H10741

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-10-03-97

Registry No. H-10741

LOCALITY

State NORTH CAROLINA

General Locality NORTH ATLANTIC OCEAN

Sublocality ENTRANCE TO CAPE FEAR RIVER

19 97

CHIEF OF PARTY

CDR M. R. KENNY, NOAA

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DATE MAY 8 1998

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NOAA FORM 77-28
(11-72)

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

REGISTRY NUMBER:

H-10741

HYDROGRAPHIC TITLE SHEET

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

FIELD NUMBER:
WH-10-03-97

State: North Carolina

General locality: North Atlantic Ocean

Locality: Entrance to Cape Fear River

Scale: 1: 10,000 Date of survey: 20 April - 24 June 1997

Instructions dated: 03 May 1996, 25 February 1997, 11 April 1997 Project Number: OPR-G309-WH

Vessel: NOAA Ship Whiting S-329

Chief of Party: CDR Maureen R Kenny

Surveyed by: M.R. Kenny, E.B. Christman, H.E. Orlinsky, R.C. Jones, J.D. Garte, U.L. Gardner, K.B. Shaver, F.R. Cruz, P.G. Lewit, D.B. Pattison, B.C. Armbruster

Soundings taken by echo sounder, hand lead-line, or pole: DSF 6000N fathometer

Graphic record scaled by: WHITING personnel

Graphic record checked by: WHITING personnel

Protracted by: N/A Automated plot by: Zeta 936 Plotters, HP 7500C (Field) ~~Encad Nova Jet III (AHB)~~ Hewlett Packard Design Jet 350C (AHB)

Verification by: Hydrographic Surveys Branch Personnel

Soundings in: Feet: ✓ Fathoms: ~~Meters:~~ (*) at MLW: MLLW: (*):

Remarks: Basic Hydrographic and 200% Side Scan Sonar coverage of Survey H-10741

Time zone used: 0 (UTC)

Horizontal Datum: NAD 83

Notes in The Descriptive Report were made in Red During Office Processing.

AWOIS and SURF ~ 4/98 RWD

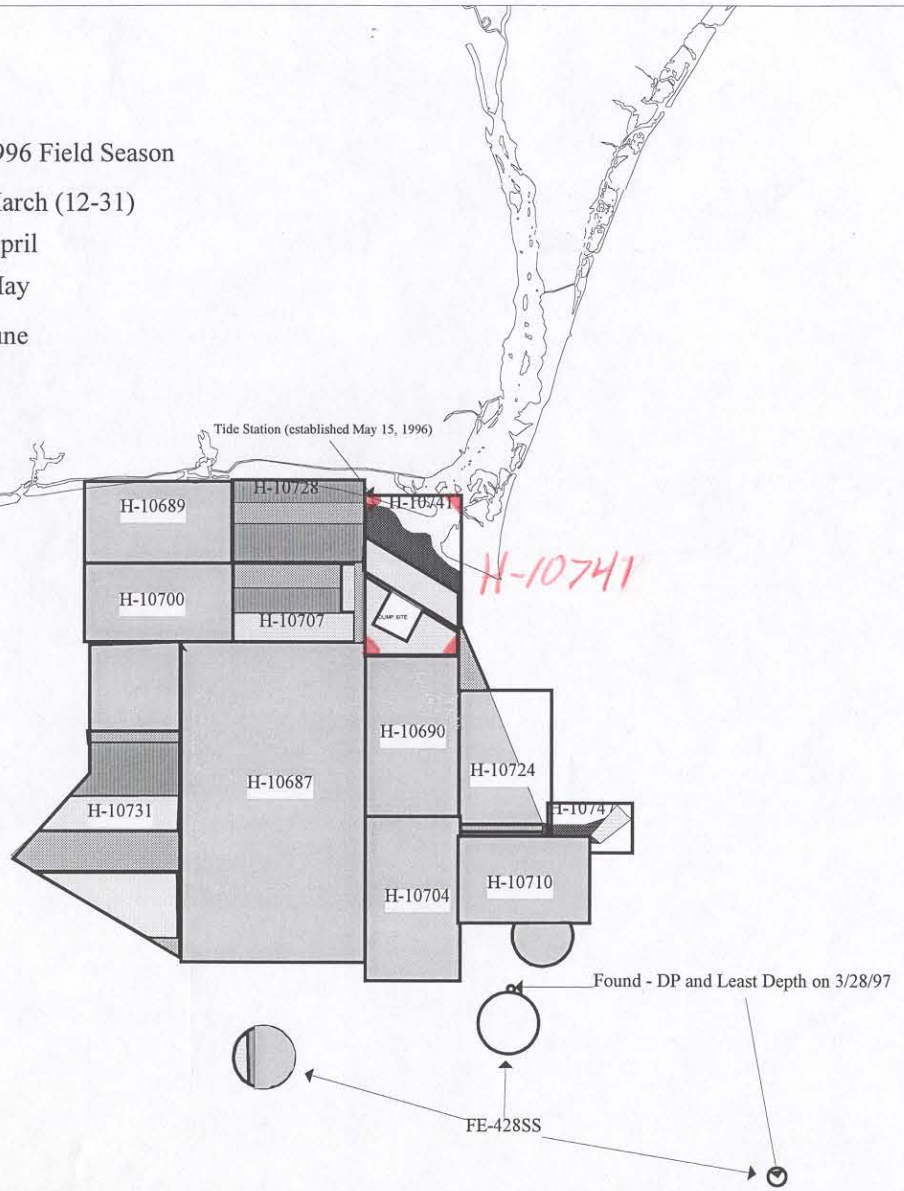
PROGRESS SKETCH - June 1997
OPR-G309-WH-96
Approaches to Wilmington,NC
NOAA Ship WHITING
CDR Maureen R. Kenny, CMDG.

