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. *2*

Registry No *H12395*

LOCALITY

State *Virginia*

General Locality *Atlantic Ocean*

Sublocality *13 NM East of Quinby Inlet*

2012

CHIEF OF PARTY

Paul L. Donaldson

Science Applications International Corporation

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NOAA FORM 77-28 (11-72) U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY No
HYDROGRAPHIC TITLE SHEET	**H12395**

State	Virginia
General Locality	Atlantic Ocean
Sub Locality	13 NM East of Quinby Inlet
Scale	1:40,000
Date of Survey	29 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	Paul L. Donaldson
Surveyed by	Alex Bernier, Gary Davis, Paul Donaldson, Chuck Holloway, Jason Infantino, John Kiernan, Colette LeBeau, Webster McDonald, Andrew Seaman, Deborah Smith, Evan Robertson
Soundings by echosounder	Multibeam RESON SeaBat 7125 SV
Verification by	
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 2 (H12395) 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 H12395
Scale 1:40,000, Surveyed 2012
M/V Atlantic Surveyor
Science Applications International Corporation (SAIC)
Paul L. Donaldson, 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: 2
Registry Number: H12395

A. AREA SURVEYED

The area surveyed was a section of the Atlantic Ocean off the coast of Virginia, 13 nautical miles (NM) East of Quinby Inlet (Figure 1).

A.1 SURVEY LIMITS

Data were acquired within the following survey limits:

Northeast Limit	Southwest Limit
37.494142 N	37.419232 N
75.276214 W	75.671505 W

Table 1: Survey Limits

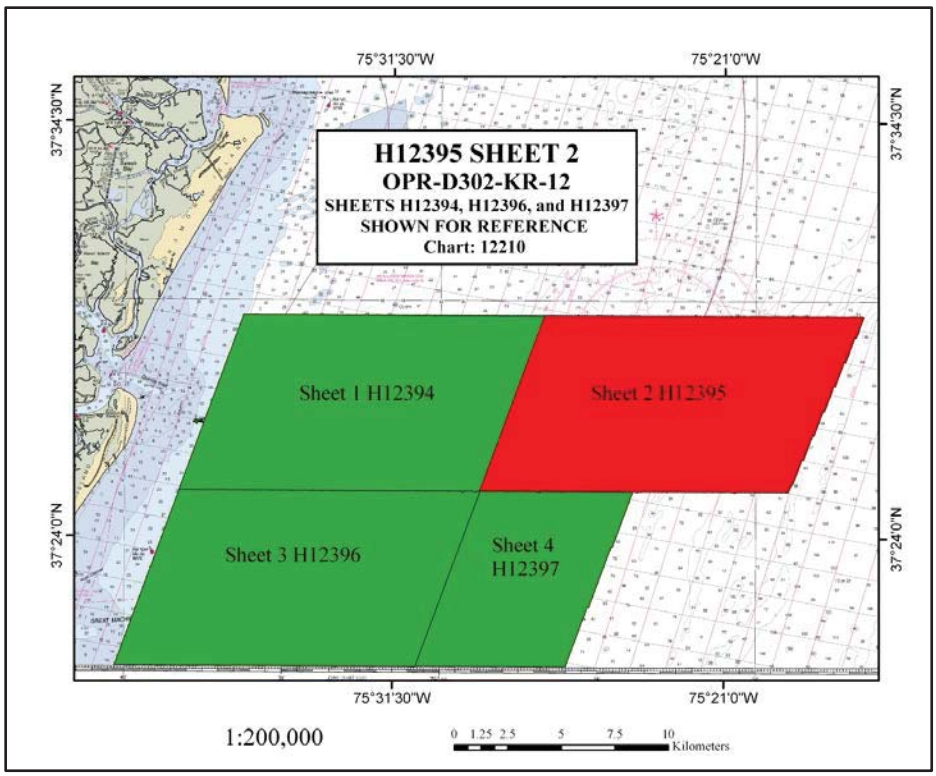

Figure 1: H12395 Survey Bounds

Survey limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 SURVEY PURPOSE

To provide NOAA with modern and accurate hydrographic survey data with which to update the nautical charts of the assigned area: Sheet 2 (H12395) in the Atlantic Ocean, Coast of Virginia.

A.3 SURVEY QUALITY

The entire survey is adequate to supersede previous data.

H12395 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

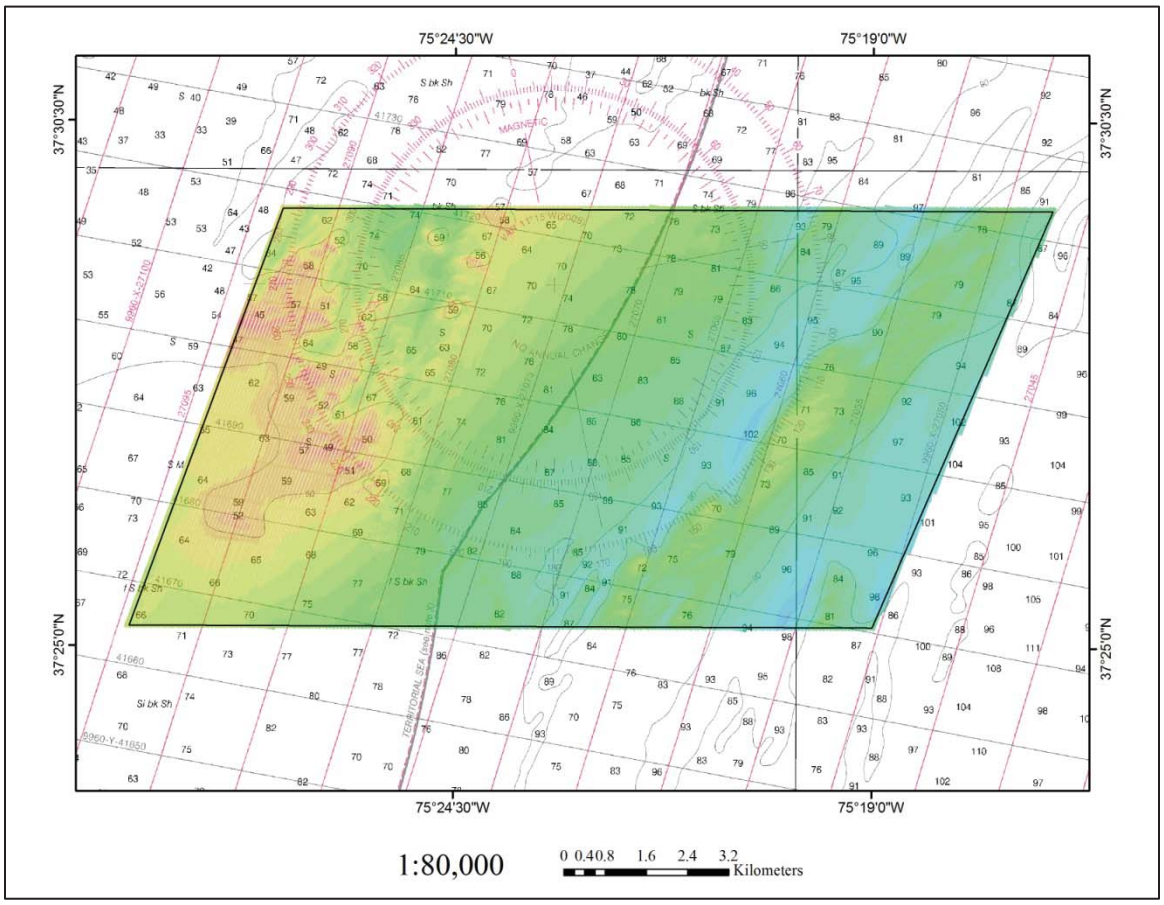

Figure 2: Final Multibeam Coverage for H12395

Survey coverage was in accordance with the requirements in the Project Instructions and the HSSD.

