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. *1*

Registry No *H12394*

LOCALITY

State *Virginia*

General Locality *Atlantic Ocean*

Sublocality *5 NM East of Quinby Inlet*

2012

CHIEF OF PARTY

Evan J. Robertson

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
HYDROGRAPHIC TITLE SHEET	**H12394**

State	Virginia
General Locality	Atlantic Ocean
Sub Locality	5 NM East of Quinby Inlet
Scale	1:40,000
Date of Survey	06 July 2012 – 29 September 2012
Instructions Dated	13 March 2012
Project No.	OPR-D302-KR-12
Vessel	*M/V Atlantic Surveyor* D582365
Chief of Party	Evan J. Robertson
Surveyed by	Alex Bernier, Gary Davis, Paul Donaldson, Brett Goldenbloome, Chuck Holloway, Jason Infantino, John Kiernan, Colette LeBeau, Webster McDonald, Evan Robertson, Andrew Seaman, Deborah Smith
Soundings by echosounder	Multibeam RESON SeaBat 7125 SV
Verification by	Atlantic Hydrographic Branch
Soundings in	Meters
Soundings at	MLLW

REMARKS:	**Contract:**	DG133C-08-CQ-0003
	Contractor:	Science Applications International Corporation 221 Third Street, Newport, RI 02840 USA
	Subcontractor:	N/A
	Times:	All times are recorded in UTC
	UTM Zone:	Zone 18 North
	Purpose:	To provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area: Sheet 1 (H12394) in the Atlantic Ocean, Coast of Virginia.

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.

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. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, 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 H12394
Scale 1:40,000, Surveyed 2012
M/V Atlantic Surveyor
Science Applications International Corporation (SAIC)
Evan J. Robertson, Lead Hydrographer

PROJECT
Project Name: Virginia Coast
Project Number: OPR-D302-KR-12
Assigned Processing Branch: Atlantic Hydrographic Branch
Dates of Instructions: 13 March 2012 **Task Order#:** 07
Dates of Supplemental Instructions: 02 April 2012, 01 May 2012, 27 August 2012, 11 October 2012 and 23 October 2012
Sheet Designation: 1
Registry Number: H12394

A. AREA SURVEYED

The area surveyed was a section of the Atlantic Ocean off the coast of Virginia, 5 nautical miles (NM) East of Quinby Inlet (Figure 1).

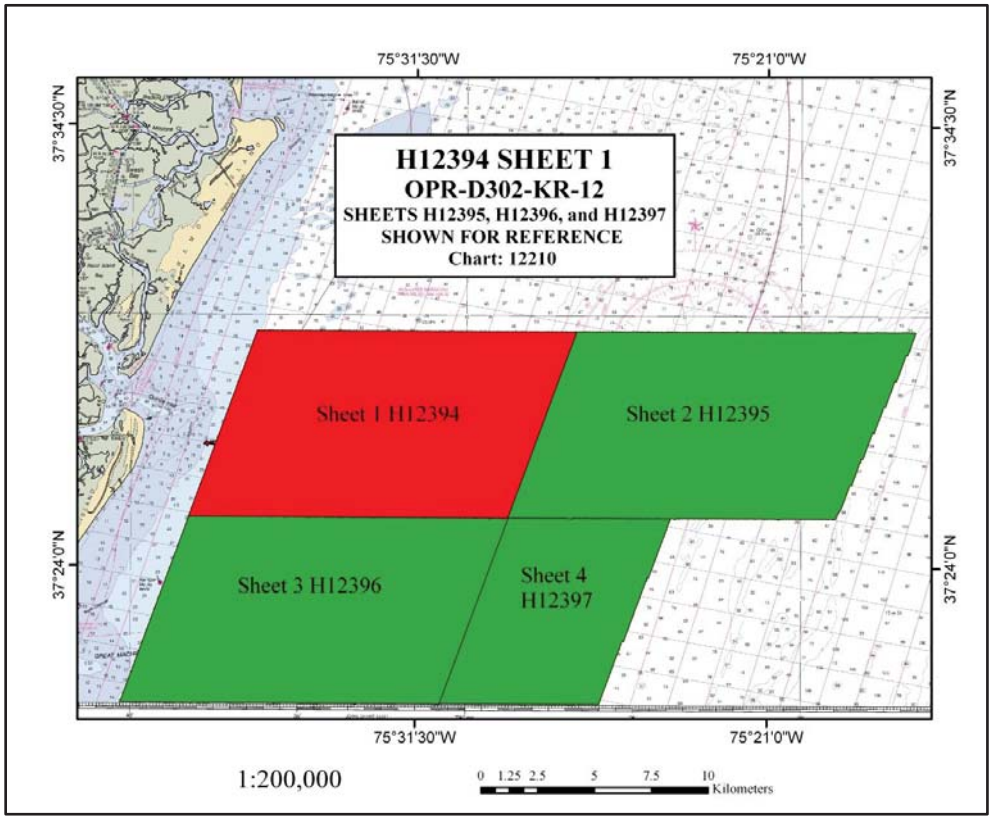

Figure 1. H12394 Survey Bounds

A.1 SURVEY LIMITS

The limits of the survey were:

- North 37° 29' 38.06"N
- South 37° 25' 09.24"N
- East 075° 26' 42.31"W
- West 075° 38' 16.73"W

A.2 SURVEY PURPOSE

To provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area: Sheet 1 (H12394) in the Atlantic Ocean, Coast of Virginia.

A.3 SURVEY QUALITY

The entire survey is adequate to supersede previous data.

H12394 was surveyed in accordance with the following documents:

1. Project Instructions, OPR-D302-KR-12, dated 13 March 2012
2. Statement of Work, Hydrographic Survey Services, SAIC, DG133C-08-CQ-0003, dated 04 May 2012
3. Tides and Water Levels Statement of Work OPR-D302-KR-2012 Virginia Coast, dated 03 February 2012
4. *NOS Hydrographic Surveys Specifications and Deliverables*, April 2012, Released 23 April 2012 (HSSD)

A.4 SURVEY COVERAGE

H12394 was surveyed using set line spacing in order to achieve 200% sidescan coverage with resulting multibeam coverage (Figure 2). The CUBE depth range observed in the final two-meter grid for H12394 was from 6.769 meters (22 feet, 0.270-meter uncertainty) to 24.005 meters (79 feet, 0.280-meter uncertainty).

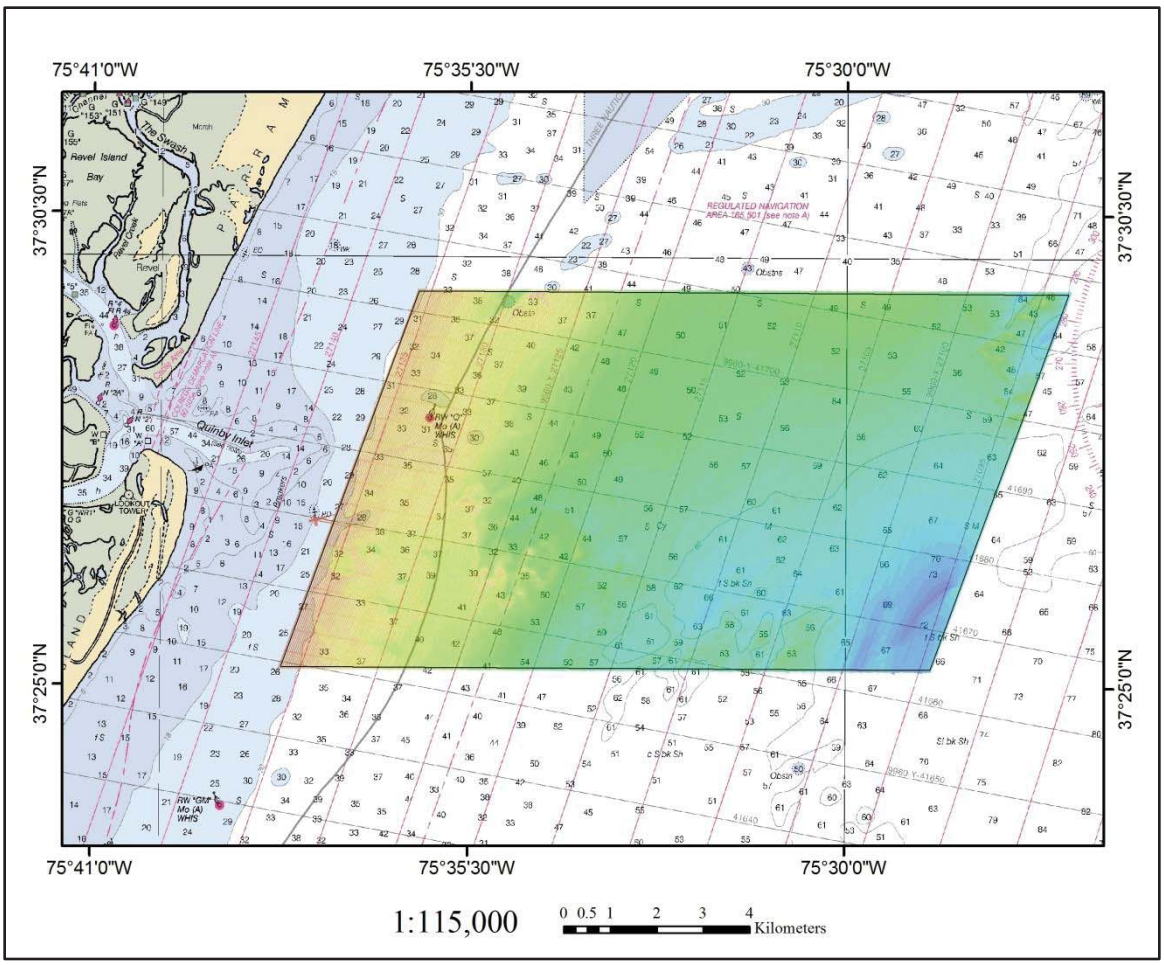

Figure 2. Final Multibeam Coverage for H12394

A.5 SURVEY STATISTICS

The survey area covered 33.76 square nautical miles and was conducted utilizing multibeam sonar and towed sidescan sonar from 06 July 2012 to 29 September 2012. The final line kilometers, bottom samples, item investigations, and other survey statistics are listed in Figure 3. The dates of multibeam data acquisition are listed in Figure 4.

***M/V Atlantic Surveyor*, Sheet 1 H12394**	**Value**
LNM Single beam only sounding lines (main scheme only)	0
LNM Multibeam only sounding lines (main scheme only)	2.67
LNM Lidar sounding lines (main scheme only)	0
LNM Sidescan sonar only lines (main scheme only)	0
LNM Single beam and Multibeam (main scheme only)	0
LNM Multibeam and Sidescan sonar (main scheme only)	1562.44
LNM Single beam and Sidescan sonar (main scheme only)	0
LNM Crosslines from Multibeam and Single beam	130.53

***M/V Atlantic Surveyor*, Sheet 1 H12394**	**Value**
LNM Lidar crosslines	0
Number of Bottom Samples	6
Dive Operations	0
Discrete Position (DP): Number of items investigated that required additional time/effort in the field beyond the above operations not developed by sonar	0
Total number of square nautical miles	33.76
Percent Crossline (LNM)	8.3

Figure 3. Hydrographic Survey Statistics

Calendar Date	Julian Day
06 July 2012	188
07 July 2012	189
08 July 2012	190
09 July 2012	191
17 July 2012	199
18 July 2012	200
19 July 2012	201
20 July 2012	202
21 July 2012	203

Calendar Date	Julian Day
22 July 2012	204
23 July 2012	205
24 July 2012	206
25 July 2012	207
28 July 2012	210
29 July 2012	211
04 August 2012	217
29 September 2012	273

Figure 4. H12394 Dates of Multibeam Data Acquisition in Calendar and Julian Days

A.6 SHORELINE

No shoreline existed within the limits of H12394.

