H12423

NOAA Form 76-35A

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Survey

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12423

LOCALITY

State:	Virginia
General Locality:	Approaches to Chesapeake Bay, VA
Sub-locality:	10 NM East of Smith Island, VA

2012

CHIEF OF PARTY
LCDR Benjamin K. Evans, NOAA

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Date:

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

HYDROGRAPHIC TITLE SHEET

H12423

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

State:	**Virginia**
General Locality:	**Approaches to Chesapeake Bay, VA**
Sub-Locality:	**10 NM East of Smith Island, VA**
Scale:	**40000**
Dates of Survey:	**07/14/2012 to 09/09/2012**
Instructions Dated:	**03/02/2012**
Project Number:	**OPR-D304-FH-12**
Field Unit:	**NOAA Ship *Ferdinand R. Hassler***
Chief of Party:	**LCDR Benjamin K. Evans, NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Side Scan Sonar**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**
H-Cell Compilation Units:	***meters at Mean Lower Low Water***

Remarks:

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 Survey H12423

Project: OPR-D304-FH-12

Locality: Approaches to Chesapeake Bay, VA

Sublocality: 10 NM East of Smith Island, VA

Scale: 1:40000

July 2012 - September 2012

NOAA Ship *Ferdinand R. Hassler*

Chief of Party: LCDR Benjamin K. Evans, NOAA

A. Area Surveyed

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	**Southwest Limit**
37.089833 N 75.505206 W	37.03785 N 75.668569 W

Table 1: Survey Limits

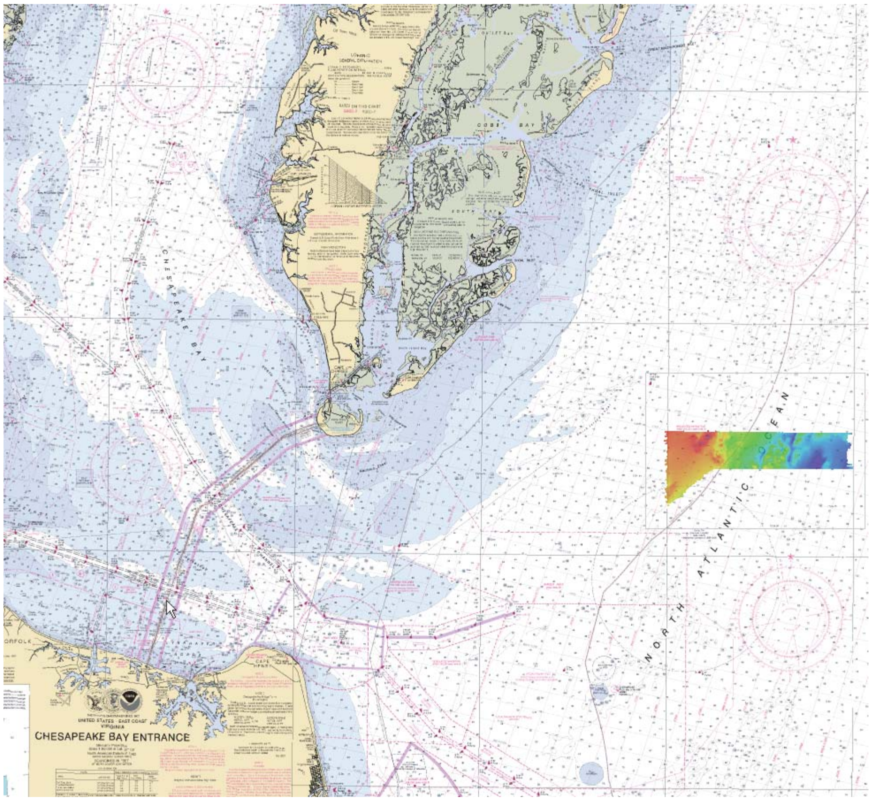

Figure 1: H12423 is located approximately 20 nautical miles north east of the entrance to Chesapeake Bay, plotted on chart 12221.

H12423 Project Instructions directed to acquire either 200% SSS or object detection MBES. This survey meets the coverage requirement with 200% SSS. In addition nearly 100% MBES data was acquired while towing SSS.

Full coverage to the assigned sheet limits was not achieved. A gap in side scan sonar coverage of ~20m by ~4700m along the northern edge of the sheet was created due to slight misalignment between the line plan and assigned sheet limits which was not detected until after the completion of data acquisition. Within this gap, there is continuous 100% side scan coverage, and partial object detection multibeam echosounder coverage, leaving an effective gap of ~16m by ~1000m between the extent of survey coverage and the sheet limits. This gap is shown in Figure 2. The survey outline as submitted reflects the area actually surveyed to the specifications required by the project instructions, and there is no contemporary junction adjacent to this side of the survey area.

There is an apparent gap in MBES data in the south west extent of the sheet. However, this is located outside of the survey sheet limits.

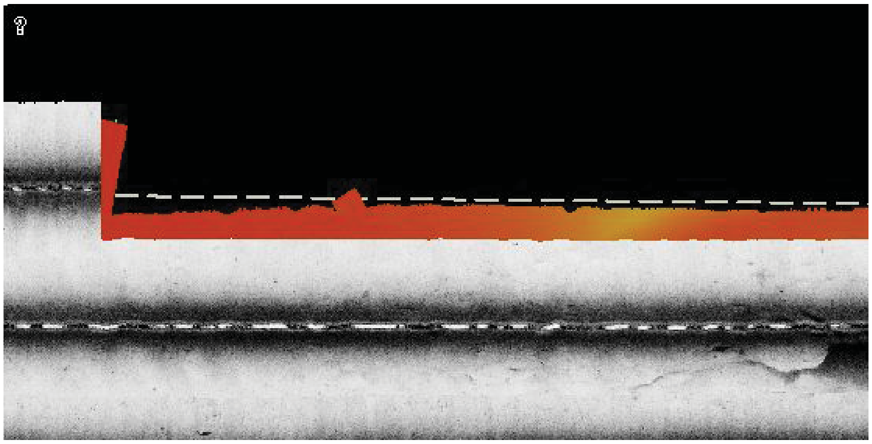

Figure 2: The 100% SSS coverage (shown in grey)and the MBES coverage (shown in red) do not extend to the assigned sheet limits (shown by dashed white line) at the northern extent of the sheet.

