NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey *Multibeam and Sidescan Sonar*

Field No. *N*

Registry No. *H12003*

LOCALITY

State *Maryland*

General Locality *Atlantic Ocean*

Sublocality *5 NM East of Assateague Island*

2009 - 2010

CHIEF OF PARTY

Paul L. Donaldson

Science Applications International Corporation

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NOAA FORM 77-28 (11-72) U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NO.

H12003

HYDROGRAPHIC TITLE SHEET

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

FIELD NO.

N

State Maryland

General locality Atlantic Ocean

Sub-Locality *5 NM East of Assateague Island*

Scale 1:20,000 Date of survey: 10 August 2009 – 18 April 2010

Instructions Dated 01 December 2008 Project No. OPR-D302-SA-09

Vessel *M/V Atlantic Surveyor* D582365

Chief of Party *Paul L. Donaldson*

Surveyed by: *Dan Baker, Alex Bernier, Jediah Bishop, Dan Burgo, Paul Donaldson, Chuck Holloway, Colette LeBeau, Rick Nadeau, Katie Offerman, Gary Paquette, Gary Parker, Evan Robertson, Eva Rosendale, Jeremy Shambaugh, Deb Smith, Jenifer Stone, Bridget Williams*

Soundings taken by **echo sounder**, hand lead, pole MULTIBEAM RESON SEABAT 7125

Graphic record scaled by

Graphic record checked by

Protracted by Automated Plot

Verification by ***Atlantic Hydrographic Branch***

Soundings in fathoms, **meters,** feet at MLW, **MLLW**

REMARKS: **Contract**: DG133C-08-CQ-0003
Contractor: Science Applications International Corp., 221 Third Street; Newport, RI 02840 USA
Subcontractors: Rotator Staffing Services, PO Box 366, 557 Cranbury Road, E. Brunswick NJ 08816
Times: All times are recorded in UTC
UTM Zone: Zone 18
Purpose: To provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area: Sheet N (H12003) in Mid–Atlantic Corridor, Coast of Maryland. ***Notes in Bold, Red, Italics made during Office processing.***

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Science Applications International Corporation (SAIC) warrants only that the survey data acquired by SAIC and delivered to NOAA under Contract DG-133C-08-CQ-0003 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 H12003
Scale 1:20,000, Surveyed 2009 - 2010
M/V Atlantic Surveyor
Science Applications International Corporation (SAIC)
Paul L. Donaldson, Lead Hydrographer

PROJECT
Project Number: OPR-D302-SA-09
Dates of Instructions: 01 December 2008 **Task Order#:** T0001

Dates of Supplemental Instructions: 03 December 2008, 10 July 2009, 23 February 2010, 26 February 2010.
Sheet Letter: N
Registry Number: H12003
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 Maryland and Virginia, 5 NM East of Assateague Island (Figure A-1). The line kilometers, bottom samples, item investigations and other survey statistics are listed in Table A-1. The area was surveyed at set line spacing with multibeam sonar and towed sidescan sonar from 10 August 2009 to 18 April 2010 (Table A-2). The CUBE depth range encountered in H12003 was from 2.40 meters (8 feet, 0.27 m uncertainty) to 23.08 meters (75 feet, 0.27 m uncertainty). ***Concur.***

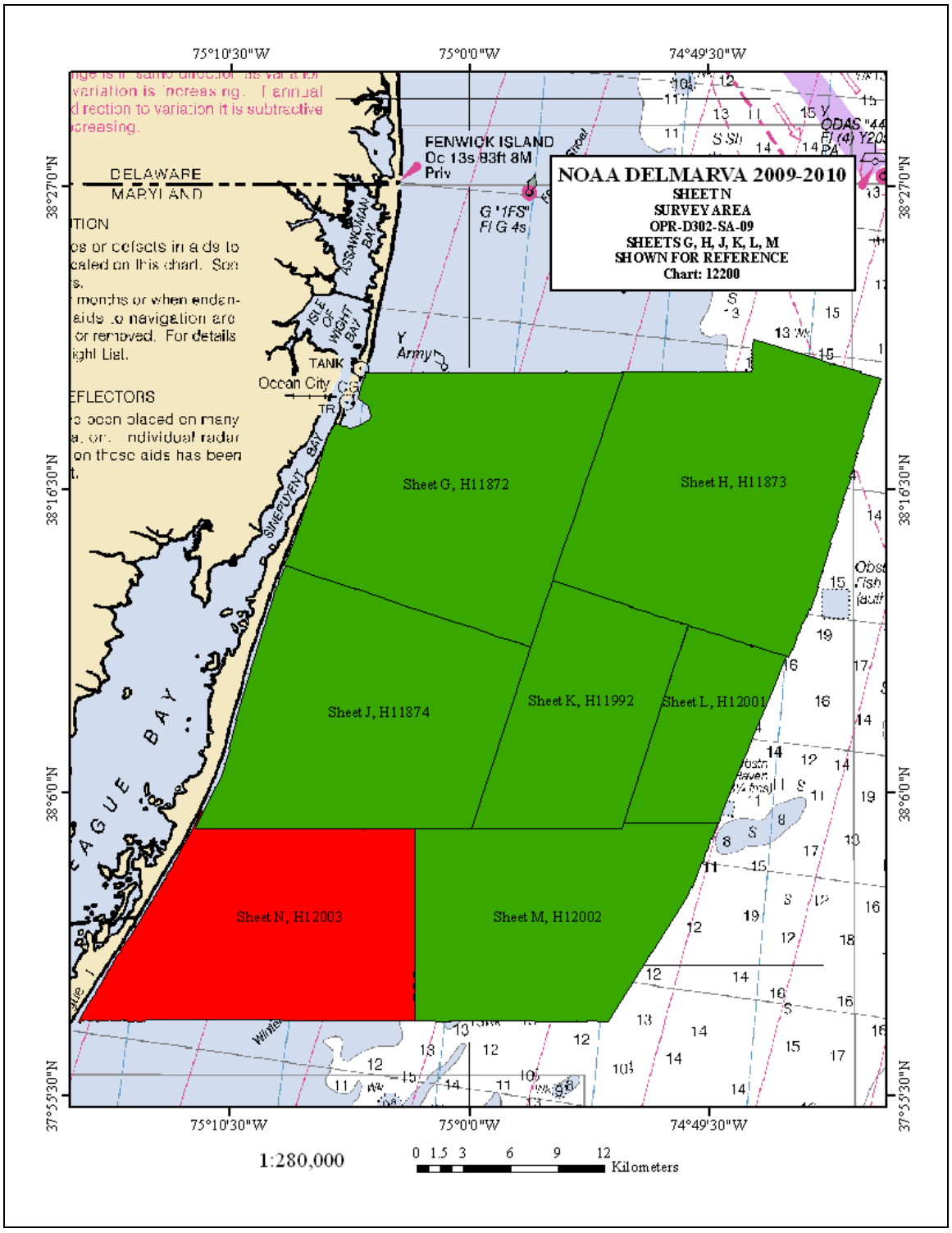

Figure A-1. H12003 Survey Bounds

Table A-1. Hydrographic Survey Statistics

***M/V Atlantic Surveyor*, Sheet N H12003**	**Value**
LNM Single beam only sounding lines (mainscheme only)	N/A
LNM Multibeam only sounding lines (mainscheme only)	N/A
LNM Lidar sounding lines (mainscheme only)	N/A
LNM Sidescan sonar only lines (mainscheme only)	N/A
LNM Mainscheme lines (multibeam and sidescan)	3015.5
LNM Crosslines from multibeam	127.9
LNM Lidar crosslines	N/A
LNM development lines non mainscheme	2.8
LNM shoreline/nearshore investigations	N/A
Number of Bottom Samples	67
Number of items investigated that required additional time/effort in the field beyond the above operations	15
Total number of square nautical miles	64.21

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

Calendar Date	Julian Day
10 August 2009	222
11 August 2009	223
12 August 2009	224
13 August 2009	225
14 August 2009	226
15 August 2009	227
16 August 2009	228
17 August 2009	229
18 August 2009	230
19 August 2009	231
20 August 2009	232
24 August 2009	236
25 August 2009	237
26 August 2009	238
27 August 2009	239
28 August 2009	240

Calendar Date	Julian Day
30 August 2009	242
31 August 2009	243
01 September 2009	244
05 September 2009	248
06 September 2009	249
07 September 2009	250
12 September 2009	255
13 September 2009	256
14 September 2009	257
15 September 2009	258
12 April 2010	102
13 April 2010	103
14 April 2010	104
15 April 2010	105
18 April 2010	108

B. DATA ACQUISITION AND PROCESSING

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-SA-09, delivered with Descriptive Report H12001 on 26 March 2010. During the shutdown period between 2009 and 2010 there were some changes to the systems used to acquire and process these data which differ from what was reported within the Data Acquisition and Processing Report* for OPR-D302-SA-09. All changes which occurred during this shutdown period are captured in Appendix V* as "Supplemental Data Acquisition and Processing Information". The information in Table B-1 below summarizes the systems listed in the Data Acquisition and Processing Report and Appendix V*. ***Concur.***

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

System	Manufacturer / Model Number	Subsystem
Multibeam Sonar	RESON SeaBat 7125	7P Sonar Processor
Sidescan Sonar	Klein 3000 Towfish	K-1 K-Wing Depressor, Transceiver/Processing Unit
Vessel Attitude System	Applanix POS/MV Inertial Navigation System	
Positioning Systems	Applanix POS/MV 320	
	Trimble 4000 GPS Receiver (12 July 2009-16 July 2009) Trimble 7400 GPS Receiver (16 July 2009- 18 April 2010)	
	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 speed 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.

The Position Orientation System/Marine Vessels (POS/MV) Inertial Measurement Unit (IMU) was mounted below the main deck of the vessel, port of the keel. The Reson 7125 transducer and surface sound velocity sensor were hull-mounted port of the vessel's keel in close proximity to the POS/MV's IMU. A Brook Ocean Technologies Moving Vessel Profiler 30 (MVP-30) was mounted to the starboard stern quarter. The sidescan sonar was towed along the centerline axis from an A-frame mounted on the stern of the vessel. Table B-2 is a list of vessel characteristics for the *M/V Atlantic Surveyor*.

Filed with original Field Records.

Table B-2. Survey Vessel Characteristics

Vessel Name	LOA	Beam	Draft	Max Speed	Gross Tonnage	Power (Hp)	Registration Number
M/V Atlantic Surveyor	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 5 Linux platforms. Klein 3000 sidescan data were collected on a Windows XP platform using Klein’s **SonarPro** 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 processing and coverage mosaics were produced using **SABER** on a Linux platform.

B.2 QUALITY CONTROL

There were approximately 127.9 linear nautical miles of crosslines and 3015.5 linear nautical miles of mainscheme lines surveyed on this sheet. This resulted in crossline mileage that represented approximately 4.24 percent of the mainscheme mileage. The crosslines were oriented at 090°/270° and were predominately spaced 1100 meters apart, while most of the mainscheme lines were oriented at 31.5°/211.5° and were spaced 40 meters apart. For safety reasons the mainscheme lines in the vicinity of Winter Quarter Shoal remained spaced at 40 meters apart but were run at 090°/270°. The sidescan sonar range scale was set to 50 meters for all mainscheme operations, providing a consistent 100-meter imagery swath.

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 varied and was based on several criteria.

- Observed sound speed changes from previously collected profiles
- Surface sound speed differences between the SSP sensor collocated with the 7125 sonar head and the current profile obtained from the MVP-30
- The amount of time elapsed since the last cast

Multiple casts were initially 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. A total of 580 profiles were applied to data for H12003. Confidence checks of the sound speed profile casts were conducted periodically (6 to 13

survey days) 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 as a result of fuel and water consumption. A dynamic draft look-up table was constructed from settlement and squat measurements determined during the pre-survey Sea Acceptance Trials. The dynamic draft look-up table was used in conjunction with recorded input from shaft RPM counters to calculate and apply a dynamic draft during data collection.

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 an acceptable range.

Multibeam confidence checks were conducted during port calls (approximately every 10-12 survey days) by lead line measurement. See separates one for a complete listing of all lead line measurements taken.

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*). The terminology Total Propagated Error (TPE) has been replaced by Total Propagated Uncertainty (TPU). This was adopted by the International Hydrographic Organization in Special Publication No. 44, "*IHO Standards for Hydrographic Surveys, 5th 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 created during survey system installation and integration. 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. The Data Acquisition and Processing Report* provides a more detailed discussion on development of the EPF and application of the TPU.
Filed with original Field 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 PFM CUBE surface, 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 the attached text file that provides a listing of all the nodes from the one-meter BAG where the final uncertainties exceeded IHO Order 1. An initial review of the areas with final uncertainties exceeding IHO Order 1 revealed that there were uncertainties exceeding IHO Order 1 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. The majority of the final uncertainties which exceed the IHO Order 1 allowable limits were associated with crosslines which were collected in 2010 which overlapped mainscheme data collected in 2009 (Figure B-1). ***Concur.***

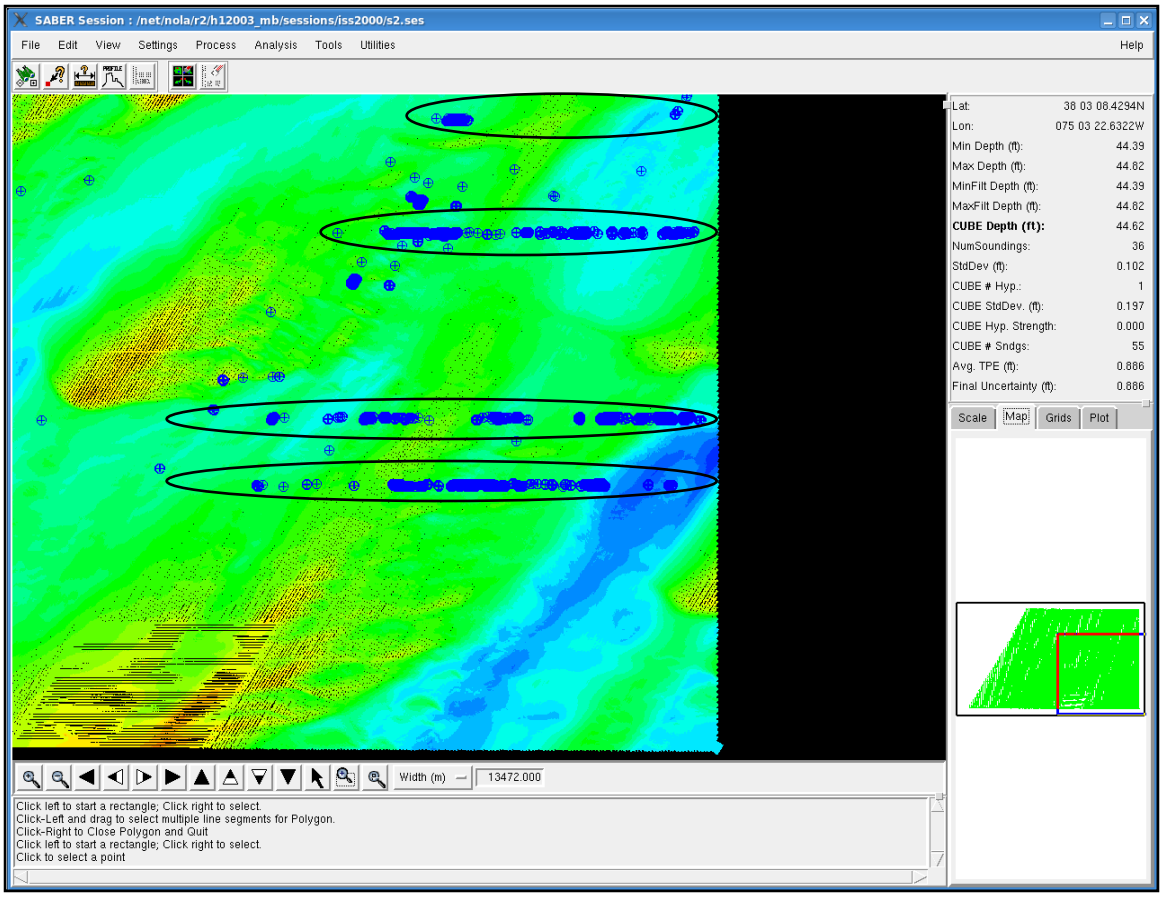

Figure B-1. Final Uncertainties for H12003 Highlighting Crossline File Contributions to the Total Number of Uncertainties

The H12003 survey area was found to be highly dynamic with changes in bottom depth and appearance occurring during the duration of the survey effort. There were a number of higher uncertainties due to overlapping data collected before and after a major weather event that occurred between JD250 (08 September 2009) and JD255 (11 September 2009). In certain areas, the bottom was disrupted significantly during this one event which had sustained 3-4 meter seas over the survey area (Figure B-2). Figure B-3 depicts the PFM with data before and after the weather event which occurred between JD 250 and 255. White track-lines are data from JD 250 prior to the weather event and blue track-lines are post event (JD 255).

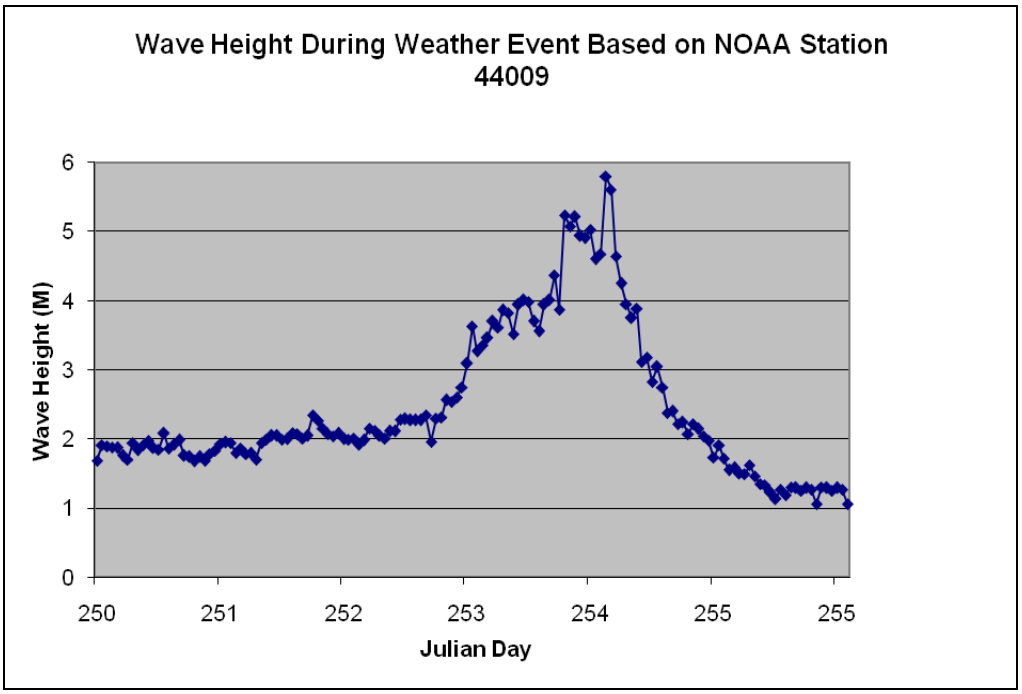

Figure B-2. Wave Heights during Weather Event

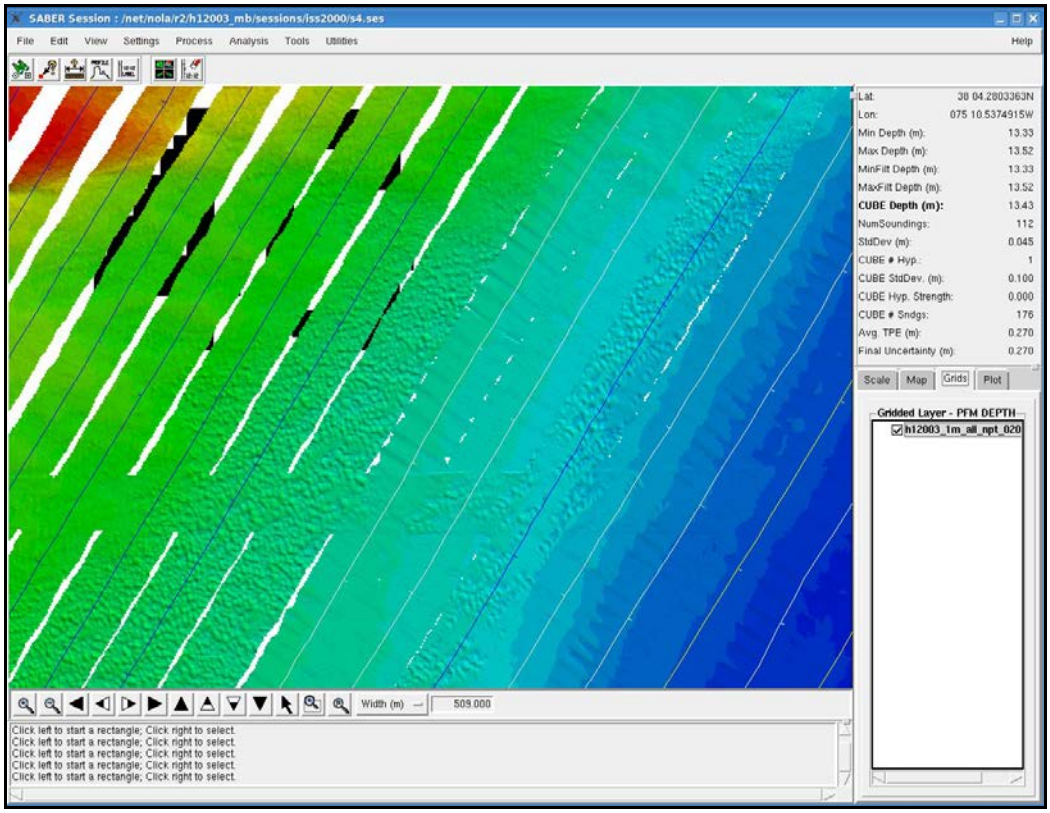

Figure B-3. Example of Weather Event Influences between JD 250 (white lines) and 255 (blue lines) Data.

Significant changes in the bottom were also noted in holiday fill data and item investigations which occurred in April 2010. Seasonal sediment transport which occurred during the six month interval between the main survey and the holiday fills and item investigations caused depths to vary by as much as 50 cm. Higher uncertainties were present for much of the holiday coverage area as a result of seasonal sediment transport. The depths associated with items which were re-run during the holiday fill surveys to ensure adequate number of soundings per node over features resulted in depths that matched the data collected prior to the winter shutdown (Figure B-4). These results indicate that the offset noted in depths for much of the holiday fill data is due to sediment transport and not tides or an offset problem. Holiday fill data were edited to contain only data needed to cover the holiday. This reduced the number of uncertainties within the CUBE surface which exceed the IHO Order 1 limit (Figure B-5 and Figure B-6).

