"

Spike Investigation
Scale 1:10,000
Position Overlay
To Accompany H-10084

Search for obstruction

39° 03' 00"

39° 03' 00"



39° 02' 30"

39° 02' 30"

75° 10' 00"

75° 09' 30"

SIGNAL TAPE LISTING

OPR D-219 PE-83

DELAWARE BAY

003	7	39	07	35539	075	12	32533	250	0021	000000	1983	PE
004	7	39	10	555 ¹⁶ 28	075	16	077 ³² 27	139	0019	000000	1983	PE
005	7	39	02	53294	075	10	57273	139	0018	000000	1933	NGS
007	7	39	07	35526	075	12	32583	139	0018	000000	1933	NGS
009	2	38	59	10030	075	06	48818	139	0018	000000	1932	NGS
021	7	38	59	10057	075	06	48766	250	0023	000000	1983	PE
022	2	39	02	53289	075	10	57348	250	0020	000000	1983	PE
023	2	39	10	5557 ⁹ 8	075	16	07743	250	0020	000000	1983	PE
024	1	39	10	514 ⁸⁹ 91	075	08	16018	250	0020	000000	1983	PE

V DVM

Replaces C&GS Form 567.

TO BE CHARTED
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT
(If field Party, Ship or Office)

NOAA Ship PEIRCE

STATE

DE, NJ

LOCALITY

Delaware Bay

DATE

5 May 83

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

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

ORIGINATING ACTIVITY

- HYDROGRAPHIC PARTY
- GEODETIC PARTY
- PHOTO FIELD PARTY
- COMPILATION ACTIVITY
- FINAL REVIEWER
- QUALITY CONTROL & REVIEW GRP.
- COAST PILOT BRANCH

(See reverse for responsible personnel)

DATUM

NAD 1927

The following objects HAVE BEEN INSPECTED FROM SEAWARD TO DETERMINE THEIR VALUE AS LANDMARKS.

JOB NUMBER

SURVEY NUMBER

DATUM

NAD 1927

METHOD AND DATE OF LOCATION
(See instructions on reverse side)

OFFICE

LATITUDE

LONGITUDE

CHARTS AFFECTED

FIELD

D.M. Meters

D.P. Meters

CHARTS AFFECTED

DESCRIPTION

POSITION

POSITION

CHARTS AFFECTED

FIELD

LATITUDE

LONGITUDE

CHARTS AFFECTED

FIELD

LATITUDE

LONGITUDE

CHARTS AFFECTED

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FIELD

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LONGITUDE

CHARTS AFFECTED

Dep 9 L-614 (02)

All are off smooth sheet, except Elbow of Cross Ledge Lt. and Cross Ledge Shoal Old Lighthouse. (H-10084)

(CROSS LEDGE SHOAL OLD LIGHTHOUSE, 1933) Formerly TOWER (Aband LH) Abandoned LH has been destroyed, only cylindrical base remains.

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

TO BE CHARTED
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT
(Field Party, Ship or Office)

NOAA Ship PEIRCE

STATE

DE, NJ

LOCALITY

Delaware Bay

DATE

5 May 83

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

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

ORIGINATING ACTIVITY

- HYDROGRAPHIC PARTY
 - GEODETIC PARTY
 - PHOTO FIELD PARTY
 - COMPILATION ACTIVITY
 - FINAL REVIEWER
 - QUALITY CONTROL & REVIEW GRP.
 - COAST PILOT BRANCH
- (See reverse for responsible personnel)

The following objects HAVE HAVE NOT been inspected from seaward to determine their value as landmarks.

JOB NUMBER

OPR PROJECT NO.
D219-PE-83

DATUM

NAD 1927

POSITION

METHOD AND DATE OF LOCATION
(See instructions on reverse side)

OFFICE

FIELD

LATITUDE

LONGITUDE

DESCRIPTION
(Record reason for deletion of landmark or aid to navigation.
Show triangulation station names, where applicable, in parentheses)

° /

D.M. Meters

° /

D.P. Meters

//

//

F1 2.5 sec
23 ft 6 M
"9"
Priv.
maintained

(MAIN CHANNEL LIGHT 9, 1983)
New light structure replaced Buoy "9"
L.L.#2099

ST JONES R RED DAY BEACON
Privately maintained: Began to lean after
being located; unsuitable for NGS data base.

