

H11649

NOAA FORM 76-35A	
U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SURVEY	
DESCRIPTIVE REPORT	
Type of Survey:	<u>Multibeam and Sidescan Sonar</u>
Field No.	<u>E</u>
Registry Number:	<u>H11649</u>
LOCALITY	
State:	Delaware-Maryland
General Locality:	Atlantic Ocean
Sub-locality:	East of Fenwick Island
2007 CHIEF OF PARTY  Tom Waddington  Science Applications International Corporation	
LIBRARY & ARCHIVES	
DATE	_____

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NO.  <b>H11649</b>
<b>HYDROGRAPHIC TITLE SHEET</b>		FIELD NO. <b>E</b>
<b>INSTRUCTIONS</b> - The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.		
<p>State <u>Delaware-Maryland</u></p> <p>General locality <u>Atlantic Ocean</u></p> <p>Sub-Locality <u>East of Fenwick Island.</u></p> <p>Scale <u>1:20,000</u> Date of survey <u>17 August 2007 – 18 November 2007</u></p> <p>Instructions Dated <u>22 February 2007</u> Project No. <u>OPR-D302-KR-07</u></p> <p>Vessel <u>M/V Atlantic Surveyor D582365</u></p> <p>Chief of Party <u>Tom Waddington</u></p> <p>Surveyed by: <u>Brian Biggert, Alex Bernier, Gary Davis, Paul Donaldson, Chuck Holloway, Jason Infantino, Mike Kelly, Jeff Koch, Colette LeBeau, Rick Nadeau, Chris Pinero, Evan Robertson, Alex Schneider, Jeremy Shambaugh, Deb Smith, and Tom Waddington.</u></p> <p>Soundings taken by <u>echo sounder</u> hand lead, pole <u>MULTIBEAM RESON SEABAT 8101</u></p> <p>Graphic record scaled by _____</p> <p>Graphic record checked by _____</p> <p>Protracted by _____ Automated Plot _____</p> <p>Verification by <u>Atlantic Hydrographic Branch</u></p> <p>Soundings in fathoms, <u>meters</u>, feet at MLW, <u>MLLW</u></p>		
<b><i>Bold, talic, red notes in the Descriptive Report were made during office processing.</i></b>		
<p>REMARKS: <b>Contract:</b> DG-133C-05-CQ-1088</p> <p><b>Contractor:</b> Science Applications International Corp., 221 Third Street; Newport, RI 02840 USA</p> <p><b>Subcontractors:</b> Williamson &amp; Associates, 1124 NW 53<sup>rd</sup> Street, Seattle WA 98107; Rotator Staffing Services, PO Box 366, 557 Cranbury Rd, E. Brunswick NJ 08816</p> <p><b>Times:</b> All times are recorded in UTC</p> <p><b>UTM Zone:</b> Zone 18</p> <p><b>Purpose:</b> To provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area: Sheet E (H11649) in Mid-Atlantic Corridor, Coast of Delaware - Maryland.</p>		

Science Applications International Corporation (SAIC) warrants only that the survey data acquired by SAIC and delivered to NOAA under Contract DG-133C-05-CQ-1088 reflects the state of the sea floor in existence on the day and at the time the survey was conducted.

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**Descriptive Report to Accompany  
Hydrographic Survey H11649  
Scale 1:20,000, Surveyed 2007  
M/V Atlantic Surveyor  
Science Applications International Corporation (SAIC)  
Tom Waddington, Hydrographer**

**PROJECT**

**Project Number:** OPR-D302-KR-07

**Dates of Instructions:** 22 February 2007

**Task Order#:** T0003\*

**Dates of Supplemental Instructions:** 27 April 2007, 10 September 2007, 02 October 2007, and 11 April 2008

**Sheet Letter:** E

**Registry Number:** H11649

**Purpose:** To provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area.

**A. AREA SURVEYED**

The area surveyed was a section of the Atlantic Ocean off of Delaware and Maryland, East of Fenwick Island (Figure A-1). The line kilometers, bottom samples, item investigations and other survey parameters are located in Table A-1. The area was surveyed at set line spacing with multibeam sonar and towed sidescan sonar from 17 August 2007 to 18 November 2007 (Table A-2). The depth range encountered in this area was from 3.33 meters (11 feet, 0.270 uncertainty) to 23.36 meters (76 feet, 0.270 uncertainty). *Concur*

*\*Data filed with original field records.*

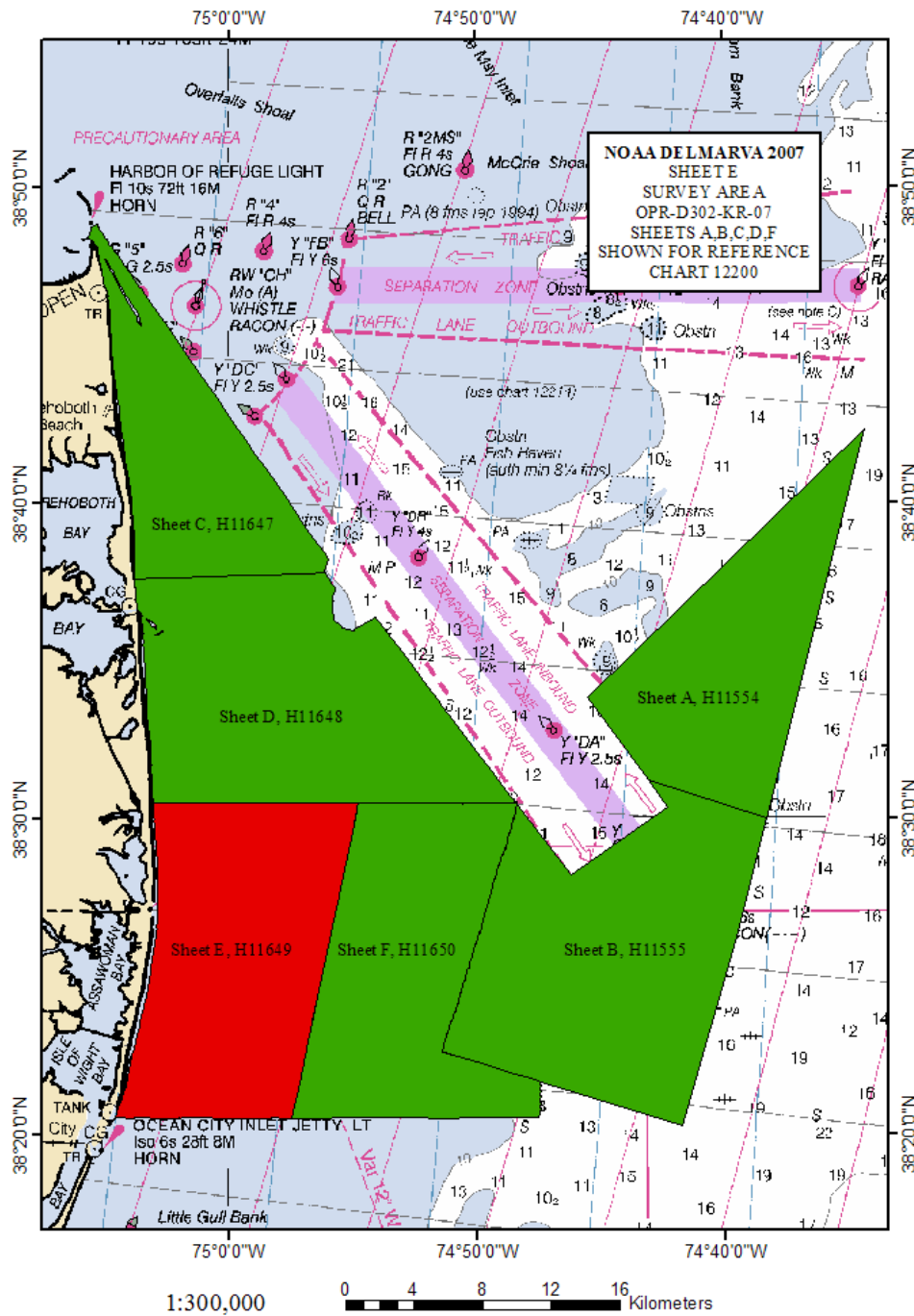


Figure A-1. H11649 Survey Bounds

Table A-1. Hydrographic Survey Statistics

<b><i>M/V Atlantic Surveyor, Sheet E H11649</i></b>	<b>Value</b>
LNM Single beam mainscheme only	N/A
LNM Multibeam mainscheme only	N/A
LNM Lidar mainscheme only	N/A
LNM Sidescan Sonar mainscheme only	3
Lineal nautical miles of mainscheme (multibeam and sidescan)	2746.3
LNM Crosslines singlebeam and multibeam combined	135.67
LNM Lidar Crosslines	N/A
LNM development lines non mainscheme	13.92
LNM shoreline/nearshore investigations	N/A
Number of Bottom Samples	26
Number of items investigated that required additional time/effort in the field beyond the above operations	0
Total number of square nautical miles	58.45

Table A-2. Dates of Multibeam Data Acquisition in Calendar and Julian Days

<b>Calendar Date</b>	<b>Julian Day</b>	<b>Calendar Date</b>	<b>Julian Day</b>
17-August-2007	229	11-September-2007	254
18-August-2007	230	12-September-2007	255
19-August-2007	231	13-September-2007	256
29-August-2007	241	14-September-2007	257
30-August-2007	242	15-September-2007	258
31-August-2007	243	16-September-2007	259
01-September-2007	244	17-September-2007	260
02-September-2007	245	27-September-2007	270
03-September-2007	246	28-September-2007	271
04-September-2007	247	29-September-2007	272
05-September-2007	248	08-October-2007	281
06-September-2007	249	13-November-2007	317
07-September-2007	250	14-November-2007	318
08-September-2007	251	17-November-2007	321
09-September-2007	252	18-November-2007	322
10-September-2007	253		



**B. DATA ACQUISITION AND PROCESSING *SEE ALSO THE EVALUATION REPORT.***

**B.1 EQUIPMENT**

A detailed description of the systems used to acquire and process these data has been included in the separate Data Acquisition and Processing Report for OPR-D302-KR-07\* delivered with Survey H11650 (Sheet F) on 02 May 2008 (SAIC document number 07-TR-012). There were no variations from the equipment configuration described. The information in Table B-1 below summarizes the information in the report.

Table B-1. Major Systems by Manufacturer and Model Number

System	Manufacturer / Model Number	Subsystem
Multibeam Sonar	RESON SeaBat 8101 ER	81P Sonar Processor
Sidescan Sonar	Klein 3000 Towfish	K-1 K-Wing Depressor, Transceiver/Processing Unit
Vessel Attitude System	TSS POS/MV Inertial Navigation System	
Positioning Systems	TSS POS/MV 320	
	Trimble 4000 GPS Receiver	
	Trimble Probeacon Differential Beacon Receiver	
Sound Speed Systems	Brooke Ocean Technology Ltd., Moving Vessel Profiler-30	Applied Microsystems Ltd. Smart SV and Pressure Sensor
	Sea-Bird Electronics, Inc. SBE 19 CTD Profiler	

**Survey Vessel**

The *M/V Atlantic Surveyor* was the platform for multibeam sonar, sidescan sonar and sound velocity data collection. Three 20-foot ISO containers were secured on the aft deck. One was used as the real-time data acquisition office, one as a data processing office, and the third for maintenance and repairs as well as spares storage. All data were shipped to the Data Processing Center in the SAIC Newport, RI office for final data processing. The Position Orientation System/Marine Vessels (POS/MV) Inertial Measurement Unit (IMU) was mounted below the main deck of the vessel, 0.34 meters port of centerline and 0.34 meters forward, 0.12 meters starboard and 1.64 meters above the RESON 8101 transducer. The multibeam sounder transducer was mounted on the hull 0.46 meters port of centerline. A Brooke Ocean Technologies Moving Vessel Profiler 30 (MVP-30) was mounted to the starboard stern quarter. Table B-2 is a list of vessel characteristics for the *M/V Atlantic Surveyor*.

***\*Data filed with original records.***

Table B-2. Survey Vessel Characteristics

Vessel Name	LOA	Beam	Draft	Max Speed	Gross Tonnage	Power (Hp)	Registration Number
<i>M/V Atlantic Surveyor</i>	110'	26'	9'	14 knots	Displacement 68 net tons Deck load 65 long tons	900	D582365

### Major Systems

SAIC used their Integrated Survey System (**ISS-2000**) software on a Windows XP platform to acquire these survey data. Survey planning and data analysis were conducted using SAIC's **SABER** software on Red Hat Enterprise 4 Linux platforms. Klein 3000 sidescan data were collected on a Windows XP platform using Klein's **SonarPro version 9.6** software. The Klein 3000 sidescan sonar data were collected in eXtended Triton Format (XTF) and maintained at full resolution, with no conversion or down sampling techniques applied. All sidescan data were reviewed using Triton **Isis** software, while coverage mosaics were produced using **SABER** on a Linux platform.

## B.2 QUALITY CONTROL

There were approximately 136 linear nautical miles of crosslines and 2746 linear nautical miles of mainscheme lines surveyed on this sheet. This resulted in crossline coverage that represented approximately five percent of the mainscheme coverage. The crosslines were oriented at 90°/270° and were spaced approximately 800 meters apart, while the mainscheme lines were oriented at 12°/192° and were spaced 40 meters apart. The sidescan sonar range scale was set to 50 meters for all mainscheme operations, providing a consistent 100-meter imagery swath. Based on the 54° beam angle used as the cutoff for acceptable multibeam data, the effective swath width for the multibeam coverage was approximately 2.75 times the water depth. Though full bottom coverage multibeam was not required, in depths greater than about 16 meters there was sufficient outer beam overlap to provide 100% multibeam bottom coverage.

A Brooke Ocean Technology Moving Vessel Profiler (MVP) with an Applied Microsystems SV&P Smart Sensor or a Seabird Electronics SBE-19 CTD was used to collect sound speed profile (SSP) data. SSP data were obtained at intervals frequent enough to reduce sound speed errors. The frequency of casts was based on observed sound speed changes from previously collected profiles and time elapsed since the last cast. Multiple casts were taken along a survey line to identify the rate and location of sound speed changes. Subsequent casts were made based on the observed trend of sound speed changes. As the sound speed profiles changed, cast frequency and location were modified accordingly. Confidence checks of the sound speed profile casts were conducted weekly by comparing two consecutive casts taken with different SV&P Smart Sensors or with a SV&P Smart Sensor and a Seabird SBE-19 CTD.

Static draft measurements were taken on each side of the vessel at each port call, both after arrival and before departure. These observed static draft measurements were used to compute and apply a prorated daily static draft during each survey leg to account for small changes in draft due to fuel and water consumption. A dynamic draft value was also applied to the data based on recorded input from the shaft RPM counters and the dynamic draft look-up table that was constructed from settlement and squat measurements taken during the pre-survey Sea Acceptance Trials.

Horizontal positioning of the multibeam transducer by the POS/MV was verified by frequent comparison checks against an independent Trimble DGPS system. During survey data acquisition, the **ISS-2000** real-time system provided a continuous view of the positioning comparison between the POS/MV and the Trimble DGPS. An alarm was triggered within **ISS-2000** if the comparisons were not within the acceptable range.

Multibeam confidence checks were conducted at least weekly by lead line measurement while in port. Table B-3 presents a summary of these comparisons showing mean differences of less than 5.9 centimeters between the lead line and the multibeam.

Table B-3. Comparison Lead Line minus Multibeam

Julian Day	Calendar Date	Port Mean (Meters)	Port STDDEV (Meters)	Starboard Mean (Meters)	Starboard STDDEV (Meters)
227	08/15/2007	0.006	0.023	0.005	0.019
232	08/20/2007	0.009	0.018	0.056	0.021
240	08/28/2007	0.008	0.019	-0.038	0.012
248	09/05/2007	0.005	0.020	0.004	0.021
255	09/12/2007	0.035	0.014	0.053	0.012
261	09/18/2007	-0.008	0.016	-0.037	0.017
268	09/25/2007	-0.023	0.014	0.002	0.019
276	10/03/2007	-0.008	0.014	0.011	0.018
283	10/10/2007	0.016	0.011	0.014	0.019
316	11/12/2007	0.030	0.011	0.058	0.021
323	11/19/2007	0.018	0.010	0.016	0.021
323	11/19/2007			0.016	0.020
MEAN OF SETS =		0.008	0.015	0.013	0.018

### Survey Systems Uncertainty Model

The Total Propagated Uncertainty (TPU) model that SAIC has adopted has its genesis at the Naval Oceanographic Office (NAVOCEANO), and is based on the work by Rob Hare and others (“Error Budget Analysis for NAVOCEANO Hydrographic Survey Systems, Task 2 FY 01”, 2001, *HSRC FY01 Task 2 Final Report*). Until recently, this concept had been referred to as the Total Propagated Error (TPE) model; however, because true error can not be measured, the term “uncertainty” has now replaced “error” throughout this discussion. This terminology has been adopted by the International Hydrographic

Organization in Special Publication No. 44, “*IHO Standards for Hydrographic Surveys, 5<sup>th</sup> Edition, February 2008*”. The fidelity of any uncertainty model is coupled to the applicability of the equations that are used to estimate each of the components that contribute to the overall uncertainty that is inherent in each sounding. SAIC’s approach to quantifying the TPU is to decompose the cumulative uncertainty for each sounding into its individual components and then further decompose those into the horizontal and vertical components. The model then combines the horizontal and vertical uncertainty components to yield an estimate of the system uncertainty as a whole. This cumulative system uncertainty is the Total Propagated Uncertainty. By using this approach, SAIC can more easily incorporate future uncertainty information provided by sensor manufacturers into the model. This also allows SAIC to continuously improve the fidelity of the model as our understanding of the sensors increases or as more sophisticated sensors are added to a system.

The data needed to drive the uncertainty model were captured as parameters taken from the Error Parameter File (EPF), which is an ASCII text file created during survey system installation and integration. The DAPR\* provides a more detailed discussion on development of the EPF and application of the TPU. Some of the required parameters are also obtained from values recorded in the GSF files during data acquisition and processing. While the input units vary, all uncertainty values that contribute to the cumulative TPU estimate are eventually converted to meters by **SABER’s Errors** program. The cumulative TPU estimates are recorded as the Horizontal Uncertainty and Vertical Uncertainty at the 95% confidence level in the GSF file. These uncertainty estimates are then used to estimate the accuracy of each individual sounding’s position and depth during both data acquisition and data processing.

*\*Data filed with original records.*

#### CUBE Uncertainty Analysis

The vertical and horizontal uncertainty values that were estimated by the TPU model for individual multibeam soundings varied little across the dataset, tending to be most affected by beam angle. All individual soundings used in development of the final CUBE depth surfaces had modeled vertical and horizontal uncertainty values at or below the allowable IHO S-44, Order 1 uncertainty. Depending on the depth, the allowable Order 1 uncertainty varied from approximately 0.5 to 0.6 meters.

During the creation of the CUBE surface, two separate uncertainty surfaces are also calculated by the **SABER** software – CUBE Standard Deviation and Average Total Propagated Uncertainty (Average TPU). The CUBE standard deviation is a measure of the general agreement between all of the soundings that contributed to the best hypothesis for the node. The Average TPU is the average of the vertical uncertainty component for each sounding that contributed to the best hypothesis for the node. A third uncertainty surface is generated from the larger of these two uncertainties at each node and is referred to as the Final Uncertainty.

After creation of the initial one-meter and half-meter PFM CUBE surfaces, the **SABER Check PFM Uncertainty** function was used to highlight all of the cases where computed final node uncertainties exceeded IHO Order 1. Appendix V\* references two attached

text files that provide a listing all of the nodes from both the one-meter and half-meter BAGs where the final uncertainties exceeded IHO Order 1. An initial review of the areas with final uncertainties exceeding IHO Order 1 revealed that most of these areas were around wrecks or obstructions and on steeper slopes where there tended to be much greater variability in the soundings that contributed to a particular node. In some cases, this uncertainty review led to the creation of additional features or designated soundings. In addition, the uncertainty review also highlighted some areas that required additional data cleaning.

Other than the expected higher uncertainties around features and steep slopes, a small number of higher uncertainty areas were also seen intermittently in the overlap areas between adjacent mainscheme lines, mainscheme lines and cross lines, or between mainscheme lines and a holiday line that was run at a much later date. Though there were extensive areas of multibeam data overlap throughout this sheet, uncertainties exceeding the IHO Order 1 limit were observed only in a few of these areas. In the cases where the uncertainties did exceed the IHO Order 1 limit there was typically an observed vertical offset between the two overlapping datasets of 20 to 25 centimeters. This intermittent observed vertical offset between adjacent lines was likely due to minor tidal zoning impacts caused by somewhat differing environmental conditions between the survey area and the primary tide gauge location in Atlantic City (see Section C for further discussion).

#### Junction and Crossing Analysis *See also the Evaluation Report.*

Comparison of mainscheme to crossline near nadir data was done daily during the survey operations to ensure that no systematic errors were introduced and to identify potential problems with the survey system. After application of all correctors and completion of final processing, separate one-meter shoal biased grids were made from the mainscheme data and from the crossline data. Comparisons of all crossing data in H11649 showed that 98.42% of comparisons were within 25 centimeters and 99.99% of comparisons were within 50 centimeters. The two comparisons greater than one meter were a large positive and negative difference in adjacent nodes that occurred along the edge of a large wreck on the western side of Fenwick Shoal. All of the other comparisons larger than 50 centimeters were accounted for by normal small DGPS position variability around this wreck, as well as the steep slopes on the south side of Fenwick Shoal. Table B-4 shows the comparisons using all crossings in H11649.

**Table B-4. Junction Analysis Mainscheme Lines vs. Near Nadir Crosslines, H11649**

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0-5	191775	31.81	91283	24.65	78609	37.29	21883	4.16
5-10	181131	61.85	111368	54.73	69763	70.39		
10-15	143382	85.63	100343	81.82	43039	90.81		
15-20	49929	93.91	38031	92.09	11898	96.45		
20-25	27210	98.42	21538	97.91	5672	99.15		

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
25-30	8350	99.8	6716	99.73	1634	99.92		
30-35	855	99.95	702	99.91	153	99.99		
35-40	119	99.96	106	99.94	13	100		
40-45	116	99.98	115	99.97	1	100		
45-50	48	99.99	48	99.99	0	100		
50-60	39	100	39	100	0	100		
60-70	7	100	7	100	0	100		
70-80	0	100	0	100	0	100		
80-90	0	100	0	100	0	100		
90-100	0	100	0	100	0	100		
100-120	0	100	0	100	0	100		
120-140	1	100	1	100	0	100		
140-160	1	100	0	100	1	100		
Total	602963	100%	370287	61.41%	210783	34.96%	21883	3.63%

Details of beam by beam comparison of 25 selected crossings in different areas of H11649 are presented in the Separates\* to this report. The crossings for detailed comparisons were randomly selected for spatial and temporal distribution over the entire survey area.

*\*Data field with field records.*

Table B-5 depicts the junction analysis between H11649 and H11650 (Sheet F) that was surveyed between 29 September and 18 November, 2007. The junction analysis was conducted in the overlap area between these two sheets and was based on the final one-meter CUBE surfaces that were created for both sheets. This analysis showed that 97.71% of the comparisons were within 15 centimeters and 100% were within 50 centimeters.

Table B-5. Junction Analysis, H11649 vs. H11650

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0-5	52254	32.48	40232	27.45	7709	76.99	4313	2.68
5-10	73629	78.25	71517	76.26	2112	98.08		
10-15	31305	97.71	31147	97.51	158	99.66		
15-20	3040	99.6	3019	99.57	21	99.87		
20-25	589	99.97	576	99.96	13	100		
25-30	50	100	50	100	0	100		
30-40	2	100	2	100	0	100		
<b>Totals</b>	160869	100.00%	146543	91.09%	10013	6.22%	4313	2.68%

## Multibeam Coverage Analysis

These survey operations were conducted at a consistent 40-meter line spacing optimized to achieve 200% sidescan sonar coverage at the 50-meter range scale setting. Based on the 54° beam angle used as the cutoff for acceptable multibeam data, the effective swath width for the multibeam coverage was approximately 2.75 times the water depth. Though full bottom coverage multibeam was not required, in depths greater than about 16 meters there was sufficient outer beam overlap to provide 100% multibeam bottom coverage. The five one-meter node BAGs (H11649\_1\_of\_22.bag to H11649\_5\_of\_22.bag) made from the one-meter node PFM CUBE Surface was used to assess and document survey coverage. The **SABER Gapchecker** routine flagged multibeam data gaps exceeding the allowable limit of three contiguous nodes. In addition, the entire surface was visually scanned for holidays at various points during the data processing effort. Additional survey lines were run to fill any holidays that were detected while the survey operations were still underway. Due to some additional data cleaning that was required after completion of the field operations, there were ten areas identified in final processing that had from 4 to 17 contiguous nodes without data. These small gaps were usually isolated to the outer most beams of the swath and were primarily due to fish interference or bubble sweep along the hull during rougher sea conditions. The final CUBE Surface had valid depths in more than 99.99% of the nodes.

### B.3 CORRECTIONS TO ECHO SOUNDINGS

Please refer to the Data Acquisition and Processing Report SAIC Doc 07-TR-012\* for a description of all corrections applied to echo soundings. There were no deviations from the corrections described therein.

*\*Data field with field records.*

### B.4 DATA PROCESSING

Five BAGs at one-meter grid resolution (H11649\_1\_of\_22.bag through H11649\_5\_of\_22.bag) are submitted for the entire area. These BAGs serve for a demonstration of coverage for this set line spacing survey as well as the bathymetric model for the areas of the survey that are 15 meters or deeper. Seventeen additional BAGs at half-meter resolution are submitted to cover the areas where the depths are less than 15 meters (H11649\_6\_of\_22.bag through H11649\_22\_of\_22.bag). The data fully support these resolutions. **Table B-6** summarizes the BAG files and node spacing. Note that the one-meter BAGs overlay the area of the half-meter BAGs.

Table B-6. Summary of H11649 BAG Files.