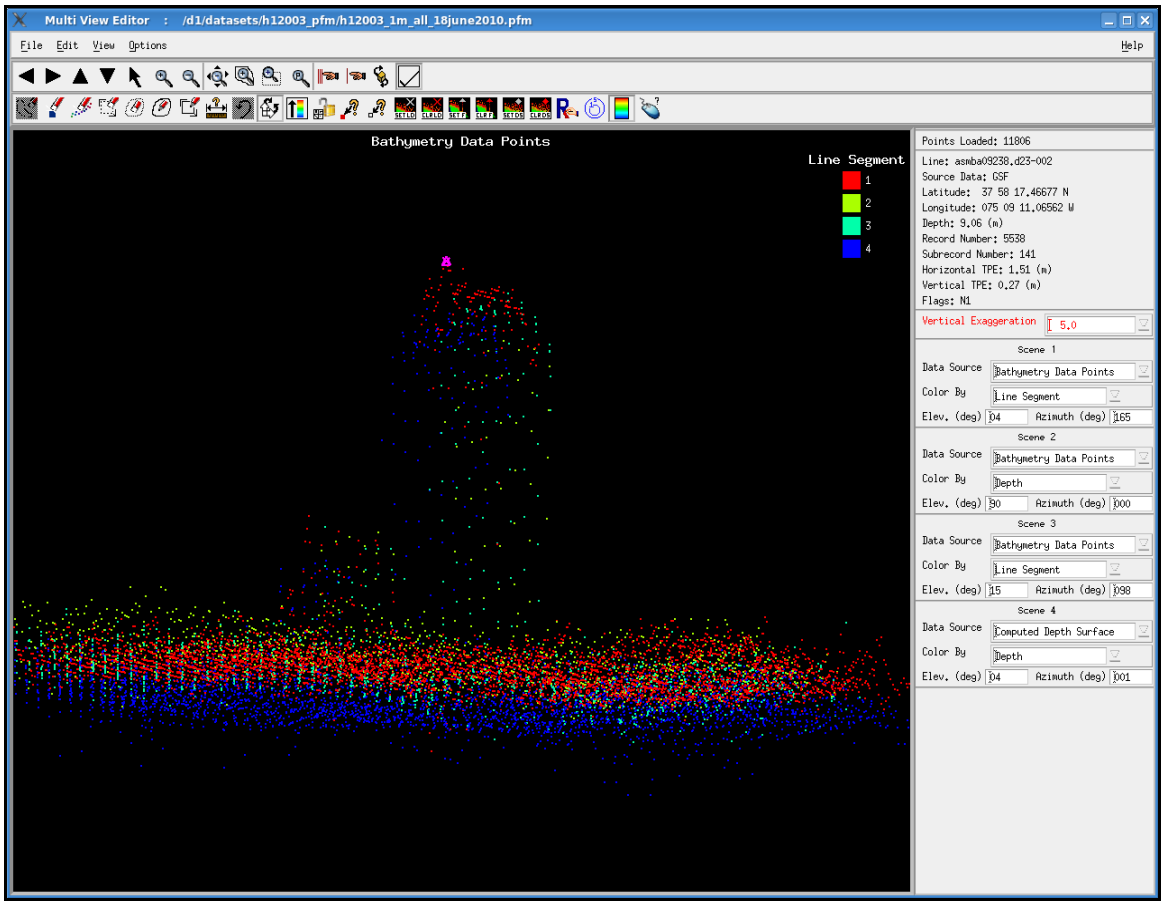

Figure B-4. Data from 2009 and 2010 Over Feature 4. The Red Line Segment is from 2009 and the Others are from 2010.

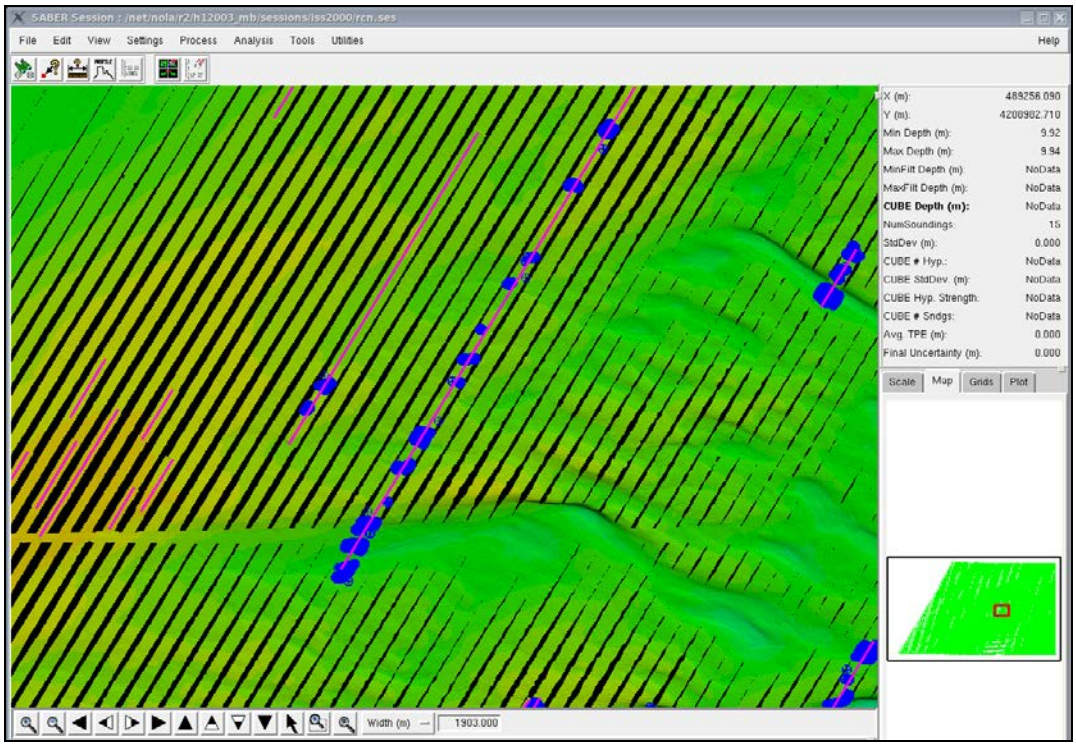

Figure B-5. Holiday lines in Magenta with Uncertainties Exceeding IHO Order 1 Flagged in Blue Prior to Edits.

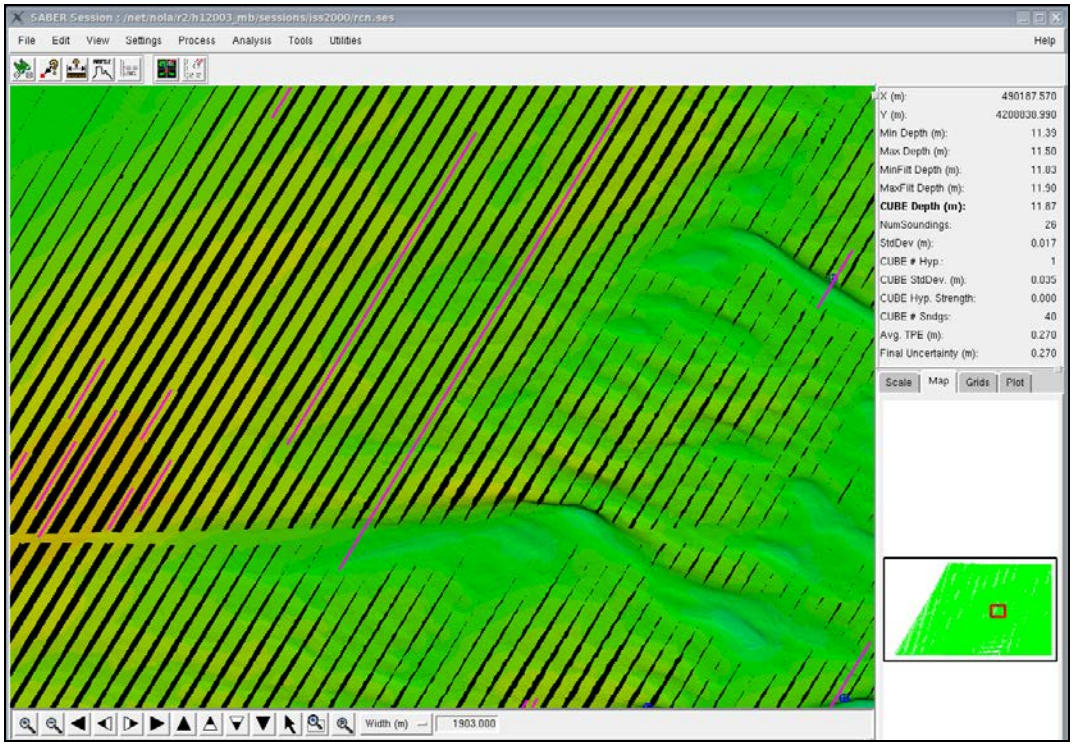

Figure B-6. Holiday lines in Magenta with Uncertainties Exceeding IHO Order 1 Flagged in Blue After Edits.

Though there were extensive areas of multibeam data overlap throughout this sheet, uncertainties exceeding the IHO Order 1 limit were observed in only a few of these overlapping areas for data collected within a single year time frame. In the cases where the uncertainties did exceed the IHO Order 1 limit, there was typically an observed vertical offset of 20 to 25 centimeters between the overlapping data (Figure B-7). This infrequent vertical offset between adjacent lines was attributed to tides. While all data were within one tide zone somewhat differing environmental conditions between the survey area and the primary tide gauge location in Duck, NC (see Section C for further discussion) are possible.

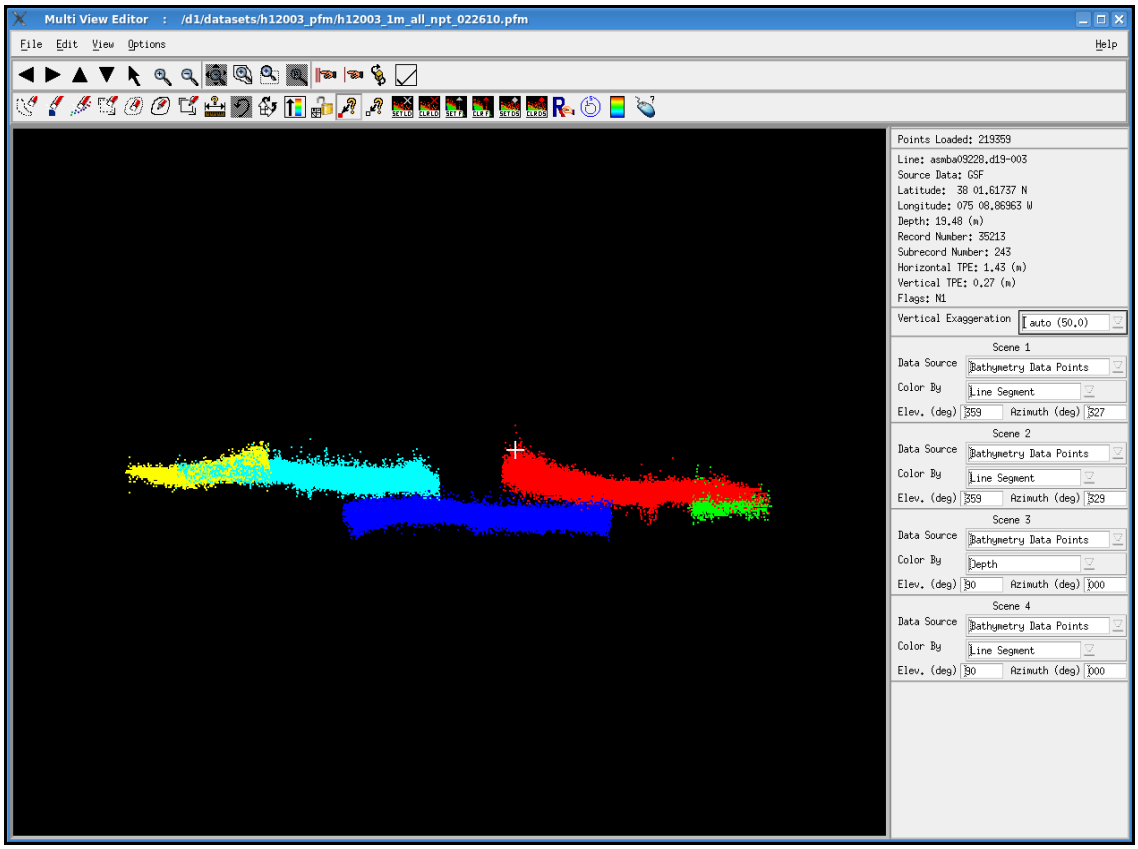

Figure B-7. A 20-cm step in Data between JD 228 and JD 230.

Junction and Crossing Analysis

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 CUBE grids were made from the mainscheme data and from the crossline data. Comparisons of all crossing data in H12003 showed that 96.83% of comparisons were within 35 centimeters and 99.31% of comparisons were within 60 centimeters (Table B-3). Due to the sediment transport that was observed during the winter shutdown, comparisons of mainscheme and crossline data were higher

as a result. When mainscheme and crossline data from 2009 only was analyzed, 95.56% of comparisons were within 25 centimeters and 99.29% of comparisons were within 35 centimeters (Table B-4). The 158 comparisons larger than 50 centimeters seen between the mainscheme and crossline data from 2009 data were accounted for by normal small DGPS position variability along steep slopes and weather events changing bathymetry along slopes. There were significantly more comparisons which differed by more than 50 centimeters when the 2010 holiday and crossline data were included. These differences were accounted for by seasonal weather events and sediment transport along with normal small DGPS position variability.

Table B-3. H12003 Junction Analysis Mainscheme Lines vs. Near Nadir Crosslines, 2009 and 2010 Data

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0-5	241836	31.61%	113709	14.86%	105665	13.81%	22462	2.94%
5-10	187319	56.10%	114187	29.79%	73132	23.37%		
10-15	138914	74.26%	94435	42.13%	44479	29.19%		
15-20	82694	85.07%	64311	50.54%	18383	31.59%		
20-25	48203	91.37%	42497	56.10%	5706	32.34%		
25-30	27092	94.91%	25265	59.40%	1827	32.57%		
30-35	14722	96.83%	13957	61.22%	765	32.67%		
35-40	8224	97.91%	7664	62.23%	560	32.75%		
40-45	4727	98.53%	4285	62.79%	442	32.80%		
45-50	2825	98.90%	2539	63.12%	286	32.84%		
50-60	3151	99.31%	2613	63.46%	538	32.91%		
60-70	1816	99.54%	1531	63.66%	285	32.95%		
70-80	1257	99.71%	1077	63.80%	180	32.97%		
80-90	990	99.84%	880	63.91%	110	32.99%		
90-100	564	99.91%	523	63.98%	41	32.99%		
100-110	476	99.97%	476	64.05%	0	32.99%		
110-120	157	99.99%	157	64.07%	0	32.99%		
120-130	24	100.00%	24	64.07%	0	32.99%		
130-140	15	100.00%	15	64.07%	0	32.99%		
Totals	756006	100.00%	490145	64.07%	252399	32.99%	22462	2.94%

Table B-4. H12003 Junction Analysis Mainscheme Lines vs. Near Nadir Crosslines, 2009 Data Only

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0-5	228275	34.97%	105596	16.18%	101323	15.52%	21356	3.27%
5-10	170779	61.13%	100570	31.58%	70209	26.28%		
10-15	123038	79.98%	80560	43.93%	42478	32.79%		
15-20	67572	90.34%	50683	51.69%	16889	35.37%		
20-25	34097	95.56%	29270	56.17%	4827	36.11%		
25-30	16804	98.13%	15759	58.59%	1045	36.27%		
30-35	7563	99.29%	7372	59.72%	191	36.30%		
35-40	2882	99.73%	2813	60.15%	69	36.31%		
40-45	1171	99.91%	1133	60.32%	38	36.32%		
45-50	408	99.98%	391	60.38%	17	36.32%		
50-60	115	99.99%	99	60.40%	16	36.32%		
60-70	23	100.00%	11	60.40%	12	36.33%		
70-80	13	100.00%	13	60.40%	0	36.33%		
80-90	5	100.00%	5	60.40%	0	36.33%		
90-100	2	100.00%	2	60.40%	0	36.33%		
Totals	652747	100.00%	394277	60.40%	237114	36.33%	21356	3.27%

Table B-5 depicts the junction analysis between H12003 and H11874 (Sheet J) that was surveyed between 10 August 2008 and 18 December 2008. The junction analysis was conducted on 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 96.75% of the comparisons were within 35 centimeters and 99.19% were within 50 centimeters.

Table B-5. Junction Analysis, H12003 vs. H11874

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0-5	317542	27.54%	115765	10.04%	171632	14.88%	30145	2.61%
5-10	251289	49.33%	64932	15.67%	186357	31.05%		
10-15	211754	67.70%	38982	19.05%	172772	46.03%		
15-20	156608	81.28%	22649	21.02%	133959	57.65%		
20-25	96586	89.66%	15692	22.38%	80894	64.66%		
25-30	53342	94.28%	9851	23.23%	43491	68.44%		
30-35	28489	96.75%	4834	23.65%	23655	70.49%		

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
35-40	14812	98.04%	3130	23.92%	11682	71.50%		
40-45	8502	98.77%	2209	24.11%	6293	72.05%		
45-50	4779	99.19%	1441	24.24%	3338	72.34%		
50-60	4633	99.59%	1100	24.33%	3533	72.64%		
60-70	2519	99.81%	169	24.35%	2350	72.85%		
70-80	1277	99.92%	0	24.35%	1277	72.96%		
80-90	721	99.98%	0	24.35%	721	73.02%		
90-100	202	100.00%	0	24.35%	202	73.04%		
Totals	1153055	100.00%	280754	24.35%	842156	73.04%	30145	2.61%

Table B-6 depicts the junction analysis between H12003 and H12002 (Sheet M) that was surveyed between 15 July 2009 and 15 April 2010. The junction analysis was conducted on 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 97.13% of the comparisons were within 25 centimeters and 99.37% were within 30 centimeters. ***Concur.***

Table B-6. Junction Analysis, H12003 vs. H12002

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0-5	198345	33.86%	71679	12.24%	108310	18.49%	18356	3.13%
5-10	157849	60.81%	39158	18.92%	118691	38.76%		
10-15	114894	80.43%	18425	22.07%	96469	55.23%		
15-20	69971	92.37%	7544	23.36%	62427	65.88%		
20-25	27887	97.13%	1665	23.64%	26222	70.36%		
25-30	13090	99.37%	472	23.72%	12618	72.51%		
30-35	3361	99.94%	281	23.77%	3080	73.04%		
35-40	285	99.99%	49	23.78%	236	73.08%		
40-45	34	100.00%	26	23.78%	8	73.08%		
45-50	13	100.00%	10	23.78%	3	73.08%		
Totals	585729	100.00%	139309	23.78%	428064	73.08%	18356	3.13%

Details of beam by beam comparison of 25 selected crossings in different areas of H12003 are presented in Separates IV* of this report. The crossings for detailed comparisons were randomly selected for spatial and temporal distribution over the entire survey. ***Concur.***

Filed with original Field records.

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 60° beam angle used as the cutoff for acceptable mainscheme and item multibeam data, the effective swath width for the multibeam coverage was approximately 3.5 times the water depth. Though full bottom coverage multibeam was not required, in depths greater than approximately 13.5 meters there was sufficient outer beam overlap to provide 100% multibeam bottom coverage. ***Concur.***

A 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. In addition seven half-meter node PFM CUBE surfaces associated with features were built. The half-meter node PFM CUBE surfaces were reviewed for coverage and **SABER's Frequency Distribution** tool was used for statistical analysis of the half-meter node PFM CUBE surfaces. Analysis showed that more than 97% of the individual nodes contained five or more CUBE soundings. The final PFM grid was also examined for the number of soundings contributing to the chosen CUBE hypothesis for each grid node by running **SABER's Frequency Distribution** tool on the CUBE number of soundings layer. For H12003, 99.22% of all grid nodes contained six or more soundings; satisfying the requirements for complete multibeam coverage.

A final review of the coverage shows small areas as having four or more contiguous nodes without data located in the outer beams of the multibeam swath. They were attributed to noise from bubble sweep along the hull and resulted in a reduced swath width of the multibeam data. In all cases there was 200% sidescan coverage of the areas with no contacts detected. 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 and Appendix V* of this report for a description of all corrections applied to echo soundings. There were no deviations from the corrections described therein. Please note that the delivered GSF multibeam files are in version 3.01 GSF. This version of GSF is compatible with Caris version 6.1.2.8 using the HotFix initially delivered to the Atlantic Hydrographic Branch on 18 December 2009. The Caris version 6.1.2.8 HotFix has also been included with this delivery. Caris version 7.0 is compatible with this new version of GSF with HotFix 5.

B.4 DATA PROCESSING

Please refer to the Data Acquisition and Processing Report and Appendix V* of this report for a description of all data processing steps performed. There were no deviations from the processes described therein.

Nine BAGs at one-meter grid resolution are submitted for the entire H12003 area. The BAGs were exported from the CUBE depth surface and the Final Uncertainty surface within the PFM grid. The resulting BAG files were limited to 300 MB in size and therefore multiple BAGs are produced from a single PFM grid. The BAG file named H12003_1_of_9.bag is the southernmost one-meter BAG while the BAG file named H12003_9_of_9.bag is the northernmost one-meter BAG. In addition seven BAGs at half-meter grid resolution are submitted for areas surrounding features in depths less than 23 meters. The half-meter BAGs were exported from the CUBE depth surface and the Final Uncertainty surface for each of the feature PFM grids. **SABER's Frequency Distribution** tool was used for analysis of the half-meter node PFM CUBE surfaces. Analysis showed that more than 97% of the individual nodes contained five or more CUBE soundings. Table B-7 summarizes all submitted BAG files.

Table B-7. Summary of H12003 BAG Files

BAG File Name	Comments
H12003_1_of_9.bag	Southern most 1.0-meter BAG
H12003_2_of_9.bag	
H12003_3_of_9.bag	
H12003_4_of_9.bag	
H12003_5_of_9.bag	
H12003_6_of_9.bag	
H12003_7_of_9.bag	
H12003_8_of_9.bag	
H12003_9_of_9.bag	Northern most 1.0-meter BAG
H12003_features_area_1_of_7.bag	Features 3 and 13
H12003_features_area_2_of_7.bag	Feature 1
H12003_features_area_3_of_7.bag	Features 8, 9 and 14
H12003_features_area_4_of_7.bag	Feature 2
H12003_features_area_5_of_7.bag	Features 6, 7, 11 and 16
H12003_features_area_6_of_7.bag	Features 4, 5 and 15
H12003_features_area_7_of_7.bag	Features 10 and 12

Filed with original Field Records.