A.7 BOTTOM SAMPLES

Bottom samples were collected at the locations proposed in the Project Reference File (PRF) supplied by NOAA. Additional information regarding bottom characteristics can be found in Section D.2.10.4 and Appendix II.

B. DATA ACQUISITION AND PROCESSING

B.1 EQUIPMENT AND VESSELS

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. Subsequent processing and review of the sidescan data, including the generation of coverage mosaics, were accomplished using **SABER.**

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 (DAPR) for OPR-D302-KR-12, delivered concurrently with this Descriptive Report (DR). There were no variations from the equipment configuration described in the DAPR.

B.1.1 Survey Vessel

The platform for acquisition of all survey data was the *M/V Atlantic Surveyor.* Figure 5 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, and the third for spares storage, maintenance, and repairs. A 10-foot ISO container housed an 80 kW generator that provided dedicated power to the sidescan winch, ISO containers, and all survey equipment.

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

Figure 5. Survey Vessel Characteristics for the *M/V Atlantic Surveyor*

B.1.2 Equipment

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 on 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 and CTD data collection.

Figure 6 summarizes the major systems listed in the DAPR.

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

System	Manufacturer / Model Number	Subsystem
Vessel Attitude	Applanix POS/MV Inertial Navigation System	
Vessel Positioning	Applanix POS/MV 320	
	Trimble 7400 DSi GPS Receiver	
	Trimble Probeacon Differential Beacon Receiver	
Sound Speed Acquisition	Brooke Ocean Technology Ltd. Moving Vessel Profiler-30	Applied Microsystems Ltd. Smart SV and Pressure Sensor
	Sea-Bird Seacat SBE 19 Conductivity, Temperature, Depth Recorder	
Bottom Sample Collection	WILDCO Petite Ponar Grab (7128-G40)	

Figure 6. Major Systems by Manufacturer and Model Number

B.2 QUALITY CONTROL

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

B.2.1 Crossline Analysis

There were 130.53 linear nautical miles of crosslines and 1562.44 linear nautical miles of main scheme lines surveyed on H12394. This resulted in crossline mileage that represented approximately 8.3 percent of the main scheme mileage which meets the requirement (Section 5.2.4.3 of the HSSD) to achieve at least eight percent for a multibeam survey using set line spacing. Crosslines were oriented at 100°/280° and were spaced 480 meters apart, while the main scheme lines were oriented at 20.4°/200.4° and were spaced 40 meters apart. During main scheme operations, the sidescan sonar range scale was set to 50 meters which provided a consistent 100-meter imagery swath and up to 20 meters of overlap between adjacent lines within each 100% coverage. Refer to the "Multibeam Processing Log" section within Separates I for information on the delineation of main scheme and crossline data files.

In the field, hydrographers conducted daily comparisons 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 in the office, separate two-meter CUBE PFM grids were built. One grid contained the full valid swath (±60° from nadir) of all main scheme multibeam data and the other included only the Class 1 (±5° from nadir) crossline data.

The **SABER Frequency Distribution** tool was used to analyze the difference grid created from these two PFM grids. Comparisons of all final crossing data in H12394 showed that 95.67% of comparisons were within 30 centimeters and 99.47% of

comparisons were within 40 centimeters (Figure 7). These comparisons fall within the requirement defined in Section 5.2.4.3 of the HSSD which states that at least 95% of the depth difference values are to be within the maximum allowable total vertical uncertainty (calculated to be between 0.508 and 0.589 meters for the water depths observed in H12394).

The difference grid was created by subtracting the H12394 crossline CUBE depths from the H12394 main scheme CUBE depths; therefore positive values indicate that H12394 main scheme data were deeper than H12394 crossline data. The main scheme data were deeper than the crossline data in 69.03% of the junctions and the main scheme data were shoaler than the crossline data in 30.69% of the junctions (Figure 7). Though the differences show a positive skew, they are evenly distributed across the range of results, as visualized in Figure 8.

Depth Difference Range (m)	All		Positive		Negative		Zero	
	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent
0.00-0.05	80862	26.95	44257	14.75	35760	11.92	845	0.28
>0.05-0.10	69983	50.28	44459	29.57	25524	20.43		
>0.10-0.15	58991	69.94	42600	43.77	16391	25.89		
>0.15-0.20	38760	82.86	30646	53.98	8114	28.59		
>0.20-0.25	25121	91.23	20818	60.92	4303	30.03		
>0.25-0.30	13326	95.67	11769	64.84	1557	30.55		
>0.30-0.35	7963	98.33	7633	67.39	330	30.66		
>0.35-0.40	3434	99.47	3371	68.51	63	30.68		
>0.40-0.45	1221	99.88	1196	68.91	25	30.69		
>0.45-0.50	304	99.98	304	69.01	0	30.69		
>0.50-0.54	61	100	61	69.03	0	30.69		
Totals	300026	100%	207114	69.03%	92067	30.69%	845	0.28%
Reference Grid: h12394_2m_main_20oct2012_pfm_h12394_2m_cross_20oct2012_pfm.dif								

Figure 7. Junction Analysis, Main Scheme Lines vs. Crosslines, H12394

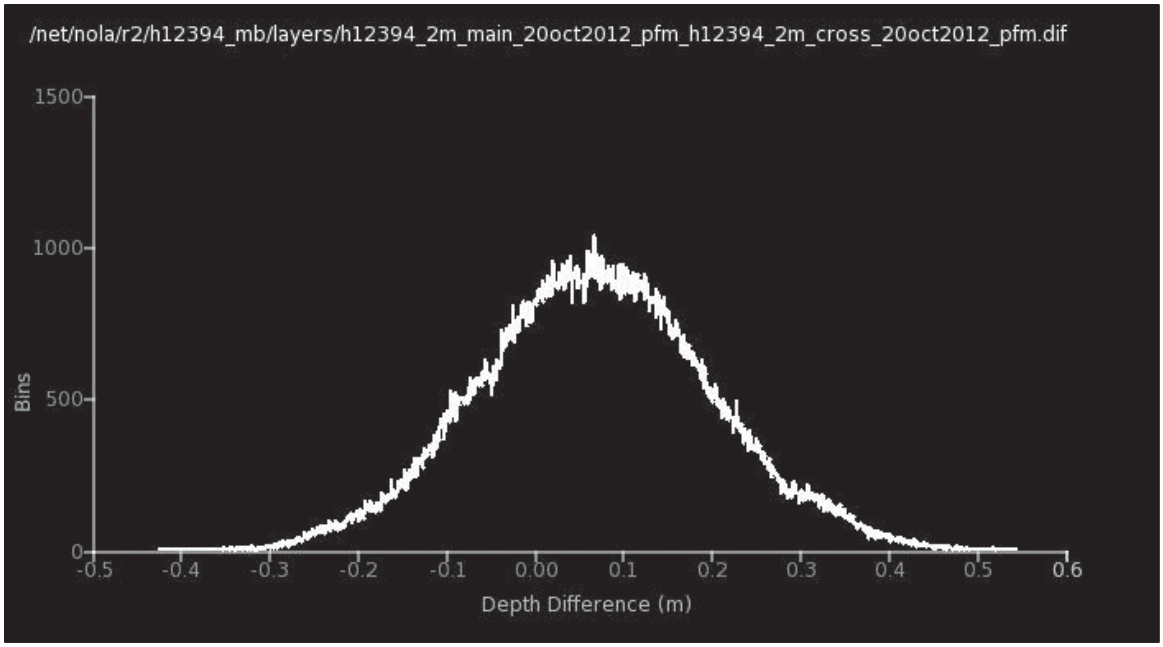

Figure 8. Frequency Distribution Plot of Depth Differences for H12394 Main Scheme Lines vs. H12394 Crosslines

Twenty-five crossings of main scheme and crossline data were selected from areas consisting of a relatively flat bottom for beam-by-beam comparison (Figure 9). The chosen crossings were confirmed to encompass the H12394 survey area both spatially and temporally. The results of the comparisons are presented in the "Crossline Comparisons" section of Separates II 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 25 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. A number of the crossings showed a depth bias ranging from 10 centimeters to 30 centimeters consistent across all beams within the multibeam swath. This is not uncommon when using discrete tide zoning and is typically due to the variability and uncertainties in the water level correctors.

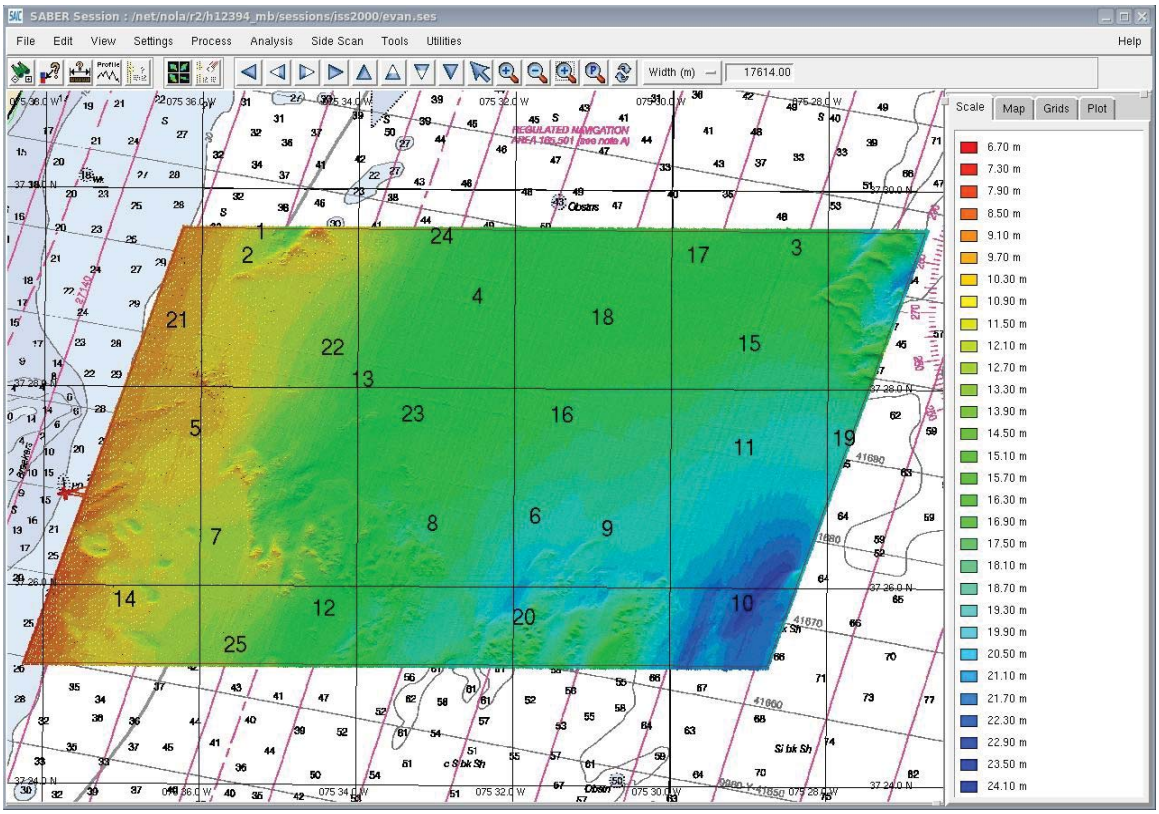

Figure 9. Location of 25 Crossings Used in the Crossing Analysis for H12394

B.2.2 Survey System Uncertainty Model

The Total Propagated Uncertainty (TPU) model that SAIC has adopted had 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.