F1 4 sec
18 ft 4 M
"11"

MURDERKILL RIVER ENTRANCE APPROACH
LIGHT 1 Rebuilt Apr 1983 Sextant fix
position unsuitable for NGS data base
#2159.70

38 55 20.449 75 06 01.975

39 04 00.610 75 24 18.385

39 03 47.91 75 22 41.78

F-2-6-L
4-5-83 12304

F-2-6-L
3-20-83 12304

F-4-8-L
4-27-83 12304

All are off survey H-10084

Page 8 of 12

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

- TO BE CHARTED
- TO BE REVISED
- TO BE DELETED

REPORTING UNIT
(Field Party, Ship or Office)

NOAA Ship PEIRCE

STATE

DE, NJ

LOCALITY

Delaware Bay

DATE

5 May 83

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

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

ORIGINATING ACTIVITY

- HYDROGRAPHIC PARTY
- GEODETIC PARTY
- PHOTO FIELD PARTY
- COMPILATION ACTIVITY
- FINAL REVIEWER
- QUALITY CONTROL & REVIEW GRP.
- COAST PILOT BRANCH

(See reverse for responsible personnel)

The following objects HAVE HAVE NOT been inspected from seaward to determine their value as landmarks.

DATUM

NAD 1927

SURVEY NUMBER

OPR PROJECT NO.
D219-PE-83

CHARTING NAME

DESCRIPTION

(Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses)

TOWER
(FALSE EGG IS PT WOODEN TOWER, 1933)
Destroyed.

FR 4 sec
15 ft 4 M
"2" PA
Light
Destroyed 1981-replacement by "BLAKE CHN
CROSS BY 2" already noted in DIPFIL file

FI 4 sec
27 ft 6 M
PA
EGG ISLAND POINT LT
Destroyed
1983 L.L. #2131

FI G 4 sec
15 ft 4 M
"1" PA
MAURICE RIVER LT 1
Destroyed
L.L. #2126

POSITION

LATITUDE

LONGITUDE

° / ' " D.M. Meters

39 12 09.060 75 10 04.880

39 02 42 73 13 36

39 09 50 75 08 52

39 08 36 75 06 18

METHOD AND DATE OF LOCATION
(See instructions on reverse side)

OFFICE

FIELD

off survey

Charted pos.
within survey limits

Charted pos.
within survey limits

off survey

CHARTS

AFFECTED

12304

12304

12304

12304

Copy - 614 (1)



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
NOAA Ship PEIRCE S-328
439 West York Street
Norfolk, Virginia 23510

1 May 1983

TO: Chart Information Section N/CG222

Thru: Director, Atlantic Marine Center

FROM: Commanding Officer *Walter J. Simmons*
NOAA Ship PEIRCE S-328

SUBJECT: Dangers to Navigation, Delaware Bay

Numerous changes to charted positions and depths of shoals have been discovered in Delaware Bay, and one obstruction was found in the Brandywine Range of the main channel.

Messages reporting the obstruction and a dangerous shoal covered two feet at mean low water were transmitted to Commander, U.S. Coast Guard District Three. Copies of these messages and a sketch showing the location of the shoal are attached.

Both dangers were discovered during standard hydrographic surveying operations using range/range electronic positioning systems with shore stations located by third order geodetic methods. Water depths are based upon predicted tides using the zoning provided in project instructions OPR-D219-PE-83.