BAG File Name	Node Spacing (Meters)	Comments
H11649_1_of_22.bag	1.0	Southern most 1.0m bag
H11649_2_of_22.bag	1.0	
H11649_3_of_22.bag	1.0	
H11649_4_of_22.bag	1.0	

BAG File Name	Node Spacing (Meters)	Comments
H11649_5_of_22.bag	1.0	Northern most 1.0m bag
H11649_6_of_22.bag	0.5	Southern most 0.5m bag
H11649_7_of_22.bag	0.5	
H11649_8_of_22.bag	0.5	
H11649_9_of_22.bag	0.5	
H11649_10_of_22.bag	0.5	
H11649_11_of_22.bag	0.5	
H11649_12_of_22.bag	0.5	
H11649_13_of_22.bag	0.5	
H11649_14_of_22.bag	0.5	
H11649_15_of_22.bag	0.5	
H11649_16_of_22.bag	0.5	
H11649_17_of_22.bag	0.5	
H11649_18_of_22.bag	0.5	
H11649_19_of_22.bag	0.5	
H11649_20_of_22.bag	0.5	
H11649_21_of_22.bag	0.5	
H11649_22_of_22.bag	0.5	Northern most 0.5m bag

### C. HORIZONTAL AND VERTICAL CONTROL

#### **SEE ALSO THE EVALUATION REPORT.**

NOAA tide station 8534720 Atlantic City, NJ was the source of verified water level heights for determining correctors to soundings. The primary means for analyzing the adequacy of zoning was observing zone boundary crossings in the navigated swath editor, SAIC's **Multi View Editor (MVE)**. In addition, the sun illuminated coverage plots were examined on screen for adequacy of zoning. Comparisons between overlapping crossline data and outer swath data (in deeper water) were also used to assess potential tidal zoning impacts. As addressed briefly in the CUBE Uncertainty Analysis discussion (Section B.3), there were a few instances where overlapping datasets had an observed vertical offset of 20 to 25 centimeters. There were only a few of these areas identified across the sheet and most were focused around just a few survey lines (e.g., 250.d23, 253.d18, 254.d04). The overlapping data were often acquired on the same day but were separated by several hours in time and during a different phase of the tide. These data were likely acquired during a period when differing environmental conditions (due to frontal passage, wind set-up, etc.) between the survey area and the primary tide gauge location in Atlantic City created a short-term and somewhat larger than expected vertical uncertainty in the tidal correctors. Overall, the water level zoning parameters provided by NOS, Table 0-1, were adequate for application of the observed verified water levels. **Approved tides and zoning were applied during field processing.**



Table 0-1. Water Level Zoning Parameters Applied on Sheet H11649

Zone	Time Corrector (minutes)	Range Ratio	Reference Station
SA26A	0.00	0.87	8534720
SA27	+6	0.88	8534720

The survey data for sheet H11649 were collected in horizontal datum NAD-83, using geodetic coordinates, while data display and products used the UTM Zone 18 projection. The following equipment was used for positioning on the *M/V Atlantic Surveyor*:

- TSS POS/MV, Serial Number 2575 with a Trimble Probeacon Differential Receiver (primary sensors)
- Trimble 4000 DSi GPS Receiver, Serial Number 3504A09516 with a Trimble Probeacon Differential Receiver (secondary sensors)

Differential correctors used for online data were from the U.S. Coast Guard Stations at Driver, VA, Annapolis, MD, Reedy Point, DE and Sandy Hook, NJ. The differential receiver was programmed to only receive data from these four corrector stations. Based on the differential station identification number, the POS/MV reported that it used other stations during online data collection. Station 18 (Cape Canaveral, FL), station 310 (Pickford, MI), and station 48 (Macon, GA) were reportedly used by the POS/MV for a total of 2.3 minutes of online data collection. SAIC believes that the incorrect station identification codes may have been sent from the beacon receiver. When an incorrect station identifier was noted during survey operations, a check on the reference station coordinates received and output by the receiver and the station transmit frequency set in the receiver were verified. In all cases the coordinates and transmit frequency matched one of the stations programmed into the receiver. This has been previously observed in the POS/MV data.

Daily position confidence checks were conducted using an independent Trimble DGPS. A real-time **ISS-2000** survey monitor also raised an alarm to alert the survey watch if the position differences exceeded the maximum allowable distance. All positioning confidence checks were well within an inverse distance of 5 meters. Please refer to the Horizontal and Vertical Control Report (SAIC Doc 07-TR-013)\* for detailed descriptions of the procedures and systems used to attain hydrographic positioning. This report will be delivered with the Descriptive Report for the last sheet (H11647) of this task order.

***\*Data filed with original field records.***

## **D. RESULTS AND RECOMMENDATIONS *SEE ALSO THE EVALUATION REPORT.***

### **D.1 CHART COMPARISON**

H11649 was compared to the largest scale charts covering the area as follows:

- **Chart 12214**, 1/80,000 scale, 48<sup>th</sup> Edition 10/01/2007 corrected by NTM through 03/08/2008
- **Chart 12211**, 1/80,000 scale, 43<sup>rd</sup> Edition 10/01/2007 corrected by NTM through 03/08/2008
- **ENC US4VA50M**, 1/80,000 compilation scale, 3rd Edition Issued 12/20/2007 Update 12/20/2007
- **ENC US4DE11M**, 1/80,000 compilation scale, 9<sup>th</sup> Edition Issued 11/08/2007 Update 11/08/2007

The chart comparisons were conducted using SAIC's **SABER** software to view the BSB raster charts with overlain layers of H11649 data such as the CUBE gridded surface, selected soundings, and features. For ENC comparisons a combination of HydroService's **dKart Inspector** and 7C's **SeeMyDENC** were used in conjunction with **SABER**. Results from the comparisons are described below.

Recommend reconstruction of the common areas of all charts using data from this survey. *Concur*

Chart 12214, 1/80,000 scale, 48th Edition 10/01/2007 corrected through 03/08/2008  
The northern portion of Survey H11649 overlaps with the southern inshore portion of Chart 12214. Over their common areas, the depths and features from this survey should supersede the presently charted information. Listed below are highlights of the comparison between this survey and Chart 12214.

In general, the inshore 18 and 30 foot depth curves were found in this survey to be closer to shore compared to the chart, sometimes by as much as 150 meters. These depth curves primarily run parallel to shore, however there are small offshore extensions of these curves. *Concur*

The numerous charted offshore shoal areas defined by the 30 foot depth curve and blue tint still exist, though there have been small changes in their overall extent and minimum depths. The results of this survey show that the larger of these offshore shoal areas appear to have remained relatively stable since the prior surveys. The smaller shoals showed greater variability in this survey. *Concur*

The charted 60 foot depth curve in 38° 28' 16.97"N 074° 57' 52.85"W agrees with the results of this survey. The 60 foot depth curve in the northeast of the survey area has extended southward and further east than charted. *Concur*

The small shoal charted as a 30 foot depth curve, blue tint, and 29 foot sounding in 38° 30' 11.17"N 075° 00' 25.42"W has migrated approximately 400 meters southwest and is much smaller. The shoalest CUBE depth in the 0.5 meter BAG was 30 feet (9.23 m) in 38° 30' 00.22"N 075° 00' 35.90"W. **Concur**

The small shoal charted with a 30 foot depth curve, blue tint, and 27 foot sounding in 38° 29' 38.98"N 075° 00' 28.61"W has migrated southwest approximately 150 meters. The shoalest CUBE depth in the 0.5 meter BAG was 27 feet (8.26 m) in 38° 29' 33.47"N 075° 00' 34.50"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 28 foot sounding in 38° 28' 43.23"N 075° 01' 31.57"W has migrated south and is smaller than charted. The shoalest CUBE depth in the 0.5 meter BAG was 28 feet (8.63 m) in 38° 28' 39.97"N 075° 01' 34.38"W. **Concur**

The larger shoal charted with a 30 foot depth curve, blue tint, and 20 foot sounding in 38° 27' 45.81"N 075° 00' 38.32"W has migrated south approximately 150 meters. The shoalest CUBE depth in the 0.5 meter BAG was 17 feet (5.34 m) in 38° 27' 40.17"N 075° 00' 34.34"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 28 foot sounding in 38° 27' 31.93"N 074° 59' 29.08"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 36 feet (10.94 m) in 38° 27' 27.99"N 074° 59' 27.22"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 27 foot sounding in 38° 27' 04.57"N 074° 59' 40.69"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 34 feet (10.36 m) in 38° 27' 02.81"N 074° 59' 36.00"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 30 foot sounding in 38° 27' 20.05"N 074° 59' 04.66"W was found though there has been a change in its extent. The shoalest CUBE depth in the 0.5 meter BAG was 29 feet (9.01 m) in 38° 27' 13.61"N 074° 59' 09.04"W. **Concur**

An uncharted small shoal area was found with a shoalest CUBE depth in the 0.5 meter BAG of 28 feet (8.48 meters, 0.270 meter uncertainty) in 38° 27' 10.42"N 075° 01' 08.19"W. This shoal was found between a charted 38 foot sounding in 38° 27' 24.78"N 075° 01' 22.38"W and a 38 foot sounding in 38° 27' 05.35"N 075° 01' 09.09"W. Recommend charting a 28 foot sounding and 30 foot depth curve in 38° 27' 10.42"N 075° 01' 08.19"W. **Concur**

The charted 33 foot sounding in 38° 27' 19.04"N 074° 59' 27.88"W was found to be in depths of 41 feet (12.5 meters) in the 0.5 meter BAG. **Concur**

The 30 foot depth curve and blue tint along the northwest edge of Fenwick Shoal in 38° 27' 56.33"N 074° 55' 47.66"W to 38° 27' 14.54"N 074° 56' 33.64"W was found approximately 250 meters south. The 18 foot sounding and 18 foot depth curve near the

north end of Fenwick Shoal in 38° 27' 55.73"N 074° 55' 35.78"W was not found.

**Concur**

The shoalest depth in this area from the 0.5 meter BAG was 20 feet (6.23 m) in 38° 27' 47.60"N 074° 55' 42.60"W. The 18 foot curve on Fenwick Shoal still exists although there have been changes in its extent. The shoalest CUBE depth in the 0.5 meter BAG was 16 feet (4.84 m) in 38° 27' 37.08"N 074° 55' 48.89"W. **Concur**

The charted wreck cleared to 6 feet with a danger circle and blue tint in 38° 27' 29.01"N 074° 56' 21.63"W (AWOIS 1069) was found with a least depth of 16 feet (5.02 meters, 0.270 meter uncertainty) in 38° 27' 28.35"N 074° 56' 21.07"W (Feature 36). Recommend removing the danger circle, blue tint and cleared to 6 feet sounding and charting a 16 foot sounding, danger circle, and blue tint in 38° 27' 28.35"N 074° 56' 21.07"W. **Concur – Delete 6 Wk, wire drag symbol and danger curve. Chart 16 Wk and danger curve.**

The charted wreck cleared to 8 feet with a danger circle in 38° 27' 29.69"N 074° 56' 02.27"W (AWOIS 1070) was found with a least depth of 11 feet (3.35 meters, 0.270 meter uncertainty) in 38° 27' 28.80"N 074° 56' 03.01"W (Feature 28). Recommend removing the danger circle and cleared to 8 feet sounding and charting an 11 foot sounding, danger circle, and blue tint in 38° 27' 28.80"N 074° 56' 03.01"W and label Wks. **Concur – Delete 8 Wk, wire drag symbol and danger curve. Chart 11 Wks and danger curve.**

The charted wreck cleared to 25 feet with a danger circle and blue tint (AWOIS 1076) in 38° 27' 59.69"N 074° 58' 47.93"W was found with a least depth of 34 feet (10.57 meters, 0.270 meter uncertainty) in 38° 28' 00.76"N 074° 58' 48.76"W (Feature 24). A linear obstruction (Feature 23) that may be part of this same wreckage had a least depth of 36 feet (11.02 meters, 0.270 meter uncertainty) in 38° 27' 58.89"N 074° 58' 49.90"W (65 meters southwest of the wreck feature). Recommend removing the danger circle, blue tint and cleared to 25 feet sounding and charting a 34 foot sounding with danger circle in 38° 28' 00.76"N 074° 58' 48.76"W and label Wreck. **Concur with clarification - AWOIS #1076 - Delete 25 Wk, wire drag symbol and danger curve. Do not chart 36 Wk. Shoaler wreck in vicinity. – AWOIS #1077 - Chart 34 Wks and danger curve in above location.**

The charted wreck with a wreck symbol, danger circle, and blue tint in 38° 27' 31.34"N 075° 00' 49.50"W was not found. Recommend removing the wreck symbol, danger circle, and blue tint. **Concur – Delete dangerous sunken wreck.**

The charted wreck with a 29 foot sounding, danger circle, blue tint, and labeled Wks in 38° 27' 47.49"N 075° 00' 49.84"W was added to the chart based on Danger to Navigation Report 1 for this survey (Feature 20, 8.94 meters, 0.270 meter uncertainty). An additional wreck, approximately 120 meters west southwest of Feature 20, has a least depth of 33 feet (10.04 meters, 0.270 meter uncertainty) in 38° 27' 46.42"N 075° 00' 54.45"W (Feature 21). Another small wreck or obstruction (Feature 48), approximately

50 meters southeast of Feature 20, has a least depth of 38 feet (11.62 meters, 0.270 meter uncertainty) in 38° 27' 46.03"N 075° 00' 49.07"W. Recommend keeping the wrecks as charted. **Concur with clarification - Do not chart 33 Wk or 38 Obstn. Shoaler wreck in vicinity. Chart 29 Wks and danger curve.**

The charted obstruction with danger circle, blue tint and labeled Obstn PA in 38° 27' 53.65"N 075° 00' 52.14"W was found approximately 270 meters northwest of this position with a least depth of 37 feet (11.48 meters, 0.270 meter uncertainty) in 38° 27' 59.98" N 075° 00' 59.63" W (Feature 6). Recommend removing the danger circle, blue tint, and label Obstn PA and charting 37 foot sounding in 38° 27' 59.98" N 075° 00' 59.63" W and label Obstn. **Concur - Delete dangerous submerged Obstn, PA. Chart 37 Obstn and danger curve.**

Several small uncharted obstructions with a least depth of 37 feet (11.22 meters, 0.270 meter uncertainty) were found in 38° 28' 37.09"N 075° 00' 56.31"W (Feature 5). Recommend charting 37 foot sounding in 38° 28' 37.09"N 075° 00' 56.31"W and label Obstns. **Do not concur - Determined insignificant during office processing. Chart 37 ft depth.**

Two uncharted obstructions with a least depth of 22 feet (6.82 meters, 0.270 meter uncertainty) were found in 38° 29' 07.27"N 075° 02' 51.41"W (Feature 25). Recommend charting 22 foot sounding in 38° 29' 07.27"N 075° 02' 51.41"W and label Obstns. **Do not concur - Determined insignificant during office processing. Shoaler depths in the vicinity. Do not chart 22 Obstn. Chart 22 ft depth.**

An uncharted obstruction rising approximately 2 meters above the bottom with a least depth of 49 feet (15.15 meters, 0.270 meter uncertainty) was found in 38° 29' 18.24"N 074° 56' 53.98"W (Feature 32). Recommend charting 49 foot sounding, danger circle, and label Obstn in 38° 29' 18.24"N 074° 56' 53.98"W. **Concur - Chart 49 Obstn and danger curve.**

Chart 12211, 1/80,000 scale, 43rd Edition 10/01/2007 corrected through 03/08/2008.

Most of Survey H11649 (except for the northernmost 2900 m) overlaps with the northern inshore portion of Chart 12211. Listed below are highlights of the comparison between this survey and Chart 12211. **Concur**

In general, the inshore 18 and 30 foot depth curves were found in this survey to be closer to shore compared to the chart, sometimes by as much as 150 meters. These depth curves primarily run parallel to shore, however there are small finger offshore extensions of these depth curves. In the southern half of the sheet, the finger shoals emanating from shore and trending to the northeast are more extensive and extend farther offshore. Though some changes in depth were noted, for the most part these larger finger shoals agreed with the results of this survey. **Concur**

The numerous charted offshore shoal areas defined by the 30 foot depth curve and blue tint still exist, though there have been small changes in their overall extent and minimum

depths. The results of this survey show that the larger of these offshore shoal areas appear to have remained relatively stable since the prior surveys. The smaller shoals showed greater variability in this survey. **Concur**

The charted 60 foot contour generally agrees well with the results of this survey. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 28 foot sounding in 38° 28' 42.18"N 075° 01' 30.50"W has migrated south and is smaller than charted. The shoalest CUBE depth in the 0.5 meter BAG was 28 feet (8.63 m) in 38° 28' 40.04"N 075° 01' 34.30"W. **Concur**

The larger shoal area with a charted 20 foot depth in 38° 27' 45.81"N 075° 00' 38.32"W has migrated south approximately 150 meters. The shoalest CUBE depth in the 0.5 meter BAG was 17 feet (5.34 m) in 38° 27' 40.17"N 075° 00' 34.34"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 28 foot sounding in 38° 27' 31.90"N 074° 59' 29.65"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 36 feet (10.94 m) in 38° 27' 27.99"N 074° 59' 27.22"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 30 foot sounding in 38° 27' 19.34"N 074° 59' 04.98"W was found though there was a change in its extent. The shoalest CUBE depth in the 0.5 meter BAG was 29 feet (9.01 m) in 38° 27' 13.61"N 074° 59' 09.04"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 27 foot sounding in 38° 27' 00.61"N 074° 59' 44.95"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 34 feet (10.38 m) in 38° 27' 02.87"N 074° 59' 36.47"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 29 foot sounding in 38° 26' 53.88"N 075° 00' 06.32"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 42 feet (12.85 m) in 38° 26' 57.15"N 074° 59' 58.07"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 29 foot sounding in 38° 25' 49.48"N 075° 01' 35.09"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 34 feet (9.69 m) in 38° 25' 45.41"N 075° 01' 35.17"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 27 foot sounding in 38° 25' 54.83"N 075° 02' 02.64"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 32 feet (9.93 m) in 38° 25' 51.26"N 075° 02' 02.66"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 26 foot sounding in 38° 25' 25.75"N 075° 01' 25.92"W has migrated south approximately 160 meters. The shoalest CUBE depth in the 0.5 meter BAG was 25 feet (7.83 m) in 38° 25' 20.98"N 075° 01' 29.92"W. **Concur**



The small shoal charted as a 30 foot depth curve, blue tint, and 29 foot sounding in 38° 23' 34.12"N 075° 00' 57.66"W has migrated south approximately 375 meters. The shoalest CUBE depth in the 0.5 meter BAG was 28 feet (8.71 m) in 38° 23' 21.94"N 075° 01' 06.09"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and 29 foot sounding in 38° 21' 37.74"N 075° 01' 12.24"W has migrated south approximately 400 meters. The shoalest CUBE depth in the 0.5 meter BAG was 29 feet (8.87 m) in 38° 21' 22.24"N 075° 01' 29.54"W. **Concur**

The small shoal charted as a 30 foot depth curve, blue tint, and a 27 foot sounding in 38° 21' 03.64"N 075° 01' 42.28"W and a 26 foot sounding in 38° 20' 46.49"N 075° 01' 52.87"W was found to be much smaller than charted. The 27 foot sounding was found to be in 45 feet (13.72 meters) in the 0.5 meter BAG. The shoalest CUBE depth in the 0.5 m BAG was 29 feet (8.82 m) in 38° 20' 45.61"N -75° 01' 47.61"W. **Concur**

The long north-south oriented shoal charted as a 30 foot depth curve with the following charted soundings was found to be three separate shoals:

24 feet in 38° 25' 27.19"N 074° 59' 21.53"W  
27 feet in 38° 25' 08.30"N 074° 59' 30.85"W  
27 feet in 38° 24' 41.54"N 074° 59' 42.66"W  
29 feet in 38° 24' 24.08"N 074° 59' 51.80"W  
27 feet in 38° 24' 07.19"N 075° 00' 14.02"W

The northern most shoal had a shoalest CUBE depth in 0.5 meter BAG of 25 feet (7.81 meters, 0.270 meter uncertainty) in 38° 25' 21.64"N 074° 59' 21.96"W. The middle shoal had a shoalest CUBE depth of 28 feet (8.59 meters, 0.270m uncertainty) in 38° 24' 35.53"N 074° 59' 43.98"W. The southern most shoal had a shoalest CUBE depth in the 0.5m BAG of 27 feet (8.37 meters, 0.270m uncertainty) in 38° 23' 58.54"N 075° 00' 24.33"W. **Concur**

An uncharted small shoal area was found with a shoalest CUBE depth in the 0.5 meter BAG of 28 feet (8.48 meters, 0.270 meter uncertainty) in 38° 27' 10.42"N 075° 01' 08.19"W. This shoal was found between a charted 38 foot sounding in 38° 27' 23.74"N 075° 01' 21.99"W and a 36 foot sounding in 38° 27' 00.40"N 075° 01' 07.85"W. Recommend charting a 28 foot sounding and 30 foot depth curve in 38° 27' 10.42"N 075° 01' 08.19"W. **Concur**

The charted 40 foot sounding in 38° 24' 32.83"N 075° 00' 19.04"W was found to be in depths of 48 feet (14.6 meters) in the 0.5 meter BAG. **Concur**

The charted 32 foot sounding in 38° 25' 43.58"N 075° 01' 00.69"W was found to be in depths of 37 feet (11.3 meters) in the 0.5 meter BAG. **Concur**

The charted 33 foot sounding in 38° 26' 35.84"N 075° 00' 16.67"W was found to be in depths of 50 feet (15.2 meters) in the 0.5 meter BAG. **Concur**

The charted 37 foot sounding in 38° 26' 29.12"N 075° 00' 35.69"W was found to be in depths of 41 feet (12.5 meters) in the 0.5 meter BAG. **Concur**

The charted 33 foot sounding in 38° 27' 19.04"N 074° 59' 27.74"W was found to be in depths of 41 feet (12.5 meters) in the 0.5 meter BAG. **Concur**

The 18 foot depth curve and 18 foot sounding in 38° 25' 26.06"N 075° 02' 01.85"W was found approximately 400 meters southwest of its charted position. The shoalest CUBE depth in the 0.5m BAG was 16 feet (4.99 m) in 38° 25' 17.19"N 075° 02' 06.62"W. **Concur**

The 18 foot depth curve and 18 foot sounding in 38° 24' 19.08"N 075° 02' 54.51"W was not found. The shoalest CUBE depth in the 0.5m BAG was ~~20~~1 feet (6.38~~40~~ m) in 38° 24' 18.49"N 075° 02' 56.56"W. **Concur**

The 30 foot depth curve and blue tint along the northwest edge of Fenwick Shoal in 38° 27' 55.79"N 074° 55' 48.23"W to 38° 27' 11.22"N 074° 56' 35.31"W and from 38° 26' 49.40"N 074° 56' 48.59"W to 38° 26' 44.67"N 074° 57' 10.54"W was found approximately 250 meters south. The 30 foot depth curve along the southeast edge of Fenwick Shoal has not changed. The 30 foot depth curve along the south edge was found approximately 80 meters south of its charted position. The 18 foot sounding and 18 foot depth curve near the north end of Fenwick Shoal in 38° 27' 55.73"N 074° 55' 35.78"W was not found. The shoalest depth in this area from the 0.5 meter BAG was 20 feet (6.22 m) in 38° 27' 50.42"N 074° 55' 40.6"W. The long 18 foot depth curve on Fenwick Shoal still exists although there have been changes in its extent. The north end of the 18 foot curve was found in 38° 27' 44.03"N 074° 55' 42.45"W, approximately 360 meters from its charted position. The south end of the 18 foot curve was found in 38° 26' 54.08"N 074° 56' 30.50"W, approximately 175 meters from its charted position. The shoalest CUBE depth in the 0.5 meter BAG was 16 feet (4.82 m) in 38° 27' 37.66"N 074° 55' 48.69"W. **Concur**

The charted wreck cleared to 6 feet with a danger circle and blue tint in 38° 27' 29.01"N 074° 56' 21.63"W (AWOIS 1069) was found with a least depth of 16 feet (5.02 meters, 0.270 meter uncertainty) in 38° 27' 28.35"N 074° 56' 21.07"W (Feature 36). Recommend removing the danger circle, blue tint, and cleared to 6 feet sounding and charting a 16 foot sounding, danger circle, and blue tint in 38° 27' 28.35"N 074° 56' 21.07"W. **Concur – Delete 6 Wk, wire drag symbol and danger curve. Chart 16 Wk and danger curve.**

The charted wreck cleared to 8 feet with a danger circle in 38° 27' 29.69"N 074° 56' 02.27"W (AWOIS 1070) was found with a least depth of 11 feet (3.35 meters, 0.270 meter uncertainty) in 38° 27' 28.80"N 074° 56' 03.01"W (Feature 28). Recommend removing the danger circle and cleared to 8 feet sounding and charting an 11 foot



sounding, danger circle, and blue tint in 38° 27' 28.80"N 074° 56' 03.01"W and label Wks. **Concur – Delete 8 Wk, wire drag symbol and danger curve. Chart 11 Wks and danger curve.**

The charted wreck cleared to 25 feet with a danger circle and blue tint (AWOIS 1076) in 38° 27' 59.69"N 074° 58' 47.93"W was found with a least depth of 34 feet (10.57 meters, 0.270 meter uncertainty) in 38° 28' 00.76"N 074° 58' 48.76"W (Feature 24). A linear obstruction (Feature 23) that may be part of this same wreckage had a least depth of 36 feet (11.02 meters, 0.270 meter uncertainty) in 38° 27' 58.89" N 074° 58' 49.90" W (65 meters southwest of the wreck feature). Recommend removing the danger circle, blue tint, and cleared to 25 feet sounding and charting a 34 foot sounding in 38° 28' 00.76"N 074° 58' 48.76"W and label Wreck. **Concur with clarification - AWOIS #1076 - Delete 25 Wk, wire drag symbol and danger curve. Do not chart 36 Wk. Shoaler wreck in vicinity. – AWOIS #1077 - Chart 34 Wks and danger curve in above location.**

The charted wreck with a wreck symbol, danger circle, and blue tint in 38° 27' 31.34"N 075° 00' 49.50"W was not found. Recommend removing the wreck symbol, danger circle, and blue tint. **Concur – Delete dangerous sunken wreck.**

The charted wreck with a 29 foot sounding, danger circle, blue tint, and labeled Wks in 38° 27' 47.49"N 075° 00' 49.84"W was added to the chart based on Danger to Navigation Report 1 for this survey (Feature 20, 8.94 meters, 0.270 meter uncertainty). An additional wreck, approximately 120 meters west southwest of Feature 20, has a least depth of 33 feet (10.04 meters, 0.270 meter uncertainty) in 38° 27' 46.42"N 075° 00' 54.45"W (Feature 21). Another small wreck or obstruction (Feature 48), approximately 50 meters southeast of Feature 20, has a least depth of 38 feet (11.62 meters, 0.270 meter uncertainty) in 38° 27' 46.03"N 075° 00' 49.07"W. Recommend keeping the wrecks as charted. **Concur with clarification - Do not chart 33 Wk or 38 Obstn. Shoaler wreck in vicinity. Chart 29 Wks and danger curve.**

The charted obstruction with danger circle, blue tint and labeled Obstn PA in 38° 27' 53.65"N 075° 00' 52.14"W was found approximately 270 meters northwest of this position with a least depth of 37 feet (11.48 meters, 0.270 meter uncertainty) in 38° 27' 59.98" N 075° 00' 59.63" W (Feature 6). Recommend removing the danger circle, blue tint, and label Obstn PA and charting 37 foot sounding in 38° 27' 59.98" N 075° 00' 59.63" W and label Obstn. **Concur – Delete dangerous submerged Obstn, PA. Chart 37 Obstn and danger curve.**

The charted wreck with a wreck symbol, danger circle, blue tint and label PA in 38° 24' 59.79"N 075° 00' 20.34"W (AWOIS 1059) was not found. An uncharted rectangular obstruction, approximately 4 meters by 8 meters, was found with a least depth of 52 feet (15.91 meters, 0.270 meter uncertainty) in 38° 25' 08.12"N 075° 00' 44.34"W (Feature 11), approximately 630 meters northwest of the charted wreck. Recommend removal of

the wreck symbol, danger circle, and blue tint and label PA and charting a 52 foot sounding in 38° 25' 08.12"N 075° 00' 44.34"W and label Obstr. ***Concur with clarification – Delete dangerous sunken wreck, PA. – 52 ft Obstrn determined insignificant during office processing. Do not chart 52 Obstrn.***

The charted obstructions with a 15 foot sounding and label Obstrns in 38° 23' 52.10"N 075° 03' 26.00"W was added to the chart based on Danger to Navigation Report 2 for this survey. Subsequent to the Danger to Navigation report, additional item lines were run through the area to ensure that all obstructions and the least depth were identified. These objects have been identified as the following series of submerged pilings:

