

NOAA FORM 76-35A <b>U.S. DEPARTMENT OF COMMERCE</b> NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SERVICE  <b>DESCRIPTIVE REPORT</b>
<i>Type of Survey</i> <u>Multibeam and Sidescan Sonar</u>
<i>Field No.</i> <u>1</u>
<i>Registry No</i> <u>H12336</u>
<b>LOCALITY</b>
<i>State</i> <u>Virginia</u>
<i>General Locality</i> <u>Atlantic Ocean</u>
<i>Sublocality</i> <u>9 NM East of Cedar Island</u>
<u>2011</u> <b>CHIEF OF PARTY</b> <u>Gary R. Davis</u> <u>Science Applications International Corporation</u>
<b>LIBRARY &amp; ARCHIVES</b>
<b>DATE</b> _____

NOAA FORM 77-28 (11-72)		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		REGISTRY No  <b>H12336</b>
<b>HYDROGRAPHIC TITLE SHEET</b>				
<b>State</b>	Virginia			
<b>General Locality</b>	Atlantic Ocean			
<b>Sub Locality</b>	9 NM East of Cedar Island			
<b>Scale</b>	1:40,000			
<b>Date of Survey</b>	25 June 2011 – 18 August 2011			
<b>Instructions Dated</b>	07 February 2011			
<b>Project No.</b>	OPR-D302-KR-11			
<b>Vessel</b>	<i>M/V Atlantic Surveyor</i> D582365			
<b>Chief of Party</b>	Gary R. Davis			
<b>Surveyed by</b>	Alex Bernier, Chuck Holloway, Colette LeBeau, Katie Offerman, Evan Robertson, Eva Rosendale, Andrew Seaman, Deborah Smith, Bridget Williams			
<b>Soundings by echosounder</b>	Multibeam RESON SeaBat 7125 SV			
<b>Verification by</b>	<i>Atlantic Hydrographic Branch</i>			
<b>Soundings in</b>	Meters			
<b>Soundings at</b>	MLLW			
<b>REMARKS:</b>	<b>Contract:</b>	DG133C-08-CQ-0003		
	<b>Contractor:</b>	Science Applications International Corporation 221 Third Street, Newport, RI 02840 USA		
	<b>Subcontractor:</b>	N/A		
	<b>Times:</b>	All times are recorded in UTC		
	<b>UTM Zone:</b>	Zone 18 North		
	<b>Purpose:</b>	To provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area: Sheet 1 (H12336) in the Atlantic Ocean, Coast of Virginia.		

# DESCRIPTIVE REPORT

## H12336

SAIC Document Number: 11-TR-030

Changes in this document shall be recorded in the following table in accordance ISO9001:2008 Procedures.

<b>Revisions</b>				
<b>Rev</b>	<b>Date</b>	<b>Pages Affected</b>	<b>Approved By</b>	<b>Remarks</b>
0	16 Dec 2011	All	G. R. Davis	Initial Document
1	30 May 2012	All	G. R. Davis	Updated sections dealing with BAGs. Updated scale of sheet. Updated header and footer on all pages.

Science Applications International Corporation (SAIC) warrants only that the survey data acquired by SAIC and delivered to NOAA under Contract DG133C-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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*The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and Rednotes were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via <http://www.ngdc.noaa.gov/>.*

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**Descriptive Report to Accompany  
Hydrographic Survey H12336  
Scale 1:40,000, Surveyed 2011  
M/V Atlantic Surveyor  
Science Applications International Corporation (SAIC)  
Gary R. Davis, Chief Hydrographer**

**PROJECT**

**Project Number:** OPR-D302-KR-11

**Dates of Instructions:** 07 February 2011

**Task Order#:** T006

**Dates of Supplemental Instructions:** 13 April 2011, 20 April 2011, 19 July 2011, 04 August 2011, 11 October 2011, and 21 March 2012.

**Sheet Designation:** 1

**Registry Number:** H12336

**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 the coast of Virginia, 9 nautical Miles (NM) East of Cedar Island (Figure A-1). H12336 was surveyed in accordance with the following documents:

1. Project Instructions, OPR-D302-KR-11, dated 07 February 2011
2. Statement of Work, Hydrographic Survey Services, SAIC, DG133C-08-CQ-003, dated 12 May 2011
3. Tides and Water Levels Statement of Work OPR-D302-KR-2011 Delaware, Maryland, Virginia Coast, dated 09 February 2011
4. *NOS Hydrographic Surveys Specifications and Deliverables*, April 2011, Revised 05 October 2011 (HSSD)

Documents 1, 2, and 3 above are provided in Separates III.

The final line kilometers, bottom samples, item investigations, and other survey statistics are listed in Table A-1. The survey was conducted utilizing multibeam sonar and towed sidescan sonar from 25 June to 18 August 2011 (Table A-2). H12336 was surveyed using set line spacing in order to achieve 200% sidescan coverage with resulting multibeam coverage. The CUBE depth range observed for H12336 was from 10.098 meters (33 feet, 0.280-meter uncertainty) to 25.312 meters (83 feet, 0.300-meter uncertainty).

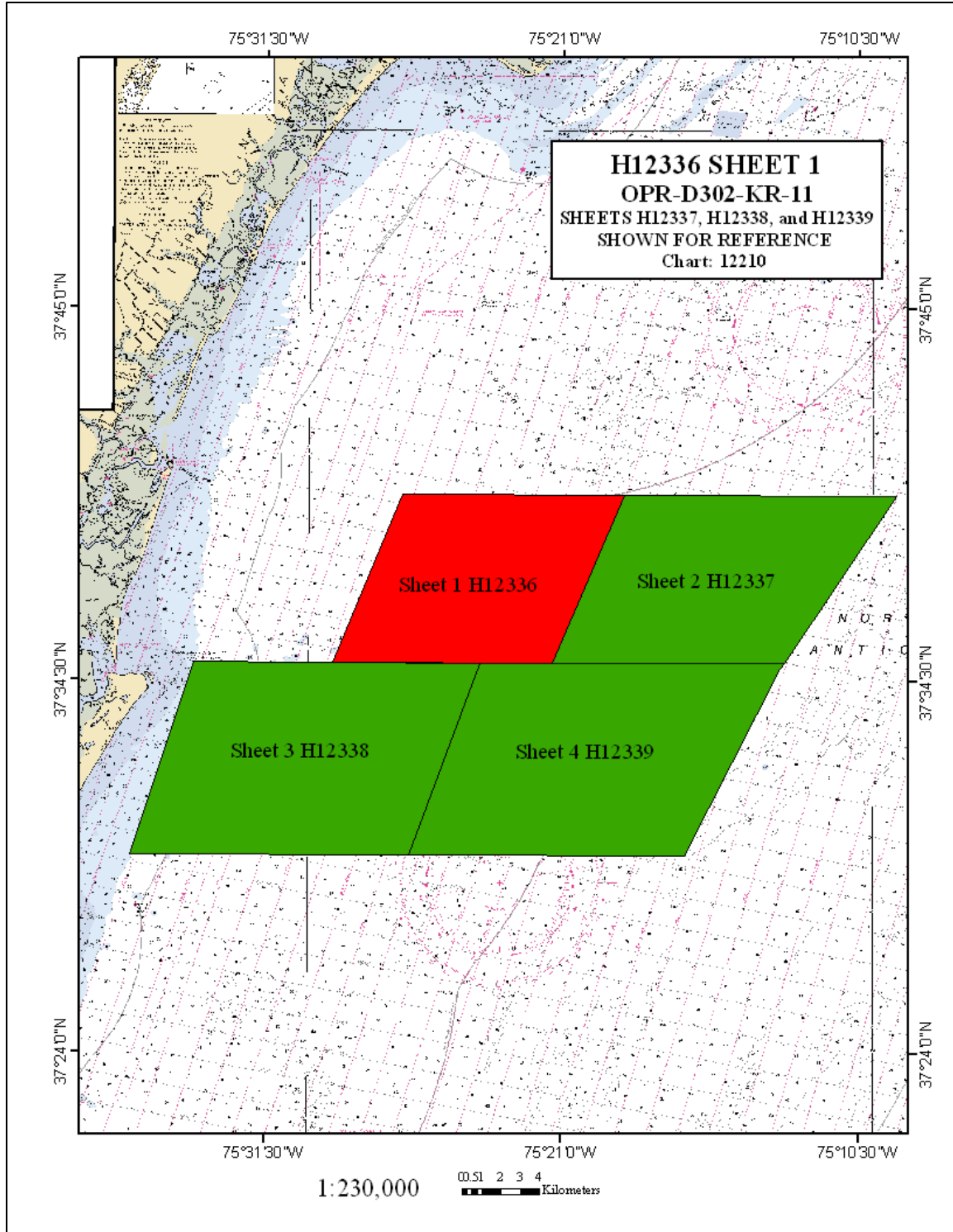


Figure A-1. H12336 Survey Bounds

**Table A-1. Hydrographic Survey Statistics**

<i>M/V Atlantic Surveyor, Sheet 1 H12336</i>	<b>Value</b>
LNM Single beam only sounding lines (main scheme only)	N/A
LNM Multibeam only sounding lines (main scheme only)	N/A
LNM Lidar sounding lines (main scheme only)	N/A
LNM Sidescan sonar only lines (main scheme only)	N/A
LNM Main scheme lines (multibeam and sidescan)	1407.83
LNM Crosslines from multibeam	123.28
LNM Lidar crosslines	N/A
LNM development lines non main scheme	N/A
LNM shoreline/nearshore investigations	N/A
Number of Bottom Samples	29
Number of items investigated that required additional time/effort in the field beyond the above operations not developed by sonar	N/A
Total number of square nautical miles	29.93

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

<b>Calendar Date</b>	<b>Julian Day</b>
25 June 2011	175
26 June 2011	176
27 June 2011	177
28 June 2011	178
29 June 2011	179
30 June 2011	180
01 July 2011	181
06 July 2011	187

<b>Calendar Date</b>	<b>Julian Day</b>
07 July 2011	188
08 July 2011	189
09 July 2011	190
10 July 2011	191
16 August 2011	228
17 August 2011	229
18 August 2011	230

## B. DATA ACQUISITION AND PROCESSING

### B.1 EQUIPMENT

SAIC used their **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. Triton **Isis** was used to review all sidescan data. Subsequent processing and the generation of coverage mosaics were accomplished using **SABER** on a Linux platform.

A detailed description of the systems used to acquire and process these data has been included in Section A of the Data Acquisition and Processing Report, REV 1, (DAPR REV 1) for OPR-D302-KR-11; delivered concurrently with this Descriptive Report (DR). The information in Table B-1 below summarizes the systems listed in the DAPR, REV 1. There were no variations from the equipment configuration described in the DAPR REV1.

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

System	Manufacturer / Model Number	Subsystem
Multibeam Sonar	RESON SeaBat 7125 SV	7P Sonar Processor
		RESON SVP 70
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 7400 GPS Receiver	
	Trimble Probeacon Differential Beacon Receiver	
Sound Speed System	Brooke Ocean Technology Ltd. Moving Vessel Profiler-30	Applied Microsystems Ltd. Smart SV and Pressure Sensor
Bottom Sample System	WILDSCO Petite Ponar Grab (7128-G40)	

#### B.1.1 Survey Vessel

The platform for multibeam sonar, sidescan sonar, and sound speed data collection was the *M/V Atlantic Surveyor*. Table B-2 provides vessel characteristics for the *M/V Atlantic Surveyor*. Three 20-foot ISO containers were secured on the aft deck. One was used as the real-time data acquisition office; another as the data processing office; the third for spares storage, maintenance, and repairs. A 10-foot ISO container housed a 80 kW generator that provided dedicated power to the sidescan winch, ISO containers, and all survey equipment.