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 the sounding's distance from nadir. 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 5th 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 uncertainty.

During the creation of the CUBE surface, two separate vertical uncertainty surfaces are calculated by the **SABER** software. One surface contains the standard deviation of all soundings that are contributing to the CUBE hypothesis (Hyp StdDev) and the other contains the average of the vertical uncertainty of all soundings contributing to the CUBE hypothesis (Hyp AvgTPU). A third vertical uncertainty surface is generated from the larger value of these two uncertainties in each node and is referred to as the Hypothesis Final Uncertainty. For specific details on this process see Section B.2 of the DAPR.

The final two-meter PFM CUBE surface contained final vertical uncertainties that ranged from 0.270 to 0.542 meters. For the depths observed in H12394, the IHO Order 1a maximum allowable vertical uncertainty was calculated to vary between 0.508 to 0.589 meters. The **SABER Check PFM Uncertainty** function was used to highlight all of the instances where the computed final vertical uncertainty value of a given node exceeded IHO Order 1a. The final two-meter PFM CUBE surface contained three individual CUBE nodes with final uncertainties that exceeded IHO Order 1a. Of these three nodes, two of them were attributed to nodes located on steep slopes and the third was observed in a node containing the outer beam junction of a main scheme line and a crossline.

The **SABER Check PFM Uncertainty** function was also run on each of the three half-meter feature PFM CUBE surfaces. Results are listed in Figure 10. As expected, there are higher numbers of nodes that exceed uncertainty limits due to the smaller node resolution and the high variability of sounding depths related to features.

Feature PFM	Number of CUBE nodes which exceed IHO Order 1a
1	1
2	10
3	393

Figure 10. Number of Nodes Exceeding the Allowable IHO Order 1a Uncertainty in the Feature PFMs

The **SABER Frequency Distribution** tool was also used to review vertical uncertainties within the two-meter and three half-meter resolution PFM grids. The results show that in the final two-meter PFM, 75% of all nodes had final uncertainties less than or equal to 0.270 meters and 99% contained vertical uncertainties of 0.280 meters or less. When performed on the three feature PFMs, more than 95% of all grid nodes contained vertical uncertainties of 0.39 meters or less.

B.2.3 Sheet-to-Sheet Junctions

An analysis of the sheet-to-sheet junction between H12394 and H12338 (OPR-D302_KR-11, delivered to AHB on 17 February 2012) was performed. Details for H12338 are listed in Figure 11. Figure 12 shows the general locality of the sheets. Analyses of the junctions with sheets H12395, H12396, and H12397 were not conducted as the processing efforts for these sheets were still ongoing.

Registry No.	Scale	Year of Acquisition	Field Party	Date Delivered to AHB	Location of Junction
H12338	1:40,000	2011	SAIC	17 February 2012	North

Figure 11. Surveys for Junction to H12394

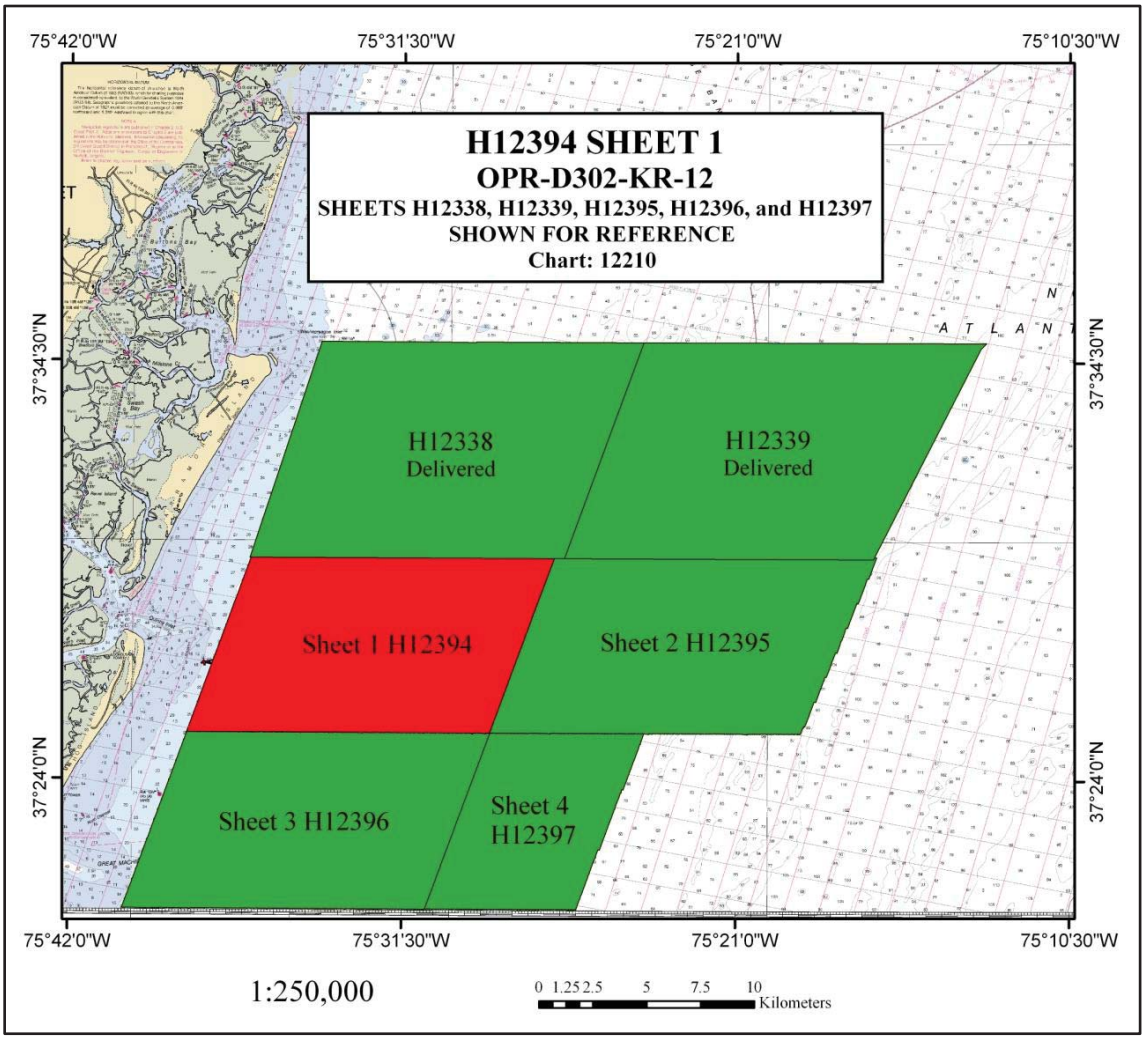

Figure 12. General Locality and Status of Sheets in Reference to H12394

Figure 13 depicts the junction analysis between H12394 and H12338, surveyed between 22 July 2011 and 03 October 2011, which borders H12394 to the north. Junction analysis was conducted on the differences between the CUBE depths from the final two-meter PFM grid from H12394 and the final one-meter PFM grid from H12338 in the common area of these two sheets. The results showed that 96.17% of the comparisons were within 30 centimeters and 99.41% were within 40 centimeters. These numbers are well within the allowable vertical uncertainty for the respective sheets.

The difference grid was generated by subtracting the H12338 data from the H12394 data. Therefore positive values indicate that H12394 depth data were deeper than H12338 depth data. Throughout the common area, H12394 CUBE depths were deeper than H12338 63.74% of the time and were shoaler than H12338 35.95% of the time. Figure 14 shows the frequency of distribution of the depth difference values in the overlap area between H12394 and H12338.

Depth Difference Range (m)	All		Positive		Negative		Zero	
	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent
0.00-0.05	156013	30.10	83676	16.14	70712	13.64	1625	0.31
>0.05-0.10	125432	54.30	73585	30.34	51847	23.65		
>0.10-0.15	95029	72.64	60136	41.95	34893	30.38		
>0.15-0.20	63351	84.86	45579	50.74	17772	33.81		
>0.20-0.25	34920	91.60	27548	56.05	7372	35.23		
>0.25-0.30	23702	96.17	21369	60.18	2333	35.68		
>0.30-0.35	11893	98.47	11122	62.32	771	35.83		
>0.35-0.40	4903	99.41	4522	63.20	381	35.90		
>0.40-0.45	1554	99.71	1406	63.47	148	35.93		
>0.45-0.50	600	99.83	541	63.57	59	35.94		
>0.50-0.55	216	99.87	197	63.61	19	35.95		
>0.55-0.60	154	99.90	150	63.64	4	35.95		
>0.60-0.65	138	99.93	138	63.67	0	35.95		
>0.65-0.70	105	99.95	105	63.69	0	35.95		
>0.70-0.75	107	99.97	107	63.71	0	35.95		
>0.75-0.80	94	99.99	94	63.72	0	35.95		
>0.80-0.85	44	99.99	44	63.73	0	35.95		
>0.85-0.90	24	100	24	63.74	0	35.95		
>0.90-0.93	6	100	6	63.74	0	35.95		
Totals	518285	100%	330349	63.74%	186311	35.95%	1625	0.31%
Reference Grid: h12394_2m_all_npt_20oct2012_pfm_H12338_1m_MLLW_pfm_CUBE.dif								

Figure 13. Junction Analysis of CUBE Depths, H12394 vs. H12338

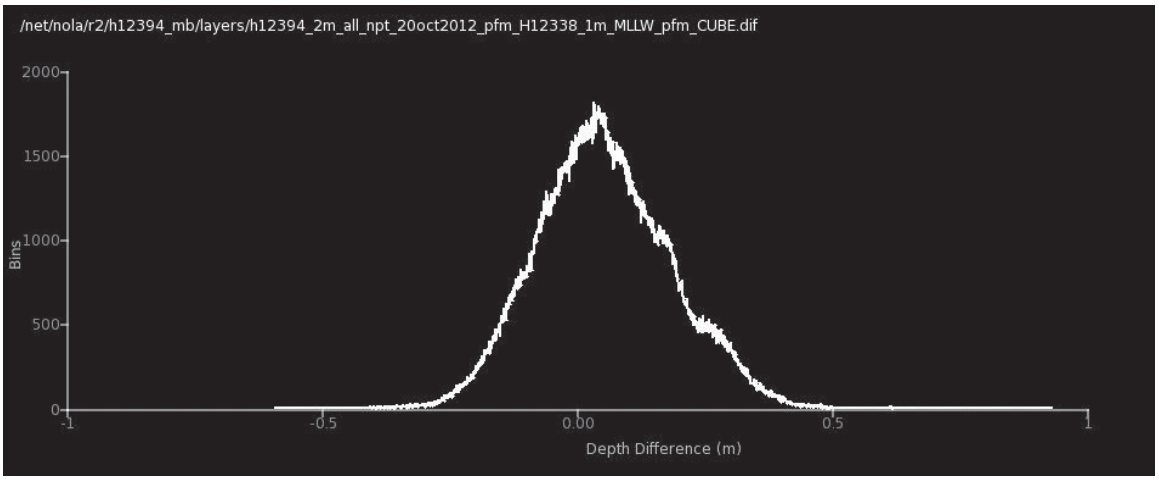

Figure 14. Frequency Distribution Plot of CUBE Depth Differences for H12394 vs. H12338

B.2.4 Sonar System Quality Checks

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

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, "Daily Positioning Confidence Checks". Additional details can be found in Section C.2 of this Descriptive Report.