- 16 feet (4.99 m, 0.270 meter uncertainty) in 38° 23' 51.83"N 075° 03' 26.37"W (Feature 50) ***Do not chart***
- 17 feet (5.14 m, 0.270 meter uncertainty) in 38° 23' 52.23"N 075° 03' 26.25"W (Feature 62) ***Do not chart***
- 15 feet (4.78 m, 0.270 meter uncertainty) in 38° 23' 52.15"N 075° 03' 26.05"W (Feature 49)\*
- 16 feet (4.88 m, 0.270 meter uncertainty) in 38° 23' 51.80"N 075° 03' 26.08"W (Feature 59) ***Do not chart***
- 16 feet (5.10 m, 0.270 meter uncertainty) in 38° 23' 52.11"N 075° 03' 25.78"W (Feature 60) ***Do not chart***
- 17 feet (5.35 m, 0.270 meter uncertainty) in 38° 23' 51.71"N 075° 03' 25.50"W (Feature 61) ***Do not chart***
- 18 feet (5.60 m, 0.270 meter uncertainty) in 38° 23' 51.83"N 075° 03' 24.99"W (Feature 19) ***Do not chart***

Recommend removing the label Obstrns, retaining the 15 sounding and danger circle in 38° 23' 52.15"N 075° 03' 26.05"W, and adding label Subm Pilings. ***Do not concur – \*Chart 15 Obstrns (subm piles) and danger curve in Latitude 38° 23' 52.15"N Longitude 075° 03' 26.05"W.***

The charted sewer in 38° 22' 57.21"N 075° 03' 00.79.47"W to 38° 23' 06.50"N 075° 03' 47.28"W labeled Sewer under construction was found approximately 85 meters north of its charted position. The offshore end of the pipeline is located in 38° 23' 00.38"N 075° 03' 00.32"W (Feature 56) and the inshore end of the exposed pipeline is located in 38° 23' 03.05"N 075° 03' 13.50"W (Feature 57). The pipeline is buried from this position in towards shore. Projection of the exposed pipe alignment to the shoreline intersects the charted high water line in 38° 23' 10.02"N 075° 03' 45.33"W. A least depth of 26 feet (8.07 m, 0.270 meter uncertainty) in 38° 23' 02.89"N 075° 03' 12.65"W (Feature 15) was found about 20 meters east of the inshore end of the exposed section of pipe. On the offshore end, a least depth of 29 feet (8.79 m, 0.270 meter uncertainty) in 38° 23' 00.53"N 075° 03' 00.85"W (Feature 16) was found about 15 meters west of the seaward

end of the exposed section of pipe. Recommend removing the charted pipeline and label Sewer under construction and charting a pipeline from 38° 23' 10.02"N 075° 03' 45.33"W to 38° 23' 00.38"N 075° 03' 00.32"W and label Sewer Pipeline. **Concur with clarification – Defer to MCD Source Data Branch for final charting recommendation/relocation of Sewer.**

The charted wreck with a wreck symbol, danger circle, and blue tint in 38° 22' 06.09"N 075° 03' 04.82"W (AWOIS 735) was not found. No significant sidescan sonar contacts or multibeam features were identified anywhere in this vicinity. Recommend removing the charted wreck symbol, danger circle, and blue tint. **Concur – Delete dangerous sunken wreck.**

The charted rectangular Fish Haven with an authorized minimum depth of 18 feet centered in 38° 21' 00.79"N 075° 03' 27.86"W has a natural bottom with a least depth of 17 feet (5.09 meters, 0.270 meter uncertainty) in 38° 20' 55.66"N 075° 03' 12.28"W, along the eastern boundary and 17 feet (5.14 meters, 0.270 meter uncertainty) in 38° 20' 33.41"N 075° 03' 34.70"W near the southern boundary associated with a prominent northeast-oriented shoal that runs through the southeastern area of the Fish Haven. Most of the numerous prominent obstructions that have been placed within this area lie in the naturally deeper waters in the northern half of the Fish Haven. Features 2, 4, 46, and 47 were set to preserve the least depth of prominent clusters of obstructions that were identified. In addition, numerous designated soundings were set to preserve the least depths for other objects in the Fish Haven. In the northern half, a least depth on an object was 27 feet (8.22 meters, 0.270 meter uncertainty) in 38° 21' 19.26"N 075° 03' 42.37"W (Feature 47) in depths of 35 feet. Along the southern edge, a long pipe section with a least depth of 18 feet (5.51 meters, 0.270 meter uncertainty) in 38° 20' 33.48"N 075° 03' 39.47"W (Feature 4) was found in depths of 21 feet. **Concur with clarification – It is recommended that the notation Obstrn Fish Haven (auth min 18 ft) be revised to Obstrn Fish Haven (auth min 16 ft). Defer to MCD Source Data Branch for final correction.**

Multiple uncharted obstructions were found as far as 265 meters outside of the northeast boundary of this Fish Haven. The least depth of these obstructions was 39 feet (11.87 meters, 0.270 meter uncertainty) in 38° 21' 28.47"N 075° 03' 08.81"W (Feature 45). Recommend charting a 39 foot sounding in 38° 21' 28.47"N 075° 03' 08.81"W and label Obstrns. **Do not concur - Determined insignificant during office processing. Depths in the vicinity are 33 to 40 feet. Do not chart 39 Obstrns .**

The charted square Fish Haven with an authorized minimum depth of 35 feet centered in 38° 22' 56.15"N 074° 58' 43.67"W has a controlling natural bottom depth of 50 feet (14.98 meters, 0.274 meter uncertainty) in 38° 22' 43.91"N 074° 58' 37.03"W along the southeast boundary. The charted wreck along the southern boundary with a wreck symbol, danger circle, and blue tint in 38° 22' 44.53"N 074° 58' 43.36"W (AWOIS 1053) was found with a least depth of 59 feet (18.12 meters, 0.270 meter uncertainty) in 38° 23'

01.79°N 074° 58' 47.10°W (Feature 29). It is likely that this wreck is also the fishing obstruction reported in AWOIS 1054. Recommend removing the wreck symbol, danger circle, and blue tint, and charting a wreck symbol in 38° 23' 01.79°N 074° 58' 47.10°W.

**Concur with clarification – AWOIS #1053 – Delete dangerous sunken wreck.**

**AWOIS #1054 – Chart 59 Wk.**

The charted wreck with a wreck symbol, danger circle, and blue tint in 38° 25' 54.15°N 074° 57' 26.00°W (AWOIS 1062) was found with a least depth of 59 feet (18.04 meters, 0.270 meter uncertainty) in 38° 25' 52.77°N 074° 57' 25.74°W (Feature 35). Recommend removing the wreck symbol, danger circle, and blue tint and charting a 59 foot sounding, danger circle, with blue tint, in 38° 25' 52.77°N 074° 57' 25.74°W and label Wk. **Concur – AWOIS #1062 - Delete dangerous sunken wreck. Chart 59 Wk and danger curve.**

Several small uncharted obstructions with a least depth of 37 feet (11.22 meters, 0.270 meter uncertainty) were found in 38° 28' 37.09°N 075° 00' 56.31°W (Feature 5). Recommend charting 37 foot sounding in 38° 28' 37.09°N 075° 00' 56.31°W and label Obstns. **Concur with clarification – Obstns determined insignificant during office processing. Do not chart 37 Obstns. Chart 37 ft depth.**

An uncharted L-shaped obstruction approximately 40 meters in length was found with a least depth of 31 feet (9.52 meters, 0.270 meter uncertainty) in 38° 26' 45.94°N 075° 02' 30.34°W (Feature 26). Recommend charting a 31 foot sounding, danger circle in 38° 26' 45.94°N 075° 02' 30.34°W and label Obstn. **Concur – Chart 31 Obstns and danger curve.**

An uncharted linear obstruction approximately 105 meters in length was found with a least depth of 34 feet (10.58 meters, 0.270 meter uncertainty) in 38° 25' 22.91°N 075° 02' 28.58°W (Feature 43). Recommend charting 34 foot sounding and danger circle, in 38° 25' 22.91°N 075° 02' 28.58°W and label Obstn. **Concur with clarification – Obstn determined insignificant during office processing. Do not chart 34 Obstn. Chart 34 ft depth.**

The special purpose buoy in 38° 20' 44.53°N 075° 01' 05.77°W and labeled Y Army was not found. Recommend removing special purpose buoy and label. **Concur – Delete buoy and notation Y Army.**

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While comparing this survey to ENC US4DE11M and US4VA50M, the following discrepancy between the two charts was noted. The 5.4 meter depth contour (DEPCNT) located parallel to the shoreline on US4VA50M changes to a depth area (DEPARE 1.8 – 5.4 meters, with a primitive attribute of line) on US4DE11M. There is no 5.4 meter depth contour (DEPCNT) along the shoreline on US4DE11M. On chart US4VA50M the area between the shoreline and the 5.4 depth contour is categorized as a DEPARE 0-5.4 meters. On chart US4DE11M the area between the shoreline and the DEPARE 1.8-5.4 line is categorized as a DEPARE 0-1.8 meters. **Concur**

In general, the charted inshore 5.4 and 9.1 meter depth contours were found in this survey to be closer to shore, sometimes by as much as 150 meters. Though these depth contours primarily run parallel to shore, there are small finger shoals that cause a periodic seaward shift in these curves. *Concur*

The numerous offshore shoal areas charted by the 9.1 meter depth contour still exist, though there have been small changes in their overall extent and minimum depths. The results of this survey show that the larger of these offshore shoal areas appear to have remained relatively stable since the prior surveys. The smaller shoals showed greater variability in this survey. *Concur*

The charted 18.2 meter depth contour agrees with the results of this survey. *Concur*

The small shoal charted as a 9.1 meter depth contour and 8.8 meter sounding in 38° 30' 10.15"N 075° 00' 25.56"W was found approximately 400 meters southwest and is much smaller. The shoalest CUBE depth in the 0.5 meter BAG was 9.23 m (0.270 meter uncertainty) in 38° 30' 00.22"N 075° 00' 35.90"W. *Concur*

The small shoal charted as a 9.1 meter depth contour and 8.2 meter sounding in 38° 29' 38.26"N 075° 00' 28.87"W has migrated southwest approximately 150 meters. The shoalest CUBE depth in the 0.5 m BAG was 8.26 m (0.270 meter uncertainty) in 38° 29' 33.50"N 075° 00' 34.52"W. *Concur*

The small shoal charted as a 9.1 meter depth contour and 8.5 meter sounding in 38° 28' 42.56"N 075° 01' 31.80"W has migrated south and is smaller than charted. The shoalest CUBE depth in the 0.5 meter BAG was 8.63 m (0.270 meter uncertainty) in 38° 28' 40.00"N 075° 01' 34.37"W. *Concur*

The larger shoal area charted as a 9.1 meter depth contour and 6.0 meter sounding in 38° 27' 44.86"N 075° 00' 38.99"W has migrated south about 150 meters. The shoalest CUBE depth in the 0.5 meter BAG was 5.34 m (0.270 meter uncertainty) in 38° 27' 40.17"N 075° 00' 34.34"W. *Concur*

An uncharted small shoal area was found with a shoalest CUBE depth in the 0.5 meter BAG of 8.48 meters (0.270 meter uncertainty) in 38° 27' 10.42"N 075° 01' 08.19"W. This shoal was found between a charted 11.5 meter sounding in 38° 27' 24.05"N 075° 01' 22.19"W and a charted 11.5 meter sounding in 38° 27' 04.90"N 075° 01' 09.26"W. Recommend charting an 8.5 meter sounding and 9.1 meter depth contour. *Concur*

The charted 10 meter sounding in 38° 27' 18.58"N 074° 59' 27.74"W was found to be in depths of 12.5 meters in the 0.5 meter BAG. *Concur*

The small shoal charted as a 9.1 meter depth contour and 8.5 meter sounding in 38° 27' 31.07"N 074° 59' 29.58"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 10.94 m (0.270 meter uncertainty) in 38° 27' 27.99"N 074° 59' 27.22"W. *Concur*



The small shoal charted as a 9.1 meter depth contour and 8.2 meter sounding in 38° 27' 03.60"N 074° 59' 42.00"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 10.36 m (0.270 meter uncertainty) in 38° 27' 02.89"N 074° 59' 36.01"W.

**Concur**

The small shoal charted as a 9.1 meter depth contour and 9.1 meter sounding in 38° 27' 19.37"N 074° 59' 04.56"W was found though there has been a change in its extent. The shoalest CUBE depth in the 0.5 meter BAG was 9.01 m (0.270 meter uncertainty) in 38° 27' 13.51"N 074° 59' 09.07"W. **Concur**

The 9.1 meter depth contour depicting the northwest edge of Fenwick Shoal in 38° 27' 55.69"N 074° 55' 47.50"W to 38° 27' 14.65"N 074° 56' 33.68"W was found approximately 250 meters south. The charted 5.4 meter depth contour and 5.4 m sounding near the north end of Fenwick Shoal in 38° 27' 54.76"N 074° 55' 35.40"W was not found. The shoalest depth in this area from the 0.5 meter BAG was 6.38 m (0.270 meter uncertainty) in 38° 27' 49.80"N 074° 55' 40.24"W. The 5.4 meter depth contour on Fenwick Shoal still exists although there have been changes in its extent. The shoalest CUBE depth in the 0.5 meter BAG was 4.84 m (0.270 meter uncertainty) in 38° 27' 37.10"N 074° 55' 48.90"W. **Concur**

The charted dangerous wreck object with a 1.8 meter sounding in 38° 27' 29.23"N 074° 56' 22.09"W (AWOIS 1069) was found with a least depth of 5.02 meters (0.270 meter uncertainty) in 38° 27' 28.35"N 074° 56' 21.07"W (Feature 36). Recommend updating the dangerous wreck object with a sounding value of 5.0 meters in 38° 27' 28.35"N 074° 56' 21.07"W and the attributes for Feature 36 in the S-57 file. **Concur –**

**Delete 6 Wk, wire drag symbol and danger curve. Chart 16 Wk and danger curve.**

The charted dangerous wreck object with a 2.4 meter sounding in 38° 27' 29.38"N 074° 56' 02.40"W (AWOIS 1070) was found with a least depth of 3.35 meters (0.270 meter uncertainty) in 38° 27' 28.80"N 074° 56' 03.01"W (Feature 28). Recommend updating the dangerous wreck object with a sounding value of 3.35 meters in 38° 27' 28.80"N 074° 56' 03.01"W and the attributes for Feature 28 in the S-57 file. **Concur –**

**Delete 8 Wk, wire drag symbol and danger curve. Chart 11 Wks and danger curve.**

The charted dangerous wreck object with a 7.6 meter sounding (AWOIS 1076) in 38° 27' 59.83"N 074° 58' 48.36"W was found with a least depth of 10.57 meters (0.270 meter uncertainty) in 38° 28' 00.76"N 074° 58' 48.76"W (Feature 24). Recommend updating the dangerous wreck object with a sounding of 10.6 meters in 38° 28' 00.76"N 074° 58' 48.76"W and the attributes for Feature 24 in the S-57 file. A linear obstruction (Feature 23) that may be part of this same wreckage had a least depth of 11.02 meters (0.270 meter uncertainty) in 38° 27' 58.89"N 074° 58' 49.90"W (Feature 23). Recommend adding a submerged obstruction object with a sounding of 11.0 meters (0.270 meter uncertainty) in 38° 27' 58.89"N 074° 58' 49.90"W. **Concur with clarification - AWOIS #1076 - Delete 25 Wk, wire drag symbol and danger curve. Do not chart 36 Wk.**

***Shoaler wreck in vicinity. – AWOIS #1077 - Chart 34 Wks and danger curve in above location.***

The charted dangerous wreck object in 38° 27' 30.67"N 075° 00' 49.57"W was not found. Recommend removing the dangerous wreck object. ***Concur – Delete dangerous sunken wreck.***

The charted dangerous wreck object with an 8.8 meter sounding in 38° 27' 47.49"N 075° 00' 49.84"W was added based on Danger to Navigation Report 1 for this survey (Feature 20). The final least depth for Feature 20 was 8.94 meters (0.270 meter uncertainty). An additional wreck, approximately 120 meters west southwest of Feature 20, has a least depth of 10.04 meters (0.270 meter uncertainty) in 38° 27' 46.42"N 075° 00' 54.45"W (Feature 21). Recommend revising depth sounding for existing wreck object to 8.9 meters in 38° 27' 47.49"N 075° 00' 49.84"W and adding a dangerous wreck object with a depth sounding of 10.0 meters in 38° 27' 46.42"N 075° 00' 54.45"W. ***Concur with clarification - Do not chart 33 Wk or 38 Obstn. Shoaler wreck in vicinity. Chart 29 Wks and danger curve.***

The charted submerged obstruction object with depth unknown in 38° 27' 53.60"N 075° 00' 52.24"W was found approximately 270 meters northwest with a least depth of 11.48 meters (0.270 meter uncertainty) in 38° 27' 59.98" N 075° 00' 59.63W" (Feature 6). Recommend updating the submerged obstruction object with a sounding value of 11.5 meters in 38° 27' 59.98" N 075° 00' 59.63W" and the attributes for Feature 6 in the S-57 file. ***Concur – Delete dangerous submerged Obstn, PA. Chart 37 Obstn and danger curve.***

Table D-1 lists additional objects found in this survey that are recommended for addition to ENC US4DE11M.

Table D-1. Additional Features from H11649 for inclusion on ENC US4DE11M

***\*Charting recommendations can be found in above discussed section D.1.***

***\*\*Determined insignificant during office processing. Do not chart obstructions. Chart depth.***

***\*\*\*Determined insignificant during office processing. Do not chart obstructions.***

Feature Number	Latitude (NAD83)	Longitude (NAD83)	Depth (Meters)	Vertical Uncertainty (Meters)	Description
5	38° 28' 37.09"N	075° 00' 56.31"W	11.22	0.270	Obstructions*
8	38° 27' 04.95"N	075° 00' 54.41"W	11.04	0.270	Obstruction**
9	38° 27' 05.88"N	075° 00' 37.23"W	14.38	0.270	Obstructions***
14	38° 27' 36.16"N	074° 59' 34.52"W	11.97	0.270	Obstruction***
17	38° 27' 26.09"N	075° 02' 22.76"W	11.01	0.270	Obstruction***
18	38° 27' 30.86"N	075° 02' 27.07"W	10.55	0.270	Obstruction

Feature Number	Latitude (NAD83)	Longitude (NAD83)	Depth (Meters)	Vertical Uncertainty (Meters)	Description
					***
22	38° 27' 44.88"N	075° 02' 38.33"W	9.61	0.270	Obstruction ***
25	38° 29' 07.27"N	075° 02' 51.41"W	6.82	0.270	Obstructions*
31	38° 29' 35.55"N	074° 59' 30.85"W	13.78	0.270	Obstruction ***
32	38° 29' 18.24"N	074° 56' 53.98"W	15.15	0.270	Obstruction*
38	38° 27' 08.37"N	074° 56' 37.06"W	9.26	0.270	Obstruction ***
39	38° 27' 57.70"N	074° 56' 03.11"W	10.15	0.270	Obstruction ***
40	38° 27' 45.74"N	075° 02' 42.77"W	9.17	0.270	Obstruction ***
41	38° 27' 33.49"N	075° 02' 30.02"W	10.36	0.270	Obstruction ***
48	38° 27' 46.03"N	075° 00' 49.07"W	11.62	0.270	Obstruction*
52	38° 27' 16.03"N	075° 01' 22.77"W	11.75	0.270	Obstruction ***
53	38° 29' 43.69"N	075° 01' 47.54"W	12.14	0.270	Obstruction ***
58	38° 27' 21.15"N	074° 59' 03.43"W	10.82	0.270	Obstruction ***

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In general, the charted inshore 5.4 and 9.1 meter depth contours were found in this survey to be closer to shore, sometimes by as much as 150 meters. Though these depth contours primarily run parallel to shore, there are small finger shoals that cause a periodic seaward shift in these curves. **Concur**

The numerous offshore shoal areas charted by the 9.1 meter depth contour still exist, though there have been small changes in their overall extent and minimum depths. The results of this survey show that the larger of these offshore shoal areas appear to have remained relatively stable since the prior surveys. The smaller shoals showed greater variability in this survey. **Concur**

The charted 18.2 meter depth contour agrees with the results of this survey. **Concur**

The small shoal charted as a 9.1 meter depth contour and 8.2 meter sounding in 38° 25' 55.53"N 075° 02' 03.08"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 9.64 m (0.270 meter uncertainty) in 38° 25' 49.70"N 075° 02' 04.42"W. **Concur**



The small shoal charted as a 9.1 meter depth contour and 8.8 meter sounding in 38° 25' 49.83"N 075° 01' 35.02"W was not found. The shoalest CUBE depth in the 0.5 meter BAG was 9.69 m (0.270 meter uncertainty) in 38° 25' 45.41"N 075° 01' 35.16"W.

**Concur**

The small shoal charted as a 9.1 meter depth contour and 7.9 meter sounding in 38° 25' 26.18"N 075° 01' 26.20"W has migrated south approximately 180 meters. The shoalest CUBE depth in the 0.5 meter BAG was 7.83 m (0.270 meter uncertainty) in 38° 25' 20.98"N 075° 01' 29.92"W. **Concur**

The small shoal charted as a 9.1 meter depth contour and 8.8 meter sounding in 38° 23' 34.43"N 075° 00' 57.36"W has migrated south approximately 450 meters. The shoalest CUBE depth in the 0.5 meter BAG was 8.71 m (0.270 meter uncertainty) in 38° 23' 21.95"N 075° 01' 06.08"W. **Concur**

The small shoal charted as a 9.1 meter depth contour and 8.8 meter sounding in 38° 21' 38.11"N 075° 01' 12.05"W has migrated south approximately 650 meters. The shoalest CUBE depth in the 0.5 meter BAG was 8.87 m (0.270 meter uncertainty) in 38° 21' 22.25"N 075° 01' 29.54"W. **Concur**

The small shoal charted as a 9.1 meter depth contour and a 8.2 meter sounding in 38° 21' 04.11"N 075° 01' 41.52"W and a 7.9 meter sounding in 38° 20' 46.81"N 075° 01' 52.44"W was found to be much smaller than charted. The 8.2 meter sounding was found to be in 13.72 meters in the 0.5 meter BAG. The shoalest CUBE depth in the 0.5 m BAG was 8.82 m (0.270 meter uncertainty) in 38° 20' 45.61"N 75° 01' 47.61"W. **Concur**

The long north-south oriented shoal charted as a 9.1 meter contour with the following charted soundings was found to be three separate shoals:

7.3 meters in 38° 25' 27.61"N 074° 59' 21.48"W  
8.2 meters in 38° 25' 08.97"N 074° 59' 31.32"W  
8.2 meters in 38° 24' 42.27"N 074° 59' 42.98"W  
8.8 meters in 38° 24' 24.18"N 074° 59' 51.69"W  
8.2 meters in 38° 24' 07.64"N 075° 00' 14.26"W

The northern most shoal had a shoalest CUBE depth in 0.5 meter BAG of 7.81 meters (0.270 meter uncertainty) in 38° 25' 21.64"N 074° 59' 21.96"W. The middle shoal had a shoalest CUBE depth of 8.59 meters (0.270m uncertainty) in 38° 24' 35.53"N 074° 59' 43.98"W. The southern most shoal had a shoalest CUBE depth in the 0.5m BAG of 8.37 meters (0.270m uncertainty) in 38° 23' 58.54"N 075° 00' 24.33"W. **Concur**

The charted 12.1 meter sounding in 38° 24' 33.23"N 075° 00' 18.76"W was found to be in depths of 14.6 meters in the 0.5 meter BAG. **Concur**

The charted 9.7 meter sounding in 38° 25' 44.33"N 075° 01' 01.31"W was found to be in depths of 11.3 meters in the 0.5 meter BAG. **Concur**

The charted 10 meter sounding in 38° 26' 36.23"N 075° 00' 17.02"W was found to be in depths of 15.2 meters in the 0.5 meter BAG. **Concur**

The charted 11.2 meter sounding in 38° 26' 29.87"N 075° 00' 35.70"W was found to be in depths of 12.5 meters in the 0.5 meter BAG. **Concur**

The 5.4 meter depth contour and 5.4 meter sounding in 38° 25' 26.77"N 075° 02' 01.92"W was found approximately 400 meters southwest of its charted position. The shoalest CUBE depth in the 0.5m BAG was 4.99 m (0.270 meter uncertainty) in 38° 25' 17.18"N 075° 02' 06.61"W. **Concur**

The 5.4 meter depth contour and 5.4 meter sounding in 38° 24' 19.53"N 075° 02' 54.31"W was not found. The shoalest CUBE depth in the 0.5m BAG was 6.38 m (0.270 meter uncertainty) in 38° 24' 18.49"N 075° 02' 56.51"W. **Concur**

The charted dangerous wreck object in 38° 25' 00.25"N 075° 00' 20.35"W (AWOIS 1059) was not found. A rectangular obstruction, approximately 4 meters by 8 meters, was found with a least depth of 15.91 meters (0.270 meter uncertainty) in 38° 25' 08.12"N 075° 00' 44.34"W (Feature 11), approximately 630 meters northwest of the charted wreck. Recommend removal of the wreck object and adding a submerged obstruction object with a 15.9 meter sounding in 38° 25' 08.12"N 075° 00' 44.34"W. **Concur with clarification – Delete dangerous sunken wreck, PA. – 52 ft Obstn determined insignificant during office processing. Do not chart 52 Obstn.**

The charted obstruction object with a 4.5 meter sounding in 38° 23' 52.20"N 075° 03' 26.10"W was added based on Danger to Navigation Report 2 for this survey. Subsequent to the Danger to Navigation report additional item lines were run through the area to ensure that all obstructions and the least depth were identified. These objects have been identified as seven submerged piles:

- 4.99 m (0.270 meter uncertainty) in 38° 23' 51.83"N 075° 03' 26.37"W (Feature 50) **Do not chart**
- 5.14 m (0.270 meter uncertainty) in 38° 23' 52.23"N 075° 03' 26.25"W (Feature 62) **Do not chart**
- 4.78 m (0.270 meter uncertainty) in 38° 23' 52.15"N 075° 03' 26.05"W (Feature 49) \*
- 4.88 m (0.270 meter uncertainty) in 38° 23' 51.80"N 075° 03' 26.08"W (Feature 59) **Do not chart**
- 5.10 m (0.270 meter uncertainty) in 38° 23' 52.11"N 075° 03' 25.78"W (Feature 60) **Do not chart**
- 5.35 m (0.270 meter uncertainty) in 38° 23' 51.71"N 075° 03' 25.50"W (Feature 61) **Do not chart**
- 5.60 m (0.270 meter uncertainty) in 38° 23' 51.83"N 075° 03' 24.99"W (Feature 19) **Do not chart**

Recommend removing the obstruction object and adding the seven obstruction objects (submerged piles). *Do not concur*

*\*Chart 15 Obstns (subm piles) and danger curve in Latitude 38° 23' 52.15"N Longitude 075° 03' 26.05"W.*

The charted pipsol object in 38° 23' 07.05"N 075° 03' 46.90"W to 38° 22' 57.75"N 075° 03' 00.97"W, category of sewer, and condition of under construction was found approximately 85 meters north of its charted position. The offshore end of the pipeline is located in 38° 23' 00.38"N 075° 03' 00.32"W (Feature 56) and the inshore end of the exposed pipeline is located in 38° 23' 03.05"N 075° 03' 13.50"W (Feature 57). The pipeline is buried from the inshore position in towards shore. Projection of the exposed pipe alignment to the shoreline intersects the charted high water line in 38° 23' 10.02"N 075° 03' 45.33"W. A least depth of 8.07 meters (0.270 meter uncertainty) in 38° 23' 02.89"N 075° 03' 12.65"W (Feature 15) was found about 20 meters east of the inshore end of the exposed section of pipe. On the offshore end, a least depth of 8.79 meters (0.270 meter uncertainty) in 38° 23' 00.53"N 075° 03' 00.85"W (Feature 16) was found about 15 meters west of the seaward end of the exposed section of pipe. Recommend updating the pipsol object endpoints to 38° 23' 10.02"N 075° 03' 45.33"W and 38° 23' 03.05"N 075° 03' 13.50"W. Note that the inshore endpoint of the pipsol object included in the S-57 file generated for H11649 is at 38° 23' 08.84"N 075° 03' 39.81"W which represents the intersection of the pipeline alignment with the inshore limit of the survey bounds. Also recommend adding two submerged obstruction objects with an 8.0 meter sounding in 38° 23' 02.89"N 075° 03' 12.65"W and an 8.8 meter sounding in 38° 23' 00.53"N 075° 03' 00.85"W. *Concur with clarification – Defer to MCD Source Data Branch for final charting recommendation/relocation of Sewer.*

The charted dangerous wreck object in 38° 22' 06.60"N 075° 03' 03.82"W (AWOIS 735) was not found. No significant sidescan sonar contacts or multibeam features were identified anywhere in this vicinity. Recommend removing the dangerous wreck object. *Concur – Delete dangerous sunken wreck.*

The charted submerged obstruction object with a category of Fish Haven and a value of sounding of 5.4 meters centered in 38° 21' 00.79"N 075° 03' 27.86"W has a natural bottom with a least depth of 5.09 meters (0.270 meter uncertainty) in 38° 20' 55.66"N 075° 03' 12.28"W, along the eastern boundary and 5.14 meters (0.270 meter uncertainty) in 38° 20' 33.41"N 075° 03' 34.70"W near the southern boundary associated with a prominent northeast-oriented shoal that runs through the southeastern area of the Fish Haven. Most of the numerous prominent obstructions within this area lie in the naturally deeper waters in the northern half of the Fish Haven. Features 2, 4, 46, and 47 were set to preserve the least depth of prominent clusters of obstructions that were identified. In addition, numerous designated soundings were set to preserve the least depths for other objects in the Fish Haven. In the northern half, a least depth on an object was 8.22

meters (0.270 meter uncertainty) in 38° 21' 19.26"N 075° 03' 42.37"W (Feature 47). Along the southern edge, a long pipe section with a least depth of 5.51 meters (0.270 meter uncertainty) in 38° 20' 33.48"N 075° 03' 39.47"W (Feature 4) was found. **Concur with clarification – It is recommended that the notation *Obstn Fish Haven (auth min 18 ft)* be revised to *Obstn Fish Haven (auth min 16 ft)*. Defer to MCD Source Data Branch for final correction.**

The charted submerged obstruction object with a category of Fish Haven and a value of sounding of 10.6 meters centered in 38° 22' 56.15"N 074° 58' 43.67"W has a controlling natural bottom depth of 14.98 m (0.274 meter uncertainty) in 38° 22' 43.91"N 074° 58' 37.03"W along the southeast boundary. The charted dangerous wreck in 38° 22' 44.85"N 074° 58' 43.40"W (AWOIS 1053) was found with a least depth of 18.12 meters (0.270 meter uncertainty) in 38° 23' 01.79"N 074° 58' 47.10"W (Feature 29). It is likely that this wreck is also the fishing obstruction reported in AWOIS 1054. Recommend updating the wreck object with a sounding value of 18.1 meters and charting a wreck symbol in 38° 23' 01.79"N 074° 58' 47.10"W. **Concur with clarification – AWOIS #1053 – Delete dangerous sunken wreck. AWOIS #1054 – Chart 59 Wk.**

The charted dangerous wreck in 38° 25' 54.58"N 074° 57' 26.22"W (AWOIS 1062) was found very close to the charted position with a least depth of 18.04 meters (0.270 meter uncertainty) in 38° 25' 52.77"N 074° 57' 25.74"W (Feature 35). Recommend updating the wreck object with a sounding value of 18.0 meters and charting a wreck symbol in 38° 25' 52.77"N 074° 57' 25.74"W. **Concur – AWOIS #1062 – Delete dangerous sunken wreck. Chart 59 Wk and danger curve.**

Table D-2 lists additional objects found in this survey that are recommended for addition to ENC US4VA50M.

