

FE371

SIDE SCAN

Diagram No. 1222-5

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey ... Side Scan Sonar
Field No. RU-20-1-92
Registry No. FE-371SS

LOCALITY

State Virginia
General Locality ... Chesapeake Bay
Sublocality 3.5 NM West of Cape
..... Charles Harbor
..... 1992
CHIEF OF PARTY
LCDR N.E. Perugini

LIBRARY & ARCHIVES

DATE August 25, 1992

FE371
SIDE SCAN

Ref L-1049(92)

EC/G
PRODUCTS

12224 NC JH Prev App'd

12221

12220

CP3

12200-NC

HYDROGRAPHIC TITLE SHEET

FE-371SS

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.

RU-20-1-92

State Virginia

General locality Chesapeake Bay

Locality Three Point Five Nautical Miles West of Cape Charles Harbor
3.5 NM

Scale 1:20,000 Date of survey March 18 to March 25, 1992

Instructions dated February 24, 1992 Project No. S- E937-RU

Vessel NOAA Ship RUDE (9040)

Chief of party LCDR Nicholas E. Perugini

Surveyed by N. Perugini, P.L. Schattgen, M.J. Oberlies, J.A. Illg, D.E. Williams

Soundings taken by echo sounder, and pneumatic depth gauge

Graphic record scaled by NEP, PLS, MJO, JAI, DEW

Graphic record checked by NEP, PLS, MJO, JAI, DEW

Protracted by NA Automated plot by NA XYNETICS 1201 PLOTTER (ANC)

Verification by NA Atlantic Hydrographic Section Personnel

Soundings in METERS at MLLW

REMARKS: All times recorded in UTC.

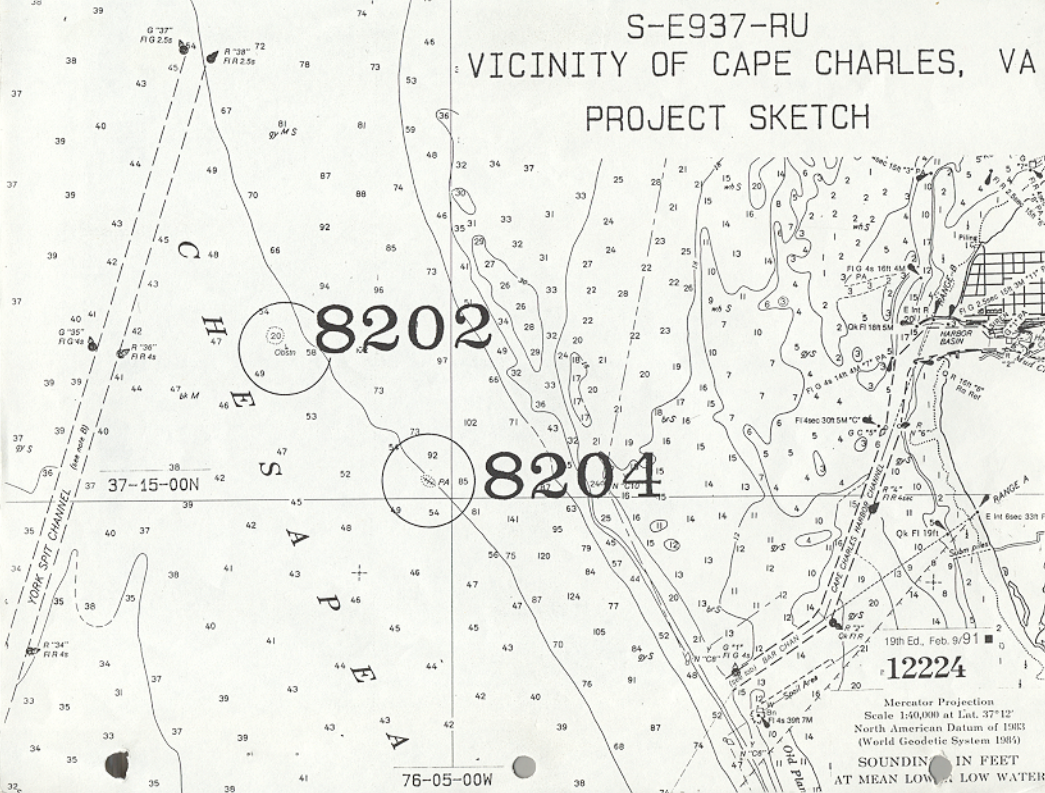
Notes in red were made during office processing.

AWAIS and SURF chk

9/23/92 MUR

XWH

S-E937-RU
VICINITY OF CAPE CHARLES, VA
PROJECT SKETCH



8202

8204

37-15-00N

76-05-00W

12224

Mercator Projection
Scale 1:40,000 at Lat. 37° 12'
North American Datum of 1983
(World Geodetic System 1983)
SOUNDING IN FEET
AT MEAN LOW WATER

TABLE OF CONTENTS

A. <u>PROJECT</u>	Page:2
B. <u>AREA SURVEYED</u>	Page:3
C. <u>SURVEY VESSELS</u>	Page:3
D. <u>AUTOMATED DATA ACQUISITION AND PROCESSING</u>	Page:4
E. <u>SONAR EQUIPMENT</u>	Page:5
F. <u>SOUNDING EQUIPMENT</u>	Page:7
G. <u>CORRECTIONS TO SOUNDINGS</u>	Page:8
H. <u>CONTROL STATIONS</u>	Page:11
I. <u>HYDROGRAPHIC POSITION CONTROL</u>	Page:12
J. <u>SHORELINE</u>	Page:14
K. <u>CROSSLINES</u>	Page:14
L. <u>JUNCTIONS</u>	Page:15
M. <u>COMPARISON WITH PRIOR SURVEYS</u>	Page:15
N. <u>COMPARISON WITH THE CHART</u>	Page:17
O. <u>ADEQUACY OF SURVEY</u>	Page:23
P. <u>AIDS TO NAVIGATION</u>	Page:23
Q. <u>STATISTICS</u>	Page:24
R. <u>MISCELLANEOUS</u>	Page:25
S. <u>RECOMMENDATIONS</u>	Page:25
T. <u>REFERRAL TO REPORTS</u>	Page:25

A. PROJECT

A.1 This survey was conducted in accordance with Hydrographic Project Instructions S-E937-RU, Vicinity of Cape Charles, Virginia. ✓

A.2 The original date of the instructions is February 24, 1992. ✓

A.3 No changes to the project instructions were issued. ✓

A.4 A sheet letter was not specified in the project instructions. ✓

A.5 Project OPR-S-E937-RU responds to requests from the Fifth U.S. Coast Guard District on behalf of the Virginia Pilots Association. Its purpose is to disprove or verify and provide least depths for a 20-ft submerged obstruction and a submerged wreck PA. Both items are considered hazards due to their proximity to an area where pilots anchor tankers. ✓

B. AREA SURVEYED

B.1 This survey is due west of Cape Charles, Virginia and in the vicinity of York Spit Channel as indicated on the chartlet section of chart 12224 found preceding the table of contents of this descriptive report. Existing depths in this survey area are between 49 and 92 feet (14.9 to 28.0 meters).

The primary traffic in the area is deep draft vessels transiting the length of the Chesapeake Bay via York Spit Channel.

B.2 The approximate limits of this survey are within a one mile radius of 37° 15' 30" N and 076° 06' 00" W.

B.3 Data acquisition began on March 18, 1992 (DOY 078). These data were accompanied by various electronic and horizontal control problems. As such, these data were rejected so data acquisition for all practical purposes began on March 19, 1992 (DOY 079) and concluded on March 24, 1992 (DOY 084).

C. SURVEY VESSELS

C.1 The following vessels were used during this project:

<u>VESSELS</u>	<u>ELECTRONIC DATA PROCESSING NUMBER</u>	<u>PRIMARY FUNCTION</u>
NOAA Ship RUDE (S590)	9040	Hydrography/ Side Scan Operations
RUDE Launch (RU3)	1290	Diving Operations

C.2 No unusual vessel configurations or problems were encountered.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

D.1 Survey data acquisition and processing were accomplished using the HDAPS system with the following software versions: ✓

Program	Version	Dates Used
SURVEY	6.10	March 18 - 24
DAS_SURV	6.20	March 18 - 24
POSTSUR	5.20	March 18 - 24

D.2 Other software includes VELOCITY 1.11 dated March 9, 1990 used to generate sound velocity corrector tables, and MTEN (dated between 1985 and 1986) for horizontal control verification and establishment. ✓

D.3 There were no nonstandard automated acquisition or processing methods used. ✓

E. SONAR EQUIPMENT

E.1 Side scan sonar operations were conducted using an EG&G Model 260 slant range corrected side scan sonar recorder and either a Model 272-T (single frequency) or 272-TD (dual frequency) towfish. All side scan operations were conducted from the RUDE (vessel # 9040). The following list shows equipment serial numbers and corresponding dates used:

Equipment Type	Serial Number	Dates Used
Recorder	0012104	Entire Survey
Towfish	11908 (Single Freq)	Entire Survey

E.2 The side scan sonar towfish was configured with a 20° beam depression, which is the normal setting and which yields the best beam correction.

E.3 The 100 Khz frequency was used throughout this survey.

E.4 a) The 100 meter range scale was used to search for the submerged buoy in AWOIS 8202. This was selected over lower range scales so the fish could be towed higher in the water column, increasing the likelihood that the floating item could be ensonified. After covering the 500 meter radius search area five times (500%) with the 100 meter range scale, all developments were conducted using the 50 meter range scale, with the hope that the greater resolution might help find the buoy.

In keeping with the investigation requirements for AWOIS 8202, every effort was made to keep the towing speed for the side scan sonar towfish below 4 knots. This sometimes required using just one engine to maintain that speed.

The current FPM specification was used to determine maximum line spacing:

$$LS_{max} = 2RS - 2ECR_{max}$$

where RS = range scale (100 m)
and ECR = error circle radius

Predicted ECR values were generated using the HDAPS function "Predict ECR" for control station configurations used in this survey. No predicted ECR value was greater than 12 meters for the entire survey area. Thus the maximum line spacing computed by the above equation was 176 meters. RUDE used a 170 meter line spacing which yielded an effective swath overlap of 30 meters. Printouts of "Predict ECR" values supporting the above calculation are included in SEPARATE V.

b) Twice daily confidence checks, before and after daily data acquisition, were obtained by either towing the fish past a buoy or previously located feature, or by noting recognizable bottom characteristics at the edges of the sonar range scale in use. ✓

c) Refer to section "N", the individual AWOIS descriptions, for side scan sonar coverage. ✓

d) The sonargram shows evidence of 100 kHz frequency interference from the DSF-6000 fathometer. This interference is manifested by black diagonal lines on the outer edges of the trace on both port and starboard channels. This interference didn't effect data acquisition. Dive investigations conducted for this survey within the search radii of both AWOIS items, showed the bottom of the bay floor to be covered with a very fine silty muck. This, combined with very little topographical relief in the area, resulted in weak returns of the side scan sonar signal. In turn, this resulted in lighter than normal sonargrams. ✓

Appearing regularly on echograms are detached spikes that can only be explained by the presence of schools of fish. These spikes occur randomly and are not an indication of equipment malfunction.