Attachments



PRTTUZYUW RULYTEQ0101 1201230-UUUU--RULYSUU.
ZNR UUUUU
P 301230 APR 83
FM NOAA S PEIRCE
TO CCGDTHREE NEW YORK NY
NOAACAM NORFOLK VA
CM GRNC

A
WS

BT

DANGER TO NAVIGATION IN DELAWARE BAY MAIN SHIP CHANNEL:

OBSTRUCTION COVERED BY 38 FEET OF WATER AT MEAN LOW WATER
DISCOVERED: CHART NO. 12304, LATITUDE 39/02.92 N LONGITUDE
75/09.91 W DISTANCE 0.81 NAUTICAL MILE, BEARING 087.5 DEGREES
TRUE FROM FOURTEEN FT. BANK LIGHT. OBSTRUCTION IS IN RIGHT
OUTSIDE QUARTER OF DELAWARE BAY MAIN CHANNEL, BRANDYWINE RANGE.
BT

✓ HR

NNNN

See Eval Rpt.

0101

TOD: 301552 APR 83
6338.5 KHZ

PTTUZYUW RULYTEQ0102 1201600-UUUU--RULYSUU.
ZNR UUUUU
P 301600Z APR 83
FM NOAA'S PEIRCE
TO CCGD THREE NEW YORK NY
NOAACAM NORFOLK VA
CM GRNC

BT

DANGER TO NAVIGATION IN DELAWARE BAY

SHOAL COVERED BY TWO FEET OF WATER AT MEAN LOW WATER (MLW)
DISCOVERED: CHART NO. 12304, LATITUDE 39/09.95 N. LONGITUDE
075/18.80 W. DISTANCE 2.3 NAUTICAL MILES (4250 METERS).
BEARING 245 DEGREES TRUE FROM ELBOW OF CROSS LEDGE LIGHT.
DISCOVERED SHOAL EXTENDS NORTHWEST 0.6 NAUTICAL MILE TO JOIN
CHARTED SHOAL COVERED BY FOUR FEET AT MLW. DISCOVERED SHOAL
ALSO EXTENDS SOUTHEAST 145 DEGREES TRUE. COVERED BY FOUR FEET
MLW AT DISTANCE 0.5 NAUTICAL MILE, COVERED BY SIX FEET AT MLW
AT DISTANCE 0.8 NAUTICAL MILE AND COVERED BY TEN FEET AT MLW
AT DISTANCE 1.6 NAUTICAL MILES.