Table D-2. Additional Features from H11649 for inclusion on ENC US4VA50M

Feature Number	Latitude (NAD83)	Longitude (NAD83)	Depth (Meters)	Vertical Uncertainty (Meters)	Description
1	38° 24' 09.59"N	075° 02' 43.37"W	10.35	0.270	Obstruction**
3	38° 23' 11.23"N	075° 02' 41.51"W	11.34	0.270	Obstruction***
7	38° 26' 07.90"N	075° 01' 10.33"W	12.72	0.270	Obstruction***
10	38° 26' 59.87"N	075° 00' 33.61"W	14.18	0.270	Obstruction***
12	38° 26' 48.89"N	075° 00' 16.16"W	15.24	0.270	Obstruction***
13	38° 26' 46.14"N	075° 00' 06.52"W	13.45	0.270	Obstruction***
26	38° 26' 45.94"N	075° 02' 30.34"W	9.52	0.270	Obstruction***
27	38° 26' 42.97"N	075° 02' 32.43"W	9.76	0.270	Obstruction***
30	38° 25' 30.53"N	074° 58' 21.20"W	13.96	0.270	Obstructions***
33	38° 26' 41.66"N	074° 57' 23.90"W	17.21	0.270	Obstruction***
34	38° 26' 28.51"N	074° 57' 25.57"W	16.12	0.270	Obstruction***

Feature Number	Latitude (NAD83)	Longitude (NAD83)	Depth (Meters)	Vertical Uncertainty (Meters)	Description
42	38° 25' 41.10"N	075° 02' 33.72"W	10.30	0.270	Obstructions**
43	38° 25' 22.91"N	075° 02' 28.58"W	10.58	0.270	Obstruction*
44	38° 24' 07.15"N	075° 03' 15.97"W	7.61	0.270	Obstruction***
45	38° 21' 28.47"N	075° 03' 08.81"W	11.87	0.270	Obstructions*
51	38° 22' 46.82"N	075° 02' 49.29"W	11.37	0.270	Obstruction***
54	38° 26' 54.48"N	074° 57' 24.63"W	13.02	0.270	Obstruction***
55	38° 21' 33.61"N	075° 03' 02.37"W	12.07	0.270	Obstructions***

*\*Charting recommendations can be found in above discussed section D.1.*

*\*\*Determined insignificant during office processing. Do not chart obstructions. Chart depth.*

*\*\*\*Determined insignificant during office processing. Do not chart obstructions.*

#### AWOIS Item Investigations

A listing of all Full and Information Only AWOIS items that fall within H11649 Sheet E are provided in Table D-3 and discussed below. In some cases, there were multiple AWOIS items listed for the same apparent feature, so we have recommended removal or merging of some of these items.

Table D-3. AWOIS Listing Received from NOAA for H11649

AWOIS Number	Chart 12211	Chart 12214	ENC US4VA50M	ENC US4DE11M
Full AWOIS Investigation				
*AWOIS 735	X		X	
Informational AWOIS Only				
*AWOIS 1053	X		X	
*AWOIS 1054	X		X	
*AWOIS 1059	X		X	
*AWOIS 1062	X		X	
AWOIS 1067	X	X		X
*AWOIS 1069	X	X		X
*AWOIS 1070	X	X		X
*AWOIS 1072	X	X		X
AWOIS 1074	X	X		X
*AWOIS 1076	X	X		X
*AWOIS 1077	X	X		X

*\*See above sections or bluenotes for final charting recommendations.*

**AWOIS 735 (Full):** Unknown - 42 ft pleasure craft reported sunk in 1980 (LNM37/80) and charted as a dangerous submerged wreck. No indications of submerged wreckage were found anywhere within a 500 meters radius of the charted wreck feature. Remove wreck from chart and update AWOIS. *See above section or bluenotes for final charting recommendations.*

**AWOIS 1053 (Informational):** *Carpender* (24 No. 3925) - reported demolished 1934. Nothing is presently charted at the AWOIS position, though the search radius encompasses the same area as AWOIS 1054 discussed below. *See above section or bluenotes for final charting recommendations.*

**AWOIS 1054 (Informational):** Unknown (19 Fishing Obstr) – no other information provided. A submerged wreck (Feature 29) was found near the AWOIS position within a charted Fish Haven. Chart submerged wreck based on Feature 29 and merge AWOIS 1053 and 1054 into a single item. *See above section or bluenotes for final charting recommendations.*

**AWOIS 1059 (Informational):** *W.L. Steed* (27 No. 248) – 3798 NT tanker reported sunk in 1942 and charted as a dangerous submerged wreck PA. A submerged obstruction (Feature 11) was found approximately 630 meters northwest of the charted PA wreck that may be remains of the sunken tanker. Remove PA wreck, chart small obstruction, and update AWOIS. *See above section or bluenotes for final charting recommendations.*

**AWOIS 1062 (Informational):** Unknown (19 Fishing Obstr) – no other information provided, though a submerged wreck is charted at this position. A large submerged wreck (Feature 35) was found very close to charted wreck. Chart dangerous wreck based on Feature 35 and update AWOIS. *See above section or bluenotes for final charting recommendations.*

**AWOIS 1067 (Informational):** Unknown (24 No. 3918) – sunken trawler reported sunk in 1949. Nothing is presently charted at the AWOIS position and no indications of any wreckage were found during this survey. Two smaller obstructions (Features 12 and 13) were found approximately 400 meters northwest of AWOIS item. *See above section or bluenotes for final charting recommendations.*

**AWOIS 1069 (Informational):** Unknown (24 No. 318 and 27 No. 530) - unknown wreck charted as a dangerous submerged wreck cleared to 6 feet. A large wreck (Feature 36) was found on the western side of Fenwick Shoal at the charted position. Chart dangerous wreck based on Feature 36 and update AWOIS. *See above section or bluenotes for final charting recommendations.*

**AWOIS 1070 (Informational):** Unknown (24 No. 1234) - unknown wreck charted as a dangerous submerged wreck cleared to 8 feet. A large wreck (Feature 28) was found on the central part of Fenwick Shoal at the charted position. Chart dangerous wreck based on Feature 28 and update AWOIS. *See above section or bluenotes for final charting recommendations.*

**AWOIS 1072 (Informational):** Unknown (27 No. 531) - wreck sunk before WW2 and located by CGS in 1929. Based on the position, this item is redundant to AWOIS 1070. Recommend merging AWOIS 1070 and 1072 into a single item. *Concur - See above section or bluenotes for final charting recommendation for AWOIS #1070.*



**AWOIS 1074 (Informational):** Unknown (19 Fishing Obstr) – no other information provided. The AWOIS position falls near Fenwick Shoal but does not correspond to any charted object. Recommend removing this item from the AWOIS list. *Concur – No obstruction located during survey operations. Item not shown on Chart #12211, 43<sup>rd</sup>., Edition, 20071001. No change in charting.*

**AWOIS 1076 (Informational):** *Joseph E. Hooper* (24 No. 612) - 2233 GT barge reported sunk in 1943 and charted as submerged dangerous wreck cleared to 25 feet. A large wreck (Feature 24) was found near the charted position. Chart submerged wreck based on Feature 24 and update AWOIS. *Concur - See above section or bluenotes for final charting recommendations.*

**AWOIS 1077 (Informational):** Unknown (19 Fishing Obstr) – no other information provided. Based on the position, this item is redundant to AWOIS 1076. Recommend removing this item from the AWOIS list. *See above section or bluenotes for final charting recommendations.*

#### Designated Soundings

Approximately 175 designated soundings were set across this sheet to help better preserve the shallowest soundings relative to the computed depth surface. In some cases, designated soundings were used to preserve the least depth of small objects that were not significant enough to warrant a feature designation. Designated soundings were also used on many large features (e.g., wrecks, pipe sections, etc.) to better define the feature and to help preserve other important least depths on that object. Designated soundings were also used extensively in the large Fish Haven in the southwest part of the sheet to preserve the least depths of many of the large objects found there. Because a separate designated sounding flag does not presently exist in the Generic Sensor Format, all of the designated soundings have been flagged as features in the GSF files. All depths flagged as features will override the CUBE best estimate of the depth in the final BAG files. All of the features that have been set for this survey are listed within two files that are referenced within Appendix II. *Concur*

#### Danger to Navigation Reports

Two Danger to Navigation Reports were submitted for this survey and copies have been included in Appendix V. AHB's corresponding version of the Danger to Navigation Reports as they were submitted to MCD are provided in Appendix I. Danger to Navigation Report 1 addressed uncharted wrecks (Features 20, 21, and 48) found in close proximity in 38° 27' 47.49"N 075° 00' 49.84"W. Danger to Navigation Report 2 addressed a series of uncharted, inshore submerged pilings (Features 19, 49, 50, 59, 60, 61, and 62) in 38° 23' 52.15"N 075° 03' 26.05"W. *Concur*

#### D.2 ADDITIONAL RESULTS

Shoreline verification was not required for this survey. Comparison with prior surveys was not required under this task order. *Concur*

## Aids to Navigation

The charted buoy G “1FS” Fl G 4s BELL in 38° 26’ 46.81”N 074° 57’ 22.92”W (NAD83) was found (Feature 37) in 38° 26’ 47.81”N 074° 57’ 22.63”W (NAD83). This agreed with The USCG Light List, Volume II, Atlantic Coast, which also noted that the buoy was placed on the west side of Fenwick Shoal. Fenwick Shoal is a large and stable feature located approximately five nautical miles offshore that rises steeply on its southern end from depths of more than 60 feet to natural controlling depths of 16 feet. It also includes two large wrecks, one of which has a least depth of 11 feet. The intent of the existing buoy is to alert near coastal vessel traffic of the shoal and to direct them shoreward (or to the west) of this feature. Most of the other lateral sea coast buoys across this region are red and intended to direct traffic offshore. Similarly, a red buoy positioned on the offshore (or eastern) side of Fenwick Shoal would serve to direct vessel traffic to the generally safer waters offshore of the shoal. Based on the shoal’s prominence relative to the surrounding waters, a danger buoy (red and black horizontally banded with a white light) positioned to the south or just offshore of the shoal might provide a better indication of the potential navigation danger of this general area. However, given the prevailing inshore commercial vessel (mostly tug and barge) traffic patterns in this area and the long-term presence of this buoy at this position, the existing configuration may be preferable. At its present location, the buoy is well positioned to mark the western side of Fenwick Shoal. **Concur**

The charted buoy Y Army in 38° 20’ 44.81”N 075° 01’ 06.00”W was not seen during survey operations nor were any indications of it found with 200% sidescan sonar coverage and resultant multibeam coverage in the area. This buoy is listed in the USCG Light List, Volume II, Atlantic Coast as the Ocean City Research Buoy maintained by the U.S. Army Corps of Engineers (USACE). Phone conversations with the USACE indicate that this buoy was likely deployed during a period in the 1970s to support coastal planning studies and was removed many years ago; there are no plans to re-establish this buoy in the future. Recommend removal of this buoy from the chart and the Light List.

**Concur**

Table D-4. Aids to Navigation

Buoy Name	Multibeam File Name	Confirmed Position (NAD83) From Multibeam		Feature Number
		Latitude (N)	Longitude (W)	
G “1FS”	asmba07257.d32	38° 26’ 47.81”	074° 57’ 22.63”	37

## Additional Factors

The inshore, near coastal areas of the mid-Atlantic are relatively dynamic, and finer-grained sediments (e.g., fine sands and silt) are routinely transported through normal coastal processes. In addition, periodic larger storm events may be capable of re-suspending and transporting coarser-grained bottom sediments. Even over the six month period of these survey operations, small-scale changes in the bottom topography, likely due to normal migration of finer-grained sand waves, was evident. These differences



were most noticeable during some of the holiday or gap fill operations that were typically conducted up to several months after most of the mainscheme operations had already been completed. Some of the higher CUBE uncertainties observed across H11649 were due to relatively minor changes in the seafloor between the times that overlapping multibeam data were acquired. Though we did observe small-scale seafloor change over the course of this survey, based on comparisons with the charts, it appears that the major shoal features across this area have remained relatively stable since the prior surveys over 20 years ago. These larger shoal areas are likely comprised of coarser-grained surface sediments that are much less impacted by coastal sediment transport processes. However, in the event of an unusually large coastal storm (e.g., hurricane or major nor'easter), even these relatively stable features may be greatly altered. *Concur*

The other major source of potential large-scale changes in bottom topography is the sand borrow dredging operations that are conducted as part of periodic beach nourishment projects across this area. The northern portions of H11649 were impacted by sand borrow dredging in support of a Bethany Beach nourishment project that began in early fall 2007 (after all of the mainscheme data had been acquired in that area). Significant changes in bottom topography were noted within the borrow area during some subsequent holiday data acquisition. The Bethany Beach project was managed by the USACE Philadelphia District, though similar projects just to the south in Ocean City would be managed by the USACE Baltimore District. The USACE prefers to site their borrow areas within the 3-mile state limit because of lower transportation costs and less federal oversight, though they will move farther offshore if necessary. Indications of past borrow site dredging were evident in several areas inside of the 3-mile limit. The District offices should be able to provide an indication of past and potential future sand borrow dredging operations and they may also be able to provide relevant survey data to help document the seafloor changes caused by these operations. Below are present relevant points of contacts for beach nourishment projects within each District. *Concur*

USACE Philadelphia District: Michael Hart, Geotechnical Section. Ph: 215-656-6667

USACE Baltimore District: Jim Snyder, Geotechnical Section. Ph: 410-962- 6817

## **E. APPROVAL SHEET**

13 June 2008

### **LETTER OF APPROVAL**

REGISTRY NUMBER: H11649

This report and the accompanying digital data for project OPR-D302-KR-07 Mid-Atlantic Corridor; Coast of Delaware Project is respectfully submitted.

Field operations and data processing contributing to the accomplishment of this survey, H11649, were conducted under supervision of myself and lead hydrographers Gary R. Davis, Paul L. Donaldson and Jason M. Infantino with frequent personal checks of progress and adequacy. This report and accompanying deliverable data items have been closely reviewed and are considered complete and adequate as per the Statement of Work.

Reports previously submitted to NOAA for this project include:

<u>Report</u>	<u>Submission Date</u>
Descriptive Report H11650, SAIC Doc 07-TR-011	02 May 2008
Data Acquisition and Processing Report, SAIC Doc 07-TR-012	02 May 2008

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Tom Waddington  
Lead Hydrographer  
Science Applications International Corporation  
13 June 2008

## APPENDIX I. DANGER TO NAVIGATION REPORTS (AHB SUBMISSIONS TO MCD)

This appendix contains copies of the two Danger to Navigation Reports as they were prepared by AHB and submitted to MCD. These AHB Danger to Navigation Reports were provided to SAIC by AHB as PDF documents and then converted to Word (DOC) documents for inclusion in this Appendix. Copies of the corresponding original Danger to Navigation Reports as prepared by SAIC and submitted to AHB are included in Appendix V.

### AHB DtoN Report 1 to MCD – H11649

**Registry Number:** H11649

**State:** Delaware

**Locality:** Atlantic Ocean

**Sub-locality:** East of Fenwick Island

**Project Number:** OPR-D302-KR-07

**Survey Date:** 09/04/2007

### Charts Affected

Number	Version	Date	Scale
12211	42nd Ed.	07/01/2004	1:80000
12214	47th Ed.	07/01/2006	1:80000
12200	48th Ed.	06/01/2004	1:419706
13003	48th Ed.	10/01/2004	1:1200000

### Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	wreck 3	GP	8.95 m	38° 27' 47.500" N	075° 00' 49.900" W	---

**1.1) wreck 3****DANGER TO NAVIGATION****Survey Summary****Survey Position:** 38° 27' 47.500" N, 075° 00' 49.900" W**Least Depth:** 8.95 m**Timestamp:** 2007-247.00:00:00.000 (09/04/2007)**GP Dataset:** H11649\_dton1.xls**GP No.:** 3**Charts Affected:** 12211\_1, 12214\_1, 12200\_1, 13003\_1**Remarks:**

Depths are reduced to Mean Lower Low Water using predicted tides based on preliminary zoning. Positions are based on NAD83. Positions were obtained using DGPS from a US Coast Guard Station.

There are three wrecks in close proximity to one another. Two wrecks are lying side by side in 38° 27' 46.4" N, 075° 00' 54.5" W (NAD83), while the third wreck is approximately 100 m to the ENE in 38° 27' 47.5" N, 075° 00' 49.9" W.

**Feature Correlation**

Address	Feature	Range	Azimuth	Status
H11649_dton1.xls	3	0.00	000.0	Primary

**Hydrographer Recommendations**

Represent the three wrecks as one wreck symbol at 38°27'47.500" , -075°00'49.900" with the shoalest depth being 29 ft.

**Cartographically-Rounded Depth (Affected Charts):**

29ft (12211\_1, 12214\_1)

4 ¾fm (12200\_1, 13003\_1)

## **S-57 Data**

**Geo object 1:** Wreck (WRECKS)

**Attributes:** CATWRK - 2:dangerous wreck  
CONVIS - 2:not visual conspicuous  
RECDAT - 20070910  
SORDAT - 20070904  
SORIND - US,US,surve,H11649  
TECSOU - 3:found by multi-beam  
VALSOU - 8.95 m  
VERDAT - 12:Mean lower low water  
WATLEV - 3:always under water/submerged

## **Office Notes**

See section D.1. of the Descriptive Report for final charting recommendation.

## Feature Images

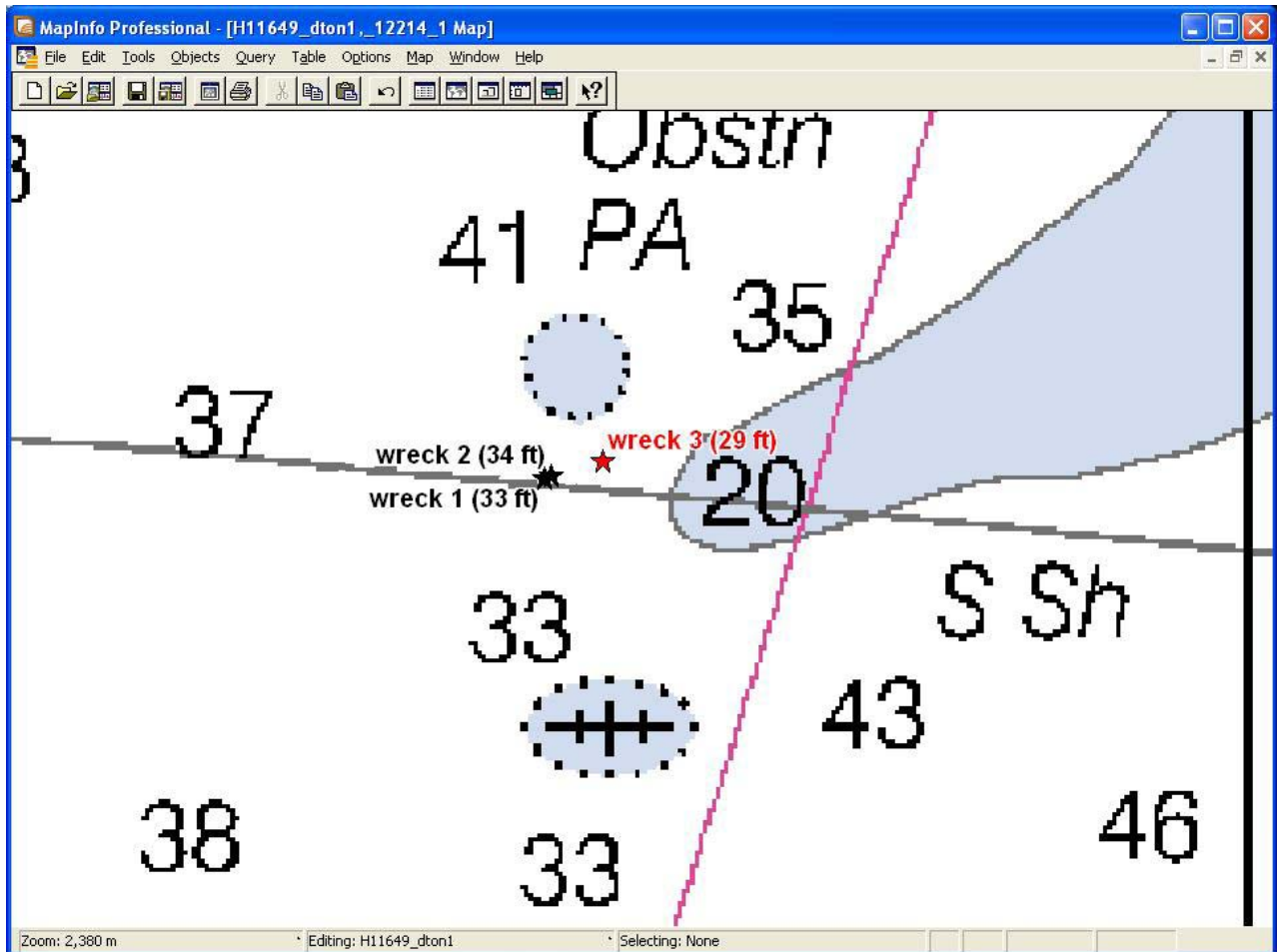
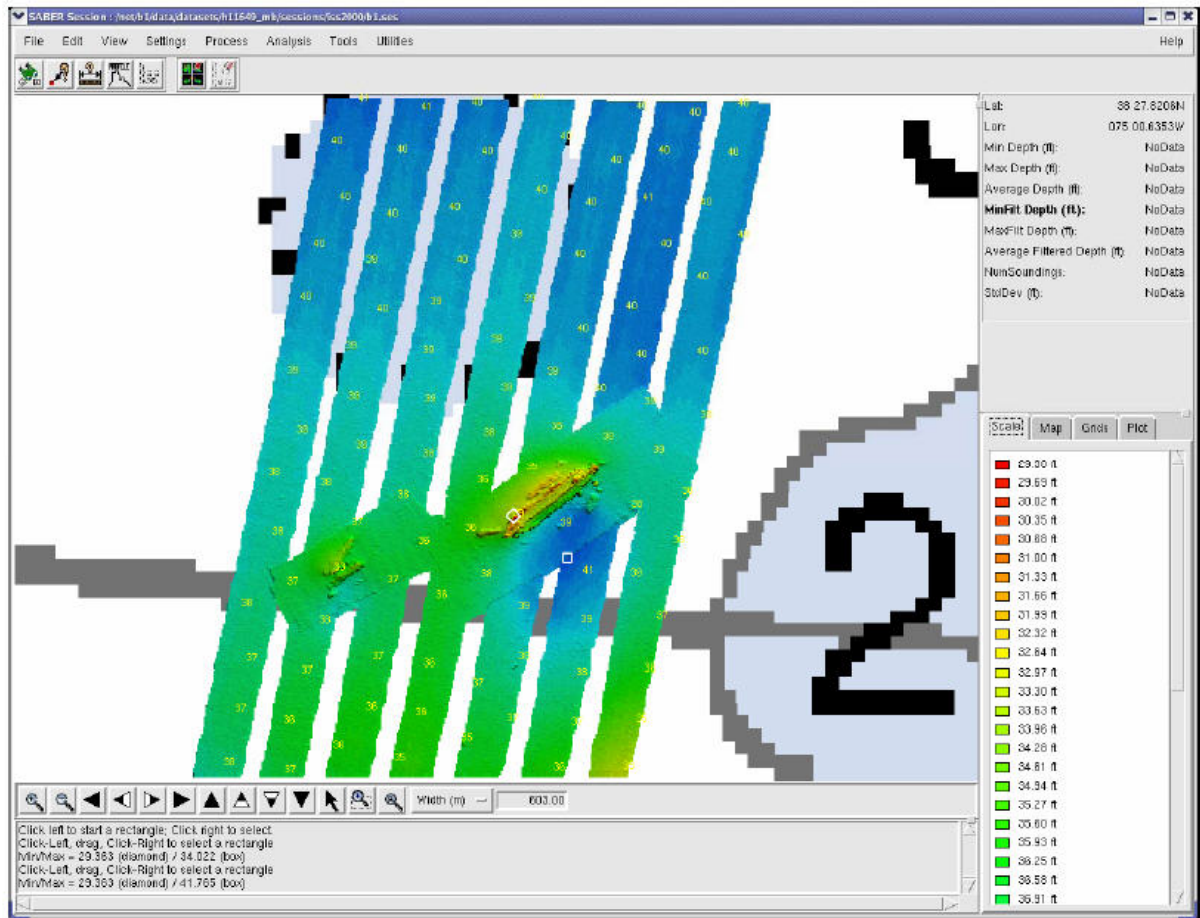