C. HORIZONTAL AND VERTICAL CONTROL

NOAA tide station 8651370 Duck, NC was the source of verified water level heights for determining correctors to soundings. The primary means for analyzing the adequacy of zoning was by entering the tidal data from adjacent zones into a spread sheet and

conducting comparative analysis. All data for H12003 was contained within one tide zone (SA46A) so zone crossings were not an issue within the data. Data were reviewed within in the navigated swath editor, SAIC's **Multi View Editor (MVE)** for differences between overlapping swath data as well as crossline versus mainscheme data. In addition, sun illuminated coverage plots were examined on screen to identify any vertical offsets which may be a result of tidal zoning impacts. As addressed in the CUBE Uncertainty Analysis discussion above (Section B.2), there were a few instances where overlapping data had an observed vertical offset of 20 to 25 centimeters. The water level zoning parameters provided by NOS, Table C-1, were adequate for application of the observed verified water levels.

Table C-1. Water Level Zoning Parameters Applied on Sheet H12003

Zone	Time Corrector (minutes)	Range Ratio	Reference Station
SA46A	0	1.08	8651370

The survey data for sheet H12003 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*:

- POS/MV Model 320 Version 4, Serial Number 2575 with a Trimble Probeacon Differential Receiver (primary sensor)
- Trimble 7400 Rsi GPS Receiver with a Trimble Probeacon Differential Receiver (secondary sensor)

Differential correctors used for online data were from the U.S. Coast Guard Stations at Driver, VA, Annapolis, MD, and Reedy Point, DE. The differential receivers were programmed to only receive differential corrector data from these three stations.

Daily position confidence checks were conducted using an independent Trimble DGPS system. A real-time **ISS-2000** survey monitor also raised an alarm to alert the survey watch stander if the position differences exceeded the maximum allowable distance. All positioning confidence checks were within the 10 meter limit specified in section 5.1.4.2 of the April 2009 "*NOS Hydrographic Surveys Specifications and Deliverables*". A summary report of positioning system confidence checks is included in Separates I.

Please refer to the Horizontal and Vertical Control Report*, delivered with this Descriptive Report, for detailed descriptions of the procedures and systems used to attain hydrographic positioning.

Filed with original Field Records.

D. RESULTS AND RECOMMENDATIONS

See Appendix II – Survey Feature Report

Feature descriptions in this section were reviewed based on the largest scale chart covering the respective area. Any features that the contractor readdressed on the ENC have been stricken out (e.g., ~~example~~) by the AHB reviewer. This was done by AHB for the sake of clarity so that each feature is only discussed once.

Refer to Appendix II as indicated by red notes following feature description for verified feature information and final feature disposition.

D.1 CHART COMPARISON

H12003 was compared to the largest scale charts covering the area as follows:

- **Chart 12211 Fenwick Island to Chincoteague Inlet,** 1:80,000 scale, 43rd Edition 10/01/2007 corrected by NTM through 06/05/2010
- ~~**ENC US4VA50M In to Chincoteague Inlet; Ocean City Inlet,** 1:80,000 compilation scale, 14th Edition Issued 10/22/2009 Update 1, 04/14/2010~~

The chart comparisons were conducted using SAIC's **SABER** software to view the BSB raster charts with overlain layers of H12003 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.

Chart 12211 Fenwick Island to Chincoteague Inlet (1:80,000) Concur with clarification. For all contours and soundings, defer to H-Cell.

Figure D-1 shows the H12003 survey area and chart 12211 with an overlay of PFM CUBE depths between the 18-foot and 30-foot depths for comparison to the charted depth curves. Also shown are the assigned AWOIS items (blue circles).

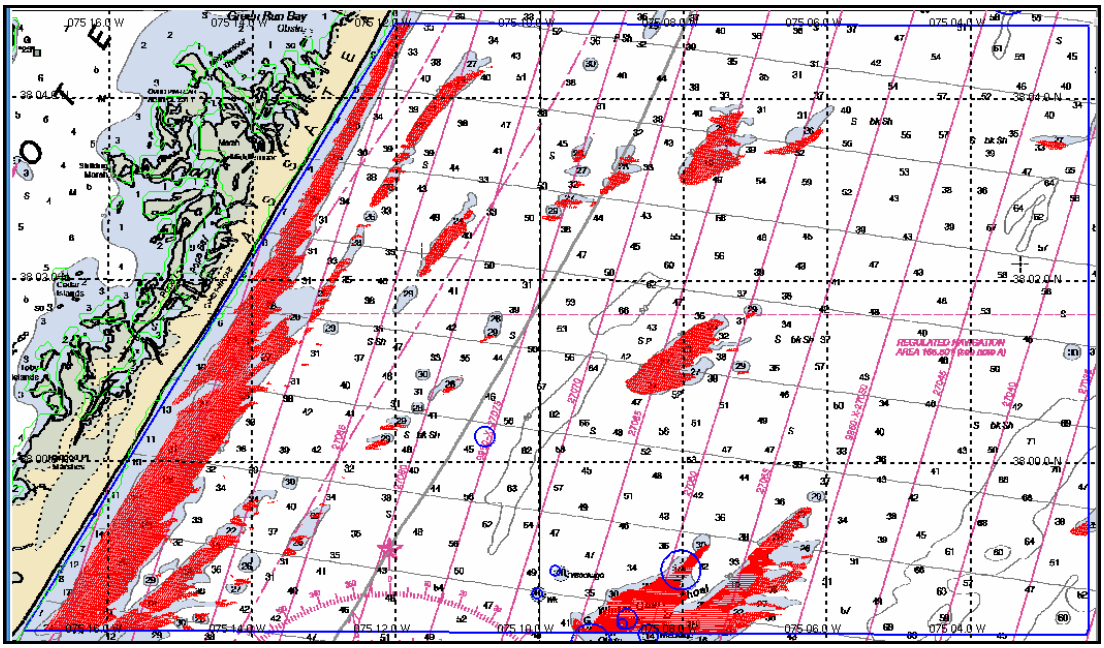

Figure D-1. H12003 Survey Area and Chart 12211 with an Overlay of PFM Depths between the 18-foot and 30-foot Depths

The 18-foot CUBE depth curve found during this survey generally agreed or was found to be within 150 meters of the charted 18-foot depth curve from 38° 04’ 50.10”N 075° 11’ 56.54”W to 37° 58’ 08.83”N 075° 17’ 00.46”W except in the following locations.

The charted 18-foot depth curve defining a finger shoal extending seaward centered on a charted 12-foot sounding in 38° 01’ 19.55”N 075° 14’ 03.11”W was found to have migrated south approximately 500 meters. CUBE depths of 11 feet (3.39 m) and 13 feet (4.13 m) were identified in 38° 00’ 49.75”N 075° 14’ 34.99”W and 38° 01’ 06.04”N 075° 13’ 57.03”W respectively within the finger shoal.

The charted 18-foot depth curve and charted 18-foot sounding in 37° 58’ 47.12”N 075° 14’ 54.02”W was not found. A 17-foot (5.26 m) CUBE depth was found approximately 640 meters southwest in 37° 58’ 31.93”N 075° 15’ 11.58”W.

The charted 18-foot depth curve and charted 18-foot sounding in 37° 58’ 14.05”N 075° 07’ 52.51”W was found to have migrated south approximately 150 meters with a CUBE depth of 17 feet (5.29 m) in 37° 58’ 09.43”N 075° 07’ 49.72”W. An additional 18-foot shoal was found approximately 400 meters northeast in 37° 58’ 20.16”N 075° 07’ 39.45”W.

The along shore 30-foot depth curve found during this survey was generally 100 meters shoreward of the charted 30-foot depth curve.

The charted 30-foot finger shoal extending northward from approximately 38° 01’ 52.10”N 075° 13’ 09.02”W started approximately 400 meters further south than charted

but was generally charted correctly along its length extending north to 38° 04’ 21.58”N 075° 10’ 57.87”W. The northern most edge of the charted finger shoal was found to have migrated south approximately 250 meters and there were various small breaks along its length.

There were several isolated areas which had CUBE depths around 28 to 30 feet identified in a northeast/southwest line just off shore of the charted near shore 30-foot depth curve between 38° 01’ 18.62”N 075° 13’ 05.74”W and 37° 58’ 49.31”N 075° 15’ 27.63”W.

The charted 30-foot finger shoal extending northward from approximately 37° 58’ 21.68”N 075° 15’ 18.56”W generally agrees with the 30-foot depth curve identified during this survey. The northern most edge of the charted finger shoal was found to have migrated south approximately 200 meters.

There are numerous isolated charted 30-foot depth curves around isolated soundings inshore of the three nautical mile line. Generally the collected data shows that the isolated 30-foot shoals have shifted slightly south. These depths are all part of ridges generally parallel to the shore.

The charted isolated 30-foot depth curves seaward of the charted 3-mile limit line all agreed with the survey data collected. The charted isolated 30-foot depth curves in 38° 03’ 39.23”N 075° 06’ 18.30”W, 38° 01’ 13.01”N 075° 02’ 36.22”W and 38° 01’ 03.85”N 075° 07’ 12.66”W were found to have migrated south approximately 200-300 meters while the charted isolated 30-foot depth curve in 37° 59’ 37.55”N 075° 06’ 08.74”W was found to no longer exist.

The charted 60-foot depth curve centered in approximately 38° 04’ 40.01”N 075° 03’ 34.96”W was found to have elongated approximately 1400 meters southwest.

The charted enclosed 60-foot depth curve centered in approximately 38° 02’ 44.79”N 075° 03’ 11.31”W was found to have doubled in size covering more area to the south east than what is charted.

The charted enclosed 60-foot depth curves centered in approximately 38° 01’ 46.17”N 075° 08’ 45.68”W, 38° 00’ 08.77”N 075° 10’ 10.80”W, 37° 58’ 18.71”N 075° 02’ 43.25”W, 37° 58' 18.05"N 075° 04' 22.01"W, and 37° 59’ 01.30”N, 075° 03’ 37.32”W were all found to generally agree with what is charted.

The charted 60-foot depth curves in the southeast corner of the survey area extending from 38° 00’ 42.17”N 075° 02’ 21.29”W to 37° 58’ 06.35”N 075° 05’ 23.05”W and 37° 58’ 06.91”N 075° 04’ 16.84”W to 38° 00’ 08.67”N 075° 02’ 20.95”W and 37° 58’ 06.17”N 075° 03’ 13.21”W to 37° 58’ 22.30”N 075° 02’ 20.89”W all generally agreed with the data collected.

The charted area identified as fish trap areas and structures bounded in the north between 38° 04’ 50.60”N 075° 11’ 18.56”W and 38° 04’ 50.20”N 075° 09’ 15.61”W and in the

south between 37° 58’ 08.33”N 075° 16’ 43.61”W and 37° 58’ 08.01”N 075° 14’ 10.32”W had no indication of fishing structures or fishing gear. Fishing activities within the boundary area were no more notable than outside of the boundary area.

The charted dangerous obstruction cleared to 40 feet and labeled Wreckage in 37° 58’ 47.35”N 075° 09’ 42.44”W (AWOIS 14241) was not found during this survey. Recommend removing the charted dangerous obstruction cleared to 40 feet and label Wreckage in 37° 58’ 47.35”N 075° 09’ 42.44”W. ***Concur.***

The charted dangerous wreck cleared to 40 feet in 37° 58’ 33.20”N 075° 10’ 01.50”W (AWOIS 1010) labeled Wk was found in 37° 58’ 32.28”N 075° 09’ 54.28”W with a CUBE depth of 42 feet (12.83 meters, 0.27 meters uncertainty, feature 13). Recommend removing the charted dangerous wreck cleared to 40 feet in 37° 58’ 33.20”N 075° 10’ 01.50”W and charting a 42-foot sounding, danger circle (K-26) and label Wk in 37° 58’ 32.28”N 075° 09’ 54.28”W. An additional object was found within the charted danger circle in 37° 58’ 30.06”N 075° 09’ 59.00”W with a CUBE depth of 45 feet (13.93 meters, 0.27 meters uncertainty, feature 3). ***Concur.***

The charted 15 1/2-foot dangerous Obstn in 37° 58’ 49.56”N 075° 08’ 02.64”W (AWOIS 14223) was not found during this survey. Recommend removing the charted 15 1/2 -foot sounding, danger curve and label Obstn. ***Concur.***

The 5-foot dangerous wreck charted in 37° 58’ 13.50”N 075° 08’ 50.30”W (AWOIS 1008) and labeled Wk was found in 37° 58’ 13.23”N 075° 08’ 47.27”W with a CUBE depth of 14 feet (4.22 meters, 0.27 meters uncertainty, feature 15). Recommend removing the charted 5-foot sounding and charting a 14-foot sounding with danger circle (K-26) and maintain label Wk. ***Concur.***

The Winter Quarter Shoal buoy G C “5” charted in 37° 58’ 17.10”N 075° 09’ 07.00”W was found in 37° 58’ 18.55”N 075° 09’ 06.62”W (feature 17) in August 2009. This generally agrees with the Light List position. In April 2010 the buoy was found to have been moved to 37° 58’ 17.76”N 075° 09’ 07.32”W (feature 18). Recommend charting buoy G C “5” in the Light List position of 37° 58’ 18.440”N 075° 09’ 06.673”W. ***Concur.***

Two obstructions which appear to be derelict buoy sinkers were found to the west of buoy G C”5” in 37° 58’ 17.56”N 075° 09’ 10.88”W (Feature 4) and 37° 58’ 17.44”N 075° 09’ 08.92”W (Feature 5). Recommend charting a 26-foot sounding with danger circle (K-28) in 37° 58’ 17.56”N 075° 09’ 10.88”W and label Obstns. ***Concur.***

The charted soundings within the surveyed area were generally within plus or minus 3 feet of what was observed during this survey. Exceptions to this were around shoal areas where the shoal had migrated as discussed above.

Table D-1. Additional Features to be Considered for Charting on Chart 12211

Feature Number	Latitude, North (NAD83)	Longitude, West (NAD83)	Depth (Feet)	Depth (Meters)	Description
6	38° 03' 41.88"	075° 03' 26.91"	36	10.94	Obstructions

ENC US4VA50M Fenwick In to Chincoteague Inlet; Ocean City Inlet (1:80,000)

~~The 5.4-meter depth curve found during this survey generally agreed or was found to be within 150 meters of the charted 5.4-meter depth curve from 38° 04' 50.10"N 075° 11' 56.54"W to 37° 58' 08.83"N 075° 17' 00.46"W except in the following locations.~~

~~The charted 5.4-meter depth curve defining a finger shoal extending seaward centered on a charted 3.6-meter sounding in 38° 01' 19.80"N 075° 14' 02.29"W was found to have migrated south approximately 500 meters. CUBE depths of 3.39 meters (11 feet) and 4.13 meters (13 feet) were identified approximately 160 meters south in 38° 00' 49.82"N 075° 14' 36.38"W and 38° 01' 06.09"N 075° 13' 57.06"W respectively within the finger shoal.~~

~~The charted 5.4-meter depth curve and charted 5.4-meter sounding in 37° 58' 47.83"N 075° 14' 54.27"W was not found. A 5.26-meter (17-foot) CUBE depth was found approximately 640 meters southwest in 37° 58' 31.98"N 075° 15' 11.59"W.~~

~~The charted 5.4-meter depth curve and charted 5.4-meter sounding in 37° 58' 14.61"N 075° 07' 52.60"W was found to have migrated south approximately 150 meters with a CUBE depth of 5.29 meters (17 feet) in 37° 58' 09.41"N 075° 07' 49.72"W. An additional 5.5-meter shoal was found approximately 400 meters northeast in 37° 58' 20.16"N 075° 07' 39.45"W.~~

~~The along shore 9.1-meter depth curve found during this survey was generally 100 meters to either side of the charted 9.1-meter depth curve.~~

~~The charted 9.1-meter finger shoal extending northward from approximately 38° 01' 52.10"N 075° 13' 09.02"W started approximately 400 meters further south than charted but was generally charted correctly along its length extending north to 38° 04' 21.58"N 075° 10' 57.87"W. The northern most edge of the charted finger shoal was found to have migrated south approximately 300 meters and there were various small breaks along its length.~~

~~There were several isolated areas which had CUBE depths identified around 8.66 to 9.13 meters in a northeast/southwest line just off shore of the charted near shore 9.1-meter depth curve between 38° 01' 18.62"N 075° 13' 05.74"W and 37° 58' 49.31"N 075° 15' 27.63"W.~~

~~The charted 9.1-meter finger shoal extending northward from approximately 37° 58' 21.68"N 075° 15' 18.56"W generally agrees with the 9.1-meter depth curve identified~~

during this survey. The northern most edge of the charted finger shoal was found to have migrated south approximately 200 meters.

There are numerous isolated charted 9.1-meter depth curves around isolated soundings inshore of three nautical miles. Generally the collected data shows that the isolated 9.1-meter shoals have shifted slightly south. These depths are all part of ridges generally parallel to the shore.

The charted isolated 9.1-meter depth curves in 38° 03’ 39.23”N 075° 06’ 18.30”W, 38° 01’ 13.01”N 075° 02’ 36.22”W and 38° 01’ 03.85”N 075° 07’ 12.66”W were found to have migrated south approximately 200-300 meters while the charted isolated 9.1-meter depth curve in 37° 59’ 37.55”N 075° 06’ 08.74”W was found to no longer exist.

The charted 18.2-meter depth curve centered in approximately 38° 04’ 40.01”N 075° 03’ 34.96”W was found to have elongated approximately 1400 meters southwest.

The charted 18.2-meter depth curve centered in approximately 38° 02’ 44.79”N 075° 03’ 11.31”W was found to have doubled in size covering more area to the south east than what is charted.

The charted 18.2-meter depth curves centered in approximately 38° 01’ 43.89”N 075° 08’ 46.14”W, 38° 00’ 12.86”N 075° 10’ 07.36”W, 37° 59’ 08.19”N 075° 03’ 53.04”W, 37° 58’ 18.02”N 075° 02’ 44.40”W, 37° 58' 18.71"N 075° 02' 43.25"W, 37° 58' 37.37"N, 075° 03' 11.05"W, and 37° 59’ 01.98”N, 075° 03’ 37.14”W were all found to generally agree with what is charted.

The charted area identified as fish trap areas and structures parallel the charted shoreline bounded in the north between 38° 04’ 50.60”N 075° 11’ 18.56”W and 38° 04’ 50.20”N 075° 09’ 15.61”W and in the south between 37° 58’ 08.33”N 075° 16’ 43.61”W and 37° 58’ 08.35”N 075° 14’ 10.32”W had no indication of fishing structures or fishing gear. Fishing activities within the boundary area were no more notable than outside of the boundary area.

The charted foul ground noted as distributed remains of wreck in 37° 58’ 48.01”N 075° 09’ 42.56”W (AWOIS 14241) was not found during this survey. Recommend removing the charted foul ground symbol in 37° 58’ 48.01”N 075° 09’ 42.56”W.

The charted dangerous wreck swept by wire drag to 12.1 meter in 37° 58’ 34.19”N 075° 10’ 01.66”W (AWOIS 1010) was found in 37° 58’ 32.28”N 075° 09’ 54.28”W with a CUBE depth of 12.83 meters (42 feet, 0.27 meters uncertainty, feature 13). Recommend removing the charted dangerous wreck cleared to 40 feet in 37° 58’ 34.19”N 075° 10’ 01.66”W and charting a 12.8-meter sounding, danger circle and categorize as dangerous wreck in 37° 58’ 32.27”N 075° 09’ 54.28”W. An additional object was found in 37° 58’ 30.06”N 075° 09’ 59.00”W with a CUBE depth of 13.93 meters (45 feet, 0.27 meters uncertainty, feature 3). Recommend charting a 13.9-meter sounding and danger circle in 37° 58’ 30.06”N 075° 09’ 59.00”W.

~~The charted 4.7-meter dangerous Obstn in 37° 58’ 50.15”N 075° 08’ 02.13”W (AWOIS 14223) was not found during this survey. Recommend removing the charted 4.7-meter sounding and danger curve.~~

~~The 1.5-meter dangerous wreck charted in 37° 58’ 14.02”N 075° 08’ 49.60”W (AWOIS 1008) was found in 37° 58’ 13.23”N 075° 08’ 47.27”W with a CUBE depth of 4.22 meters (14 feet, 0.27 meters uncertainty, feature 15). Recommend removing the charted 1.5-meter sounding and charting a 4.2-meter sounding with danger circle.~~

~~The Winter Quarter Shoal buoy G C “5” charted in 37° 58’ 17.51”N 075° 09’ 06.82”W was found in 37° 58’ 18.55”N 075° 09’ 06.62”W (feature 17) in August 2009. This agrees with the Light List position. In April 2010 the buoy was found to have been moved to 37° 58’ 17.76”N 075° 09’ 07.32”W. (feature 18). Recommend charting buoy G C “5” in the Light List position of 37° 58’ 18.440”N 075° 09’ 06.673”W.~~

~~Two obstructions which appear to be derelict buoy sinkers were found to the west of buoy G C”5” in 37° 58’ 17.56”N 075° 09’ 10.88”W (feature 4) and 37° 58’ 17.44”N 075° 09’ 08.92”W (feature 5) with CUBE depths of 8.1 meters and 8.6 meters respectively. Recommend charting an 8.1-meter sounding with danger circle in 37° 58’ 17.56”N 075° 09’ 10.88”W and an 8.6-meter sounding with danger circle in 37° 58’ 17.44”N 075° 09’ 08.92”W.~~

The charted soundings within the surveyed area were generally within plus or minus 1 meter of what was observed during this survey. Exceptions to this were around shoal areas where the shoal had migrated as discussed above. ***Concur.***

Table D-2. Additional Features to be Considered for Charting on ENC US4VA50M

See Appendix II for all feature charting recommendations.

Feature Number	Latitude, North (NAD83)			Longitude, West (NAD83)			Depth (Feet)	Depth (Meters)	Description
1	37°	58’	26.49”	075°	04’	59.42”	66	20.13	Obstruction
2	38°	00’	12.88”	075°	02’	32.99”	70	21.47	Obstruction
6	38°	03’	41.88”	075°	03’	26.91”	36	10.94	Obstruction
7	38°	03’	43.04”	075°	03’	34.21”	38	11.61	Obstruction
8	38°	00’	25.63”	075°	06’	19.88”	52	16.03	Obstruction
9	38°	00’	03.21”	075°	07’	28.07”	45	13.78	Obstruction
10	37°	59’	01.96”	075°	13’	42.40”	41	12.65	Obstruction
11	38°	03’	36.87”	075°	13’	42.40”	36	10.96	Obstruction
12	37°	58’	56.37”	075°	13’	52.67”	38	11.79	Obstruction
14	38°	00’	03.36”	075°	07’	26.92”	45	13.74	Obstruction
16	38°	04’	16.30”	075°	03’	40.55”	55	16.98	Obstruction

AWOIS Item Investigations

There were seven AWOIS items assigned for this project that fell within the H12003 survey bounds. Four of the AWOIS items assigned were identified for full investigation while the remaining three AWOIS items were information only. Each of the AWOIS items are discussed below.