**Table B-2. Survey Vessel Characteristics *M/V Atlantic Surveyor***

Vessel Name	LOA	Beam	Draft	Max Speed	Gross Tonnage	Power (Hp)	Registration Number
<i>M/V Atlantic Surveyor</i>	110'	26'	9'	14 knots	Displacement 68.0 Net Tons Deck Load 65.0 Long Tons	900	D582365

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 was hull-mounted port of the vessel's keel in close proximity to the IMU. The Brooke Ocean Technology Moving Vessel Profiler 30 (MVP-30) was mounted to the starboard stern quarter. The Klein 3000 sidescan sonar was towed along the centerline axis from an A-frame mounted on the stern of the vessel. A J-frame mounted on the starboard rail of the ship served as the location for bottom sample collection.

## **B.2 QUALITY CONTROL**

SAIC performs various quality control checks throughout survey operations and data processing. Refer to the Section B of the DAPR REV 1 for further details regarding the processing flow SAIC utilizes and details for each process.

There were 123.28 linear nautical miles of crosslines and 1407.83 linear nautical miles of main scheme lines surveyed on H12336. This resulted in crossline mileage that represented approximately 8.8 percent of the main scheme mileage which meets the requirement in Section 5.2.4.3 of the HSSD, to achieve at least eight percent for a multibeam survey. Crosslines were oriented at 92°/272° and were predominately spaced 450 meters apart, while the main scheme lines were oriented at 22.8°/202.8° and were spaced 40 meters apart. Comparison between crosslines and main scheme data is discussed in Section B.2.5. Refer to the "H12336\_Multibeam\_Processing\_Log" section within Separates I for information on the delineation of main scheme and crossline data files. During main scheme operations, the sidescan sonar range scale of 50 meters provided a consistent 100-meter imagery swath.

### **B.2.1 Sonar System Quality Checks**

Specific details regarding each of the multibeam sonar system quality checks can be found throughout the DAPR REV 1.

A Brooke Ocean Technology Moving Vessel Profiler (MVP) with an Applied Microsystems SV&P Smart Sensor was used to collect sound speed profile (SSP) data. SSP data were obtained at frequent intervals as defined in Section 5.2.3.3 of the HSSD. Please refer to Section A.8 of the DAPR REV 1 for details regarding acquisition of sound speed profiles. Details regarding application of sound speed profiles can be found in Section C.1.3 of the DAPR REV 1. A total of 458 profiles were applied to online data

for H12336. For information regarding the start and end of online data, please reference the "H12336\_Sidescan\_Review\_Log" and "Watchstander\_Logs" sections within in Separates I.

Confidence checks of the sound speed profile casts were conducted periodically (generally every seven survey days) by comparing at least two consecutive casts taken with different SV&P Smart Sensors. Six confidence checks were conducted during H12336, the results can be found in Separates II within the "H12336\_Atlantic\_Surveyor\_Comparison\_Cast\_Log" section. The calibration reports for each sensor used are also documented under "Certificate of Calibration Records" within Separates II.

Sound speed profiles were obtained for four different survey purposes. The "H12336\_Atlantic\_Surveyor\_Sound\_Speed\_Profile\_Log", four tables located in Separates II, is a cumulative report detailing each cast associated with H12336. This log is separated by the purpose of the applied cast; with individual tables for "Used\_for\_MB" (online Multibeam), "Used\_for\_Comparison", "Used\_for\_Lead\_Line", and "Used\_for\_Closing". Additionally in a separate folder on the delivery drive, in the "H12336/Data/Processed/SVP/CARIS\_SSP" folder, there are four sound speed profile files (.svp). These four files contain concatenated SSP data that has been formatted for use in CARIS. The CARIS SSP files are designated based on the purpose of the cast and their filenames are the registry number and the purpose of the cast as noted in the tabs within the sound speed profile log (i.e. H12336\_Used\_for\_MB). Sound speed files are delivered with the H12336 delivery in the "H12336/ Data/Processed/SVP" folder. The sound speed files are broken out into sub-folders which correspond to the purpose of that applied cast.

Details regarding how and when static draft measurements are taken can be found in Section C.1.1 of the DAPR REV 1. The static draft values applied for each day of data collection are presented in the "H12336\_Daily\_Draft\_Log" section within Separates I. Please refer to Section C.1.2 of the DAPR REV 1 for details regarding the dynamic draft look-up table and application of dynamic draft.

Horizontal positioning of the multibeam transducer by the POS/MV was verified by daily comparison checks against an independent Trimble DGPS system. These daily positional checks are presented in Separates I, "H12336\_Daily\_Positioning\_Confidence\_Checks". Further details can be found in Section C.2 of this Descriptive Report.

All multibeam files have delayed heave, (Applanix *TrueHeave*<sup>TM</sup>) files (.thv) from the POS/MV, applied during post processing. There were a few instances where delayed heave was not applied due to short time gaps in the delayed heave file. When delayed heave was not available, the real-time heave was used. All cases where delayed heave was not applied were investigated and the loss of delayed heave application had no effect on the data. For specific details on delayed heave collection and application, see sections B.2 and C.3 of the DAPR REV 1. Delayed heave files are included with the H12336 data delivery in "H12336/Data/Processed/Delayed\_Heave" folder.

Multibeam confidence checks were conducted during port calls (approximately every 10 survey days) by performing lead line measurements. Details regarding lead line comparisons can be found in Section A.6 of the DAPR REV 1. Of the six lead lines performed, there were mean differences of less than 0.035 meters per set with the standard deviation of the means from all sets less than 0.018 meters. A complete listing of all lead line measurements can be found in Separates I in the section titled “H12336\_Atlantic\_Surveyor\_Lead\_Line\_Comparison”. Multibeam files used for confidence checks are located in a sub folder within the multibeam data folder named “Used\_for\_Lead\_Line”.

As discussed in Section A.7 of the DAPR REV 1, sidescan data are collected and maintained in eXtended Triton Format (XTF), and are preserved at full resolution. Towfish navigation is recomputed using the **SABER** Navup routine. The Navup routine populates the sensor X and sensor Y fields within the XTF files with the final sidescan position contained within the catenary data files recorded by **ISS-2000**.

Sidescan sonar confidence checks were performed at least once per day, as specified in Section 6.3.1 of the HSSD. Sidescan data reviewers verified that distinct bottom features or objects were visible to the outer edges of the sonar record. Confidence checks are included in the “H12336\_Sidescan\_Review\_Log” located in Separates I.

## **B.2.2 Multibeam Coverage Analysis**

These survey operations were conducted at a set 40-meter line spacing 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 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 15 meters there was sufficient outer beam overlap to provide 100% multibeam bottom coverage.

A PFM CUBE surface was used to assess and document multibeam survey coverage. The CUBE depth is populated as either the node’s chosen hypothesis or the depth of a feature or designated sounding set by the hydrographer, which overrides the chosen hypothesis. As noted previously, the range of CUBE depths encountered was from 10.098 meters (33 feet, 0.280-meter uncertainty) to 25.312 meters (83 feet, 0.300-meter uncertainty). Based on this depth range encountered in H12336 and Section 5.2.2.3 of the HSSD, the final CUBE surface was generated at one-meter grid node resolution. Over significant features, that were located in depths less than 20 meters, CUBE surfaces were generated at half-meter grid node resolution as defined in Section 5.2.2.1 of the HSSD. Four significant features were identified in H12336 and separate half-meter resolution PFM grids made for each. Data within the half-meter resolution CUBE PFM grids also remain in the one-meter CUBE PFM grid.

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. A final review of the coverage showed no areas with four or more contiguous nodes without data. The final CUBE surface had valid depths in 100% of the nodes.

All grids were examined for the number of soundings contributing to the chosen CUBE hypotheses for each node by running **SABER’s Frequency Distribution** tool on the CUBE Number of Soundings layer of the PFM grid. The CUBE Number of Soundings layer reports the number of soundings that were used to compute the chosen hypothesis. Analysis of the H12336 final one-meter PFM grid revealed that more than 99% of all nodes contained five or more soundings, for the original submitted data as well as the supplemental PFM grid; satisfying the requirements for complete multibeam coverage of set line spacing surveys, as specified in Section 5.2.2.2 of the HSSD. A complete analysis based on the **Frequency Distribution** routine is provided in Table B-3 for the original submitted one-meter PFM grid. As a result of the upgraded PFM library, there are slight differences between the original submitted one-meter PFM and the supplemental delivered PFM, refer to Section B.4.1 for specifics about the PFM library. Therefore, the number of nodes that had a particular number of CUBE soundings contributing to the node differed slightly between the original submitted one-meter PFM and the supplemental delivered PFM, the cumulative percentages did not change.

**Table B-3. Frequency Distribution of the H12336 One-Meter CUBE Number of Soundings Layer**

CUBE No. of Soundings contributing to Grid Node	Binned Grid Node Count	Percent
1	9871	100.00%
2	9272	99.99%
3	7513	99.98%
4	7727	99.97%
5	7265	99.97%
6	7103	99.96%
7	7320	99.95%
8	7420	99.95%
9	7457	99.94%
10	7281	99.93%
11-389	102170111	99.92%

Analysis of both the original submitted and the supplemental delivered four half-meter PFM grids indicated that all feature PFMs maintained a minimum of 99.99% of all individual nodes containing five or more soundings as listed below,

- Features Area 1 (feature 1) had 99.99% nodes containing 5 or more soundings
- Features Area 2 (feature 2) had 99.99% nodes containing 5 or more soundings
- Features Area 3 (feature 3) had 99.99% nodes containing 5 or more soundings
- Features Area 4 (feature 4) had 99.99% nodes containing 5 or more soundings

### B.2.3 Survey System 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*). Once the TPU model is applied to the GSF bathymetry data, each beam is attributed with the horizontal uncertainty and the vertical uncertainty at the 95% confidence level. For specific details on SAIC's use and application of the **SABER** Total Propagated Uncertainty model, see Section B.1 in the DAPR REV 1.

### B.2.4 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. During application of horizontal and vertical uncertainties to the GSF files, individual beams where either the horizontal or vertical uncertainty exceeded the maximum allowable IHO S-44 5<sup>th</sup> edition Order 1a specifications were flagged as invalid. As a result, all individual soundings used in development of the final CUBE depth surface had modeled vertical and horizontal uncertainty values at or below the allowable IHO S-44 5<sup>th</sup> edition, Order 1a uncertainty. The allowable Order 1a horizontal uncertainty is depth dependent and defined as 5 meters + 5% of the depth. The allowable Order 1a vertical uncertainty is also dependent on depth and defined by the equation:

$$\pm\sqrt{a^2 + (b \times d)^2}$$

Where, for Order 1a surveys:

a = 0.5 meters

b = 0.013

d = depth

During the creation of the CUBE surface, two separate vertical uncertainty surfaces are calculated by the **SABER** software, CUBE Standard Deviation and Average Total Propagated Uncertainty (Average TPU). A third vertical uncertainty surface is generated from the larger of these two uncertainties at each node and is referred to as the Final Uncertainty. For specific details on this process see Section B.2 of the DAPR REV 1.

The final one-meter PFM CUBE surface in both the original submitted data as well as the supplemental PFM contained final vertical uncertainties from 0.270 to 0.619 meters while the IHO Order 1a maximum allowable vertical uncertainty was calculated to vary between 0.517 to 0.599 meters for the depths observed in H12336. The **SABER Check PFM Uncertainty** function was used to highlight all of the cases where computed final node vertical uncertainty exceeded IHO Order 1a. The final one-meter PFM CUBE surface contained eight individual CUBE nodes with final uncertainties that exceeded IHO Order 1a. A review of the areas with final uncertainties exceeding IHO Order 1a revealed that four nodes with high vertical uncertainties surrounded feature 1, two nodes with high vertical uncertainties surrounded feature 2, and two nodes were on a steep slope in 37° 35' 47.95"N 075° 25' 36.11"W, where there tended to be much greater variability in the depths of the soundings that contributed to a particular node.

The **SABER Check PFM Uncertainty** function was also run on each of the four half-meter feature PFM CUBE surfaces. The results listed in Table B-4 are for the original submitted half-meter feature PFM CUBE surfaces as well as the supplemental delivered half-meter feature PFM grids.