Figure 1.1.1

H11649

10 September 2007

SAIC



**Figure 2. Chart 12214 Showing Area Covered by this Report with location of Wrecks Minimum Depth of 29 Feet (MLLW) and Soundings within H11649.**

*Figure 1.1.2*



H11649

10 September 2007

SAIC

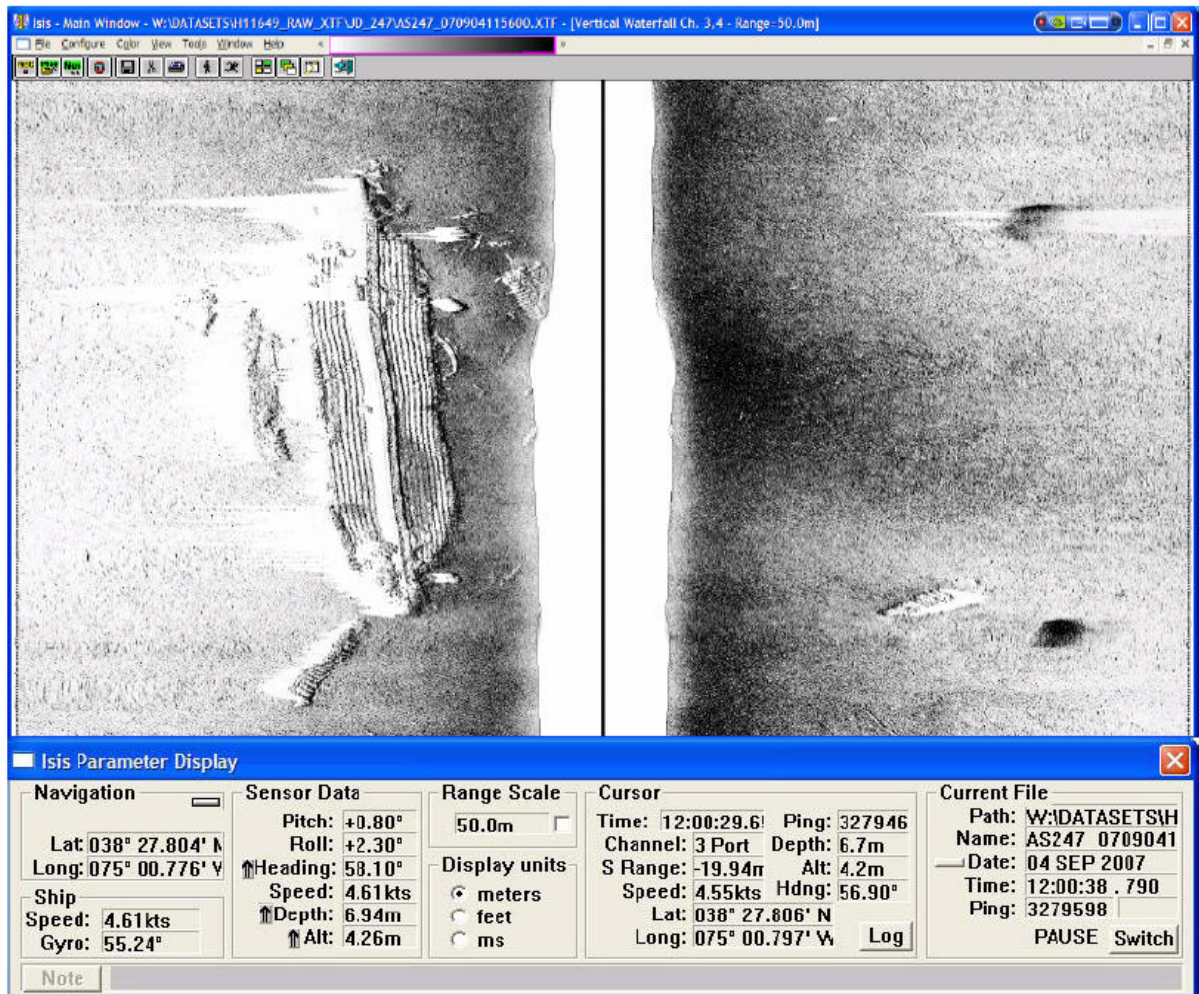


Figure 7. Sidescan Image Showing Wreck 3 within H11649.

Figure 1.1.3

H11649

10 September 2007

SAIC

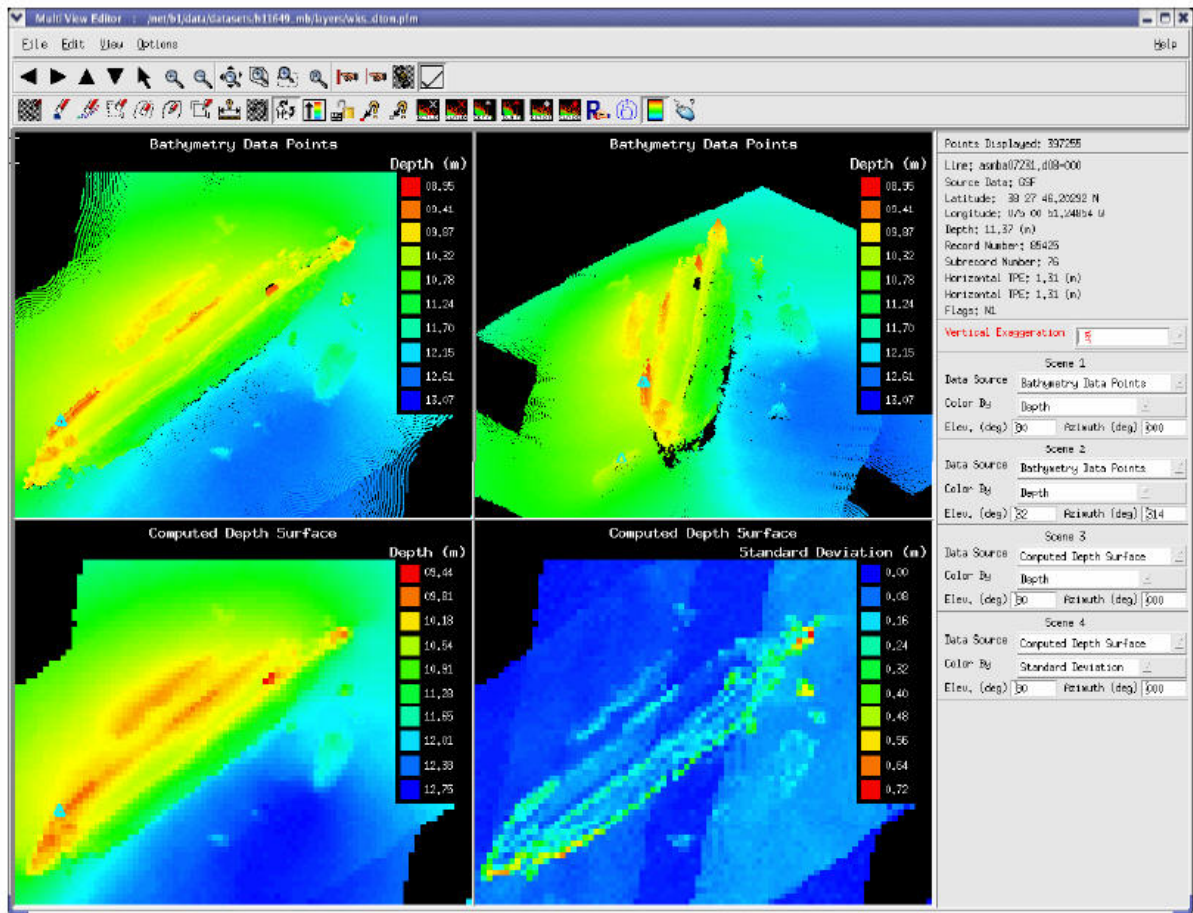


Figure 5. Multiview Editor of PFM Grid Showing Wreck 3 within H11649.

Figure 1.1.4

H11649

10 September 2007

SAIC

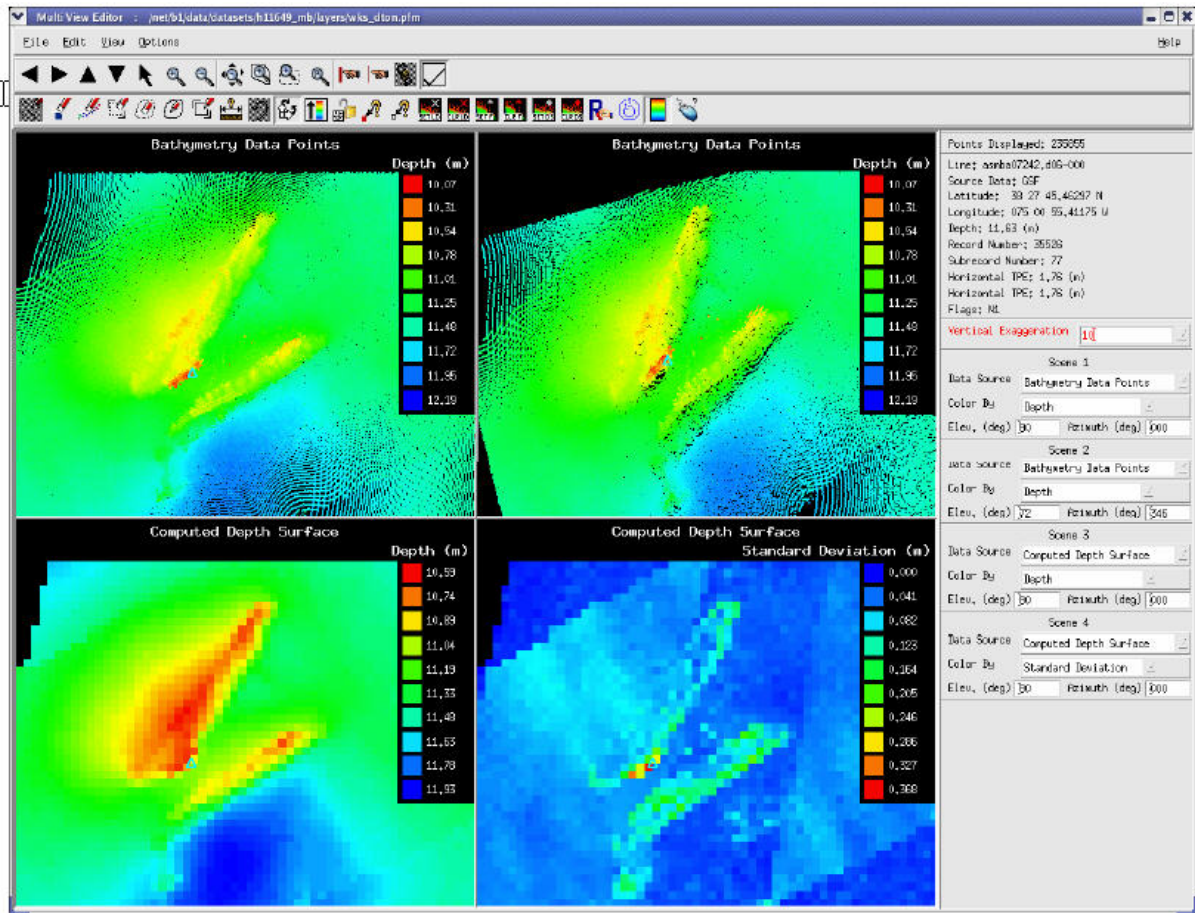


Figure 4. Multiview Editor of PFM Grid Showing Wrecks 1 and 2 within H11649.

Figure 1.1.5



**AHB DtoN Report 2 to MCD – H11649****Registry Number:** H11649**State:** Delaware**Locality:** Atlantic Ocean**Sub-locality:** East of Fenwick Island**Project Number:** OPR-D302-KR-07**Survey Date:** 09/03/2007**Charts Affected**

Number	Version	Date	Scale
12211	42nd Ed.	07/01/2004	1:80000
12200	48th Ed.	06/01/2004	1:419706
13003	48th Ed.	10/01/2004	1:1200000

**Features**

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	15-ft Submerged Piles	GP	4.72 m	38° 23' 52.200" N	075° 03' 26.100" W	---

## 1.1) 15-ft Submerged Piles

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 38° 23' 52.200" N, 075° 03' 26.100" W

**Least Depth:** 4.72 m

**Timestamp:** 2007-246.00:00:00.000 (09/03/2007)

**GP Dataset:** H11649\_SubmergedPiles.xls

**GP No.:** 1

**Charts Affected:** 12211\_1, 12200\_1, 13003\_1

#### Remarks:

There are three submerged pilings located in this area. The shoalest of the pilings is located at 38° 23' 52.2" N 075° 03' 26.1" W (NAD83) has a least depth of 15 ft (4.72m). A second submerged piling with a least depth of 16 ft (4.80 m) is located approximately 10 meters south of the first piling in 38° 23' 51.8" N 075° 03' 26.1" W (NAD83). A third piling with a least depth of 18 ft (5.61 m), approximately 30 meters east (offshore) from the first two pilings in 38° 23' 51.8" N 075° 03' 25.0" W (NAD83).

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
H11649_SubmergedPiles.xls	1	0.00	000.0	Primary

#### Hydrographer Recommendations

Chart a 15 foot sounding, with danger circle and label Subm Piles in 38° 23' 52.2" N 075° 03' 26.1" W (NAD83).

#### Cartographically-Rounded Depth (Affected Charts):

15ft (12211\_1)

2 ½fm (12200\_1, 13003\_1)

## S-57 Data

**Geo object 1:** Obstruction (OBSTRN)

**Attributes:** INFORM - Subm Piles Least Depth 4.72m / 15-ft rounded  
NATCON - 6:wooden  
QUASOU - 6:least depth known  
RECDAT - 20070911  
SORDAT - 20070911  
SORIND - US,US,SURVE,H11649  
TECSOU - 2,3:found by side scan sonar,found by multi-beam  
VALSOU - 4.72 m  
VERDAT - 12:Mean lower low water  
WATLEV - 3:always under water/submerged

## Office Notes

See section D.1. of the Descriptive Report for final charting recommendation.

## Feature Images

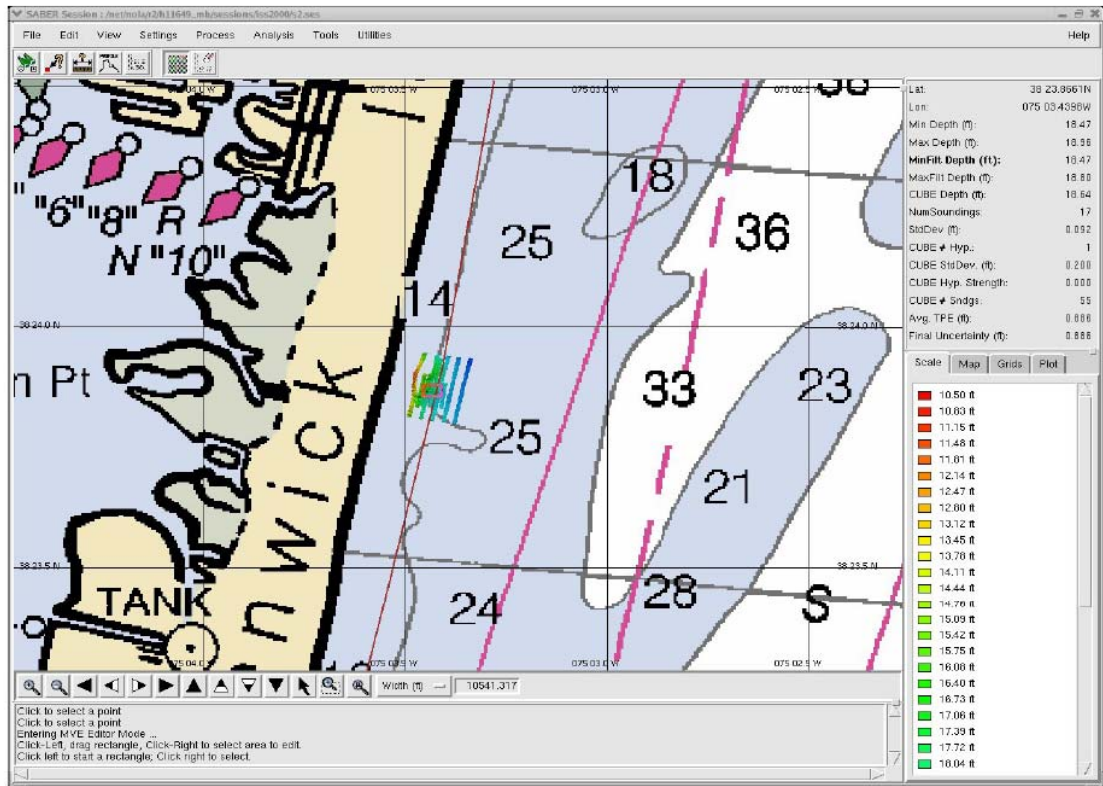
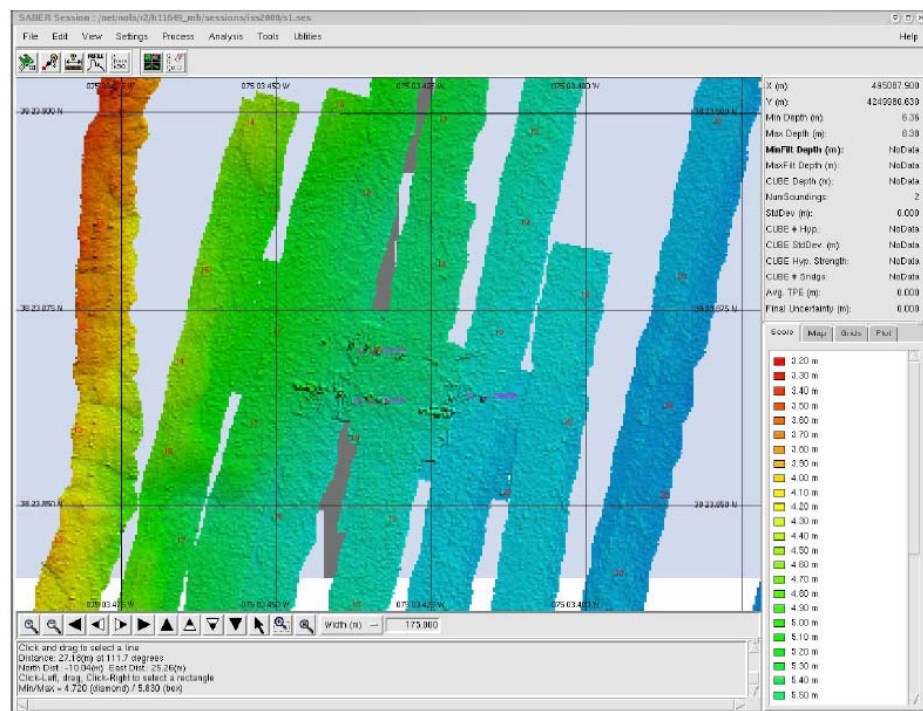


Figure 1. A view of Chart 12211 showing the general area covered by Danger to Navigation Report 2 within Sheet H11649.

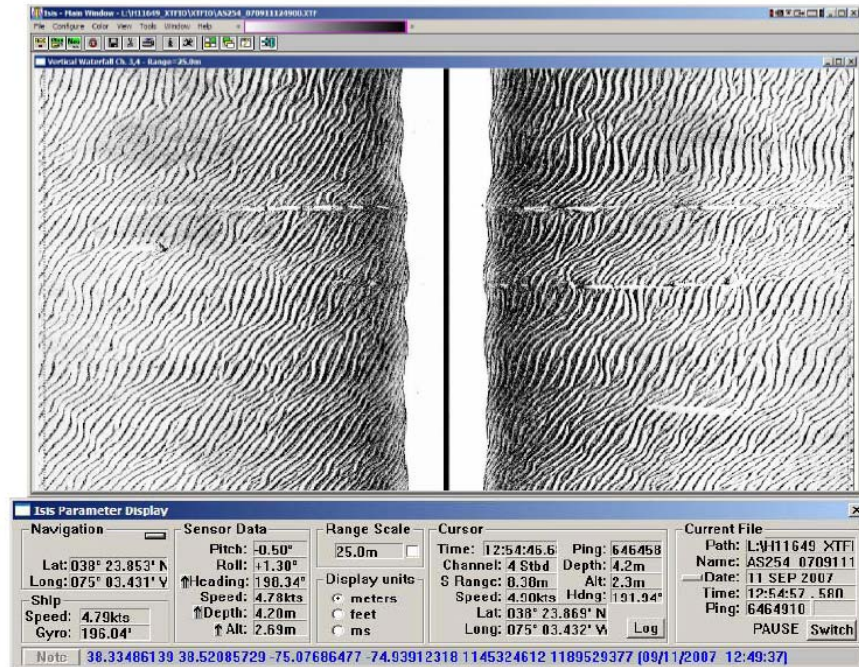
Figure 1.1.1





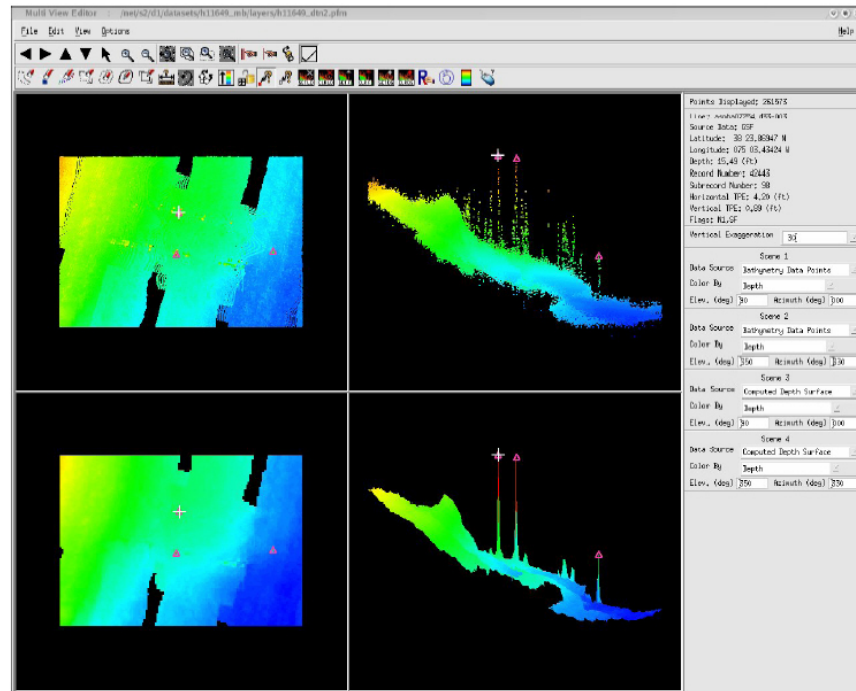
**Figure 3.** 0.5m gridded multibeam data, the selected soundings, and the three specific features that were designated within Saber.

*Figure 1.1.2*



**Figure 5.** High frequency side-scan sonar imagery (25m range scale) clearly depicting the two lines of pilings, as well as the offshore piling located in between these two rows. This line was run along a southerly heading, so the inshore portion is in the starboard channel (right-side image) and the offshore portion is in the port channel.

*Figure 1.1.3*



**Figure 4.** Multiview Editor of the 0.5m multibeam grid in the immediate vicinity of the submerged pilings. The three pilings that were selected as features are denoted with triangles in the views above. The top two panels show bathymetry points. The lower two panels show the CUBE depth. The vertical exaggeration is set to 30.