The echograms for DOY 78,79 and 80 are unusually dark. This was due to the 6 db boost function being in operation. This malfunction didn't affect data quality.

e) The towfish was deployed from the stern during the entire survey. ✓

E.5 Contacts that were suspected of being the object of the AWOIS investigation were investigated by echosounder development and multiple side scan sonar passes. There were three diver investigations conducted during this survey. Refer to section N.5 of the individual AWOIS discussions for specific contact development procedures. ✓

E.6 Overlap was checked on-line using the real-time plot and the edited swath plot for holidays. All holidays were reconciled by running additional side scan sonar lines. ✓

F. SOUNDING EQUIPMENT

F.1 All hydrographic soundings were acquired using a Raytheon 6000N Digital Survey Fathometer (DSF). One DSF 6000N was used during the entire survey: S/N B050N. ✓

F.2 Three diver investigations were conducted during this survey. Divers determined a least depth on one of these dives for AWOIS 8204. The least depth was measured with a 3-D Instruments, Inc. precision direct drive depth gauge: ✓

0- 70 fsw (feet salt water)

S/N 201637

Calibration and check documentation for this gauge can be found in Separate IV. (*Filed with survey records*)

F.3 There were no faults in soundings equipment that affected the accuracy/quality of the data. ✓

F.4 Both the high (100 kHz) and low (24 kHz) frequency sounding data were recorded during data acquisition. Only high frequency soundings were plotted. ✓

G. CORRECTIONS TO SOUNDINGS

G.1 a) The velocity of sound through water was determined using a Digibar Sound Velocity Probe (S/N 169), made by Odom. A Data Quality Assurance Test was conducted before the velocity cast to ensure the meter was within tolerance.

All data were processed using Velocity 1.11 software. The computed velocity correctors were entered into the HDAPS sound velocity table and applied on-line to both high and low frequency soundings. The sound velocity correctors applied to this survey are based on the cast recorded on the following date:

Cast Number	Date	Latitude	Longitude	HDAPS Table #	Applied to Days
01	3-17-92	37° 14.5' N	76° 04.2' W	01	078-084

b) There was no variation in the DSF-6000N instrument initial.

c) No instrument correctors to the DSF-6000N were required.

d) A lead line comparison with the DSF-6000N was made in the project area.

March 25, 1992 at 37° 16.1'N 76° 06.3'W (55 ft depths)

The greatest variation between leadline and DSF soundings was 0.5 meters. Considering the ship's motion and the wire angle in the leadline from current (approximately 10°), this is excellent agreement and provides an adequate check that the echosounder was functioning properly. Data from these comparisons are found in Separate IV.

Both of the leadlines used in the leadline to DSF 6000 comparison were calibrated by steel tape prior to the above comparison. An average leadline correction of -0.2 feet was applied in comparisons between the DSF-6000 and the ship's leadlines.

e) All sounding correctors were applied to both the narrow (100 kHz) and wide (24 kHz) DSF 6000N beams.

f) During the winter 1988 dry dock period, an exact vertical measurement was taken from the DSF transducer to a fixed point on the bridge wing. After the ship was re-floated, the height above the waterline was determined for this point. The ship's static draft was thereby calculated to be exactly 2.26 meters (7.4 feet). This draft value was applied to the sounding data via the HDAPS offset table.

g) Settlement and squat correctors for the RUDE were determined on the Elizabeth River, Norfolk, Virginia on March 13,

1991. An observer, stationed with a level on a pier, measured changes in relative height by sighting to a staff held at the longitudinal position of the ship's transducer. The ship steamed directly toward and then away from the observer. The toward and away runs were averaged and applied to soundings through the HDAPS offset table.

h) Heave data were acquired by a Datawell heave, roll and pitch sensor (S/N 19128-C), and were applied to soundings in real time. Only the heave corrections were applied to the plotted soundings.

See Separate IV for data records. (Filed with survey records)

G.2 There were no unusual or unique methods or instruments used for correcting echo soundings.

G.3 There was no need to reapply any correctors for the data acquired during this survey.

G.4 The ship's shallow water (0-70 fsw) pneumatic depth gauge was calibrated on January 16, 1992. This gauge was bought new prior to the start of the 1992 field season and calibrated by the manufacturer. Corrector data from the calibration was not applied to pneumatic depths because it was less than 0.1 meters.

G.5 Generally, sea conditions greater than one meter affected the sounding record, creating a trace of constant peaks and dips. Application of heave correctors to raw echo soundings appeared to accurately represent true depths.

G.6 a) The tidal datum for this project is Mean Lower Low Water. The operating tide station at Chesapeake Bay Bridge Tunnel, Virginia (863-8863) served as direct control for datum determination. Hampton Roads, Virginia (863-8610) was the reference station for predicted tides. Data for predicted tides were provided on floppy magnetic disk before the start of the project.

b) Tidal data used during data acquisition were obtained from Table 2 of the East Coast of North and South America Tide Predictions, and applied to the digital tide data using the HDAPS software. The subordinate station for predicted tides was:

NO.	PLACE	TIME		HEIGHT	
		High water	Low water	High water	Low water
2067	Cape Charles Harbor	-0 11	+0 01	*0.94	*0.92

Tidal correctors were applied on-line using the HDAPS predicted tide table number 3.

c) Zoning for this project is consistent with the project instructions. ✓

A request for smooth tides was mailed on March 26, 1992.

All smooth plotted depths have been reduced using smooth tides.

H. CONTROL STATIONS *See also section 2.a. of the Evaluation Report*

H.1 The horizontal datum for this project is the North American Datum of 1983 (NAD 83).

H.2 The list of Horizontal Control Stations is located in Appendix III.

H.3 No horizontal control stations were established for this survey. Existing NGS stations were used. All horizontal control stations used during this survey are Third-order.

H.4 All horizontal control stations are within the NGS Quadrants N370762, N370753 and N370761. All are referenced to the NAD 83 Horizontal Datum.

H.5 See Appendix III for the letter addressing horizontal control submitted for this project.

H.6 There are no photogrammetric problems, positioning problems or unconventional survey methods pertinent to this survey.

I. HYDROGRAPHIC POSITION CONTROL See also section 2.1.1. of the Evaluation Report

I.1 This survey was conducted entirely with the use of the Falcon Mini-Ranger system.

I.2 Accuracy requirements were met as specified by the Hydrographic Manual and Field Procedures Manual (FPM).

I.3 Control Equipment:

Mini-Ranger:

Falcon 484 by Motorola Inc.

Serial Numbers:

RPU	F-0246	
R/T	F-3409	
R/S:	F-3222	(code 4)
	F-3296	(code 5)
	D-2123	(code 7)
	F-3241	(code 8)

I.4 Calibration procedures for the positioning system is as follows:

As stated in section 3.1.3.3 of the Field Procedures Manual for Hydrographic Surveying, a continuous critical system check is obtained "when data are acquired with three or more LOP's and ECR and maximum residual criteria are being met as required in section 3.1.3.1" (of the same manual). RUDE routinely conducted survey operations using at least three LOP's, and all other positioning criteria were met as required (see section I.2).

A pre-project baseline calibration of the Mini-Ranger system was conducted at the Atlantic Marine Center on March 11, 1992. These data are included with Separate III.

I.5 The Falcon system required calibration data to be applied to raw ranges. The range corrector and minimum acceptable signal strength (MASS) for each Mini-Ranger Reference Station was entered into the HDAPS system using the Pre-Survey C-0 Table. This table provided the mechanism by which HDAPS automatically applies the proper range corrector and removes from the position computation those LOP's with signal strengths below MASS. Overall, calibration data applied to the raw Mini-Ranger ranges was adequate and effective.

I.6 a) There were no unusual methods used to calibrate or operate the electronic positioning equipment.

b) There were no occurrences of equipment malfunctions or substandard operation.

c) There were no occurrences of unusual atmospheric conditions that may have affected data quality.

d) There were no occurrences of weak signals or poor

geometric configurations of a duration to significantly compromise data quality.

e) No systematic errors were detected that required adjustments.

f) Antenna positions were corrected for offset and layback, and referenced to the position of the DSF 6000N transducer. These correctors were located in the HDAPS Offset table, and applied on-line to the positioning algorithm. Refer to Separate III for a copy of offset table 1, which was the only table used during this survey.

g) Offset and layback distances for the A-frame (tow point) were located in the HDAPS Offset table and applied on-line. These offsets, along with the cable length, towfish height, and depth of water, were used by the HDAPS system to compute the position of the towfish. Refer to Separate III for offset table 1.