A.2 Survey Purpose

The primary purpose of this project is to support safe navigation through the acquisition and processing of hydrographic data for updating the National Ocean Service's (NOS) nautical charting products.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

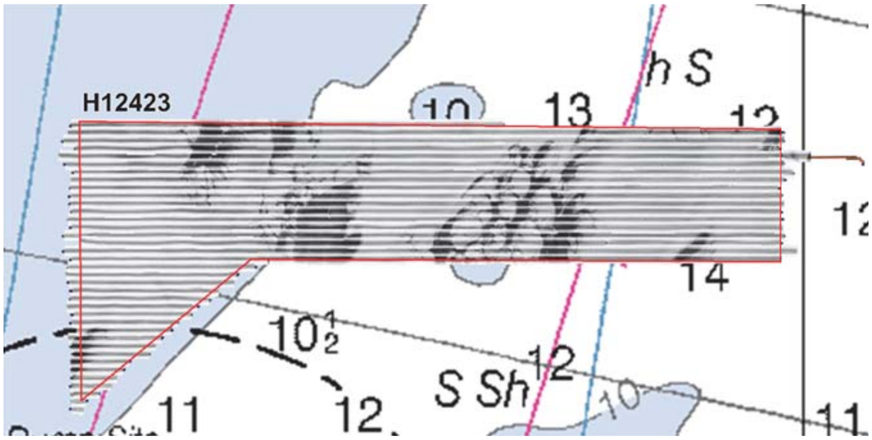

Figure 3: H12423 SSS survey coverage overlaid on survey sheet limits.

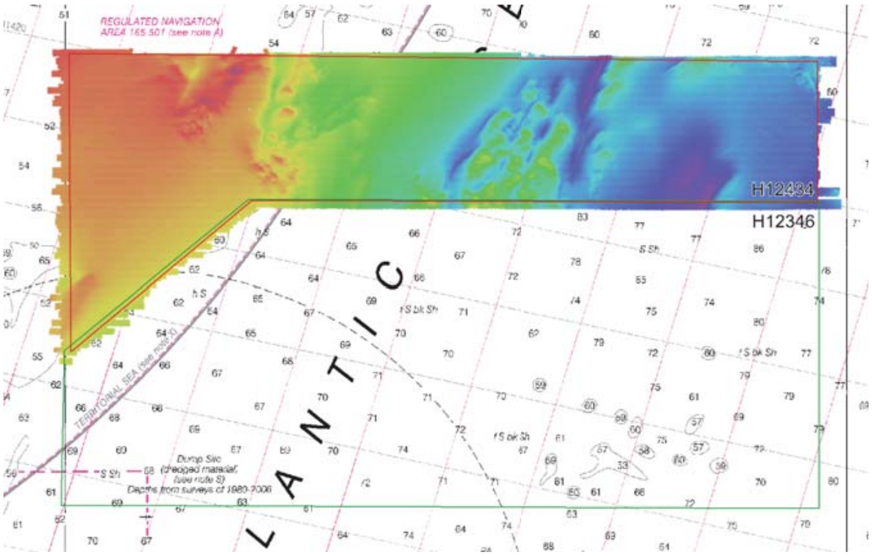

Figure 4: H12423 MBES coverage showing nearly 100% MBES coverage obtained concurrently with 200% SSS.

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	*S250*	*Total*
LNM	**SBES Mainscheme**	0.00	0.00
	MBES Mainscheme	0.00	0.00
	Lidar Mainscheme	0.00	0.00
	SSS Mainscheme	0.00	0.00
	SBES/MBES Combo Mainscheme	0.00	0.00
	SBES/SSS Combo Mainscheme	0.00	0.00
	MBES/SSS Combo Mainscheme	331.02	331.02
	SBES/MBES Combo Crosslines	26.14	26.14
	Lidar Crosslines	0.00	0.00
Number of Bottom Samples			7
Number of DPs			0
Number of Items Items Investigated by Dive Ops			0
Total Number of SNM			13.12

Table 2: Hydrographic Survey Statistics

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

Survey Dates
07/14/2012
08/26/2012
08/27/2012
08/28/2012
09/09/2012

Table 3: Dates of Hydrography

Survey lines were run with dual head Reson MBES. Total LNM is calculated from Port side data only.

A.6 Shoreline

The survey area is offshore and no shoreline investigation was required in the project instructions.

A.7 Bottom Samples

The position of the bottom samples against the side scan mosaic are shown in Figure 5.

Seven bottom samples were taken within the limits of H12423 and are included in the surveys Final Feature File (FFF).

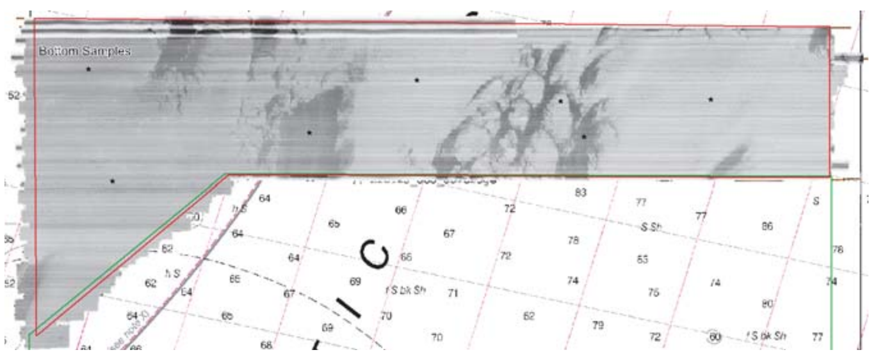

Figure 5: Bottom sampling locations, indicated by black stars plotted on SSS mosaic.

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

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

Hull ID	***S250***
LOA	37.7 meters
Draft	3.85 meters

Table 4: Vessels Used

NOAA Ship FERDINAND R. HASSLER (S250) acquired all data submitted as H12423.