*Figure 1.1.4*

## APPENDIX II. SURVEY FEATURE REPORT

This supporting survey feature report consists of the 68 attached files as described below:

- One excel spreadsheet and one corresponding PDF file, titled *H11649\_Multibeam\_Feature\_List.xls*, listing all significant multibeam features that correspond to the objects in the S-57 feature file. The positioning information extracted for the Fenwick Shoal buoy (Feature 37) is also included in this file, though this buoy is not included as an S-57 object.
- One excel spreadsheet and one corresponding PDF file, titled *H11649\_All\_Designated\_Soundings.xls*, listing the S-57 multibeam features, as well as all of the designated sounding features. Approximately 175 designated soundings were set across this sheet to help better preserve the shallowest soundings relative to the computed depth surface. Because a separate designated sounding flag does not presently exist in the Generic Sensor Format, all of the designated soundings have been flagged as features. All of the depths flagged as features included in this table will override the CUBE best estimate of the depth in the final BAG files.
- One excel spreadsheet and one corresponding PDF file, titled *H11649\_Side\_Scan\_Contact\_List.xls*, listing all side scan contacts identified on H11649.
- 62 PDF files containing feature correlator sheets, listed below:

H11649_01.PDF	H11649_22.PDF	H11649_43.PDF
H11649_02.PDF	H11649_23.PDF	H11649_44.PDF
H11649_03.PDF	H11649_24.PDF	H11649_45.PDF
H11649_04.PDF	H11649_25.PDF	H11649_46.PDF
H11649_05.PDF	H11649_26.PDF	H11649_47.PDF
H11649_06.PDF	H11649_27.PDF	H11649_48.PDF
H11649_07.PDF	H11649_28.PDF	H11649_49.PDF
H11649_08.PDF	H11649_29.PDF	H11649_50.PDF
H11649_09.PDF	H11649_30.PDF	H11649_51.PDF
H11649_10.PDF	H11649_31.PDF	H11649_52.PDF
H11649_11.PDF	H11649_32.PDF	H11649_53.PDF
H11649_12.PDF	H11649_33.PDF	H11649_54.PDF
H11649_13.PDF	H11649_34.PDF	H11649_55.PDF
H11649_14.PDF	H11649_35.PDF	H11649_56.PDF
H11649_15.PDF	H11649_36.PDF	H11649_57.PDF
H11649_16.PDF	H11649_37.PDF	H11649_58.PDF
H11649_17.PDF	H11649_38.PDF	H11649_59.PDF
H11649_18.PDF	H11649_39.PDF	H11649_60.PDF
H11649_19.PDF	H11649_40.PDF	H11649_61.PDF
H11649_20.PDF	H11649_41.PDF	H11649_62.PDF
H11649_21.PDF	H11649_42.PDF	

## APPENDIX III. FINAL PROGRESS SKETCH AND SURVEY OUTLINE

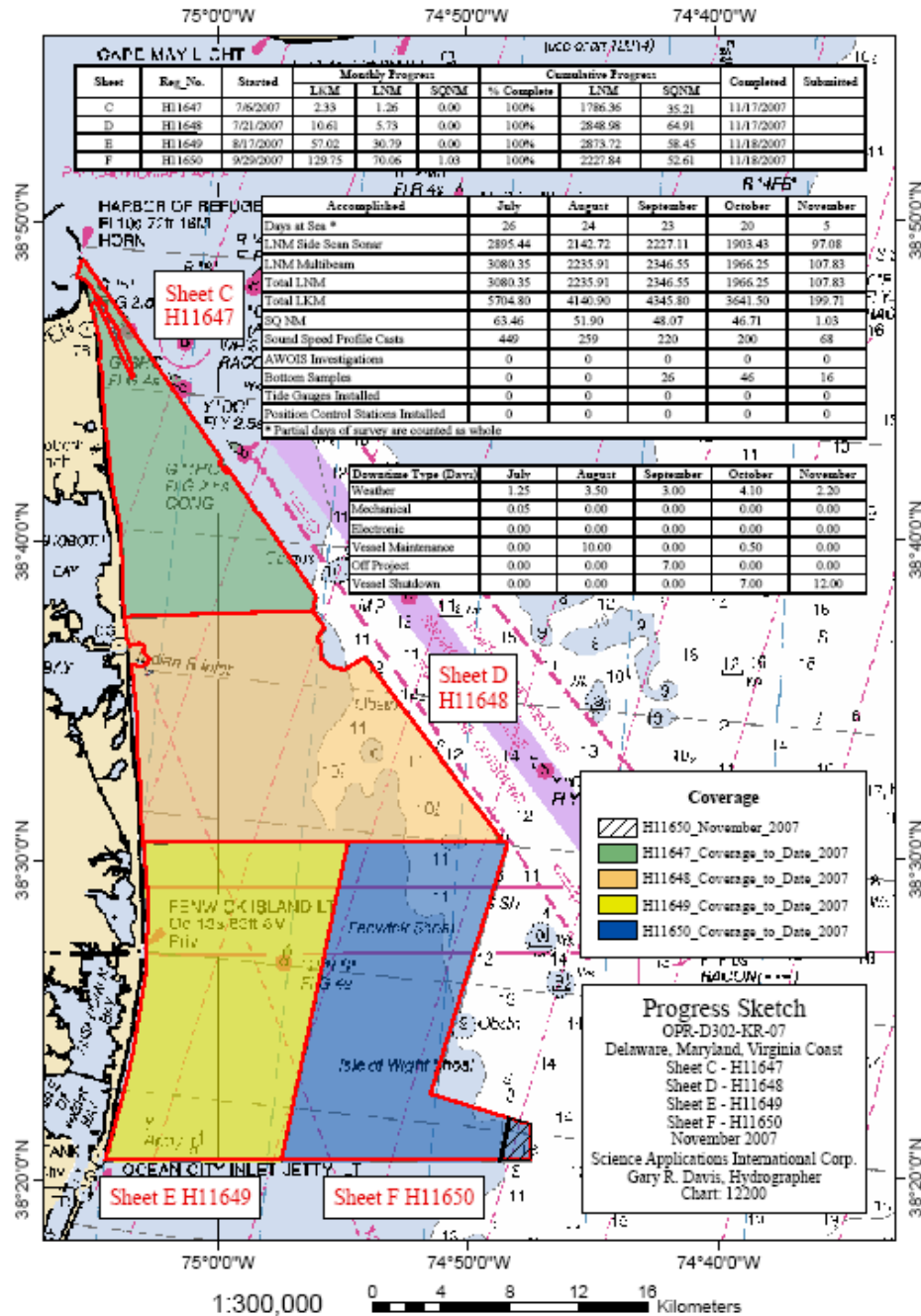
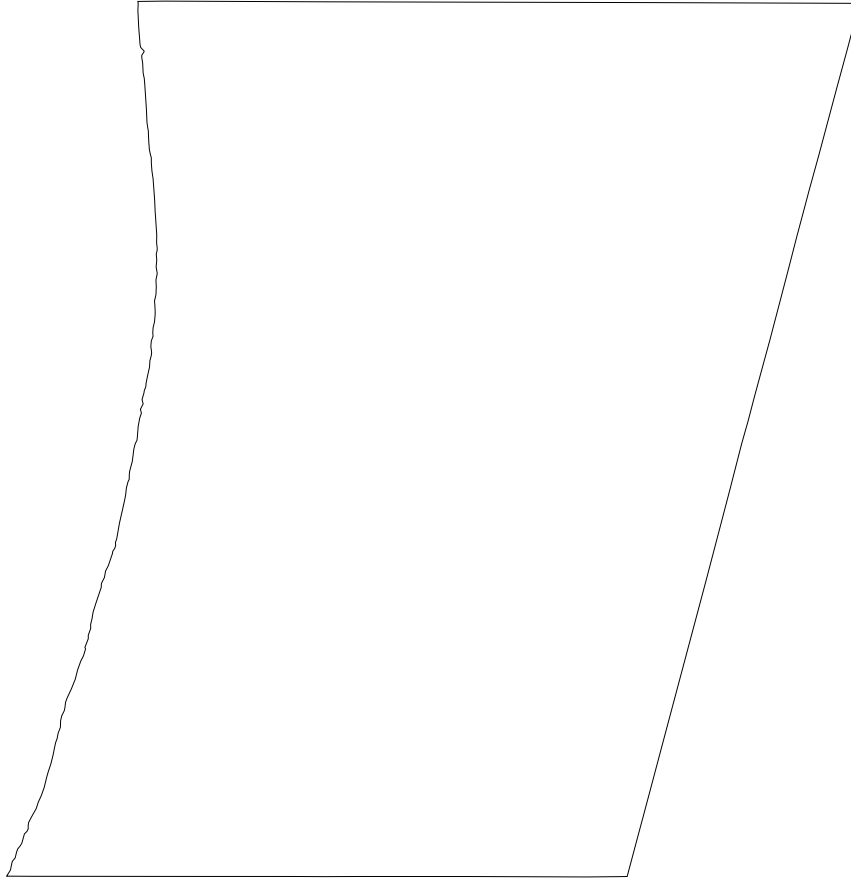


Figure Appendix III-1. Final Progress Sketch for H11649

The Survey Outline for H11649 was delivered to the COTR, on 29 November 2007 in file DELMARVA\_Completed\_Survey\_Outlines.zip. The WinZip file contained a DXF format survey outline in lat/long format for import into MapInfo for each sheet surveyed. The survey outline file for Sheet E (H11649\_survey\_outline\_lat\_long.dxf) is also part of this delivery. Figure Appendix III-2 demonstrates the graphical depiction of the DXF.



**Figure Appendix III-2. Survey Outline for H11649**

## APPENDIX IV. TIDES AND WATER LEVELS

The on-line times for acquisition of valid hydrographic data are presented in Abstract of Times of Hydrography, H11649.

**Project:** OPR-D302-KR-07

**Registry No.:** H11649

**Contractor Name:** Science Applications International Corporation

**Date:** 18 November 2007

**Sheet Letter:** E

**Inclusive Dates:** 17 August 2007 – 18 November 2007

Field work is complete.

**Table Appendix IV-1. Abstract Times of Hydrography, H11649**

<b>Begin Date</b>	<b>Begin Julian Day</b>	<b>Begin Time</b>	<b>End Date</b>	<b>End Julian Day</b>	<b>End Time</b>
08/17/2007	229	20:47:34	08/19/2007	231	20:59:03
08/29/2007	241	14:09:13	09/05/2007	248	06:25:36
09/06/2007	249	15:19:25	09/12/2007	255	06:58:51
09/13/2007	256	15:01:14	09/15/2007	258	08:35:34
09/16/2007	259	16:20:43	09/17/2007	260	08:26:08
09/17/2007	260	15:06:15	09/17/2007	260	15:25:22
09/27/2007	270	14:41:47	09/29/2007	272	10:57:57
10/08/2007	281	00:28:33	10/08/2007	281	03:35:11
11/13/2007	317	19:29:51	11/14/2007	318	12:57:05
11/17/2007	321	19:52:06	11/18/2007	322	00:53:45

### FINAL TIDE NOTE

Observed verified water levels were downloaded from the <http://tidesandcurrents.noaa.gov/> web site for Atlantic City, NJ (8534720). Water Level correctors were prepared for each zone using the **SABER/Tools/Create Water Level Files** software. **SABER/Apply Correctors/Tides** software applied these files to the multibeam data according to the zone containing the nadir beam of each ping.

Analysis of the H11649 multibeam data in the **SABER Multi-View Editor** and in depth grids revealed minimal depth jumps across the junction of zones based on Atlantic City, NJ (8534720). A spreadsheet analysis also confirmed the adequacy of zoning correctors based on Atlantic City, NJ (8534720). The water level zoning correctors based entirely on Atlantic City, NJ (8534720) were applied to all multibeam data for H11649.



## APPENDIX V. SUPPLEMENTAL SURVEY RECORDS & CORRESPONDENCE

This appendix is comprised of three sections and two attached files. The first section contains the Danger to Navigation Reports as originally prepared by SAIC and delivered to AHB. The second section contains copies of e-mail exchanges between SAIC and NOAA concerning various data processing and submital issues. The third section contains the tabular summary of the bottom composition results for this sheet. The two attached text files outlined below list the nodes from the 22 Bathymetric Attributed Grids (BAGs) that exceeded the IHO Order 1 uncertainty.

- One text file, titled *h11649\_mb\_one\_m\_bag\_uncert\_exceeds\_IHO1.txt*, listing all of the nodes from the one-meter BAGs where the final uncertainties exceeded the IHO Order 1 uncertainty at that depth.
- One text file, titled *h11649\_mb\_half\_m\_bag\_uncert\_exceeds\_IHO1.txt*, listing all of the nodes from the half-meter BAGs where the final uncertainties exceeded the IHO Order 1 uncertainty at that depth.

### DANGER TO NAVIGATION REPORT 1

Hydrographic Survey Registry Number: H11649

State: Delaware

Locality: Atlantic Ocean

Sublocality: East of Fenwick Island

Project Number: OPR-D302-KR-07

Survey Date: 04 September 2007 and on going

Depths are reduced to Mean Lower Low Water using ***predicted*** tides based on preliminary zoning. Positions are based on NAD-83. Positions were obtained using DGPS from a US Coast Guard Station.

Charts affected:

12214 47 <sup>th</sup> Edition	7/1/2006	1:80,000 scale: Corrected through NM 08/04/07
12211 42 <sup>nd</sup> Edition	7/1/2004	1:80,000 scale: Corrected through NM 08/04/07

The following items were found during hydrographic survey operations:

<u>FEATURE</u>	<u>DEPTH (FT)</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>
Wreck	33 (10.07 m)	38° 27' 46.4" N	074° 00' 54.5" W

Wreck	34 (10.42 m)	38° 27' 46.6" N	074° 00' 54.0" W
Wreck	29 (8.95 m)	38° 27' 47.5" N	074° 00' 49.9" W

#### Description

There are three wrecks in close proximity to one another. Two wrecks are lying side by side in 38 ° 27' 46" N 074 ° 00' 54" W (NAD83) while the third wreck is approximately 100m to the ENE in 38° 27' 47.5" N 074° 00' 49.9" W (NAD83).

1. Deteriorated wreck (Least Depth of 33 ft (10.07 m)) Oriented NE/SW, Approximately 29m in Length and 7m width.
2. Deteriorated wreck (Least Depth of 34 ft (10.42 m)) Oriented NE/SW, Approximately 25m in Length and 5m width.
3. Deteriorated wreck (Least Depth of 29 ft (8.95 m)) Oriented NE/SW, Approximately 47m in Length and 15m width.

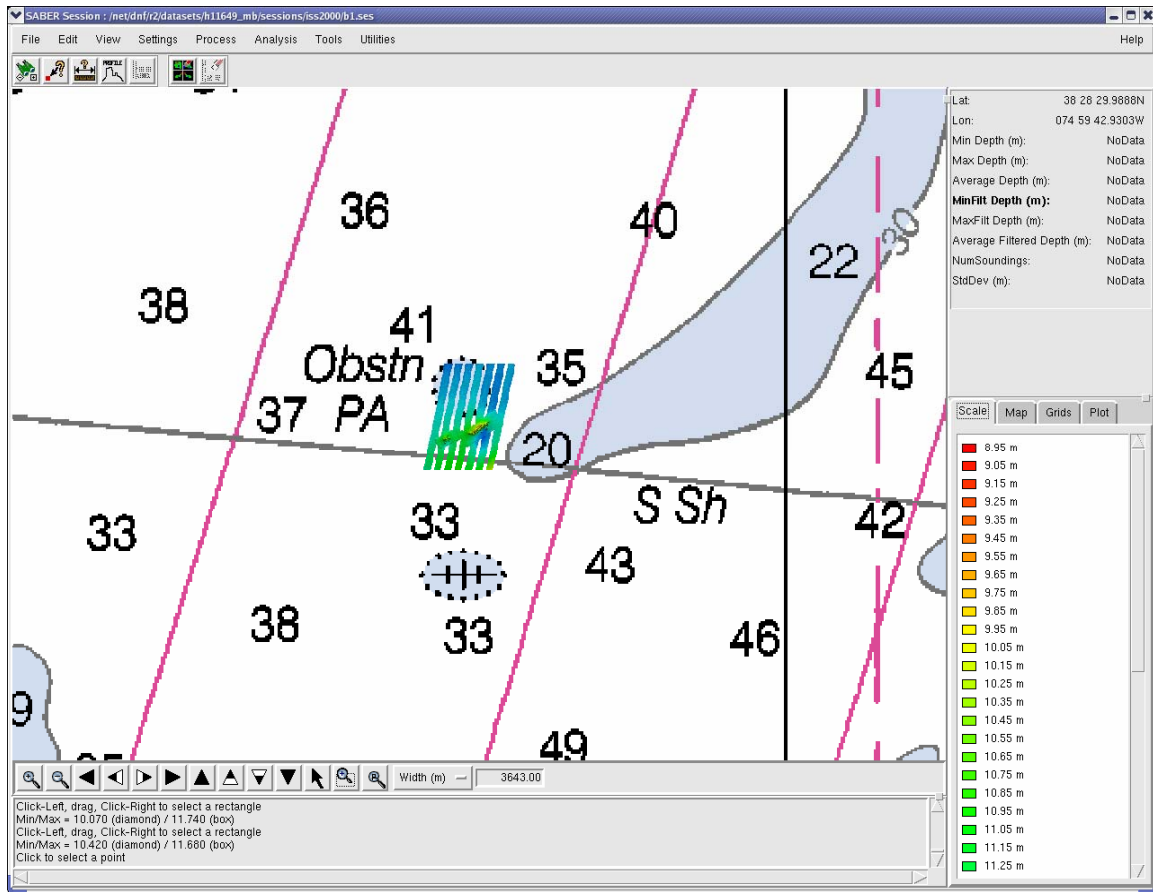
#### RECOMMENDATIONS:

Remove charted danger circle, blue tint and label Obstrn PA in 38 ° 27' 53" N 074 ° 00' 52" W (NAD83).

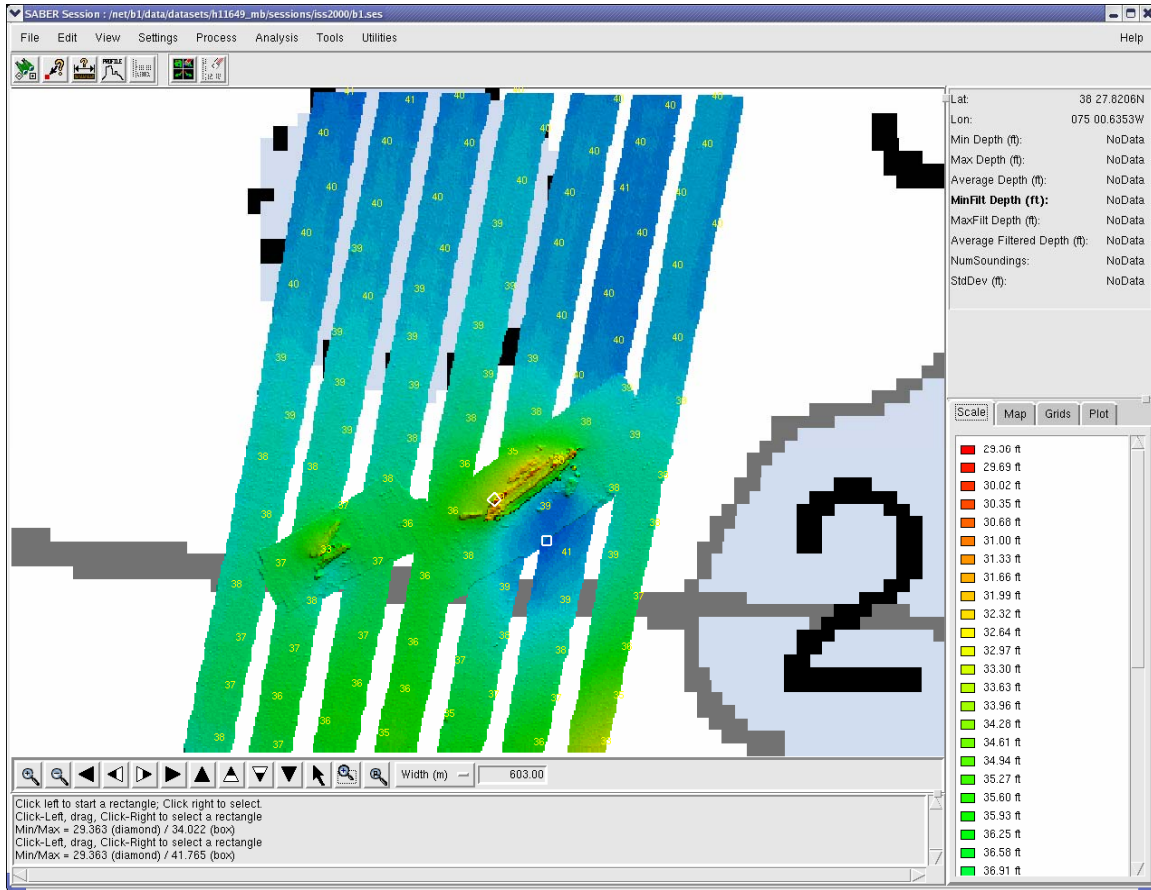
Remove charted danger circle, blue tint and dangerous wreck symbol in 38 ° 27' 31" N 074° 00' 49" W (NAD83). Data are not presented below, but the multibeam and side scan data have been reviewed for this area, and there is no wreck.

Chart 29 foot (8.9 m) sounding, symbol Wks, and danger circle with blue tint (K-28) in 38° 27' 47.5" N 074° 00' 49.9" W (NAD83).

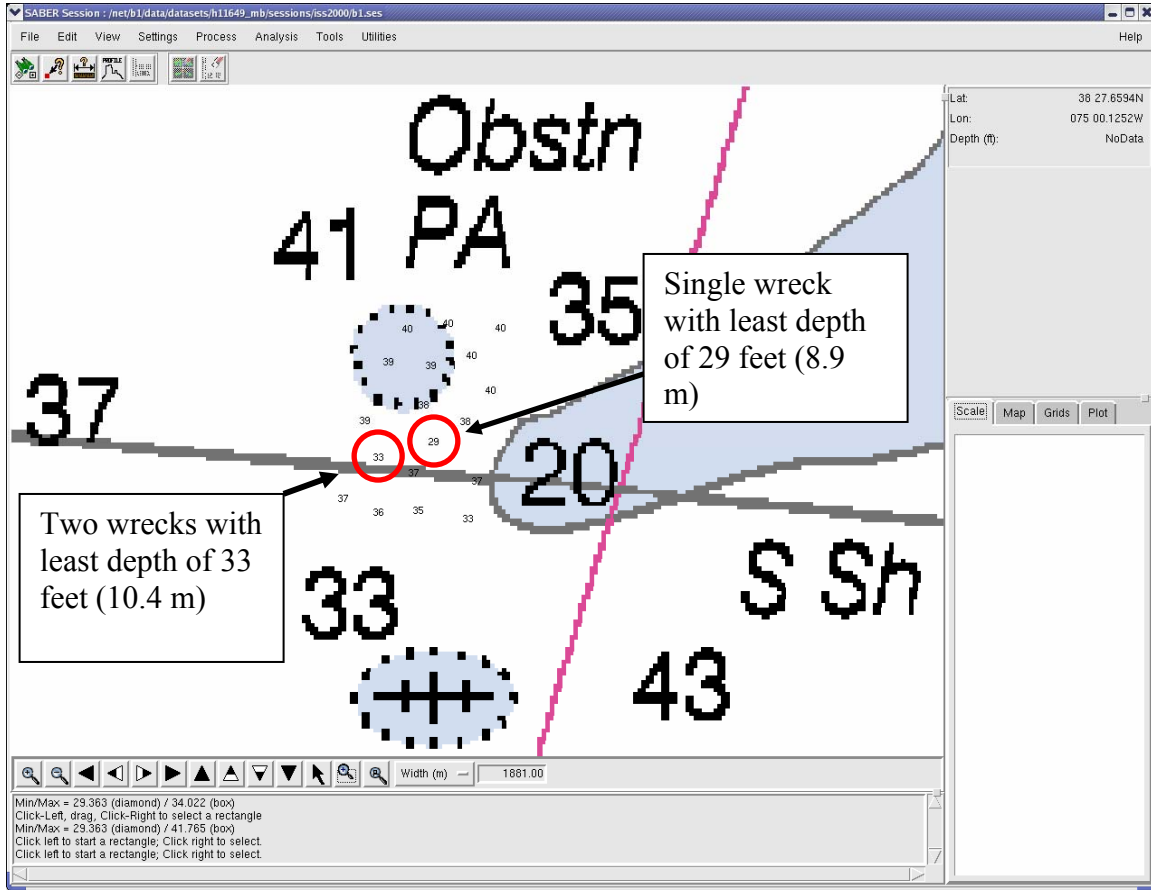
See section D.1. of the Descriptive Report for final charting recommendations.



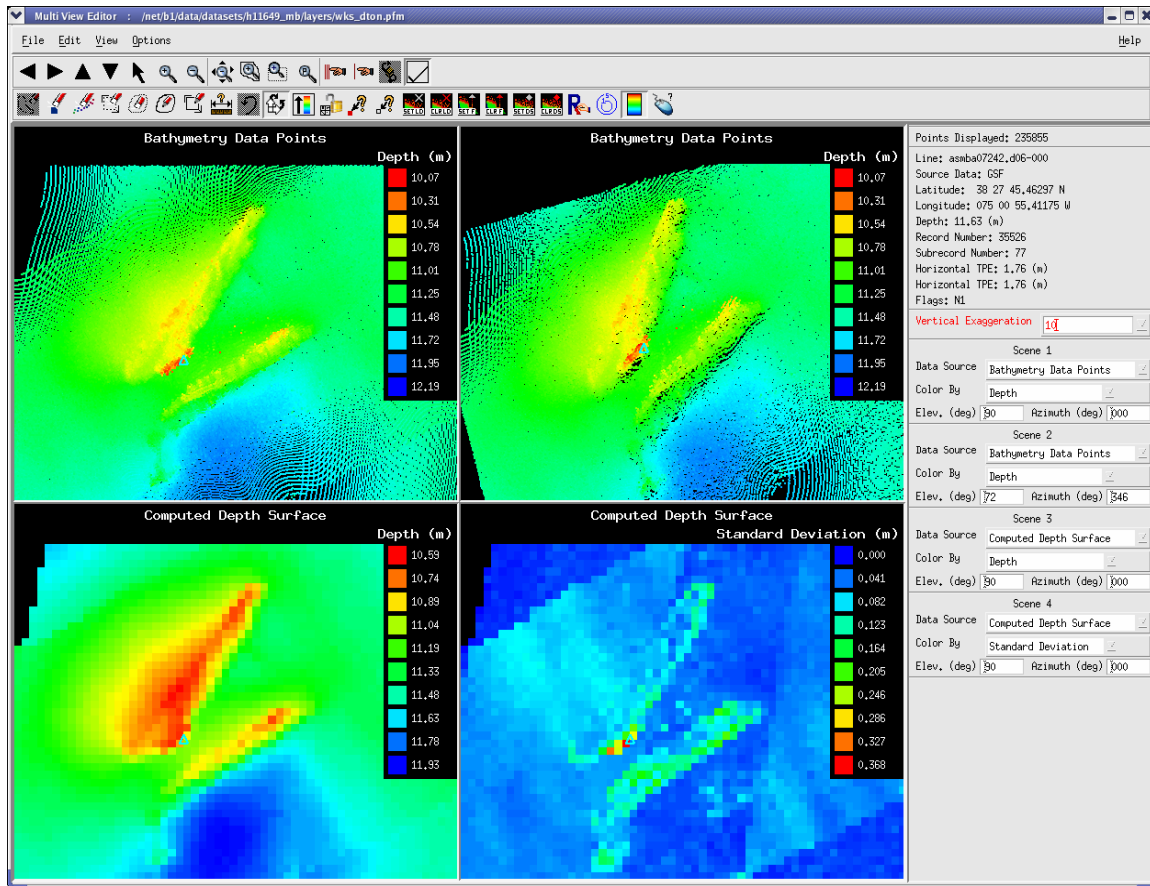
**Figure 1.** Chart 12214 Showing Area Covered by this Report with location of Wrecks with Minimum Depth of 29 Feet (MLLW) within H11649.



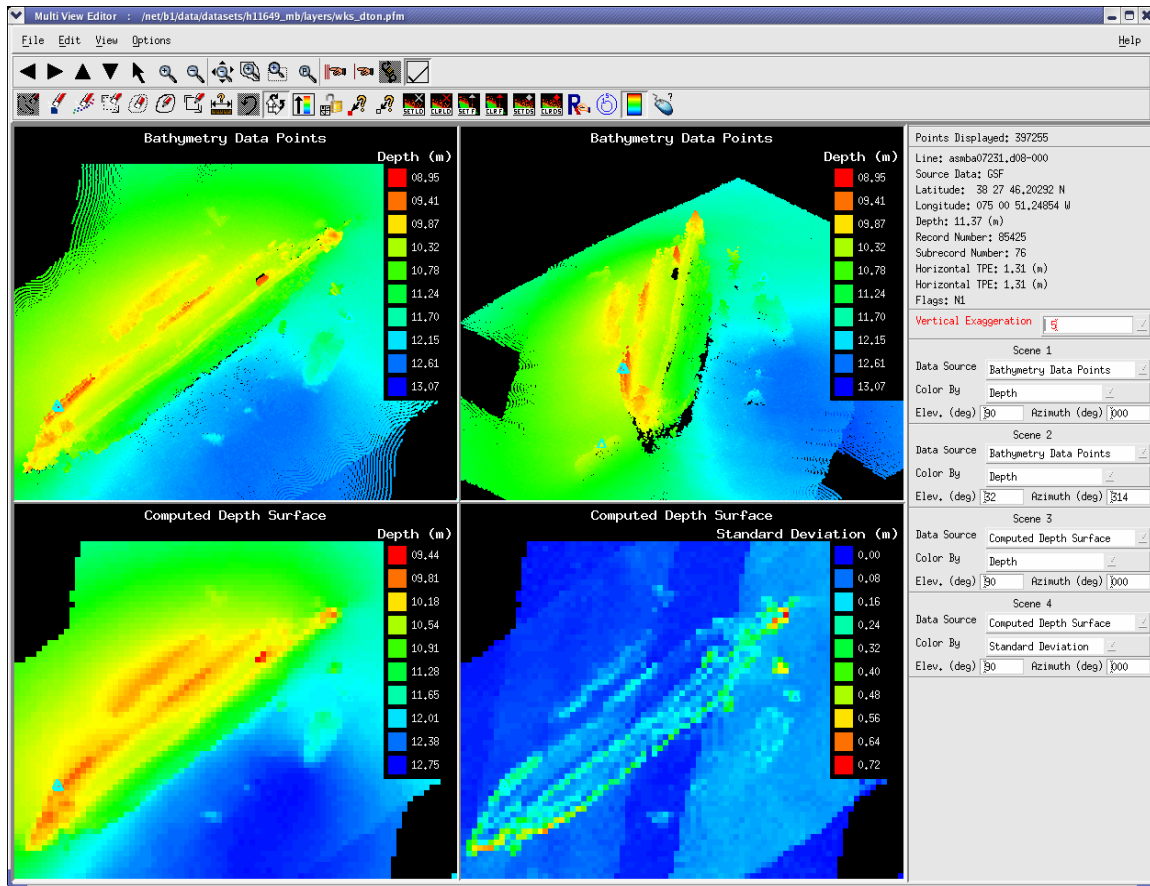
**Figure 2.** Chart 12214 Showing Area Covered by this Report with location of Wrecks Minimum Depth of 29 Feet (MLLW) and Soundings within H11649.