J. SHORELINE See also section 2.6. of the Evaluation Report

No field sheets encompassed any shoreline. ✓

K. CROSSLINES See also section 3.6. of the Evaluation Report

AWOIS 8202: This item provided abundant opportunities to compare crossline (East-West) soundings and mainscheme (North-South) soundings. The agreement between soundings gives no indication of any inadequacies with the electronic positioning systems or the electronic sensors. Generally, all soundings agree within 1.0 meters with adjacent soundings. ✓

AWOIS 8204: Since this item was found very early in the investigation there were virtually no opportunities for a comparison of mainscheme and crossline agreement. No comment is made regarding comparisons. ✓

L. JUNCTIONS See also section 5 of the Evaluation Report

This survey does not junction with any current surveys. ✓

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

M.1 Applicable prior surveys are:

Hydrographic Survey No. 8012
Virginia ✓
Lower Chesapeake Bay
Off Cape Charles City
April - October 1950 & October 1950
Scale 1:20,000

M.2 AWOIS item investigations are discussed in Section "N". ✓

M.3 Soundings from this survey were compared to the above prior survey, and the findings are as follows. ✓

AWOIS 8202: This item saw significant investigative coverage providing extensive opportunities for comparing the soundings of this survey with those of the prior survey. In all cases soundings agreed within 1.0 meters with the closest sounding. In the majority of cases agreement was closer to 0.25 meters. Also, the depths presently charted on the current edition of chart 12224 were compared to the soundings of this survey and the soundings of the prior survey. Here too, agreement was excellent. ✓

AWOIS 8204: This item provided only a few opportunities for comparing soundings from this survey with soundings from the prior survey. In the majority of cases soundings from this survey agreed within 0.5 meters with the closest sounding from the prior survey. Never did the difference between soundings exceed 1.0 meters. Also, the depths presently charted on the current edition of chart 12224 were compared to the soundings of this survey and the soundings of prior survey. Of the six depths presently charted within the search radius or close to it, only one of these fell within the area of coverage of this survey. In this case the depth and corresponding soundings differed by 0.5 meters. However, these six depths from the current edition of chart 12224 were compared to the prior survey for the area. Agreement between depths and soundings were excellent. *cancel* ✓

M.4 AWOIS items 8202 and 8204 do not cover enough area to reveal general trends. *cancel*

M.5 No significant features or depths from prior surveys have been disproved during this survey. ✓

M.6 There are no features or significant depths from prior surveys that have not been found or are considered disproved. ✓

M.7 The RUDE is aware of no authoritative non-NOS surveys of the area. ✓

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

NOTE: Paragraphs N.11 and N.12 are not discussed in this section. Refer to section M.3 for comparisons with prior surveys and chart 12224.

AWOIS 8202

N.1 The object of this investigation is a 3 foot steel sphere tethered by a nylon line to a steel clump anchor. The sphere served as a target for sonar testing and was fitted with a locating pinger. It was last located on February 16, 1989, but was unrecoverable due to adverse weather. Subsequent to that, the Naval Coastal Systems Center again attempted to locate it but with negative results. They suspect it may have been dragged off or the mooring cut.

N.2 Item Location

Geographic position provided was: 37° 15' 51.97" N
76° 06' 11.04" W

N.3 Source of Item

Local Notice to Mariners 18/89.

N.4 Largest Scale Chart Affected

Chart 12224, scale 1:40,000, edition 19 dated February 9, 1991.

N.5 Investigation Procedures

Survey requirements called for 400% side scan sonar coverage in conjunction with echosounder development in a 500 meter search radius. A diver investigation was also required, if appropriate.

Five hundred percent side scan sonar coverage was completed for this item. The additional 100% completed in excess of project requirements was done because the third 100% of coverage was not offset 85 meters from the first 100% of coverage. Therefore, the fifth 100% of coverage was offset 85 meters from the first 100%.

The small size of this item obviously makes it extremely difficult to find even when surveying conditions are excellent. The actual item was expected to present an indefinite image if found, making definitive identification near impossible. Due to this fact, contacts that would not of been given a second look in other surveys were given further attention as possibly being the object of this search.

Prior to the completion of the 400% side scan sonar coverage a promising contact was found during main scheme investigation. This contact was designated A and was developed by side scan sonar at the 50 and 100 meter range scale. Further investigation proved it to be insignificant and it was no longer considered.

After the completion of 400% (actually 500%) coverage all marginal contacts were entered into a contact table and plotted within the search radius. Of these possible contacts, four were chosen for further development and the origin of the search radius was considered a contact (number 0) so as to receive further investigation.

These five contacts, numbered 0 through 4, were developed by side scan sonar on a 50 meter range scale. Of these five, none showed further evidence of possibly being a contact of significant height. However, while investigating contact 4 another contact was found that merited further attention. This was designated contact 5. A position was computed for this contact, a buoy dropped and a dive investigation conducted. The divers intended to conduct a 30 meter circle search around the buoy to find the contact. The current at the bottom was very strong and the visibility was so poor the divers were separated after completing only a 180° arc. Once the divers surfaced the decision was made that given the conditions a search for a contact of this size was impractical by these means.

Echosounder development was used instead to locate the contact and get a least depth for it. This contact, although not expected to be the sonar target itself, warrants being addressed in section N.6 since its height is in excess of one meter. See section N.6.

N.6 Investigation Results

AWOIS 8202:

Although survey requirements of 400% side scan coverage was completed on this item, this item is not considered to be conclusively disproven. Given the difficulty of finding a three foot sphere in the conditions present in the survey area and combined with the limitations of the electronic sensors, a definitive statement that the item does not exist cannot be made. It is recommended that the obstruction be retained as charted and that an "Existence Doubtful" note be added. *Do not concur, see section 7.a. of the Evaluation Report*

CONTACT DEVELOPMENT 5:

A least depth for this item was determined by echosounder. Least depth information for this item is as follows:

FIX	166
LATITUDE	37° 16' 12.79" N
LONGITUDE	76° 06' ^{16 01} 15.97" W
LEAST DEPTH (MLLW)	16. ⁹ ₅ meters (55. ₅ feet)

N.7 Explanation for Position Difference

Not applicable.

N.8 Least Depth Information

See section "N.6".

N.9 Charting Recommendation

AWOIS 8202:

Retain the presently charted 20 foot obstruction and add an "Existence Doubtful" note. Do not concur. Delete the 20 Obstr from the chart. See also section 7. a. of the Evaluation Report.

CONTACT DEVELOPMENT 5:

This contact although significant does not merit charting given its height and the surrounding depth of water. Concur. Shown on the

N.10 Danger to Navigation Report

None submitted.

present survey as a 16⁹ Obstr. It is recommended that the diver description of the bottom "Silt" be charted as shown on the present survey. See sheet 1 of 2.

AWOIS 8204

N.1 The object of this investigation is a wreck approximately 200 feet long first reported to the Atlantic Marine Center in 1968 by a scuba diver.

Mr. Jim Jenrette of Cape Charles, Virginia captains a charter fishing boat. He visited the RUDE and was asked if he knew anything about the wreck (AWOIS 8204) presently charted. He told us that the wreck is there and it's a popular fishing spot known locally as the "Texaco wreck". His LORAN rates provided a position almost exactly the same as the geographic position given for this item.

N.2 Item Location

Geographic position provided was: 37° 15' 06.49" N
76° 05' 09.76" W

N.3 Source of Item

CL1380/68 and Notices to Mariners 41/68 and 46/68.

N.4 Largest Scale Chart Affected

Chart 12224, scale 1:40,000, edition 19 dated February 9, 1991.

N.5 Investigation Procedures

Survey requirements called for 400% side scan sonar coverage in conjunction with echosounder development in a 500 meter search radius. A diver investigation was also required, if appropriate.

This item was found on the first side scan sonar line (150 meter range scale) run over the geographic position provided. A buoy was dropped over the position in preparation for making a dive. On the first dive, the least depth obtained by diver's depth gauges did not correlate with what was expected from prior review of the echogram for this item. A second dive was made to further explore the wreck. During this second dive, the divers obtained a least depth for the wreck by use of a pneumatic depth gauge (0-70 fsw). Diver visibility during both investigations was poor, generally 5 feet. Very little could be ascertained about the physical characteristics of the wreck.

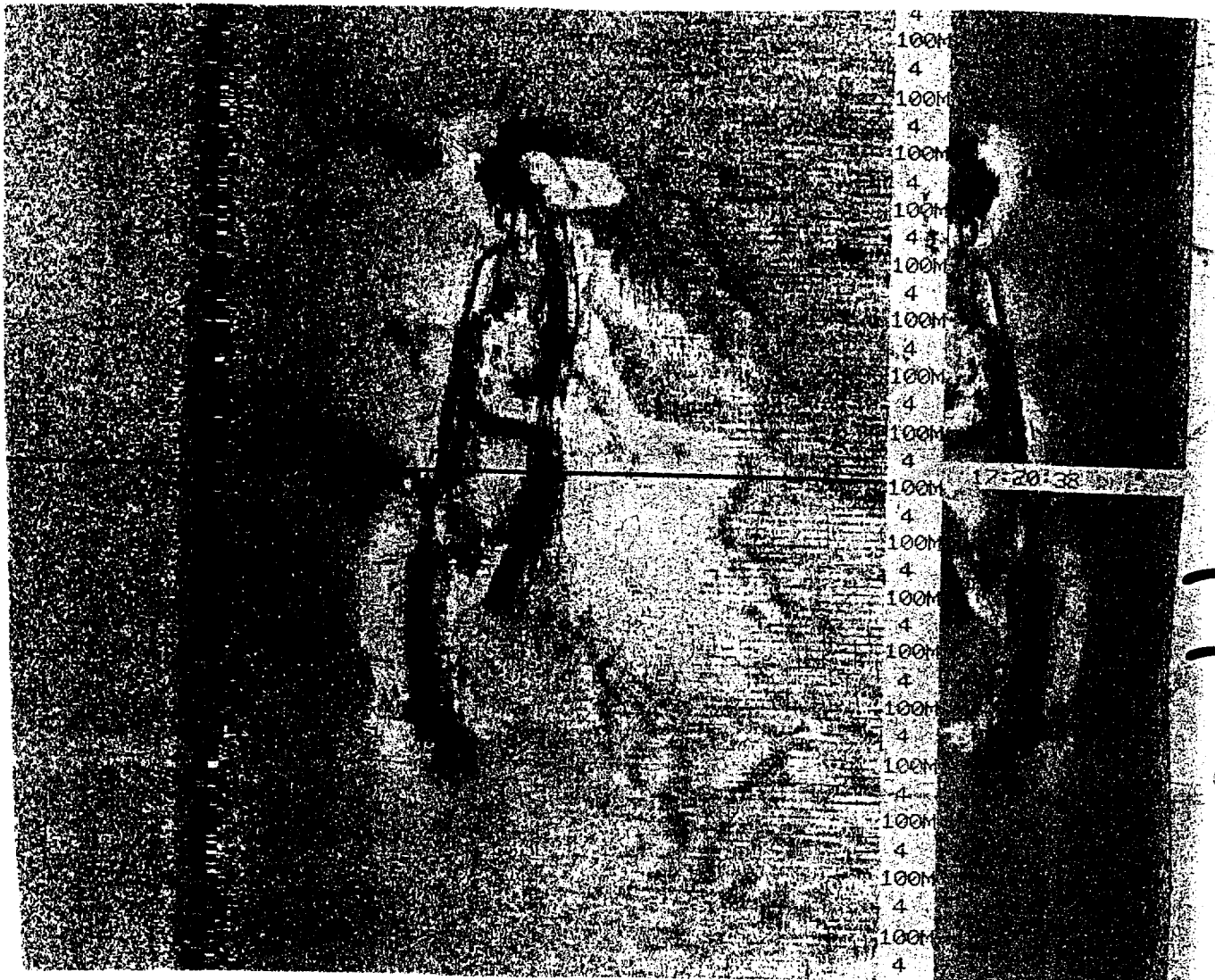
In keeping with general practice, the procedure for getting a detached position on an item is to maneuver the ship right alongside the buoy the divers placed on the shoalest point of the wreck. Then the ship moves around this point recording several detached positions with the echosounder that correspond to the position where the divers made their least depth determination. Unfortunately, because of strong currents in the area, the buoy was dragged off the wreck after the divers were recovered from the water. Thus, the ship was unable to obtain a position over the diver's least depth.