B.1.2 Equipment

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

Manufacturer	**Model**	**Type**
Reson	7125	MBES
Klein	5000 V2	SSS
Applanix	POS/MV 320 V4	Positioning and Vessel Attitude System
Hemisphere	MBX-4	Positioning System
Sea-Bird	SBE 45 MicroTSG	Sound Speed System
Brooke Ocean	MVP-30	Sound Speed System
AML	Smart SV&P	Sound Speed System

Table 5: Major Systems Used

Two Klein 5000 V2 side scan sonars (SSS) were used to acquire the data for this survey. The ship's SSS (SN386) was used for the first day of acquisition (Dn 196). The fleet spare SSS (SN385) was used to complete the SSS acquisition on this sheet (Dn239-Dn241).

B.2 Quality Control

B.2.1 Crosslines

Because dual head frequency modulated mode (FM) was used for all mainscheme coverage, crosslines were acquired exclusively with the port head in continuous wave (CW) mode.

A geographic plot of crosslines is shown in Figure 6. 12.1 nautical miles of crosslines were acquired. This accounts for 7.9% of mainscheme distance and satisfies NOS Specifications and Deliverables (2012).

Crosslines were filtered to remove soundings greater than 45 degrees from nadir. To evaluate crossline agreement, two 1-meter surfaces were created: one from the cross line soundings, the other from mainscheme soundings. These two surfaces were differenced using CARIS HIPS and SIPS. The statistical analysis of the differences between the mainscheme and cross line surfaces are shown in Figure 7. The average difference between the surfaces is 0.02 meters; 95% of all differences were less than 0.14 meters.

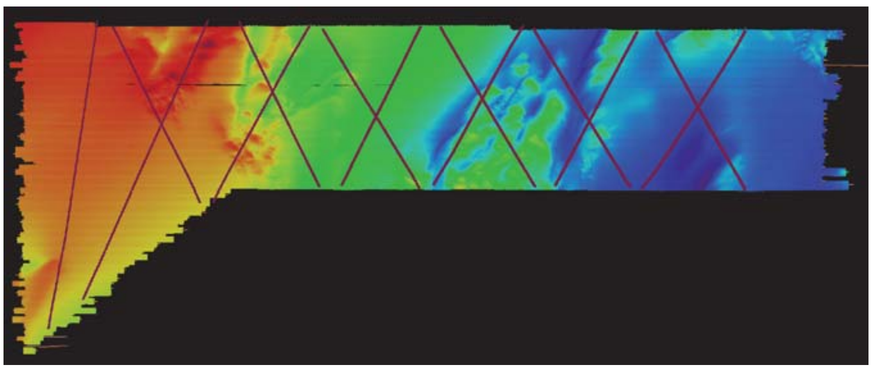

Figure 6: Crossline tracks overlaid on mainscheme 1 meter BASE surface.

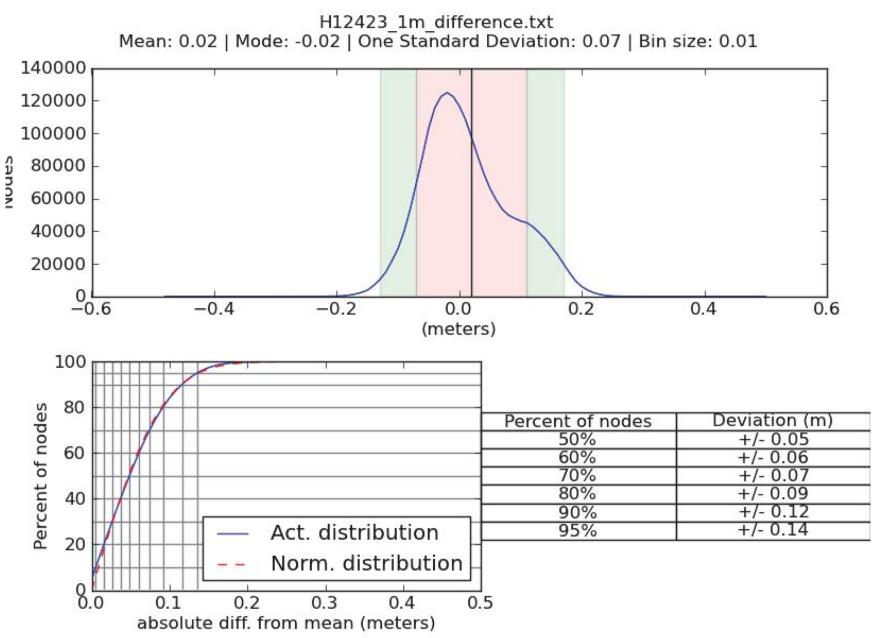

Figure 7: H12423 Crossline statistical analysis - mainsheme depths minus crossline depths

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01meters	0.09meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S250	1.0meters/second	1.0meters/second	0.5meters/second

Table 7: Survey Specific Sound Speed TPU Values

CO-OPS did not provide a tidal uncertainty in the Project Instructions due to lack of available water level time series data. Tide uncertainties provided by CO-OPS for the adjoining sheets in the 2011 project OPR-D304-FH-11 were used for this project.

B.2.3 Junctions

Areas of overlap between sheet H12423 and its junction sheets were reviewed in CARIS Subset Editor for sounding consistency. The H12423 surface was differenced with junction surfaces to assess agreement.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12037	1:25000	2009	NOAA Ship THOMAS JEFFERSON	W
H12346	1:40000	2011	NOAA Ship FERDINAND R. HASSLER	S
H12424	1:40000	2012	NOAA Ship FERDINAND R. HASSLER	E

Table 8: Junctioning Surveys

<u>H12037</u>

This junction survey is within project OPR-D304-TJ-09 and contains MBES data from dates 2009. The location of H12037 is shown in Figure 8. The average difference between the surfaces is -0.15m with a standard deviation of 0.13m. 95% of all differences were less than +/- 0.26 meters, as shown in Figure 9.