**Figure 3.** Chart 11211 Showing Selected Soundings of Wrecks with Minimum Depth of 29 Feet (MLLW) within H11649.

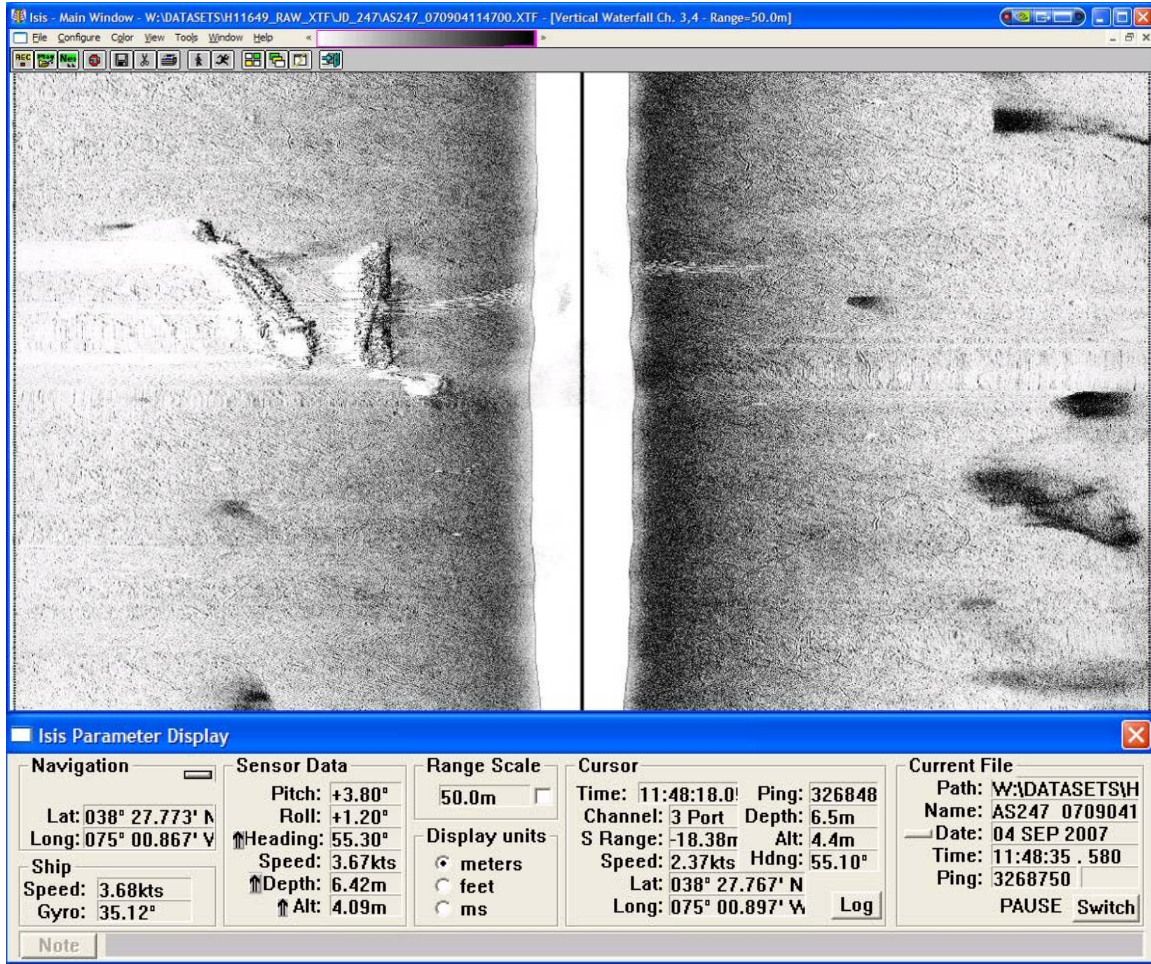


**Figure 4.** Multiview Editor of PFM Grid Showing Wrecks 1 and 2 within H11649.



**Figure 5.** Multiview Editor of PFM Grid Showing Wreck 3 within H11649.





**Figure 6.** Sidescan Image Showing Wrecks 1 and 2 within H11649.

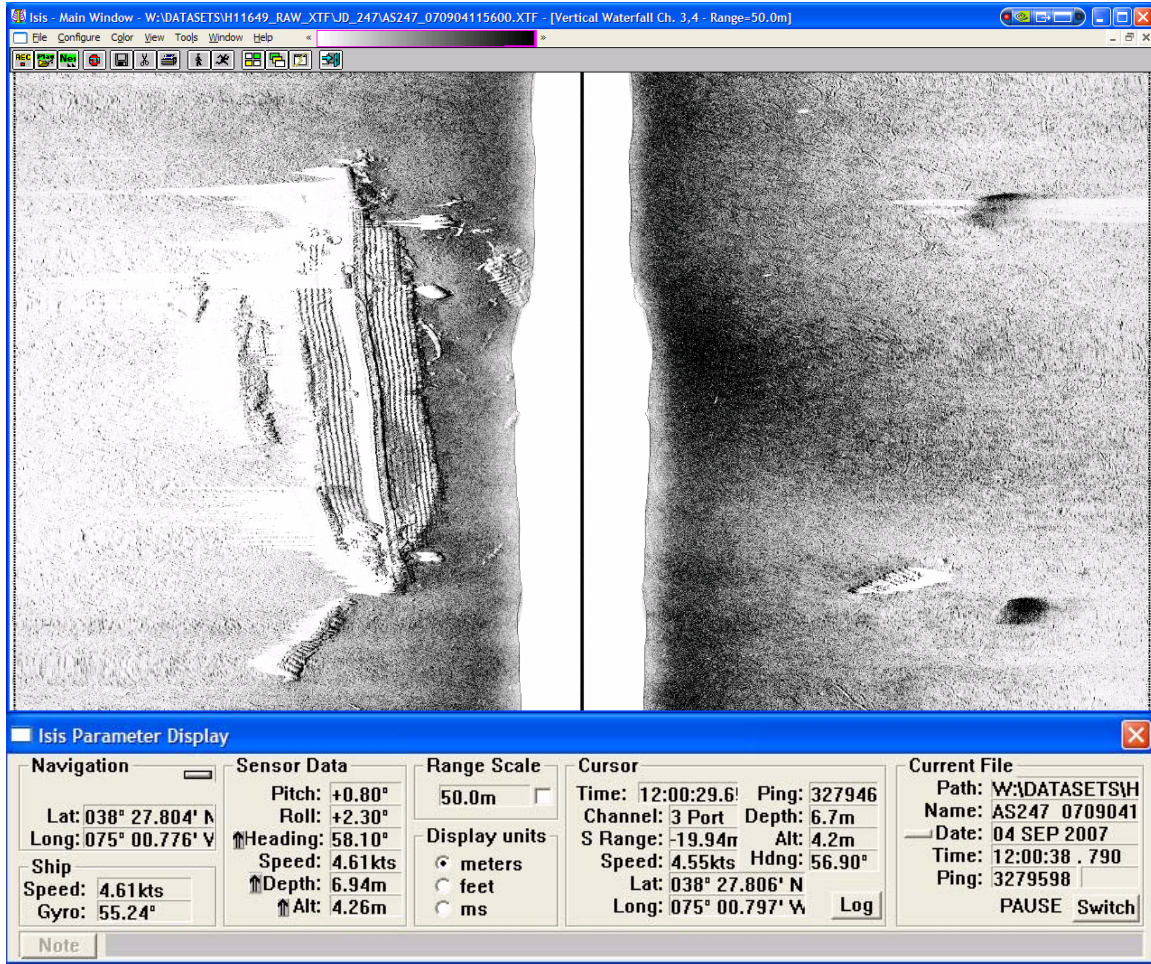


Figure 7. Sidescan Image Showing Wreck 3 within H11649.



**DANGER TO NAVIGATION REPORT 2**

Hydrographic Survey Registry Number: H11649

State: Delaware

Locality: Atlantic Ocean

Sublocality: East of Fenwick Island

Project Number: OPR-D302-KR-07

Survey Date: 03 September 2007 and on going

The following depths are reduced to Mean Lower Low Water (MLLW ) using **verified** tides based on preliminary zoning. All positions are based on NAD83. Positions were obtained using DGPS from a US Coast Guard Station.

**CHARTS AFFECTED:**12211 43<sup>rd</sup> Edition 10/1/2007 1:80,000 scale: Corrected through NM 11/10/07

The following items were found during hydrographic survey operations:

<u>FEATURE</u>	<u>DEPTH FT (M)</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>
Submerged Pilings	15 (4.72 m)	38° 23' 52.2" N	075° 03' 26.1" W

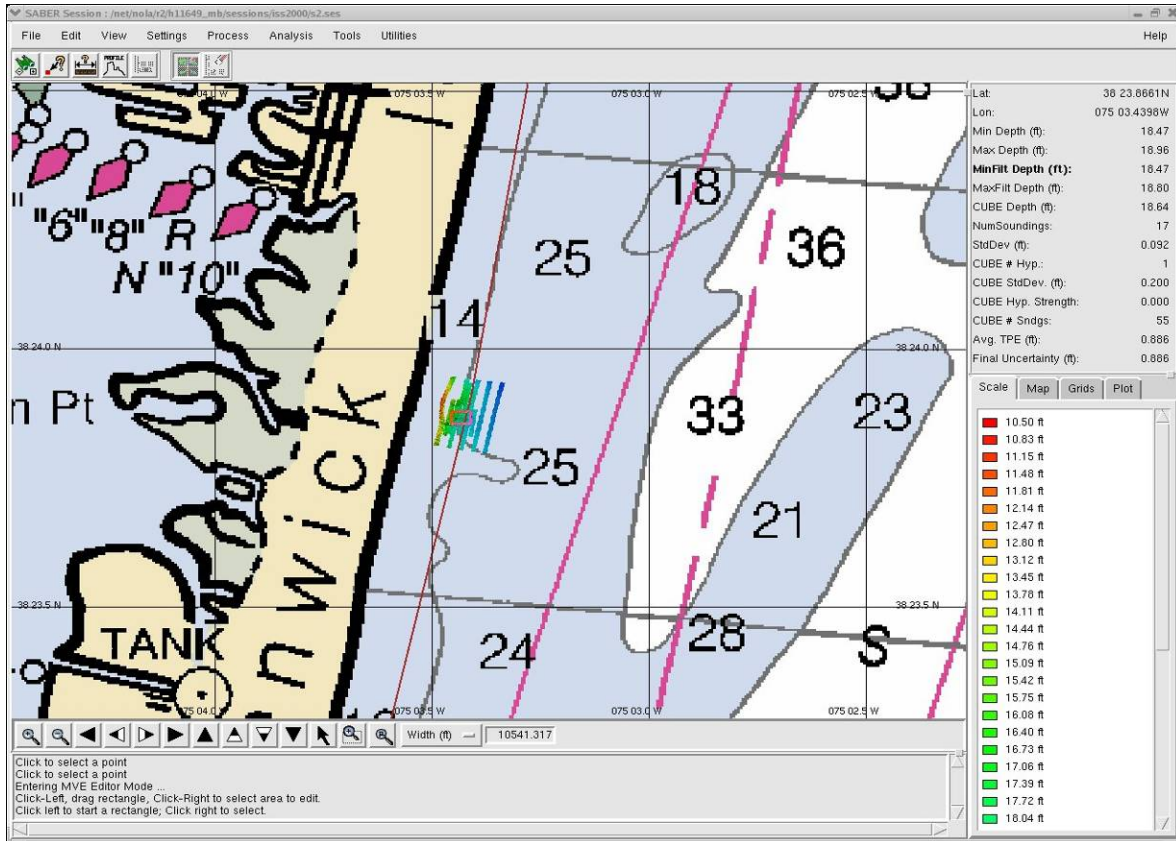
**DESCRIPTION:**

There is a series of submerged pilings that lie along two distinct rows aligned in an east-west orientation (Figures 1 and 2). Three of these pilings have been designated as features within Saber during post-processing (Figure 3). The shoalest piling located in 38° 23' 52.2" N 075° 03' 26.1" W (NAD83) has a least depth of 15 ft (4.72m). A second submerged piling with a least depth of 16 ft (4.80 m) is located approximately 10 meters south of the first piling in 38° 23' 51.8" N 075° 03' 26.1" W (NAD83). A third piling with a least depth of 18 ft (5.61 m), approximately 30 meters east (offshore) from the first two pilings in 38° 23' 51.8" N 075° 03' 25.0" W (NAD83). The orientation and relative height of these pilings are depicted in the Saber Multiview Editor view (Figure 4) and the high-frequency side-scan sonar image (Figure 5).

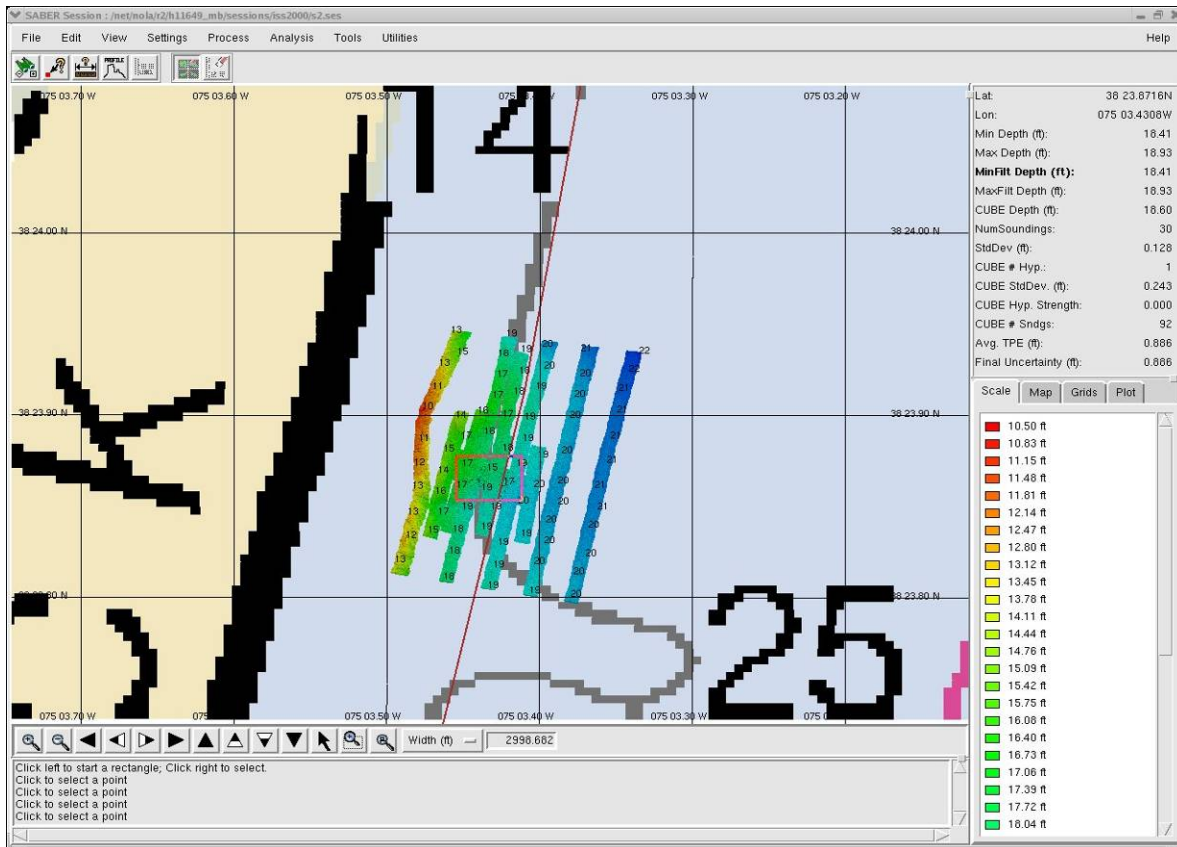
**RECOMMENDATIONS:**

Chart a 15 foot sounding, with danger circle and label Subm Piles in 38° 23' 52.2" N 075° 03' 26.1" W (NAD83).

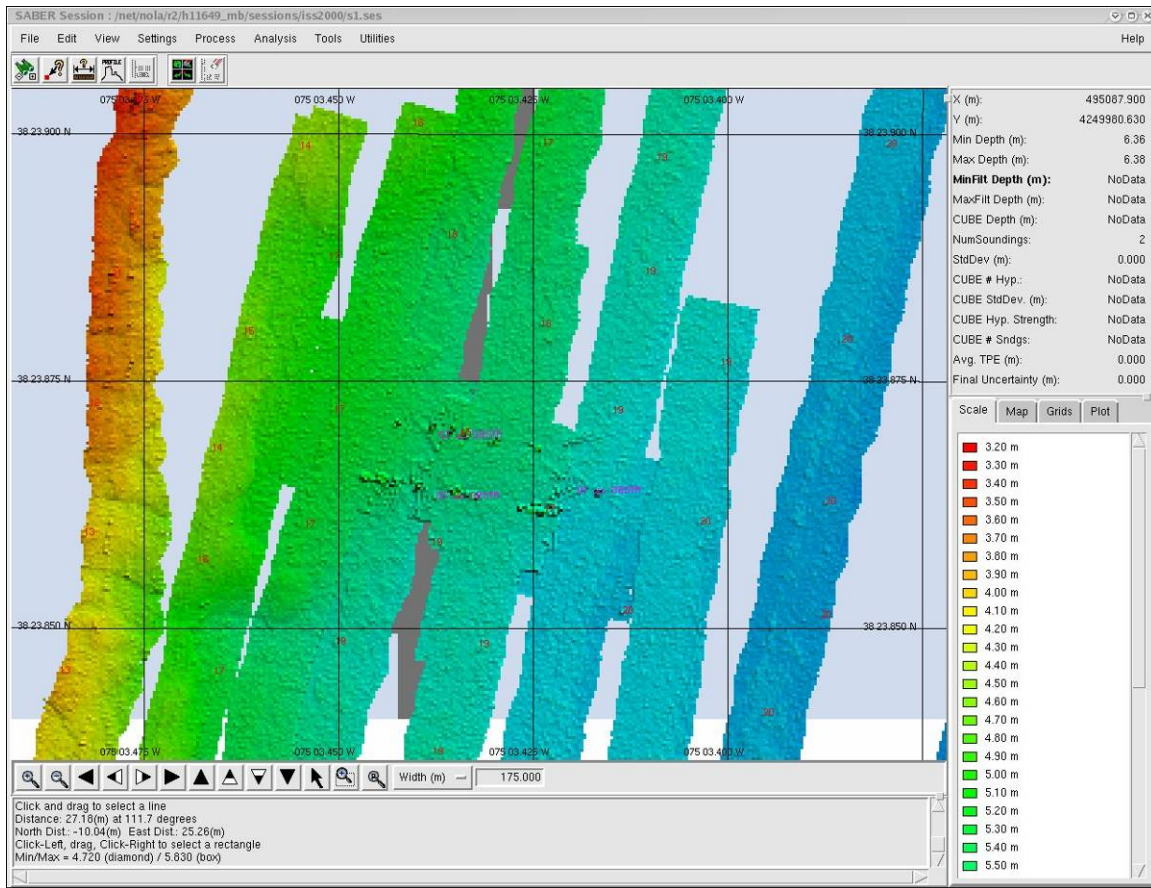
See section D.1. of the Descriptive Report for final charting recommendations.



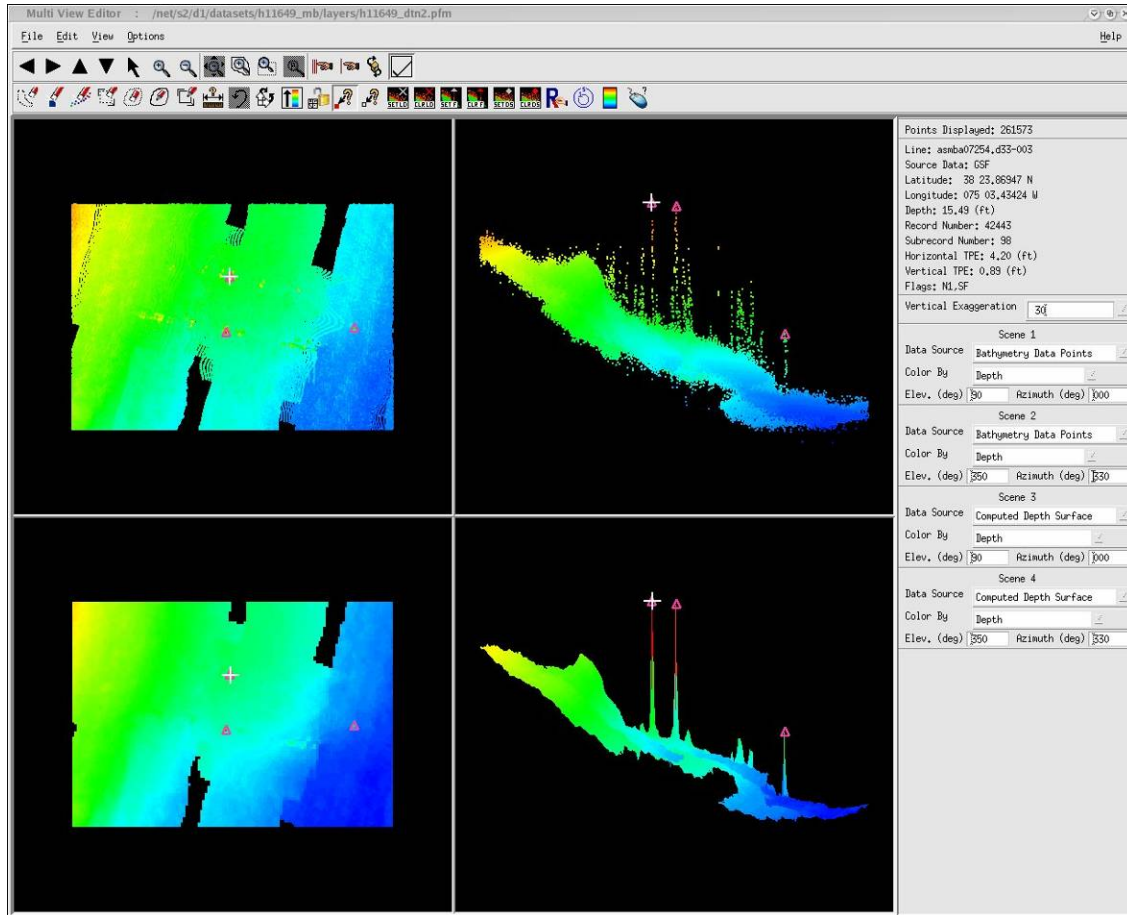
**Figure 1.** A view of Chart 122-11 showing the general area covered by Danger to Navigation Report 2 within Sheet H11649.



**Figure 2.** Chart 12211, the 0.5m gridded multibeam data, and the selected soundings in the immediate vicinity of the submerged pilings. The least depth on these pilings is 15 ft (MLLW). The small rectangle in the center of the grid represents the area depicted in the Multiview Editor view (Figure 4).

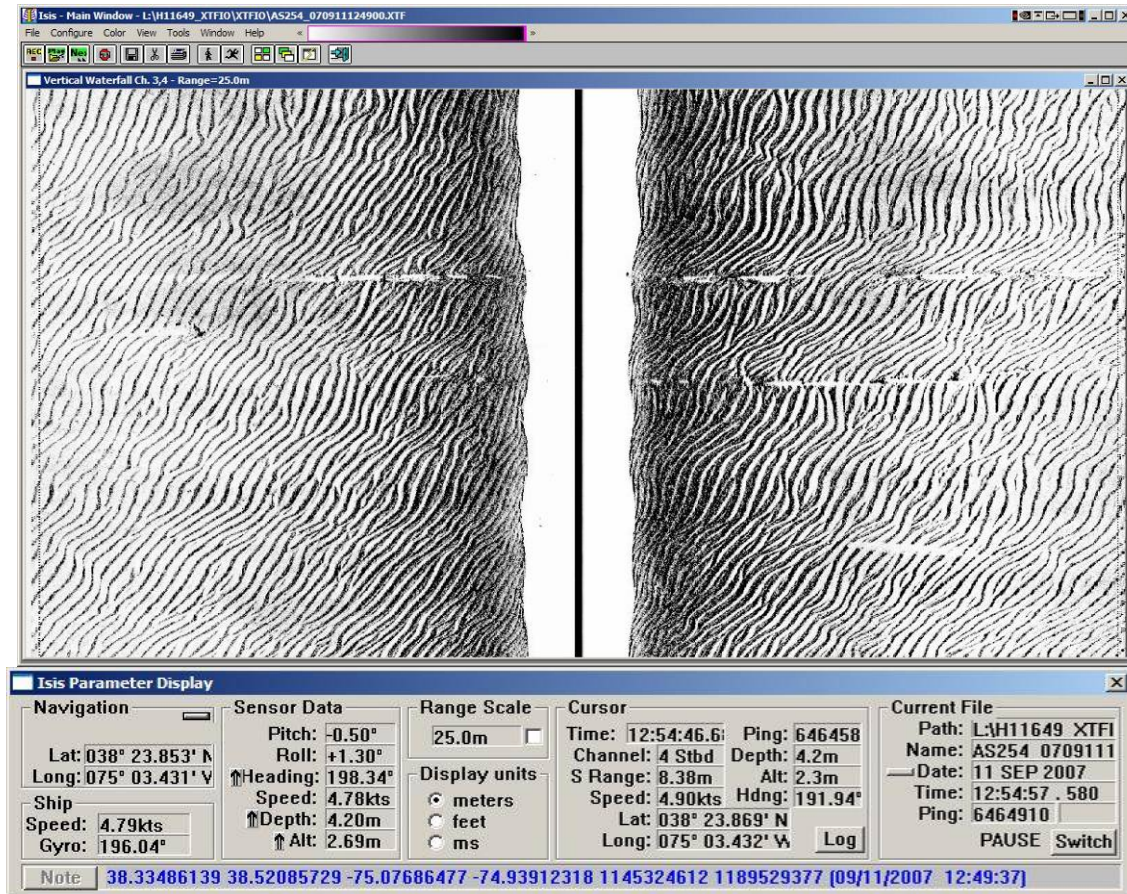


**Figure 3.** 0.5m gridded multibeam data, the selected soundings, and the three specific features that were designated within Saber.