N.10 Danger to Navigation Report

This item was not reported as a danger to navigation.

AWOIS 8204 - "TEXACO WRECK"

LINE HEADING 220 DEGREES, APPROX. LENGTH 90 METERS



O. ADEQUACY OF SURVEY *See section 8 § 9 of the Evaluation Report.*

O.1 All items investigated during this survey have been addressed. -

O.2 There are no parts of the survey that are considered incomplete or substandard. ✓

P. AIDS TO NAVIGATION *See also section 7.6. of the Evaluation Report*

P.1 The RUDE conducted no correspondence with the U.S. Coast Guard regarding floating aids to navigation. -

P.2 No aids to navigation were investigated for positioning during this survey. -

P.3 No aids not already listed in the Light List were located during this survey. -

P.4 No bridges, overhead cables or overhead pipelines are located within the survey area. -

P.5 No submarine cables, pipelines or ferry routes are located within the survey area. -

P.6 No ferry terminals are located within the survey area. -

Q. STATISTICS

Q.1	a) Number of positions	197
	b) Lineal nautical miles of sounding lines	
	-nautical miles of survey with the use of the side scan sonar	24.9
	-nautical miles of survey without the use of the side scan sonar	2.8
Q.2	a) square nautical miles of hydrography	0.3
	b) days of production	7
	c) detached positions	6
	-one for diver investigation	
	-five for contact development	
	d) bottom samples	0
	e) tide stations	0
	f) current stations	0
	g) velocity casts	1
	h) magnetic stations	0
	i) XBT drops	0

R. MISCELLANEOUS

R.1 a) No evidence of silting was found during this survey.

b) No evidence of unusual submarine features was found during this survey.

c) No evidence of anomalous tidal conditions was found during this survey.

d) Currents associated with ebb tides in the area were observed to run in a southerly direction while currents associated with a flood tide ran in a northerly direction. The maximum surface current observed in the project area was approximately 1.5 knots.

e) No evidence of magnetic anomalies was found during this survey.

R.2 Bottom samples were not required for this project.

S. RECOMMENDATIONS

S.1 No survey inadequacies have been noted.

S.2 The RUDE is aware of no construction or dredging that will affect results of this survey.

S.3 No further investigation of the survey area is recommended. The existing charted depths adequately represent current soundings (see section N), and a basic survey of any of the area covered is not recommended. *Concur*

T. REFERRAL TO REPORTS

No other reports have been submitted in conjunction with this survey.

APPENDIX I. DANGER TO NAVIGATION REPORTS

No danger to navigation reports were submitted in conjunction
with this survey.

✓

APPENDIX II. NON-FLOATING AIDS AND LANDMARKS FOR CHARTS

NOAA Form 76-40 is attached.

RESPONSIBLE PERSONNEL

TYPE OF ACTION

NAME

ORIGINATOR

OBJECTS INSPECTED FROM SEAWARD

- PHOTO FIELD PARTY
- HYDROGRAPHIC PARTY
- GEODETIC PARTY
- OTHER (Specify)

POSITIONS DETERMINED AND/OR VERIFIED

FIELD ACTIVITY REPRESENTATIVE

FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW

OFFICE ACTIVITY REPRESENTATIVE

ACTIVITIES

- REVIEWER
- QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'

(Consult Photogrammetric Instructions No. 64.)

R. Q. Smith

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS

Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object.

EXAMPLE: 75E(C)6042
8-12-75

FIELD (Cont'd)

B. Photogrammetric field positions** require

entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object.

EXAMPLE: P-8-V
8-12-75
74L(C)2982

FIELD

I. NEW POSITION DETERMINED OR VERIFIED

Enter the applicable data by symbols as follows:

- F - Field
- L - Located
- V - Verified
- 1 - Triangulation
- 2 - Traverse
- 3 - Intersection
- 4 - Resection
- P - Photogrammetric
- Vis - Visually
- 5 - Field identified
- 6 - Theodolite
- 7 - Planetable
- 8 - Sextant

A. Field positions* require entry of method of location and date of field work.

EXAMPLE: F-2-6-L
8-12-75

*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.

II. TRIANGULATION STATION RECOVERED

When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery.

EXAMPLE: Triang. Rec.
8-12-75

III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH

Enter 'V-Vis.' and date.

EXAMPLE: V-Vis.
8-12-75

**PHOTOGAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.

RESPONSIBLE PERSONNEL

TYPE OF ACTION

NAME

ORIGINATOR

OBJECTS INSPECTED FROM SEAWARD

- PHOTO FIELD PARTY
- HYDROGRAPHIC PARTY
- GEODETIC PARTY
- OTHER (Specify)

POSITIONS DETERMINED AND/OR VERIFIED

FIELD ACTIVITY REPRESENTATIVE

OFFICE ACTIVITY REPRESENTATIVE

FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES

- REVIEWER
- QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'

(Consult Photogrammetric Instructions No. 64.

R. W. Samuel

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS

Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object.

EXAMPLE: 75E(C)6042
8-12-75

FIELD (Cont'd)

B. Photogrammetric field positions** require

entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object.

EXAMPLE: P-8-V
8-12-75
74L(C)2982

FIELD

I. NEW POSITION DETERMINED OR VERIFIED

Enter the applicable data by symbols as follows:

- F - Field
- L - Located
- V - Verified
- 1 - Triangulation
- 2 - Traverse
- 3 - Intersection
- 4 - Resection
- P - Photogrammetric
- Vis - Visually
- 5 - Field identified
- 6 - Theodolite
- 7 - Planetable
- 8 - Sextant

A. Field positions* require entry of method of location and date of field work.

EXAMPLE: F-2-6-L
8-12-75

III. TRIANGULATION STATION RECOVERED

When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery.

EXAMPLE: Triang. Rec.
8-12-75

POSITION VERIFIED VISUALLY ON PHOTOGRAPH

Enter 'V-Vis.' and date.
EXAMPLE: V-Vis.
8-12-75

**PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.

*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.

APPENDIX III. LIST OF HORIZONTAL CONTROL STATIONS

1. See the attached list of horizontal control stations. A copy of the letter submitted to the Coastal Surveys Unit detailing the horizontal control used for this survey is attached.
2. MTEN information is included with the above letter.

CONTROL STATIONS as of 20 Mar 1992

No	Type	Latitude	Longitude	H	Cart	Freq	Vel	Code	MM/DD/YY	Station Name
101	F	037:14:53.988	076:01:13.855	0	250	0.0	0.0	4	03/17/92	CAPE CHARLES CITY RING RR LT
102	F	037:23:25.106	076:11:22.074	0	250	0.0	0.0	8	03/17/92	WOLFTRAP LIGHTHOUSE
103	F	037:13:43.614	076:02:40.872	0	250	0.0	0.0	7	03/17/92	PLANTATION
104	F	037:11:19.824	075:59:53.477	0	250	0.0	0.0	5	03/17/92	CHEAPSIDE USE 1932 ECC
105	F	037:23:25.029	076:11:21.961	0	250	0.0	0.0	8	03/18/92	WOLF TRAP LIGHTHOUSE <u>OFFSET</u>
106	F	037:15:58.073	076:01:40.657	0	250	0.0	0.0	7	03/19/92	CAPE CHARLES JETTY LIGHT



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of NOAA Corps Operations
Atlantic Marine Center
439 W. York Street
Norfolk, VA 23510-1114

March 26, 1992

MEMORANDUM FOR: Mr. James E. Dunford
Chief, Coastal Surveys Unit

FROM: Lieutenant Commander *Nicholas E. Perugini*, NOAA
Commanding Officer, NOAA Ship RUDE

SUBJECT: Horizontal Control For Survey FE-371SS

RUDE has just completed a survey in the lower Chesapeake Bay in the vicinity of Cape Charles Harbor. In lieu of a formal horizontal control report which will not be submitted until the end of the 1992 field season, this letter is submitted to allow processing of this survey.

The horizontal control involved with this project is rather straight forward. Four stations were used. Three of the four were NGS positions. Of these three, two were 1984 positions provided by your office. The other was a Blue Book position. The remaining position was a field position computed as an offset from a 1984 position also provided by your office. These stations are as follows:

101) CAPE CHARLES CITY RNG A RR LT	1984 Position
104) CHEAPSIDE USE 1932 ECC	1984 Position
105) WOLF TRAP LIGHTHOUSE 1898 OFFSET	Field Position
106) CAPE CHARLES JETTY LIGHT	Blue Book Position

Stations 101, 104 and 105 required conversion of their positions from NAD 27 values to NAD 83 values. This was done by use of NADCON and the information is included with this letter. The position for station 3 was provided in NAD 83 values.

It was necessary to utilize station 105 as an offset since the light itself could not be occupied. The offset was computed by establishing the Falcon Mini-Ranger unit in a direct line between station Cape Charles Water Tank - Char and station Wolf Trap Lighthouse 1898. By use of MTEN, an inverse was calculated between these two stations which provided an azimuth for the Mini-Ranger. Then using the measured distance between the position of the Mini-Ranger and Wolf Trap Lighthouse 1898 and by use of MTEN, a position was computed for the offset. This position was used for the control station table in HDAPS. A copy of these calculations as provided by MTEN is included with this letter as well as a diagram of the offset position itself.

I anticipate that Atlantic Hydrographic Section will contact you for verification of these horizontal control stations.