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. Of the eight lead lines performed, there were mean differences of less than 0.023 meters per set with the standard deviation of the means from all sets less than 0.021 meters. A complete listing of all lead line measurements can be found in Separates I in the section titled "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".

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 "Sidescan Review Log" section located in Separates I.

B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment effectiveness.

B.2.6 Factors Affecting Soundings

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

The MVP-30 was the primary sensor used to collect sound speed profile (SSP) data. However, two profiles collected with the CTD were used for data acquisition while the MVP-30 was receiving maintenance and repairs. SSP data were obtained at intervals frequent enough to meet depth accuracy requirements. Section 5.2.3.3 of the HSSD requires that if the sound speed measured at the sonar head differs by more than two meters/second from the commensurate profile data, then another cast shall be acquired. For the area near Quinby Inlet in H12394, there were a number of occurrences where the sound speed values exceeded the two meters/second threshold due to the local temporal and tidal variability. In this region, many profiles were acquired and reapplied in an effort to reduce these effects. The product of this effort resulted in the final data bearing no significant artifacts due to sound speed differences. Additional information can be found in Section A.8 of the DAPR.

On average, a profile was applied every 24 minutes and a new profile was acquired every 36 minutes. A total of 438 profiles were applied to online data for H12394. All profiles that were applied for online multibeam collection were acquired within the bounds of the survey area with the exception of two. These two profiles (assvt12203_d12.svp and assvt12203_d14.svp) were acquired within 200 meters (during the lead-in) of the beginning of two survey lines. Please refer to the DAPR for specific details regarding acquisition (Section A.8) and application (Section C.1.3) of sound speed profiles. For information regarding the start and end of online data, please reference the “Sidescan Review Log” and “Watchstander Logs” sections within Separates I.

Confidence checks of the sound speed profile casts were conducted periodically (at least once per survey leg) by comparing at least two consecutive casts, each taken with different SV&P Smart Sensors or the CTD. Six sound speed confidence checks were conducted during H12394 and the results can be found in Separates II within the “Atlantic Surveyor Comparison Cast Log” section.

Sound speed profiles were obtained for four different survey purposes. The “Atlantic Surveyor Sound Speed Profile Log” section of Separates II is a cumulative report detailing each cast associated with H12394. The 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 (H12394/Data/Processed/SVP/CARIS_SSP) on the delivery drive, there are four (.svp) files. 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 match the tables within the sound speed profile log. All sound speed profile files are delivered with the H12394 delivery data and are broken out into sub-folders which correspond to the purpose of each cast.

B.2.8 Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the DAPR.

B.2.9 Coverage Analysis

The **SABER Gapchecker** routine was used to flag multibeam data gaps exceeding the allowable limit of three contiguous nodes. Additionally, 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. A final review of the CUBE surface showed that valid depths exist in 99.99% of the nodes and there were no areas where four or more contiguous nodes lacked data.

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 Hypothesis Number of Soundings (Hyp # Soundings) layer of the PFM grid. The Hyp # Soundings layer reports the number of soundings that were used to compute the chosen hypothesis. Analysis of the H12394 final two-meter PFM grid revealed that 99.89% of all nodes contained three or more soundings; satisfying the requirements for set line spacing surveys, as specified in Section 5.2.2.3 of the HSSD.

Analysis of the three half-meter feature PFM grids indicated that all of them maintained a minimum of 99.94% of all individual nodes containing five or more soundings to meet object detection coverage (HSSD Section 5.2.2.1).

B.3 ECHO SOUNDING CORRECTIONS

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 BACKSCATTER

Backscatter was not collected for this survey.

B.5 DATA PROCESSING

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

B.5.1 Software Updates

Data processing and analysis were carried out using SAIC's **SABER** software package for LINUX. Please refer to Section A.10 of the DAPR for a description of the software and the version updates installed and used during the processing of the data.

B.5.2 Surfaces

A PFM CUBE surface was used to assess and document multibeam survey coverage. The CUBE depth is populated with 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 in H12394 was from 6.769 meters (22 feet, 0.270-meter uncertainty) to 24.005 meters (79 feet, 0.280-meter uncertainty). Section 5.2.2.3 of the HSSD requires a two-meter grid resolution for depths ranging from zero meters to 20 meters and a four-meter grid resolution for depths ranging from 16 meters to 40 meters. Due to the range of depths encountered on this project, SAIC requested and was granted permission to deliver all final grids at the higher two-meter node resolution (see 01 May 2012 correspondence in Appendix II). Therefore, the final CUBE surface for H12394 was generated at two-meter grid node resolution. Over significant features, CUBE surfaces were generated at half-meter grid node resolution to meet the object detection specifications defined in Section 5.2.2.1 of the HSSD. Three significant features were identified in H12394 and separate half-meter resolution PFM grids made for each. Data within the half-meter resolution CUBE PFM grids also remain in the two-meter CUBE PFM grid.

The final gridded multibeam data are delivered as Bathymetric Attributed Grids (BAGs). The BAGs were exported from the CUBE PFM grid as detailed in Section B.2.5 of the DAPR. A summary of the final BAG files for H12394 is provided in Figure 15.

BAG File Name	Node Resolution	Depth Range (meters)	Uncertainty Range (meters)
H12394_2m_MLLW.bag	2 meter	6.769 – 24.005	0.270 – 0.542
H12394_Feature_1_50cm_MLLW_1of3.bag	0.5 meter	16.105 – 17.454	0.270 – 0.691
H12394_Feature_2_50cm_MLLW_2of3.bag	0.5 meter	17.088 – 18.361	0.270 – 0.849
H12394_Feature_3_50cm_MLLW_3of3.bag	0.5 meter	6.769 – 8.931	0.270 – 1.358

Figure 15. Summary of H12394 BAG Files

In addition to the standard Depth and Uncertainty surfaces, all final BAGs delivered for H12394 contain the additional Elevation Solution Group and Node Group surfaces. The Elevation Solution Group consists of three surfaces; Standard Deviation, Number of Soundings, and Shoal Depth. The Node Group comprises surfaces containing values for Hypothesis Strength and Number of Hypotheses. A detailed description for each of these group surfaces can be found in Section B.2.5 of the DAPR.

The BAGs delivered for OPR-D302-KR-12 are BAG version 1.5.1. This version of BAG allows for the compression of the grid files. For H12394, the final two-meter BAG is delivered in both compressed and uncompressed formats. The file sizes for the compressed BAGs are typically 25-30 percent the size of the uncompressed versions. The feature BAGs are only delivered in the uncompressed format since they have very small file sizes.

As of the date of delivery for H12394, the hotfix for CARIS that will allow users to view version 1.5.1 BAGs is not available. Therefore, BAG version 1.1.0 files are being delivered as well. The BAG version 1.1.0 files only contain two surfaces, so the additional surfaces are delivered as supplemental nonstandard BAG files. These additional BAG files were generated through the same process as the standard BAG files. The version 1.1.0 BAG format only allows for a Depth surface and an Uncertainty surface. Therefore, each of the nonstandard BAG files were created with the CUBE Depth values populating the Depth surface of the BAG and each of the additional Elevation Solution and Node group surfaces populating the Uncertainty surface of the BAG.

Please note when reviewing these additional, nonstandard 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 nonstandard BAGs are provided for review purposes only and are not intended to be used as archival products.

B.5.3 Sidescan Data Processing

For all details regarding sidescan data processing, see Section B.3 of the DAPR. The Project Instructions required 200% sidescan coverage with concurrent set line spacing multibeam data 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 independently reviewed using tools in **SABER** to verify data quality and swath coverage. Both coverage mosaics are determined to be complete and sufficient to meet the requirements contained within the Project Instructions. The mosaics are delivered as TIFF (.tif) images with accompanying world files (.tfw).

- H12394_ss_1_100_mosaic
- H12394_ss_2_100_mosaic

Sidescan sonar contacts were investigated and confirmed using **SABER Contact Review**. Sidescan contact information is delivered in several ways. The “Sidescan Contacts List” spreadsheet, located in Separates III, notes all sidescan contacts that were identified within H12394. All sidescan sonar contacts and accompanying images are also delivered in a Sidescan Sonar Contacts S-57 file.

C. VERTICAL AND HORIZONTAL CONTROL

No vertical or horizontal controls were established, recovered, or occupied during data acquisition for OPR-D302-KR-12, which includes H12394. Therefore a Horizontal and Vertical Control Report is not required.

C.1 VERTICAL CONTROL

The vertical datum for H12394 is Mean Lower Low Water (MLLW). The Project Instructions specified NOAA tide station 8651370 Duck, NC as the source for water level correctors. A full explanation of the tide zone assessment is detailed in Section C.4 of the DAPR. For H12394, 8651370 Duck, NC was the source of all final verified water level heights for determining correctors to soundings. All data for H12394 were contained within three tide zones which were provided from NOAA and are summarized in Figure 16.

Zone	Time Corrector (minutes)	Range Ratio	Reference Station
SA53	+12	1.18	8651370
SA54	+12	1.11	8651370
SA55	+6	1.11	8651370

Figure 16. Water Level Zoning Parameters Applied on Sheet H12394

SAIC did not revise the delivered tide zones for tide station 8651370 Duck, NC as the water level zoning parameters in Figure 16, provided by National Ocean Service (NOS), were deemed adequate for the application of observed verified water levels. As a result, they were accepted as final and applied to all H12394 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 H12394.

C.2 HORIZONTAL CONTROL

The survey data for sheet H12394 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.

Please refer to the DAPR 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 (289 kHz), Annapolis, MD (301 kHz), and New Bern, NC (294 kHz). The differential receivers were programmed manually to only receive differential corrector data from these three 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. Any soundings with total horizontal uncertainties exceeding the maximum allowable IHO S-44 5th edition Order 1a specifications were flagged as invalid and therefore not used in

the CUBE depth calculations. All daily positioning confidence checks for H12394 were within 0.83 meters. These daily positional checks are presented in a table within Separates I, "Daily Positioning Confidence Checks".

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 H12394, the survey area is fully covered by one Raster Chart (BSB) and one Electronic Navigational Chart (ENC).

Chart 12210	**Chincoteague Inlet to Great Machipongo Inlet**	
	Scale	1:80,000
	Edition and Date	38th, 05/01/2008
	Notice to Mariners corrected through	38.193, 12/01/2012

ENC US4VA70M	**Chincoteague Inlet to Great Machipongo Inlet**	
	Scale	1:80,000
	Edition and Issue Date	12th, 07/12/2012
	Update and Date	8, 11/05/2012

The chart comparisons were conducted using SAIC's **SABER** software to view the BSB raster charts with overlain layers of H12394 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**. Charting recommendations for depths follow Section 5.1.2 of the HSSD where depths and uncertainties are to be rounded using standard arithmetic rounding (round half up) and accompanying chart depth units are rounded using NOAA cartographic rounding (0.75 round up). All depths and uncertainty values for H12394 are provided to millimeter precision.