AWOIS 1008 (Full):
The 5-foot dangerous wreck charted in 37° 58' 13.5"N 075° 08' 50.3"W (AWOIS 1008) was found in 37° 58' 13.23"N 075° 08' 47.27"W with a CUBE depth of 14 feet (4.22 meters, 0.27 meters uncertainty, feature 15). Recommend removing the charted 5-foot sounding and charting a 14-foot sounding with danger circle (K-26) and maintain label Wk. ***Concur.***

AWOIS 1009 (Informational):
A radius of at least 200 meters was covered with 200% sidescan and resulting multibeam around this AWOIS. No obstructions or wrecks were found within the covered area. Probably was AWOIS 1008. ***Concur.***

AWOIS 1010 (Full):
Wreckage was found approximately 185 meters east of the AWOIS position in 37° 58' 32.28"N 075° 09' 54.28"W with a CUBE depth of 42 feet (12.83 meters, 0.27 meters uncertainty, feature 13). The wreckage was approximately 53 meters long and was oriented northwest by southeast and was approximately 11 meters wide. An additional object was identified in close proximity (135 meters) of the wreck. The object was linear in nature between 7 and 13 meters long and 1 meter wide with a CUBE depth of 45 feet (13.93 meters, 0.27 meters uncertainty, feature 3) in 37° 58' 30.06"N 075° 09' 59.00"W. ***Concur.***

AWOIS 1014 (Informational):
A radius of 200 meters was covered with 200% sidescan and 100% multibeam around AWOIS 1014. No obstructions or wrecks were found within the covered area. ***Concur.***

AWOIS 1232 (Informational):
A radius of 100 meters was covered with 200% sidescan and 100% multibeam around AWOIS 1232. No obstructions or wrecks were found within the covered area. ***Concur.***

AWOIS 14223 (Full):
A radius of 400 meters was covered with 200% sidescan and resulting multibeam around AWOIS 14223. No obstructions or wrecks were found within the covered area. ***Concur.***

AWOIS 14241 (Full):
A radius of 100 meters was covered with 200% sidescan and 100% multibeam. No obstructions or wrecks were found within the covered area. ***Concur.***

Designated Soundings

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, obstructions, etc.) to better define the extents of the feature and to help preserve important least depths on that feature. A separate designated sounding flag exists in the Generic Sensor Format (version 3.01), and all of the designated soundings in the final CUBE surface have also been flagged as designated soundings in the GSF files. There were 30 designated soundings set in H12003. All depths flagged as features and designated soundings will override the CUBE best estimate of the depth in the final BAG files. All of the features and designated soundings that have been set for this survey are listed within two files that are referenced within Appendix II. ***Concur.***

Danger to Navigation Reports

No Danger to Navigation Reports were submitted for this survey. ***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 Winter Quarter Shoal buoy G C "5" (Figure D-2 and Table D-3) charted in 37° 58' 17.1"N 075° 09' 07.00"W was found in 37° 58' 18.55"N 075° 09' 06.62"W (feature 17) approximately 45 meters north of charted position in August 2009. This generally agrees with the USCG Light List, Volume II, Atlantic Coast position. In April 2010 the buoy was found to have been moved to 37° 58' 17.76"N 075° 09' 07.32"W. (feature 18). Recommend charting buoy G C "5" in the Light List position of 37° 58' 18.440"N 075° 09' 06.673"W. ***Concur.***

Figure D-2. Winter Quarter Shoal Buoy G C "5"

Table D-3. Aids to Navigation

Buoy Name	Multibeam File Name	Confirmed Position (NAD83) From Multibeam		Feature Number
		Latitude (N)	Longitude (W)	
G C "5"	asmba09238.d22	37° 58' 18.55"	075° 09' 06.62"	17
	asmba10108.d17	37° 58' 17.78"	075° 09' 07.32"	18

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. This includes alongshore transport and seasonal to and from shore transport. In addition, periodic large storm events may be capable of re-suspending and transporting coarser-grained bottom sediments. Over the nine 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 the holiday fill operations that were typically conducted up to several months (with the winter storm season in the middle) after the mainscheme operations had been completed.

Most of the higher CUBE uncertainties observed across H12003 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 changes over the course of this survey, based on comparisons with the charts, it appears that except for the Winter Quarter Shoal, the major shoal features throughout this area have remained relatively stable. These larger shoal areas are comprised of coarser-grained 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), the depths and extents of these relatively stable features may be greatly altered.

APPROVAL SHEET

14 July 2010

LETTER OF APPROVAL

REGISTRY NUMBER: H12003

This report and the accompanying digital data for project OPR-D302-SA-09 DELMARVA, Coast of Maryland Project is respectfully submitted.

Field operations and data processing contributing to the accomplishment of this survey, H12003, were conducted under supervision of myself and other SAIC lead hydrographers 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:

Report	Submission Date
Data Acquisition and Processing Report, SAIC Doc 10-TR-007	26 March 2010
H12001 Descriptive Report, SAIC Doc 10-TR-001	26 March 2010
H12002 Descriptive Report, SAIC Doc 10-TR-002	02 July 2010

Reports concurrently submitted to NOAA for this project include:

Report	Submission Date
H12001_H12002_H12003_Horizontal and Vertical Control Report, SAIC Doc 10-TR-028	14 July 2010

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Paul L. Donaldson

Digitally signed by Paul L. Donaldson
DN: cn=Paul L. Donaldson, o=MSTD, ou=SAIC, email=paul.l.donaldson@saic.com, c=US
Date: 2010.07.09 16:18:45 -04'00'

Paul L. Donaldson
Lead Hydrographer
Science Applications International Corporation
14 July 2010

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

There were no observed Dangers to Navigation for this survey.

APPENDIX II. SURVEY FEATURE REPORT

H12003 AWOIS

Registry Number: H12003
State: Maryland
Locality: Atlantic Ocean
Sub-locality: 5 NM East of Assateague Island
Project Number: OPR-D302-SA-09
Survey Date: 04/18/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12211	43rd	10/01/2007	1:80,000 (12211_1)	[L]NTM: ?
12200	49th	06/01/2007	1:419,706 (12200_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	OBSTRUCTION	AWOIS	[no data]	[no data]	[no data]	---
1.2	CHINA ARROW	AWOIS	[no data]	[no data]	[no data]	---
1.3	UNKNOWN	AWOIS	[no data]	[no data]	[no data]	---
1.4	UNKNOWN	AWOIS	[no data]	[no data]	[no data]	---
1.5	42ft Wreck	Wreck	12.83 m	37° 58' 32.3" N	075° 09' 54.3" W	1010
1.6	14ft Wreck	Wreck	4.22 m	37° 58' 13.2" N	075° 08' 47.3" W	1008

1 - AWOIS

1.1) AWOIS #14223 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 37° 58' 49.1" N, 075° 08' 01.6" W

Historical Depth: 4.72 m

Search Radius: 400

Search Technique: S2, MB

Technique Notes: Area has charted depth of 27ft. Obstruction sounding obtained using Del Norte in range-range mode and corrected to mean low water. Copies of fathogram in CL-1892(75). 1978 survey did not detect the obstruction with 95m effective spacing or a line perpendicular to the axis of the shoal passing through charted position. A least depth of 28ft was found.

History Notes:

--CL 1892/75, 10/24/1975; NOS -- Unknown obstruction observed by NOAA Ship Whiting CSS-29 while completing another project that did not allow further investigation. Area has charted depth of 27ft. Obstruction sounding obtained using Del Norte in range-range mode and corrected to mean low water. (ETR 08/04/2008)

--H09796/1978; NOS -- 1978 survey did not detect the obstruction with 95m effective spacing or a line perpendicular to the axis of the shoal passing through charted position. A least depth of 28ft was found. Possibility of its existence remained, so recommended that the charted obstruction be retained. (ETR 08/06/2008)

Survey Summary

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 14223	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

[None]

Office Notes

[None]

1.2) AWOIS #1232 - CHINA ARROW

No Primary Survey Feature for this AWOIS Item

Search Position: 37° 59' 30.4" N, 075° 10' 28.7" W

Historical Depth: [None]

Search Radius: 100

Search Technique: S2. MB

Technique Notes: [None]

History Notes:

--NM6/42--Wreck reported sunk in 37/59/30N 75/11/30W. (ETR 08/04/2008)

-- CL485/49, 06/17/1949; USCG -- Reported position wreck 37/59/30N 75/11/30W covered by wire drag 29-47ft. All drag strips cleared (except along bottom). Recommended wreck removed from chart. Chart histories shows wreck was deleted. See also F00081/1949 (ETR 08/04/2008)

The previously entered position for the China Arrow was 37/58/33N 75/10/3W. This position was not shown in F00081, CL485, or NM6/42. It is similar to the position that appears in proprietary information 20. There is also another entry for CHINA ARROW (AWOIS 1232) with different coordinates, but also had a survey that did locate the wreck.

DESCRIPTION

24 NO.392; TANKER, 8404 GT, SUNK 2/5/42 BY SUBMARINE; POSITION ACCURACY

WITHIN 1 MILE; WD CLEARED TO

Survey Summary

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 1232	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

[None]

Office Notes

[None]

1.3) AWOIS #1009 - UNKNOWN

No Primary Survey Feature for this AWOIS Item

Search Position: 37° 58' 16.8" N, 075° 08' 46.5" W
Historical Depth: [None]
Search Radius: 200
Search Technique: S2, MB
Technique Notes: [None]

History Notes:

01009

DESCRIPTION

19 FISHING OBSTR.

OLD LORAN C 9930Y-52787.0,9930Z-70530.4=9960W-15803.5,9960Z-58978.5

NAD-27 GP CONVERTED FROM ORIGINAL DATA USING 1980 CORRECTIONS.

SURVEY REQUIREMENTS

NOT DETERMINED

Survey Summary

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 1009	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

[None]

Office Notes

[None]

1.4) AWOIS #1014 - UNKNOWN

No Primary Survey Feature for this AWOIS Item

Search Position:	38° 00' 16.8" N, 075° 10' 22.6" W
Historical Depth:	[None]
Search Radius:	200
Search Technique:	S2, MB
Technique Notes:	[None]

History Notes:

01014

DESCRIPTION

19 FISHING OBSTR.

OLD LORAN A 3H4-2868.0, 3H5-3111.0=LORAN C,9960W-15810.2,9960Z-58981.6,

(1980 COMPUTED VALUE)

NAD-27 GP CONVERTED FROM ORIGINAL DATA USING 1980 CORRECTIONS.

SURVEY REQUIREMENTS

NOT DETERMINED

Survey Summary

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 1014	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

[None]

Office Notes

[None]

1.5) 42ft Wreck

Primary Feature for AWOIS Item #1010

Search Position:	37° 58' 33.4" N, 075° 10' 01.7" W
Historical Depth:	12.19 m
Search Radius:	100
Search Technique:	S2, MB
Technique Notes:	Wreckage reported 3/4mi NW of Barnestable (37.9704001N 75.1474091W CL485/49) in 7.5 fathoms water with 42ft over wreck. Wreckage not located by H09796/1978.

History Notes:

--F00081/1949; NOS-- Wreckage located 37/58/1016m N 75/10/60m W. Wreckage appeared 200ft long in N-S direction and about 7ft high. (ETR 08/06/2008)

--H09796/1978; NOS-- Listed as one of two wrecks charted on west side of Winter Quarter Shoal at 37/58/33N 75/10/03W. It was not investigated and did not appear on the main scheme fathograms. Recommended that wrecks be retained as currently charted. (ETR 08/06/2008)

Survey Summary

Survey Position:	37° 58' 32.3" N, 075° 09' 54.3" W
Least Depth:	12.83 m (= 42.09 ft = 7.016 fm = 7 fm 0.09 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2010-108.00:00:00.000 (04/18/2010)
Dataset:	H12003_features_ToPydro.000
FOID:	US 0000085030 00001(022600014C260001)
Charts Affected:	12211_1, 12200_1, 13003_1

Remarks:

WRECKS/remrks: WRECKS/remrks: AWOIS 1010 Update. Modify chart.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085030 00001	0.00	000.0	Primary
AWOIS_EXPORT	AWOIS # 1010	183.85	101.3	Secondary (grouped)

Hydrographer Recommendations

Chart dangerous wreck at survey position, least depth 42ft.

Cartographically-Rounded Depth (Affected Charts):

42ft (12211_1)

7fm (12200_1, 13003_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 2:dangerous wreck
	NINFOM - Chart wreck
	QUASOU - 6:least depth known
	SORDAT - 20100418
	SORIND - US,US,graph,H12003
	TECSOU - 2,3:found by side scan sonar,found by multi-beam
	VALSOU - 12.830 m
	WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart 42ft Wreck at survey position, least depth 42ft

Feature Images

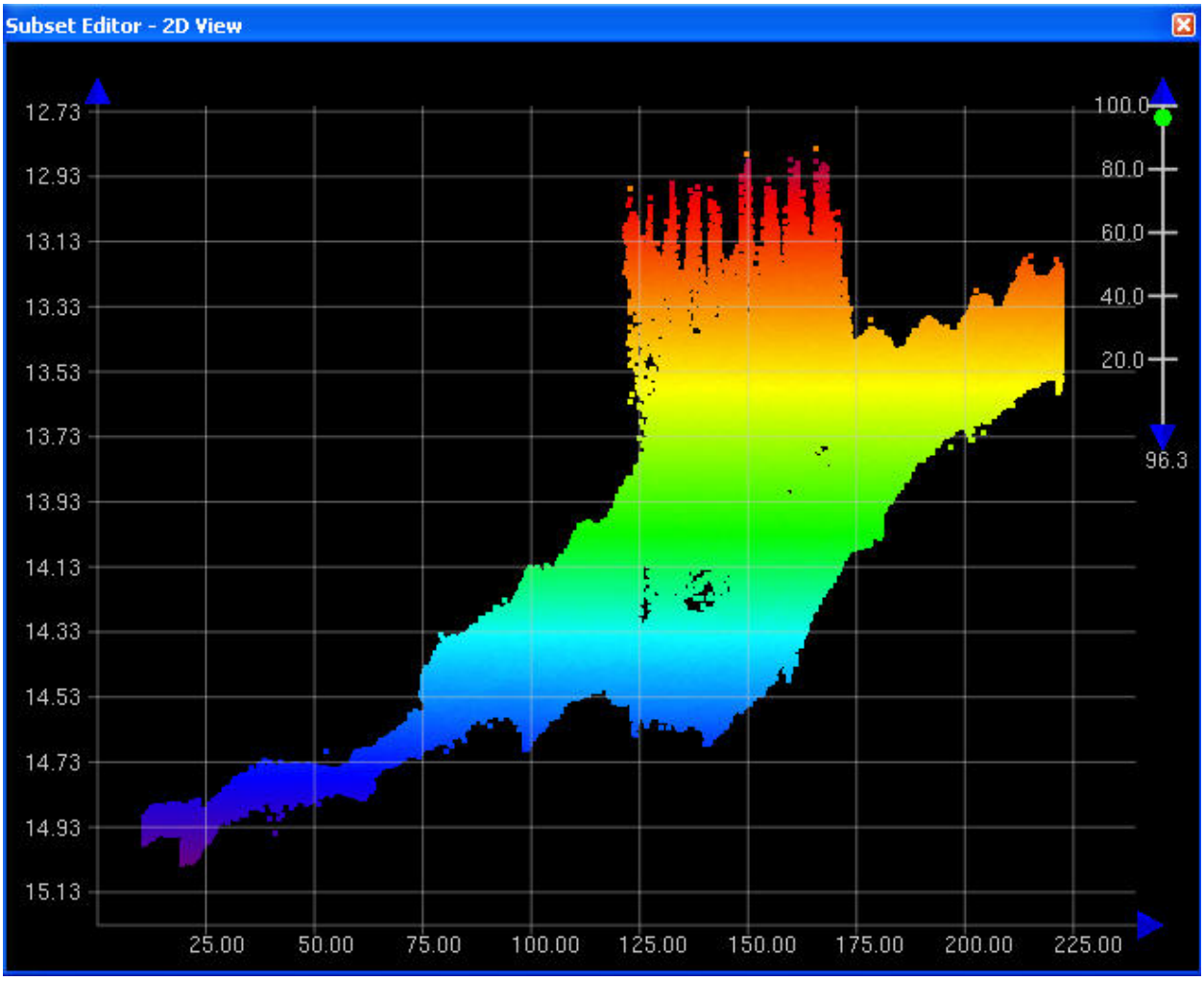

Figure 1.5.1

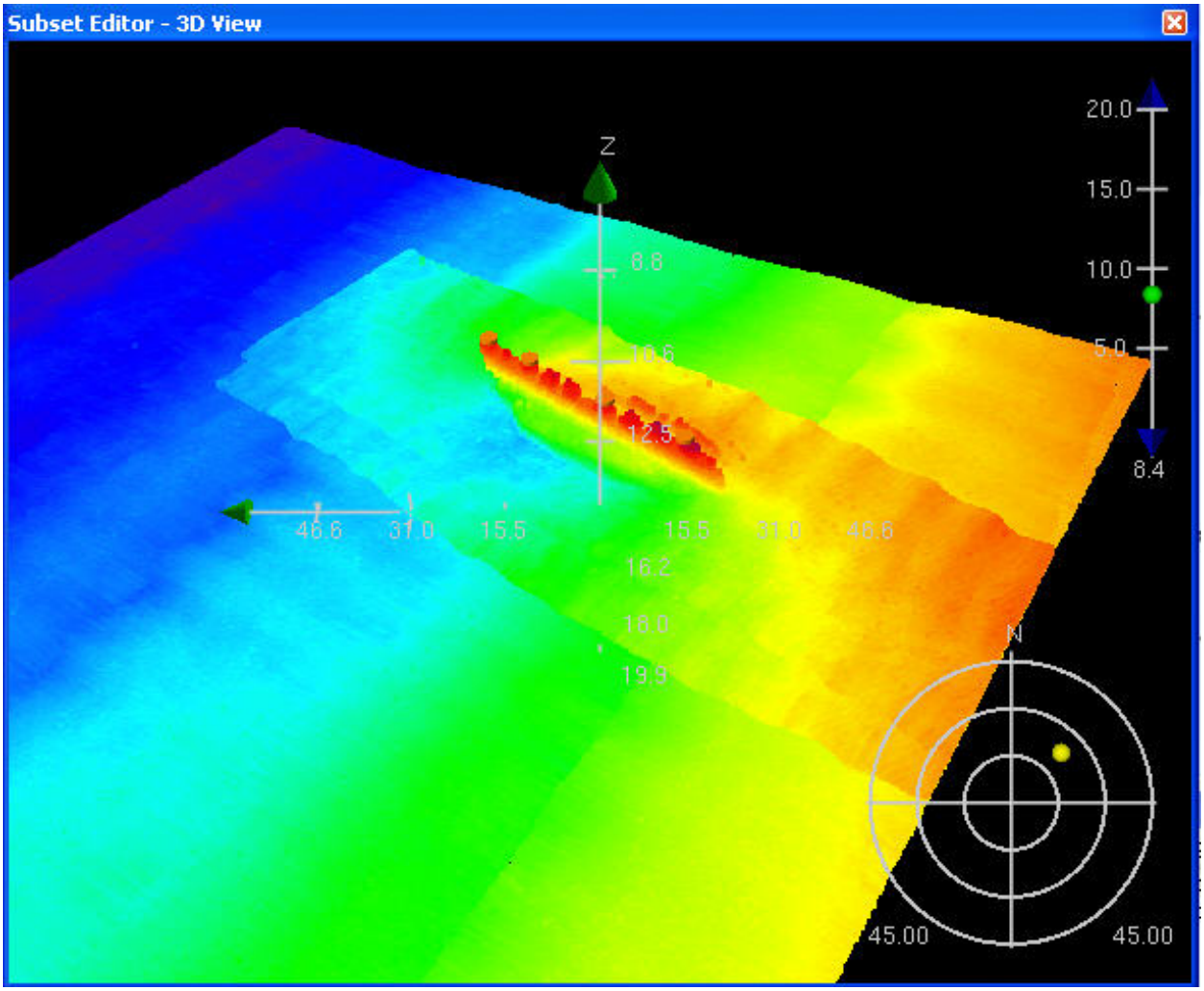
Subset Editor - 3D View
Z
20.0
15.0
10.0
5.0
8.4
8.8
10.6
12.5
46.6
31.0
15.5
15.5
31.0
46.6
16.2
18.0
19.9
N
45.00
45.00

Figure 1.5.2

1.6) 14ft Wreck

Primary Feature for AWOIS Item #1008

Search Position:	37° 58' 13.4" N, 075° 08' 50.7" W
Historical Depth:	1.52 m
Search Radius:	100
Search Technique:	S2, MB
Technique Notes:	H09796/1978 did not observe the wreck in the charted position with east-west splits of main scheme reducing effective spacing to 95m and a diagonal line perpendicular to the axis of the shoal. Least depth of 24ft found.

History Notes:

-- CL485/49, 06/17/1949; USCG -- Wreck located at 37/58.23N 75/08.85W with 6ft lead line sounding. Lead line came up covered in rust. Wreck clearly visible. Fishermen reported wreck disintegrated with only boiler remaining. Also see F00081/1949. (ETR 08/04/2008)

--H09796/1978; NOS -- The barge Barnestable was not observed in the charted position 37/58/13N 75/08/52W, with east-west splits of main scheme reducing effective spacing to 95m and a diagonal line perpendicular to the axis of the shoal. Least depth of 24ft found. Recommended the wreck symbol and note be retained.

Original coordinates when this AWOIS was created were 37/58/.01N 75/8/40.28W. These coordinates did not agree with CL485/49 or F00081/49. Did not find entry in NM listed below.