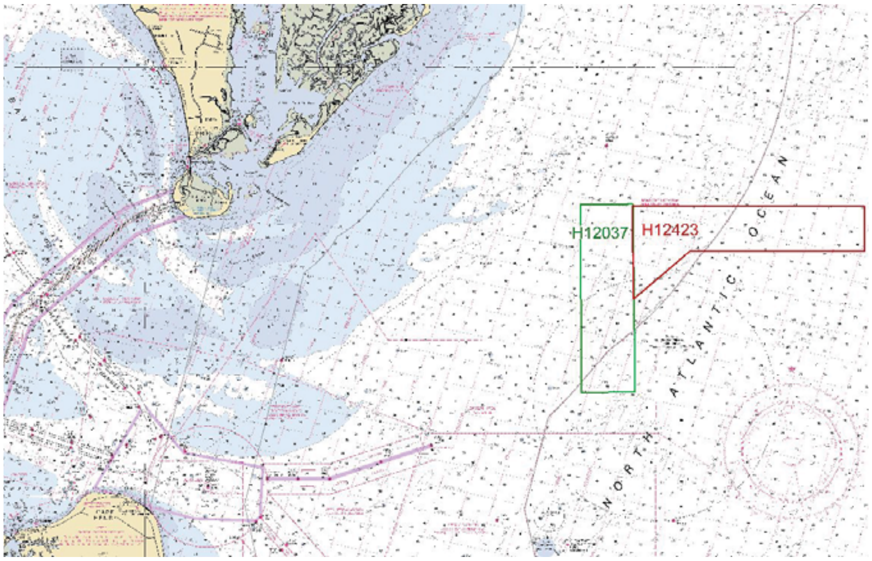

Figure 8: Junction Survey Limits; H12037

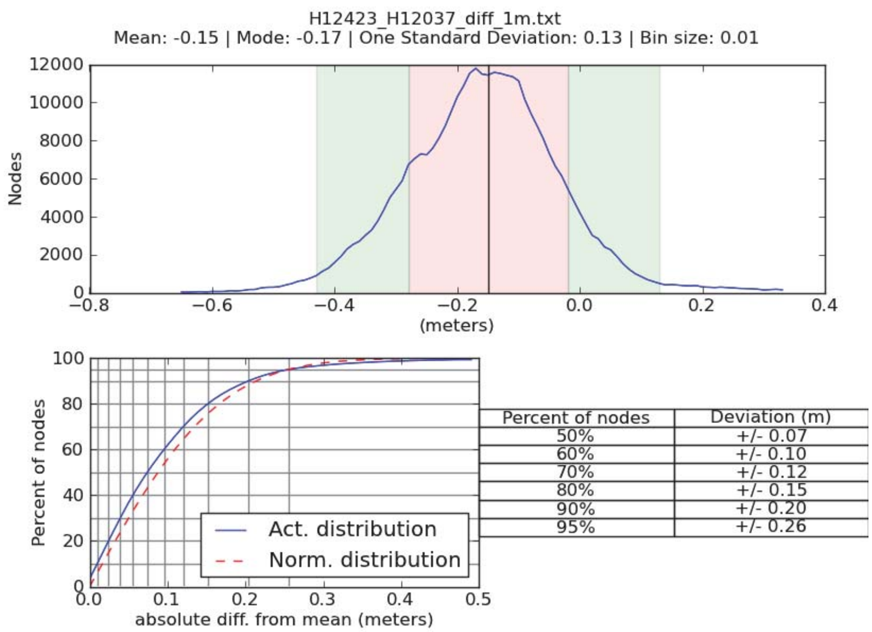

Figure 9: Difference Surface Statistics - H12423 minus H12037

<u>H12346</u>

This junction survey is within project OPR-D304-FH-11 and contains MBES data from dates 2011. The location of H12346 is shown in Figure 10. The average difference between the surfaces is -0.03 meters with a standard deviation of 0.08 meters. 95% of all differences were less than +/- 0.16 meters, as shown in Figure 11.