**Table B-4. Feature Area PFM Nodes Exceeding the Allowable IHO Order 1a Uncertainty**

Feature Area	Number of CUBE nodes which exceed IHO Order 1a
1	27
2	45
3	2
4	0

The **SABER Frequency Distribution** tool was also used to review vertical uncertainties within the one-meter and four half-meter resolution PFM grids. This tool creates statistical data about the distribution of values within a selected surface. To examine the vertical uncertainty, the routine was run on the Final Uncertainty layer of each PFM. The results from the routine show that more than 99.99% of all grid nodes in the one-meter PFM contained vertical uncertainties of 0.50 meters or less (Table B-5). While the number of nodes that fell within the vertical uncertainty range differed slightly between the original submitted one-meter data and the supplemental delivered PFM, the cumulative percentages did not change. When performed on the original submitted four individual features PFMs, at least 99.99% of all grid nodes contained vertical uncertainties of 0.50 meters or less (Table B-6). When performed on the supplemental delivered four feature PFM grids, at least 99.91% of all grid nodes contained vertical uncertainties of 0.50 meters or less (Table B-7).

**Table B-5. Frequency Distribution Results for Vertical Uncertainty in the One-meter PFM**

Final Uncertainty (meters)	Count	Cumulative Percent
0.000 - 0.300	102174488	99.93%
0.300 - 0.500	73848	99.99%
0.500 - 0.619	4	100.00%

**Table B-6. Frequency Distribution Results for Vertical Uncertainty in the Original Half-meter PFMs**

Feature Area	Final Uncertainty (meters)	Count	Cumulative Percent
1	0.00 - 0.50	38972	99.99%
2	0.00 - 0.50	39356	99.99%
3	0.00 - 0.50	32218	99.99%
4	0.00 - 0.50	39601	99.99%

**Table B-7. Frequency Distribution Results for Vertical Uncertainty in the Supplemental Delivery Half-meter PFMs**

Feature Area	Final Uncertainty (meters)	Count	Cumulative Percent
1	0.00 - 0.50	39170	99.91%
2	0.00 - 0.50	39555	99.88%
3	0.00 - 0.50	32398	99.99%
4	0.00 - 0.50	39800	99.99%

### B.2.5 Junction and Crossing Analysis

Three types of repeatability analyses were performed on H12336 multibeam data; junction analysis of gridded crossings within H12336, junction analysis with adjacent completed sheets, and beam-by-beam crossing analysis.

#### B.2.5.1 Junction Analysis

The **SABER Junction Analysis** tool was used during the survey to conduct a daily comparison of main scheme to near nadir crossline data to ensure that no systematic errors were introduced and to identify potential problems with the survey system. After the application of all correctors and completion of final processing, separate one-meter CUBE PFM grids were built. One grid contained the full valid swath ( $\pm 60^\circ$  cutoff) of all main scheme multibeam data and the other included only the Class 1 ( $\pm 5^\circ$  cutoff) crossline data.

The **SABER Frequency Distribution** tool was used to analyze the resulting difference grid. Comparisons of all final crossing data in H12336 showed that 98.96% of comparisons were within 20 centimeters and 99.99% of comparisons were within 30 centimeters (Table B-8). All comparisons were found to be 36 centimeters or less, which is well within the requirement defined in Section 5.2.4.3 of the HSSD stating that at least 95% of the depth difference values be within the maximum allowable total vertical uncertainty (calculated to be between 0.517 and 0.599 meters for H12336).

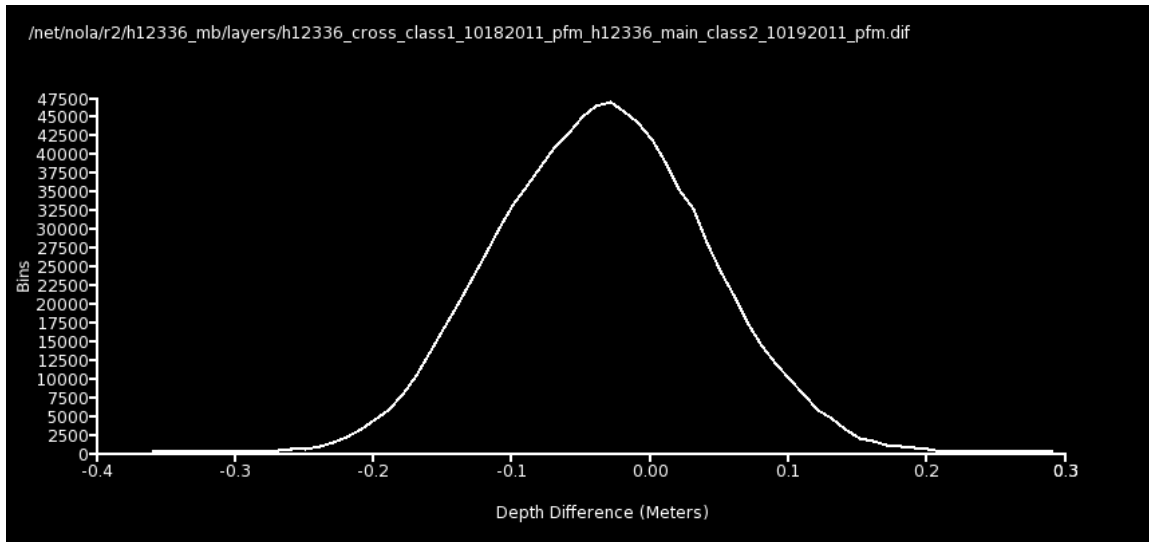
The difference grid used was created by subtracting the H12336 main scheme CUBE depths from the H12336 cross CUBE depths. Therefore, positive values indicate that H12336 crossline data are deeper than H12336 main scheme data. The crossline data

were shoaler than the crossline data in 31.21% of junctions and the crossline data were deeper than main scheme data in 68.32% of the junctions across the entire survey area. Though the distribution is skewed slightly in the positive direction, the differences are fairly well spread about zero, as visualized in Figure B-1.

**Table B-8. Junction Analysis, Main Scheme Lines vs. Crosslines, H12336**

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent
0.00-0.05	296640	45.18	165061	18.80	227416	25.91	4163	0.47
>0.05-0.10	268962	75.82	77424	27.62	191538	47.72		
>0.10-0.15	151582	93.09	26391	30.63	125191	61.99		
>0.15-0.20	49634	98.74	4657	31.16	44977	67.11		
>0.20-0.25	9740	99.85	442	31.21	9298	68.17		
>0.25-0.30	1219	99.99	1	31.21	1218	68.31		
>0.30-0.35	82	99.99	0	31.21	82	68.32		
>0.35-0.40	1	100.00	0	31.21	1	68.32		
<b>Totals</b>	877860	100.00%	273976	31.21%	599721	68.32%	4163	0.47%

Reference Grid: H12336\_1m\_cross\_class1\_ver5\_12052011\_pfm\_H12336\_main\_1m\_ver5\_pfm.dif

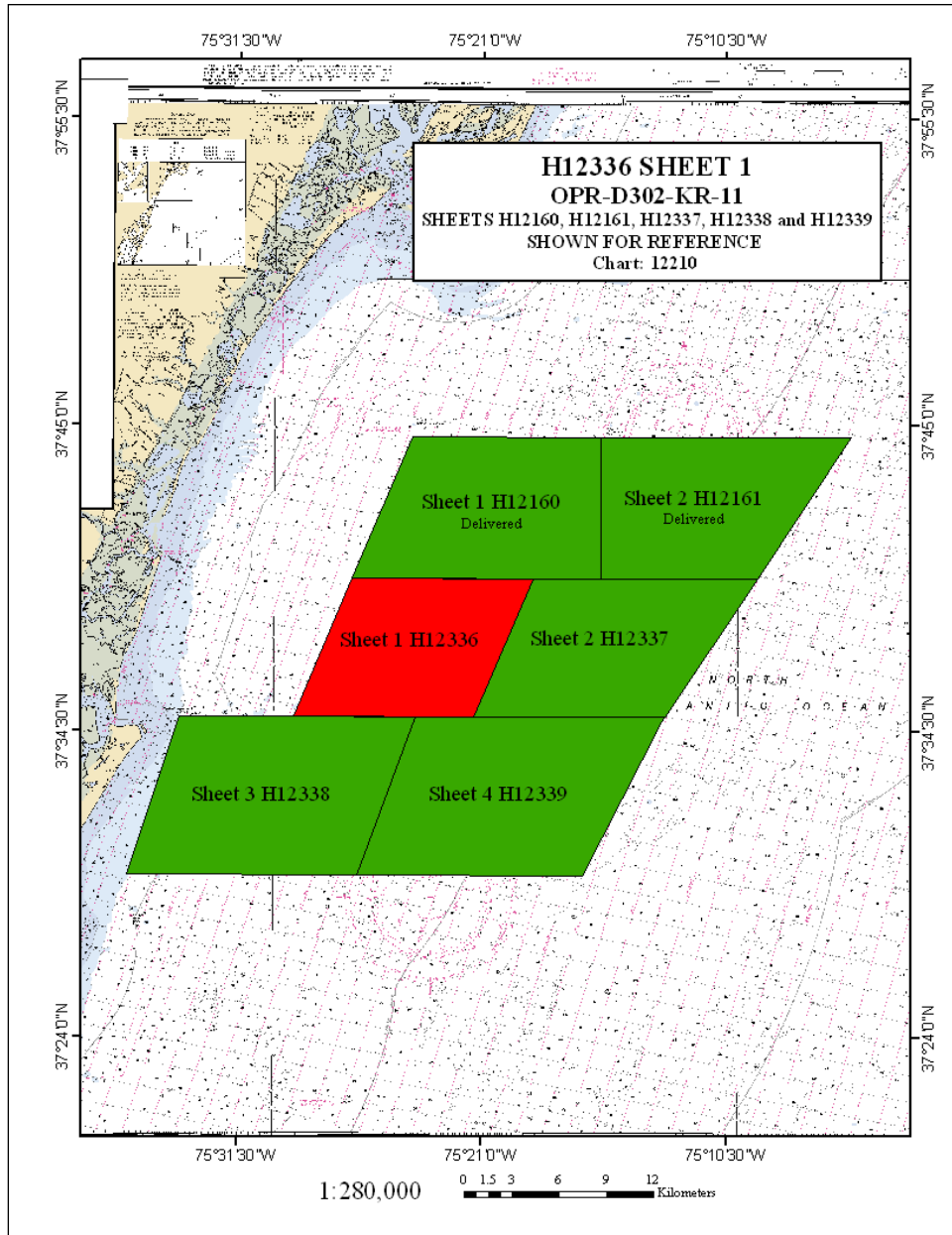


**Figure B-1. Frequency Distribution Plot of Depth Differences for H12336 Main Scheme Lines vs. H12336 Crosslines**

Sheet-to-sheet junction analyses were performed between H12336 and adjacent sheets for which all edits and final correctors were applied to the data. Adjacent survey sheets with finalized data for junction analysis are listed in Table B-9. Refer to Figure B-2 for the general locality of each sheet.