HISTORY

NM19/34

DESCRIPTION

24 NO.419; BARGE SUNK BY MARINE CASUALTY; POSITION ACCURACY WITHIN 1 MILE

AT 37-58-04N, 75-08-28W; LOCATED BY CGS FIELD PARTY, WD CLEARED TO

14 FT IN 1939.

27 NO.603; BARGE; SUNK BEFORE WWII; LOCATED BY C POS.37-58N, 75-08-40W.

SURVEY REQUIREMENTS

NOT DETERMINED

Survey Summary

Survey Position:	37° 58' 13.2" N, 075° 08' 47.3" W
Least Depth:	4.22 m (= 13.85 ft = 2.308 fm = 2 fm 1.85 ft)

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085038 00001(022600014C2E0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

WRECKS/remrks: WRECKS/remrks: AWOIS 1008. The 5ft dangerous wreck charted in 37-58-13.50N, 075-08-50.30W and labeled Wk was found in 37-58-13.23N, 075-08-47.27W with a CUBE depth of 14 feet Recommend removing the charted 5ft wreck and charting a 14-foot sounding with danger circle and label Wk.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085038 00001	0.00	000.0	Primary
AWOIS_EXPORT	AWOIS # 1008	83.21	094.6	Secondary (grouped)

Hydrographer Recommendations

Chart dangerous Wreck at survey position, least depth 14ft

Cartographically-Rounded Depth (Affected Charts):

14ft (12211_1)

2 ¼fm (12200_1, 13003_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 2:dangerous wreck

NINFOM - Chart wreck

QUASOU - 6:least depth known

SORDAT - 20100418

SORIND - US,US,graph,H12003

TECSOU - 2,3:found by side scan sonar,found by multi-beam

VALSOU - 4.220 m

WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart 14ft dangerous wreck at survey position, least depth 14ft

H12003 DR_UnCharted

Registry Number: H12003
State: Maryland
Locality: Atlantic Ocean
Sub-locality: 5 NM East of Assateague Island
Project Number: OPR-D302-SA-09
Survey Date: 04/18/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12211	43rd	10/01/2007	1:80,000 (12211_1)	[L]NTM: ?
12200	49th	06/01/2007	1:419,706 (12200_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	26ft Obstruction	Obstruction	8.12 m	37° 58' 17.6" N	075° 09' 10.9" W	---

1 - Tree

1.1) 26ft Obstruction

Survey Summary

Survey Position: 37° 58' 17.6" N, 075° 09' 10.9" W

Least Depth: 8.12 m (= 26.64 ft = 4.440 fm = 4 fm 2.64 ft)

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085035 00001(022600014C2B0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

OBSTRN/remrks: OBSTRN/remrks: OBSTRN. Chart a 26 foot sounding danger circle and label Obstrn.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085035 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart obstruction at survey position, least depth 26ft

Cartographically-Rounded Depth (Affected Charts):

26ft (12211_1)

4 ½fm (12200_1, 13003_1)

S-57 Data

Geo object 1: Obstruction (OBSTRN)

Attributes:

NINFOM - Chart obstruction

QUASOU - 6:least depth known

SORDAT - 20100418

SORIND - US,US,graph,H12003

TECSOU - 2,3:found by side scan sonar,found by multi-beam

VALSOU - 8.120 m

WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart obstruction at survey position, least depth 26ft

Feature Images

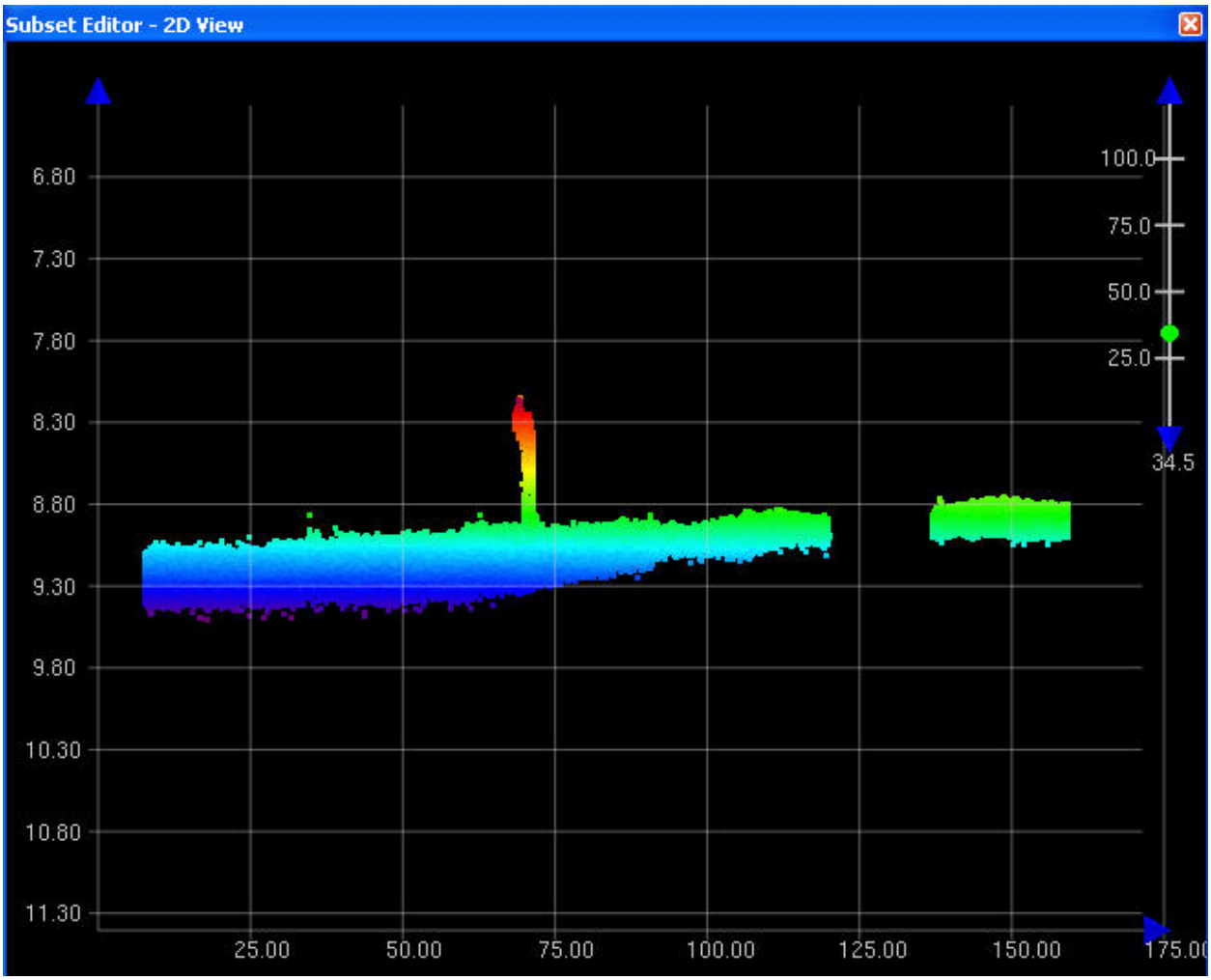

Figure 1.1.1

H12003 Bottom Samples

Registry Number: H12003
State: Maryland
Locality: Atlantic Ocean
Sub-locality: 5 NM East of Assateague Island
Project Number: OPR-D302-SA-09
Survey Date: 04/18/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12211	43rd	10/01/2007	1:80,000 (12211_1)	[L]NTM: ?
12200	49th	06/01/2007	1:419,706 (12200_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Bottom Sample	GP	[None]	37° 58' 42.4" N	075° 15' 10.4" W	---
1.2	Bottom Sample	GP	[None]	38° 00' 38.7" N	075° 13' 50.6" W	---
1.3	Bottom Sample	GP	[None]	37° 58' 44.3" N	075° 12' 28.2" W	---
1.4	Bottom Sample	GP	[None]	38° 01' 34.6" N	075° 11' 50.1" W	---
1.5	Bottom Sample	GP	[None]	38° 03' 24.6" N	075° 11' 48.9" W	---
1.6	Bottom Sample	GP	[None]	37° 59' 40.7" N	075° 11' 48.3" W	---
1.7	Bottom Sample	GP	[None]	38° 04' 26.5" N	075° 09' 47.3" W	---
1.8	Bottom Sample	GP	[None]	38° 02' 34.4" N	075° 09' 45.5" W	---
1.9	Bottom Sample	GP	[None]	38° 00' 37.1" N	075° 09' 43.0" W	---
1.10	Bottom Sample	GP	[None]	38° 03' 24.9" N	075° 09' 04.7" W	---
1.11	Bottom Sample	GP	[None]	38° 01' 32.5" N	075° 09' 01.7" W	---
1.12	Bottom Sample	GP	[None]	37° 58' 44.9" N	075° 08' 21.5" W	---
1.13	Bottom Sample	GP	[None]	37° 59' 41.7" N	075° 07' 42.6" W	---
1.14	Bottom Sample	GP	[None]	38° 04' 26.2" N	075° 07' 03.9" W	---

1.15	Bottom Sample	GP	[None]	38° 02' 34.3" N	075° 07' 02.1" W	---
1.16	Bottom Sample	GP	[None]	37° 58' 45.9" N	075° 07' 00.9" W	---
1.17	Bottom Sample	GP	[None]	38° 01' 34.2" N	075° 06' 24.2" W	---
1.18	Bottom Sample	GP	[None]	38° 00' 38.2" N	075° 05' 37.5" W	---
1.19	Bottom Sample	GP	[None]	38° 03' 27.8" N	075° 05' 01.4" W	---
1.20	Bottom Sample	GP	[None]	38° 01' 36.0" N	075° 03' 36.5" W	---
1.21	Bottom Sample	GP	[None]	37° 59' 43.0" N	075° 03' 36.0" W	---
1.22	Bottom Sample	GP	[None]	38° 04' 24.1" N	075° 02' 56.0" W	---
1.23	Bottom Sample	GP	[None]	38° 02' 31.8" N	075° 02' 55.4" W	---
1.24	Bottom Sample	GP	[None]	37° 58' 46.5" N	075° 02' 55.1" W	---

1 - Bottom Samples

1.1) Bottom Sample

Survey Summary

Survey Position: 37° 58' 42.4" N, 075° 15' 10.4" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085404 00001(022600014D9C0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085404 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_54; H12003_BS_54.jpg
NATQUA - 2,4:medium,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.2) Bottom Sample

Survey Summary

Survey Position: 38° 00' 38.7" N, 075° 13' 50.6" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085397 00001(022600014D950001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085397 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: COLOUR - 8:brown
INFORM - H12003_BS_58; H12003_BS_58.jpg
NATSUR - 1:mud
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.3) Bottom Sample

Survey Summary

Survey Position: 37° 58' 44.3" N, 075° 12' 28.2" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085403 00001(022600014D9B0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085403 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_52; H12003_BS_52.jpg
NATQUA - 2,4:medium,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.4) Bottom Sample

Survey Summary

Survey Position: 38° 01' 34.6" N, 075° 11' 50.1" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085396 00001(022600014D940001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085396 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_22; H12003_BS_22.jpg
NATQUA - 1:fine
NATSUR - 4:sand
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.5) Bottom Sample

Survey Summary

Survey Position: 38° 03' 24.6" N, 075° 11' 48.9" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085399 00001(022600014D970001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085399 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_55; H12003_BS_55.jpg
NATQUA - 1:fine
NATSUR - 4:sand
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.6) Bottom Sample

Survey Summary

Survey Position: 37° 59' 40.7" N, 075° 11' 48.3" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085401 00001(022600014D990001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085401 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_38; H12003_BS_38.jpg
NATQUA - 1:fine
NATSUR - 4:sand
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.7) Bottom Sample

Survey Summary

Survey Position: 38° 04' 26.5" N, 075° 09' 47.3" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085395 00001(022600014D930001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085395 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: COLOUR - 8:brown
INFORM - H12003_BS_07; H12003_BS_07.jpg
NATSUR - 1:mud
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.8) Bottom Sample

Survey Summary

Survey Position: 38° 02' 34.4" N, 075° 09' 45.5" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085393 00001(022600014D910001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085393 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_20; H12003_BS_20.jpg
NATQUA - 1:fine
NATSUR - 4:sand
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.9) Bottom Sample

Survey Summary

Survey Position: 38° 00' 37.1" N, 075° 09' 43.0" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085391 00001(022600014D8F0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085391 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: COLOUR - 8:brown
INFORM - H12003_BS_34; H12003_BS_34.jpg
NATSUR - 1,4:mud,sand
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.10) Bottom Sample

Survey Summary

Survey Position: 38° 03' 24.9" N, 075° 09' 04.7" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085407 00001(022600014D9F0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085407 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_10; H12003_BS_10.jpg
NATQUA - 1,4:fine,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.11) Bottom Sample

Survey Summary

Survey Position: 38° 01' 32.5" N, 075° 09' 01.7" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085402 00001(022600014D9A0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085402 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: COLOUR - 8:brown
INFORM - H12003_BS_24; H12003_BS_24.jpg
NATSUR - 1:mud
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.12) Bottom Sample

Survey Summary

Survey Position: 37° 58' 44.9" N, 075° 08' 21.5" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085410 00001(022600014DA20001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085410 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: COLOUR - 8:brown
INFORM - H12003_BS_49; H12003_BS_49.jpg
NATQUA - 3:coarse
NATSUR - 4,7:sand,pebbles
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic

1.13) Bottom Sample

Survey Summary

Survey Position: 37° 59' 41.7" N, 075° 07' 42.6" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085390 00001(022600014D8E0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085390 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_41; H12003_BS_41.jpg
NATQUA - 1,4:fine,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.14) Bottom Sample

Survey Summary

Survey Position: 38° 04' 26.2" N, 075° 07' 03.9" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085400 00001(022600014D980001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085400 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_05; H12003_BS_05.jpg
NATQUA - 1:fine
NATSUR - 4:sand
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.15) Bottom Sample

Survey Summary

Survey Position: 38° 02' 34.3" N, 075° 07' 02.1" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085406 00001(022600014D9E0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085406 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_18; H12003_BS_18.jpg
NATQUA - 2,4:medium,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.16) Bottom Sample

Survey Summary

Survey Position: 37° 58' 45.9" N, 075° 07' 00.9" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085388 00001(022600014D8C0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085388 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: COLOUR - 8:brown
INFORM - H12003_BS_48; H12003_BS_48.jpg
NATQUA - 1,4:fine,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.17) Bottom Sample

Survey Summary

Survey Position: 38° 01' 34.2" N, 075° 06' 24.2" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085394 00001(022600014D920001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085394 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_26; H12003_BS_26.jpg
NATQUA - 1:fine
NATSUR - 4:sand
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.18) Bottom Sample

Survey Summary

Survey Position: 38° 00' 38.2" N, 075° 05' 37.5" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085389 00001(022600014D8D0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085389 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_31; H12003_BS_31.jpg
NATQUA - 2,4:medium,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.19) Bottom Sample

Survey Summary

Survey Position: 38° 03' 27.8" N, 075° 05' 01.4" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085387 00001(022600014D8B0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085387 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_13; H12003_BS_13.jpg
NATQUA - 1,4:fine,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.20) Bottom Sample

Survey Summary

Survey Position: 38° 01' 36.0" N, 075° 03' 36.5" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085409 00001(022600014DA10001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085409 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_28; H12003_BS_28.jpg
NATQUA - 2,4:medium,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.21) Bottom Sample

Survey Summary

Survey Position: 37° 59' 43.0" N, 075° 03' 36.0" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085405 00001(022600014D9D0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085405 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_44; H12003_BS_44.jpg
NATQUA - ,4:,broken
NATSUR - 3,17:silt,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.22) Bottom Sample

Survey Summary

Survey Position: 38° 04' 24.1" N, 075° 02' 56.0" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085408 00001(022600014DA00001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085408 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_02; H12003_BS_02.jpg
NATQUA - 1,4:fine,broken
NATSUR - 4,17:sand,shells
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.23) Bottom Sample

Survey Summary

Survey Position: 38° 02' 31.8" N, 075° 02' 55.4" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085392 00001(022600014D900001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085392 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_15; H12003_BS_15.jpg
NATQUA - 2:medium
NATSUR - 4:sand
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

1.24) Bottom Sample

Survey Summary

Survey Position: 37° 58' 46.5" N, 075° 02' 55.1" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085398 00001(022600014D960001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085398 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: INFORM - H12003_BS_45; H12003_BS_45.jpg
NATQUA - 1:fine
NATSUR - 4:sand
OBJNAM - SBDARE
SORDAT - 20100418
SORIND - US,US,graph,H12003
WATLEV - 3:always under water/submerged

Office Notes

Compile Notes: Chart seabed characteristic.

H12003 Sandwave Area

Registry Number: H12003
State: Maryland
Locality: Atlantic Ocean
Sub-locality: 5 NM East of Assateague Island
Project Number: OPR-D302-SA-09
Survey Date: 04/18/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12211	43rd	10/01/2007	1:80,000 (12211_1)	[L]NTM: ?
12200	49th	06/01/2007	1:419,706 (12200_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Sandwave Area	GP	[None]	38° 04' 46.6" N	075° 10' 55.4" W	---
1.2	Sandwave Area	GP	[None]	37° 58' 11.2" N	075° 14' 24.4" W	---
1.3	Sandwave Area	GP	[None]	37° 58' 10.1" N	075° 08' 40.3" W	---
1.4	Sandwave Area	GP	[None]	37° 59' 25.4" N	075° 02' 23.2" W	---

1 - Seabed Characteristics

1.1) Sandwave Area

Survey Summary

Survey Position: 38° 04' 46.6" N, 075° 10' 55.4" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085201 00001(022600014CD10001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085201 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Sand waves (SNDWAV)

Attributes: NINFOM - Chart Sandwave Area

SORDAT - 20100418

SORIND - US,US,graph,H12003

Office Notes

Compile Notes: Chart seabed characteristic

1.2) Sandwave Area

Survey Summary

Survey Position: 37° 58' 11.2" N, 075° 14' 24.4" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085204 00001(022600014CD40001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085204 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Sand waves (SNDWAV)

Attributes: NINFOM - Chart Sandwave Area

SORDAT - 20100418

SORIND - US,US,graph,H12003

Office Notes

Compile Notes: Chart seabed characteristic

1.3) Sandwave Area

Survey Summary

Survey Position: 37° 58' 10.1" N, 075° 08' 40.3" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085202 00001(022600014CD20001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085202 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Sand waves (SNDWAV)

Attributes: NINFOM - Chart Sandwave Area

SORDAT - 20100418

SORIND - US,US,graph,H12003

Office Notes

Compile Notes: Chart seabed characteristic

1.4) Sandwave Area

Survey Summary

Survey Position: 37° 59' 25.4" N, 075° 02' 23.2" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-108.00:00:00.000 (04/18/2010)

Dataset: H12003_features_ToPydro.000

FOID: US 0000085133 00001(022600014C8D0001)

Charts Affected: 12211_1, 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12003_features_ToPydro.000	US 0000085133 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart seabed characteristic

S-57 Data

Geo object 1: Sand waves (SNDWAV)

Attributes: NINFOM - Chart Sandwave Area

SORDAT - 20100418

SORIND - US,US,graph,H12003

Office Notes

Compile Notes: Chart seabed characteristic

APPENDIX III. FINAL PROGRESS SKETCH AND SURVEY OUTLINE

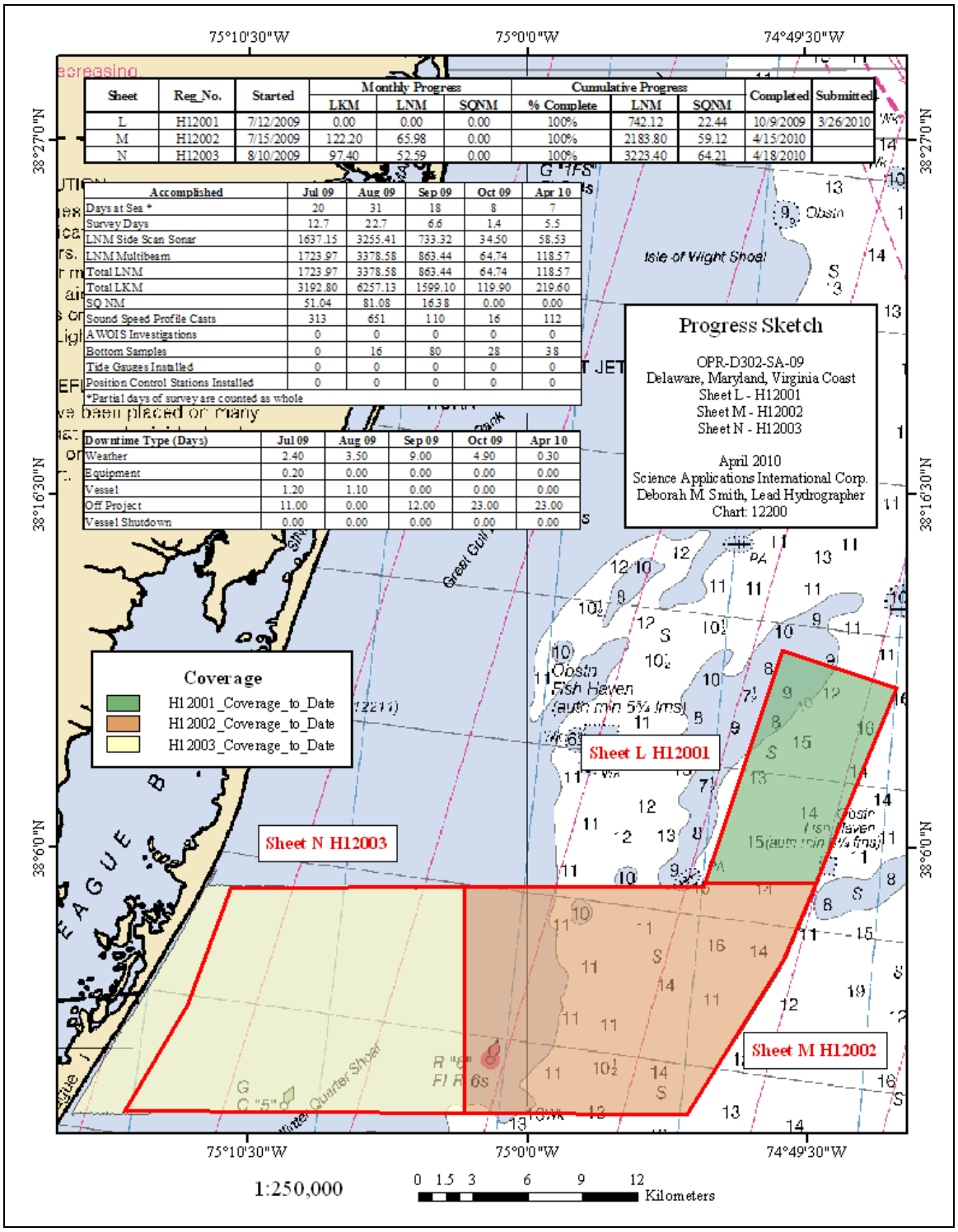

Figure Appendix III-1. Final Progress Sketch for H12003

The Survey Outline for H12003 was delivered to the COTR on 05 May 2010 in the file *H12003_survey_outlines.zip*. The zip file contained two survey outlines in dxf format. One outline was delivered in a geodetic latitude/longitude coordinate system (*H12003_survey_outline_LL_R12.dxf*) and the other in a projected UTM coordinate system (*H12003_survey_outline_UTM18.dxf*). These outline files are also included as part of this delivery. Figure Appendix III-2 demonstrates the graphical depiction of the DXFs.

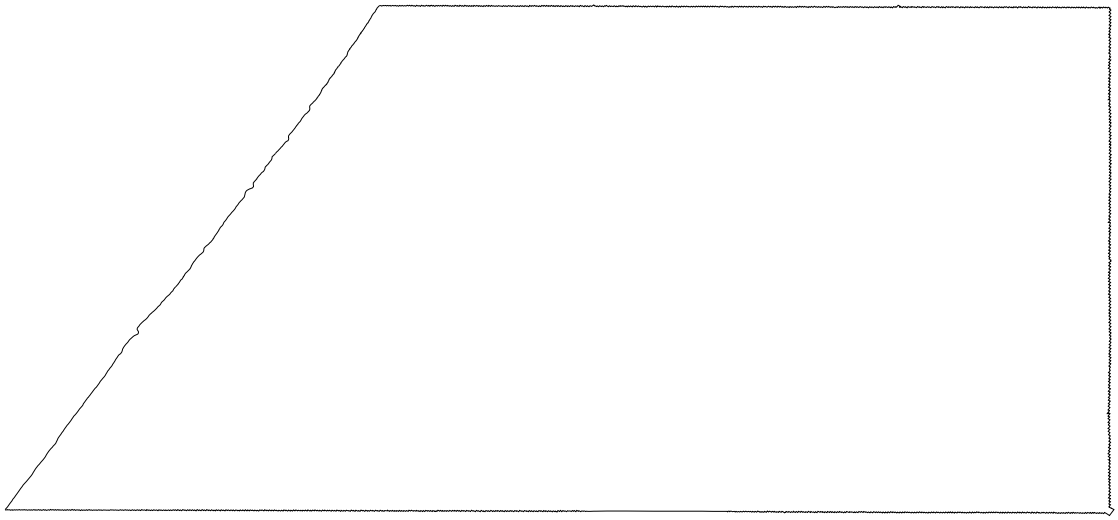

Figure Appendix III-2. Survey Outline for H12003

APPENDIX IV. TIDES AND WATER LEVELS

The on-line times for acquisition of valid hydrographic data are presented in the Abstract of Times of Hydrography, H12003, Table Appendix IV-1.