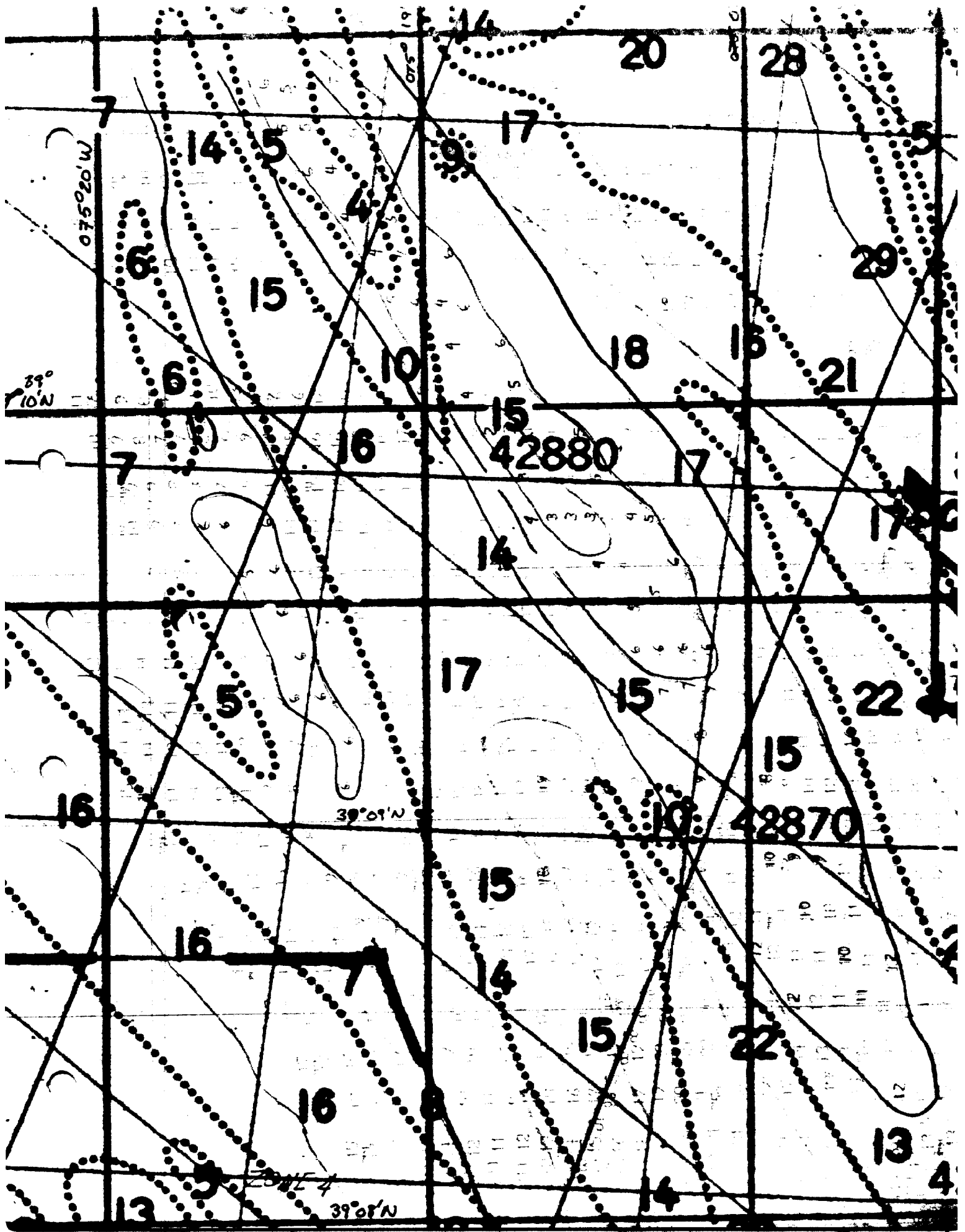
BT

NNNN
0102

US

Based on uncorrected depths

TOD: 301629Z APR 83
6338.5 KHZ
NNNN
[Signature]



ZONE 4

18

10

13

22

26

17

31

14

15

10

5

6



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
ATLANTIC MARINE CENTER
439 West York Street
Norfolk, Virginia 23510

UES
A

February 16, 1983

N/MOA11:KWP

TO: Commanding Officer
NOAA Ship PEIRCE

THRU: Chief, Marine Services Division ^{nx}

FROM: *for* *Charles H. Houlder*
Richard H. Houlder
Director, Atlantic Marine Center

SUBJECT: PMC OORDER APPENDIX M and S: MINI-RANGER III CALIBRATION

During this field season whenever Mini-Ranger III and/or the Falcon 484 is utilized for hydrographic survey projects, PMC OORDER APPENDIX M and S pertaining to Mini-Ranger III calibration will be adhered to.



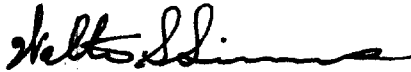
APPROVAL SHEET

H-10084

Fieldwork on this survey was conducted under my supervision with frequent personal examination of the field sheet and records. This report and final field sheet have been reviewed and found to represent a complete and adequate survey, except for investigation of the charted sunken dangerous wreck (PSR item number 02946) at latitude 39°08'47"N, longitude 075°15'32.0"W.

The side scan sonar surveys specified in the project instructions were not conducted because of bad weather, a shortage of time, and the substantial changes found in shoal areas. If side scan sonar coverage is still required, it should be assigned as a separate survey.

This survey should supersede all prior surveys and charted soundings in the common area.



Walter S. Simmons
Commander, NOAA
Commanding Officer
NOAA Ship PEIRCE

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

DATE: March 20, 1986

Marine Center: Atlantic

OPR: D219

Hydrographic Sheet: H-10084

Locality: Delaware Bay

Time Period: April 6-May 4, 1983

Tide Station Used: 855-4399 Mahon River Entrance, DL
855-5388 Murderkill River Entrance, DL

Plane of Reference (Mean Lower Low Water): 855-4399 = 1.68 ft.
855-5388 = 2.71 ft.