1996 Field Season
March (12-31)
April
May
June

Accomplished	Mar	April	May	June
LNM Hydro	151	89	113	239
LNM SSS	655	952	1283	447
Sq NM Surveyed	28.3	39.3	51.7	13.3
AWOIS Items	2	0	0	8
Dives	2	8	7	44
Bottom Samples	19	26	7	35

Downtime_Hrs	Mar	April	May	June
Weather	137	280	72	60
Electronics	6	15	17	18
Mechanical	24	9	2	1
Other	0	10	0	0

Reg_No	Started	Est_Complete	Complete	Submitted
H-10731	10/23/96	6/18/97	100%	7/1/97
H-10707	3/18/97	6/12/97	100%	7/1/97
H-10728	3/20/97	6/10/97	100%	7/11/97
H-10741	4/20/97	6/18/97	100%	7/11/97
H-10747	5/5/97	6/18/97	100%	7/11/97



DESCRIPTIVE REPORT TO ACCOMPANY
HYDROGRAPHIC SURVEY
OPR-G309-WH
WH-10-03-97
H-10741

NOAA SHIP WHITING
CDR Maureen R. Kenny, NOAA
Commanding Officer

A. PROJECT

The purpose of this project is to provide contemporary hydrographic survey data to update nautical charts of the approaches to Wilmington, North Carolina. The project is being conducted in response to requests from the United States Coast Guard(USCG), the United States Army Corps of Engineers (USACE), the North Carolina State Ports Authority, and the Wilmington-Cape Fear Pilots Association. Project OPR-309-WH consists of 14 sheets.

This survey is designated as "E" sheet, field sheet number WH-10-03-97, and registry number H-10741. Survey Operations were conducted according to the Hydrographic Project Instructions OPR-G309-WH dated May 3, 1996, Change No. 1 dated February 25, 1997 and Change No. 2 dated April 11, 1997. In addition, permission was obtained by telephone from the Chief of the Hydrographic Surveys Division to acquire side scan sonar coverage in to the 30 foot depth curve. Echo sounder only was sufficient in shoaler depths.

B. AREA SURVEYED

Hydrographic survey H-10741 is located at the entrance to Cape Fear River, North Carolina.

E sheet coordinates:

SW corner	33° 47' 06" N	78° 04' 39" W
NW corner	33° 53' 57" N	78° 04' 39" W
NE corner	33° 50' 41" N	77° 59' 31" W
SE corner	33° 47' 06" N	77° 59' 31" W

Survey operations began April 20, 1997 and concluded on June 24, 1997. The inshore limit of the survey is the 5 meter (18 foot) depth curve. As allowed for in Change No. 2, no survey data were acquired within the active dumpsite at the following coordinates:

S corner 33° 47' 18" N, 78° 02' 46" W
W corner 33° 48' 35" N, 78° 01' 58" W
N corner 33° 49' 31" N, 78° 03' 05" W
E corner 33° 48' 19" N, 77° 01' 37" W

Due to time constraints, only echo sounder data were acquired north of a line extending from 33° 53' 31"N, 78° 04' 44"W to 33° 48' 52"N, 77° 59' 28" W. South of that line both echo sounder and 200% side scan sonar coverage were acquired.

C. SURVEY VESSELS

NOAA Ship WHITING-329, launch 1015 and 1014 are designated in HYPACK as 2930, 2931 and 2932, respectively. These vessels were used for main scheme echosounder and side scan sonar data acquisition, main scheme echosounder splits, developments, sound velocity casts, AWOIS investigations, crosslines, bottom samples, detached positions and dive operations. No unusual problems or equipment configurations were encountered.

D. AUTOMATED DATA ACQUISITION AND PROCESSING See Also Evaluation Report.

Survey data acquisition was accomplished using standard PC's with Coastal Oceanographics' HYPACK software, version 6.4. Pre-survey and data processing was accomplished by using a combination of HPS software and MAPINFO software version 4.1. Sound velocity corrections were determined using *CAT* version 3.00 and *VELOCITY* version 3.00. The DGPS stations were checked using *MONITOR* version 3.0. The MOD III Diver Least Depth Gauge was checked using the *DAILYDQA* program. There were no nonstandard automated acquisition or processing methods used.

E. SIDE SCAN SONAR EQUIPMENT

Side scan sonar (SSS) operations were conducted using an EG&G model 260-TH slant-range corrected SSS recorder and an EG&G 272-T dual-channel towfish. The towfish was operated on the 100 kHz frequency and configured with a 20° beam depression. The following equipment was used:

Vessel	Type	S/N	DN
2930	Towfish	11904	110-121
		16697	121-175
	Recorder	16942	110-175
2931	Towfish	20642	110-175
	Recorder	16671	110-121
		16669	121-175
2932	Towfish	20642	110-175
	Recorder	16946	110-175

On NOAA Ship WHITING, the SSS towfish was deployed from a Reuland winch using one of two armored cables on an A-frame on the stern. The armored cable was connected to the SSS recorder by a slip-ring assembly. On launches 1014 and 1015, the SSS towfish was deployed using a Superwinch with an adjustable davit arm on the stern. The SSS towfish was towed with a vinyl-coated Kevlar cable and was connected to the recorder by a slip-ring assembly.

This survey required 200% side scan sonar coverage in depths greater than 30 feet. Proper coverage was achieved by running main scheme lines with either 80-meter line spacing at the 100-meter range scale, 57-meter line spacing at the 75-meter range scale, and 30-meter line spacing at the 50 meter range scale. This line spacing provided for proper overlap as required by Field Procedures Manual, section 7.3.2.2. Adequate coverage was ensured by plotting alternate main scheme lines on 'A' and 'B' swath plots and verifying 100% coverage on each plot.

The towfish was maintained at a height off the bottom of 8-20 percent of the range scale. Side scan operations were limited to a speed-over-ground of 4-6 knots. Confidence checks were accomplished by noting changes in linear bottom features extending to the outer edges of the sonargram, by passing aids to navigation, or by towing the fish near a known contact.

Contacts were measured off the sonargram and entered in the HPS contact table. Using the contact utility program, WHITING hydrographers determined contact heights, positions, and correlations to other contacts. Analysis was done on overlapping SSS records to verify contacts. Contacts appearing significant were further investigated by SSS development and then by divers if deemed necessary. Least depths were determined by a MOD III Diver Least Depth Gauge (S/N 68332) and final positioning of significant items was determined by taking detached positions on diver-placed buoys.

F. SOUNDING EQUIPMENT

Raytheon Digital Survey Fathometer (DSF-6000N) echosounders were 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) depths. The high and low frequency digital depths were recorded by the HYPACK acquisition system. The high frequency depths were selected as the primary depths and were used for plotting. All echograms were scanned for significant features and any significant features that were not selected as primary soundings were manually inserted.