A.5 SURVEY STATISTICS

The following table lists the mainscheme and crossline acquisition mileage for this survey:

	HULL ID	M/V Atlantic Surveyor	Total
LNM	SBES Mainscheme	0	0
	MBES Mainscheme	1.14	1.14
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/MBES Combo Mainscheme	0	0
	SBES/SSS Combo Mainscheme	0	0
	MBES/SSS Combo Mainscheme	1024.44	1024.44
	SBES/MBES Combo Crosslines	85.18	85.18
	Lidar Crosslines	0	0
Number of Bottom Samples			6
Number of DPs			0
Number of Items Items Investigated by Dive Ops			0
Total Number of SNM			35.52

Table 2: Hydrographic Survey Statistics

The following table lists the specific dates of data acquisition for this survey:

Survey Dates
07/29/2012
07/30/2012
07/31/2012
08/01/2012
08/02/2012
08/03/2012
08/04/2012
08/05/2012
08/07/2012
08/08/2012
08/09/2012
08/10/2012
08/12/2012
08/13/2012
08/14/2012
09/29/2012

Table 3: Dates of Hydrography

A.6 SHORELINE

Shoreline was investigated in accordance with the Project Instructions and the HSSD.

A.7 BOTTOM SAMPLES

Bottom samples were acquired in accordance with the Project Instructions or the HSSD.

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, Revision 1 (DAPR, rev1) for OPR-D302-KR-12, delivered concurrently with this Descriptive Report (DR). There were no variations from the equipment configuration described in the DAPR, rev1.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	*M/V Atlantic Surveyor*
LOA	110 feet
Draft	9 feet

Table 4: Vessels Used

The platform for multibeam sonar, sidescan sonar, and sound speed data collection was the *M/V Atlantic Surveyor* (D582365). 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.

B.1.2 Equipment

The following major systems were used for data acquisition during this survey:

Manufacturer	Model	Type
RESON	SeaBat 7125 SV	MBES
L3 Klein	3000	SSS
Applanix	POS/MV 320	Positioning and Attitude System
Trimble	Probeacon	Positioning System
Brooke Ocean Technology LTD	MVP-30	Sound Speed System
Seabird	SBE-19	Sound Speed System

Table 5: Major Systems Used

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 sampling and CTD data collection.

B.2 QUALITY CONTROL

B.2.1 Crosslines

There were 85.18 linear nautical miles of crosslines and 1024.44 linear nautical miles of mainscheme lines surveyed on H12395. This resulted in crossline mileage that represented approximately 8.3 percent of the mainscheme 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 775 meters apart, while the mainscheme lines were oriented at 20.5°/200.5° and were spaced 65 meters apart. During mainscheme operations, the sidescan sonar range scale was set to 75 meters, which provided a consistent 150-meter imagery swath and up to 20 meters of overlap between adjacent lines in each 100% coverage mosaic. Refer to the "Multibeam Processing Log" section within Separates I for information on the delineation of mainscheme and crossline data files.

In the field, hydrographers conducted daily comparisons of mainscheme 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 mainscheme multibeam data and the other included only the near nadir swath (±5° from nadir) crossline data.

The SABER Frequency Distribution tool was used to analyze difference grids created from the mainscheme and crossline grids. Comparisons of all final crossing data in H12395 showed that all comparisons were less than 38 centimeters (Figure 3). All 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 0.531 to 0.665 meters for the range of depths observed in H12395).

As the difference grid used was created by subtracting the H12395 crossline CUBE depths from the H12395 mainscheme CUBE depths. Therefore, positive differences indicate that H12395 mainscheme data are deeper than H12395 crossline data. The mainscheme data were deeper than the crossline data in 66.66% of junctions and shoaler than crossline data in 32.95% of the junctions across the entire survey area (Figure 3). The distribution is fairly well spread about zero with a slight skew towards positive, as visualized in Figure 4.

Twenty-five crossings of mainscheme and crossline data were selected from areas of relatively flat bottom and varied spatially and temporally for beam-by-beam comparisons. 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 20 centimeters. Slight 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. Some of the

crossings showed a depth bias ranging from 10 centimeters to 20 centimeters consistent across all beams in the multibeam swath. This is not uncommon when using discrete tide zoning and is typically due to the variability and uncertainty in the water level correctors.

Depth Difference Range (m)	All		Positive		Negative		Zero	
	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent
0.00-0.05	90229	35.42	51723	20.31	37512	14.73	994	0.39
>0.05-0.10	74882	64.82	50141	39.99	24741	24.44		
>0.10-0.15	52064	85.26	39763	55.60	12301	29.27		
>0.15-0.20	24855	95.02	18752	62.96	6103	31.66		
>0.20-0.25	9536	98.76	7067	65.74	2469	32.63		
>0.25-0.30	2583	99.78	1929	66.49	654	32.89		
>0.30-0.35	508	99.98	377	66.64	131	32.94		
>0.35-0.38	63	100.00	53	66.66	10	32.95		
Totals	254720	100.00%	169805	66.66%	83921	32.95%	994	0.39%
Reference Grid: h12395_main_2m_CUBE_23Oct2012_pfm_h12395_cross_2m_cl1_CUBE_22Oct2012_pfm.dif								

Figure 3: Junction Analysis of CUBE Depths, Mainscheme Lines vs. Crosslines, H12395

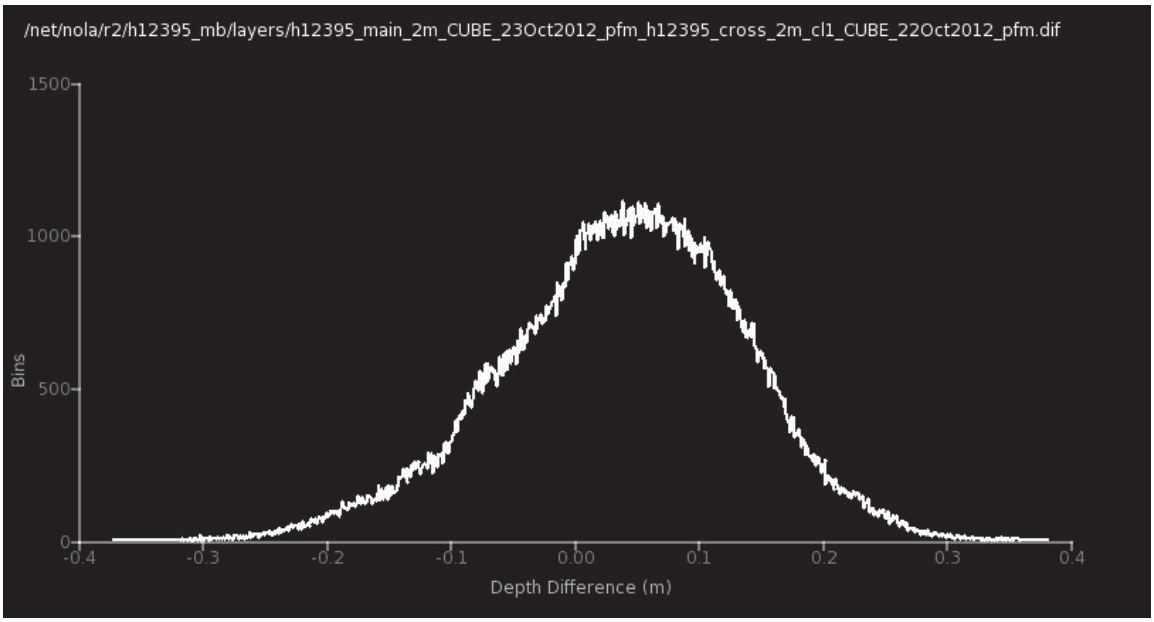

Figure 4: Frequency Distribution Plot of CUBE Depth Differences for H12395 Mainscheme Lines vs. H12395 Crosslines