**Table B-9. Surveys for Junction to H12336**

Registry No.	Scale	Year of Acquisition	Field Party	Date Delivered to AHB	Location of Junction
H12160	1:20,000	2011	SAIC	12 August 2011	North



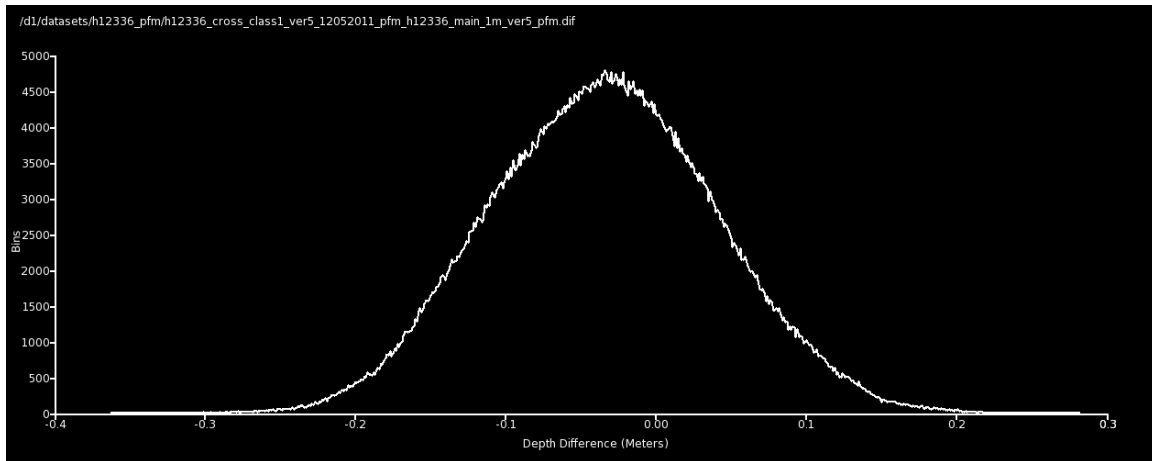
**Figure B-2. General Locality and Status of Sheets in Reference to H12336**

Table B-10 depicts the junction analysis between H12336 and H12160 (Sheet 1, Project Number OPR-D302-KR-10) that was surveyed between 10 April and 25 June 2011 and borders H12336 to the north. Junction analysis was conducted on the differences between the CUBE depths from the final one-meter PFM grid for each sheet in the common area of these two sheets. The H12336 CUBE depths within the overlap area of the two sheets varied from 12.671 meters to 23.791 meters resulting in allowable vertical uncertainties between 0.526 and 0.588 meters. The results showed that 98.20% of the comparisons were within 20 centimeters and 99.57% were within 25 centimeters.

Junction analysis was performed by subtracting the H12160 data from the H12336 data. Therefore positive values indicate that H12336 depth data were deeper than H12160 depth data. Throughout the common area, H12336 CUBE depths were shoaler than H12336 31.27% of the time and were deeper than H12336 68.20% of the time (Table B-10). Though the distribution is skewed slightly in the positive direction, the differences are fairly well spread about zero, as visualized in Figure B-3.

**Table B-10. Junction Analysis, H12336 vs. H12160**

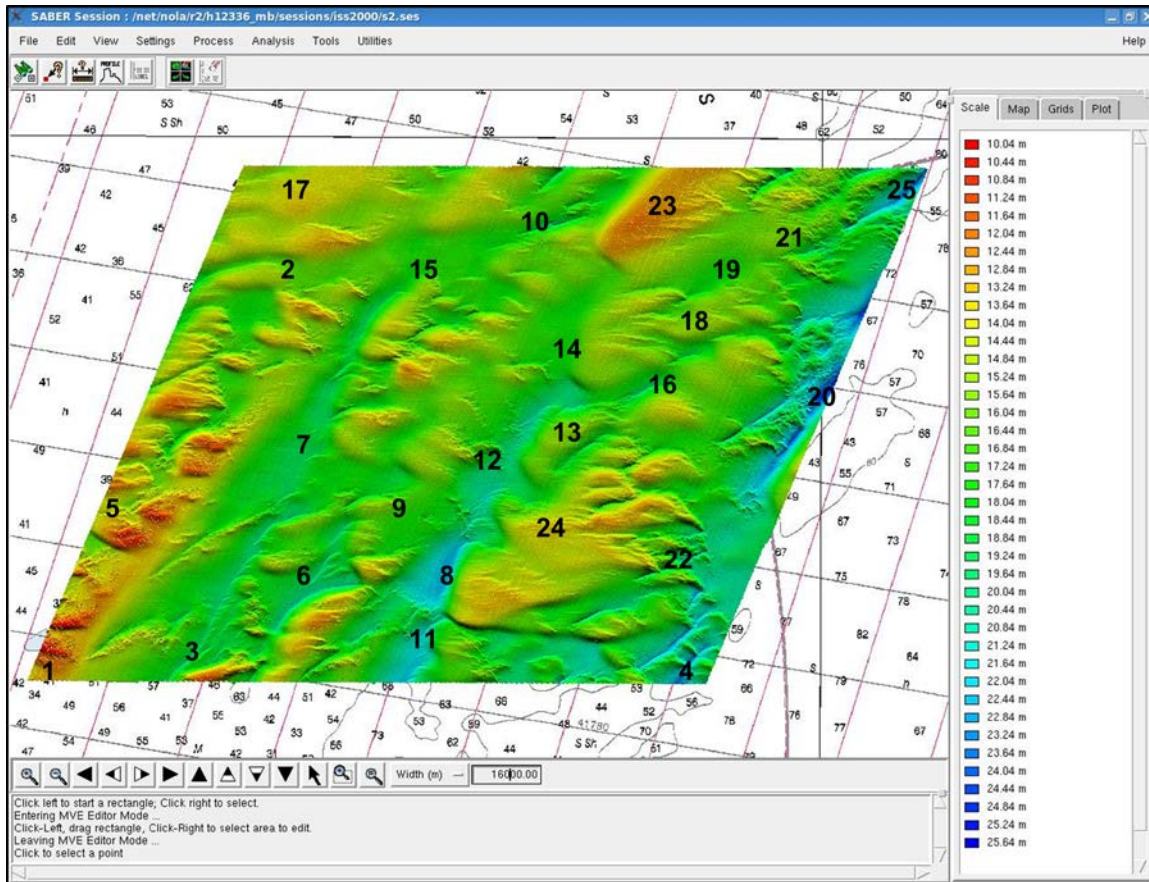
Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent
0-0.05	208543	45.75	118673	26.03	87443	19.18	2427	0.53
>0.05-0.10	137163	75.83	98858	47.72	38305	27.58		
>0.10-0.15	77643	92.87	63549	81.66	14094	30.68		
>0.15-0.20	24296	98.20	21901	66.46	2395	31.20		
>0.20-0.25	6356	99.57	5953	67.77	303	31.27		
>0.25-0.30	1663	99.93	1643	68.13	20	31.27		
>0.30-0.35	202	99.98	292	68.17	0	31.27		
>0.35-0.40	75	99.99	75	68.19	0	31.27		
>0.40-0.45	21	99.99	21	68.19	0	31.27		
>0.45-0.50	8	100.00	8	68.20	0	31.27		
<b>Totals</b>	455870	100.00%	310883	68.20%	142560	31.27%	2427	0.53
Reference Grid: H12336_1m_MLLW_pfm_H12160_1m_MLLW_pfm.dif								



**Figure B-3. Frequency Distribution Plot of Depth Differences for H12336 vs. H12160**

#### *B.2.5.2 Crossing Analysis*

Twenty-five crossings were selected from areas consisting of a relatively flat bottom for beam-by-beam comparison (Figure B-4). The chosen crossings were confirmed to encompass the H12336 survey area both spatially and temporally. The results of the comparisons are presented in Separates IV of this report. The crossings show a general trend of uniform differences in beam depths across the swaths of the files with the majority of the differences less than 20 centimeters. Sound speed artifacts were observed in a few of the crossings; however none of these artifacts were outside of the data quality specifications or had a significant effect on the final gridded surface. There were no offset biases observed.



**Figure B-4. Location of 25 Crossings Used in the Crossing Analysis for H12336**

### B.2.6 Sidescan Coverage Analysis

The Project Instructions required 200% sidescan coverage for all depths. The 200% sidescan coverage was verified by generating two separate 100% coverage mosaics at one-meter cell size resolution as specified in Section 8.3.1 of the HSSD. The first and second 100% coverage mosaics were reviewed using tools in **SABER** to verify data quality and swath coverage. The first and second 100% coverage mosaics are determined to be complete and sufficient to meet the Project Instructions, for 200% sidescan sonar coverage.

Each 100% coverage mosaic is delivered as a geo-referenced image (image file [.tif] and a corresponding world file [.tfw]).

### B.3 CORRECTIONS TO ECHO SOUNDINGS

Please refer to the DAPR REV 1 for a description of all corrections applied to echo soundings. There were no deviations from the corrections described therein.

## B.4 DATA PROCESSING

Please refer to Sections B.2 and B.3 of the DAPR REV 1 for a description of all data processing steps performed. There were no deviations from the processes described therein.

### B.4.1 Bathymetry Data Processing

The final gridded multibeam data are delivered as Bathymetric Attributed Grids (BAGs). The BAGs were exported from the CUBE Depth and Final Uncertainty surfaces within the CUBE PFM grid, which are defined in Section B.2.4 of the DAPR REV 1. Based on a request by NOAA's Atlantic Hydrographic Branch (AHB), SAIC limited the resulting BAG file size to approximately 300 megabytes (MB). Therefore, multiple BAGs were produced from the single CUBE PFM grid of the sheet. For the original submission for this sheet, five BAGs at one-meter grid resolution were submitted for the entire H12336 area. The BAG file named H12336\_1m\_MLLW\_1of5.bag is the southernmost one-meter BAG, while the BAG file named H12336\_1m\_MLLW\_5of5.bag is the northernmost one-meter BAG. A summary of the final one-meter BAG files (converted from the one-meter CUBE PFM grid) and the four half-meter BAG files (converted from four half-meter feature area CUBE PFM grids) is provided in Table B-11. The depth range and uncertainty range for each delivered BAG is detailed in Table B-12.

**Table B-11. Summary of Original Submitted H12336 BAG Files**

BAG File Name	Comments
H12336_1m_MLLW_1of5.bag	Southernmost 1.0-meter BAG
H12336_1m_MLLW_2of5.bag	
H12336_1m_MLLW_3of5.bag	
H12336_1m_MLLW_4of5.bag	
H12336_1m_MLLW_5of5.bag	Northernmost 1.0-meter BAG
H12336_features_area_1_50cm_MLLW_1of4.bag	Feature 1; 0.5-meter BAG
H12336_features_area_2_50cm_MLLW_2of4.bag	Feature 2; 0.5-meter BAG
H12336_features_area_3_50cm_MLLW_3of4.bag	Feature 3; 0.5-meter BAG
H12336_features_area_4_50cm_MLLW_4of4.bag	Feature 4; 0.5-meter BAG

**Table B-12. Summary of H12336 Original Submitted BAG Depth and Uncertainty Values**

BAG File Name	Depth Range (meters)	Uncertainty Range (meters)
H12336_1m_MLLW_1of5.bag	10.098 – 23.929	0.270 – 0.498
H12336_1m_MLLW_2of5.bag	10.469 – 22.862	0.270 – 0.619
H12336_1m_MLLW_3of5.bag	11.100 – 25.312	0.270 – 0.433
H12336_1m_MLLW_4of5.bag	12.630 – 24.769	0.270 – 0.582
H12336_1m_MLLW_5of5.bag	12.198 – 24.126	0.270 – 0.441
H12336_features_area_1_50cm_MLLW_1of4.bag	13.190 – 15.537	0.280 – 0.969

BAG File Name	Depth Range (meters)	Uncertainty Range (meters)
H12336_features_area_2_50cm_MLLW_2of4.bag	14.806 – 16.853	0.280 – 1.294
H12336_features_area_3_50cm_MLLW_3of4.bag	14.128 – 15.504	0.280 – 0.623
H12336_features_area_4_50cm_MLLW_4of4.bag	16.734 – 17.666	0.280 – 0.402

As requested by NOAA's AHB, six additional non-standard BAG files corresponding to each of the standard BAG files listed in Table B-11 were generated for the original delivery of this sheet. These additional BAG files were generated through the same process as the standard BAG files. Currently the BAG format only allows for two layers to be defined within the BAG, a Depth layer and an Uncertainty layer. Therefore, each of the non-standard BAG files were created with the CUBE Depth layer, populating the Depth layer of the BAG and each of the following surfaces populating the Uncertainty layer of the BAG:

- CUBE Number of Hypotheses
- CUBE Standard Deviation
- CUBE Hypothesis Strength
- CUBE Number of Soundings
- Average TPU
- Standard Deviation

A detailed description of these layers can be found in Section B.2.5 of the DAPR REV 1.