Project: OPR-D302-SA-09
Registry No.: H12003
Contractor Name: Science Applications International Corporation
Date: 18 April 2010
Sheet Letter: N
Inclusive Dates: 10 August 2009 – 18 April 2010

Field work is complete.

Table Appendix IV-1. Abstract Times of Hydrography, H12003

Begin Date	Begin Julian Day	Begin Time	End Date	End Julian Day	End Time
08/10/2009	222	06:28:35	08/11/2009	223	04:15:57
08/12/2009	224	19:00:25	08/20/2009	232	08:29:27
08/24/2009	236	19:18:46	08/28/2009	240	23:47:52
08/30/2009	242	15:40:35	09/01/2009	244	14:26:55
09/05/2009	248	07:18:35	09/07/2009	250	07:38:50
09/12/2009	255	17:20:33	09/15/2009	258	00:24:53
09/15/2009	258	10:42:10	09/15/2009	258	19:44:52
04/12/2010	102	18:33:21	04/13/2010	103	22:32:28
04/14/2010	104	05:17:21	04/15/2010	105	00:25:49
04/15/2010	105	11:00:59	04/15/2010	105	12:35:13
04/18/2010	108	18:56:55	04/18/2010	108	23:48:33

Final Tide Note
Observed verified water levels were downloaded from the NOAA Tides and Currents web site for the station in Duck, NC (8651370). Water Level correctors were prepared for each zone of the project using the **Create Water Level Files** routine in the **SABER** software. The **Apply Correctors** routine within **SABER** applied these files to the multibeam data according to the zone containing the nadir beam of each ping.

The H12003 multibeam data fell entirely within the SA46A NOAA supplied tide zone. While all data fell within one tide zone, analysis of multibeam data collected from all sheets of this project using **SABER's Multi-View Editor** and bathymetry grids revealed minimal depth changes across the junction of the supplied zones based on the preliminary zoning parameters and data from the tide station in Duck, NC (8651370). A statistical

analysis also confirmed the adequacy of the zoning correctors based on this station. Refer to the DAPR for this project, delivered on 26 March 2010 with the H12001 Descriptive Report for a complete, detailed description of the analysis. The verified water level zoning correctors, based entirely on Duck, NC (8651370), were applied to all multibeam data for H12003 (Table Appendix IV-2).

Table Appendix IV-2. Tide Zone Parameters for H12003

Zone	Time Corrector	Range Ratio	Reference Station
SA46A	00 minutes	1.08	8651370

APPENDIX V. SUPPLEMENTAL SURVEY RECORDS & CORRESPONDENCE

This appendix is comprised of three sections and 83 attached files. The first section contains copies of email exchanges between SAIC and NOAA concerning various aspects of the survey, data processing, and submittal topics. The second section contains the tabular summary of the bottom characteristics results for this sheet and 67 attached image files of the bottom samples. The third section contains Supplemental Data Acquisition and Processing Information. This last section includes information on hardware and software upgrades for the 2010 season as well as updated calibration dates for the sound speed sensors and results from the sea acceptance test (SAT) conducted prior to 2010 survey operations. The "Appendix_V_Files" directory contains the following supplemental files.

- One text file and one corresponding PDF file, titled *H12003_one_Meter_Bag_Uncertainty_Exceeds_IHO1 (.txt and .pdf)*, 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 and one corresponding PDF file for each of the seven 0.5-meter BAGs covering significant features in water depths less than 23 meters as listed below:
  - H12003_half_Meter_Bag_Feature_Area_1_Uncertainty_Exceeds_IHO1.txt
  - H12003_half_Meter_Bag_Feature_Area_2_Uncertainty_Exceeds_IHO1.txt
  - H12003_half_Meter_Bag_Feature_Area_3_Uncertainty_Exceeds_IHO1.txt
  - H12003_half_Meter_Bag_Feature_Area_4_Uncertainty_Exceeds_IHO1.txt
  - H12003_half_Meter_Bag_Feature_Area_5_Uncertainty_Exceeds_IHO1.txt
  - H12003_half_Meter_Bag_Feature_Area_6_Uncertainty_Exceeds_IHO1.txt
  - H12003_half_Meter_Bag_Feature_Area_7_Uncertainty_Exceeds_IHO1.txt
- 67 JPEG files containing photographs for the bottom samples as listed below. Note there was no H12003_BS_1 bottom sample planned or taken for this survey; therefore the images listed below start with H12003_BS_02.jpg.

H12003_BS_02.jpg	H12003_BS_19.jpg	H12003_BS_36.jpg	H12003_BS_53.jpg
H12003_BS_03.jpg	H12003_BS_20.jpg	H12003_BS_37.jpg	H12003_BS_54.jpg
H12003_BS_04.jpg	H12003_BS_21.jpg	H12003_BS_38.jpg	H12003_BS_55.jpg
H12003_BS_05.jpg	H12003_BS_22.jpg	H12003_BS_39.jpg	H12003_BS_56.jpg
H12003_BS_06.jpg	H12003_BS_23.jpg	H12003_BS_40.jpg	H12003_BS_57.jpg
H12003_BS_07.jpg	H12003_BS_24.jpg	H12003_BS_41.jpg	H12003_BS_58.jpg
H12003_BS_08.jpg	H12003_BS_25.jpg	H12003_BS_42.jpg	H12003_BS_59.jpg
H12003_BS_09.jpg	H12003_BS_26.jpg	H12003_BS_43.jpg	H12003_BS_60.jpg
H12003_BS_10.jpg	H12003_BS_27.jpg	H12003_BS_44.jpg	H12003_BS_61.jpg
H12003_BS_11.jpg	H12003_BS_28.jpg	H12003_BS_45.jpg	H12003_BS_62.jpg
H12003_BS_12.jpg	H12003_BS_29.jpg	H12003_BS_46.jpg	H12003_BS_63.jpg
H12003_BS_13.jpg	H12003_BS_30.jpg	H12003_BS_47.jpg	H12003_BS_64.jpg
H12003_BS_14.jpg	H12003_BS_31.jpg	H12003_BS_48.jpg	H12003_BS_65.jpg
H12003_BS_15.jpg	H12003_BS_32.jpg	H12003_BS_49.jpg	H12003_BS_66.jpg
H12003_BS_16.jpg	H12003_BS_33.jpg	H12003_BS_50.jpg	H12003_BS_67.jpg
H12003_BS_17.jpg	H12003_BS_34.jpg	H12003_BS_51.jpg	H12003_BS_68.jpg
H12003_BS_18.jpg	H12003_BS_35.jpg	H12003_BS_52.jpg	

CORRESPONDENCE

From: Evans, Rhodri E.
Sent: Wednesday, December 03, 2008 11:13 AM
To: 'Mark.T.Lathrop'
Subject: RE: Request for Proposal, Hydrographic Survey Services

Mark,

Thanks for your response. With regard the #2 our intent is to propose 200% side scan sonar and resulting multibeam data as we have been doing for several years. We wanted to clarify that we will not propose VBES.

Thanks, RE.

From: Mark.T.Lathrop [mailto:Mark.T.Lathrop@noaa.gov]
Sent: Wednesday, December 03, 2008 11:09 AM
To: Evans, Rhodri E.
Subject: Re: Request for Proposal, Hydrographic Survey Services

Rod,

Please see my responses below in red.

Mark

Evans, Rhodri E. wrote:

Mark,

We have the following questions in relation to the Request for Proposal, Letter Instructions and a Statement of Work for Hydrographic Survey Services:

1) Section 1.4 of the SOW states: "Work on all task orders will be conducted per the latest edition of the HSSD." And also the Survey Project Instructions state that the Specifications are "April 2009".For proposal purposes we assume that applicable specifications will very similar to the April 2008 Specifications and that only one specification will apply for the survey (i.e. if a new specification is issued during the course of the ongoing survey, it would not apply)? Please confirm. You are correct. Specifications issued during a survey will not apply.

2) The Survey Project Instructions state: ""200% SSS with concurrent VBES or MB coverage". We intend to propose multibeam coverage for this task order. Please confirm. Are you saying multibeam and no side scan or multibeam with side scan as you've been doing for several years?

3) The Survey Project Instructions state: "Create a survey outline region in MapInfo..." Is it acceptable that the survey outline be in a MapInfo compatible format (i.e. dxf)? Yes

4) Section 6.3.3 of the SOW states: "In addition, single beam soundings will be included in the S-57 feature file portrayed at survey scale."We assume this is not applicable for this task order. Please confirm. The SOW covers all types of survey. This section would apply IF you were acquiring singlebeam data.

5) Section 7.2 of the SOW states: "The delivery address will be included in the Project Letter Instructions." However, delivery address is not in the Survey Project Instructions. Please provide delivery address. Same as before. Atlantic Hydrographic Branch.

6)Please provide the AWOIS database files for the applicable AWOIS items for this survey. We will need the specific search criteria to accurately estimate the areas that require Object Detection Coverage. It looks like I just sent you one of the AWOIS files. I've attached the other files. If you can't read these files, let me know.

7) The Survey Project Instructions state: "The inshore limit of hydrography will be the farthest offshore of the following: (1) the4-meter depth contour or (2) the line defined by the distance seaward from the MHW line which is equivalent to 0.8 millimeters at the scale of the largest scale nautical chart." Please provide information on how we determine the MHW line? This won't apply in your survey. The inshore limit of hydrography is well offshore of this line.

8) The Survey Project Instructions state: "Contractor shall obtain samples of the bottom sediment per section 7.1 of the HSSD." Please confirm. We are asking only because we typically see "As required to verify bottom characteristics". Wording is different but task is the same. Collect, record, but do not keep the samples.

9) Can the project CD be made available to us now? When we receive the tide zoning from CO-OPS we will send you the project CD.

Regards, RE. Rod Evans Ph.D.,
AVP & Marine Survey Manager,
Science Applications International Corporation,
Marine Science and Technology Division,
221 Third Street, Building A,
Newport RI 02840 USA.
Tel (401) 848.4783.
Mobile (401) 439.1037.
Email: evansrh@saic.com

From: Mark.T.Lathrop [mailto:Mark.T.Lathrop@noaa.gov]
Sent: Monday, December 01, 2008 2:29 PM

To: Evans, Rhodri E.
Subject: Request for Proposal, Hydrographic Survey Services

Rod, Attached is a Request for Proposal, Letter Instructions and a Statement of Work for Hydrographic Survey Services. The due date of this request is December15,2008. If you have any questions, feel free to contact me.

Mark

From: Jeffrey Ferguson <Jeffrey.Ferguson@noaa.gov>
To: Evans, Rhodri E.
Cc: Mark T Lathrop <Mark.T.Lathrop@noaa.gov>
Sent: Fri Jul 10 11:23:42 2009
Subject: [Fwd: Re: [Fwd: RE: Tide Clarification]]

Rod,

See below. Let me know if you have any other questions.

Jeff

Subject:
Re: [Fwd: RE: Tide Clarification]
Date: Fri, 10 Jul 2009 11:12:16 -0400
From: Carolyn Lindley Carolyn.Lindley@noaa.gov
Reply-To: Carolyn.Lindley@noaa.gov
Organization: National Ocean Service
To: Kyle.Ward Kyle.Ward@noaa.gov
CC: Jeffrey Ferguson <Jeffrey.Ferguson@noaa.gov>, William Sweet <William.Sweet@noaa.gov>
References: <4A57405A.2050208@noaa.gov> 4A5759CF.4010209@noaa.gov

Hi All,
Duck has been upgraded to priority processing on the HHL.

Thanks,Carolyn

Kyle.Ward wrote:

Jeff,
I spoke with Billy and Caroline and they confirmed only Duck is needed to control D302, as stated in the instructions from CO-OPS. Atlantic City, NJ (853-4720) and Lewes, DE (863-5750) were inadvertently added to the SOW. Caroline will have Duck added to the Hydro hot list.

Regards,
Kyle

Jeffrey Ferguson wrote:

As discussed...

Thanks,

Jeff

Subject: RE: Tide Clarification
Date: Thu, 09 Jul 2009 17:46:56 -0400
From: Evans, Rhodri E. <RHODRI.E.EVANS@saic.com
To: Davis, Gary R. <GARY.R.DAVIS@saic.com>, Mark.T.Lathrop >> <Mark.T.Lathrop@noaa.gov>, Jeffrey.Ferguson@noaa.gov>>
CC: Donaldson, Paul L. <PAUL.L.DONALDSON@saic.com>, Rebecca >> Quintal <REBECCA.T.QUINTAL@saic.com>, Walter Simmons >> <WALTER.S.SIMMONS@saic.com>>>
References: >> <4A3253243D8F5B4BB74B27E54334000D051CC164@0015-its-exmb04.us.saic.com>>> >> >> >>

Jeff,

I believe Mark is on leave as of this evening. Please see the attached email.

Thanks, RE.

From: Davis, Gary R.
Sent: Thu 7/9/2009 5:30 PM
To: Mark.T.Lathrop
Cc: Rhodri Evans; Donaldson, Paul L.; Rebecca Quintal; Walter Simmons
Subject: Tide Clarification

Mark,

In a recent response for tide zoning for our upcoming surveys off the DelMarVa coast you indicated that we should use the same zoning as last year's surveys. These zones were based on the tide station at Duck, NC (865-1370). We are currently planning to start survey operations on Sunday 12 July and request that the status of this station be changed to Priority Processing on the COOPS Hot List. The COOPS Hot List currently shows the status of this station as "Priority Processing removed, gauge will be used again in the summer of 2009. We have also noticed that the Project Instructions (OPR-D302-SA-09 Project Instructions.pdf) lists tide stations Atlantic City, NJ (853-4720) and Lewes, DE (863-5750) under the Tide Requirements. It does not mention the Duck, NC

tide station. Are these stations required in addition to Duck, NC; or intended as backup tide stations in the event that Duck, NC fails? If so we request that they also be added to the COOPS Hot List.

Regards,
Gary R. Davis, ACSM Certified Hydrographer
Chief Hydrographer
SAIC Marine Science and Technology Division
221 Third Street
Building A
Newport, RI 02840
Tel (401)847-4210
Email: gary.r.davis@saic.com

-----Original Message-----
From: Castle.E.Parker [mailto:Castle.E.Parker@noaa.gov]
Sent: Tuesday, February 23, 2010 2:44 PM
To: Mark.T.Lathrop; Quintal, Rebecca T.
Cc: Evans, Rhodri E.; Donaldson, Paul L.; Davis, Gary R.; Simmons, Walter S.
Subject: Re: Clarification on Object Detection Coverage

Good Day Everyone,
My comments will be in blue fonts:
Question 1: Yes to 1m resolution grid for the entire area and no to the second part. Object Detection 0.5m resolution grid for AWOIS MB investigations where 200% SS was not acquired and any MB developments that contains a feature. This refers to the output deliverables at 0.5m resolution. Object detection is really covered with the SS 200% for disprovals and detecting features; side scan is the object detection tool in this case, then developed with MB coverage for features that are considered significant or an AWOIS item if located. If the multibeam sonar is a high resolution sonar such a 0.5°x0.5° beam width it is considered object detection capable and considered appropriate for charted feature disproval without SSS coverage. We don't really need the AWOIS items covered with 200% SSS and then conducting object detection coverage over the same area with MB where the feature was not located within the SS records. This in essence is two object detect coverages. The disproval of a feature (AWOIS or charted feature) can occur with MB if a high res sonar unit, but that common area should have 200% SSS coverage and that would be the disproval source. Thus if SS doesn't reveal or contain contacts that represent the AWOIS item, then the AWOIS items does not need 0.5m resolution grid coverage over the entire AWOIS search radius. The 0.5m grid should only contain the MB developments for the feature located.

We don't need a 0.5m resolution grid for the entire area. The 0.5m resolution grid should contain only the feature developments.

Question 2: Yes.
Again, object detection grid resolution would not be applicable for a 200% SSS survey with skunk striped MB (bathy data). the object detection should source the SS.

Submit 1 grid for the entire area at 1m resolution. Submit a grid at 0.5m resolution for all MB developments where applicable.
Clear? If not, please respond.
Gene

Mark.T.Lathrop wrote:

Rebecca,

It makes sense to me to have a 1-meter BAG for the entire sheet including the AWOIS and a separate BAG for those AWOIS items < 23m. I am including Gene in my reply since AHB will be reviewing the data and I'm sure he'll want to weigh in on this.
Mark

Quintal, Rebecca T. wrote:

Mark,

We would like clarification on the requirement for Object Detection Coverage in the Project Instructions for OMNI TO#1 MARYLAND Sheets LMN, TO#2 DELMARVA Sheets OPQR, and TO#3 Georgia ABCDE. For all three projects the Coverage section of the Project Instructions state the following:

REQUIRED COVERAGE TYPES

/water depth range or area
required coverage type(s)/**

all depths 200% SSS with concurrent VBES or MB coverage

Area(s) where object detection is critical
Object Detection Coverage including AWOIS investigations

We have interpreted the “areas where object detection is critical” to only be the portions of assigned AWOIS investigation areas within our survey bounds since no other areas are specified.

Section *5.1.2.1 Object Detection Coverage *in the 2009 Specifications and Deliverables document states that "The following grid-resolution thresholds as a function of depth range; shall be used unless an exception is approved as described in Section 5.1.2."

*Depth** Range** (m)	Resolution (m)*
0–23	0.5
20-40	1

Question 1 – For water depths between 0-23 meters

Our intention is to deliver 1 meter resolution BAG files for the entire sheet to meet the Set Line Spacing Coverage requirement. For the Object Detection Coverage, we have assumed where the assigned AWOIS search radius falls within our SOW area, and the depths range from 0-23 meters, that a separate BAG will be delivered covering this area at 0.5 meter resolution. Please confirm if this is correct?

Question 2 – For water depths deeper than 23 meters

As our intention is to deliver 1 meter resolution BAG files for the entire sheet, we are assuming that these 1 meter BAGs will meet the Object Detection Coverage requirement for AWOIS areas (with assigned search radii) that fall within our SOW area and the depths are deeper than 23 meters water depth. Therefore no additional deliverables are required. Please confirm this assumption?

-Rebecca

Rebecca T. Quintal | SAIC
Data Processing Manager | Marine Science and Technology Division
phone: 401.847.4210 | fax: 401.849.1585
mobile: 401.829.6242 | email: rebecca.t.quintal@saic.com

From: Castle.E.Parker [Castle.E.Parker@noaa.gov]
Sent: Friday, February 26, 2010 4:25 PM
To: Donaldson, Paul L.
Cc: Sarah Eggleston
Subject: Re: SSP application question
Attachments: Castle_E_Parker.vcf

Hey Paul,
Make it better... I don't recall a Caris issue regarding GSF and SV application because we don't apply SV to the GSF converted Caris. It's been awhile since I converted SAICGSF, but I don't recall any SV issues translating from the GSF. Caris does allow one to choose the SV correction with regard to time and location but in SAIC's case it doesn't get

applied; Caris can apply either earlier or later in time and also with respect to spatial location. What I remember is that the corrections that take place in ISS 2000 and post processing corrections stay with the GSF translated to Caris format. I don't think we've gotten around to testing the new GSF converter with SAIC data; I've tried it with some Hi-ilakai (sp?) data from Joyce Miller out in the Pacific and didn't seem to have issues.

I would like you to proceed with what you think represents and corrects the data the best. Positively, absolutely no artifacts for you! :>)

We didn't get any snow recently, you should be the one to WORRY! I heard NY got slammmed and hard ; you're closer than I am! AHB has been SLAMMED with data.... not snow.... I can't get my head around it, through it, over it, and outta here! So far behind...Hope you're doing good and back to normal or as normal as one can be! If AHB ends up having an issue with this, I'll make sure to get back in touch with you and ask... WTF! just kidding.
Have a great weekend, I'm outta here!
gene

Donaldson, Paul L. wrote:

Gene,

Hope all is well and that you are not buried in a snow drift. I have a quick question for you concerning sound speed profile applications. In the past we would not apply an SSP cast to data that was collected earlier in time due to a GSF conversion issue going to a Caris data format. As I recall Caris had a problem applying the SSP as it had a time stamp that was after the time for data collection in the GSF record. I have a file that does not exceed uncertainty values however I can see some SSP artifact in the record. At the end of the survey line we took a new SSP and if I apply that cast it will improve the data quality. I did not want to do this however unless Caris can now handle this during data file conversion. As I mentioned the data file in question is not outside of specifications however I can make it better. Please let me know how you would like for me to proceed.

Thank you,

Paul Donaldson
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BOTTOM CHARACTERISTICS

There were 67 bottom samples taken to verify the bottom types charted for H12003. Table Appendix V- 1 compares information for each sample collected to the charted bottom type within 2000 meters. A photograph of each bottom sample is provided in the Appendix_V_Files folder.