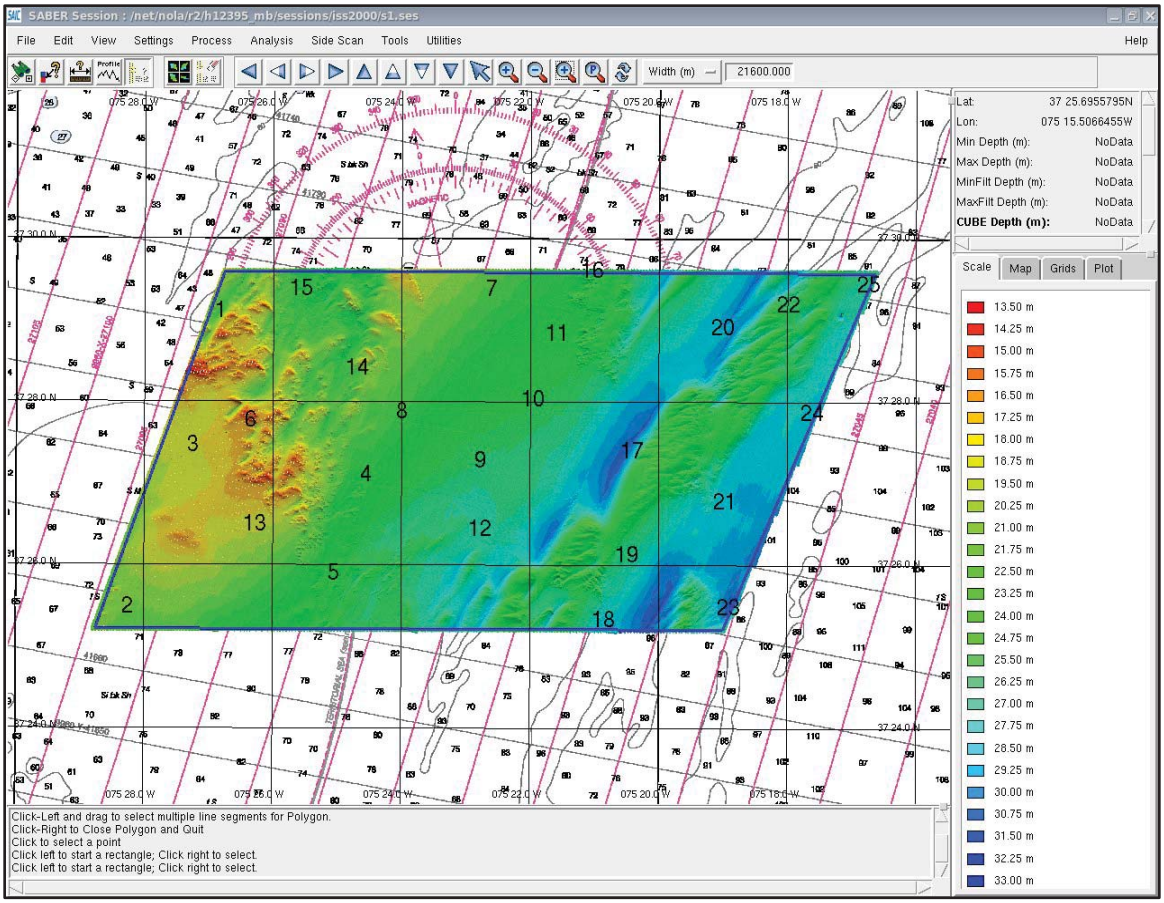

Figure 5: Location of 25 Crossings Used in the Crossing Analysis for H12395

B.2.2 Uncertainty

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, rev1.

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 IHO S-44 5th edition, Order 1a 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 AvgTPE). A third vertical uncertainty surface is generated from the larger value of these two uncertainties at each node and is referred to as the Hypothesis Final Uncertainty. For specific details on this process see Section B.2 of the DAPR, rev1.

The final two-meter PFM CUBE surface for H12395 contained final vertical uncertainties that ranged from 0.270 to 0.675 meters. The IHO Order 1a maximum allowable vertical uncertainty was calculated to range between 0.531 to 0.665 meters, based on the minimum CUBE depth (13.865 meters) and maximum CUBE depth (33.687 meters). The **SABER Check PFM Uncertainty** function was used to highlight all instances where the computed final vertical uncertainty value for 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. The three nodes with high vertical uncertainties surrounded a large wreck (Feature 1) in 37° 29’ 04.06”N 075° 17’ 08.91”W and had final uncertainty values of 0.587, 0.589, and 0.614 meters.

The **SABER Check PFM Uncertainty** function was also run on the one-meter feature PFM. The results showed that 111 nodes exceeded the maximum allowable uncertainty for IHO Order 1a (Figure 6). The higher number of nodes exceeding the uncertainty limits are a result of the small node resolution and the high variability of depths around the feature (Feature 1).

The **SABER Frequency Distribution** tool was also used to review the Hypothesis Final Uncertainty surface within the final two-meter and one-meter resolution PFM grids. The results show that in the final two-meter PFM, 89.53% of all nodes had final uncertainties less than or equal to 0.280 meters and 99.78% contained vertical uncertainties of 0.290 meters or less. When performed on the one-meter feature PFM, 97.28% of the nodes had vertical uncertainties of less than 0.29 meters and 99.03% were less than 0.44 meters.

Feature Area	Feature Number	Number of CUBE nodes which exceed IHO Order 1a
1	1	111

Figure 6: Number of Nodes Exceeding the Allowable IHO Order 1a Uncertainty in the Feature PFM

B.2.3 Junctions

An analysis of the sheet-to-sheet junctions between H12395 and H12338, H12339, and H12394 was performed. Details for H12338, H12339, and H12394 are listed in Table 6. Figure 13 (at the end of this section) depicts the general locality of H12395 as it relates to the sheets for which sheet-to-sheet junctions were performed. Analysis of the junctions with sheets H12395 and H12397 was not conducted as the processing efforts for this sheet was still ongoing.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12338	40000	2011	SAIC	NW
H12339	40000	2011	SAIC	N
H12394	40000	2012	SAIC	W