The following fathometers were used:

Vessel	S/N	DN
2930	B046N	110-175
2931	A116N	110-115
	A110N	115-175
2932	A108N	110-175

Electronic technicians did accuracy checks and preventive maintenance on all of the DSF-6000N echosounders used in surveying.

Least depths on diver investigations in the survey area were acquired by using the MOD III Diver Least Depth Gauge (S/N 68332).

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 and S/N 1060). The CTD profilers were calibrated on January 2, 1997. The Seacat calibration records are included in the Separates, section IV. *

A corrector table was generated for the ship (vessel number 2930) for each velocity cast taken. Additionally, a corrector table was generated for the launches (vessel numbers 2931 and 2932). The following table shows the dates, locations and the table depths of each velocity cast that was applied to the data collected in this survey area:

DN	Velocity Table #	Latitude	Longitude	Depth
107	70 (launches)	33° 49' 36" N	078° 06' 03" W	18.0 m
111	76 (dives)	33° 48' 54" N	078° 06' 21" W	16.2 m(dives)
124	82 (ship)	33° 47' 39" N	078° 04' 01" W	18.9 m
124	83 (launches)	33° 47' 39" N	078° 04' 01" W	18.9 m

* Data filed with Field Records.

DN	Velocity Table #	Latitude	Longitude	Depth
149	92 (ship)	33° 47' 24" N	078° 07' 36" W	16.5 m
149	93 (launches)	33° 47' 24" N	078° 07' 36" W	16.5 m
161	95 (dive)	33° 53' 42" N	078° 04' 02" W	07.4 m (dives)
167	98 (ship)	33° 47' 18" N	078° 03' 12" W	16.7m
167	99 (launches)	33° 47' 18" N	078° 03' 12" W	16.7m
175	03 (ship)	33° 46' 45" N	078° 03' 07" W	19.6m
175	04 (launches)	33° 46' 45" N	078° 03' 07" W	19.6m

Each cast was processed and corrector tables generated using *CAT* version 3.00 and *VELOCITY* version 3.00. The velocity corrcctors were manually entered into an HPS velocity table where correctors were applied to both the high and low frequency beams during data processing. Velocity profile data are included in the Separates, section IV. ✱

Data Quality Assurance (DQA) for the Seacat CTD profilers was checked by using a hydrometer and a thermometer to measure the density and temperature of a surface water sample taken during the CTD cast. The *CAT* program compared these values to the Seacat's surface values and confirmed that the Seacat was working properly. WHITING hydrometers were calibrated on March 3, 1997. Correctors were then applied to the hydrometer readings.

There were no variations in instrument initials.

The *DAILYDQA* program, with data from the ship's barometer, was used to assure that the MOD III Diver Least Depth Gauge was working properly. Daily results fell within specified operating ranges. CTD casts were used in the *SMLGAUGE* program to calculate a least depth.

The static draft correction for launches 1014 and 1015 is 0.55 meters, and was measured on July 28, 1993. The corrector was entered into HPS Offset Tables 2✱ and 1✱ respectively. The correction for static draft for WHITING is 3.2 meters, a historical value which WHITING divers confirmed with a MOD III Diver Least Depth Gauge on May 11, 1995. The corrector was entered into Offset Table 9✱ Static draft correctors were applied during data processing for each survey platform.

Settlement and squat values for launch 1014 were determined on March 7, 1997, and were entered into HPS Offset Table 2✱ Settlement and squat values for launch 1015 were determined on March 10, 1997, and were entered into HPS Offset Table 1✱ Settlement and squat values for WHITING were determined on March 26, 1996, and were entered into HPS Offset Table 9✱ The settlement and squat correctors were applied to the sounding data in real time for each survey platform. Offset tables are included in the Separates, section II ✱

Heave correctors for data acquired by WHITING, launch 1014, and launch 1015 were determined by a TSS Dynamic Motion Sensor DMS-05. The HYPACK data acquisition computer logged and applied these calculations in real-time. Serial numbers for these sensors were as follows:

✱ Data filed with field Records.

VESSEL	SN
2930	2066
2931	2062
2932	2068

The tidal datum for this project was Mean Lower Low Water (MLLW). The operating tide station at Springmaid Pier, North Carolina (866-1070) served as the reference station for predicted tides. The back-up water level sensor was located at Yaupon Beach, North Carolina (865-9182) and was maintained by WHITING. Tidal data used during data acquisition were based on Table 2 of the East Coast of North and South America Tide Tables. Digital tidal data were received on floppy disk from N/CS33, Hydrographic Surveys Branch, and applied in HPS to the digital data during data processing. A request for smooth tide data was submitted to Product Services Branch, Datum Section, on June 30, 1997.* Approved Tides and Zoning were Applied During Office Processing.

Time and height correctors used for this survey are as follows:

Time Correction	00 hrs 00 mins
Height Ratio	x 0.97

Bar checks were performed on launch 1014 and 1015 on April 24, 1997 (DN 114). No corrections to soundings were needed. Copies of the bar and lead-line check data are included in the Separates, section IV.*

Lead line comparisons were performed on WHITING on April 3, 1997 (DN 093) and on June 5, 1997 (DN 156). Weather and sea conditions were calm and proved ideal for performing the lead line comparisons. In both cases, the results showed excellent agreement with DSF-6000N high frequency depths averaging 0.04 meters deeper than lead line depths. No corrections to soundings were needed. Copies of the lead line comparison data are included in the Separates, section IV.* Lead lines used were calibrated on February 11, 1997, and the calibration confirmed that lead line error was negligible.

H. CONTROL STATIONS

See also Evaluation Report

The horizontal datum for this project is the North American Datum of 1983 (NAD 83). The source of differential correctors were USCG maintained Differential Global Positioning System (DGPS) stations at Fort Macon, North Carolina and at Charleston, South Carolina. Positions obtained from USCG reference listings are:

Station	**Latitude**	**Longitude**
Charleston USCG DGPS Beacon	32° 45' 27.214" N	079° 50' 34.335" W
Fort Macon USCG DGPS Beacon	34° 41' 50.600" N	076° 40' 59.224" W

* Data Filed with Field Records.