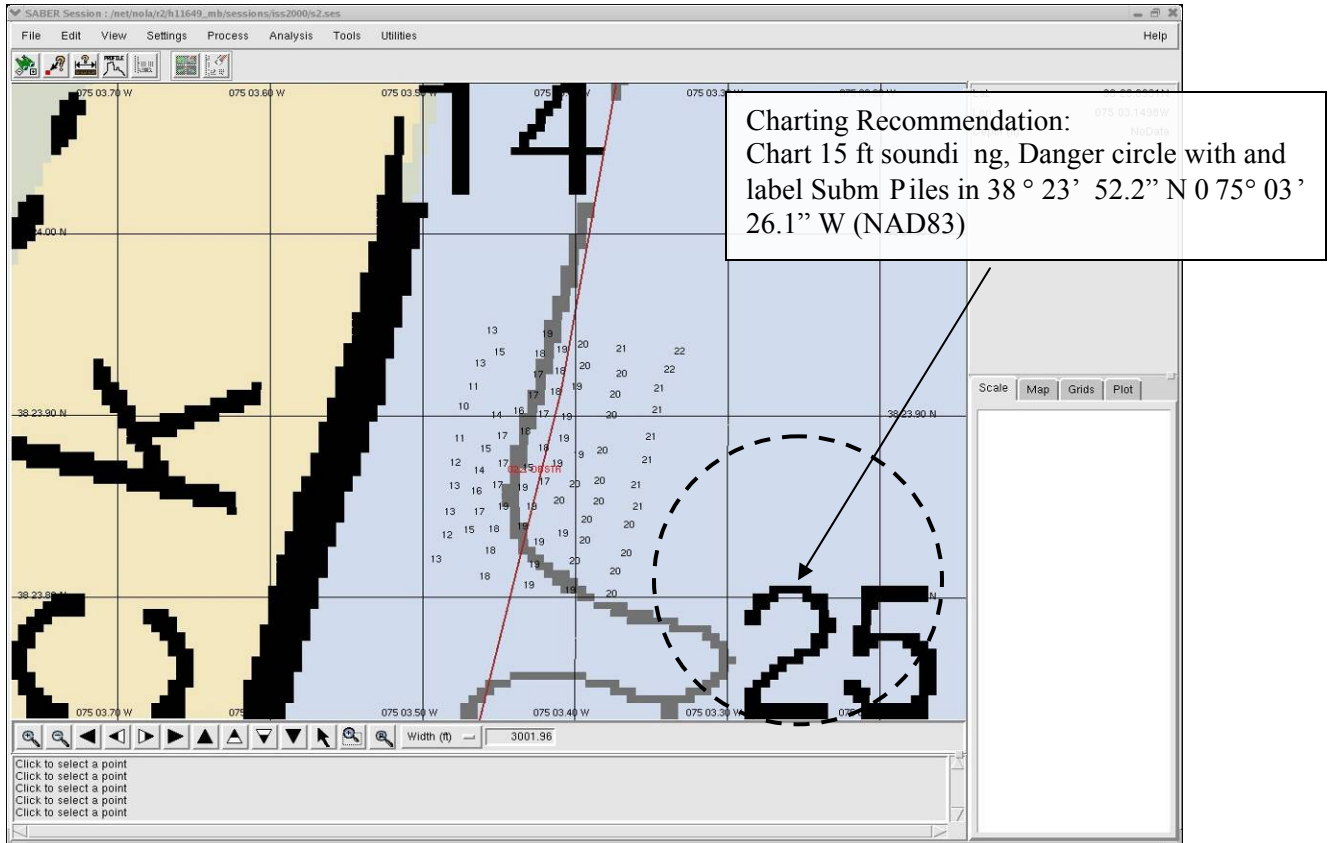


**Figure 4.** Multiview Editor of the 0.5m multibeam grid in the immediate vicinity of the submerged pilings. The three pilings that were selected as features are denoted with triangles in the views above. The top two panels show bathymetry points. The lower two panels show the CUBE depth. The vertical exaggeration is set to 30.





**Figure 5.** High frequency side-scan sonar imagery (25m range scale) clearly depicting the two lines of pilings, as well as the offshore piling located in between these two rows. This line was run along a southerly heading, so the inshore portion is in the starboard channel (right-side image) and the offshore portion is in the port channel.



**Figure 6.** Chart 12214, the selected soundings, and the shoalest of the three piling features that were selected in Saber.

## CORRESPONDENCE

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From: mark.t.lathrop [mailto:Mark.T.Lathrop@noaa.gov]  
Sent: Friday, April 27, 2007 11:33 AM  
To: Evans, Rhodri E.  
Subject: Re: FW: SAIC Proposal for NOAA Everywhere Contract DG133C-05-CQ-1088TaskOrder 3

At the same time we also noticed that the NOAA provided survey area for Sheet F (H11650) does not junction with Sheet B (H11555) by about 300 meters east/west and about 1000 meters north/south. In case NOAA intended the sheets to junction, we created extended surveys for Sheet F (H11650). That extension will add one day.

Rod,

I don't know why the area I was provided was based on the B sheet outline and not the actual survey. That is certainly not our intent. Thanks for catching this and please extend to fill in this gap between surveys.

Mark

---

Re: H11649 DtoN 1 positionsFrom: Simmons, Walter S.  
Sent: Monday, September 10, 2007 9:47 AM  
To: Stephen.Gottschalk@noaa.gov; 'mark.t.lathrop'  
Cc: Castle.E.Parker@noaa.gov; Evans, Rhodri E.; Davis, Gary R.  
Subject: RE: H11649 DtoN 1 positions

Attachments: H11649\_dtn1\_10sep.pdf

Stephen and Mark,

SAIC regrets the error in the longitude reported in the previous submission of H11749 DtoN 1. Please replace the previous submission with this 10 September 2007 version.

The positions are:

38.4628889 -75.0151389 wreck 1  
38.4629444 -75.0150000 wreck 2  
38.4631944 -75.0138611 wreck 3

I should have caught the error during review. I offer my personal apology.

Walter S. Simmons

ACSM Certified Hydrographer  
Lead Hydrographer  
SAIC Newport, RI  
972-867-8277

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From: Donaldson, Paul L. [mailto:PAUL.L.DONALDSON@saic.com]  
Sent: Monday, September 10, 2007 7:21 AM  
To: Stephen.Gottschalk@noaa.gov  
Cc: Castle.E.Parker@noaa.gov; wsimmons@mtg.saic.com

Subject: Re: H11649 DtoN 1 positions

Stephen,

You are correct, the positions should be 75 degrees longitude and not 74 degrees. This typo was propagated throughout the report. I will get a re-submission sent out right away. I would have sent one with this e-mail but I am currently offshore and only my blackberry is able to connect to the internet. Sorry for any inconvenience this may have caused.

Paul Donaldson

----- Original Message -----

From: Stephen Gottschalk <Stephen.Gottschalk@noaa.gov>

To: Donaldson, Paul L.

Cc: gene\_parker <Castle.E.Parker@noaa.gov>

Sent: Mon Sep 10 07:35:08 2007

Subject: H11649 DtoN 1 positions

Hi Paul,

Could you take a look at the positions for the three wrecks in this DtoN again? The ones we received do not fall on either of the 'charts affected', and the screen grabs indicate that at least a couple of these wrecks should be nearer the 75 degree longitude mark rather than 74.

These are the positions provided to us in the report:

38.4628889 -74.0151389 wreck 1

38.4629444 -74.0150000 wreck 2

38.4631944 -74.0138611 wreck 3

Let me know if you have any questions.

Thanks,  
Stephen

---

From: gene\_parker [mailto:Castle.E.Parker@noaa.gov]

Sent: Tuesday, October 02, 2007 10:01 AM

To: Quintal, Rebecca T.

Cc: Shep.Smith@noaa.gov; Donaldson, Paul L.

Subject: Re: 25 September 2007 Meeting

Good Morning,

It's always good to see you and Paul! I agree that we should try to do this more often and if physical visits are hard to arrange, we can always do a teleconference. I think you're on track with the points listed below, that's how I remember the discussions and final decision. I will place my comments below under your bullets in blue fonts.

Regards, Gene

"Quintal, Rebecca T." wrote:

Gene and Shep,

Thanks so much for taking time out to meet with Paul and myself last week. We find these meetings very valuable and hope to try have them more regularly. We have composed our notes of the specific questions that we asked and are hoping you can just read over these quickly before we send them off to Crescent and Mark. Things went back and forth a few times so we just want to double check that we are on the same page before we send the official requests to the COTRs.

Thanks and please let us know if we got something wrong!

-Rebecca

#### LakeBorgne Questions/Answers:

1.. For contacts with no least depth (i.e. we don't have bathy but are estimating the depth from side scan instead) should use a QUASOU of 9 (Value reported, not confirmed). Concur. This is in tune with MCD request for attribution.

2.. MCOVER and MQUAL will be made from the outer perimeter of the bathy (GS+ and SB). Concur. Since bathy data is the source for chart update, the coverage is based upon the source of updates (bathy).

3.. A single MQUAL will be made for an entire sheet. MQUAL will have a CATZOC of 2 (ZOC A2 - Full seafloor sonification or sweep. All significant seafloor features detected and depths measured.) We decided on this because we do have full sonification via the side scan and all features do have depths measured except where noted (see QUASOU of 9 above). Note that the S&D states that we should use a CATZOC of 6 (not assessed), but AHB have started accessing and would like us to as well. Concur. We'll have to note this for clarification of Specs revisions in 2008. 2007 Spec, page 122 ... "M\_QUAL (Quality of Data) This should be separated for different classes of survey. Singlebeam, multibeam (Complete) and multibeam (Object Detection), and Lidar should be separate. page 123... "Point features with heights or surveyed extents of features: For features with heights rather than depths, or where extents were collected for islets, reefs, ledges, shoreline construction, etc., use CATZOC 6 (U for data not assessed)."

· I think the U (not assessed) refers to heights of features that are above MLLW and has elevation values.

4..

5..

6.. MQUAL will also have a TECSO U of 1, 2 and 3 (found by echo sounder, found by side scan and found by multi-beam, respectively). Concur. Only attribute with hardware used. Echo sounder refers to VBES, so in most cases, SAIC would use 2 and 3 for SSS and SWMB.

7.. Regarding Section 6.2 of the SOW below:

If an interferometric side scan is used, final depth data from the side scan shall be submitted as a Bathymetric Attributed Grid (BAG). The DR shall discuss the uncertainty and total propagated error (TPE) of the data and describe what portions of the swath (if any) meet IHO Order 1 specifications. The single beam soundings shall be submitted separately as part of the S-57 feature file.

We asked if they really wanted every valid sounding of every singlebeam file to be populated in the S-57 feature file. Shep ended up calling Gerd Glang and Jeff Ferguson about this issue to see what their true intentions were for the data as stated in the SOW. They stated that their intention was to have selected soundings of the SB data at survey scale be in the S-57 feature file. So we came to a conclusion that we would build 5-meter binned minimum grids of the SB data, build selected soundings at survey scale (same as we did for smooth sheets), then deliver the XYZ file from the minimum grid and the selected soundings in the S-57 file. This approach precludes delivering every valid sounding of all SB files to be in the S-57 file. Concur. We don't want XYZ for every ping, but something like the selected smooth sheet density (4-7mm at scale).

8.. We discussed Section 5.2.3 () in the June 2006 S&D which states:  
An example distribution of grid resolution;

- 0 to 15 meter depths; 0.5 meter grid resolution,

- 14 to 30 meter depths; 1.0 meter grid resolution,
- 29 to 60 meter depths; 2.0 meter grid resolution,
- 59 to 150 meter depths; 5.0 meter grid resolution,
- deeper than 149 meter depths; 10.0 meter grid resolution.

The hydrographer may adjust these values based on the bathymetry of the survey area, the type of multibeam sonar used and other factors.

All four LakeBorgne sheets fall in the water depths where the example node spacing is 0.5 meters. This will create very large grids representing a relatively flat seafloor. We discussed possibly delivering the LakeBorgne sheets at 1 meter node spacing due to the "bathymetry of the survey area". Concur. If the survey is featureless, flat or gently sloping with little or no relief, my personal opinion is that 1 m is sufficient. If you do decide to generate 0.5m surfaces, break the surfaces down to smaller areas to reduce the number of grid nodes. A surface 1k X 1k = 1 million nodes at 1m; thus 0.5m res would be 2m nodes. It's not so much the size of the area, but the resolution which determines the number of nodes.

#### DELMARVA Questions/Answers:

1.. We discussed that depth contours and depth areas had been added into the S-57 feature file in the April 2007 S&D. We asked about contour interval and were given guidelines to make the contours and depth areas based on the depth intervals used in H-Cells (0, 3, 6, 12, 18 feet etc., only the metric equivalent (using the 0.75 rounding rule). Concur. AHB will not use the curves except during survey review and assessment. H-cell specs for AHB product to MCD does not include curves and associated DEPART.

2.. We should include the swim buoys encountered in DELMARVA in the S-57 feature file as BOYSPP (Buoy special purpose) and attribute them with CATSPM = 13 (private mark). Concur.

3.. For the swim buoys we should try to get some images even if they are from Google Earth or something similar. We should also add as much information to the inform field about when they are out (ex: Memorial Day through Labor Day) etc. Concur.

General things we should/can change for all submissions:

1.. We can just include the AWOIS descriptions in the AWOIS database in Appendix 2 of the DR. In Section D of the DR we will just say "see AWOIS database in Appendix 2". That way the information is only presented once. We do not need to include the Uncertainty value for the sounding in the AWOIS database if it is presented elsewhere (in the Excel list of features for example). Once the appendix 2 is established, the reference note could include the page number within Appendix 2.

2.. We should put the DTN reports that AHB submit to MCD in Appendix 1 (Danger to Navigation Reports). We may (should) include our original DTN reports in Appendix 5 (Supplemental survey Records and Correspondence). AHB would like us to do this since they have to add in their submissions if we don't. Concur. AHB will include SAIC on the AHB Danger submissions. Thus this can happen. Agree with inclusion of SAIC DtoN submission and place in supplemental correspondence with Appendix 5.

3.. We discussed that all four Lake Borgne sheets fall in the water depths where the recommended node spacing is 0.5 meters. This will create very large grids. AHB are OK with us having to break up sheets due to grid file sizes. They stated that we should break our survey areas down to whatever size works for us and if they have to they can break it down even further. Concur. It would be in the best interest of all to keep the grids between 500mb and 1gb. As always, the smaller file sizes make the grids easier to work with. Grids over 1GB are more difficult to work with.

· · Overall, your right on track and this is what I remember. If you have any other questions, please respond.

· · Thanks for your efforts and continued support with NOAA charting program.

· Regards, Gene

Rebecca Quintal  
Data Processing Manager  
Science Applications International Corporation  
221 Third Street  
Newport, RI 02840 USA  
401.847.4210  
401.849.1585 (fax)

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From: Mark.T.Lathrop [mailto:Mark.T.Lathrop@noaa.gov]  
Sent: Friday, April 11, 2008 1:46 PM  
To: Quintal, Rebecca T.  
Cc: Crescent Moegling; Evans, Rhodri E.; gene\_parker  
Subject: Re: Seeking clarification on the April 2007 Specs regarding the S-57 Feature File

Rebecca,

After feedback from Gene at AHB, we've concluded that we will not require depth contours in the S-57 feature file. If you did choose to include them for QC they would be used for review and validation of the survey data, but AHB will generate their own contours anyway.

Mark

Quintal, Rebecca T. wrote:

Crescent and Mark,

We would like to seek clarification on the requirements for the S-57 feature files to be delivered for the Mid-Atlantic Corridor – OPR-D302-KR-07 sheets (H11647, H11649, H11649 and H11650).

In the June 2006 S&D, the last paragraph of section 8.2. S-57 Feature File states “General soundings, contours and depth areas will NOT be included in the S-57 feature file since these objects will be derived from the final BAGs during chart compilation. In rare cases, an isolated sounding may be part of the S-57 feature file if it needs a danger circle and/or additional attributions.” This paragraph is exactly the same in the April 2007 S&D. However, in the April 2007 S&D there were the following additions in Section 8.2.1. S-57 Attribution under “A list of the more common objects and attributions that may be used during a typical hydrographic survey is given below.” ...

#### DEPCNT (Depth Contour) Objects

Contours and depth areas including surveyed “0” curve and the MHW-MLLW intertidal DEPART needed for creating ledges and reefs.

#### Mandatory Attributes:

- VALDCO (Value of depth contour)

#### DEPART (Depth Area) Objects

Depth Areas correspond to the area between the contours.

#### Mandatory Attributes:

- DRVAL1 (Depth range value 1) – The minimum (shoalest) value of the depth area.
- DRVAL2 (Depth range value 2) – The maximum (deepest) value of the depth area.

Please confirm if Depth Contours and/or Depth Areas are to be delivered as part of the S-57 Feature File.



Thank you,

-Rebecca

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## BOTTOM COMPOSITION

There were 26 bottom samples taken to verify the bottom types charted for H 11649. Table Appendix V-1 compares information for each sample collected to the charted bottom type. Charts 12200 and 12216 had no charted bottom types that fell within the survey area.

**Table Appendix V-1. H11649 Bottom Sample Characteristics**

JD	Sample Number	Bottom Sample Position (NAD83)		Observed Bottom Type	Depth of Bottom Sample (m)	Depth Uncertainty	Charted Bottom Type	
		Latitude (N)	Longitude (W)				Chart # 12211_1	Chart # 12214_1
244	BS-16	038° 25' 45.7"	074° 58' 50.7"	med S Sh	14.18	0.270	S Sh	
244	BS-17	038° 25' 35.2"	075° 00' 26.8"	M	15.98	0.270	S	
244	BS-18	038° 25' 29.8"	075° 02' 28.2"	med S med P	11.16	0.270	S Sh P	
244	BS-19	038° 24' 26.4"	075° 01' 21.6"	M	15.82	0.274	M Sh	
244	BS-20	038° 24' 04.5"	074° 58' 57.2"	fne S	14.26	0.270	S	
244	BS-21	038° 22' 30.4"	074° 59' 41.7"	M fne S	18.19	0.270	S M	
244	BS-22	038° 22' 27.1"	075° 01' 16.6"	med S Sh	11.56	0.270	S	
244	BS-23	038° 21' 26.4"	075° 02' 21.2"	med S Sh	10.03	0.270	S	
244	BS-24	038° 21' 33.5"	075° 00' 13.8"	med S	18.35	0.270	Oz S	
244	BS-25	038° 20' 37.3"	074° 59' 29.4"	med S	14.47	0.270	S	
244	BS-26	038° 23' 24.8"	075° 02' 33.7"	fne S	12.22	0.270	S	
260	BS-2*	038° 30' 25.9"	074° 56' 28.1"	fne S brk Sh	17.68	0.270		S
260	BS-3	038° 30' 20.3"	074° 58' 14.4"	crs S fne P brk Sh	15.78	0.270		S
260	BS-4	038° 29' 39.5"	074° 59' 57.9"	crs S fne P brk Sh	15.84	0.270		M Sh
260	BS-5	038° 29' 30.7"	074° 59' 21.1"	fne S fne P brk Sh	13.60	0.270		S
260	BS-6	038° 29' 22.9"	074° 57' 21.1"	fne S fne P brk Sh	17.72	0.270		S
260	BS-7	038° 29' 33.2"	074° 55' 17.6"	fne S fne P brk Sh	14.61	0.280		S
260	BS-8	038° 28' 35.8"	074° 55' 50.5"	fne S fne P brk Sh	12.45	0.270	S	S
260	BS-9	038° 28' 13.6"	074° 57' 16.2"	fne S fne P Sh	16.53	0.270	S Sh	S Sh
260	BS-10	038° 27' 34.4"	074° 58' 32.9"	fne S Sh	17.15	0.270	S Sh	S Sh
260	BS-11	038° 27' 32.8"	075° 00' 23.1"	fne S	14.16	0.270	S Sh	S Sh
260	BS-12	038° 28' 43.0"	075° 00' 30.7"	fne P	13.27	0.270	S	S
260	BS-13	038° 28' 32.5"	075° 01' 30.1"	fne S Sh	12.26	0.270	S P	S P
260	BS-14	038° 26' 32.7"	075° 01' 24.7"	fne S Sh	11.75	0.270	S Sh P	
260	BS-15	038° 26' 44.1"	074° 59' 34.3"	fne S Sh	15.47	0.270	M	
260	BS-27	038° 28' 39.8"	074° 59' 41.0"	fne S fne P Sh	9.42	0.270	M	M

It is recommended that the bottom type charted be updated where necessary based on the information collected during the latest survey. \*There is not a BS-1 for this survey.

# AHB PRE-COMPILATION PROCESS H11649

REGISTRY No.	<i>H11649</i>
PROJECT No.	<i>OPR-D302-KR-07</i>
FIELD UNIT	<i>SAIC</i>
PRE-COMPILER	<i>Katrina Wyllie</i>
LARGEST SCALE CHART	<i>12211, edition 43, 20071001</i>
CHART SCALE	<i>1:80000</i>
SURVEY SCALE	<i>1:20000</i>
DATE OF SURVEY	<i>20070817-20071118</i>
CONTENT REVIEW DATE	<i>20090225</i>

Components	File Names
<i>Product Surface</i>	<i>PS_H11649_80k_800mrad_40mres.hns</i>
<i>Shifted Surface</i>	<i>PS_H11649_80k_800mrad_40mres_Shifted.hns</i>
<i>Contour Layer</i>	<i>PS_H11649_80k_800mrad_40mres_Contours.hob</i>
<i>Survey Scale Soundings</i>	<i>H11649_SS_Soundings.hob</i>
<i>Chart Scale Soundings</i>	<i>H11649_CS_Soundings.hob</i>
<i>ENC Retain Soundings</i>	<i>H11649_ENC_Retain_Soundings</i>
<i>Feature Layer</i>	<i>H11649_Features.hob</i>
<i>Meta-Objects Layer</i>	<i>H11649_MetaObjects.hob</i>
<i>Blue Notes</i>	<i>H11649_BlueNotes.hob</i>

## I. META-OBJECTS:

### a. M\_COVR attributes

Acronym	Value
INFORM	<i>H11649; OPR-D302-KR-07</i>
SORDAT	<i>20071118</i>
CATCOV	<i>Coverage available</i>
SORIND	<i>US, US, survy, H11649</i>

### b. M\_QUAL attributes

Acronym	Value
CATZOC	<i>zone of confidence A2</i>
INFORM	<i>H11649; OPR-D302-KR-07</i>
POSACC	<i>10</i>
SORDAT	<i>20071118</i>
SORIND	<i>US,US,survey,H11649</i>
SUREND	<i>20071118</i>
SURSTA	<i>20070817</i>
TECSOU	<i>Found by multi-beam, found by side scan sonar</i>

### c. DEPARE attributes

Acronym	Value
DRVALV 1	<i>9.00 ft</i>
DRVALV2	<i>79.00 ft</i>
SORDAT	<i>20071118</i>
SORIND	<i>US,US,nsurf,H11649</i>



H11649\_AHB\_5m\_Combined

8 KB XML Document

1/28/2009 2:04 PM



H11649\_AHB\_5m\_Combined....

78,286 KB HNS File

1/28/2009 2:04 PM

**ATLANTIC HYDROGRAPHIC BRANCH  
EVALUATION REPORT to Accompany  
Surveys H11649 (2007)**

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.

**B. DATA ACQUISITION AND PROCESSING**

**B.1 DATA PROCESSING**

The following software was used to process and review data at the Atlantic Hydrographic Branch (AHB):

CARIS HIPS/SIPS version 6.1  
CARIS BASE Manager 2.1  
CARIS HOM ENC 3.3  
PYDRO, version 8.7 r2537 (DTONS's)  
CARIS S-57 Composer 2.0  
DKART Inspector, version 5.0 Build 732 SP1

**B.2 QUALITY CONTROL**

**H-Cells**

The AHB source depth grid was generated as a 5m resolution BASE surface. The 5M combined grid was created from twenty-two 1M and 0.5M contractor bags. Survey scale soundings were extracted from AHB generated 5m Base surface at a 1:20000 scale using a radius of 1.75m. Soundings were selected for charting using the latest raster charts 12211 and 12214. Soundings were then checked for conflicts, corrected to remove conflicts, and edited to allow for proper sounding compilation placement with respect to existing charted depths outside the survey area. The BASE surface was referenced when selecting the chart scale soundings, to ensure that the selected soundings portrayed the bathymetry within the common area.

Depth curves were drawn from the Base surface. The contours are included in the final SS H-Cell product as per 2009 H-Cell specifications. The curves were utilized during chart scale sounding selection at AHB.

The compilation products and Stand Alone HOB Files (SAHOB) are detailed in the Compilation Process Log of this document. All individual SAHOB files were assembled in BASE Editor during H-Cell compilation.

The completed H-Cell was exported as a Base Cell File (ENC.000) in S-57 format with all values in metric units. The metric equivalent ENC.000 file was then converted to NOAA chart units (ENC\_CS.000) with all values measured in feet following NOAA sounding rounding rules.

The H11650 CARIS H-Cell final deliverables include the following products:

H11649_CS.000	1:80,000 Scale	H11649 Selected Soundings (Chart Scale)
H11649_SS.000	1:20,000 Scale	H11649 Selected Soundings (Survey Scale)

#### **JUNCTIONS**

<u>H11648 (2007)</u>	<u>to the north</u>
<u>H11650 (2007)</u>	<u>to the east</u>

Survey H11648 (2007) junctions with the present survey to the north. Present survey soundings are 1 foot shoaler than survey H11648 (2007).

Survey H11650 (2007) junctions with the present survey to the east. Present survey soundings are 1 foot deeper than survey H11650 (2007).

#### **C. VERTICAL AND HORIZONTAL CONTROL**

Final vertical correction processing was completed by the field unit with no additional corrections required by Atlantic Hydrographic Branch personnel. The field unit applied verified water levels in conjunction with the preliminary tidal zoning which was accepted and approved by N/OPSI CO-OPS as the final zoning for H11650. Sounding datum is Mean Lower Low Water (MLLW). Vertical datum is Mean High Water (MHW).

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD83), UTM projection zone 18. Office ENC processing of this survey required translating the datum to meet S-57 ENC requirements. The horizontal geodetic datum was translated to Latitude and Longitude (LLDG) World Geodetic System-84 (WGS-84) during CARIS Base Manager processing.

#### D. RESULTS AND RECOMMENDATIONS

<u>Chart Comparison</u>	<u>12211 (43<sup>rd</sup> Edition, Oct. /07</u>
	Corrected through NM, May 24/08
	Corrected through LNM, Apr. 15/08
	Scale 1:80,000

<u>Chart Comparison</u>	<u>12214 (48<sup>th</sup> Edition, Oct. /07</u>
	Corrected through NM, Jun. 07/08
	Corrected through LNM, Jun. 03/08
	Scale 1:80,000

<u>ENC Comparison</u>	<u>US5MD50M</u>
	Fenwick Island to Chincoteague Inlet
	Edition 1
	Update Application Date 2008-12-08
	Issue Date 2008-12-08
	References: Charts 12211

<u>ENC Comparison</u>	<u>US4DE11M</u>
	Cape May to Fenwick Island
	Edition 13
	Update Application Date 2008-04-03
	Issue Date 2008-09-26
	References: Charts 12214

#### Hydrography

The charted Hydrography originates with prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in Section D. of the Descriptive Report.

**Adequacy of Survey**

The present survey is adequate to supersede the charted bathymetry within the common area. Any features not specifically addressed either in the H-Cell File or the Blue Notes should be retained as charted. Refer to the Descriptive Report for further survey requirements recommended by the hydrographer.

**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. See Section D.1. of this report for a list of the Raster Charts and Electronic Navigation Charts (ENC) used for compiling the present survey.



**APPROVAL SHEET**  
**H11649**

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, representation of critical depths, cartographic symbolization, and verification or disproval of charted data. All revisions and additions made to the H-Cell files during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with National Ocean Service and Office of Coast Survey requirements except where noted in the Descriptive Report and the Evaluation Report.

All final products have undergone a comprehensive review as per the Atlantic Hydrographic Branch Processing Manual and are verified to be accurate and complete except where noted.

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**Katrina Wyllie**  
Hydrographic Intern  
Atlantic Hydrographic Branch

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**Norris A. Wike**  
Cartographer  
Atlantic Hydrographic Branch

I have reviewed the H-Cell files, accompanying data, and reports. This survey and accompanying Marine Chart Division deliverables meet National Ocean Service requirements and standards for products in support of nautical charting except where noted.

Approved: \_\_\_\_\_  
**For: Shep Smith**  
Commander, NOAA  
Chief, Atlantic Hydrographic Branch