Height of Mean High Water Above Plane of Reference:

855-4399 = 5.8 ft.

855-5388 = 5.1 ft.

Remarks: Recommended Zoning:

A) East of Longitude 75°10.0'

1. North of latitude 39°07.0' zone on 855-4399 and apply a -25 minute time correction.
2. South of 39°07.0' zone on 855-5388 and apply a -30 minute time correction and x 1.06 range ratio.

for Brian K. Curran
Chief, Tidal Datum Quality
Assurance Section

March 20, 1986

PAGE 2

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

H-10084

- B) West of $75^{\circ}10.0'$ to $75^{\circ}15.0'$
1. North of $39^{\circ}05.0'$ zone on 855-4399 and apply a -20 minute time correction and x 0.98 range ratio.
 2. South of $39^{\circ}05.0'$ zone on 855-5388 and apply a -20 minute time correction and x 1.06 range ratio.
- C) West of $75^{\circ}15.0'$ to $75^{\circ}20.0'$
1. North of $39^{\circ}05.0'$ zone on 855-5388 and apply a -10 minute time correction and x 0.98 range ratio.
 2. South of $39^{\circ}05.0'$ zone on 855-5388 and apply a -10 minute time correction and x 1.04 range ratio.
- D) West of $75^{\circ}20.0'$
1. North of $39^{\circ}07.0'$ zone direct on 855-4399.
 2. South of $39^{\circ}07.0'$ zone direct on 855-5388.

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NO.: H-10084

Number of positions	2775
Number of soundings	17752
Number of control stations	10

	<u>TIME-HOURS</u>	<u>DATE COMPLETED</u>
Preprocessing Examination	19	6 FEB 84
Verification of Field Data	260	6 MAR 85
Quality Control Checks	72	
Evaluation and Analysis	34	31 JAN 86
Final Inspection		6 FEB 86
TOTAL TIME	389	
Marine Center Approval		19 MAR 86

Transmittal letter of survey and survey records will be included in the Descriptive Report to identify the records accompanying the survey.

GEOGRAPHIC NAMES

H-10084

Name on Survey	Source of Name										
	A	B	C	D	E	F	G	H	K		
	ON CHART NO.	ON PREVIOUS SURVEY NO.	CON U.S. QUADRANGLE MAPS	FROM LOCAL INFORMATION	ON LOCAL MAPS	P.O. GUIDE OR MAP	GRAND McNALLY ATLAS	U.S. LIGHT LIST			
BLAKE CHANNEL											1
CROSS LEDGE											2
DELAWARE BAY											3
EGG ISLAND FLATS											4
ELBOW OF CROSS LEDGE											5
FOURTEEN FOOT BANK											6
JOE FLOGGER SHOAL											7
MIAH MAULL SHOAL											8
NEW JERSEY (title)											9
THE LOWER MIDDLE											10
											11
											12
											13
											14
											15
											16
											17
											18
											19
											20
											21
											22
											23
											24
											25

Approved:

Chas. C. Harrington
Chief Geographer - N 1062.5

JAN 27 1986

ATLANTIC MARINE CENTER
EVALUATION REPORT

REGISTRY NO.: H-10084

FIELD NO.: PE-20-2-83

Delaware--New Jersey, Delaware Bay, Fourteen Foot Bank to Cross Ledge

SURVEYED: April 6 through May 3, 1983

SCALE: 1:20,000

PROJECT NO.: OPR-D219-PE-83

SOUNDINGS: Ross Model 5000 Finline
Echo Sounder

CONTROL: Mini-Ranger (Motorola)
(Electronic Range-Range)

Chief of Party W. S. Simmons

Surveyed by M. P. Conricote
..... R. M. Mandzi
..... N. G. Millett
..... R. B. Harris
..... S. I. Andreeva

Automated Plot by Xynetics 1201 Plotter (AMC)

1. INTRODUCTION

- a. There were no unusual problems encountered on this survey.
- b. Changes in the Descriptive Report were made in red during office processing.