North American Datum Conversion
 NAD 27 to NAD 83
 NADCON Program Version 1.01

Transformation #: 1 Region: Conus

Station name: CHEAPSIDE USE 1932 ECC

	Latitude		Longitude
NAD 27 datum values:	37 11 19.319		75 59 54.720
NAD 83 datum values:	37 11 19.824		75 59 53.476
NAD 83 - NAD 27 shift values:	.505		-1.244 (secs.)
Magnitude of total shift:	15.578		-30.673 (meters)
		34.402 (meters)	

Transformation #: 2 Region: Conus

Station name: WOLF TRAP LIGHTHOUSE 1898

	Latitude		Longitude
NAD 27 datum values:	37 23 24.618		76 11 23.295
NAD 83 datum values:	37 23 25.106		76 11 22.074
NAD 83 - NAD 27 shift values:	.488		-1.221 (secs.)
Magnitude of total shift:	15.044		-30.041 (meters)
		33.597 (meters)	

Transformation #: 3 Region: Conus

Station name: CAPE CHARLES CITY RANGE A RR LIGHT

	Latitude		Longitude
NAD 27 datum values:	37 14 53.489		76 01 15.094
NAD 83 datum values:	37 14 53.988		76 01 13.854
NAD 83 - NAD 27 shift values:	.499		-1.240 (secs.)
Magnitude of total shift:	15.393		-30.549 (meters)
		34.208 (meters)	

DIRECT COMPUTATIONS

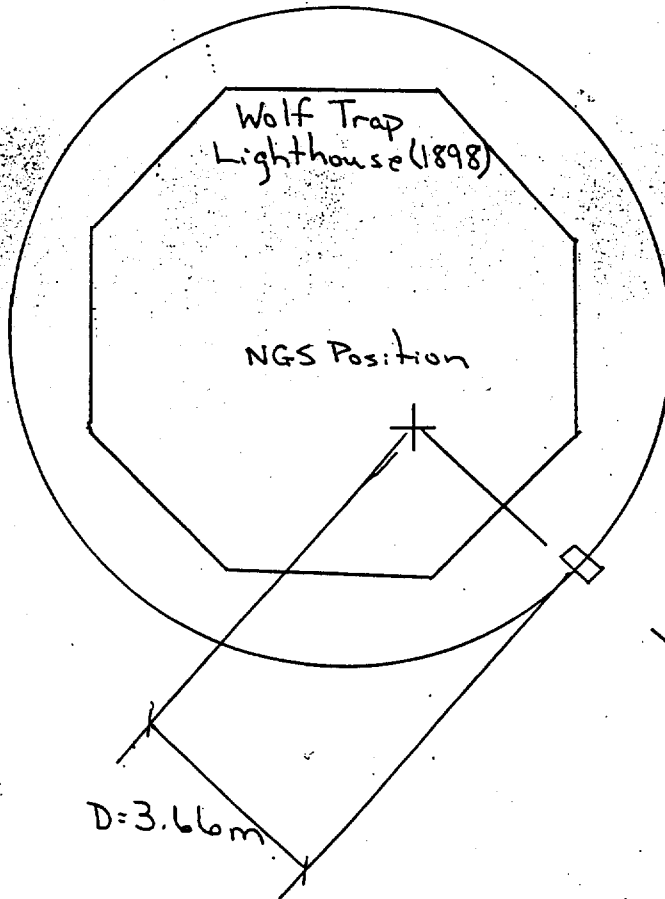
STATION ... "FROM"	AZIMUTHS/DISTANCE	STATION ... "TO"
WOLF TRAP LIGHTHOUSE	-INVERSE-	CAPE CHARLES WATER TAN
FWD 130-30-42.24578		
LAT 037-23-25.10600 N	BCK 310-37-12.71224	LAT 037-16-04.91168 N
LON 076-11-22.07400 W	DST 20867.5764	LON 076-00-38.15851 W
WOLF TRAP LIGHTHOUSE	-DIRECT-	WOLF TRAP LIGHT OFFSET
FWD 130-30-42.24578		
LAT 037-23-25.10600 N	BCK 310-30-42.31447	LAT 037-23-25.02888 N
LON 076-11-22.07400 W	DST 3.6600	LON 076-11-21.96088 W

DIRECT COMPUTATIONS

STATION ... "FROM"	AZIMUTHS/DISTANCE	STATION ... "TO"
WOLF TRAP LIGHTHOUSE	-INVERSE-	CAPE CHARLES WATER TANK
LAT 037-23-25.10600 N	FWD 130-30-42.24578	LAT 037-16-04.91168 N
LON 076-11-22.07400 W	BCK 310-37-12.71224	LON 076-00-38.15851 W
	DST 20867.5764	
WOLF TRAP LIGHTHOUSE	-DIRECT-	WOLF TRAP LIGHT OFFSET
LAT 037-23-25.10600 N	FWD 130-30-42.24578	LAT 037-23-25.02888 N
LON 076-11-22.07400 W	BCK 310-30-42.31447	LON 076-11-21.96088 W
	DST 3.6600	

Position of Falcon Equipment
On Wolf Trap Lighthouse

RE-ENTER ... "GEODETTIC" ... INVERSE (Y/N)? -



Mini-Ranger was sighted in line with Wolf Trap Lighthouse and Cape Charles Water Tank. An inverse was computed between these stations to calculate the Az of the offset

Az = 130° 30' 42.24578"

Cape Charles Water Tank \triangle
(Char)

APPENDIX VII. APPROVAL SHEET

LETTER OF APPROVAL

REGISTRY NO. FE-371SS

Field operations contributing to the accomplishment of this survey were conducted under my supervision with frequent personal checks of progress and adequacy. This report and field sheets have been reviewed and are considered complete and adequate for charting.

There is strong evidence which suggests that the submerged obstruction described in AWOIS 8202 no longer exists in its currently charted position. Nothing remotely resembling a "solid" contact was observed within the 500 meter search radius after 500 percent coverage. Unfortunately, the RUDE and other NOAA field units do not have experience searching for relatively small objects suspended in the water column. We are not certain how this object would appear on a sonargram. *The investigation and records were considered adequate to disprove this item.*

Acoustic theory suggests that a steel sphere filled with air would provide a good acoustic target. In addition, the 1000 lb weight required to keep the sphere submerged should also present a good target. However, the silty bottom conditions and the surface return encountered during this survey did not yield the highest quality sonargrams. Taking all of the above factors into account, the ship has recommended that the charted obstruction be retained with an "Existence Doubtful" note. *Do not concur. See Section 7.a. of the Evaluation Report.*

If this item is of sufficient importance to the Hydrographic Surveys Branch, the ship should be directed to replicate the obstruction and run test patterns over the submerged sphere. If the return from the sphere proved to have a prominent signature, the sonargrams submitted with this survey could be revisited and a full disproof recommended. *See sections 8 & 9 of the Evaluation Report.*



Nicholas E. Perugini, LCDR NOAA
Commanding Officer
NOAA Ship RUDE



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Ocean and Earth Sciences
Rockville, Maryland 20852

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: April 10, 1992

MARINE CENTER: Atlantic

OPR: S-E937-RU

HYDROGRAPHIC SHEET: FE-371SS

LOCALITY: Virginia, Chesapeake Bay, Three Point Five Nautical
Miles West of Cape Charles Harbor

TIME PERIOD: March 18 - March 25, 1992

TIDE STATION USED: 863-8863 Chesapeake Bay Bridge Tunnel, Va.
Lat. $36^{\circ} 58.0'N$ Lon. $76^{\circ} 06.8'W$

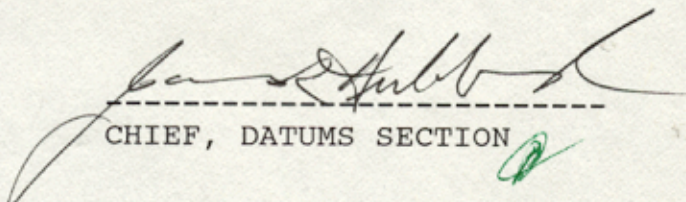
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 24.88 ft.

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.7 ft.

REMARKS: RECOMMENDED ZONING

For AWOIS items #8202 and #8204, apply a +55 minute time correction
and a x0.90 range ratio to Chesapeake Bay Bridge Tunnel, Va.
(863-8863).

Note: Times are tabulated in Eastern Standard Time.


CHIEF, DATUMS SECTION



GEOGRAPHIC NAMES

Name on Survey	<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">A ON CHART NO.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">B ON PREVIOUS SURVEY NO.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">C ON U.S. QUADRANGLE MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">D FROM LOCAL INFORMATION</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">E ON LOCAL MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">F P.O. GUIDE OR MAP</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">G RAND McNALLY ATLAS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">H U.S. LIGHT LIST</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">K</div> </div>											
	Cape Charles Harbor (title) X											
Chesapeake Bay (title) X												2
Virginia (title) X												3
												4
												5
												6
												7
												8
												9
												10
												11
												12
												13
												14
												15
												16
												17
												18
												19
												20
												21
												22
												23
												24
												25

Approved:

Charles E. Harrington
Chief Geographer

AUG 17 1992

08/14/92

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: FE-371SS

NUMBER OF CONTROL STATIONS	4
NUMBER OF POSITIONS	182
NUMBER OF SOUNDINGS	583

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	33	07/31/92
VERIFICATION OF FIELD DATA	72	06/19/92
ELECTRONIC DATA PROCESSING	16	
QUALITY CONTROL CHECKS	22	
EVALUATION AND ANALYSIS	12	07/23/92
FINAL INSPECTION	3	08/14/92
TOTAL TIME	158	
ATLANTIC HYDROGRAPHIC SECTION APPROVAL		08/14/92

N/CG244-63-92

LETTER TRANSMITTING DATA

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

ORDINARY MAIL AIR MAIL

REGISTERED MAIL EXPRESS

GBL (Give number) _____
hand carried

DATE FORWARDED

8-14-92

NUMBER OF PACKAGES

1 envelope

TO:

NOAA/National Ocean Service
Hydrographic Surveys Branch
N/CG241-~~RIMM~~ S. Verry
Rockville, MD 20852

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.

SURVEY FE-371ss

1 original Descriptive Report and smooth plots .

Survey records will be sent seperately.

FROM: (Signature)

R. D. *Sanocki*

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

NOAA-National Ocean Service
Atlantic Hydrographic Section
ATTN: N/CG2441-Sanocki
439 West York Street
Norfolk, VA 23510-1114

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

SURVEY NO.: FE-371SS

FIELD NO.: RU-20-1-92

Virginia, Chesapeake Bay, 3.5 NM West of Cape Charles Harbor

SURVEYED: 18 March through 25 March 1992

SCALE: 1:20,000

PROJECT NO.: S-E937-RU-92

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

CONTROL: MOTOROLA FALCON 484 Mini-Ranger (Range/Range)

Chief of Party.....N. E. Perugini

Surveyed by.....P. L. Schattgen
.....M. J. Oberlies
.....J. A. Illg
.....D. E. Williams

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

1. INTRODUCTION

a. This is primarily a side scan sonar survey. A Raytheon DSF-6000N Fathometer was operated concurrently with the side scan sonar. Pneumatic depth gauges were used to determine least depths during dive operations. No wire drag was accomplished during this survey.

b. One (1) 1:10,000 and one (1) 1:20,000 scale page size plots were generated during office processing and are attached to this report. These plots are considered the smooth plots for this survey.

c. No unusual problems were encountered during office processing.