Please note when reviewing these additional, non-standard BAGs the file name designates the layer which populates the Uncertainty layer of the BAG. Please also note that when displayed the two layers of the BAG remain named Depth and Uncertainty. These non-standard BAGs are provided for review purposes only and are not intended to be used as archival products.

As discussed in the DAPR REV 1, the BAG version was updated in April 2012. SAIC re-generated BAGs in version 1.5.0 and is submitting them as a supplemental delivery along with this revision to the descriptive report. These new BAG files include not only the Depth and Uncertainty layers but also the Depth Solution Group Surfaces and Node Group Surfaces which include the following surfaces:

- Depth
- Uncertainty
- Standard Deviation
- Number of Soundings
- Shoal Depth
- Hypothesis Strength
- Number of Hypotheses

Please refer to Section B 2.5 of the DAPR REV 1 for details about the optional surfaces. With the inclusion of additional surfaces into one BAG file, the total number of BAG files built from the single CUBE PFM grid of the sheet is different from the originally submitted data. Thirteen BAG version 1.5.0 files at one-meter grid resolution are submitted for the entire H12336 area. However, with version 1.5.0 BAGs that include the optional surfaces contained in the Depth Solution Group and Node Group, non-standard BAG files are no longer required. Therefore non-standard BAG files are not included with this supplemental delivery. Refer to the DAPR REV 1 for a discussion of the layers included within each BAG file.

Please note however, when the BAG 1.5.0 support was added to **SABER**, the PFM library was also upgraded. The precision of the positions of the min/max X/Y values in the PFM header and the precision of the offsets saved in the PFM depth records were increased in this version of PFM and thus the positions of depth records (soundings) read from the PFM may be slightly different from previous versions of the PFM library. Some depth records that were very close to the extreme of the CUBE capture radius may or may not be included in a CUBE node when compared to the same PFM created with the previous PFM library. This resulted in slightly different CUBE depth and uncertainty values in a small number of nodes evenly distributed throughout the BAG, when comparing the original delivered version 1.1.0 BAGs. When differences were observed, they were generally on the scale of one centimeter or smaller.

A summary of the one-meter version 1.5.0 BAG files (converted from the one-meter CUBE PFM grid) and the four half-meter BAG files (converted from four half-meter feature area CUBE PFM grids) is provided in Table B-13. The depth range and uncertainty range for each delivered BAG is detailed in Table B-14. Please disregard Table B-11 and Table B-12 as well as the originally submitted BAG files for H12336 if there is a CARIS version available which supports version 1.5.0 BAG files at the time of review of this sheet. SAIC has inquired with CARIS on the timeframe for support of version 1.5.0 BAGs and as of the date of delivery of this report we have only heard back that it will likely be summer of 2012. SAIC will notify AHB once a release date is announced. If an updated version of CARIS is not available when review of this sheet begins, the original delivered BAGs (both standard and non-standard) provide the information required to perform the review, just as in past year's deliveries.

**Table B-13. Summary of Supplemental Delivered H12336 BAG Version 1.5.0 Files**

BAG File Name	Comments
H12336_1m_MLLW_1of13.bag	Southernmost 1.0-meter BAG
H12336_1m_MLLW_2of13.bag	
H12336_1m_MLLW_3of13.bag	
H12336_1m_MLLW_4of13.bag	
H12336_1m_MLLW_5of13.bag	
H12336_1m_MLLW_6of13.bag	
H12336_1m_MLLW_7of13.bag	
H12336_1m_MLLW_8of13.bag	

BAG File Name	Comments
H12336_1m_MLLW_9of13.bag	
H12336_1m_MLLW_10of13.bag	
H12336_1m_MLLW_11of13.bag	
H12336_1m_MLLW_12of13.bag	
H12336_1m_MLLW_13of13.bag	Northernmost 1.0-meter BAG
H12336_features_area_1_50cm_MLLW_1of4.bag	Feature 1; 0.5-meter BAG
H12336_features_area_2_50cm_MLLW_2of4.bag	Feature 2; 0.5-meter BAG
H12336_features_area_3_50cm_MLLW_3of4.bag	Feature 3; 0.5-meter BAG
H12336_features_area_4_50cm_MLLW_4of4.bag	Feature 4; 0.5-meter BAG

**Table B-14. Summary of Supplemental Delivered H12336 BAG Version 1.5.0 Depth and Uncertainty Values**

BAG File Name	Depth Range (meters)	Uncertainty Range (meters)
H12336_1m_MLLW_1of13.bag	11.536 - 23.929	0.270 - 0.446
H12336_1m_MLLW_2of13.bag	10.168 - 23.619	0.270 - 0.498
H12336_1m_MLLW_3of13.bag	10.098 - 22.862	0.270 - 0.583
H12336_1m_MLLW_4of13.bag	10.717 - 22.848	0.270 - 0.428
H12336_1m_MLLW_5of13.bag	10.469 - 21.911	0.270 - 0.452
H12336_1m_MLLW_6of13.bag	11.489 - 23.698	0.270 - 0.619
H12336_1m_MLLW_7of13.bag	11.100 - 24.462	0.270 - 0.433
H12336_1m_MLLW_8of13.bag	11.631 - 25.312	0.270 - 0.433
H12336_1m_MLLW_9of13.bag	13.150 - 24.588	0.270 - 0.485
H12336_1m_MLLW_10of13.bag	12.790 - 24.769	0.270 - 0.443
H12336_1m_MLLW_11of13.bag	12.302 - 21.535	0.270 - 0.582
H12336_1m_MLLW_12of13.bag	12.198 - 24.101	0.270 - 0.441
H12336_1m_MLLW_13of13.bag	12.671 - 24.126	0.270 - 0.374
H12336_features_area_1_50cm_MLLW_1of4.bag	13.190 – 15.537	0.280 – 0.969
H12336_features_area_2_50cm_MLLW_2of4.bag	14.806 – 16.853	0.280 – 1.294
H12336_features_area_3_50cm_MLLW_3of4.bag	14.128 – 15.504	0.280 – 0.623
H12336_features_area_4_50cm_MLLW_4of4.bag	16.734 – 17.666	0.280 – 0.402

#### B.4.2 Sidescan Data Processing

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. Sidescan sonar contacts were made through Triton **Isis**. Sidescan contact information is delivered in several ways. The spreadsheet “H12336\_Sidescan\_Contacts\_List”, located in Appendix II, notes all sidescan contacts that were identified within H12336. Contacts for which an **Isis** contact file was created are delivered in Separates V (\*\_n.CON files) for which details regarding these files can be found in Section B.3.3 of the DAPR REV 1. Sidescan contacts that have been correlated to a multibeam feature are included in the

Feature Correlator Sheets, found in Appendix II. Sidescan sonar contacts are also delivered as a Sidescan Sonar Contacts S-57 file. Additionally all contact image files (.tif) are delivered in Separates V.

## C. VERTICAL AND HORIZONTAL CONTROL

No vertical or horizontal controls were established, recovered, or occupied during OPR-D302-KR-11 data acquisition, which includes H12336. Therefore a Horizontal and Vertical Control Report is not required. Vertical and horizontal control specifics pertaining to H12336 are discussed below.

### C.1 VERTICAL CONTROL

The vertical datum for H12336 is Mean Lower Low Water (MLLW). The Project Instructions specified NOAA tide station 8631044 Wachapreague, VA as the source for water level correctors. A full explanation of the tide zone assessment is detailed in Section C.4 of the DAPR REV 1 delivered concurrently with this report. For H12336, 8631044 Wachapreague, VA was the source of all final verified water level heights for determining correctors to soundings. All data for H12336 were contained within three tide zones which were provided from NOAA and are summarized in Table C-1.

**Table C-1. Water Level Zoning Parameters Applied on Sheet H12336**

Zone	Time Corrector (minutes)	Range Ratio	Reference Station
SA46	-66	0.87	8631044
SA55	-66	0.90	8631044
SA55A	-72	0.90	8631044

SAIC did not revise the delivered tide zones for tide station 8631044 Wachapreague, VA as the water level zoning parameters provided by National Ocean Service (NOS), Table C-1, were deemed adequate for the application of observed verified water levels. As a result, they were accepted as final and applied to all H12336 multibeam data.

No final tide note was provided by the NOAA Center for Operational Oceanographic Products and Services (CO-OPS). SAIC is not required to have a final tide note from CO-OPS for H12336. SAIC has provided a final tide note in Appendix IV.

### C.2 HORIZONTAL CONTROL

The survey data for sheet H12336 were collected in horizontal datum North American Datum of 1983 (NAD-83), using geodetic coordinates, while data display and products used the UTM Zone 18, North 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)

Please refer to the DAPR REV 1 for details regarding all antenna and transducer offsets.

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

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. All daily positioning confidence checks for H12336, were within 1.66 meters. These daily positional checks are presented in a standalone table within Separates I, "H12336\_Daily\_Positioning\_Confidence\_Checks". All soundings with total horizontal uncertainties which exceeded the maximum allowable IHO S-44 5<sup>th</sup> edition Order 1a specifications were flagged as invalid and therefore were not used in the CUBE depth calculations.

## D. RESULTS AND RECOMMENDATIONS

### D.1 CHART COMPARISON

For chart comparisons, survey data are compared to the largest scale chart that encompasses the entire area. In the case of H12336, the survey area is fully covered by one Raster Chart (BSB) and one Electronic Navigational Chart (ENC). Details of each chart are listed below.

<b>Chart 12210</b>	<b>Chincoteague Inlet to Great Machipongo Inlet</b>
Scale	1:80,000
Edition and Date	38 <sup>th</sup> , 05/01/2008
Notice to Mariners corrected through	38.159, 10/22/2011
<b>ENC US4VA70M</b>	<b>Chincoteague Inlet to Great Machipongo Inlet</b>
Scale	1:80,000
Edition and Issue Date	11 <sup>th</sup> , 03/03/2011
Update and Date	7, 09/19/2011

The chart comparisons were conducted using SAIC's **SABER** software to view the BSB raster charts with overlain layers of H12336 data such as the CUBE gridded surface, selected soundings, contacts, and features. For ENC comparisons, a combination of Jeppesen's **dKart Inspector**, SevenCs' **SeeMyDENC**, and CARIS' **EasyView** were used in conjunction with **SABER**. Results from the comparisons are described below.

Charting recommendations for depths follow Section 5.1.2 of the HSSD where depths and uncertainties are to be reported in meters rounded to the nearest millimeter by standard arithmetic rounding (round half up). Chart depth units are rounded using NOAA cartographic rounding (0.75 round up).

Notice to Mariners publications from the United States Coast Guard (USCG) District 5 were reviewed for changes subsequent to the date of the Hydrographic Survey Project Instructions or Statement of Work and before the end of survey that affect the area within H12336 as requested in Section 8.1.4 of the HSSD. The USCG District 5 Local Notice to Mariners for Week 31/11 had the following entry in Section IV Chart Corrections:

ADD Obstruction in Feet; 49 Obstn                      Chart No. 1:K41 (NOS NW-20624) 37-38-46.100N 075-25-51.620

This addition was from Danger to Navigation Report 1, as submitted by SAIC.

H12336 data meets data accuracy standards and bottom coverage requirements. Recommend updating the common areas of all charts using data from this survey. All charting recommendations for all features are provided under Appendix II, Survey Feature Report.

### **D.1.1 Chart 12210 Chincoteague Inlet to Great Machipongo Inlet (1:80,000)**

Chart 12210 encompasses all of H12336.

CUBE depths within sheet H12336 generally agreed within  $\pm 4$  feet of the charted depths. The following two isolated soundings show notable exceptions to the general agreement.

The charted 57-foot sounding in approximately  $37^{\circ} 36' 20.93''\text{N } 075^{\circ} 28' 18.39''\text{W}$  was in CUBE depths of 41 to 46 feet.