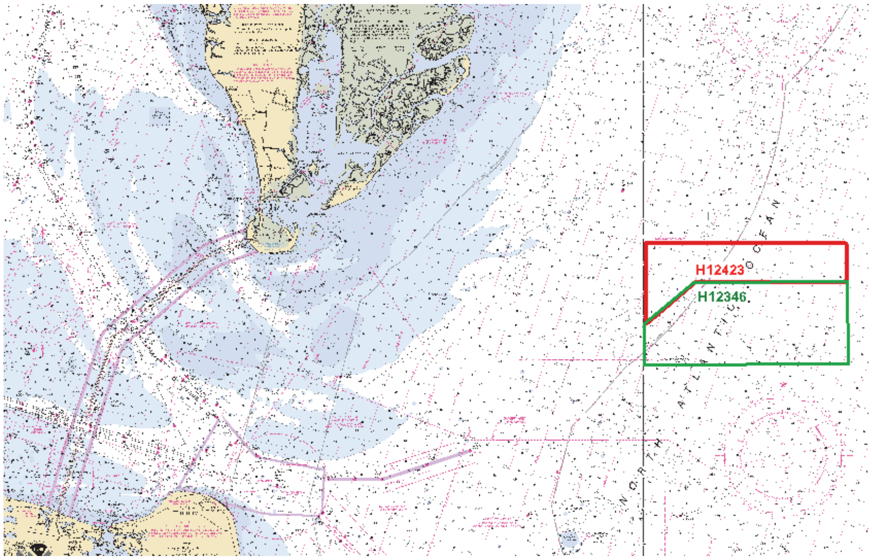

Figure 10: Junction Survey Limits; H12346

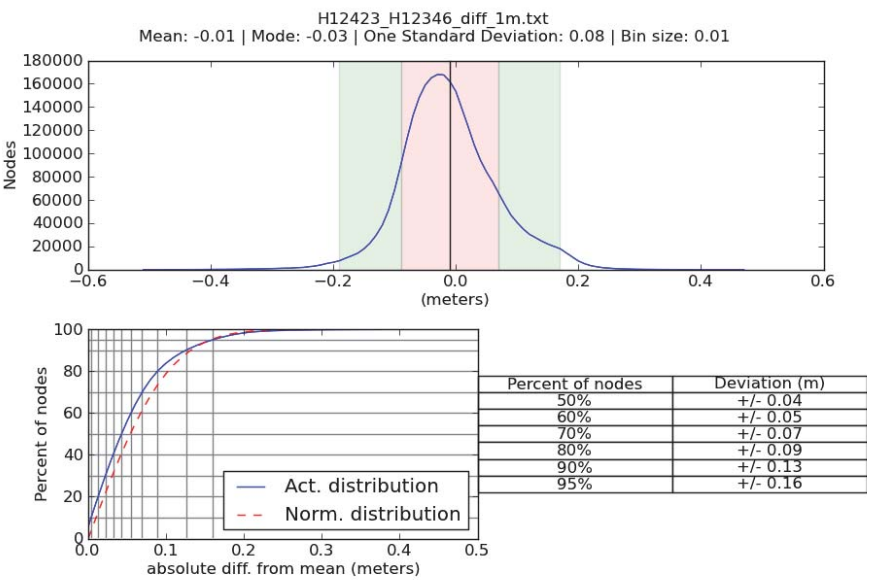

Figure 11: Difference Surface Statistics - H12423 minus H12346

<u>H12424</u>

This junction survey is within project OPR-D304-FH-12 and contains overlapping MBES data from 2012. The location of H12346 is shown in Figure 12. The average difference is -0.10m with a standard deviation of 0.11 meters. 95% of all differences were less than +/- 0.20 meters, as shown in Figure 13.

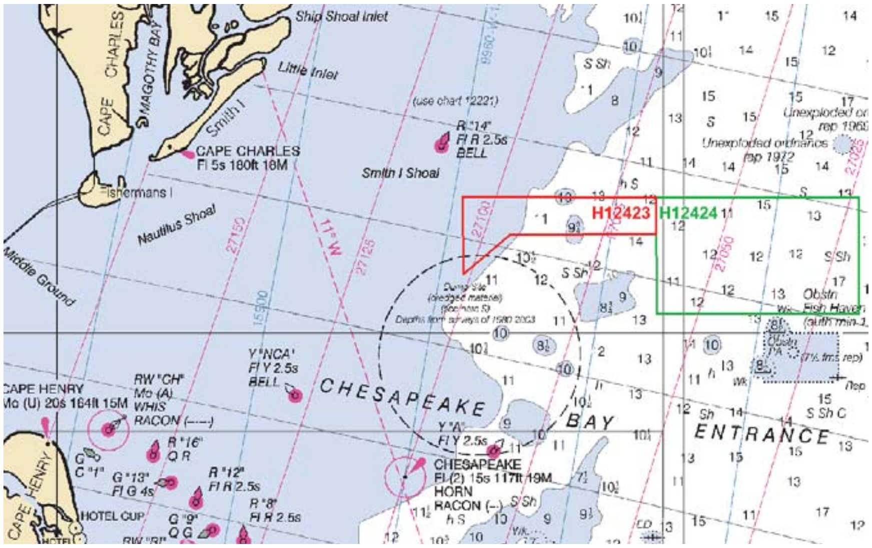

Figure 12: Junction Survey Limits; H12424

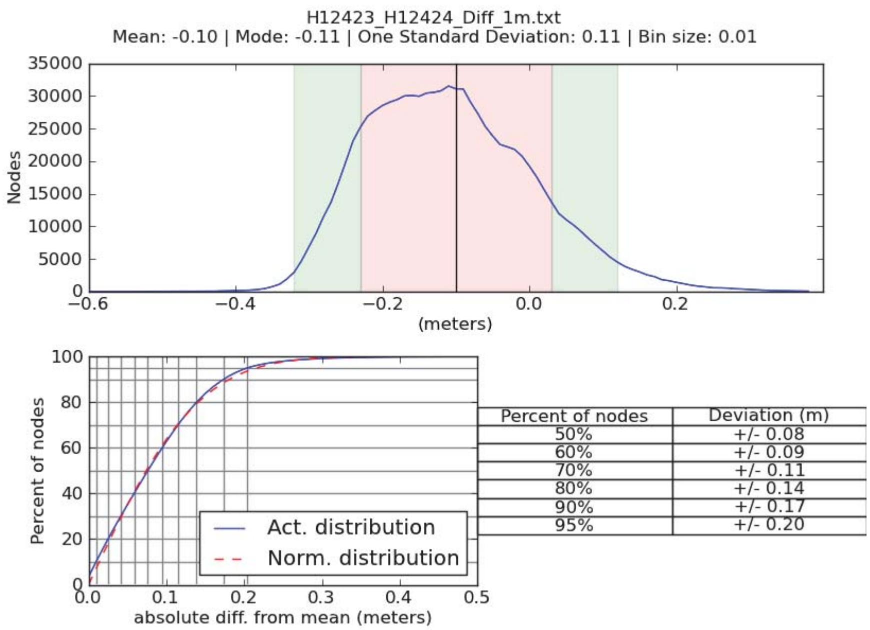

Figure 13: Difference Surface Statistics - H12423 minus H12424

B.2.4 Sonar QC Checks

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

B.2.5 Equipment Effectiveness

B.2.5.1True Heave Dropouts

The internally logged POS file used for Trueheave had gaps in the IMU data for three lines. Because Caris linearly interpolates across a gap in the data record, these data gaps resulted in large heave errors in the corrected soundings. An example of this interpolation across a data gap and the bathymetric effect is shown in Figure 14. These data gaps occurred on the following port Reson lines:

Dn240_20120827_023848
Dn240_20120827_113730
Dn240_20120827_162551

The data gaps were corrected by application of the concurrently logged Ethernet POS file. In these cases, the Ethernet POS file is submitted under the survey's RAW data in addition to the internally logged files.

Following these corrections, the large heave artifacts caused by these data gaps are completely eliminated.