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

2. CONTROL AND SHORELINE

a. Control is adequately discussed in sections H. and I. of the Descriptive Report.

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD 83). Office processing of this survey is based on these values. The smooth sheets have been annotated with ticks

showing the computed mean shift between the NAD 83 and the North American Datum of 1927 (NAD 27).

To place the 1:20,000 scale sheet 1 of 2 on the NAD 27 move the projections 0.499 seconds (15.385 meters or 0.77 mm at the scale of the survey) north in latitude, and 1.232 seconds (30.359 meters or 1.52 mm at the scale of the survey) east in longitude.

To place the 1:10,000 scale sheet 2 of 2 on the NAD 27 move the projections 0.499 seconds (15.385 meters or 1.54 mm at the scale of the survey) north in latitude, and 1.232 seconds (30.359 meters or 3.03 mm at the scale of the survey) east in longitude.

b. There is no shoreline with the limits of this survey.

3. HYDROGRAPHY

a. Hydrography run and shown on the smooth plots included in this report to determine least depths has had all correctors applied, and may be used to supplement the present charted hydrography in the common area.

b. Where applicable, soundings at crossings are in good agreement.

c. Development of bottom configuration and determination of least depths is considered adequate.

4. CONDITION OF SURVEY

The smooth sheets and accompanying overlays, hydrographic records, and reports are adequate and conform to the requirements of the HYDROGRAPHIC MANUAL, SIDE SCAN SONAR MANUAL, FIELD PROCEDURE MANUAL, and Project Instructions.

5. JUNCTIONS

There are no contemporary junctional surveys.

6. COMPARISON WITH PRIOR SURVEYS

H-8012 (1950-52) 1:20,000

Present soundings agree well with the prior survey within the common area of AWOIS item #8202, sheet 1 of 2. Both present and prior soundings are in agreement in depths less

than 18² m (60 ft). In depths greater than 18² m, present survey soundings are 1 to 2 m (3.2 to 6.5 ft) shoaler than the prior survey. This is probably due to the slope of the bottom.

Comparison between the present survey (sheet 2 of 2) and the prior survey is adequately discussed in section M.3, page 15, of the Descriptive Report.

The present survey is considered adequate to supersede the prior survey in the common area.

7. COMPARISON WITH CHARTS 12224 (19th Ed., Feb. 9/91)

a. Hydrography

The charted hydrography originates with the previously discussed prior survey. Specific items are discussed in section N. of the Descriptive Report and require no additional comments except for the following:

AWOIS item 820², an Obstruction with a depth of 20 feet charted in Latitude 37°15'51.97"N, Longitude 76°06'11.04"W originating with LNM 18 of 1989 is considered adequately investigated to disprove its existence. No additional work is recommended and the charted obstruction should be removed from the chart.

b. Aids to Navigation

There are no fixed or floating aids to navigation within the limits of this survey.

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

8. COMPLIANCE WITH INSTRUCTIONS

This survey adequately complies with the Project Instructions.

9. ADDITIONAL FIELD WORK

This is a good side scan sonar survey. No additional field work is recommended.

Franklin L. Saunders

Franklin L. Saunders
Cartographic Technician
Verification of Field Data

Richard H. Whitfield

Richard H. Whitfield
Cartographer
Evaluation and Analysis

Robert R. Hill

Robert R. Hill
Senior Cartographic Technician
Verification Check

APPROVAL SHEET
FE-371SS

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 disproof of charted data. The digital data have been completed and all revisions and additions made to the smooth sheet during survey processing have been entered in the magnetic tape record for this survey. Final control, position, and sounding printouts of the survey have been made. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

R. D. Sanocki Date: 8-14-92
R. D. Sanocki
Chief, Hydrographic Processing Unit
Atlantic Hydrographic Section

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

George E. White LEDR, NOAA Date: 8-14-92
for Christopher B. Lawrence, CDR, NOAA
Chief, Atlantic Hydrographic Section

Final Approval:

Approved: J. Austin Yeager Date: 5/18/94
J. Austin Yeager
Rear Admiral, NOAA
Director, Coast and Geodetic
Survey

76° 07'

76° 06'

76° 05'

76° 06' 00"

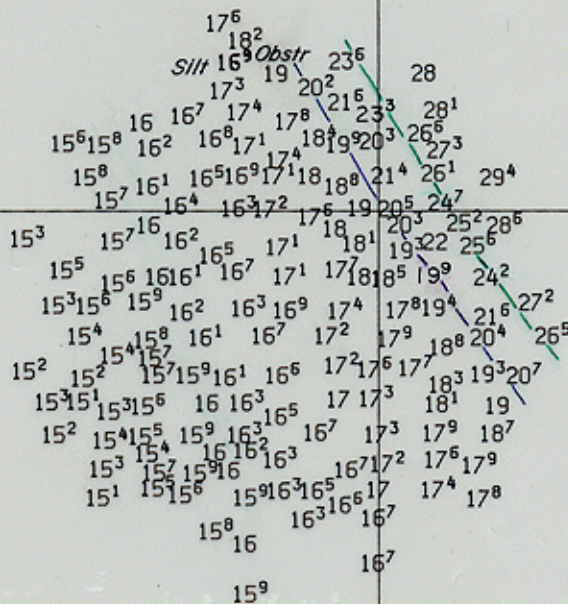
37° 17' 00"

NAD 27

XYNETICS 1200

MM 6/17/92

37° 17'



37° 16'

37° 15'

1090

FE-371SS
 VIRGINIA
 CHESAPEAKE BAY
 3.5 NM WEST OF CAPE CHARLES HARBOR
 DATE OF SURVEY: 18 MAR 1992 TO 25 MAR 1992
 SCALE: 1:20000
 SOUNDINGS IN METERS AT MLLW
 HORIZONTAL DATUM: NAD 1983
 SHEET 1 OF 2
 AWOIS ITEM NUMBER 8202

+

76° 05' 30"

76° 05' 00"

76° 05' 00"

37° 15' 30"

37° 15' 30"

NAD 27
XYNETICS 1201
MM 6/15/92

19

21⁸

16⁷ 17³ 17⁴ 18⁸
16¹ 16⁵ 17
15⁹ 16² 17¹ 17²

37° 15' 00"

Wk "TEXACO" (Least depth 12⁷ meters)

16⁴ 17³
15⁹ 17⁴
15⁵ 15⁶ 16¹ 16⁸ 17
15¹ 15⁵ 16⁶ 16⁹ 17¹

15¹

37° 14' 30"

570

FE-371SS
VIRGINIA
CHESAPEAKE BAY
3.5 NM WEST OF CAPE CHARLES HARBOR
DATE OF SURVEY: 24 MAR 1992
SCALE: 1:10000
SOUNDINGS IN METERS AT MLLW
HORIZONTAL DATUM: NAD 1983
SHEET 2 OF 2
AWOIS ITEM NUMBER 8204

+

LAT 37:15:40

LAT 37:16:00

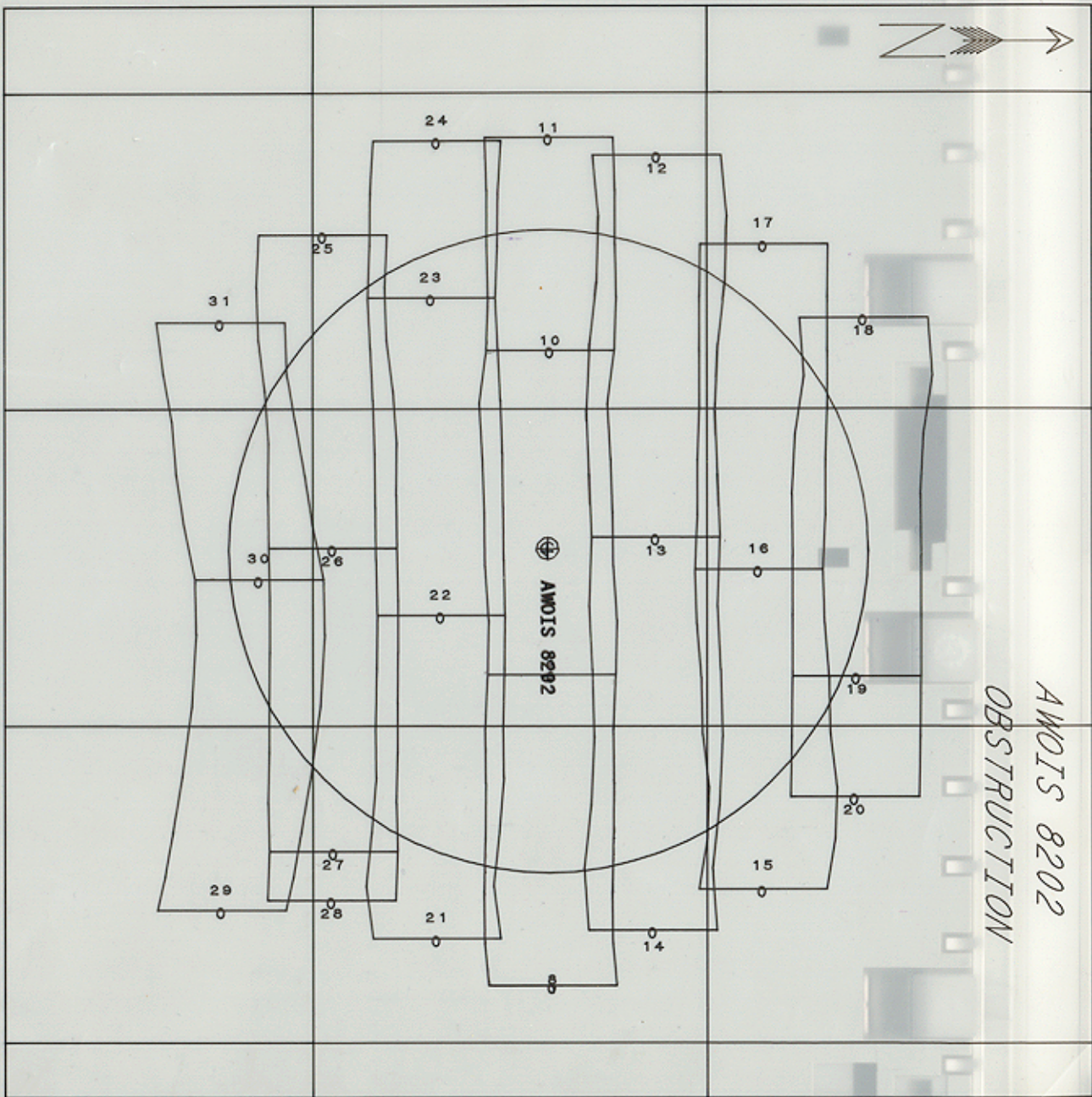


LON 76:06:40

LON 76:06:20

LON 76:06:00

LON 76:05:40



FE-371SS
 VIRGINIA - CHESAPEAKE BAY
 REE POINT FIVE NAUTICAL MILES
 WEST OF CAPE CHARLES
 20 MARCH 1992
 SCALE: 10,000
 SOUNDINGS IN METERS AT MLLW
 HORIZONTAL DATUM: NAD 1983