2. CONTROL AND SHORELINE

- a. No shoreline has been shown on the smooth sheet because this is an offshore survey.
- b. The source of control is adequately described in the Descriptive Report.

3. HYDROGRAPHY

- a. Depths at crossings are in good agreement.
- b. The standard depth curves are adequately delineated. The 3-foot depth curve, brown curves, and some dashed curves were added during verification to emphasize shoal features.
- c. The development of the bottom configuration and the determination of least depths are considered adequate.

4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records, and reports comply with the requirements of the Hydrographic Manual. However, split lines and axis lines should have been run over the major shoals in areas of 200-meter line spacing.

5. JUNCTIONS

An adequate junction was effected with H-10079 (1983) on the west. A partial butt junction was effected on the south with H-9202 (1971) where differences of 1 to 4 feet were noted. These differences are considered to have been caused by the shifting of sand due to currents and storms.

No contemporary surveys junction with the present survey on the north or east. However, present depths are in general harmony with charted depths in those areas.

6. COMPARISON WITH PRIOR SURVEYS

- a. H-118 (1842-43) 1:20,000
- H-122 (17842) 1:20,000
- H-123 (1842) 1:20,000
- H-124 (1841) 1:20,000
- H-148 (1841-43) 1:80,000
- H-299 (1852) 1:10,000
- H-352 (1852) 1:20,000

These surveys taken together cover the entire area of the present survey, and are prior to the construction of a Federal Channel Project. A comparison of prior soundings with present depths reveals significant differences that are attributed to natural causes and methods of surveying. A few charted depths originate from these surveys. However, due to bottom changes in the area, the prior soundings are considered no longer valid. The present survey is adequate to supersede the prior surveys within the common area.

- b. H-1475b (188) 1:20,000
- H-1476a (1880) 1:20,000
- H-1476b (1880) 1:10,000
- H-1581 (1882-83) 1:20,000
- H-1631 (1884) 1:20,000
- H-1632 (1884) 1:20,000
- H-1679 (1885) 1:20,000

These prior surveys taken together cover the common area of the present survey, and are prior to dredging and spoiling created by construction of a Federal Channel Project. The most recent surveys in the area were conducted almost 100 years ago. A comparison between present and prior depths reveals variable differences of less than 9 feet, caused in part by methods of surveying and by sedimentation and scouring of tidal currents. The major shoals have remained relatively stable in position and depth but the two shoals on the western edge of the survey have accreted southeasterly about a mile.

The southern part of Joe Flogger Shoal has generally deepened as much as 7 feet, while Blake Channel to the west has shoaled 8 to 9 feet. General depths of 20 to 23 feet in the area of Fourteen Foot Bank are presently 4 to 7 feet shoaler which apparently has been created by the dumping of spoil. Lesser isolated shoals in the northeast part of the survey are 1 to 2 feet shoaler and are slightly larger in extent than on the prior survey.

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

7. COMPARISON WITH CHART 12304 (28th Edition, April 17, 1982)

a. Hydrography

The charted hydrography originates with the previously discussed prior surveys which require no further consideration, supplemented by miscellaneous sources.

The dangerous submerged wreck (AWOIS 02946) at latitude $38^{\circ}08'47''$ ⁹N, longitude $75^{\circ}15'32''$ W from Notice to Mariners 28 of 1962 was not fully investigated. Additional work was recommended for this item and it was reassigned to Project Instructions OPR-D219-PE-84. The wreck should be retained on the chart. ✓HR

The isolated 8-foot depth, PD charted at latitude $39^{\circ}10.5'$ N, longitude $75^{\circ}16.65'$ W from a miscellaneous source falls in depths of 13 to 15 feet on the present survey. The position of this depth was probably reported in error as comparable depths on the present survey are 150 meters to the westward. This depth is considered discredited by the present survey and should be deleted from the chart. ✓HR