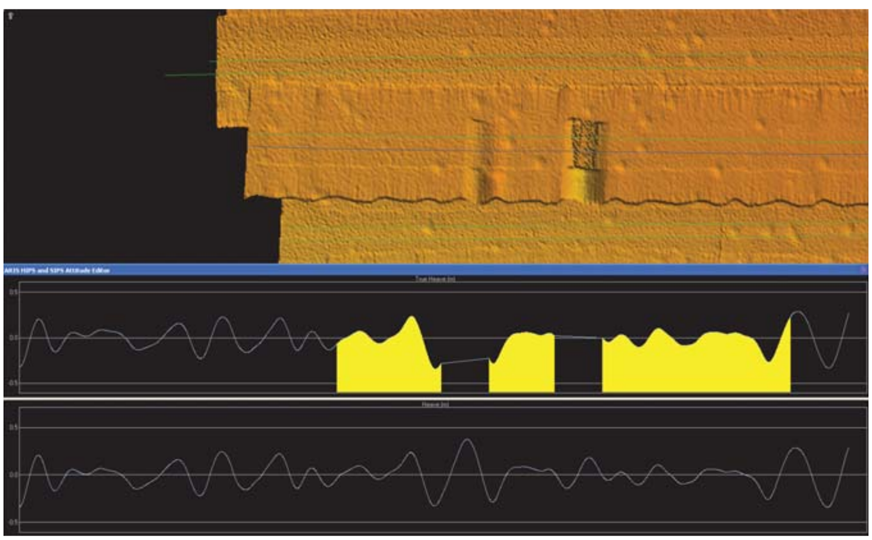

Figure 14: Example of a true heave drop-out seen in the 1-meter BASE surface (top) before correction. CARIS Attitude Editor highlights true heave in yellow illustrating the record's gaps. The corresponding heave record is below.

B.2.5.1Frequency Modulation Upgrade - Inter-head Interference

During Acquisition on Dn196, an inappropriate Frequency Modulation (FM) pulse configuration resulted in interference between the port and starboard sonar heads. The starboard receiver detected the signal transmitted from the port head. This produced an 'S' shaped artifact superimposed on the correct signal from the starboard head. An example of this is shown in Figure 15. These resulting artifacts have been rejected in

CARIS Subset Editor. A new FM configuration was tested and successfully used for acquisition on Dn239, Dn240 and Dn241. No further interference artifacts were detected .

Section A.2.2.1 of the DAPR describes this issue and solution in more detail.

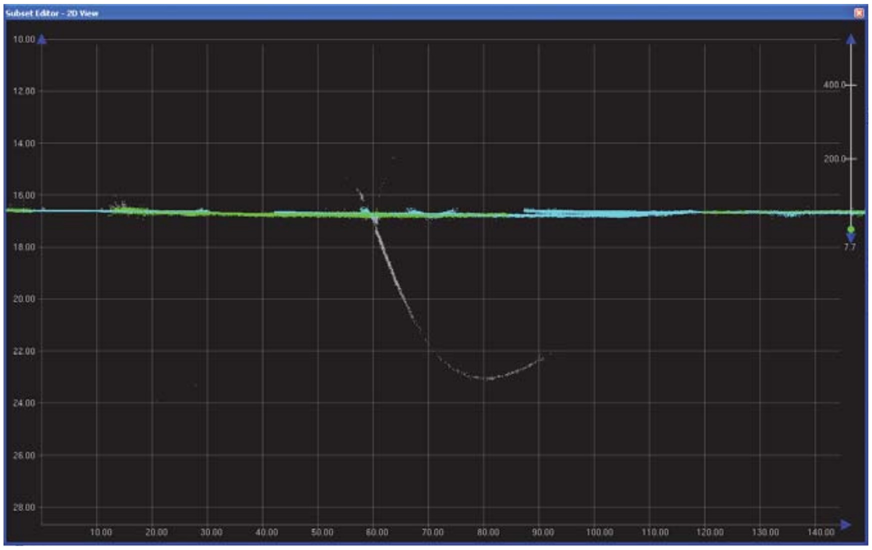

Figure 15: Inter-head interference data resulting from inappropriate matched filters seen in CARIS Subset Editor.

B.2.5.1Frequency Modulation Upgrade - Port/Starboard Depth Offset

During the first day of acquisition on this sheet (Dn196), the errors in the implementation of FM matched filter processing resulted in a depth measurement difference of 0.2 meters between the heads. An example of this error prior to correction is shown in Figure 16. This offset and the causes are discussed in greater detail in the DAPR submitted with this report.

This error was corrected for Dn196 by incorporation of a 0.22 meter offset in the static draft for the port 7125 HVF. This largely eliminated the inter-head offset for Dn196. For the remainder of this survey, the FM implementation was correct and did not introduce any depth biases between the heads.

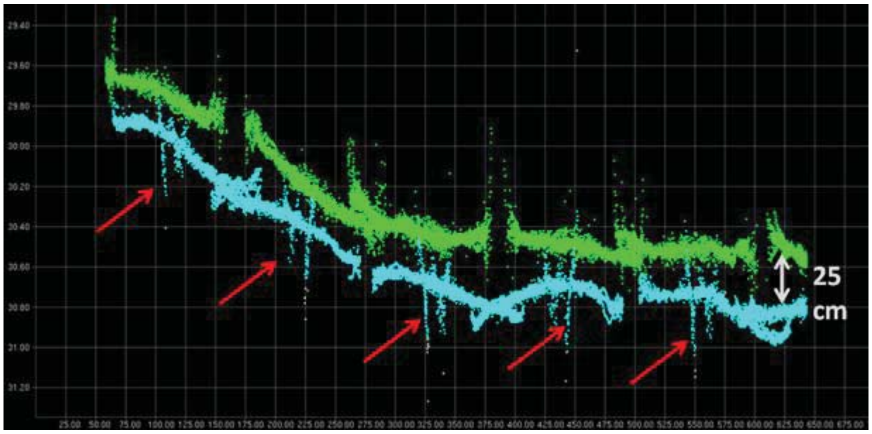

Figure 16: Data resulting from inappropriate FM pulse spectral content.
Port data (green) is consistently 0.20-0.25 m shoaler than starboard data.
Red arrows illustrate the inter-head interference across multiple swaths.

B.2.5.1Side Scan - Telemetry Error

On Dn196 data telemetry errors were observed between the SSS towfish (SN: 386) and the topside processor. These errors resulted in small gaps and artifacts in the SSS imagery. An example is shown in Figure 17. These errors became more frequent throughout the day, and acquisition was stopped before the errors significantly degraded data quality. Affected imagery was not rejected. However correlating MBES coverage does not reveal any contacts within these small gaps in SSS data. All subsequent SSS data on this sheet was obtained with a different towfish (SN: 385). No telemetry errors were observed with this towfish.

The towfish that had shown the telemetry errors was returned to the manufacturer, who replaced the multiplexer board. This resolved the issue.