Table 6: Junctioning Surveys

H12338

Figure 7 depicts the junction analysis between H12395 and H12338, surveyed between 22 July 2011 and 03 October 2011, which borders H12395 to the northwest. Junction analysis was conducted on the differences between the CUBE depths from the final two-meter PFM grid from H12395 and the final one-meter PFM grid from H12338 in the common area of these two sheets. The H12395 CUBE depths within the overlap area of the two sheets varied from 19.047 meters to 22.653 meters resulting in allowable vertical uncertainties between 0.558 and 0.580 meters. The results showed that 96.27% of the comparisons were within 25 centimeters and 99.70% were within 35 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 H12395 data. Therefore positive values indicate that H12395 depth data were deeper than H12338 depth data. Throughout the common area, H12395 CUBE depths were shoaler than H12338 82.34% of the time and were deeper than H12338 17.44% of the time (Figure 7). Though the distribution is skewed slightly in the negative direction, the common data shared between the two sheets represents three days data collection and a slight tidal correction variation therefore can account for the delta. The majority of the differences between the two sheets are fairly well spread about seven cm, 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	6535	25.58	2206	8.63	4273	16.72	56	0.22
>0.05-0.10	7077	53.27	1068	12.81	6009	40.24		
>0.10-0.15	5306	74.04	944	16.51	4362	57.31		
>0.15-0.20	3655	88.34	148	17.09	3507	71.04		
>0.20-0.25	2025	96.27	26	17.19	1999	78.86		
>0.25-0.30	667	98.88	17	17.26	650	81.41		
>0.30-0.35	210	99.70	29	17.37	181	82.11		
>0.35-0.40	62	99.95	12	17.42	50	82.31		
>0.40-0.45	9	99.98	4	17.43	5	82.33		
>0.45-0.472	5	100.00	2	17.44	3	82.34		
Totals	25551	100.00%	4456	17.44%	21039	82.34%	56	0.22%
Reference Grid: h12395_all_2m_CUBE_gaps_23Oct2012_pfm_H12338_1m_MLLW_pfm.dif								

Figure 7: Junction Analysis of CUBE Depths, H12395 vs. H12338

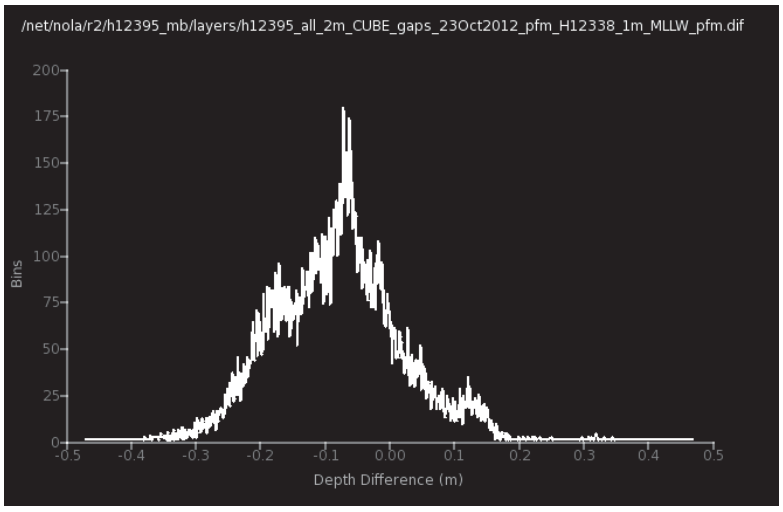

Figure 8: Frequency Distribution Plot of CUBE Depth Differences for H12395 vs. H12338

H12339

Figure 9 depicts the junction analysis between H12395 and H12339, surveyed between 12 August 2011 and 30 September 2011, which borders H12395 to the north. Junction analysis was conducted on the differences between the CUBE depths from the final two-meter PFM grid from H12395 and the final one-meter BAG grid from H12339 in the common area of these two sheets. The H12395 CUBE depths within the overlap area of the two sheets varied from 17.706 meters to 31.073 meters resulting in allowable vertical

uncertainties between 0.550 and 0.643 meters. The results showed that 95.60% of the comparisons were within 20 centimeters and 99.64% were within 30 centimeters. These numbers are well within the allowable vertical uncertainty for the respective sheets.

The difference grid was generated by subtracting the H12339 data from the H12395 data. Therefore positive values indicate that H12395 depth data were deeper than H12339 depth data. Throughout the common area, H12395 CUBE depths were shoaler than H12339 43.10% of the time and were deeper than H12339 56.49% of the time (Figure 9). The majority of the differences between the two sheets are fairly well spread about zero, as visualized in Figure 10.

Depth Difference Range (m)	All		Positive		Negative		Zero	
	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent
0.00-0.05	218543	39.72	117171	21.30	99114	18.02	2258	0.41
>0.05-0.10	164617	69.65	95702	38.69	68915	30.54		
>0.10-0.15	96860	87.25	56874	49.03	39986	37.81		
>0.15-0.20	45905	95.60	28819	54.27	17086	40.92		
>0.20-0.25	16287	98.56	8724	55.86	7563	42.29		
>0.25-0.30	5971	99.64	2733	56.35	3238	42.88		
>0.30-0.35	1654	99.94	629	56.47	1025	43.07		
>0.35-0.40	262	99.99	124	56.49	138	43.09		
>0.40-0.50	55	100.00	30	56.49	25	43.10		
Totals	550154	100.00%	310806	56.49%	237090	43.10%	2258	0.41%
Reference Grid: h12395_all_2m_CUBE_gaps_23Oct2012_pfm_H12339_1m_MLLW_1of6_bag.dif								

Figure 9: Junction Analysis of CUBE Depths, H12395 vs. H12339

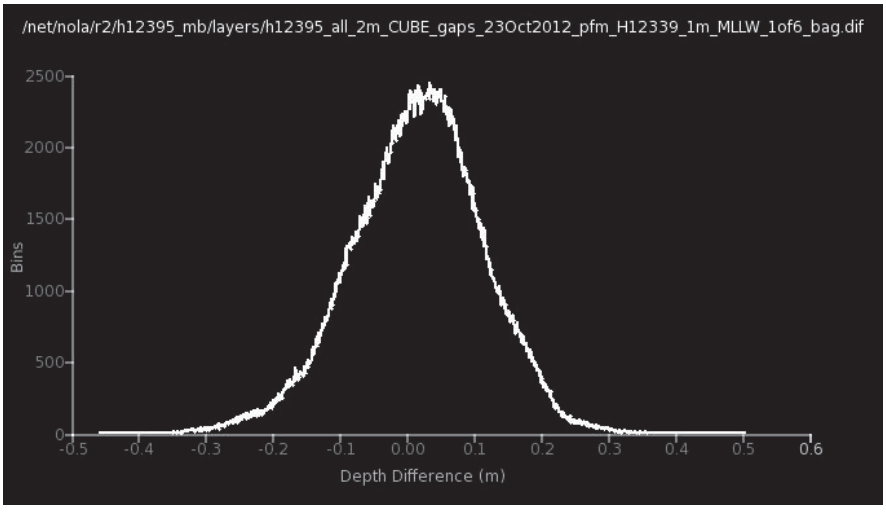

Figure 10: Frequency Distribution Plot of CUBE Depth Differences for H12395 vs. H12339

H12394

Figure 11 depicts the junction analysis between H12395 and H12394, surveyed between 06 July 2012 and 29 September 2012, which borders H12395 to the west. Junction analysis was conducted on the differences between the CUBE depths from the final two-meter PFM grid from H12395 and the final two-meter PFM grid from H12394 in the common area of these two sheets. The H12395 CUBE depths within the overlap area of the two sheets varied from 13.959 meters to 31.637 meters resulting in allowable vertical uncertainties between 0.541 and 0.647 meters. The results showed that 96.15% of the comparisons were within 12 centimeters and 99.98% were within 24 centimeters. These numbers are well within the allowable vertical uncertainty for the respective sheets.