The charted 32-foot sounding in approximately  $37^{\circ} 36' 39.02''\text{N } 075^{\circ} 27' 32.53''\text{W}$  was in CUBE depths of 41 to 43 feet.

The charted 60-foot depth curves across H12336 were generally in good agreement with the CUBE depths with the following exception.

CUBE depths between 61 and 68 feet were found between approximately  $37^{\circ} 38' 40.00''\text{N } 075^{\circ} 24' 50.00''\text{W}$  and approximately  $37^{\circ} 34' 58.50''\text{N } 075^{\circ} 27' 37.00''\text{W}$ . The area is approximately 8000 meters long, varies between 200 to 1500 meters wide along an azimuth of approximately  $30^{\circ}/210^{\circ}$ .

Recommendations:

- Draw a 60-foot depth curve around the appropriate depths in this area.

### **D.1.2 ENC US4VA70M Chincoteague Inlet to Great Machipongo Inlet (1:80,000)**

US4VA70M encompasses all of H12336.

CUBE depths within sheet H12336 generally agreed within  $\pm 1.5$  meters of the charted depths. The following two isolated soundings show notable exceptions to the general agreement.

The charted 17.3-meter sounding in approximately  $37^{\circ} 36' 21.15''\text{N } 075^{\circ} 28' 18.43''\text{W}$  was in CUBE depths of 12.312 to 14.114 meters.

The charted 9.7-meter sounding in approximately  $37^{\circ} 36' 39.39''\text{N } 075^{\circ} 27' 32.54''\text{W}$  was in CUBE depths of 12.782 to 14.724 meters.

The charted 18.2-meter depth curves across H12336 were generally in good agreement with the CUBE depths with the following exception.

CUBE depths between 18.300 and 20.930 meters were found between approximately  $37^{\circ} 38' 40.00''\text{N } 075^{\circ} 24' 50.00''\text{W}$  and approximately  $37^{\circ} 34' 58.50''\text{N } 075^{\circ} 27' 37.00''\text{W}$ . The area is approximately 8000 meters long, varies between 200 to 1500 meters wide along an azimuth of approximately  $30^{\circ}/210^{\circ}$ .

Recommendations:

- Draw an 18.2-meter depth curve around the appropriate depths in this area.

### **D.1.3 Automated Wreck and Obstruction Information Service (AWOIS) Item Investigations**

As defined in the Project Instructions, there were a total of four AWOIS items assigned for project OPR-D302-KR-11. None of these AWOIS items fell within the H12336 survey boundary. As a result, there were no AWOIS items investigated for H12336.

### **D.1.4 Designated Soundings**

Designated soundings are used to help better preserve the shallowest sounding relative to the computed depth surface. Separate flags exist in the Generic Sensor Format (version 3.01) for designated soundings and features. The designated sounding in the final CUBE surface has also been flagged as a designated sounding in the GSF files. 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 H12336 are listed within two spreadsheets "H12336\_Multibeam\_Features\_List" and "H12336\_Designated\_Soundings\_List" located in Appendix II. Both the designated soundings and features flags as defined within GSF are mapped to the same HDGS flag when ingested into CARIS (PD\_DEPTH\_DESIGNATED\_MASK). The following pages discuss the three designated soundings that were set in the H12336 survey data.

D.1.4.1 Designated Sounding 1

Designated sounding 1 is a small non-significant object with a least depth of 14.865 meters in 37° 39' 27.64"N 075° 20' 08.11"W. The object is approximately 0.60 meters high lying in a shallow 0.25 meter depression. A designated sounding was set because the CUBE depth at this position was 15.323 meters, 0.458 meters deeper than the least depth of the object, thus preserving the least depth of the object (Figure D-1 and Figure D-2). There are two sidescan contacts on this object, 1189131922.con and 1189144931.con.

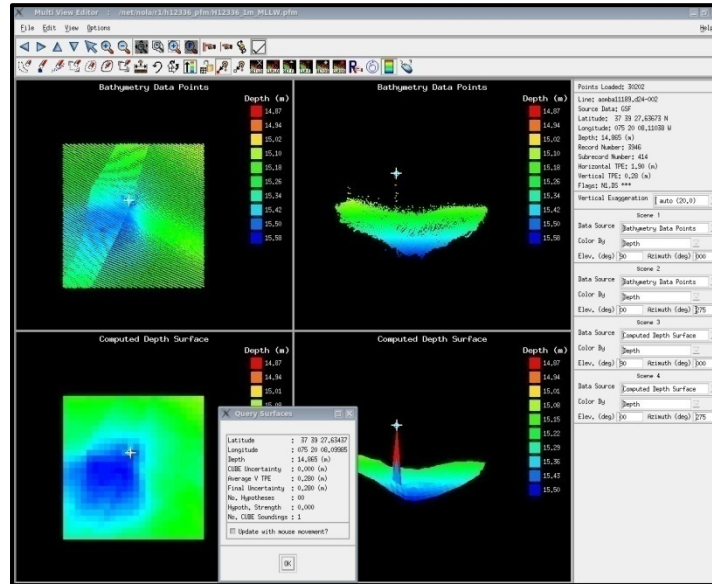


Figure D-1. Designated Sounding 1 CUBE Surface when Set in MVE

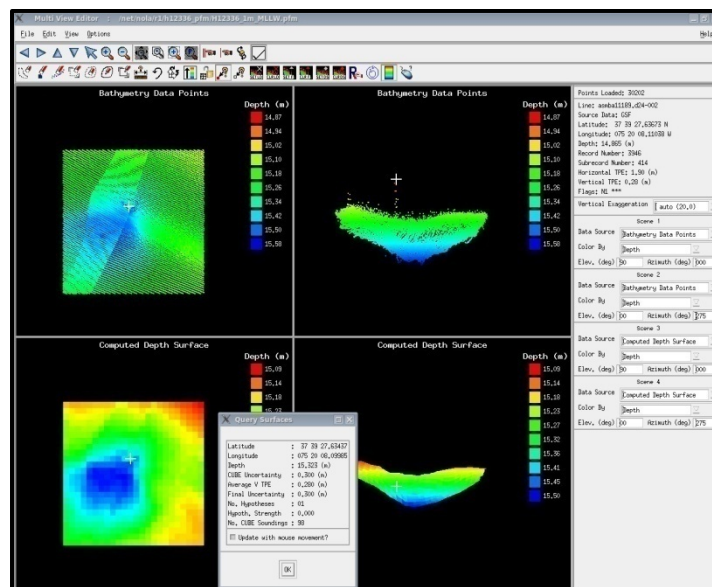


Figure D-2. Designated Sounding 1 CUBE Surface when Not Set in MVE

D.1.4.2 Designated Sounding 2

Designated sounding 2 is a small non-significant object with a least depth of 17.685 meters in 37° 37' 51.54"N 075° 23' 23.36"W. The object is approximately 0.35 meters high lying in a slight slope in approximately 18.06 meters of water. A designated sounding was set because the CUBE depth at this position was 17.915 meters, 0.23 meters deeper than the least depth of the object, thus preserving the least depth of the object (Figure D-3 and Figure D-4). There are two sidescan contacts on this object, 11190103854.con and 1190123428.con.

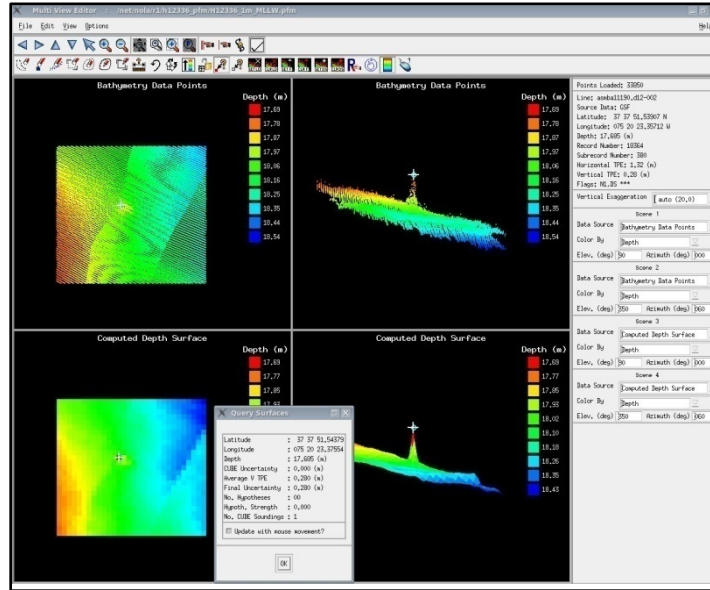


Figure D-3. Designated Sounding 2 CUBE Surface when Set in MVE

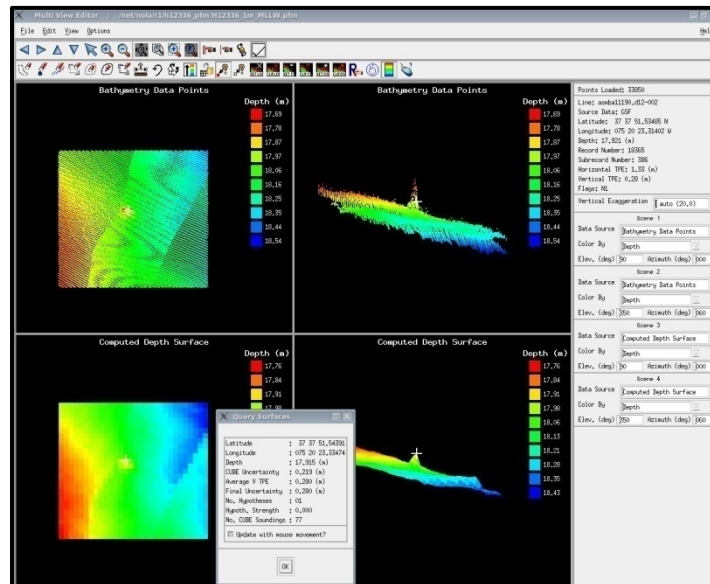


Figure D-4. Designated Sounding 2 CUBE Surface when Not Set in MVE

### D.1.4.3 Designated Sounding 3

Designated sounding 3 is a small non-significant object with a least depth of 18.275 meters in 37° 37' 56.55"N 075° 20' 18.82"W. The object is approximately 0.55 meters high in approximately 18.81 meters of water. A designated sounding was set because the CUBE depth at this position was 18.640 meters, 0.365 meters deeper than the least depth of the object, thus preserving the least depth of the object (Figure D-5 and Figure D-6). There are two sidescan contacts on this object, 11190123346.con and 1190144706.con.