Table Appendix V-1. H12003 Bottom Sample Characteristics

JD	Sample Number	Bottom Sample Position (NAD83)		Observed Bottom Type	Depth of Bottom Sample (m)	Depth Uncertainty (m)	Charted Bottom Type
		Latitude (N)	Longitude (W)				Chart # 12211
257	H12003_BS_02	38° 04' 24.1"	075° 02' 56.0"	fneS brkSh	14.76	0.27	S
258	H12003_BS_03	38° 04' 23.7"	075° 04' 20.3"	fneS brkSh	16.13	0.27	S bkSh
258	H12003_BS_04	38° 04' 24.3"	075° 05' 36.6"	fneS brkSh	12.82	0.27	S bkSh
258	H12003_BS_05	38° 04' 26.2"	075° 07' 03.9"	fneS	11.13	0.27	S
258	H12003_BS_06	38° 04' 20.2"	075° 08' 23.5"	brkSh fneS P	12.72	0.27	P Sh
258	H12003_BS_07	38° 04' 26.5"	075° 09' 47.3"	brM	15.71	0.27	P Sh
258	H12003_BS_08	38° 04' 22.1"	075° 11' 07.2"	fneS	10.65	0.27	
258	H12003_BS_09	38° 03' 31.1"	075° 10' 28.0"	fneS	13.02	0.27	S
258	H12003_BS_10	38° 03' 24.9"	075° 09' 04.7"	fneS brkSh	11.70	0.27	S
258	H12003_BS_11	38° 03' 29.5"	075° 07' 45.0"	fneS brkSh	9.04	0.27	S
258	H12003_BS_12	38° 03' 25.3"	075° 06' 25.7"	fneS	9.54	0.27	S bkSh
258	H12003_BS_13	38° 03' 27.8"	075° 05' 01.4"	fneS brkSh	16.85	0.27	S bkSh
257	H12003_BS_14	38° 03' 27.2"	075° 03' 35.7"	mS P brkSh	10.61	0.27	S bkSh
257	H12003_BS_15	38° 02' 31.8"	075° 02' 55.4"	mS	18.34	0.27	
258	H12003_BS_16	38° 02' 31.7"	075° 04' 14.8"	mS brkSh	12.44	0.27	
258	H12003_BS_17	38° 02' 28.9"	075° 05' 37.4"	mS brkSh	12.16	0.27	
258	H12003_BS_18	38° 02' 34.3"	075° 07' 02.1"	mS brkSh	16.18	0.27	S
258	H12003_BS_19	38° 02' 29.7"	075° 08' 25.5"	fneS	15.27	0.27	S
258	H12003_BS_20	38° 02' 34.4"	075° 09' 45.5"	fneS	11.50	0.27	S
258	H12003_BS_21	38° 02' 29.7"	075° 11' 09.3"	fneS	7.74	0.27	
258	H12003_BS_22	38° 01' 34.6"	075° 11' 50.1"	fneS	13.46	0.27	S Sh
258	H12003_BS_23	38° 01' 35.0"	075° 10' 26.8"	fneS	11.05	0.27	S
258	H12003_BS_24	38° 01' 32.5"	075° 09' 01.7"	brM	19.60	0.27	S P
258	H12003_BS_25	38° 01' 34.0"	075° 07' 44.3"	mS	9.62	0.27	S bkSh
258	H12003_BS_26	38° 01' 34.2"	075° 06' 24.2"	fneS	13.92	0.27	S bkSh
258	H12003_BS_27	38° 01' 38.9"	075° 04' 59.8"	mS brkSh	14.19	0.27	
257	H12003_BS_28	38° 01' 36.0"	075° 03' 36.5"	mS brkSh	17.26	0.30	S
257	H12003_BS_29	38° 00' 39.2"	075° 02' 55.4"	mS	16.42	0.27	S bkSh
257	H12003_BS_30	38° 00' 38.3"	075° 04' 16.0"	mS brkSh	15.59	0.27	S bkSh
257	H12003_BS_31	38° 00' 38.2"	075° 05' 37.5"	mS brkSh	15.26	0.27	S
257	H12003_BS_32	38° 00' 38.2"	075° 07' 00.3"	fneS	16.62	0.27	S
257	H12003_BS_33	38° 00' 37.7"	075° 08' 21.1"	fneS	15.92	0.27	S
257	H12003_BS_34	38° 00' 37.1"	075° 09' 43.0"	brM fneS brkSh	19.09	0.27	S
257	H12003_BS_35	38° 00' 36.3"	075° 11' 04.1"	brM	15.11	0.27	S bkSh
257	H12003_BS_36	38° 00' 36.0"	075° 12' 28.3"	brM	14.35	0.27	S bkSh

JD	Sample Number	Bottom Sample Position (NAD83)		Observed Bottom Type	Depth of Bottom Sample (m)	Depth Uncertainty (m)	Charted Bottom Type
		Latitude (N)	Longitude (W)				Chart # 12211
257	H12003_BS_37	37° 59’ 40.4”	075° 13’ 11.0”	fneS brkSh	12.85	0.27	S
257	H12003_BS_38	37° 59’ 40.7”	075° 11’ 48.3”	fneS	15.52	0.27	S
257	H12003_BS_39	37° 59’ 41.0”	075° 10’ 25.6”	fneS brkSh	19.02	0.27	
257	H12003_BS_40	37° 59’ 41.4”	075° 09’ 03.5”	fneS brkSh	16.05	0.27	S
257	H12003_BS_41	37° 59’ 41.7”	075° 07’ 42.6”	fneS brkSh P	12.93	0.27	
257	H12003_BS_42	37° 59’ 41.8”	075° 06’ 20.0”	fneS P brkSh	11.31	0.27	S
257	H12003_BS_43	37° 59’ 41.7”	075° 05’ 00.5”	fneS brkSh	13.61	0.27	
257	H12003_BS_44	37° 59’ 43.0”	075° 03’ 36.0”	Si brkSh	20.06	0.27	S bkSh
257	H12003_BS_45	37° 58’ 46.5”	075° 02’ 55.1”	fneS	15.25	0.27	
257	H12003_BS_46	37° 58’ 40.8”	075° 04’ 15.1”	fneS brkSh P	18.72	0.27	
257	H12003_BS_47	37° 58’ 46.0”	075° 05’ 39.2”	fne S	11.62	0.27	
257	H12003_BS_48	37° 58’ 45.9”	075° 07’ 00.9”	fnebrS brkSh	8.30	0.27	
257	H12003_BS_49	37° 58’ 44.9”	075° 08’ 21.5”	crsbrS P	9.18	0.27	
257	H12003_BS_50	37° 58’ 45.2”	075° 09’ 43.5”	mS P	13.81	0.27	
257	H12003_BS_51	37° 58’ 44.4”	075° 11’ 05.8”	mS Sh	15.67	0.27	
257	H12003_BS_52	37° 58’ 44.3”	075° 12’ 28.2”	mS brkSh	15.51	0.27	S
257	H12003_BS_53	37° 58’ 43.5”	075° 13’ 49.6”	mS brkSh	10.79	0.27	
256	H12003_BS_54	37° 58’ 42.4”	075° 15’ 10.4”	mS brkSh	9.02	0.27	
258	H12003_BS_55	38° 03’ 24.6”	075° 11’ 48.9”	fneS	9.49	0.27	S
258	H12003_BS_56	38° 02’ 33.0”	075° 12’ 30.4”	fneS	10.43	0.27	
258	H12003_BS_57	38° 01’ 32.9”	075° 13’ 10.0”	fneS	9.00	0.27	S Sh
257	H12003_BS_58	38° 00’ 38.7”	075° 13’ 50.6”	brM	10.19	0.27	
257	H12003_BS_59	37° 59’ 39.8”	075° 14’ 31.6”	fneS	9.91	0.27	
258	H12003_BS_60	37° 58’ 13.5”	075° 14’ 37.3”	fneS	10.82	0.27	
258	H12003_BS_61	37° 58’ 12.7”	075° 13’ 12.2”	brM	15.94	0.27	
258	H12003_BS_62	37° 58’ 14.1”	075° 11’ 50.7”	mS brkSh	16.12	0.27	
258	H12003_BS_63	37° 58’ 14.8”	075° 10’ 29.9”	fne S	14.84	0.27	
258	H12003_BS_64	37° 58’ 09.3”	075° 09’ 15.8”	crsS P brkSh	8.97	0.27	
258	H12003_BS_65	37° 58’ 14.1”	075° 07’ 44.3”	fne S	6.31	0.27	
258	H12003_BS_66	37° 58’ 17.9”	075° 06’ 24.2”	fne S	15.53	0.27	
258	H12003_BS_67	37° 58’ 16.8”	075° 05’ 03.1”	mS brkSh	18.61	0.27	
258	H12003_BS_68	37° 58’ 18.4”	075° 03’ 43.1”	mS brkSh	15.96	0.27	

***Note:** There was no H12003_BS_1 Bottom Sample planned or taken for this survey.

****Note:** Chart 12200 (Cape May to Cape Hatteras) and Chart 13303 (Cape Sable to Cape Hatteras) cover all of the survey area of H12003; however, there are no bottom characteristics charted within the survey area.

It is recommended that the bottom type charted be updated where necessary based on the information collected during the latest survey.

SUPPLEMENTAL DATA ACQUISITION AND PROCESSING INFORMATION

The first sheet to be delivered for OPR-D302-SA-09 was H12001, which was delivered on 26 March 2010. The Data Acquisition and Processing Report for OPR-D302-SA-09 was also delivered on 26 March 2010. The data collection on the two remaining sheets (H12002 and H12003) was completed in April 2010. The following sections provide supplemental data acquisition and data processing information about the systems used in the 2010 survey. Only changes from what was reported in the Data Acquisition and Processing Report are presented here.

Multibeam Systems

The Reson 7125 multibeam system was upgraded to the 7125 SV configuration. This upgrade removed the subsea Link Control Unit (LCU). The upgraded system now has a single combined sonar interface and processing topside unit. The system continued to be operated as a single frequency system at 400 kHz in the same manner as described in the Data Acquisition and Processing Report for OPR-D302-SA-09. The Firmware Versions used during 2010 are provided below.

2010	
Firmware	**Version/SN**
7k Upload Interface	3.10.2.7
7k Center	3.5.3.11
7k I/O	3.3.0.19
SVP-70 S/N	4408372

Sound Speed Profiles

Serial numbers and calibration dates for the sound speed sensors used for H12003 during 2010 are listed below. Sound speed data and calibration records are included with the survey data in Section II of the Separates.

- Applied Microsystems Ltd., SV&P Smart Sensor, Serial Number 4523
  - Calibration Date: 15 March 2010.
- Applied Microsystems Ltd., SV&P Smart Sensor, Serial Number 4880
  - Calibration Date: 15 March 2010.
- Applied Microsystems Ltd., SV&P Smart Sensor, Serial Number 5454
  - Calibration Date: 05 February 2010.
- Seabird Electronics, Inc., CTD, Serial Number 565
  - Calibration Date: 18 July 2009 (used for comparison cast only during SAT).

Data Acquisition and Processing Software

The SAIC **ISS-2000** data acquisition software was upgraded from Version 4.1.0.11.0 to Version 4.2.0.5.1 during the 2009-2010 shut down. Acquisition methods and processes were not changed from what was described within the Data Acquisition and Processing Report for OPR-D302-SA-09.

Survey planning, data processing and analysis were carried out using the SAIC **Survey Planning** and **SABER** software**.** This software was upgraded from version 4.3.0.12.1 to version 4.3.0.16.1 during the 2009-2010 shut down. No processing methods or routines were changed from what was described within the Data Acquisition and Processing Report for OPR-D302-SA-09.

SonarPro version 9.6 was upgraded to version 11.3 for sidescan data acquisition during the shutdown. No processing methods or routines were changed from what was described within the Data Acquisition and Processing Report.

Survey System Uncertainty Model

The two tables below (Table Appendix V-2 and Table Appendix V-3) provide the uncertainty values that were used in the Total Propagated Uncertainty calculations for the 2010 survey.

Table Appendix V-2. 2010 *M/V Atlantic Surveyor* Error Parameter File (EPF)

Parameter	Value	Units
VRU Offset – X	0.34	Meters
VRU Offset – Y	0.29	Meters
VRU Offset – Z	-1.71	Meters
VRU Offset Error – X (uncertainty)	0.005	Meters
VRU Offset Error – Y (uncertainty)	0.011	Meters
VRU Offset Error – Z (uncertainty)	0.013	Meters
VRU Latency	0.00	milliseconds (msec)
VRU Latency Error (uncertainty)	1.00	milliseconds (msec)
Heading Measurement Error (uncertainty)	0.02	Degrees
Roll Measurement Error (uncertainty)	0.02	Degrees
Pitch Measurement Error (uncertainty)	0.02	Degrees
Heave Fixed Error (uncertainty)	0.05	Meters
Heave Error (% error of height) (uncertainty)	5.00	Percent
Antenna Offset – X	4.60	Meters
Antenna Offset – Y	-0.37	Meters
Antenna Offset – Z	-8.09	Meters
Antenna Offset Error – X (uncertainty)	0.013	Meters
Antenna Offset Error – Y (uncertainty)	0.012	Meters
Antenna Offset Error – Z (uncertainty)	0.020	Meters
Estimated Error in Vessel Speed (uncertainty)	0.0299	Knots
GPS Latency	0.00	milliseconds (msec)
GPS Latency Error (uncertainty)	1.00	milliseconds (msec)
Horizontal Navigation Error (uncertainty)	0.75*	Meters
Vertical Navigation Error (uncertainty)	0.20*	Meters
Static Draft Error (uncertainty)	0.01	Meters
Loading Draft Error (uncertainty)	0.02	Meters
Settlement & Squat Error (uncertainty)	0.034	Meters
Predicted Tide Measurement Error (uncertainty)	0.17	Meters
Observed Tide Measurement Error (uncertainty)	0.07	Meters
Unknown Tide Measurement Error (uncertainty)	0.50	Meters
Tidal Zone Error (uncertainty)	0.10	Meters
Surface Sound Speed Error (uncertainty)	1.00	meters/second (m/s)
SEP Uncertainty	0.15	Meters

Parameter	Value	Units
SVP Measurement Error (uncertainty)	1.00	meters/second (m/s)
Depth Sensor Bias	0.00	Meters
Depth Measurement Error (% error of depth) (uncertainty)	0.00	Percent
Wave Height Removal Error (uncertainty)	0.05	Meters

*NOTE: These values would only be used if not included in the GSF file

Table Appendix V-3. 2010 Reson 7125 Sonar Parameters

Parameter	Value	Units
Transducer Offset – X	0.00*	Meters
Transducer Offset – Y	0.00*	Meters
Transducer Offset – Z	0.00*	Meters
Transducer Offset Error – X (uncertainty)	0.005	Meters
Transducer Offset Error – Y (uncertainty)	0.011	Meters
Transducer Offset Error – Z (uncertainty)	0.013	Meters
Roll Offset Error (uncertainty)	0.005	Degrees
Pitch Offset Error (uncertainty)	0.05	Degrees
Heading Offset Error (uncertainty)	0.05	Degrees
Model Tuning Factor	6.00	N/A
Amplitude Phase Transition	1	Samples
Latency	0.00	milliseconds (msec)
Latency Error (uncertainty)	1.00	milliseconds (msec)
Installation Angle	0.0	Degrees

*NOTE: These values would only be used if not included in the GSF file

Corrections to Echo Soundings

A system acceptance test was conducted on all equipment offsets and biases were confirmed or new values were determined for the 2010 survey on 05-09 April 2010. The values reported within the Data Acquisition and Processing Report for OPR-D302-SA-09, remain valid except for the tow block height above water. The tow block height above water value reported in Table C-1 and Figure C-1 was previously 4.87 meters and is now 4.67 meters. A discrepancy was noted in the Data Acquisition and Processing Report for OPR-D302-SA-09 for the tow block from IMU Y value presented in Figure C-1. It was reported as +0.23 however it should have been reported as +0.40. This value is not used in any tow fish calculations and is reported as additional information only. The tow fish position is calculated based on the tow block from the multibeam sonar (7125) which was captured correctly.

Dynamic Draft Measurements

Dynamic draft values were re-established during the 2010 Sea Acceptance Test (SAT). An initial depth reference surface was created by stopping the vessel and acquiring multibeam data as the vessel drifted with the prevailing wind and current. A survey transect was then established perpendicular to the reference surface. This transect was run twice (once in each direction) at each of the six shaft rpm settings. This test was conducted on JD 096 to determine the settlement and squat correctors and then re-run on JD 097 to verify the settlement and squat values entered into the vessel configuration file. Separate 0.5-meter PFM and minimum grids were created using the near nadir (5 degree)

beams for the drift reference line and each of the RPM pairs. Difference grids were then created between the CUBE depth in the PFM grid as well as from the minimum grids from the drift reference line and each of the RPM pairs. The resulting difference grids were then analyzed using **SABER's Frequency Distribution** tool. This tool allowed the Hydrographer to visually and numerically view the distribution of depth differences between each RPM pair and the reference drift line. Settlement and Squat values were determined to the nearest centimeter to satisfy the 0.05-meter precision requirement outlined in the April 2009 NOS Hydrographic Surveys Specifications and Deliverables. Table Appendix V-4 summarizes the shaft RPM, depth corrector, approximate speed and SAT multibeam files used. The values determined from the analysis were entered into a look up table within the **ISS-2000** system. A shaft RPM counter provides automatic input to the **ISS-2000** system which in conjunction with the look up table applies a dynamic settlement and squat value as data are collected.

Table Appendix V-4. *M/V Atlantic Surveyor* Settlement and Squat Determination

Shaft RPM	Depth Corrector	Approximate Speed (Kts)	Files	
			Julian Day 096	Julian Day 097
0	0.00	0	asmba10096.d49	asmba10097.d98
140	-0.02	4	asmba10096.d50	asmba10097.d97 asmba10097.d47
180	-0.01	5	asmba10096.d51	asmba10097.d48
250	0.01	6	asmba10096.d52	asmba10097.d49
300	0.06	8	asmba10096.d53 asmba10096.d54	asmba10097.d50
340	0.010	9	asmba10096.d55	asmba10097.d51
380	0.12	10	asmba10096.d56 asmba10096.d57	asmba10097.d52

Multibeam Calibrations

Timing Test

A ping timing test was completed on 06 April 2010, prior to all other calibration tests, to verify that no timing errors exist within the survey system. The fundamental tool is the event marking capability of the Symmetricom BC635PCI IRIG-B card. An event is characterized by a positive-going TTL pulse occurring on the event line of the IRIG-B connector on the back of the ISSC. The pulses of interest are the transmit trigger of the RESON 7-P and the 1PPS timing pulses from the POS/MV. This test demonstrated that all GSF ping times matched the corresponding IRIG-B event times to within 2.2 milliseconds or less. These time differences are plotted in Figure Appendix V-1.

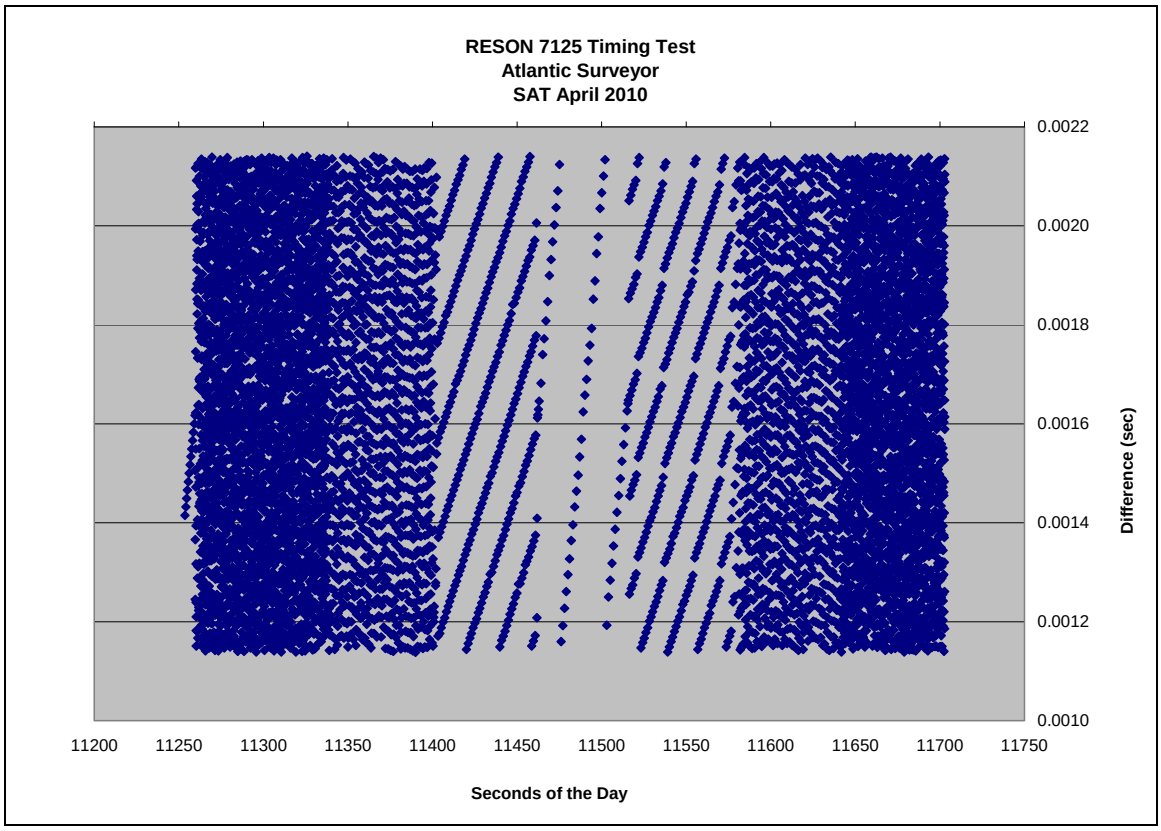


Figure Appendix V-1. Timing Test Results (time differences of ping trigger event vs. ping time tag from GSF)

Multibeam Bias

Roll, pitch, and heading biases were determined on 06 April 2010 (JD096) over a 47 foot wreck in the fish haven approximately six kilometers southeast of Manasquan Inlet in New Jersey (Table Appendix V-5). The wreck is charted in 40° 03.3925'N 073° 59.5541'W. On 07 April 2010 (JD097) the pitch, roll and gyro biases determined on 06 April 2010 (JD096) were verified.

Table Appendix V-5. Final Multibeam Files Verifying Alignment Bias Calculated using the SABER Swath Alignment Tool (SAT)

Component	Multibeam Files (pairs)		Bias
Pitch	asmba10097.d03	asmba10097.d04	+2.46°
Roll	asmba10097.d03	asmba10097.d04	+0.25°
Gyro	asmba10097.d05	asmba10097.d06	+1.80°

Pitch Alignment

Two sets of lines were collected for pitch bias calculation. All lines were run along the same survey transect in order that separate comparisons could be made between lines run in opposite directions. Several samples were viewed for each set of comparison lines in order to determine an accurate measurement of the pitch bias. Figure Appendix V-2 and Figure Appendix V-3 are images of the **SABER SAT** tool depicting data collected with the +2.46° pitch bias entered in the **ISS-2000** system; therefore the indicated bias is zero.