A dangerous obstruction covered by 38 feet of water, charted on the 1983 edition of chart 12304 in latitude $39^{\circ}02.9'$ N, longitude $75^{\circ}09.9'$ W, lies in the right outside quarter of the dredged channel. This obstruction was reported by the hydrographer through Local Notice to Mariners 18 of 1983. This depth is the same as adjacent depths along the channel's edge. As a specific obstruction was not identified, the 38-foot depths inside the channel are considered evidence of shoaling. A U.S. Army Corps of Engineers survey conducted in June 1983, one month after the completion of H-10084, reported a controlling depth of 39.7 feet at MLW in this area. It is recommended that this feature be expunged from the chart. ✓HR

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

b. Controlling Depths

The table of controlling depths along the ranges covered by the present survey is based on U.S. Army Corps of Engineers information of December 1981. These depths are in agreement with the present survey depths, except in the right outside quarter of Brandywine Range. Here, 38-foot soundings fall in an area reported to have a controlling depth of 39.6 feet at MLW. ✓HR

c. Aids to Navigation


The aids to navigation on the present survey are in substantial agreement with their charted positions and adequately mark the features intended. Channel Crossing Light "2," PA charted at latitude 39°02.7'N, longitude 75°13.6'W was reported to have been discontinued in Local Notice to Mariners 34 of 1982. The hydrographer reported this light to have been destroyed in 1981. Channel Crossing Buoy "2" is presently located at this position. Egg Island Point Light, PA charted at latitude 39°09.82'N, longitude 75°08.85'W was reported by the hydrographer to have been destroyed. The Aids to Navigation Unit in Rockville was informed by the evaluator of the reported status of these lights.


8. COMPLIANCE WITH INSTRUCTIONS

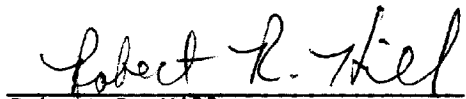
This survey adequately complies with the project instructions.

9. ADDITIONAL FIELD WORK

This is a good basic survey and no additional field work is recommended, except AWOIS item 02946 which was reassigned to Project Instructions OPR-0219-PE-84 in 1984.


Douglas V. Mason
Cartographic Technician
Verification of Field Data



George K. Myers
Chief, Standards Section (N/CG242)
Hydrographic Surveys Branch
Evaluation and Analysis


Robert R. Hill
Senior Cartographic Technician
Verification Check

Certification of Digital Data
H-10084

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, sounding and digitized data printouts of the survey have been made.


Certified: 20 May 1986


Robert G. Roberson
Chief, Evaluation and Analysis Group

Inspection Report
H-10084


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 survey complies with National Ocean Service (NOS) requirements except as noted in the Evaluation Report. The survey records comply with NOS requirements except where noted in the Evaluation Report. Descriptions of triangulation stations and fixed aids to navigation are to be added to the smooth sheet by the verifier after evaluation and inspection.

Inspected



Dale E. Westbrook
Deputy Chief, Hydrographic Surveys
Branch (N/CG24x1)