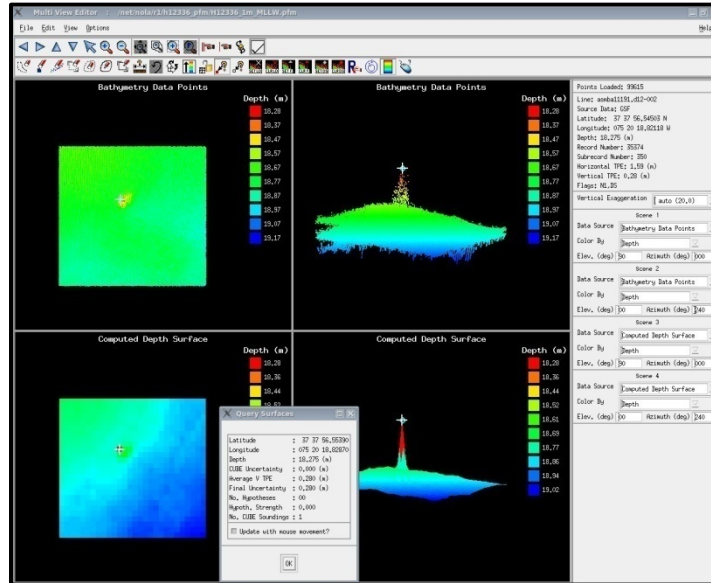


Figure D-5. Designated Sounding 3 CUBE Surface when Set in MVE

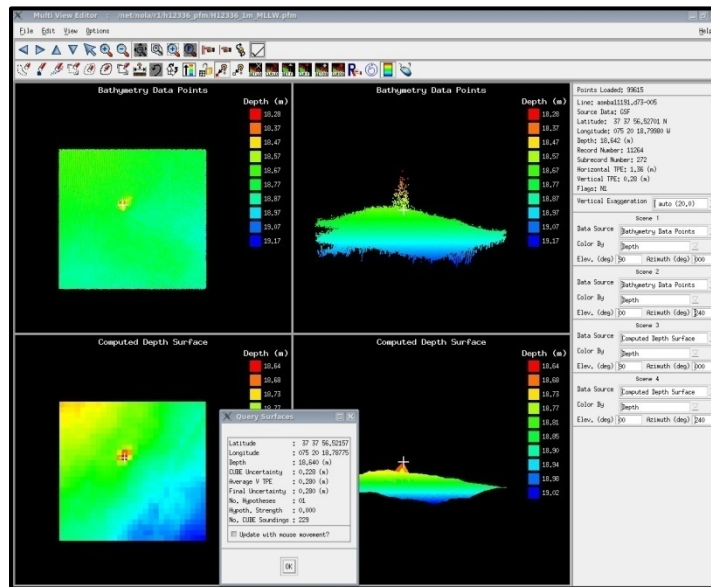


Figure D-6. Designated Sounding 3 CUBE Surface when Not Set in MVE

### **D.1.5 Danger to Navigation Reports**

One Danger to Navigation Report was submitted for this survey and a copy is included in Appendix V. The Atlantic Hydrographic Branch's corresponding version as it was submitted to Marine Charting Division is included in Appendix I.

## **D.2 ADDITIONAL RESULTS**

### **D.2.1 Shoreline Verification**

Shoreline verification was not required for H12336.

### **D.2.2 Comparison with Prior Surveys**

Comparison with prior surveys was not required under this Task Order.

### **D.2.3 Aids to Navigation**

There were no Aids to Navigation that fell within the H12336 survey area.

### **D.2.4 S-57 Feature File**

Included with H12336 delivery is the S-57 feature file, 3S412336.000. Details on how this file is generated and quality reviewed can be found in Section B.2.6 of the DAPR REV 1. The **SABER** software was recently modified to allow the value of sounding (VALSOU) attribute be at least millimeter precision and to allow for the NOAA Extended Attributes, as defined in the HSSD. The S-57 feature file delivered for H12336 contains millimeter precision although some supporting documents, such as Feature Correlator sheets, retain centimeter precision. Following specifications, the S-57 feature file is in the WGS84 datum and is unprojected with all units in meters. All four of the features addressed in H12336 are retained within the S-57 feature file.

Feature Correlator sheets are presented in Appendix II. At the request of AHB, the Feature Correlator sheet was exported as an image file (.jpg) and is included under the NOAA Extended Attribute field "images" with the S-57 feature file for all features.

### **D.2.5 Sidescan Sonar Contacts S-57 File**

As requested by AHB, SAIC also generated a supplemental S-57 file to present the sidescan contacts. Details on how this file was generated, attributed, and quality reviewed can be found in Section B.3.4 of the DAPR REV 1. Note that both the feature and sidescan S-57 files share the same name "3S412336.000". The supplemental sidescan S-57 feature file is located in the directory named "H12336\Data\Processed\S-57\_Features\Side\_Scan\_Sonar\_S-57\_File\_as\_Cartographic\_symbol", while the S-57 final feature file is located in the directory named "H12336\Data\Processed\S-57\_Features".

The “H12336\_Sidescan\_Contacts\_List”, located in Appendix II of this report, also provides the same information as the sidescan S-57 file.

#### **D.2.6 Bottom Characteristics**

In accordance with both the Project Instructions and Section 7.1 of the HSSD, bottom characteristics were obtained for H12336. Bottom characteristics were determined at a set distance of approximately 2000 meters, evenly distributed throughout the H12336 survey area. Twenty-nine samples were collected. Bottom characteristics are included in the H12336 S-57 feature file, 3S412336.000, within the Seabed Area (SBDARE) object and are classified according to the requirements set forth in Appendix 10 of the HSSD. In addition to being maintained within the S-57 feature file, bottom characteristic results are represented in Appendix V of this document. Table Appendix V-1 presents the findings and is followed by images of each bottom sample. Bottom characteristics obtained for H12336 are sufficient to be used to update the respective raster and vector charts.

## E. APPROVAL SHEET

30 May 2012

### LETTER OF APPROVAL

REGISTRY NUMBER: H12336

This report and the accompanying digital data for project OPR-D302-KR-11 DELMARVA, Virginia Project is respectfully submitted.

Field operations and data processing contributing to the accomplishment of this survey, H12336, 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 concurrently submitted to NOAA for this project include:

<u>Report</u>	<u>Submission Date</u>
Data Acquisition and Processing Report, REV 1	30 May 2012
H12337 Descriptive Report, REV 1	30 May 2012
H12338 Descriptive Report, REV 1	30 May 2012
H12339 Descriptive Report, REV 1	30 May 2012

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

**Gary R.  
Davis**

Digitally signed by Gary R. Davis  
DN: cn=Gary R. Davis, o=Marine  
Survey and Engineering  
Solutions, ou=SAIC,  
email=gary.r.davis@saic.com,  
c=US  
Date: 2012.05.30 13:08:35 -04'00'

Gary R. Davis  
Chief Hydrographer  
Science Applications International Corporation  
30 May 2012

APPENDIX I  
TIDES AND WATER LEVELS

## APPENDIX IV. TIDES AND WATER LEVELS

### Field Tide Note

A field tide note was not required for H12336.

### Final Tide Note

Observed verified water levels were downloaded from the [NOAA Tides and Currents](#) web site for the station in Wachapreague, VA (8631044). Water Level correctors were prepared for each zone using the **SABER Create Water Level Files** software. The **SABER Apply Correctors** software applied the water level data to the multibeam data according to the zone containing the nadir beam of each ping.

Please refer to the H13226 Descriptive Report Section C.1 for details regarding final tides for H12336. The water level zoning correctors, based entirely on Wachapreague, VA (8631044), were applied to all multibeam data for H12336.

No final tide note was provided by NOAA Center for Operational Oceanographic Products and Services (CO-OPS), SAIC is not required to have a final tide note from CO-OPS for this survey.

The on-line times for acquisition of valid hydrographic data are presented in the Abstract of Times of Hydrography, H12336 (Table Appendix IV-1).

### Abstract Times of Hydrography

**Project:** OPR-D302-KR-11

**Registry No.:** H12336

**Contractor Name:** Science Applications International Corporation

**Date:** 25 June 2011

**Sheet Designation:** 1

**Inclusive Dates:** 25 June 2011 – 16 August 2011

Field work is complete.

**Table Appendix IV-1. Abstract Times of Hydrography, H12336**

Begin Date	Begin Julian Day	Begin Time	End Date	End Julian Day	End Time
06/25/2011	176	06:18349	06/30/2011	181	23:22:39
07/06/2011	187	16:31:33	07/10/2011	191	21:08:40
08/16/2011	228	19:17:16	08/18/2011	230	05:54:56

### Transmittal Letter to CO-OPS

A transmittal letter to CO-OPS was not required for H12336.

### Other Correspondence Relating to Tides

There is no other correspondence relating to tides and/or water levels.

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS  
AND CORRESPONDENCE

## CORRESPONDENCE

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From: Mark.T.Lathrop [mailto:Mark.T.Lathrop@noaa.gov]  
Sent: Wednesday, April 13, 2011 1:34 PM  
To: Evans, Rhodri E.  
Cc: Jeffrey Ferguson; James.M.Crocker@noaa.gov  
Subject: Re: 2011 HSSD

Rod,

Yes, all FY11 task orders will use the new Specs.

Mark

On 4/13/2011 1:26 PM, Evans, Rhodri E. wrote:  
Mark,

We see that the April 2011 version of the NOS Specifications and Deliverables Document is now posted on NOAA's website. We are doing a thorough comparison to last year's version this week.

Are you able to advise me if any Task Orders that may be awarded this Government fiscal year will be required to adhere to the 2011 HSSD document?

Thanks and Regards, RE.

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From: Mark.T.Lathrop [mailto:Mark.T.Lathrop@noaa.gov]  
Sent: Wednesday, April 20, 2011 1:12 PM  
To: Evans, Rhodri E.  
Cc: Jeffrey Ferguson; James.M.Crocker@noaa.gov  
Subject: Re: 2011 HSSD

Rod,

The following should answer your questions regarding the 2011 HSSD:

- 1) The change section is in error. We will be happy to receive millimeter precision, but centimeter precision is the minimum level acceptable.
- 2) Your assumption is correct.
- 3) It is our intention to have AFF files created and provided for all projects this year.

Mark

On 4/20/2011 11:13 AM, Evans, Rhodri E. wrote:  
Mark,

We have completed our review of the new HSSD 2011 document. In order for us to fully understand the potential impact of some of the changes

on our survey data acquisition and processing/deliverables going forward would you please advise us on the following questions:

Questions on the April 2011 Specifications and Deliverables

In Section 1.2 Changes from April 2010 it states that Section 5.1.2 Units and Rounding is updated for millimeter precision, but Section 5.1.2 Units and Rounding still states "Depth values shall be recorded in meters, with a precision of at least centimeters." Please confirm the precision for depth values.

In 5.2.1.2 General Requirement Management of Multiple Grids it states "The following additional attributes shall be included if supported by the hydrographer's data processing software:" and then is followed by "Standard Deviation: Standard deviation of the depths within the capture radius of the node". We assume this means any sounding that contributed to any hypothesis for a given node. Please confirm.

In Section 8.1.4 D.1 Chart Comparisons it states "An Assigned Feature File (AFF), in .000 format incorporating the NOAA Extended Attributes defined in Section 8.2, may be provided by HSD Ops along with the project instruction to assist the contractor or NOAA field unit with this requirement". Will SAIC receive an Assigned Feature File (AFF)?

Thanks and Regards, RE.

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From: Mark.T.Lathrop [mailto:Mark.T.Lathrop@noaa.gov]  
Sent: Tuesday, July 19, 2011 2:14 PM  
To: Evans, Rhodri E.  
Subject: AFF for OPR-D302-KR-11

Rod,

Attached are the Assigned Feature File and Prior Reference File for OPR-D302-KR-11. We are providing these S57 files to contractors this year as a courtesy.

Mark

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From: Mark.T.Lathrop [mailto:Mark.T.Lathrop@noaa.gov]  
Sent: Thursday, August 04, 2011 9:48 AM  
To: Evans, Rhodri E.  
Subject: Re: AFF for OPR-D302-KR-11

Rod,

The AFF is just a file we are providing to the contractors this year as a courtesy. AWOIS items are not included. There are no special investigations associated with this file.

Mark

On 8/3/2011 1:15 PM, Evans, Rhodri E. wrote:

Mark,

We request a clarification regarding the Assigned Feature Files that were sent in your e-mail (see below dated July 19 2001).

The Project Instructions dated February 7, 2011 (OPR-D302-KR-11.pdf), listed 4 AWOIS Items for full investigation. We also received an Excel spreadsheet (AWOIS D302-D302-KR-11.xls) and a PDF file (OPR-D302-KR-11 AWOIS.pdf) listing the four AWOIS Items: 987 (Wreck Alleghany), 2783 (Wreck Menominee), 2888 (Obstruction), and 7190 (Obstruction).

The AFF file has 6 assigned items:

Record ID 0 1AFF01.000/FE1, Obstruction (Fish Haven). Not in the original spreadsheet

Record ID 0 1AFF01.000/FE2, Obstruction (Fish Haven). Not in the original spreadsheet

Record ID 0 1AFF01.000/FE3, Obstruction in 37 29.486N 075 34.951W. Not in the original spreadsheet.

Record ID 0 1AFF01.000/FE4, Obstruction. AWOIS 2888 in the original Spreadsheet.