WHITING used *MONITOR* 3.0 to verify station positions and to check for multipath in the area. The digital data obtained from the *MONITOR* 3.0 program were forwarded to N/CS31 in September 1996. Scatter plots and histograms can be found in Separates Section III. *

I. HYDROGRAPHIC POSITION CONTROL

DGPS was used as the navigation system for this survey. Both launches and the ship used an Ashtech Sensor GPS receiver with a CSI MBX1 beacon receiver supplying correctors for DGPS navigation. Ashtech receivers were initialized by HYPACK and the CSI MBX1's were preset to the appropriate station and frequency.

DGPS positioning was accomplished according to the Field Procedures Manual, section 3.4. The HDOP limit for a 1:10,000 scale survey using the Charleston and Fort Macon stations is 3.2. No position flyers were encountered. All suspect positions (high HDOP, DR'd positions, high EPE) were examined for reliability. Questionable positions were either smoothed or rejected and annotated on the on-line printout.

The serial numbers of the Ashtech Sensor and CSI MBX1 receivers on the data acquisition platforms are as follows:

Vessel	Device	Serial Number
2930	Ashtech Sensors	700417B1203 (system A)
		700417B1191 (system B)
	CSI MBX1	X-1318 (system A)
		X-1081 (system B)
2931	Ashtech Sensor	700417B1194
	CSI MBX1	X-1088
2932	Ashtech Sensor	700417B1055
	CSI MBX1	X-1079

DGPS performance checks on NOAA Ship WHITING were determined by using *SHIPDIM* version 1.2. The position determined using correctors from the Charleston DGPS tower was compared with the position determined using correctors from the Fort Macon DGPS beacon using two independent DGPS systems. *SHIPDIM* routinely showed the positions given by the two systems to be within 2-3 meters of each other.

DGPS performance checks for launch 1014 and 1015 were conducted with the launches secured in the WHITING davits using correctors from the Charleston DGPS tower. Simultaneous HYPACK positions were compared with WHITING. An offset in distance and azimuth was then calculated between the ship and launch system. A summary of the DGPS performance checks is included in the

* Data filed with Field Records.

Separates, section III. All DGPS performance checks confirmed that the equipment was working properly.

DGPS antenna offsets were measured on March 19, 1993, for WHITING. Offsets and laybacks were measured using the high frequency echosounder transducer as the reference. DGPS antennae were reinstalled on launches 1014 and 1015 on April 2, 1996, directly over the echosounder transducers. Antenna heights were also measured on the same respective dates shown above, using the water line as the reference and were verified February 7, 1997. The offsets and laybacks were recorded in HYPACK initialization files and in tables 1, 2 and 9 in HPS. A minimum of four satellites was used during survey H-10741 (1:10,000) providing altitude unconstrained positioning.

Offset, layback, and height corrections for launch 1014 and 1015's SSS aft towing booms were measured on July 28, 1993, and verified on April 5, 1994. These were recorded in tables 2 and 1. All offset, layback, and height data were applied by HYPACK on-line. Offset, layback, and height for WHITING's SSS towfish A-frame was measured on July 27, 1992, using the forward high frequency transducer as the reference. The offset and layback correctors were adjusted slightly on March 11, 1997, due to a small shift of the A-frame. Correctors were recorded in Offset Table 9.

J. SHORELINE See also Evaluation Report.

Comprehensive shoreline verification was not conducted. No significant changes to charted shoreline were found.

K. CROSSLINES

A total of 66 nautical miles of cross lines, or 9.8% of the main scheme mileage, was run on H-10741. Agreement between main scheme and cross line soundings is adequate. Overall, crossline soundings agree with main scheme soundings to within 0.2 meters. A few soundings differ by 0.6 meters. Differences were randomly shoal and deep with no noticeable trends.

L. JUNCTIONS See also Evaluation Report.

Survey H-10741 junctions with five complete surveys H-10707(Sheet "D", 1:10,000 1997); H-10724(Sheet "J", 1:10,000 !996); H-10728(Sheet "B"1:10,000 1997); H-10690(Sheet "H" 1:10,000 1996); H-10687(Sheet "G" 1:20,000 1996). Agreement between overlapping soundings at the junctions is within 0.2 meters. Differences were random with no noticeable trends.

M. COMPARISONS WITH PRIOR SURVEYS See also Evaluation Report.

Comparisons with prior surveys were done in the northeast section of the sheet where echo sounder

Data filed with Field Records.

data only were acquired. The results are as follows:

H-9359 (1973-1974 1:10,000) and H-9115 (1970 1:20,000 unreviewed) were the most recent surveys that covered ~~the majority~~ sheet E. Overall soundings tended to be deeper than the prior within 2-3 feet except in the dumpsite and artificial reef. The area around the channel showed the greatest change with some soundings differing by 5-10 feet deeper.

N. ITEM INVESTIGATIONS ~~See also Evaluation Report.~~

The following items were investigated by WHITING during this survey. Least depths of features and surrounding depths are corrected to ~~predicted~~ MLLW.
Approved

N1. Concrete Block

SSS Item:	29001.95
Fix Number of DP:	9134
Least Depth:	~~3.6~~ 3.4 m (11 FT) Chart Obstr (conc block)
Time of Least Depth	1545 UTC
Position of Least Depth:	033° 53' 41.443"N 078° 04' 02.017"W

Description: (DN 161). Divers conducted a 30m circle search and found a block of concrete with some metal. It rises approximately 6 feet off the bottom. A MOD III depth reading was used for a least depth.

Recommendation: Chart an obstruction with a least depth of 12 feet at the above position. Concur
Chart 11; Obstn

N2. Rock

SSS Item:	1649.75
Fix Number of DP:	9816
Least Depth:	~~10.9~~ 9.9 m (32 FT) Chart Rock
Time of Least Depth	2221 UTC
Position of Least Depth:	033° 50' 48.~~000~~ 11"N 078° 04' 44.~~000~~ 3.86"W

Description: Divers found a rock 6-8 feet in diameter and rising approximately 3 feet off the bottom. An echosounder position and depth were taken after an error in a MODIII reading. A corrected depth of ~~35~~ 32 feet in an area of 37 to 38 feet was found. This contact and DP were corroborated by contact 798.2 on adjoining survey H-10707.