R11-00-1-92

SWATH PLOT
 Day 079
 FIXES 8 to 34

AWOIS 8202
OBSTRUCTION



LAT 37:16:00

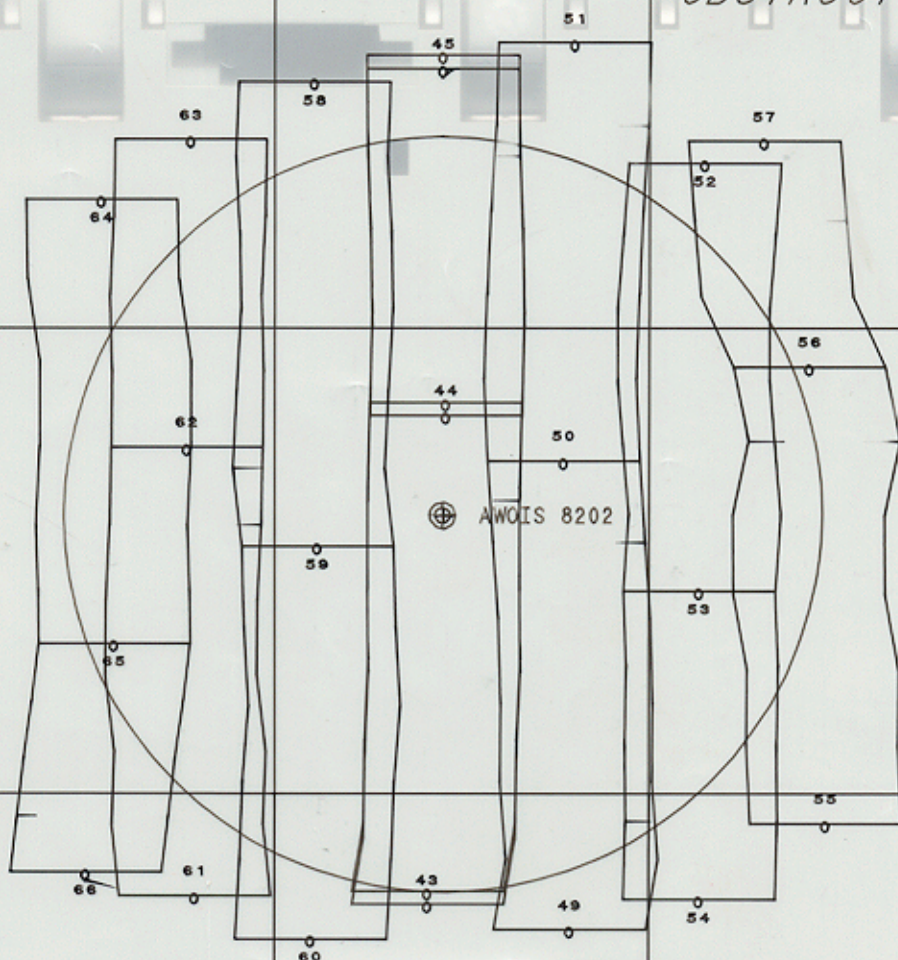
LAT 37:15:40

LON 76:06:40

LON 76:06:20

LON 76:06:00

LON 76:05:40



FE-371SS
VIRGINIA - CHESAPEAKE BAY
THREE POINT FIVE NAUTICAL MILES
WEST OF CAPE CHARLES
20 MARCH 1992
SCALE: 10,000
SOUNDINGS IN METERS AT MLLW
HORIZONTAL DATUM: NAD 1983

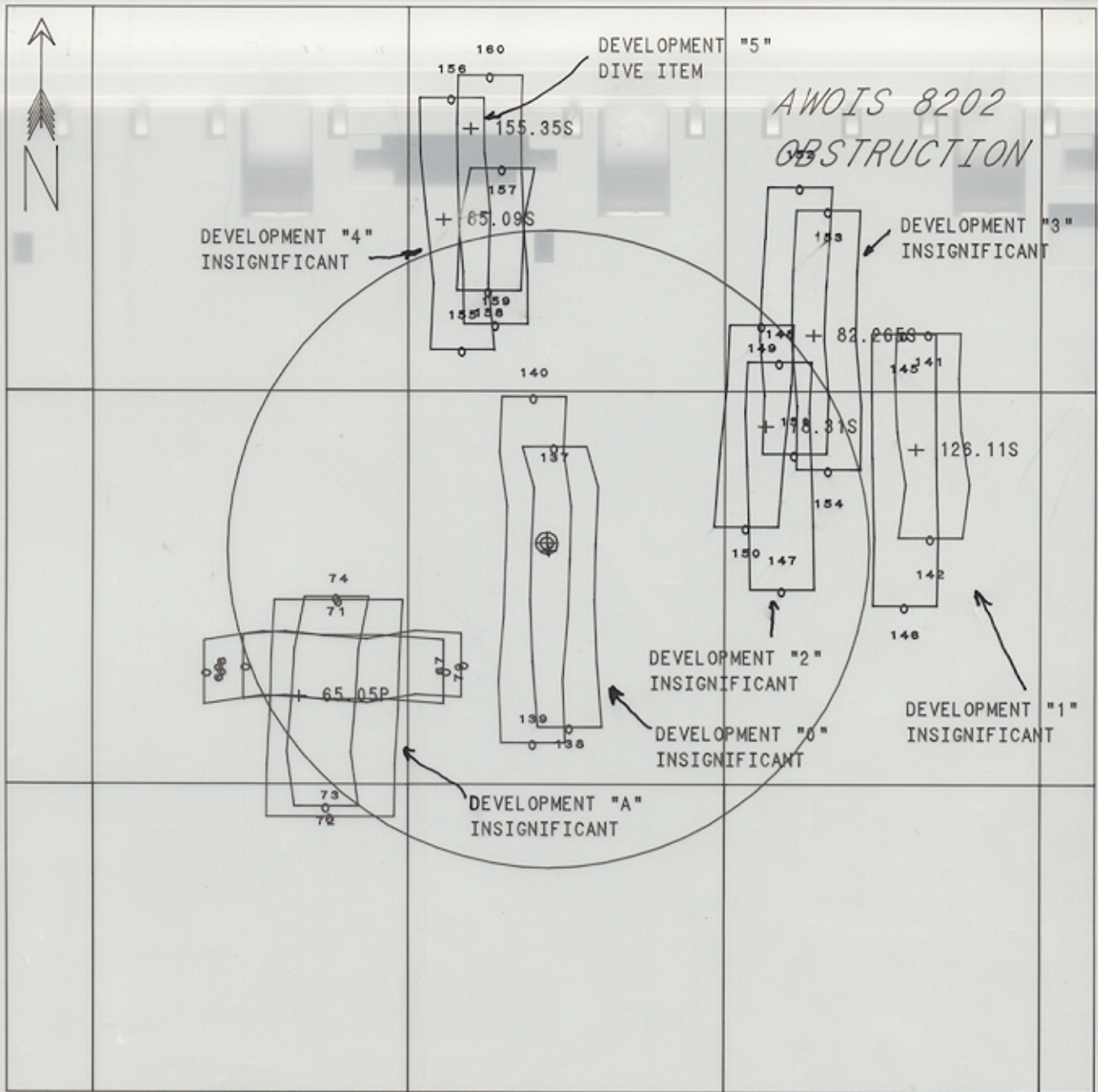
SWATH PLOT
Day 080
FIXES 43 to 66

26-1-00-78



LAT 37:16:00

LAT 37:15:40



LON 76:06:40

LON 76:06:20

LON 76:06:00

LON 76:05:40

FE-371SS
 VIRGINIA - CHESAPEAKE BAY
 THREE POINT FIVE NAUTICAL MILES
 WEST OF CAPE CHARLES
 20 MARCH 1992
 SCALE: 10,000
 SOUNDINGS IN METERS AT MLLW
 HORIZONTAL DATUM: NAD 1983

DEVELOPMENTS
 A - 65.05P DAY 84 FIXES 67 TO 74
 0 - ORIGIN DAY 84 FIXES 137 TO 140
 1 - 126.11S DAY 84 FIXES 141 TO 146
 2 - 78.31S DAY 84 FIXES 147 TO 150
 3 - 82.26S DAY 84 FIXES 151 TO 154
 4 - 85.09S DAY 84 FIXES 159 TO 160
 5 - 155.35S DAY 85 FIXES 161 TO 170