The difference grid was generated by subtracting the H12394 data from the H12395 data. Therefore positive values indicate that H12395 depth data were deeper than H12394 depth data. Throughout the common area, H12395 CUBE depths were shoaler than H12394 43.50% of the time and were deeper than H12394 55.78% of the time (Figure 11). The majority of the differences between the two sheets are fairly well spread about zero, as visualized in Figure 12.

Depth Difference Range (m)	All		Positive		Negative		Zero	
	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent	Count	Cumulative Percent
0.00-0.03	94489	38.70	55272	22.64	37471	15.35	1746	0.72
>0.03-0.06	76999	70.23	48684	42.58	28315	26.94		
>0.06-0.09	41393	87.19	21299	51.30	20094	35.17		
>0.09-0.12	21897	96.15	7999	54.57	13898	40.86		
>0.12-0.15	7275	99.13	2573	55.63	4702	42.79		
>0.15-0.18	1404	99.71	278	55.74	1126	43.25		
>0.18-0.21	507	99.92	71	55.77	436	43.43		
>0.21-0.24	165	99.98	22	55.78	143	43.49		
>0.24-0.32	41	100.00	1	55.78	40	43.50		
Totals	244170	100.00%	136199	55.78%	106225	43.50%	1746	0.72%
Reference Grid: h12395_all_2m_CUBE_gaps_23Oct2012_pfm_H12394_2m_MLLW_pfm.dif								

Figure 11: Junction Analysis of CUBE Depths, H12395 vs. H12394

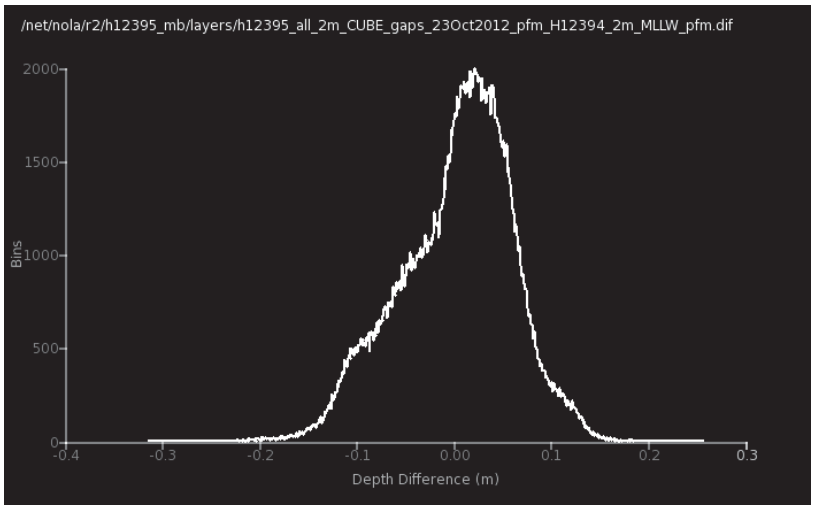

Figure 12: Frequency Distribution Plot of CUBE Depth Differences for H12395 vs. H12394

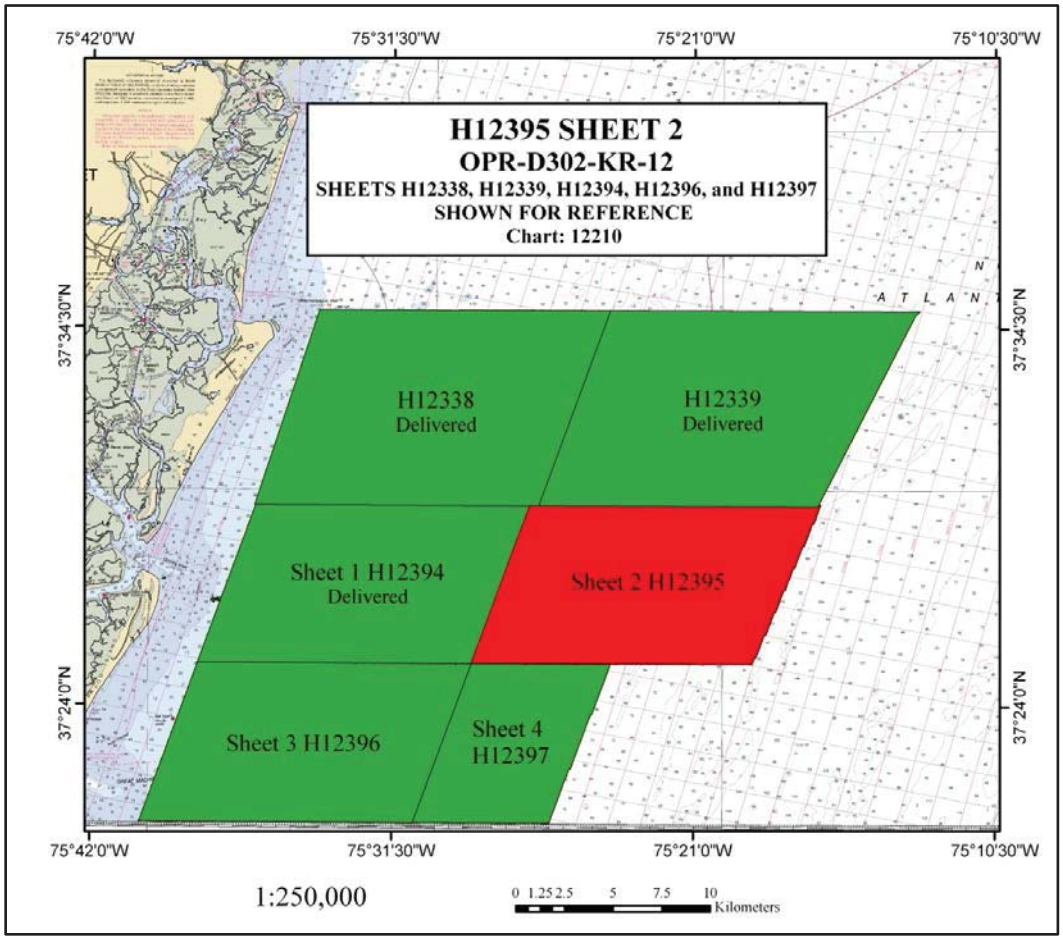

Figure 13: General Locality and Status of Sheets in Reference to H12395

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR, rev1.

B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: The MVP-30 was the primary sensor used to collect sound speed profile (SSP) data. One profile collected with the CTD was used for data collection while the MVP-30 was receiving maintenance or repairs. SSP data were obtained at frequent intervals 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. There were times when the sound speed values exceeded the two meters/second threshold due to the local temporal and tidal variability. During these times several profiles were acquired and reapplied in an effort to reduce these effects. The product of this effort resulted in the final data having no significant artifacts due to sound speed differences. Additional information can be found in Section A.8 of the DAPR, rev1.

A total of 355 profiles were applied to online data for H12395. All profiles that were applied for online multibeam data collection were acquired within the bounds of the survey area. Please refer to the DAPR, rev1 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 taken with different SV&P Smart Sensors or the CTD. Five confidence checks were conducted during H12395, 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 H12395. 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 ("H12395/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 H12395 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, rev1.

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 Depth 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) surface of the PFM grid. The Hyp # Soundings surface reports the number of soundings that were used to compute the chosen hypothesis. Analysis of the H12395 final two-meter PFM grid revealed that 99.96% of all nodes contained three or more soundings; satisfying the requirements for set line spacing surveys, as specified in Section 5.2.2.2 of the HSSD.