United States Coast Guard (USCG) District 5 Notice to Mariners publications were reviewed for changes subsequent to the date of the Hydrographic Survey Project Instructions and before the end of survey (as specified in Section 8.1.4 of the HSSD). The Notice to Mariners reviewed were from week 11 (13 March 2012) until week 39 (25 September 2012). There were no changes that affected the area within H12394 over that time period.

H12394 data meet data accuracy standards and bottom coverage requirements. Recommend updating the common areas of all charts using data from this survey. Charting recommendations for all features are provided in the S-57 Feature file.

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

CUBE depths within sheet H12394 generally agreed within ±4 feet of the charted depths. The following two side-by-side soundings show notable exceptions to the general agreement.

The charted 32-foot sounding in approximately 37° 26' 33.76"N 075° 35' 07.94"W was in CUBE depths of 43 to 46 feet.

The charted 33-foot sounding in approximately 37° 26' 37.48"N 075° 34' 51.17"W was in CUBE depths of 41 to 49 feet.

The charted depth curves (30-foot and 60-foot) throughout H12394 were generally found to be in agreement with the survey data. Most were found to be located within 300 meters of their charted locations. One exception would be the 28-foot sounding and surrounding 30-foot depth curve in approximately 37° 28' 22.79"N 075° 36' 02.62"W which was observed to be located approximately 600 meters south of its charted location.

The following exceptions are recommended for removal from the chart.

- The isolated 30-foot sounding and surrounding depth curve in approximately 37° 27' 53.35"N 075° 35' 25.64"W was found in CUBE depths between 36 and 38 feet.
- The isolated 60-foot sounding and surrounding depth curve in approximately 37° 26' 06.23"N 075° 31' 13.74"W was found in CUBE depths between 61 and 67 feet.

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

CUBE depths within sheet H12394 generally agreed within ±1.5 meters of the charted depths. The following two side-by-side soundings show notable exceptions to the general agreement.

The charted 9.7-meter sounding in 37° 26' 34.68"N 075° 35' 08.12"W was in CUBE depths of 13.3 to 14.0 meters.

The charted 10-meter sounding in 37° 26' 37.74"N 075° 34' 51.51"W was in CUBE depths of 12.7 to 14.8 meters.

The charted depth curves (9.1-meter and 18.2-meter) throughout H12394 were generally found to be in agreement with the survey data. Most were found to be located within 300 meters of their charted locations. Though the 8.5-meter sounding and surrounding 9.1-meter depth curve in 37° 28' 22.72"N 075° 36' 02.57"W was found approximately 600 meters to the south of its charted location.

The following exceptions are recommended for removal from the chart.

- The isolated 9.1-meter sounding and surrounding depth curve in 37° 27' 53.89"N 075° 35' 25.96"W was found in CUBE depths between 11.1 and 11.8 meters.

- The isolated 18.2-meter sounding and surrounding depth curve in 37° 26' 06.47"N 075° 31' 14.09"W was found in CUBE depths between 18.7 and 20.4 meters.

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

As documented in the Project Instructions, the one uncharted AWOIS item (2784) assigned for project OPR-D302-KR-12 fell within the survey bounds of H12394. Details of the information only AWOIS are as follows.

- Vessel San Albano
- Position 37° 26' 18.49"N 075° 37' 10.72"W
- Radius 200 meters
- Notes Wrecked Feb 22, 1892; 1291 Tons

The AWOIS area was covered by 200% sidescan data and resulting multibeam data. There were several small insignificant (10 – 20 centimeters high) objects observed in both the multibeam and sidescan data. However, no significant obstructions or wrecks were observed in the survey data.

D.1.4 Charted Features

Two charted features were investigated for H12394.

The charted obstruction in 37° 29' 29.17"N 075° 34' 57.16"W was not found. This obstruction was also not found in 2011 during data collection for H12338, OPR-D302-KR-11. An AWOIS was not assigned for the obstruction, however after reviewing the AWOIS database for Region 5, SAIC believe that this obstruction is AWOIS 7189.

The wreck presently charted as Position Doubtful in 37° 27' 01.02"N 075° 37' 45.32"W was observed (Feature #3, 37° 26' 55.32"N 075° 37' 44.43"W) in the H12394 data. A review of the AWOIS database for Region 5 revealed a wreck sunk in 37° 27' 00.49"N 075° 37' 40.72"W (AWOIS 2427). AWOIS 2427 is described as a submerged dangerous wreck PD. SAIC believe that the observed wreck (Feature #3) is AWOIS 2427. Further details, descriptions and charting recommendations for these charted features are addressed in the S-57 Feature file.

D.1.5 Uncharted Features

The survey data for H12394 revealed three uncharted obstructions within the survey bounds; Feature #1 in 37° 26' 52.15"N 075° 33' 52.34"W, Feature #2 in 37° 26' 00.86"N 075° 33' 06.42"W, and Feature #4 in 37° 25' 52.88"N 075° 29' 26.27"W. See the S-57 Feature file for all the details and recommendations regarding these three obstructions.

D.1.6 Danger to Navigation Reports

One Danger to Navigation Report was submitted to the Atlantic Hydrographic Branch for this survey. The report documented a least depth and confirmed the location of a wreck

charted as position doubtful in 37° 27' 01.02"N 075° 37' 45.32"W. Because the wreck is charted within 170 meters of its surveyed location, AHB chose not to forward the DTON to the Marine Charting Division. The wreck (Feature #3, 37° 26' 55.32"N 075° 37' 44.43"W) was addressed as a chart update in the S-57 Feature file.

D.1.7 Shoal and Hazardous Features

There were no significant uncharted shoals discovered during this survey.

D.1.8 Channels

No maintained channels exist within the bounds of this survey.

D.2 ADDITIONAL RESULTS

D.2.1 Shoreline Verification

Shoreline verification was not required for H12394.

D.2.2 Comparison with Prior Surveys

The junction analysis with the contemporary 2011 survey H12338 was conducted and the results are presented in the Sheet-to-Sheet Junctions section of this report.

D.2.3 Aids to Navigation

The charted RW "Q" Mo (A) WHIS buoy (Figure 17) was found to be serving its intended purpose in its charted location, 37° 28' 06.34"N 075° 36' 04.73"W (Feature #5). This agreed with the description of the Quinby Inlet Lighted Whistle Buoy "Q" (No. 320/6700) in the United States Coast Guard Light List Volume II Atlantic Coast updated through LNM week: 48/12.

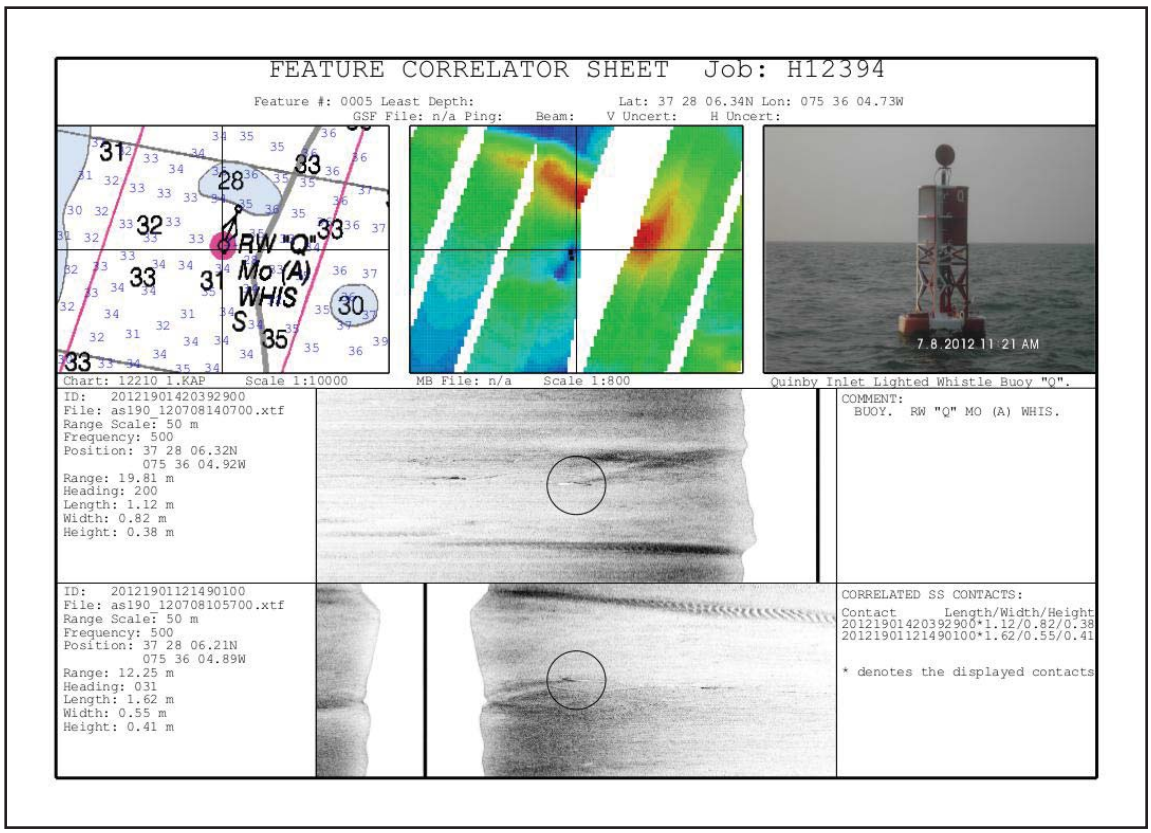

Figure 17. Feature Correlator Sheet for Quinby Inlet Lighted Whistle Buoy "Q"

D.2.4 Overhead Features

No overhead features exist within the bounds of this survey.

D.2.5 Submarine Features

No submarine features exist within the bounds of this survey.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist within the bounds of this survey.

D.2.7 Platforms

No platforms exist within the bounds of this survey.

D.2.8 Significant Features

All significant features are addressed in the S-57 Feature file.

D.2.9 Construction and Dredging

No construction or dredging was observed within the limits of the survey.

D.2.10 Other Results

D.2.10.1 Designated Soundings

All designated soundings set for H12394 were classified as features and are maintained within the final S-57 Feature file.

D.2.10.2 S-57 Feature File

Included with H12394 delivery is the S-57 Feature file, H12394.000. Details on how this file is generated and quality controlled can be found in Section B.2.6 of the DAPR. The S-57 Feature file delivered for H12394 contains millimeter precision for the value of sounding (VALSOU) attribute. As specified in Section 8.2 of the HSSD, the S-57 Feature file is in the WGS84 datum and is unprojected with all units in meters. The wreck and each of the obstructions found in H12394 are retained within the S-57 Feature file.

For each feature contained in the S-57 file, the Feature Correlator sheet was exported as an image file (.jpg) and is included in the S-57 Feature file under the NOAA Extended Attribute field “images” as requested by AHB.

D.2.10.3 Sidescan Sonar Contacts S-57 File

As requested by AHB, SAIC also generated a supplemental S-57 file to present the sidescan contacts, H12394_SSCon.000. Details on how this file was generated, attributed, and quality controlled can be found in Section B.3.5 of the DAPR. The supplemental Sidescan Contact S-57 file is delivered in a sub-directory of the S-57_Features directory named, “Sidescan_Sonar_S-57_File_as_Cartographic_Symbol”.