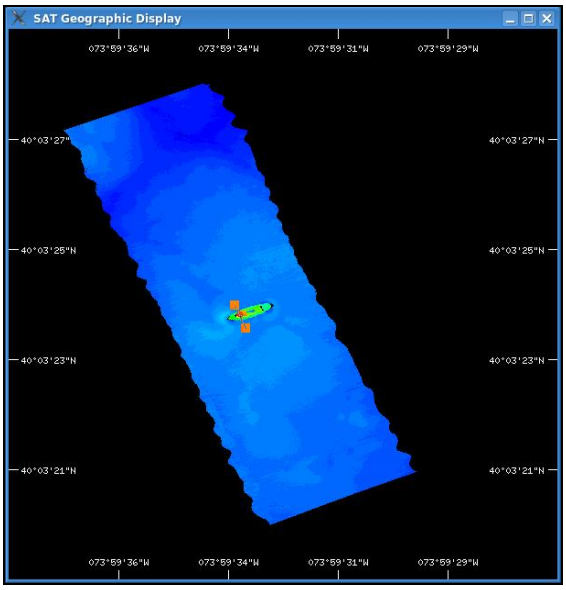


Figure Appendix V-2. SAT Tool, Plan View Depicting +2.46° Pitch Bias

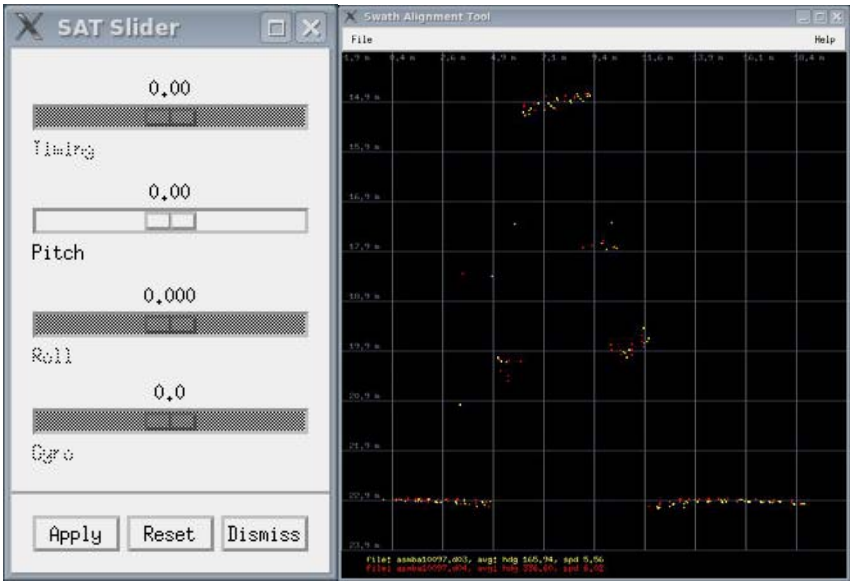


Figure Appendix V-3. SAT Tool, Depth vs. Distance Plot Depicting +2.46° Pitch Bias

Roll Alignment

Two sets of lines were collected for roll bias calculation. All lines were run along the same survey transect in order that separate comparisons could be made between lines run in opposite directions. Several samples were viewed for each set of comparison lines in order to determine an accurate measurement of the roll bias. Figure Appendix V-4 and Figure Appendix V-5 are images of the **SABER SAT** tool depicting data collected with the +0.25° roll bias entered in the **ISS-2000** system; therefore the indicated bias is zero.

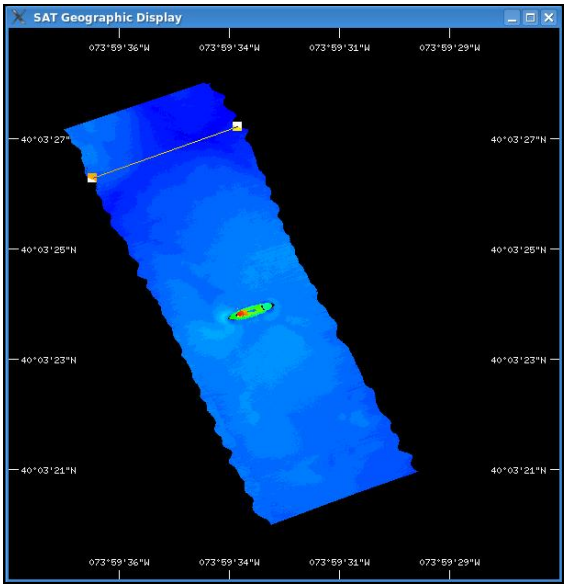


Figure Appendix V-4. SAT Tool, Plan View Depicting +0.25° Roll Bias

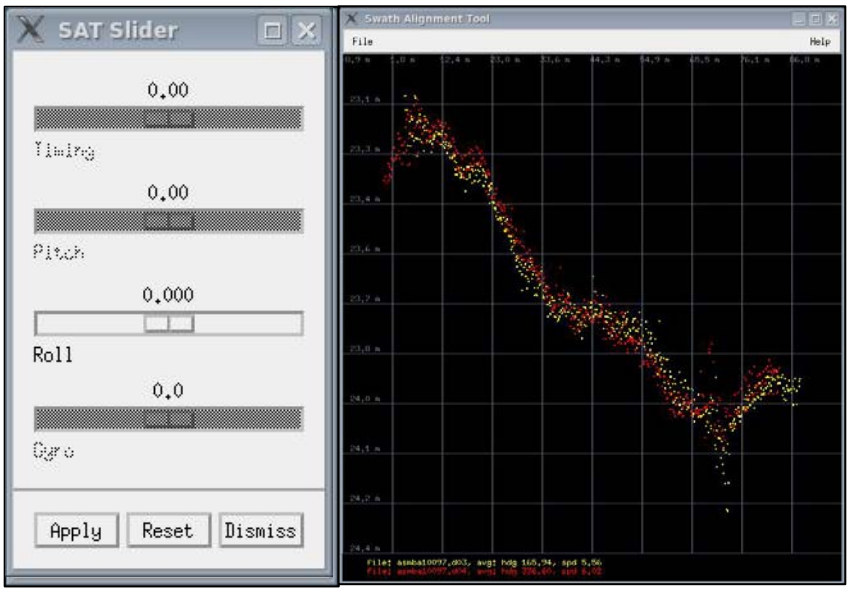


Figure Appendix V-5. SAT Tool, Depth vs. Distance Depicting +0.25° Roll Bias

Heading Alignment

Two sets of lines were collected for heading bias calculation. Lines were run on either side of the charted wreck in opposite directions in order that separate comparisons could be made. Several samples were viewed for each set of comparison lines in order to determine an accurate measurement of the heading bias. Figure Appendix V-6 and Figure Appendix V-7 are images of the **SABER SAT** tool depicting data collected with the +1.80° heading bias entered in the **ISS-2000** system; therefore the indicated bias is zero.

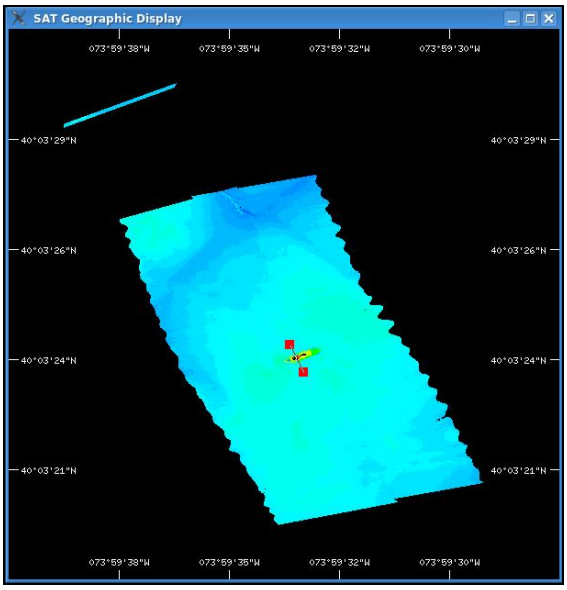


Figure Appendix V-6. SAT Tool, Plan View Depicting +1.80° Heading Bias

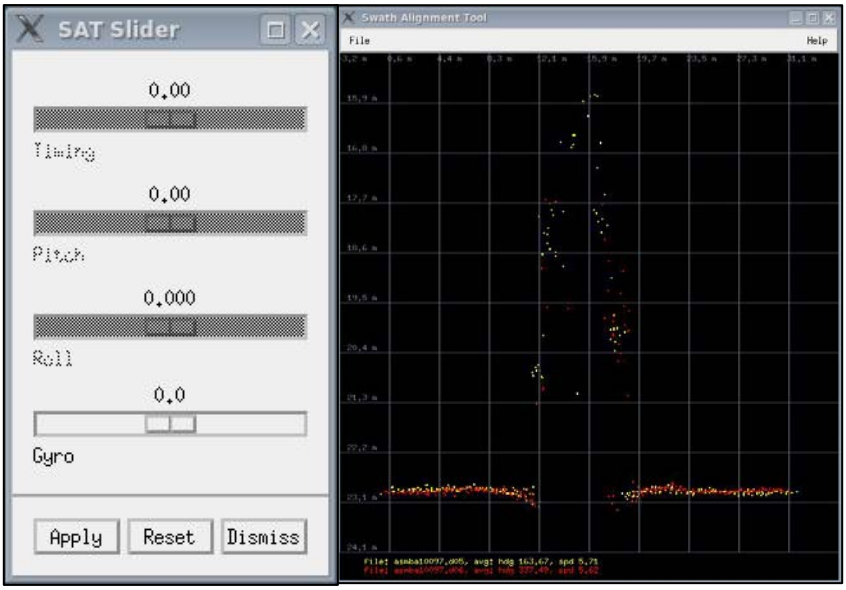


Figure Appendix V-7. SAT Tool, Depth vs. Distance Depicting +1.80 Heading Bias

Multibeam Accuracy

After all calibration tests were completed and bias values entered, a system verification survey was run in the vicinity of the wreck alignment site consisting of 19 main scheme lines and three cross lines centered on the wreck. All depths were corrected for predicted tides using zoning for the Atlantic City tide gauge, 8534720. For the multibeam data, the class one cutoff angle was set to 5° and class two cutoff set to 60°. Standard multibeam data processing procedures were followed to clean the data, apply delayed heave and calculate uncertainty. Three one-meter minimum grids were created. One grid of the main scheme lines using class two data, one grid of cross lines using class one data, and one grid of all lines using class two data were created. A one-meter PFM of all the data was also generated and processed using the gap checker and check uncertainty routines. The results of the system verification survey provided an overview assessment of the data acquisition and processing procedures outlined for the project. The resulting minimum grid with selected soundings (in feet) is shown in Figure Appendix V-8. The PFM with CUBE depths and Uncertainties are shown in Figure Appendix V-9 and Figure Appendix V-10, respectively. The junction analysis results for the depth differences between the main and cross lines are shown in Table Appendix V-6 showing agreement between values. Note a slight tidal influence is seen in the junction results due to the use of predicted tides combined with the fact all cross lines were run back to back and were not separated in time across the rest of the main scheme survey lines.

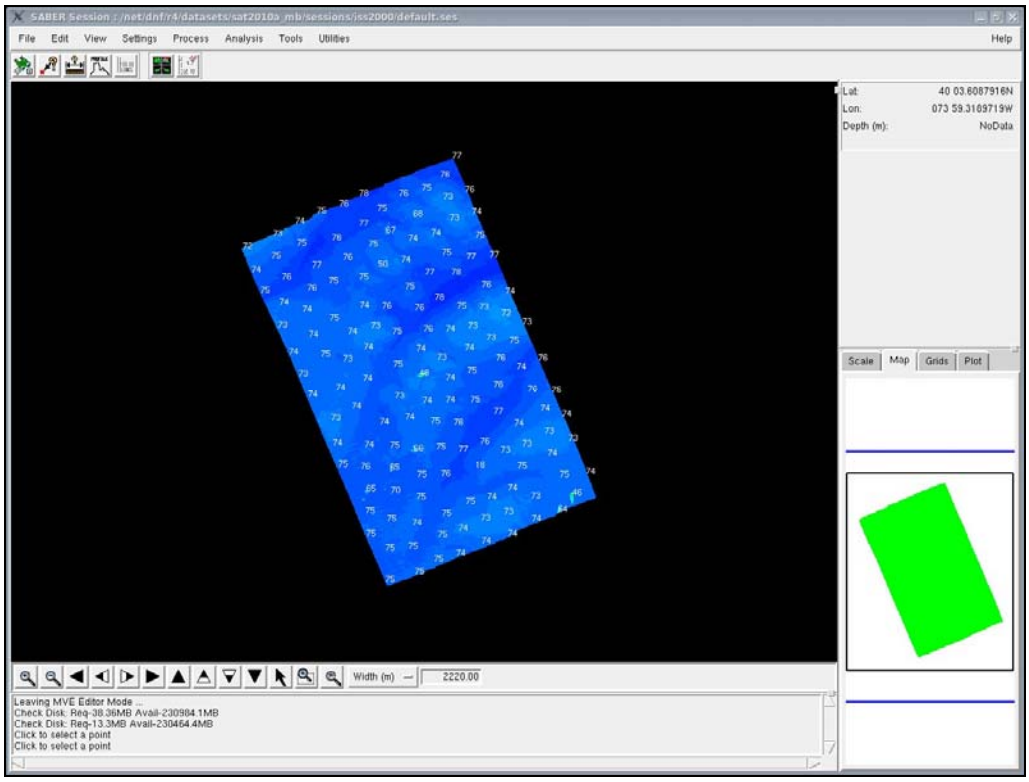


Figure Appendix V-8. Verification Survey Minimum Depth Grid and Selected Soundings

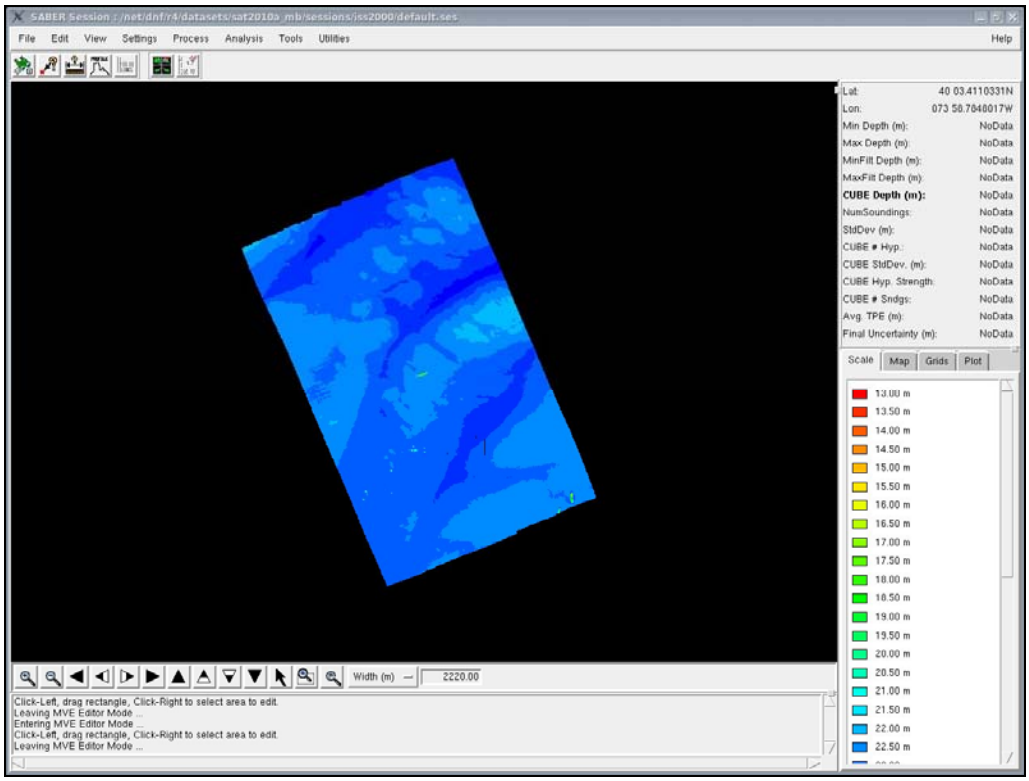


Figure Appendix V-9. Verification Survey PFM CUBE Depths

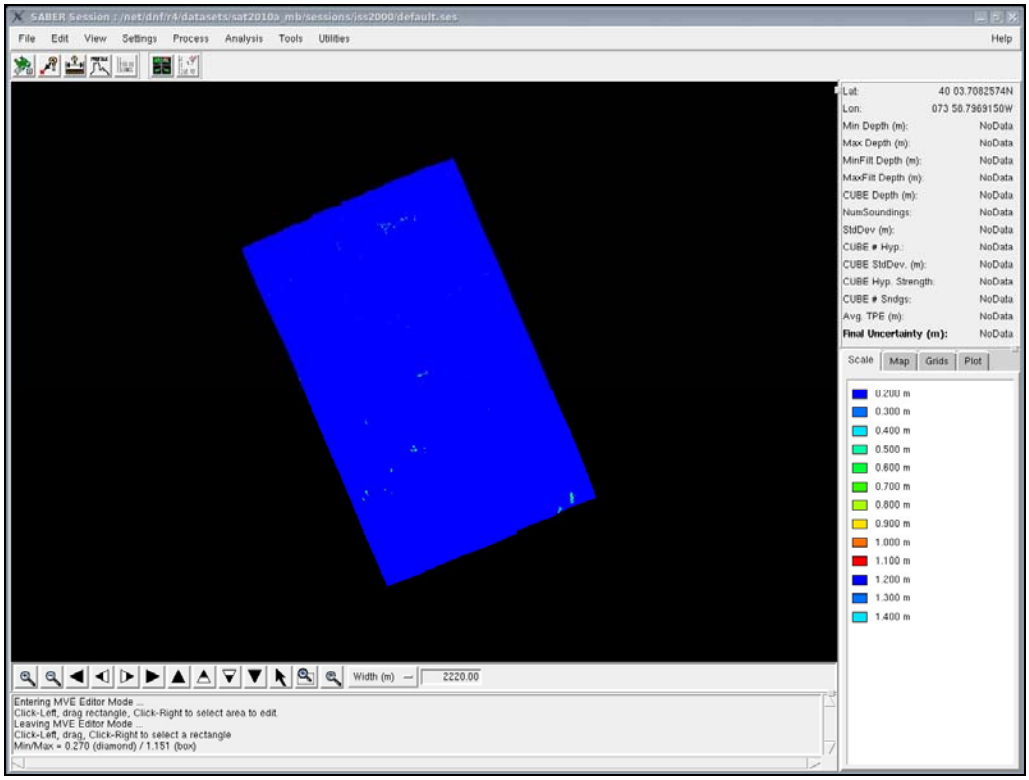


Figure Appendix V-10. Verification Survey PFM Uncertainties

Table Appendix V-6. Verification Survey Junction Analysis of Cross versus Main Scheme

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0-5cm	3087	39.79	2149	27.70	631	8.13	307	3.96
5-10cm	2519	72.25	2474	59.58	45	8.71		
10-15cm	1637	93.35	1637	80.68	0	8.71		
15-20cm	402	98.53	402	85.86	0	8.71		
20-25cm	97	99.78	97	87.11	0	8.71		
25-40cm	16	100.00	16	87.32	0	8.71		
Total	7758	100.00%	6775	87.33%	676	8.71%	307	3.96%

This Document is for Office Process use only and is intended to supplement, not supersede or replace, information/recommendations in the Descriptive or H-Cell Reports.

AHB COMPILATION LOG

General Survey Information	
REGISTRY No.	H12003
PROJECT No.	OPR-D302-SA-09
FIELD UNIT	SAIC
DATE OF SURVEY	20090810 - 20100418
LARGEST SCALE CHART	***12211_1, edition 44, 20110201, 1:80,000***
SOUNDING UNITS	**FEET**
COMPILER	Kolleen Mortimer

Source Grids	**File Name** T:\CompileQueue\H12003_D302_SAIC\AHB_H12003\SAR Final Products\GRIDS
	H12003_1_of_9.bag **H12003_2_of_9.bag** **H12003_3_of_9.bag** **H12003_4_of_9.bag** **H12003_5_of_9.bag** **H12003_6_of_9.bag** **H12003_7_of_9.bag** **H12003_8_of_9.bag** **H12003_9_of_9.bag** **H12003_features_area_1_of_7.bag** **H12003_features_area_2_of_7.bag** **H12003_features_area_3_of_7.bag** **H12003_features_area_4_of_7.bag** **H12003_features_area_5_of_7.bag** **H12003_features_area_6_of_7.bag** **H12003_features_area_7_of_7.bag**
Surfaces	**File Name** T:\CompileQueue\H12003_D302_SAIC\AHB_H12003\COMPILE\Working
Combined	**H12003_4m_Combined.csar**
Interpolated TIN	\Interpolated TIN**H12003_12m_InterpTIN.csar**
Shifted Interpolated TIN	\Shifted Surface**H12003_12m_InterpTIN_Shifted.csar**
Final HOBs	**File Name** T:\CompileQueue\H12003_D302_SAIC\AHB_H12003\COMPILE\Final_Hobs
Survey Scale Soundings	**H12003_SS_Soundings.hob**
Chart Scale Soundings	**H12003_CS_Soundings.hob**
Contour Layer	**H12003_Contours.hob**
Feature Layer	**H12003_Features.hob**
Meta-Objects Layer	**H12003_MetaObjects.hob**
Blue Notes	**H12003_BlueNotes.hob**

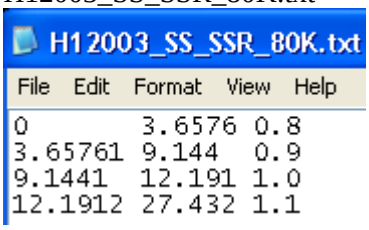
Meta-Objects Attribution	
Acronym	**Value**
M_COVR	
CATCOV	1 – coverage available
SORDAT	20100418
SORIND	US,US,graph,H12003
M_QUAL	
CATZOC	1 – coverage available

INFORM	M/V Atlantic Surveyor D582365
POSACC	5.0 m
SORDAT	20100418
SORIND	US,US,graph,H12003
SUREND	20100418
SURSTA	20090810
DEPARE	
DRVALV 1	7.87ft
DRVALV2	74.68 ft
SORDAT	20100418
SORIND	US,US,graph,H12003

SPECIFICATIONS:

I. COMBINED SURFACE:
- a. Number of SAR Final Grids: 16
- b. Resolution of Combined (m): 4 m

II. SURVEY SCALE SOUNDINGS (SS):
- a. Attribute Name: Depth
- b. Selection criteria: Radius, Shoal bias
- c. Radius value is: mm at map scale
  - i. Use single-defined radius: N/A
  - ii. And/Or use radius table file: H12003_SS_SSR_80K.txt [*80k = chart scale*]



- d. Queried Depth of All Soundings
  - i. Minimum: 7.87402 ft
  - ii. Maximum: 74.67192 ft

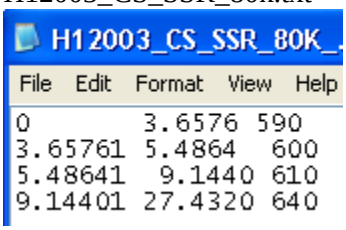
III. INTERPOLATED TIN SURFACE:
- a. Resolution (m): 12 m
- b. Interpolation method: Natural Neighbor
- c. Shift value: -0.75 ft

IV. CONTOURS:
- a. Attribute Name: Depth
- b. Use a Depth List: H12003_depth_contours.txt
- c. Output Options: Create contour lines
  - i. Line Object: DEPCNT
  - ii. Value Attribute: VALDCO

V. FEATURES:
- a. Number of Chart Features: 34 [*all features included in H-Cell*]
- b. Number of Non-Chart Features: 49 [*all features submitted by field & not included in H-Cell*]

VI. CHART SURVEY SOUNDINGS (CS):

a. Number of ENC CS Soundings: 415
b. Attribute Name: Depth
c. Selection criteria: Radius, Shoal bias
d. Radius value is: Distance on the ground (m)
   i. Use single-defined radius: N/A
   ii. And/Or use radius table file: H12003_CS_SSR_80k.txt [*80k = chart scale*]



e. Number Survey CS Soundings: 421

VII. NOTES:

[*Type text*]