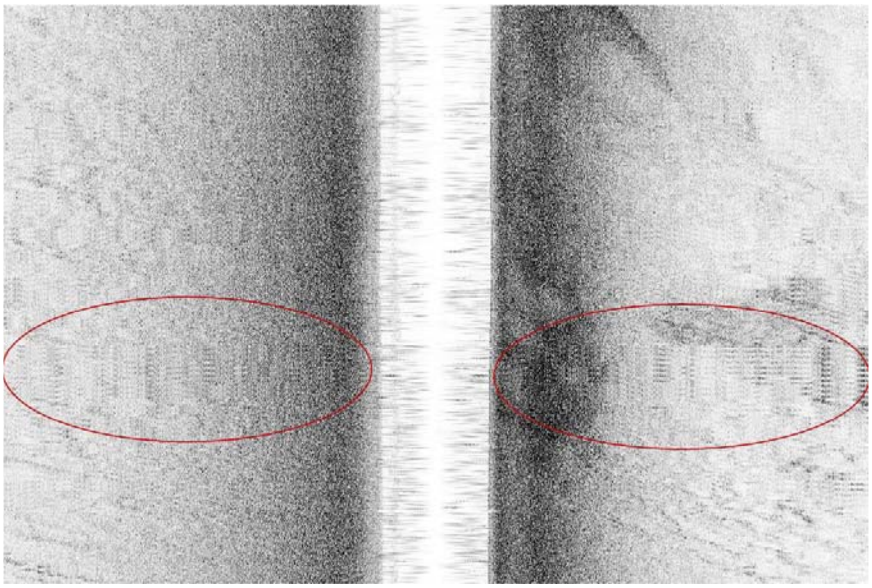

Figure 17: Telemetry error (circled) in SSS data on Dn196.

B.2.5.1Sound Velocity Artifacts in SSS Data

On Dn196 a strong thermocline resulted in refraction artifacts in the SSS data. These artifacts are shown in Figure 18. Towfish height was adjusted in an effort to eliminate this effect. This attempt was unsuccessful and for this reason as well as the telemetry issue noted above, SSS acquisition was stopped. This data was processed and reviewed in conjunction with MBES data.

Approximately 60 days later, SSS acquisition resumed. No sound velocity refraction artifacts were observed.

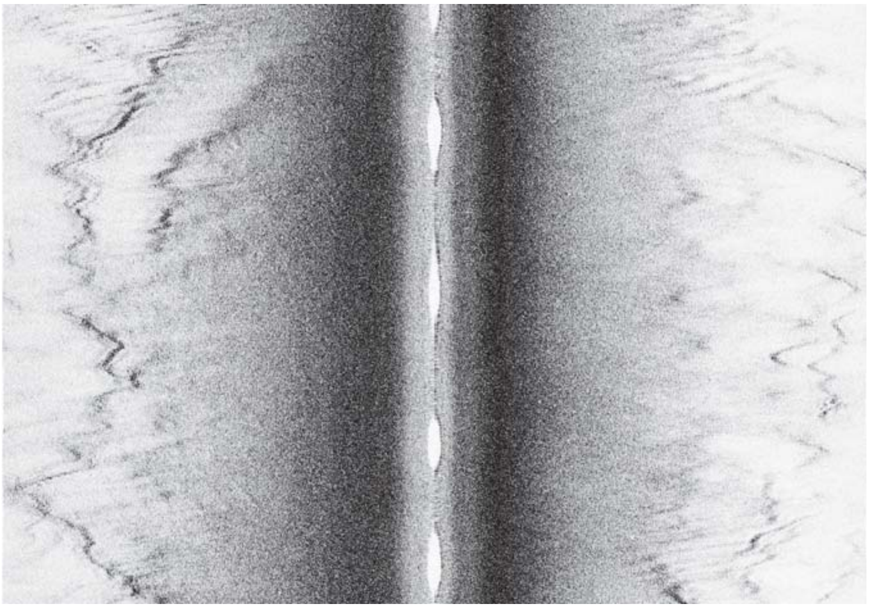

Figure 18: Sound velocity distortion artifacts in outer SSS data.

B.2.5.1Reson I/O Module Clock

During MBES acquisition on Dn196, the starboard Reson internal clock periodically lost the ZDA time input. The PPS continued to work and disciplined the clock, explaining the precise -3 second difference from GPS in the ping-timing. The error for correlating data was corrected through the vessel offset file.

A new Reson I/O module was installed on Dn197 and this timing issue was resolved for subsequent data.

B.2.5.1Port Surface Sound Velocity Outage

Due to implementation errors in the Reson dual-head configuration, the sound velocity of the slave unit (the port head) was not regularly updated during acquisition on Dn196. The issue did not cause significant sound speed artifacts in the data because the surface sound speed did not vary significantly across the sheet on Dn196.

This deficiency was fixed with the installation of Reson Service Pack 3, along with new sonar heads, on Dn214. Section A.2.2.1 of the DAPR describes this issue and solution in more detail.

B.2.6 Factors Affecting Soundings

B.2.6.1 None Exist

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed casts were conducted with the MVP approximately every twenty minutes during acquisition for H12423.

The sound speed correction method of nearest in distance within time of one hour was applied to data in CARIS. Sound speed artifacts exist in the MBES data from Dn196. This is shown in CARIS Subset Editor in Figure 19. These outer beam artifacts do not affect the BASE surface more than 0.20m and data meets specifications. Subsequent MBES data, acquired in August does not contain these artifacts.