Record ID 0 1AFF01.000/FE5, Wreck AWOIS 987 in the original spreadsheet

Record ID 0 1AFF01.000/FE6, Wreck in 37 35.716N 075 14.810W. Not in the original spreadsheet

So the Assigned Feature File contains 4 additional items that were not in the original spreadsheet, and does not include the two AWOIS items 2783 and 7190.

The surveys cover all items in the Assigned Feature File so there is no impact on the survey estimate though we had to modified the H12338 survey to cover the FE1 (Fish Haven) and FE3 (Obstruction) items extending 15 lines by 200 meters. They both fell outside the original survey bounds in the SOW.

We request clarification regarding the assigned items:

1. 4 or 6?
2. Spreadsheet or AFF files?

Regards, RE.

---

From: Mark.T.Lathrop [mailto:Mark.T.Lathrop@noaa.gov]  
Sent: Tuesday, October 11, 2011 10:34 AM  
To: Evans, Rhodri E.  
Subject: Re: SAIC Status Report

Rod,

A staggered delivery is preferable as that eases the burden on the processing branch, hence the 120 days after completion of field work stated in the Project Instructions.

However, March 31, 2012 is the official delivery requirement for Task Order 6.

Mark,

On 10/11/2011 9:40 AM, Evans, Rhodri E. wrote:  
Mark,

Can you please confirm that it is acceptable that the last 2 sheets fall outside of the 120 days delivery stated in the Project Instructions? All deliveries fall within the Task Order PoP ending 3/31/2012. We believe that our delivery schedule provides a better spacing of deliveries to the AHB.

Regards, RE.

From: Evans, Rhodri E.  
Sent: Tuesday, October 11, 2011 9:07 AM  
To: 'Mark.T.Lathrop'  
Subject: SAIC Status Report

Mark,

Status Report via email reference: Task Order OMNI TO#6 DELMARVA Sheets 1-4:

The ship "Atlantic Surveyor" is now in home port (Point Pleasant, NJ). This week SAIC will fully demobilize the ship.

Our preliminary AHB delivery schedule is as follows:

H12336 - 12/16/2011  
H12337 - 01/20/2012  
H12338 - 02/17/2011  
H12339 - 03/16/2012

The next status report will be on Monday 17 October 2011.

Regards, RE.

Rod Evans Ph.D | SAIC  
Assistant Vice President & Hydrographic Survey Services Manager  
Maritime Operations Division-Marine Survey and Engineering Services  
ph: 401.848.4783 | cell: 401.439.1037 | e: evansrh@saic.com

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AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. Contract ID Code		Page of Pages	
						1 2	
2. AMENDMENT MODIFICATION NO. M0001		3. EFFECTIVE DATE MAR 21, 2012	4. REQUISITION/PURCHASE REQ. NO. NCNJ3000-12-01931		5. PROJECT NO. (if applicable) 12861		
6. ISSUED BY NWS/NOS/NMFS EXTERNAL CLIENTS 1325 EAST WEST HIGHWAY SSMC2, 11TH FLOOR SILVER SPRING MD 20910 MARK LATHROP 301-713-2702 113			CODE WSOSFSEC	7. ADMINISTERED BY (if other than item 6) See Block 6		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (NO., Street, Country, State and ZIP Code) SCIENCE APPLICATIONS INTERNATIONAL CORPORATION DUNS: 054781240 10260 CAMPUS POINT DRIVE Cage Code: 52302 MAIL STOP G2 SAN DIEGO CA 921211522  William Raymond 401-848-4713 CODE 00000676 FACILITY CODE				(x)	9A. AMENDMENT OF SOLICITATION NO.		
					9B. DATED (SEE ITEM 11)		
				X	10A. MODIFICATION OF CONTRACT/ORDER NO. DG133C-08-CQ-0003/T005		
					10B. DATED (SEE ITEM 13) JUN 28, 2011		
<b>11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS</b>							
<input type="checkbox"/> The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of offers <input type="checkbox"/> is extended, <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing items 8 and 15, and returning _____ copies of amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OR OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment your desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified. 12. ACCOUNTING AND APPROPRIATION DATA (if required) Modification Amount: \$0.00 See Schedule Modification Obligated Amount: \$0.00							
<b>13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.</b>							
Check One	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.						
X	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).						
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:						
	D. OTHER (Specify type of modification and authority)						
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input checked="" type="checkbox"/> is required to sign this document and return <u>1</u> copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible) The purpose of this modification is to extend the delivery date from March 31, 2012 to May 31, 2012 at no additional cost to the Government.							
Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print) <i>Christine Lepore, Contracts Manager</i>				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) HARRY RIPPENBAUM, CONTRACTING OFFICER 301-713-3405 x 193 HARRY.RIPPENBAUM@NOAA.GOV			
15B. CONTRACTOR/OFFEROR <i>Christine Lepore</i> (Signature of person authorized to sign)		15C. DATE SIGNED 3-21-12		16B. UNITED STATES OF AMERICA <i>Harry Rippenbaum</i> (Signature of Contracting Officer)		16C. DATE SIGNED MAR 21, 2012	

NSN 7540-01-152-8070  
Previous Edition unusable

STANDARD FORM 30. (Rev. 10-83)  
Prescribed by GSA FAR (48 CFR) 53.243

## BOTTOM CHARACTERISTICS

There were 29 bottom samples taken to verify the bottom types charted for H12336. Table Appendix V-1 compares information from each sample collected to the charted bottom type within 2000 meters if available. The chart 12210 was used for comparison, which is the largest scale chart that covers the entire survey area. A photograph of each bottom sample is included following the table. It is recommended that the bottom types charted be updated where necessary based on the information collected during the latest survey.

**Table Appendix V-1. H12336 Bottom Characteristics**

JD	Sample Number	Bottom Sample Position (NAD83)		Observed Bottom Type	CUBE Depth of Bottom Sample (m)	Depth Uncertainty (m)	Charted Bottom Type Chart 12210
		Latitude (N)	Longitude (W)				
191	H12336-BS-01	37° 39' 26.36"	075° 25' 46.49"	medS brkSh	14.175	0.280	S
191	H12336-BS-02	37° 39' 26.77"	075° 24' 25.12"	fneS brkSh	15.854	0.280	S
191	H12336-BS-03	37° 39' 24.26"	075° 23' 01.47"	fneS brkSh	17.120	0.280	S
191	H12336-BS-04	37° 39' 24.99"	075° 21' 41.53"	fneS	13.290	0.280	S
191	H12336-BS-05	37° 39' 23.03"	075° 20' 16.80"	fneS	14.924	0.280	
191	H12336-BS-06	37° 38' 28.11"	075° 19' 37.56"	fneS brkSh	21.734	0.280	
191	H12336-BS-07	37° 38' 31.33"	075° 20' 58.71"	fneS	15.752	0.280	h
191	H12336-BS-08	37° 38' 29.99"	075° 22' 21.74"	fneS	15.756	0.280	h
191	H12336-BS-09	37° 38' 29.15"	075° 23' 45.41"	fneS brkSh	17.710	0.280	S
191	H12336-BS-10	37° 38' 30.71"	075° 25' 06.39"	fneS brkSh	18.962	0.280	S
191	H12336-BS-11	37° 38' 28.52"	075° 26' 25.91"	fneS M brkSh	17.656	0.280	S
191	H12336-BS-12	37° 37' 34.29"	075° 27' 07.48"	fneS	13.598	0.280	S
191	H12336-BS-13	37° 37' 31.44"	075° 25' 46.53"	fneS M brkSh	19.489	0.280	S
191	H12336-BS-14	37° 37' 33.01"	075° 24' 23.82"	fneS brkSh	16.139	0.280	S
191	H12336-BS-15	37° 37' 33.23"	075° 22' 59.61"	fneS M	19.932	0.285	h
191	H12336-BS-16	37° 37' 32.57"	075° 21' 41.85"	fneS	14.447	0.280	S
191	H12336-BS-17	37° 37' 32.85"	075° 20' 18.48"	medS brkSh	20.119	0.280	
191	H12336-BS-18	37° 36' 35.67"	075° 20' 59.61"	fneS brkSh	19.865	0.280	S
191	H12336-BS-19	37° 36' 36.26"	075° 22' 19.56"	medS brkSh	15.658	0.280	S
191	H12336-BS-20	37° 36' 36.87"	075° 23' 41.67"	fneS	16.947	0.280	S
191	H12336-BS-21	37° 36' 39.53"	075° 25' 02.61"	medS brkSh	16.533	0.280	S

JD	Sample Number	Bottom Sample Position (NAD83)		Observed Bottom Type	CUBE Depth of Bottom Sample (m)	Depth Uncertainty (m)	Charted Bottom Type Chart 12210
		Latitude (N)	Longitude (W)				
191	H12336-BS-22	37° 36' 35.96"	075° 26' 26.88"	fneS brkSh	18.375	0.280	S
191	H12336-BS-23	37° 36' 34.88"	075° 27' 45.41"	medS brkSh	12.573	0.280	
191	H12336-BS-24	37° 35' 39.57"	075° 28' 30.14"	fneS brkSh	13.258	0.280	S Sh
191	H12336-BS-25	37° 35' 39.88"	075° 27' 07.01"	fneS M brkSh	18.988	0.280	
191	H12336-BS-26	37° 35' 39.57"	075° 25' 43.83"	fneS brkSh	14.627	0.280	h
191	H12336-BS-27	37° 35' 38.47"	075° 24' 22.75"	fneS	19.752	0.280	S
191	H12336-BS-28	37° 35' 38.80"	075° 23' 02.43"	fneS brkSh	18.453	0.280	S
191	H12336-BS-29	37° 35' 40.45"	075° 21' 40.91"	fneS brkSh	17.900	0.280	S

APPENDIX III  
SURVEY FEATURES REPORT

# Appendix III - Survey Feature Report

**Registry Number:** H12336  
**State:** Virginia  
**Locality:** Atlantic Ocean  
**Sub-locality:** 9 NM East of Cedar Island  
**Project Number:** OPR-D302-KR-11  
**Survey Dates:** 20110625 - 20110818

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12210	38th	05/01/2008	1:80,000 (12210_1)	USCG LNM: 5/8/2012 (5/15/2012) NGA NTM: None (5/26/2012)
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	DTON #01 - Delete obstruction	GP	[None]	37° 38' 46.1" N	075° 25' 51.6" W	---

# **1 - Dangers To Navigation**

## 1.1) DTON #01 - Delete obstruction

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 37° 38' 46.1" N, 075° 25' 51.6" W  
**Least Depth:** [None]  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 1981-001.00:00:00.000 (01/01/1981)  
**Dataset:** H12336\_Feature\_Import\_02.000  
**FOID:** US 0000265239 00001(022600040C170001)  
**Charts Affected:** 12210\_1, 12200\_1, 13003\_1

#### Remarks:

DTON 1. The obstruction is approximately 4.7 x 3.1 meters. It is approximately 1.7 meters high in 16.5 meters of water. There is 0.35 meters of scour around the object.

#### Feature Correlation

Source	Feature	Range	Azimuth	Status
H12336_Feature_Import_02.000	US 0000265239 00001	0.00	000.0	Primary
H12336_Feature_Import.000	US 0000151111 00001	2.19	006.5	Secondary (grouped)

#### Hydrographer Recommendations

Update charted depth.

#### S-57 Data

**Geo object 1:** Cartographic symbol (\$CSYMB)  
**Attributes:** NINFOM - Delete obstruction  
 NTXTDS - Chart 12210, ED38, NTM 20120630

#### Office Notes

SAR: Feature located at survey position by 200% SSS and ODMB. Feature reported as DTON and applied to chart as 49ft Obstruction based on Predicted Tides.

Compile: Feature is not navigationally significant relative to surrounding depths. Delete charted 49ft obstruction.

APPROVAL PAGE

H12336

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NGDC for archive

- H12336\_DR\_rev1.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12336\_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved for: \_\_\_\_\_

**LT Abigail Higgins, NOAA**  
Chief, Atlantic Hydrographic Branch