Analysis of the single one-meter feature PFM grid indicated that a minimum of 99.99% of all individual nodes contained 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, rev1.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR, rev1.

B.4 BACKSCATTER

Backscatter was not collected for this survey.

B.5 DATA PROCESSING

B.5.1 Software Updates

There were no software configuration changes after the DAPR, rev1 was submitted.

The following Feature Object Catalog was used: NOAA Extended Attribute Files V5_2.

B.5.2 Surfaces

The following surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12395_2m_MLLW	BAG	2 meters	13.865 meters – 33.687 meters	N/A	MBES Trackline SBES Set Line Spacing
H12395_Feature_1_1m_MLLW_1of1	BAG	1 meter	22.488 meters – 33.716 meters	N/A	Object Detection
H12395_ss_1_100_mosaic	SSS Mosaic	1 meter	-	N/A	100% SSS
H12395_ss_2_100_mosaic	SSS Mosaic	1 meter	-	N/A	200% SSS

Table 7: Surfaces

A PFM CUBE Depth 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, the range of CUBE depths in H12395 was from 13.865 meters (45 feet, 0.270-meter uncertainty) to 33.687 meters (110 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 H12395 was generated at two-meter grid node resolution. Over significant features, CUBE surfaces were generated at one-meter node resolution to meet the object detection specifications defined in Section 5.2.2.1 of the HSSD. One significant feature was identified in H12395 with a least depth of 22.488 meters and a separate one-meter resolution PFM grid was made to meet the object detection specifications defined in Section 5.2.2.1 of the HSSD. Data within the one-meter CUBE PFM also remain in the two-meter CUBE PFM grid.

The final gridded multibeam data are delivered as a Bathymetric Attributed Grids (BAG). The BAG files were exported from the CUBE PFM grid as detailed in Section B.2.5 of the DAPR, rev1.

In addition to the standard Depth and Uncertainty surfaces, all final BAG files delivered for H12395 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 of 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, rev1.

The BAG files delivered for OPR-D302-KR-12 are in BAG version 1.5.1. This version of BAG allows for the compression of the grid files. For H12395, the final two-meter BAG is delivered in both compressed and uncompressed formats. The file size for the compressed BAGs is typically 25-30 percent the size of the uncompressed versions. The feature BAG is only delivered in the uncompressed format since it has a small file size.

As of the date of delivery for H12395, 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 non-standard 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 non-standard BAG files were created with the CUBE Depth surface, populating the Depth values of the BAG and each of the additional group surfaces listed above populating the Uncertainty surface of the BAG.

Please note when reviewing these additional, non-standard BAGs the file name designates the surface which populates the Uncertainty surface for that BAG (Figure 14). Please also note that when displayed the two surfaces 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.

BAG File Name	Comments
H12395_2m_MLLW_CUBE_Depth_and_Node_ Standard_Deviation	Standard Deviation (Elevation Solution) of 2.0-meter BAG
H12395_2m_MLLW_CUBE_Depth_and_ Hypothesis_Number_of_Soundings	Number of Soundings (Elevation Solution) of 2.0-meter BAG
H12395_2m_MLLW_CUBE_Depth_and_Node_ Shoal_Depth	Shoal Depth (Elevation Solution) of 2.0-meter BAG
H12395_2m_MLLW_CUBE_Depth_and_Node_ Hypothesis_Strength.	Hypothesis Strength (Node) of 2.0-meter BAG
H12395_2m_MLLW_CUBE_DEPTH_and_Node_ Number_of_Hypotheses	Number of Hypotheses (Node) of 2.0-meter BAG
H12395_Feature_1_1m_MLLW_CUBE_Depth_ and_Node_Standard_Deviation_1of1	Standard Deviation (Elevation Solution) of 1.0-meter BAG
H12395_Feature_1_1m_MLLW_CUBE_Depth_ and_Hypothesis_Number_of_Soundings_1of1	Number of Soundings (Elevation Solution) of 1.0-meter BAG
H12395_Feature_1_1m_MLLW_CUBE_Depth_ and_Node_Shoal_Depth_1of1	Shoal Depth (Elevation Solution) of 1.0-meter BAG
H12395_Feature_1_1m_MLLW_CUBE_Depth_ and_Node_Hypothesis_Strength_1of1	Hypothesis Strength (Node) of 1.0-meter BAG
H12395_Feature_1_1m_MLLW_CUBE_Depth_ and_Node_Number_of_Hypotheses_1of1	Number of Hypotheses (Node) of 1.0-meter BAG

Figure 14: Summary of Non-standard H12395 BAG Files

B.5.3 Sidescan Coverage Analysis

For all details regarding sidescan data processing, see Section B.3 of the DAPR, rev1. 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).

- H12395_ss_1_100_mosaic
- H12395_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 H12395. 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 OPR-D302-KR-12 data acquisition, which includes H12395. Therefore a Horizontal and Vertical Control Report is not required.

C.1 VERTICAL CONTROL

The vertical datum for this project is Mean Lower Low Water.

Standard Vertical Control Methods Used:
Discrete Zoning

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Duck, NC	8651370

Table 8: NWLON Tide Stations

File Name	Status
8651370_verified_07282012_09302012.tid	Verified Observed

Table 9: Water Level Files (.tid)

File Name	Status
D302KR2012CORP.zdf	Final

Table 10: Tide Correctors (.zdf or .tc)

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 H12395 however a final tide note has been provided by SAIC in Appendix I.

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, rev1. For H12395, 8651370 Duck, NC was the source of all final verified water level heights for determining correctors to soundings.

SAIC did not revise the delivered tide zones for tide station 8651370 Duck, NC as the water level zoning parameters in the file D302KR2012CORP.zdf, 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 H12395 multibeam data.

C.2 HORIZONTAL CONTROL

The horizontal datum for this project is North American Datum of 1983 (NAD83).

The survey data for sheet H12395 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, rev1 for details regarding all antenna and transducer offsets.

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. Daily positioning confidence checks for H12395 were conducted several times throughout the day and a daily value is presented as a standalone table within Separates I, "Daily Positioning Confidence Checks". All daily positioning confidence checks for H12395 were within 0.68 meters.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Driver, VA (289 kHz)
Annapolis, MD (301 kHz)
New Bern, NC (294 kHz)

Table 11: USCG DGPS Stations

D. RESULTS AND RECOMMENDATIONS

D.1 CHART COMPARISON

D.1.1 Raster Charts

The following are the largest scale raster charts, which cover the survey area:

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
12210	1:80000	38	05/01/2008	01/15/2013	01/19/2013

Table 12: Largest Scale Raster Charts

12210

The chart comparisons were conducted using SAIC's **SABER** software to view the BSB raster charts with overlain data for H12395 such as the CUBE gridded surface, selected soundings, contacts, and features. Charting recommendations for depths follow Section 5.1.2 of the HSSD where depths and uncertainties are to be rounded to the nearest millimeter 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 H12395 are provided to millimeter precision.

United States Coast Guard (USCG) District 5 Notice to Mariners was reviewed for changes subsequent to the date of the Hydrographic Survey Project Instructions and before the end of survey (as required 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 H12395 over that time period.

CUBE depths within sheet H12395 generally agreed within ±3 feet of the charted depths.

The charted depth curves (60-foot and 90-foot) throughout H12395 were found to be in general agreement with the data collected.