The “Sidescan Contacts List”, located in Separates III of this report, provides a table containing the same information as the Sidescan Contact S-57 file.

D.2.10.4 Bottom Characteristics

In accordance with both the Project Instructions and Section 7.1 of the HSSD, bottom characteristics were obtained for H12394. Bottom characteristics were acquired at the locations proposed in the Project Reference File (PRF) by NOAA. Six samples were collected. Bottom characteristics are included in the H12394 S-57 Feature file, H12394.000, 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 II of this document. Bottom characteristics obtained for H12394 are sufficient to be used to update the respective charts.

E. APPROVAL SHEET

11 January 2013

LETTER OF APPROVAL

REGISTRY NUMBER: H12394

Field operations and data processing contributing to the accomplishment of this survey, H12394, were conducted under my supervision and that of the 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.

This report and the accompanying digital data for project OPR-D302-KR-12, Virginia Coast, are respectfully submitted. All records are forwarded for final review and processing.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual. These data are adequate to supersede charted data in their common areas.

Reports concurrently submitted to NOAA for this project include:

Report	Submission Date
Data Acquisition and Processing Report	11 January 2013

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Evan J. Robertson

Digitally signed by Evan J. Robertson
DN: cn=Evan J. Robertson, o=Marine Survey and Engineering Solutions, ou=SAIC, email=Evan.J.Robertson@saic.com, c=US
Date: 2013.01.08 12:33:15 -05'00'

Evan J. Robertson
Lead Hydrographer
Science Applications International Corporation
11 January 2013

APPENDIX I

TIDES AND WATER LEVELS

APPENDIX I. TIDES AND WATER LEVELS

Field Tide Note
A field tide note was not required for H12394.

Final Tide Note
Verified water levels for the station in Duck, NC (8651370) were downloaded from the NOAA Tides and Currents web site. 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 H12394 Descriptive Report Section C.1 for details regarding final tides for H12394. The water level zoning correctors, based entirely on Duck, NC (8651370), were applied to all multibeam data for H12394.

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.

The on-line times for acquisition of valid hydrographic data are presented in the Abstract Times of Hydrography, H12394 (Figure 18).

Abstract Times of Hydrography

Project: OPR-D302-KR-12
Registry No.: H12394
Contractor Name: Science Applications International Corporation
Date: 11 January 2013
Sheet Designation: 1
Inclusive Dates: 06 July 2012 - 29 September 2012

Field work is complete.

Begin Date	Begin Julian Day	Begin Time	End Date	End Julian Day	End Time
07/06/2012	188	15:59:29	07/07/2012	189	04:40:01
07/08/2012	190	00:13:55	07/09/2012	191	04:43:46
07/17/2012	199	16:48:52	07/25/2012	207	18:58:54
07/28/2012	210	23:30:40	07/29/2012	211	18:11:25
08/04/2012	217	11:26:24	08/04/2012	217	18:54:49
09/29/2012	273	02:35:50	09/29/2012	273	03:44:40

Figure 18. Abstract Times of Hydrography, H12394

Transmittal Letter to CO-OPS
A transmittal letter to CO-OPS was not required for H12394.

Other Correspondence Relating to Tides
There is no other correspondence relating to tides and/or water levels.

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

This appendix is comprised of two sections. 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 characteristic results for this sheet.

CORRESPONDENCE

From: Marc Moser [mailto:marc.s.moser@noaa.gov]
Sent: Monday, April 02, 2012 11:55 AM
To: Evans, Rhodri E.
Cc: Jeffrey Ferguson; Mark Lathrop; Megan Greenaway
Subject: 2012 NOAA Extended Attribute Files

Good afternoon,
I am sending the attached files to all contractors as a courtesy to provide you with information on how HSD and NOAA field units are implementing the feature reporting requirements, as documented in the 2012 HSSD, within CARIS software. This is by no means an endorsement for CARIS products nor is it meant to imply any requirement to use CARIS products to process and or deliver hydrographic feature data. For those who utilize CARIS software, the attached files contain the guidance and necessary files that HSD provides to the NOAA field units to implement NOAA Extended Attributes in CARIS. You are welcome to use NOAA's approach for implementing the NOAA Extended Attributes or establish a different approach that better suits your processes and procedures.

All charted features within the bounds of the assigned project area shall be addressed, documented and submitted using the NOAA Extended Attributes as defined in 2012 HSSD. To aid with this requirement I have directed the COTR's to provide a Composite Source Feature File (CSF) in a .000 format. This file has been generated from the largest scale ENC covering the project area. The CSF shall be updated with your survey results. The updated CSF will become the final feature deliverable, the Final Feature File in .000 format, as described in the 2012 HSSD.

Please contact your COR if you have any questions.

From: Mark Lathrop [mailto:mark.t.lathrop@noaa.gov]
Sent: Wednesday, April 25, 2012 1:57 PM
To: Davis, Gary R.
Cc: Evans, Rhodri E.; Donaldson, Paul L.; Quintal, Rebecca T.
Subject: Re: Tide Zones for TO7

Gary,

Our scale criteria has changed in the last few years away from the printed smooth sheet and more towards reflecting the nautical chart. Surveys are now generally twice the scale of the largest scale chart of the survey area with a minimum scale of 1:40,000.

We should be receiving updated zoning from CO-OPS soon. Please stand by.

Mark

On Tue, Apr 24, 2012 at 5:07 PM, Davis, Gary R. <GARY.R.DAVIS@saic.com> wrote:
Mark,

There is a section of Sheet 3 (H12396), Task Order 7, that is not covered by a tide zone (see attached file). Please provide additional zoning to cover this area. Also please clarify if Water Level Station Duck, NC (865-1370) or Wachapreague, VA (863-1044) is to be used, both are listed in the project instructions.

We would also like to verify that the scale of the surveys for Task order 7 is 40,000. Previous surveys along the coast have been 20,000.

Thanks,
Gary

From: Mark Lathrop [mailto:mark.t.lathrop@noaa.gov]
Sent: Thursday, April 26, 2012 2:19 PM
To: Evans, Rhodri E.
Subject: Re: 2012 RFP

Rod,

I will send you the updated Project Instructions and SOW next week. We will be surveying to the 2012 Specs. If there is anything there that you are concerned about with regard to this year's survey please let me know. I've attached the Awois detail, CSF and PRF files for your survey.

Mark

On Thu, Apr 26, 2012 at 1:52 PM, Evans, Rhodri E. <RHODRI.E.EVANS@saic.com> wrote:

Mark,

In addition to the revised tide zoning and Tides SOW that we know will be coming from CO-Ops soon, we have the following questions and requests:

1. We note that today the NOS Hydrographic Surveys Specifications and Deliverables Manual (HSSDM), April 2012 in now posted to the NOAA website. We are currently reviewing it for changes from the October 2011 version. Please confirm if we are to deliver to the April 2012 version (the task was proposed to the 2011 specifications per your email below of 12 January 2012)?

2. We note that the Project Instructions (dated 2/27/2012) that we received with the faxed task award lists the Statement of Work (SOW), Hydrographic Survey Services, 2011 as a supporting document. Is there a new 2012 version of the SOW, or is the 2011 version still in effect (per your email below)? Further, can we please have the project instructions as a PDF file (we have only the faxed hard copy and a scruffy scan that we made of the fax) and we will use it as the PIs for our internal use and for delivery in the Separates.

3. In your email below (dated January 12, 2012), you indicated that the Project Instructions list 2 Full Investigation AWOIS Items, but that there is only one and it is Information Only. Can you please provide the information for the one AWOIS?

4. The new HSSDM states that a Composite Source File (CSF) and Project Reference File (PRF) will be provided. It also states that a Prior Survey Feature File (PRI) may be provided with the Project Instructions. Can you please send these files?

Thanks & Regards,
Rod

From: Mark Lathrop [mailto:mark.t.lathrop@noaa.gov]
Sent: Tuesday, May 01, 2012 3:07 PM
To: Evans, Rhodri E. [UNK]
Subject: Re: 2012 RFP

Rod,

Only two? That's a first, I believe!
1) No problem with submitting 2-meter node resolution for the entire survey.

2) AHB has several ACORs and I believe they are not necessarily dedicated to any particular contractor. You may substitute the DTON email address provided for ACOR. In fact I suggested this change to the 2012 HSSD during the review process but it somehow didn't get modified.

Mark

On Mon, Apr 30, 2012 at 4:54 PM, Evans, Rhodri E. <RHODRI.E.EVANS@saic.com> wrote:

Mark,

We have completed our review of the new April 2012 HSSD document and we have only 2 questions:

1. We note that in section 5.2.2.3 Set Line Spacing, of the April 2012 HSSD, it calls for 2-meter node resolution for water depths from 0-20 meters and 4-meter node resolution for water depths 16-40 meters. Is it acceptable to deliver the entire sheet at 2-meter node spacing if the data can support it?
2. We note that in section 8.1.3 Danger to Navigation, of the April 2012 HSSD, that it states "Contractors shall submit all Dangers to Navigation via e-mail to the COR and ACOR at processing branch stated in the Hydrographic Survey Project Instructions." We do not see the ACOR identified in the Project instructions. Can you please provide that contact information?

Thanks and Regards, Rod.

From: Castle Parker [mailto:castle.e.parker@noaa.gov]
Sent: Monday, August 27, 2012 7:54 AM
To: Quintal, Rebecca T.
Cc: Mark T Lathrop
Subject: RE: OPR-D302-KR-12 Danger To Nav Reports - H12394 DTN#1; H12395 DTN#1; H12396 DTN#1

Good Morning Rebecca,
AHB is going to submit H12396 DtoN #1 50ft OBSTRN; standby on the official submission. AHB will not submit H12394 DtoN#1 as the wreck is charted even though the feature and position is charted as doubtful; it is nonetheless charted. H12395 DtoN#1 will not be submitted either as the wreck is deeper than the danger zone of 66ft (11fm). Both features will be updated with the associated Hcell.
I will be submitting H12396 DtoN#1 within the next half hour.
Thanks for your continued support. Have a great day!
Gene

From: Quintal, Rebecca T.
Sent: Friday, August 24, 2012 3:30 PM
To: Mark.T.Lathrop@noaa.gov; ahb.dton@noaa.gov
Cc: Evans, Rhodri E.; Davis, Gary R.; Donaldson, Paul L.; Robertson, Evan J.; Smith, Deborah M.; Holloway, Charles F.; Castle Parker
Subject: OPR-D302-KR-12 Danger To Nav Reports - H12394 DTN#1; H12395 DTN#1; H12396 DTN#1

Mark,

Please find attached three (3) Danger to Navigation Reports.

- H12394 DTON #1
- H12395 DTON #1
- H12396 DTON #1

The files for each DTON submission are contained in a separate zip file. Each Zip file contains the following files:

- One (1) S-57 file (*.000)
- One (1) Word document report (*.docx)
- One (1) Text file (*.txt)
- Four (4) image files that are referenced in the S-57 file (*.jpg)

We note that the May 4, 2012 SOW states in Section 2.2.7.2 Dangers to Navigation, that Contractors shall deliver the DTON as a report (with sample report provided). However in the 2012 edition of the Hydrographic Surveys Specifications and Deliverables it states in Section 8.1.3 Danger to Navigation, that Contractors shall deliver the DTON as an S-57 .000 feature file and does not state that a report or ascii text file should be delivered in addition.