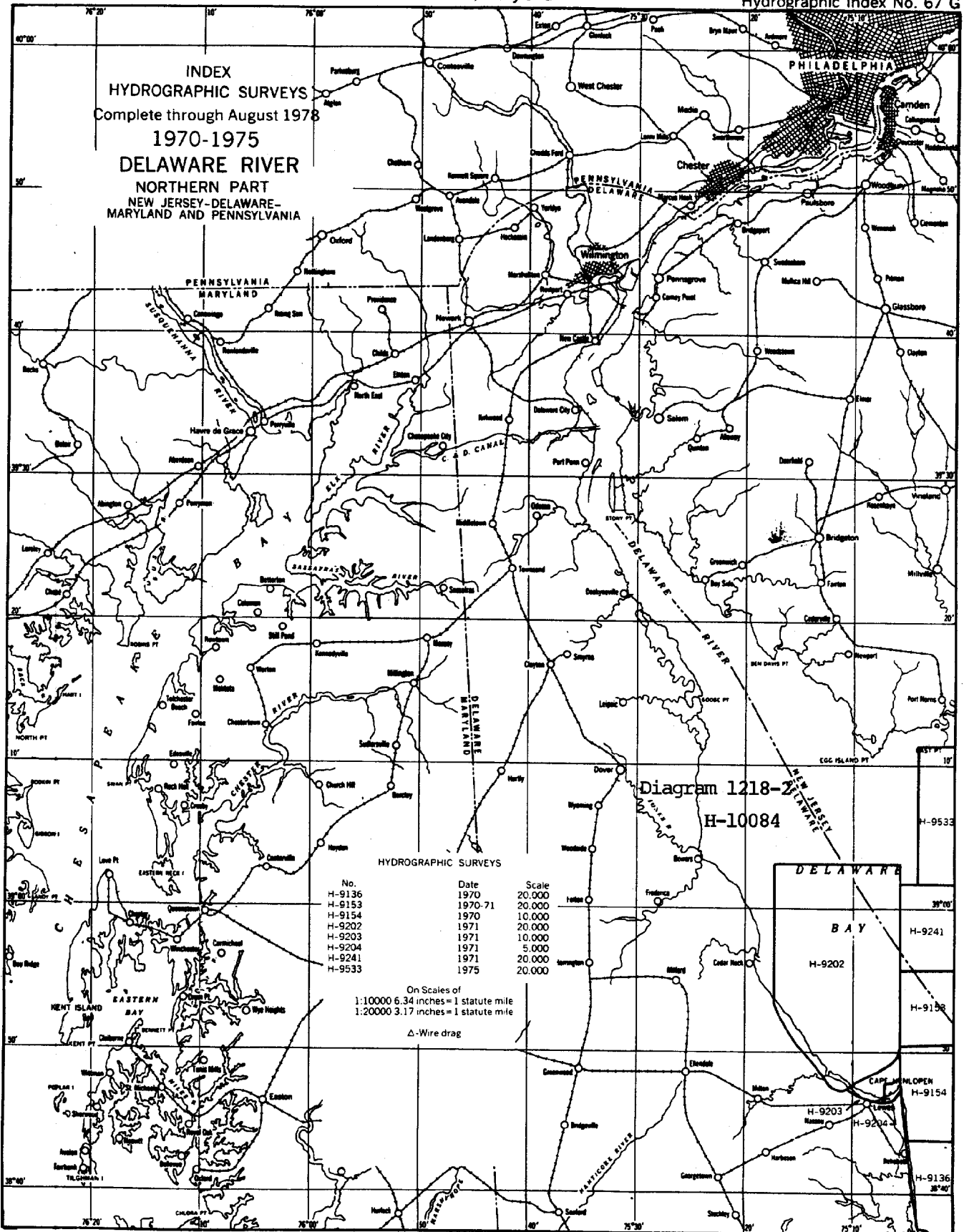
Approved



Wesley V. Hull, RADM, NOAA
Director, Atlantic Marine Center

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

Hydrographic Index No. 67 G



INDEX
HYDROGRAPHIC SURVEYS
Complete through August 1978
1970-1975
DELAWARE RIVER
NORTHERN PART
NEW JERSEY-DELAWARE-
MARYLAND AND PENNSYLVANIA

Diagram 1218-2
H-10084

HYDROGRAPHIC SURVEYS

No.	Date	Scale
H-9136	1970	20,000
H-9153	1970-71	20,000
H-9154	1970	10,000
H-9202	1971	20,000
H-9203	1971	10,000
H-9204	1971	5,000
H-9241	1971	20,000
H-9533	1975	20,000

On Scales of
1:10000 6.34 inches = 1 statute mile
1:20000 3.17 inches = 1 statute mile

△-Wire drag

MARINE CHART BRANCH
RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10084

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
12304	5-14-87	H. Redders	Full Part After Marine Center Approval Signed Via
			Drawing No. 55
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
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