The following two exceptions were noted:

- The charted 59-foot sounding and surrounding 60-foot depth curve in approximately 37° 29' 16.81"N 075° 24' 42.24"W was in CUBE depths of 61 to 70 feet.
  Recommendations:
  - Remove the 59-foot sounding and associated 60-foot depth curve.
- The charted 59-foot sounding and surrounding 60-foot depth curve in approximately 37° 28' 31.58"N 075° 24' 31.15"W was in CUBE depths of 61 to 70 feet.
  Recommendations:
  - Remove the 59-foot sounding and associated 60-foot depth curve.

D.1.2 Electronic Navigational Charts

The following are the largest scale ENCs, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US4VA70M	1:80000	12	07/12/2012	01/03/2013	NO

Table 13: Largest Scale ENCs

US4VA70M

For ENC comparisons, a combination of Jeppesen's **dKart Inspector**, SevenCs' **SeeMyDENC**, and CARIS' **EasyView** were used in conjunction with **SABER**.

CUBE depths within sheet H12395 generally agreed within ±1 meter of the charted depths with the occasional difference of up to 2 meters.

The charted depth curves (18.2-meter and 27.4-meter) throughout H12395 were found to be in general agreement with the survey data collected.

The following two exceptions were noted:

- The charted 17.9-meter sounding in 37° 29' 17.41"N 075° 24' 42.78"W and surrounding 18.2-meter depth curve was found to have a depth of 18.643 to 23.749 meters.
  Recommendations:
  - Remove the 17.9-meter sounding and associated 18.2-meter depth curve.
- The charted 17.9-meter sounding in 37° 28' 31.97"N 075° 24' 31.31"W and surrounding 18.2-meter depth curve was in CUBE depths of 18.360 to 22.567 meters.
  Recommendations:
  - Remove the 17.9-meter sounding and associated 18.2-meter depth curve.

D.1.3 AWOIS Items

No AWOIS items exist for this survey.

As documented in the Project Instructions, the one uncharted AWOIS item (2784) assigned for project OPRD302-KR-12 fell outside the survey bounds of H12395.

D.1.4 Charted Features

No charted features exist for this survey.

D.1.5 Uncharted Features

The survey data for H12395 revealed one uncharted wreck with a least depth of 74 feet (22.488 meters, 0.28 meters uncertainty) within the survey bounds (Feature 1) in 37° 29' 04.06"N 075° 17' 08.91"W. In addition three exposed cables were identified within H12395 survey bounds. See the S-57 feature file and Section D.2.5 below for details and recommendations regarding these objects.

D.1.6 Danger to Navigation

One Danger to Navigation Report (DTON) was submitted to the Atlantic Hydrographic Branch (AHB) for this survey. The report documented a wreck (Feature 1) in 37° 29'

04.06”N 075° 17’ 08.91”W with a least depth of 74 feet (22.488 meters, 0.28 meters uncertainty) in 95 feet of water. Because the wreck was located in 95 feet of water, AHB chose not to forward the DTON to the Marine Charting Division. The wreck (Feature 1) was addressed as a chart update in the S-57 file.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.2 ADDITIONAL RESULTS

D.2.1 Shoreline

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work.

D.2.2 Prior Surveys

The junction analysis with the contemporary 2011 surveys H12338 and H12339 and the 2012 survey H12394 was conducted and the results are presented in Section B.2.3 Junctions of this report.

D.2.3 Aids to Navigation

Aids to navigation (ATONs) do not exist for this survey.

D.2.4 Overhead Features

Overhead features do not exist for this survey.

D.2.5 Submarine Features

Three uncharted exposed cables were found within the eastern side of the survey area. Two of the cables extend across a significant portion of H12395 while the third section was only visible for a short distance where it crossed another cable. One cable was exposed for approximately 4840 meters from 37° 29’ 34.32”N 075° 17’ 11.93”W south to approximately 37° 27’ 01.47”N 075° 17’ 56.64”W. A second 6590-meter long section of cable was exposed from 37° 28’ 41.12”N 075° 20’ 48.28”W south to approximately 37° 25’ 09.27”N 075° 21’ 23.72”W. This cable had a small 300 meter section of exposed cable crossing it in approximately 37° 27’ 05.11”N 075° 21’ 06.05”W. This small section of cable extended from approximately 37° 27’ 05.30”N 075° 21’ 05.86”W southwest to approximately 37° 26’ 57.60”N 075° 21’ 13.32”W. All three cables were

visible in the sidescan data records and could not be identified in the multibeam bathymetry data or either one-meter mosaic. The cables are identified by sidescan contacts as noted in Figure 15, below.

Recommendations:

- Chart submarine cable where supported by this data.

Contact Name	Sequential ID	Cable Association	Comments
20122261156424300	42	1	Northern Extent of Exposed Cable in Sidescan Data
20122261528152500	44	1	Section of Exposed Cable Seen in Sidescan Data
20122261011391300	38	1	Section of Exposed Cable in Sidescan Data
20122261018409300	39	1	Section of Exposed Cable in Sidescan Data
20122261124498000	40	1	Section of Exposed Cable in Sidescan Data
20122261650129300	46	1	Southern Extent of Exposed Cable in Sidescan Data
20122202259033100	13	2	Northern Extent of Exposed Cable in Sidescan Data
20122210249072800	16	2	Section of Exposed Cable in Sidescan Data
20122210150178100	14	2	Section of Exposed Cable in Sidescan Data
20122211150435200	23	2	Section of Exposed Cable in Sidescan Data
20122212024217200	25	2	Southern Extent of Exposed Cable in Sidescan Data
20122210151073100	15	3	Northeast Extent of Exposed Cable in Sidescan Data
20122210626164400	18	3	Southwest Extent of Exposed Cable in Sidescan Data

Figure 15: Listing of Contacts used to Identify Three Exposed Cables seen within H12395

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features exist for this survey.

D.2.9 Construction and Dredging

There is no present or planned construction or dredging within the survey limits.

D.2.10 Other Results

D.2.10.1 Designated Soundings

All designated soundings set for H12395 were classified as features and are maintained within the final S-57 Feature file.

D.2.10.2 S-57 Feature File

Included with H12395 delivery is the S-57 feature file, H12395.000. Details on how this file is generated and quality controlled can be found in Section B.2.6 of the DAPR, rev1. The S-57 feature file delivered for H12395 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 depth units in meters. The single significant feature (Feature 1) found in H12395 is retained within the S-57 feature file.

For each feature in the S-57 feature file, a 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 (H12395_SSCon.000) to present the sidescan contacts. Details on how this file was generated, attributed, and quality controlled can be found in Section B.3.4 of the DAPR, rev1. The supplemental sidescan S-57 feature 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 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 H12395. Bottom characteristics were acquired at the locations proposed in the Project Reference File (PRF) by NOAA. Six samples were collected within H12395’s survey area. Bottom characteristics are included in the H12395 S-57 feature file, H12395.000, 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 H12395 are sufficient to be used to update the respective charts.

E. APPROVAL SHEET

01 February 2013

LETTER OF APPROVAL

REGISTRY NUMBER: H12395

Field operations and data processing contributing to the accomplishment of this survey, H12395, were conducted under my direct supervision or that of other SAIC lead hydrographers with frequent personal checks of progress and adequacy. This report and accompanying deliverable data items have been closely reviewed by me and are considered complete and adequate as per the Statement of Work.

This Descriptive Report, and all accompanying records and data are approved and forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Project Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required.