Recommendation: Chart a ~~nondangerous~~ rock with a least depth of 36 feet at the above position. CONCUR
Chart 32: RK

N3. **Concrete Block**

SSS Item: 3258.92
Fix Number of DP: 9813
Least Depth: 8.2 m (26 FT) Chart Obstr (conc block)
Time of Least Depth 1954 UTC
Position of Least Depth: 033° 51' 12.155"N
078° 03' 51.919"W
Description: Divers found a block of concrete rising about 3 feet off the bottom. Approximate size is 5 feet by 3 feet. A MODIII reading was used for a least depth.

Recommendation: Chart a depth of 27 feet at the above position. Do not chart an obstruction. Do NOT Concur - Chart 26 Obstn
Chart 26: Obstn

N4. Sunken Buoy

SSS Item: 21342.15
Fix Number of DP: 11023 Chart Obstr (sunken buoy)
Least Depth: 9.9 m (32 FT)
Time of Least Depth 2155 UTC
Position of Least Depth: 033° 48' 17.784"N
078° 00' 57.689"W
Description: Divers found what appears to be a sunken buoy rising 7 feet off the bottom in an up-right position. A MODIII reading was used for a least depth.

Recommendation: Chart an obstruction with a depth of 32 feet at the above position. Note: This obstruction was reported to the USCG as a danger to navigation (See Appendix I). CONCUR
Chart 32: Obstn

N5. Rock

SSS Item: 29138.05
Fix Number of DP: 11020 Chart 14: Rock
Least Depth: 4.3 m (14 FT)
Time of Least Depth 1830 UTC

Position of Least Depth: 033° 52' 45.731"N
078° 02' 59.660"W

Description: Divers found a rock 3 feet by 4 feet rising 3 feet off the bottom. A MODIII reading was used for a least depth.

Recommendation: Chart a ~~non-~~(dangerous) rock with a depth of 14 feet at the above position. Concur
Chart (14) Rk

11537 ✓ 11534 ✓

AWOIS ITEMS

Due to time constraints AWOIS Items 554 and 9677, 9678 were not investigated (they fell outside the survey data limits). Item 9676 was not required to be investigated; the item was located within the charted active dumpsite that wasn't surveyed. Item 9679 and 553 were looked at during a shoreline reconnaissance.

Awois Item	Position	Results	Recomendation
N6. 9679 ~~Visible Wreck~~ Sunken Wk	33° 53' 48"N 078° 03' 34"W	The item near Oak Island was not seen. A red and white float with a line leads into the sand. Charted as Submerged Wreck.	Remove from chart. Do not Concur – Retain as charted
N7. 9677 41' sunken fishing vessel	33° 53' 16"N 078° 02' 36"W	The Item near Western Bar Channel was not addressed. Charted as Submerged Wreck PA.	Leave as charted Concur
N8. 553 Visible Wreck	33° 51' 21"N 078° 00'36"W	The item near Bald Head Shoal was not found. Charted as Submerged Wreck.	Leave as charted Concur
N9. 554 Submerged Wreck	33° 51' 25"N 078° 02 10"W	The item near the tide gauge was not investigated. Charted as Submerged Wreck PD.	Leave as charted Concur
N10. 9678 Visible Wreck	33° 53' ~~27~~ 45"N 078° 03' ~~06~~ 11"W	Not investigated. completely ~~Not Charted.~~	Revise charted ~~Add to chart~~ ~~Concur~~

Wreck to subm. See next page. RWD 7/98

Kapp 203-standard 200 211 377 soterr done

11537 ✓ 11534 ✓ (margin checks beside each item)

O. COMPARISON WITH THE CHART See Also Evaluation Report.

Comparisons were made between survey H-10741 and charts 11536 (13th edition, March 15, 1997 scale 1:80,000) and 11537 (29th edition, July 9, 1994, scale 1:40,000). Overall, agreement is adequate with charted depths agreeing with survey soundings to within 2 feet. The trend is a slight deepening throughout the survey area. However shoaling to 13 feet was found at the western entrance to the Western Bar Channel where 16 feet is presently charted.

AWOIS # 9678

Survey depths acquired in the channel were deeper than controlling depths. A visible wreck charted at 33° 53' 44"N, 078° 03' 11"W was not found during shoreline reconnaissance. WHITING recommends removing it from the chart. Do not Concur. ~~with conditions~~ ~~Revise wreck to sunken wreck~~ Revise to submerged. RWD 7/98

The U.S. Army Corps of Engineers has constructed a submerged artificial reef in the charted discontinued disposal area. This reef is composed of rock debris from dedging operations in Bald Head Shoal Channel and is referred to as the Wilmington Offshore Fisheries Enhancement Structure (WOFES). Echo sounder development over this area was run at 20-meter line spacing. Soundings averaging 25 to 35 feet in an area charted as 40 to 46 feet were found. The reef runs in two strips approximately 120 to 150 meters wide from:

33° 47' 08"N, 078° 02' 07"W northeast to 33° 47' 48"N, 078° 01' 21"W and
33° 47' 55"N, 078° 01' 59"W southeast to 33° 47' 34"N, 078° 01' 31"W

The USCG was informed of this reef in a danger to navigation letter (see Appendix I). In addition, they were informed about a new obstruction discussed under section N4.

P. ADEQUACY OF SURVEY

This survey is complete and adequate to supersede all prior surveys in their common area.

Q. AIDS TO NAVIGATION See also Evaluation Report

Eleven buoys fall within the limits of this survey. A detached position was taken at each buoy. The following list describes the buoy in relation to the chart.

NAME	POSITION	DISTANCE FROM CHARTED POSITION
G"1"	33° 48' 45.817"N 078° 04' 41.689"W	18 m
G"3"	33° 49' 17.431"N 078° 04' 08.174"W	49 m
G"5"	33° 49' 57.876"N 078° 03' 18.564"W	52 m
G"7"	33° 50' 44.484"N 078° 02' 26.146"W	16 m

G "9"	33° 51' 31.915"N 078° 01'31.938"W	40m
G "11"	33° 52'15.247"N 078° 00'43.127W	140
R "2"	33° 48' 40.019"N 078° 04' 36.967"W	50m
R "4"	33° 49' 16.643"N 078° 03' 52.950"W	610
R "6"	33° 50' 17.527"N 078° 02' 45.913"W	33
R "8"	33° 51' 03.431"N 078° 01' 54.659"W	24
R "10"	33° 51' 50.345"N 078° 01' 00.677"W	53
Yellow "A"	33° 48' 16.375"N 078° 04' 13.141"W	510

These aids to navigation appear adequate to serve their intended purposes.