For these deliveries we provided the S-57 file, and a report and ascii text file. Please let us know if the S-57 file is all that is required on future DTON deliveries. Thanks!

Please contact me if there are any questions or problems with the attached files.

Thank you,
-Rebecca

From: Castle Parker [mailto:castle.e.parker@noaa.gov]
Sent: Monday, August 27, 2012 8:36 AM
To: Quintal, Rebecca T.
Cc: Mark Lathrop
Subject: RE: OPR-D302-KR-12 Danger To Nav Reports - H12394 DTN#1; H12395 DTN#1; H12396 DTN#1

Rebecca,
You can submit the S57 file without the Word document. The remarks should include the information regarding the water level correction and horizontal datum. Also, submit the images. The ASCII file is not necessary either. One thing I did notice is that the acquisition time in the S57 file had the correct date , but the time was missing. HSSD doesn't specify the acquisition time and the associated S57 field to populate; use the "obstim" to populate the date and time stamp.
HSD has started using S57 file for all DtoN submissions…. Or should I say, we're moving that way. The documents and ASCII files are more work and all the information should be populated in the S57 file.
Thanks again and respond as necessary.
Gene

From: Quintal, Rebecca T. [mailto:REBECCA.T.QUINTAL@saic.com]
Sent: Monday, August 27, 2012 8:29 AM
To: Castle Parker

Cc: Mark T Lathrop
Subject: RE: OPR-D302-KR-12 Danger To Nav Reports - H12394 DTN#1; H12395 DTN#1; H12396 DTN#1

Thank for the information Gene!

Any comments on if we need to submit both the written report and associated ascii files, and the S-57 file?
Thanks!
-Rebecca

From: Megan Greenaway <megan.greenaway@noaa.gov>
Date: Thu, Oct 11, 2012 at 9:48 AM
Subject: Documenting Extended Attribute Files in DR

Good morning,
I want to clarify and emphasize the importance of the naming convention for the NOAA Extended Attribute files in the DR section B.5 Data Processing "Feature Object Catalog". From here forward please use the following naming convention.

NOAA Extended Attribute Files VX_X

The version number is the important item because the processing branches need to use the same version when SAR'ing and compiling your surveys. For now, the processing branches can use a 2012 NOAA Extended Attribute set of files to process 2010 and 2011 surveys because we have made "additions" to the extended attribute files and have not removed any attributes. However, in the future we may remove items or change enumeration values and therefore would not see an attribute or enumeration that was populated by the field.

HSD OPS will update the 2013 HSSD with these requirements. I realize the xmlDR prompt is very vague right now. Grant has suggested a drop down which I think is a good idea.

Vitad or Chris can you please forward to the NRT's?

Thanks,
Megan

From: Castle Parker
Sent: Tuesday, October 23, 2012 2:31 PM
To: Quintal, Rebecca T.
Cc: Mark Lathrop
Subject: RE: OPR-D302-KR-12 Danger To Nav Reports - H12394 DTN#1; H12395 DTN#1; H12396 DTN#1

Good Day Rebecca,
I would leave special feature type blank, since they weren't officially submitted to MCD's Nautical Data Branch as a DtoN. Therefore, they are a regular survey feature.
The "descrp" attribute can be flagged as "update" since we want to remove the charted position doubtful (PD).
$0.02 worth!
gp

From: Quintal, Rebecca T.
Sent: Tuesday, October 23, 2012 2:17 PM
To: Castle Parker
Cc: Mark T Lathrop
Subject: RE: OPR-D302-KR-12 Danger To Nav Reports - H12394 DTN#1; H12395 DTN#1; H12396 DTN#1

Gene,

Hello. For objects where DToNs were submitted by a field unit, but were not submitted by the branches to MCD, should the field unit fill out the sftype (Special Feature Type) as DTON or leave it blank? We had this case twice this year (see below).

BOTTOM CHARACTERISTICS

There were six bottom samples taken to verify the bottom types charted for H12394 as recommended in the Project Reference File (PRF). Figure 19 compares information from each sample collected to the charted bottom type within 2500 meters, if available. Chart 12210 was used for comparison; this chart is the largest scale chart that covers the entire survey area. It is recommended that the bottom types charted be updated where necessary based on the information collected during the latest survey.

JD	Sample Number	Bottom Sample Position (NAD83)		Observed Bottom Type	CUBE Depth (m)	Depth Uncertainty (m)	Charted Bottom Type Chart #12210
		Latitude (N)	Longitude (W)				
207	H12394_BS_01	37° 26' 22.17"	075° 36' 55.10"	fne br S brk wh Sh	11.019	0.270	S
207	H12394_BS_02	37° 26' 23.61"	075° 33' 40.02"	br Sh fne br S	17.455	0.270	S
207	H12394_BS_03	37° 29' 01.36"	075° 33' 38.27"	fne br S	14.009	0.270	S
207	H12394_BS_04	37° 26' 24.77"	075° 30' 23.57"	fne br S	19.908	0.270	M
207	H12394_BS_05	37° 29' 00.60"	075° 30' 20.76"	fne br S brk wh Sh	15.975	0.270	S
207	H12394_BS_06	37° 29' 00.86"	075° 27' 04.83"	fne br S brk wh Sh	19.736	0.280	S

Figure 19. H12394 Bottom Characteristics

APPENDIX III

FEATURES REPORT

DTONS -- NONE

AWOIS -- ONE

WRECK -- ONE

MARITIME BOUNDARIES -- NONE

H12394 AWOIS Features

Registry Number: H12394
State: Virginia
Locality: Atlantic Ocean
Sub-locality: 5 NM East of Quinby Inlet
Project Number: OPR-D302-KR-11
Survey Dates: 01/01/2006 - 09/29/2012

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12210	38th	05/01/2008	1:80,000 (12210_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	AWOIS 2427 - 22 Wreck	Wreck	6.77 m	37° 26' 55.3" N	075° 37' 44.4" W	2427
1.2	AWOIS_2784	Wreck	[None]	37° 26' 18.5" N	075° 37' 10.7" W	---
1.3	AWOIS_7189	GP	[None]	37° 29' 29.2" N	075° 34' 57.2" W	---

1 - AWOIS Features

1.1) AWOIS 2427 - 22 Wreck

Primary Feature for AWOIS Item #2427

Search Position: 37° 27' 00.5" N, 075° 37' 40.7" W

Historical Depth: [None]

Search Radius: 0

Search Technique: [None]

Technique Notes: [None]

History Notes:

History

Lnm37/71--salvage vessel, 125 ft., sunk in 19 ft. At pos.37-27-15n, 75-37-47w

Lnm38/71--turtle wreck lighted buoy wr (ll2634.10) established.

Lnm28/74--buoy discontinued. A wire search failed to locate wreck.

H10034/82--OPR-D103-MI-82; (item 44) subm Dang Wk PD, charted in Lat 37-27-00N, Long 75-37-42W. Line spacing reduced, not found. Retain as Charted (updated 2/89 srb)

Survey Summary

Survey Position: 37° 26' 55.3" N, 075° 37' 44.4" W

Least Depth: 6.77 m (= 22.21 ft = 3.701 fm = 3 fm 4.21 ft)

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

Timestamp: 2012-273.00:00:00.000 (09/29/2012)

Dataset: H12394_Features.000

FOID: US 0000002025 00001(0226000007E90001)

Charts Affected: 12210_1, 12200_1, 13003_1

Remarks:

The wreck presently charted as Position Doubtful in 37° 27' 01.02"N 075° 37' 45.32"W was observed (Feature #3, 37° 26' 55.32"N 075° 37' 44.43"W) in the H12394 data. A review of the AWOIS database for Region 5 revealed a wreck sunk in 37° 27' 00.49"N 075° 37' 40.72"W (AWOIS 2427). AWOIS 2427 is described as a submerged dangerous wreck PD. SAIC believe that the observed wreck is AWOIS 2427.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12394_Features.000	US 0000002025 00001	0.00	000.0	Primary
AWOIS_EXPORT	AWOIS # 2427	184.24	209.8	Secondary (grouped)

Hydrographer Recommendations

Feature was submitted to the Atlantic Hydrographic Branch (as a Danger to Navigation). The report documented a least depth and confirmed the location of a wreck charted as position doubtful in 37° 27' 01.02"n 075° 37' 45.32"w. Because the wreck is charted within 170 meters of its surveyed location, AHB chose not to forward the dton to the marine charting division.

Cartographically-Rounded Depth (Affected Charts):

22ft (12210_1)

3 ¾fm (12200_1, 13003_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 2:dangerous wreck
	INFORM - Delete Wreck from charted location, add Wreck in surveyed location
	NINFOM - add Wreck
	QUASOU - 6:least depth known
	SORDAT - 20120929
	SORIND - US,US,graph,H12394
	STATUS - 1:permanent
	TECSOU - 3:found by multi-beam
	VALSOU - 6.769 m
	WATLEV - 3:always under water/submerged

Office Notes

SAR: This feature is real and was ensonified with object detection coverage. The field unit considers the feature to be AWOIS 2427; AWOIS 2427 database location 37-27-0N.49 075-37-40.72W and is approximately 175m NNE from the located survey wreckage.

The survey feature is located on the outer boundary of the charted feature's symbology (dangerous sunken wreck PD). Final chart disposion is deferred to the cartographic team.

Compile: Add 22 Wreck (AWOIS #2427)