Reports previously submitted to NOAA for this project include:

Report Name	Report Date Sent
Data Acquisition and Processing Report	11 January 2013
Descriptive Report, H12394	11 January 2013

Reports concurrently submitted to NOAA for this project include:

Report Name	Report Date Sent
Data Acquisition and Processing Report, Revision 1	01 February 2013

Paul L. Donaldson

Digitally signed by Paul L. Donaldson
DN: cn=Paul L. Donaldson, o=Marine Survey and Engineering Solutions, ou=SAIC, email=paul.l.donaldson@saic.com, c=US
Date: 2013.01.30 16:09:12 -05'00'

Paul L. Donaldson
Lead Hydrographer
Science Applications International Corporation
01 February 2013

Appendix I:
Tides & Water Levels

APPENDIX I. TIDES AND WATER LEVELS

Field Tide Note
A field tide note was not required for H12395.

Final Tide Note
Observed 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 H12395 Descriptive Report Section C.1 for details regarding final tides for H12395. The water level zoning correctors, based entirely on Duck, NC (8651370), were applied to all multibeam data for H12395.

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, H12395 (Table A-1).

Abstract Times of Hydrography

Project: OPR-D302-KR-12
Registry No.: H12395
Contractor Name: Science Applications International Corporation
Date: 01 February 2013
Sheet Designation: 2
Inclusive Dates: 29 July 2012 - 29 September 2012
Field work is complete.

Begin Date	Begin Julian Day	Begin Time	End Date	End Julian Day	End Time
07/29/2012	211	19:06:36	08/03/2012	216	05:36:28
08/04/2012	217	01:22:08	08/04/2012	217	10:24:40
08/04/2012	217	19:47:18	08/05/2012	218	23:19:22
08/07/2012	220	18:35:16	08/10/2012	223	03:16:36
08/12/2012	225	18:11:28	08/14/2012	227	09:04:52
09/29/2012	273	07:23:47	09/29/2012	273	11:59:43

Table A-1: Abstract Times of Hydrography, H12395

Transmittal Letter to CO-OPS
A transmittal letter to CO-OPS was not required for H12395.

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

Appendix II:
Supplemental Survey Records and Correspondence

APPENDIX II. SUPPLEMENTAL SURVEY RECORDS & 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: 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).

Appendix III:
Feature Report

AWOIS: 0

DtoN: 0

Maritime Boundary: 0

Wrecks: 1

H12395 Wreck

Registry Number: H12395
State: Virginia
Locality: Atlantic Ocean
Sub-locality: 13 NM East of Quniby Inlet
Project Number: OPR-D302-KR-12
Survey Dates: 20120729 - 20120929

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	74ft Wreck	Wreck	22.49 m	37° 29' 04.1" N	075° 17' 08.9" W	---

1.1) 74ft Wreck

Survey Summary

Survey Position:	37° 29' 04.1" N, 075° 17' 08.9" W
Least Depth:	22.49 m (= 73.78 ft = 12.297 fm = 12 fm 1.78 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2012-273.00:00:00.000 (09/29/2012)
Dataset:	H12395_CS.000
FOID:	US 0000354038 00001(0226000566F60001)
Charts Affected:	12210_1, 12200_1, 13003_1

Remarks:

Submerged dangerous wreck was found with a least depth of 74 feet in 37° 29’ 03.99” N 075° 17’ 08.95” W. The wreck is lying upside down and is approximately 52 meters long by 20 meters wide, oriented 185°. There is a 10-foot deep scour at the south end of the wreck and 14-foot scour at the north end of the wreck. The wreck was found in depths of 90 to 95 feet.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12395_CS.000	US 0000354038 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart a 74-foot sounding with danger circle and label WK in 37° 29’ 03.99” N 075° 17’ 08.95” W.

Cartographically-Rounded Depth (Affected Charts):

74ft (12210_1)

12fm (12200_1, 13003_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 1:non-dangerous wreck
	INFORM - Feature: 1 - MB File: asmba12226.d26; Ping: 1939; Beam: 145; Depth: 22.488m; Time: 20:46:30.81; H. Uncert.: 1.510m; V. Uncert.: 0.280m.
	NINFOM - Add wreck
	QUASOU - 6:least depth known

SORDAT - 20120929

SORIND - US,US,graph,H12395

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

VALSOU - 22.488 m

WATLEV - 3:always under water/submerged

Office Notes

SAR: Feature verified as submitted. Compile: Add wreck

Feature Images

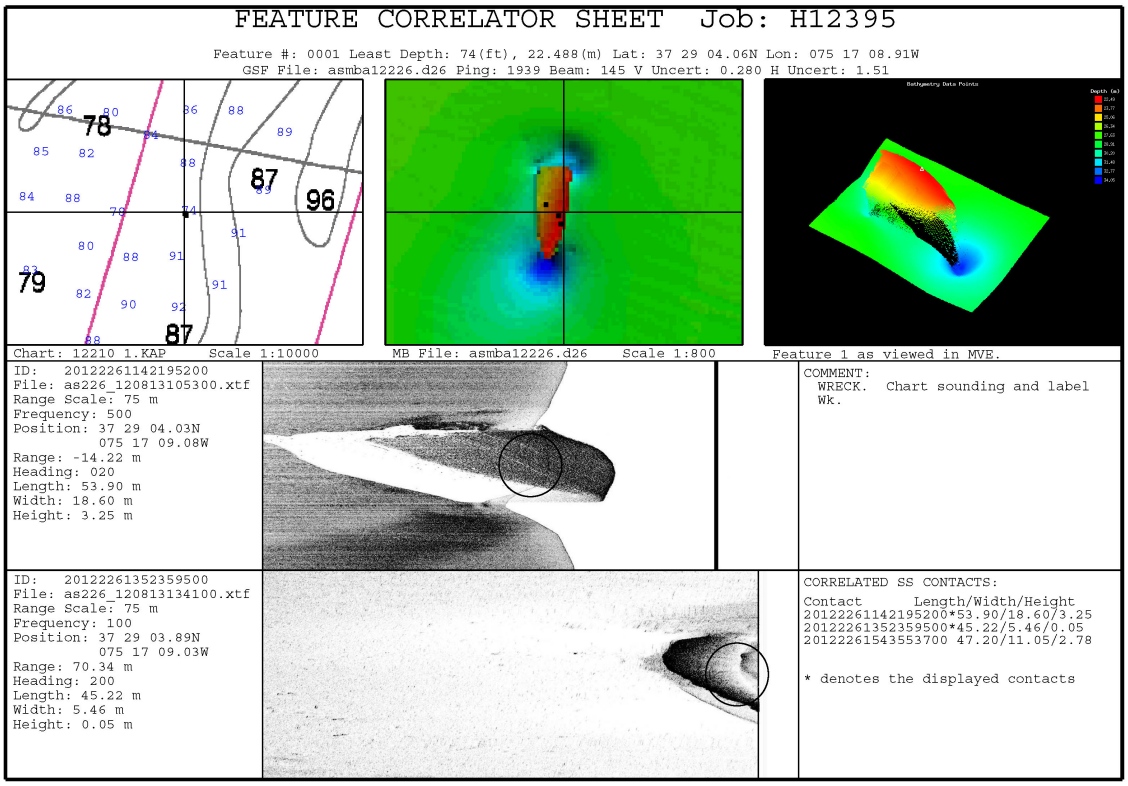

Figure 1.1.1

APPROVAL PAGE

H12395

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

- H12395_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12395_GeoImage.pdf

The survey evaluation and verification has been conducted according to 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