AWOIS 8202
OBSTRUCTION

LAT 37:15:40

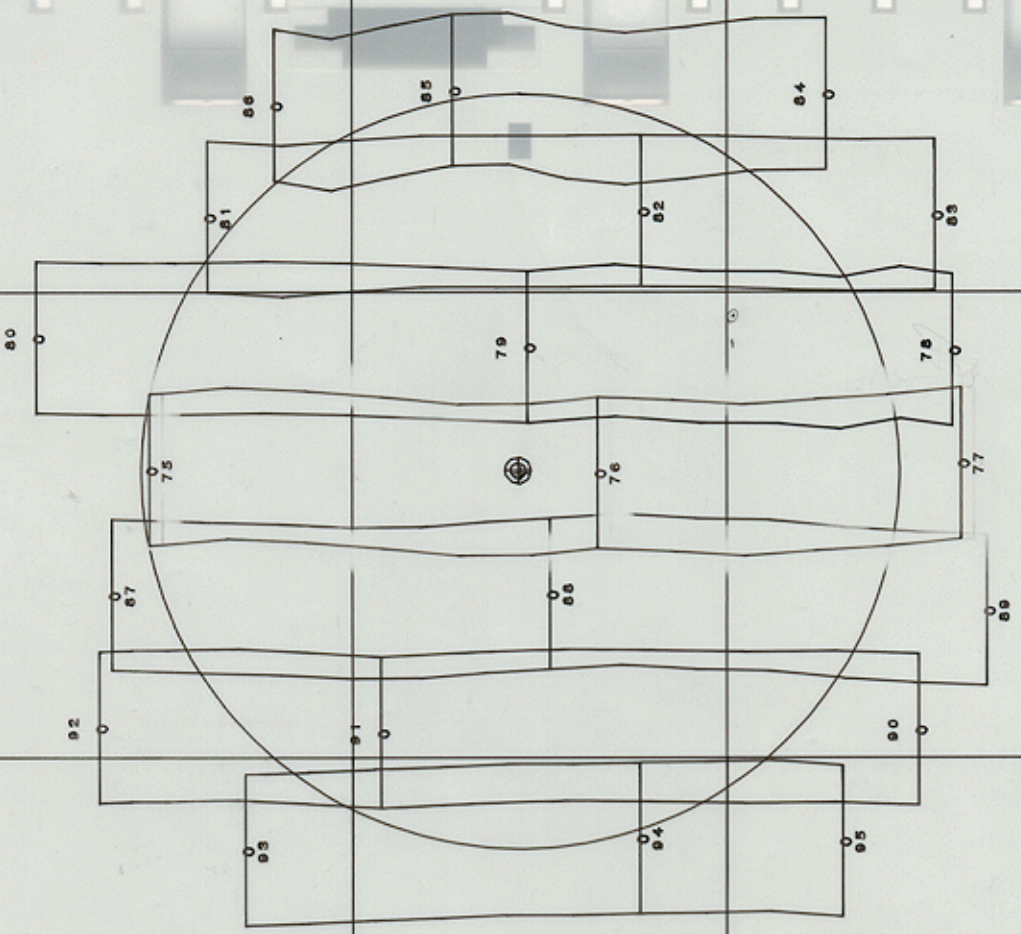
LAT 37:16:00

LON 76:06:40

LON 76:06:20

LON 76:06:00

LON 76:05:40



FE-371SS
VIRGINIA - CHESAPEAKE BAY
THREE POINT FIVE NAUTICAL MILES
WEST OF CAPE CHARLES
20 MARCH 1992
SCALE: 10,000
SOUNDINGS IN METERS AT MLLW
HORIZONTAL DATUM: NAD 1983

SWATH PLOT
Day 080
FIXES 75 to 95

RV-20-1-92

AWOIS 8202
OBSTRUCTION



LAT 37:16:00

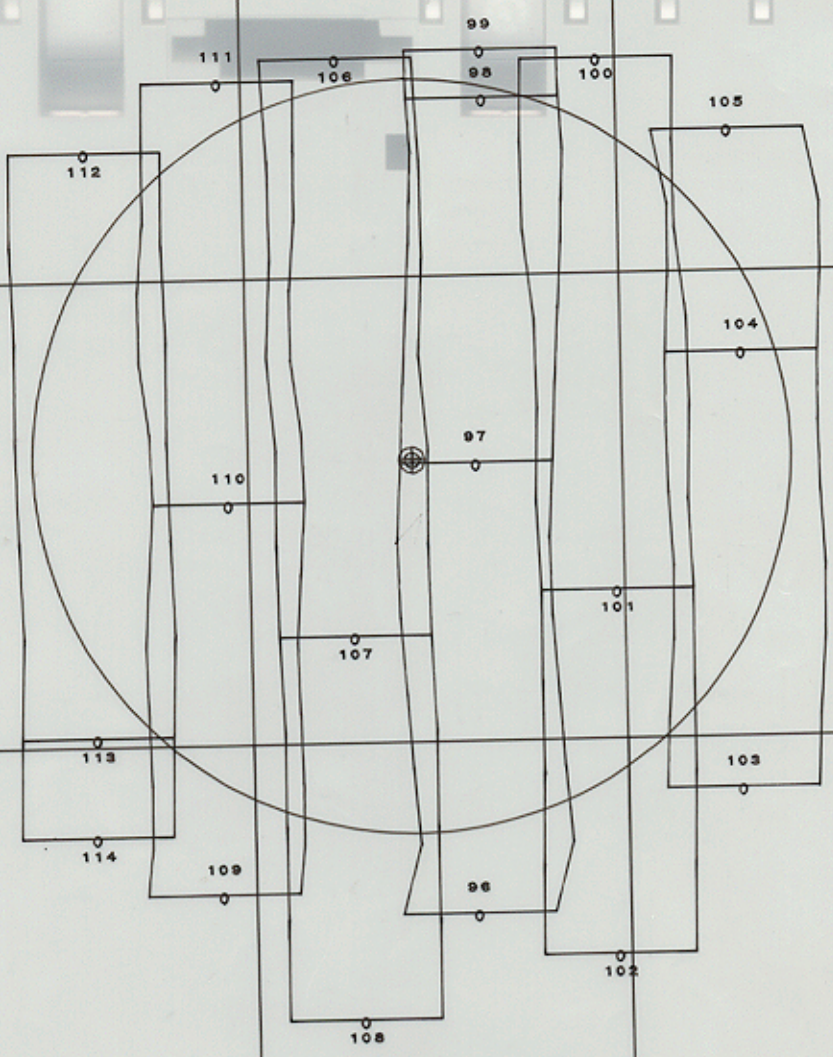
LAT 37:15:40

LON 76:06:40

LON 76:06:20

LON 76:06:00

LON 76:05:40



FE-371SS
VIRGINIA - CHESAPEAKE BAY
THREE POINT FIVE NAUTICAL MILES
WEST OF CAPE CHARLES
20 MARCH 1992
SCALE: 10,000
SOUNDINGS IN METERS AT MLLW
HORIZONTAL DATUM: NAD 1983

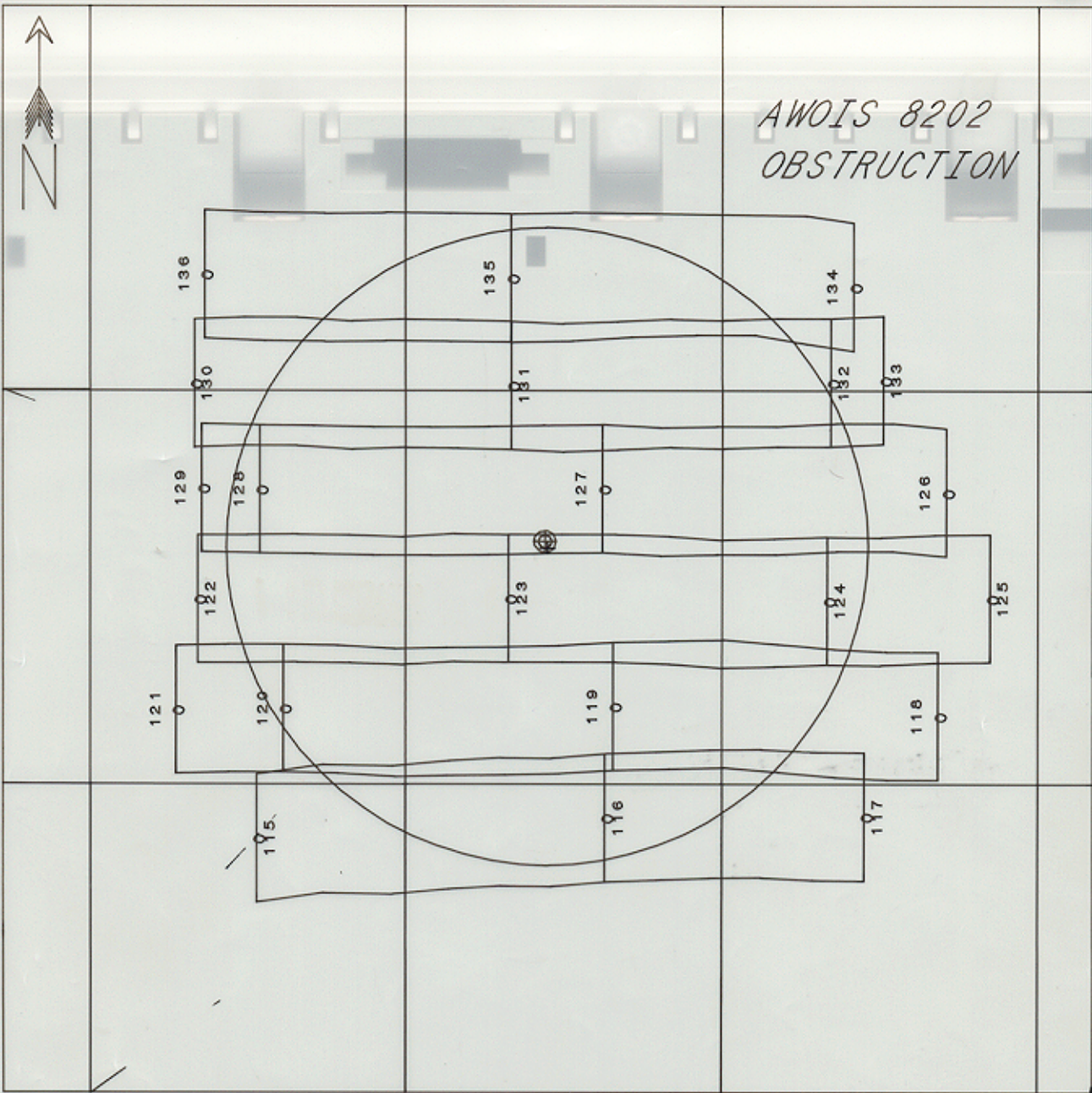
SWATH PLOT
Day 080
FIXES 96 to 114

AWOIS 8202
OBSTRUCTION



LAT 37:16:00

LAT 37:15:40



LON 76:06:40

LON 76:06:20

LON 76:06:00

LON 76:05:40

FE-371SS
VIRGINIA - CHESAPEAKE BAY
REE POINT FIVE NAUTICAL MILES
WEST OF CAPE CHARLES
20 MARCH 1992
SCALE: 10,000
SOUNDINGS IN METERS AT MLLW
HORIZONTAL DATUM: NAD 1983

SWATH PLOT
DAY 084
FIXES 115 TO 136

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

Hydrographic Index No. 70 M