Feature Images

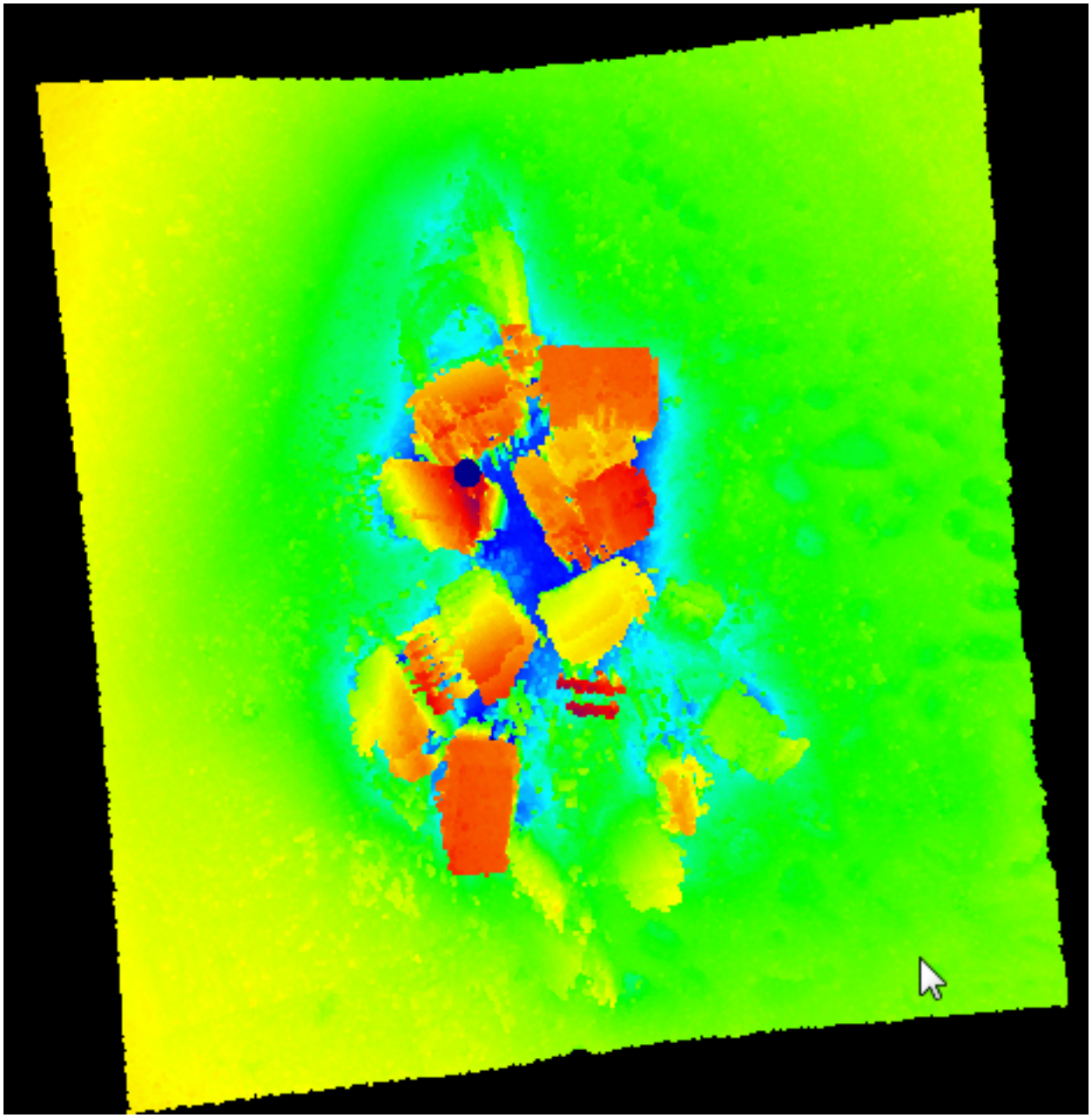

Figure 1.1.1

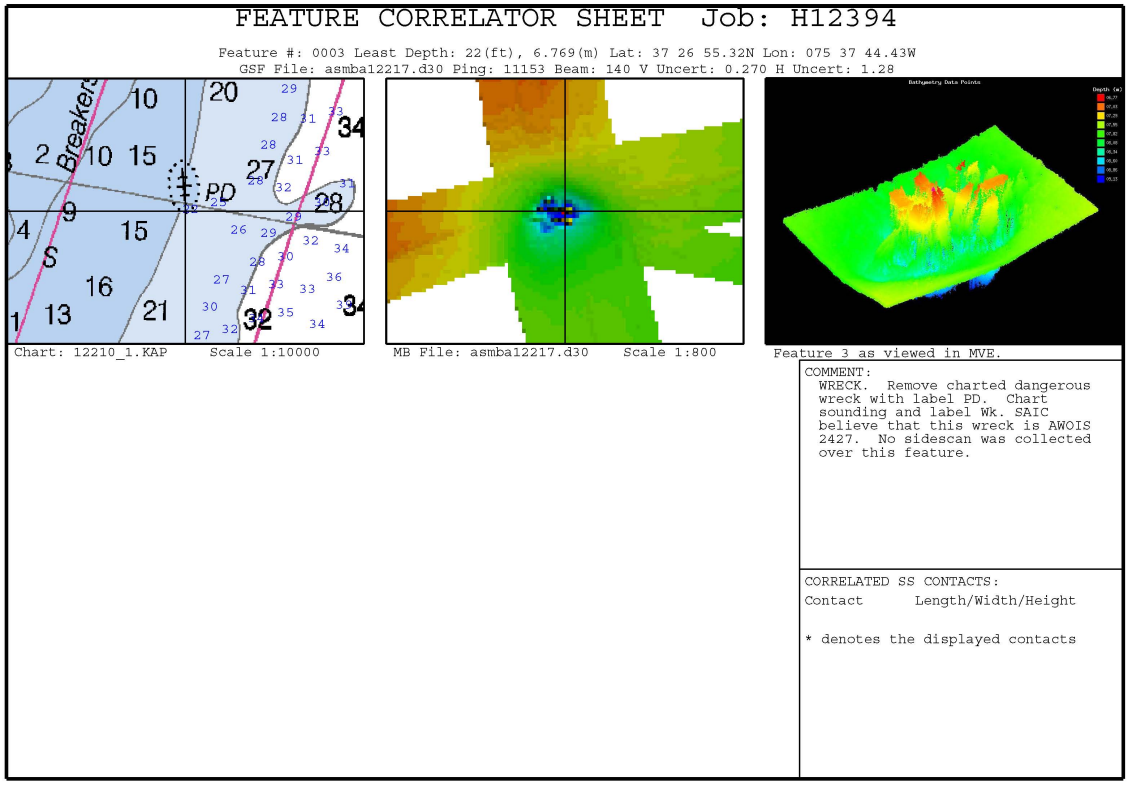
FEATURE CORRELATOR SHEET Job: H12394
Feature #: 0003 Least Depth: 22(ft), 6.769(m) Lat: 37 26 55.32N Lon: 075 37 44.43W
GSF File: asmba12217.d30 Ping: 11153 Beam: 140 V Uncert: 0.270 H Uncert: 1.28
Breakers
PD
Chart: 12210_1.KAP Scale 1:10000
MB File: asmba12217.d30 Scale 1:800
Feature 3 as viewed in MVE.
COMMENT:
WRECK. Remove charted dangerous wreck with label PD. Chart sounding and label Wk. SAIC believe that this wreck is AWOIS 2427. No sidescan was collected over this feature.
CORRELATED SS CONTACTS:
Contact Length/Width/Height
* denotes the displayed contacts

Figure 1.1.2

1.2) AWOIS_2784

Survey Summary

Survey Position: 37° 26' 18.5" N, 075° 37' 10.7" W

Least Depth: [None]

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

Timestamp: 2012-273.00:00:00.000 (09/29/2012)

Dataset: H12394_Features.000

FOID: US 0000002075 00001(02260000081B0001)

Charts Affected: 12210_1, 12200_1, 13003_1

Remarks:

HISTORY

The wreck San Albano was a Spanish Cargo Ship powered by steam built in 1880, 2037 gr tonnage, 95.8 x 10.5 m dimensions, that ran aground 02-22-1892. The steamer, a vessel of twelve hundred and ninety-one tons register, carrying a valuable cargo, was bound from New Orleans, Louisiana, to Hamburg, Germany, via Norfolk, Virginia, where it was intended to obtain coal. In the thick weather prevailing during the tempestuous voyage to the northward the reckoning had been overrun and the entrance to the Chesapeake Bay passed. In retracing the distance along the coast the master steered too far to the westward, and on the evening of the 22nd the vessel, which drew twenty-one feet of water, grounded on the outer shoals of Hog Island but later worked over the bar and floated in one of the numerous channels or gullies. Here the master came to an anchor, but the increasing force of adverse elements proved irresistible, and the vessel drifted before the wind and sea, striking upon the shoals at intervals, until, aleak and full of water, she finally grounded five hundred yards from the beach a hopeless wreck.

(http://www.ocmuseum.org/index.php/site/shipwrecks_article/shipwreck_of_the_spanish_steamship_san_albano)

Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 2784	0.00	000.0	Primary
H12394_Features.000	US 0000002075 00001	0.06	000.0	Secondary (grouped)

Hydrographer Recommendations

$CSYMB/remrks: Feature ID US 0000007354 00001 from the Project Reference File; OPR-D302-KR-12_PRF.000. Wreck not observed in 200% sidescan coverage or the resulting multibeam coverage for the designated 200-meter radius.

Uncharted AWOIS item (2784) assigned for project OPR-D302-KR-12 fell within the survey bounds of H12394. Details of the information only AWOIS are as follows:

Vessel San Albano

Position 37° 26' 18.49"N 075° 37' 10.72"W

Radius 200 meters

Notes Wrecked Feb 22, 1892; 1291 Tons

The AWOIS area was covered by 200% sidescan data and resulting multibeam data. There were several small insignificant (10 – 20 centimeters high) objects observed in both the multibeam and sidescan data. However, no significant obstructions or wrecks were observed in the survey data.

S-57 Data

Geo object 1: Cartographic symbol ($CSYMB)

Attributes: INFORM - AWOIS 2784 was not observed in the survey data coverage using 200% sidescan and resulting multibeam.

NINFOM - Compile: as Wreck is not currently charted, retain Wreck as not currently charted, update AWOIS database as Wreck not observed.

NTXTDS - US4VA70M,13th Ed.,20130305

SORDAT - 20120929

SORIND - US,US,graph,H12394

Office Notes

SAR: The AWOIS search radius was ensonified with 200% SSS and associated set line spacing MBES. The wreck was not located within the defined AWOIS search radius. No side scan contacts were submitted near the vicinity of the feature.

Compile: Update AWOIS #2784, wreck San Albano, as disproven, no wreck is evident within the AWOIS search radius.

1.3) AWOIS_7189

Survey Summary

Survey Position: 37° 29' 29.2" N, 075° 34' 57.2" W

Least Depth: [None]

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

Timestamp: 2006-001.00:00:00.000 (01/01/2006)

Dataset: H12394_Features.000

FOID: US 0000002126 00001(02260000084E0001)

Charts Affected: 12210_1, 12200_1, 13003_1

Remarks:

History

H10034/82--OPR-D103-MI-82; subm obstruction, Lat 37-29-30N, Long 75-35-00W. Reported by local mariners (Earl Parker and Jim Wallace, Wachapreaque VA) to be a sunken barge. No investigation conducted. (entered 2/89 srb)

Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 7189	0.00	000.0	Primary
H12394_Features.000	US 0000002126 00001	56.16	316.7	Secondary (grouped)

Hydrographer Recommendations

$CSYMB/remrks: Feature ID US 0000005282 00001 from the Composite Source File; OPR-D302-KR-12_CSF.000. Obstruction not observed in 200% sidescan coverage or the resulting multibeam coverage. Obstruction was also not found in 2011 during data collection for H12338; OPR-D302-KR-11.

The charted obstruction in 37° 29' 29.17"n 075° 34' 57.16"w was not found. An AWOIS was not assigned for the Obstruction, however after reviewing the AWOIS database for region 5, SAIC believes that this Obstruction is AWOIS 7189.

S-57 Data

Geo object 1: Cartographic symbol ($CSYMB)

Attributes: INFORM - Obstruction was not observed in the survey data coverage using 200% sidescan and resulting multibeam. An obstruction was assigned in the CSF; not as an AWOIS; however SAIC believe that this obstruction is AWOIS 7189.

NINFOM - Delete OBSTRN

NTXTDS - US4VA70M,13th Ed.,20130305

SORDAT - 20060100

SORIND - US,US,graph,Chart 12210

Office Notes

SAR: The charted features was ensonified with 200% SSS and set line spacing MBES; The feature was not observed nor verified.

Compile: Delete OBSTRN.

APPROVAL

PAGE H12394

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

- H12394_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12394_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:___ Abigail A Higgins

Digitally signed by HIGGINS.ABIGAIL.SARAH.1267671750
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=HIGGINS.ABIGAIL.SARAH.1267671750
Date: 2013.08.30 11:00:19 -04'00'

LT Abigail Higgins, NOAA
Chief, Atlantic Hydrographic Branch