R. STATISTICS

Number of Soundings	33485
Main scheme Sounding Lines (Nautical Miles)	652
Cross lines (Nautical Miles)	66
Square Nautical Miles Surveyed	25.5
Days of Production	29
Detached Positions	20
Bottom Samples	33
Tide Stations Installed	1
Current Stations	None
Number of CTD Casts	11
Magnetic Stations	None

S. MISCELLANEOUS

See also Evaluation Report

No anomalies in either tide or current and/or unusual magnetic variations were encountered in the survey area. No unusual submarine features were discovered. Bottom samples were not required to be submitted to the Smithsonian Institution.

Dredging operations in Bald Head Shoal Channel were ongoing during the survey. The channel is being deepened and the dump site falling within the survey limits was used exclusively for the dredge material. Discussions are being held by the U.S. Army Corps of Engineers to possibly further deepen and extend the existing channel, or move it to the southeast to avoid bedrock. This information was obtained from the U.S. Army Corps of Engineers, Wilmington Office.

T. RECOMMENDATIONS

No other field work is required. Dredging in the survey area is reported. The Active dump site falling within the survey limits will be surveyed by the U.S. Army Corps of Engineers, Wilmington office, in the near future. Mr. Phil Payonk should be contacted at 910-251-4725 to obtain a copy of the survey.

U. REFERRAL TO OTHER REPORTS

A Coast Pilot Report was submitted in December 1996. A Chart User Evaluation Report was submitted in February 1997.

Submitted by:

Maureen R. Kenny

Senior Survey Technician Peter Lewit
NOAA Ship WHITING

NATIONAL OCEAN SERVICE
AUTOMATED WRECK AND OBSTRUCTION INFORMATION SYSTEM
OPR-G309
H10741/97

DATE:07/09/98

AWOIS NUMBER NAME	QUADRANT	REG #	LATITUDE	LONGITUDE	HORZ DATM AREA	PROJECT NO. GP AC	SVY ST	CARTO CODE	CHART
9678		C				31		OPR-G309	
UNKNOWN		2	0 33/53/45.62	078/03/10.96	G	31	11	0100	11537

----SURVEY REQUIREMENTS----

ASSIGNED TYPE:FULL — INITIALS:RWD — TECHNIQUES:VS,ES,BD,DI,SD — DATE:03/19/96 — SEARCH RADIUS:50

HISTORY
H9115/70--UNREVIEWED; VISIBLE WRECK (UNCOV 1FT AT MLW), POSITION SCALED FROM SURVEY IN LAT 33-53-45.00N, LONG 78-03-12.00W (NAD27). (ENTERED 3/96 RWD) (REVISED 7/98 RWD)
H10741/97--INVESTIGATION INCOMPLETE, ATTRIBUTED TO ERRONEOUS POSITION PROVIDED TO THE FIELD. REVISE CHARTED VISIBLE WRECK TO SUBMERGED. (UPDATED 7/98 RWD)

SURVEY REQUIREMENTS KEY

TYPE:
FULL -- VERIFY OR DISPROVE THE ASSIGNED ITEM. IF FOUND, LEAST DEPTH OR ELEVATION AND ACCURATE POSITION REQUIRED. DISPROVAL REQUIRES AN INVESTIGATION TO THE FULL EXTENT OF THE SPECIFIED SEARCH AREA. IF FEATURE IS LOCATED AND VERIFIED AS THE ITEM BEING SOUGHT, WITH NO SURROUNDING WRECKAGE, THEN NO ADDITIONAL SEARCH IS REQUIRED.

LIMITED -- REDUCED LINE SPACING TO A MINIMUM OF ONE-HALF OF THE MAIN SCHEME HYDRO, ANY INDICATION OF THE ASSIGNED ITEM MUST BE FURTHER DEVELOPED AS A FULL INVESTIGATION (SEE ABOVE).

INFORMATION -- ANY INDICATION BY MAIN SCHEME HYDRO MUST BE FURTHER DEVELOPED AS A FULL INVESTIGATION (SEE ABOVE).

WD/SSS -- WIRE DRAG OR SIDE SCAN SONAR

TECHNIQUES:
S2 -- 200% SIDE SCAN SONAR COVERAGE
S4 -- 400% SIDE SCAN SONAR COVERAGE
ES -- ECHO SOUNDER
WD -- WIRE DRAG (CLEARED DEPTH)
CT -- CONSTANT TENSION WIRE DRAG (CLEARED DEPTH)
BD -- BOTTOM DRAG
DI -- DIVER OR WADER INVESTIGATION (PNEUMATIC DEPTH GAUGE OR LEAD LINE LEAST DEPTH)
VS -- VISUAL SEARCH (BOTTOM VISIBLE IN CLEAR WATER OR AREA UNCOVERED AT CHART DATUM)
SD -- DISPROVAL MAY BE ACQUIRED BY SALVAGE DOCUMENTATION
-- SEE SURVEY REQUIREMENT COMMENTS BELOW

SEARCH RADIUS: METERS

THE GP CONTAINED IN RECORDS SENT TO THE NOAA FIELD UNITS WILL REFERENCE THE 1983 DATUM WHEN POSSIBLE. IF THE GP WAS CONVERTED FROM A 1927 REFERENCED DATUM TO A 1983 DATUM A 'C' WILL BE SHOWN IMMEDIATELY TO THE RIGHT OF THE AWOIS ITEM NUMBER. IF THE GP IS FROM A SOURCE ON NAD83, THAT AREA WILL BE BLANK.

THESE DATA WERE GENERATED FROM DBASE III FILES WITHIN THE NATIONAL OCEAN SERVICE. INFORMATION IN AWOIS IS INTENDED TO SATISFY THE NEEDS OF HYDROGRAPHIC SURVEY PLANNERS AND IS NOT CONSIDERED TO BE A COMPLETE RECORD OF WRECK AND OBSTRUCTION INFORMATION WITHIN ANY GEOGRAPHIC AREA. FOR ADDITIONAL INFORMATION OR ASSISTANCE IN INTERPRETING THE DATA PLEASE CONTACT THE HYDROGRAPHIC SURVEYS BRANCH (N/CG241), PHONE 301-713-2702.

HORIZONTAL CONTROL STATIONS

Station: Charleston Coast Guard Beacon

Latitude: 32° 45' 27.214" N
Longitude: 079° 50' 34.335" W
Frequency: 298 MHZ
Station ID (Antennae A):016
Transmission Rate: 100 BPS

Station:Fort Macon Coast Guard Beacon

Latitude: 34° 41' 50.600" N
Longitude:076° 40' 59.224" W
Frequency: 294 MHZ
Station ID (Antennae A):014
Transmission Rate: 100 B.S.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of NOAA Corps Operations
NOAA Ship WHITING S-329
439 W. York Street
Norfolk, VA 23510-1114

July 7, 1997

ADVANCE INFORMATION

Commander, Fifth Coast Guard District
Federal Building
431 Crawford Street
Portsmouth, Virginia 23704-5004

Dear Sir:

The NOAA Ship WHITING, while conducting hydrographic survey operations in the approaches to Wilmington, North Carolina, located four features which are dangers to navigation. Our findings are summarized below.

	Feature	Latitude	Longitude	Depth
1.	Shoal Depth	33° 39' 12.1" N	077° 53' 26.5" W	17 feet (2.8 fathoms)
2.	Obstruction	33° 53' 05.6" N	078° 06' 34.3" W	21 feet (3.5 fathoms)
3.	Obstruction	33° 48' 17.8" N	078° 00' 57.7" W	32 feet (5.4 fathoms)

OFF LIMITS OF SURVEY

4. A submerged artificial reef composed of rock that is approximately 120 meters in width was found 4 miles south of the entrance to the Cape Fear River. It extends northeast from 33°47' 11.8" N, 078° 02' 03.9" W, to 33° 47' 48.1" N, 078° 01' 19.9" W, and extends southeast from 33° 47' 49.7" N, 078° 01' 50.9" W to 33° 47' 34.7" N, 078° 01' 32.2" W. Least depths of 25 feet were found along the ridges in areas.

In addition, NOAA Ship WHITING located the following uncharted floating aid to navigation:

OFF LIMITS OF SURVEY

	Latitude	Longitude	Date Located
Yellow, Round Labeled "AR 455"	33° 47' 02.2" N	078° 17' 53.5" W	June 12, 1997

WHITING also found buoy "1", green can, in Frying Pan Shoals Slue, presently charted at 33° 39' 24" N, 077° 52' 41" W, to be in a different position than charted. The position is as follows:

OFF LIMITS OF SURVEY

	Latitude	Longitude	Date Located
Green, can, "1"	33° 39' 40.9" N	077° 52' 32.9" W	June 17, 1997

Differential GPS was used to determine the survey positions of the dangers to navigation and buoys listed above. Positions are referenced to NAD 83. All depths are referenced to MLLW using predicted tides. Charts 11534 (28th edition), 11536 (12th edition), and 11537 (29th edition) are affected by this report.

A copy of this letter has been forwarded to the following offices:
Chief, Marine Charting Division, NOAA
Chief, AMC Operations Division, NOAA
Chief, Atlantic Hydrographic Branch, NOAA
Director, Defense Mapping Agency
Hydrographic/Topographic Agency
President, Wilmington Cape Fear Pilots Association

Sincerely,

Maureen R. Kenny

Maureen R. Kenny
Commander, NOAA
Commanding Officer

APPROVAL SHEET
HYDROGRAPHIC SURVEY
OR-G309-WH
1997
WH-10-03-97
H-10741

The data for this survey were acquired and checked under my daily supervision. Position and sounding accuracy meet the requirements specified in the Project Instructions, Hydrographic Manual, 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, determining depths, and identifying all potential dangers to navigation. No final field sheets were prepared for this survey. The survey data and accompanying records are complete for the preparation of the smooth sheet.

Approved by:

Maureen R. Kenny

Commander Maureen R. Kenny, NOAA
Commanding Officer, NOAA Ship WHITING

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: September 19, 1997

HYDROGRAPHIC BRANCH: Atlantic

HYDROGRAPHIC PROJECT: OPR G309-WH

HYDROGRAPHIC SHEET: H-10741

LOCALITY: Approaches to Cape Fear River, N.C.

TIME PERIOD: May 4 - June 24, 1997

TIDE STATION USED: 865-9182 Yaupon Beach, N.C..
Lat. 33° 54.1'N Lon. 78° 4.9'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 m
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.512 m

REMARKS: RECOMMENDED ZONING

Use zone(s) identified as: SEC104, SEC105, SEC106, SEC107, SEC108, SEC109, SEC110, CFR1 & CFR2

Refer to attachment(s) for zoning information.

Note: Provided time series data are tabulated in metric units (meters) and on Greenwich Mean Time.

CHIEF, TIDAL ANALYSIS BRANCH

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-10741

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO. 11534, 11536, 11537	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	
BALD HEAD (summit)	X		X							1
BALD HEAD ISLAND	X		X							2
BALD HEAD SHOAL	X									3
BALD HEAD SHOAL CHANNEL	X									4
CAPE FEAR (title)	X		X							5
CAPE FEAR RIVER (title)	X		X							6
FORT CASWELL	X		X							7
JAY BIRD SHOALS	X									8
NORTH ATLANTIC OCEAN	X		X							9
NORTH CAROLINA (title)	X		X							10
OAK ISLAND	X		X							11
WESTERN BAR CHANNEL	X									12
YAUPON BEACH	X		X							13
										14
										15
										16
										17
										18
										19
					Approved:					20
										21
										22
										23
					AUG 25 1997					24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 61-29
(12-71)

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

LETTER TRANSMITTING DATA

REFERENCE NO.

N/CS33-39-98

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

☐ ORDINARY MAIL ☐ AIR MAIL

☐ REGISTERED MAIL ☒ EXPRESS

☐ GBL *(Give number)* _____

TO:

CHIEF, DATA CONTROL GROUP, N/CS3x1
NOAA/NATIONAL OCEAN SERVICE
STATION 6815, SSMC3
1315 EAST-WEST HIGHWAY
SILVER SPRING, MARYLAND 20910-3282

DATE FORWARDED

APR 28, 1998

NUMBER OF PACKAGES

ONE TUBE

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

H-10741

NORTH CAROLINA, NORTH ATLANTIC OCEAN, ENTRANCE TO CAPE FEAR RIVER

1 (ONE) TUBE CONTAINING THE FOLLOWING:

1 SMOOTH SHEET FOR SURVEY H-10741
1 ORIGINAL DESCRIPTIVE REPORT
2 DRAWING HISTORY FORMS (NOAA FORM #76-71) 1 EACH FOR NOS CHARTS 11534 AND 11537
1 RECORD OF APPLICATION TO CHART FORM (NOAA FORM #75-96) FOR SURVEY H-10741
1 H-DRAWING FOR NOS CHART 11534
1 H-DRAWING FOR NOS CHART 11537
1 COMPOSITE DRAWING FOR NOS CHART 11534
1 COMPOSITE DRAWING FOR NOS CHART 11537

FROM: *(Signature)*

Deborah A. Bland Deborah A Bland

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

ATLANTIC HYDROGRAPHIC BRANCH
N/CS33
439 WEST YORK STREET
NORFOLK, VA 23510-1114

NOAA FORM 61-29 SUPERSEDES FORM C & GS 413 WHICH MAY BE USED.

*U.S.GPO:1983-0-664-006/1192

This form was electronically produced by ELite Federal Forms' Forms Manager

04/28/98

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H-10741

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	33485
NUMBER OF SOUNDINGS	33485

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	8	08/11/97
VERIFICATION OF FIELD DATA	85	03/25/98
EVALUATION AND ANALYSIS	38	
FINAL INSPECTION	8	02/23/98
COMPILATION	64	04/27/98
TOTAL TIME	203	

ATLANTIC HYDROGRAPHIC BRANCH APPROVAL 02/27/98

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR H-10741 (1997)

This Evaluation Report has been written to supplement and/or clarify the original Descriptive Report. Sections in this report refer to the corresponding sections of the Descriptive Report.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

Hydrographic Processing System
NADCON, version 2.10
MicroStation 95, version 5.05
I/RAS B, version 5.01
Siteworks, version 2.01

The smooth sheet was plotted using a Hewlett Packard DesignJet 350C plotter.

H. CONTROL STATIONS

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 NAD 83 and the North American Datum of 1927 (NAD 27).

To place this survey on the NAD 27, move the projection lines 0.631 seconds (19.432 meters or 1.94 mm at the scale of the survey) north in latitude, and 1.036 seconds (26.626 meters or 2.66 mm at the scale of the survey) east in longitude.

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

J. SHORELINE

Brown shoreline originates with National Ocean Service (NOS) Chart 11537 (29th Edition, July 9, 1994) and is for orientation purposes only.

L. JUNCTIONS

H-10687 (1996)	to the south southwest
H-10690 (1996)	to the south
H-10707 (1997)	to the southwest
H-10724 (1997)	to the southeast

H-10728 (1997) to the northwest

Standard junctions were effected between the present survey and surveys H-10687 (1996), H-10707 (1997), H-10724 (1997), and H-10728 (1997).

A standard junction could not be effected with survey H-10690 (1996) and the preset survey. This survey is archived at National Ocean Service (NOS) Headquarters, Silver Spring, Maryland. Junctions will have to be effected during chart compilation.

There are no junctional surveys to the northeast. Present survey depths are in harmony with the charted hydrography to the north.

M. COMPARISON WITH PRIOR SURVEYS

A comparison with prior surveys was not done during office processing in accordance with section 4. of the memorandum titled "Changes to Hydrographic Survey Processing", dated May 24, 1995.

O. COMPARISON WITH CHART 11534 (29TH Edition, May 17/97)
11536 (13th Edition, Mar 15/97)
11537 (30th Edition, Apr 15/97)

Hydrography

The charted hydrography originates with the prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in sections N. and O. of the Descriptive Report. The following should be noted:

An uncharted rock with a depth of 38 feet (11.5m) in Latitude 33°49'18.27"N, Longitude 78°04'07.04"W was located by the field. It is recommended that a 38ft dangerous submerged rock be charted in the present survey location.

The present survey is adequate to supersede the charted hydrography within the common area.

Aids to Navigation

Aids to navigation shown on the present survey appear adequate to serve their intended purposes.

Dangers to Navigation

One Danger to Navigation report was submitted to Commander(oan), Fifth Coast Guard District, Portsmouth, Virginia for inclusion in the Local Notice to Mariners, and to the Marine Chart Division, N/CS3x1, Silver Spring, Maryland. Copies of this report are appended to the descriptive report.

P. ADEQUACY OF SURVEY

This is an adequate hydrographic/side scan sonar survey. No additional work is recommended.

S. MISCELLANEOUS

Chart compilation was done by Atlantic Hydrographic Branch personnel, in Norfolk, Virginia. Compilation data will be forwarded to Marine Chart Division, Silver Spring, Maryland.

H-10741

WHITING Processing Team

Robert Snow

Robert Snow
Cartographic Technician
Verification of Field Data
Evaluation and Analysis

APPROVAL SHEET
H-10741

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 digital data for this survey. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Robert G. Roberson Date: FEBRUARY 27, 1998
Robert G. Roberson
Chief, Cartographic 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: February 27, 1998
Nicholas E. Perugini
Commander, NOAA
Chief, Atlantic Hydrographic Branch

****

Final Approval:

Approved: Andrew A. Armstrong, III Date: May 8, 1998
Andrew A. Armstrong, III
Captain, NOAA
Chief, Hydrographic Surveys Division

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-10741

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
11534	4/3/98	D.A. Bland	Full [redacted] After Marine Center Approval Signed Via
			Drawing No.
11537	4/10/98	D.A. Bland	
			Full [redacted] After Marine Center Approval Signed Via
			Drawing No. 43
11537	5/15/98	Kam Jett	Full Part Before After Marine Center Approval Signed Via
			Drawing No. 43
11534	6/1/98	Kam Jett	Full Part Before After Marine Center Approval Signed Via
			Drawing No. 30
11536	6/1/98	Kam Jett	Full Part Before After Marine Center Approval Signed Via
			Drawing No. 24
11539	6/2/98	Kam Jett	Full Part Before After Marine Center Approval Signed Via
			Drawing No. 26
11520	6/2/98	Kam Jett	Full Part Before After Marine Center Approval Signed Via
			Drawing No. 52
			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.