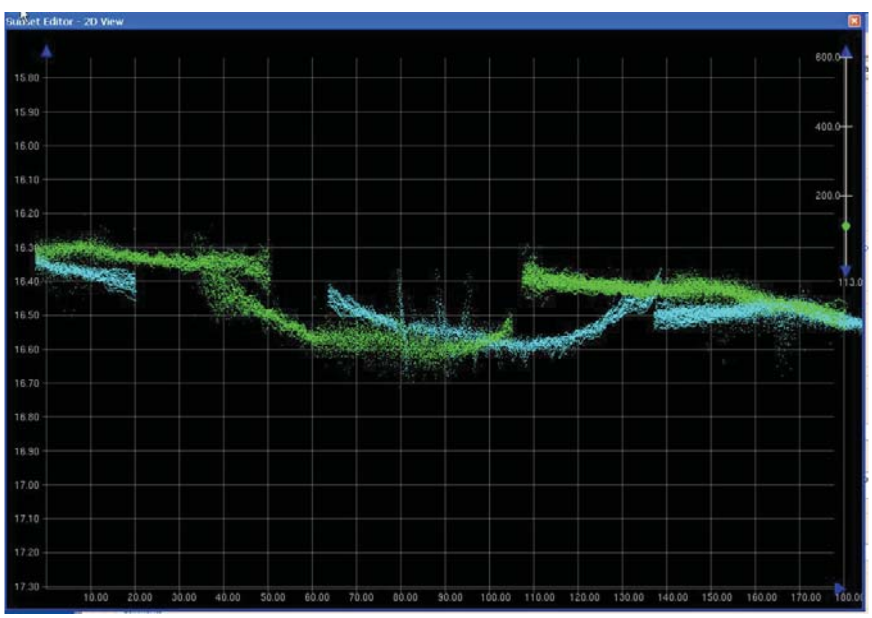

Figure 19: MBES Data from Dn 196 (middle) contains sound velocity artifacts. Data on either side from Dn240 does not show sound velocity issues.

B.2.8 Coverage Equipment and Methods

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

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 logged in Reson datagram 7008 snippets record in the raw .s7k files. The .s7k file also holds the navigation and bottom detections for all MBES lines in survey H12423. The snippet records were not processed; SSS data was used to create mosaics.

B.5 Data Processing

B.5.1 Software Updates

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

The following Feature Object Catalog was used: 5.2

CARIS HDCS lines were all converted and processed using CARIS HIPS and SIPS 7.1 Service Packs 1 (Dn196) and 2 (Dn239-241). Service Pack 2 accounts for the June 30, 2012 leap second that was not accounted for in SP1.

Should it be necessary to re-process this data or re-apply SBETs, it is imperative that this should only be done with SP1 for Dn196 and SP2 for Dn239-Dn241. Failure to heed this warning will result in a one-second mismatch between the navigation and attitude in the soundings. This causes large artifacts.

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12423_1m	CUBE	1 meters	13.31 meters - 28.10 meters	NOAA_1m	Object Detection
H12423_1m_Final_19plus	CUBE	1 meters	19 meters - 999 meters	NOAA_1m	Object Detection
H12423_50cm	CUBE	0.5 meters	13.29 meters - 28.16 meters	NOAA_0.5m	Object Detection
H12423_50cm_Final_0to20	CUBE	0.5 meters	0 meters - 20 meters	NOAA_0.5m	Object Detection
H12423_1m_combined	CUBE	1 meters	13.29 meters - 28.10 meters	NOAA_1m	Complete MBES
H12423_1m_100	SSS Mosaic	3 meters	-	N/A	100% SSS
H12423_1m_200	SSS Mosaic	3 meters	-	N/A	200% SSS

Table 9: CARIS Surfaces

B.5.3 RAW Data File Size

On the first day of the survey (Dn196) the Reson 7125 systems were set to record compressed image data (7011), which resulted in very large .S7k files. The 7011 files were not recorded for the rest of this sheet.

B.5.4 Total Vertical Uncertainty Analysis

A custom layer was created on finalized surfaces showing the uncertainty of individual nodes in relation to the allowable uncertainty for their depths. This layer was exported and run through a custom Python script resulting in statistical analysis. 100% of nodes within survey H12423 met the vertical uncertainty standards of section 5.1.3 of the Hydrographic Surveys Specifications and Deliverables (2012 Edition). See "H12423_Standards_Compliance.pdf" submitted in Appendix II of this report.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

C.1 Vertical Control

The vertical datum for this project is 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 10: NWLON Tide Stations

File Name	Status
8651370.tid	Verified Observed

Table 11: Water Level Files (.tid)

File Name	Status
D304FH2012CORP.zdf	Final

Table 12: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 09/28/2012. The final tide note was received on 10/09/2012.

Preliminary tides for H12423 were accepted as final.

C.2 Horizontal Control

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

The following PPK methods were used for horizontal control:

Smart Base

All data submitted as H12423 has SBETs and SMRMSG's applied for post-processed position/attitude and TPU values, respectively. Refer to the OPR-D304-FH-12 HVCR for specific values used for processing and applying these files.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
Acushnet 6	ACU6
Cedar Island	NCCI
Chesapeake Light	COVX
Driver 5	DRV5
Driver 6	DRV6
Duck 3	NCDU
Loyola 2 COOP	LOY2
Loyola LOYW	LOYW
Loyola LS03	LS03
Middle Township	NJCM
Moriches 5	MOR5
Wallops Island	VAWI

Table 13: CORS Base Stations

Data was acquired using real-time DGPS correctors prior to applying SBET in post processing.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Driver, Virginia (289kHz)

Table 14: 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
12221	1:80000	81	04/2011	04/05/2011	04/09/2011

Table 15: Largest Scale Raster Charts

12221

H12423 bathymetry data is in general agreement with the chart. However, most survey soundings are generally slightly deeper than charted values and the sixty-foot depth curve is west of the charted location in some areas.

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?
US3DE01M	1:419716	12	10/06/2011	12/15/2011	NO
US3EC08M	1:200000	14	12/14/2010	05/09/2011	NO
US4VA12M	1:80000	19	02/08/2012	02/08/2012	NO

Table 16: Largest Scale ENCs

US3DE01M

This electronic chart compares similarly to RNC 12221, above.

US3EC08M

Electronic chart US3EC08M covers the western-most 1500 m of survey H12423. The soundings from this survey are 1ft shoaler and 3ft deeper than the charted depths in the north and south respectively.

US4VA12M

This electronic chart compares similarly to RNC 12221, above.

D.1.3 AWOIS Items

No AWOIS items exist for this survey.

D.1.4 Charted Features

No charted features exist for this survey.

D.1.5 Uncharted Features

An uncharted object was detected with sidescan. Figure 20 shows this feature in CARIS Side Scan Editor. Correlating MBES data in Figure 21 verifies the object. The shoal sounding corresponding to the side scan feature was designated. Additional details and a charting recommendation are included in the Final Feature File.

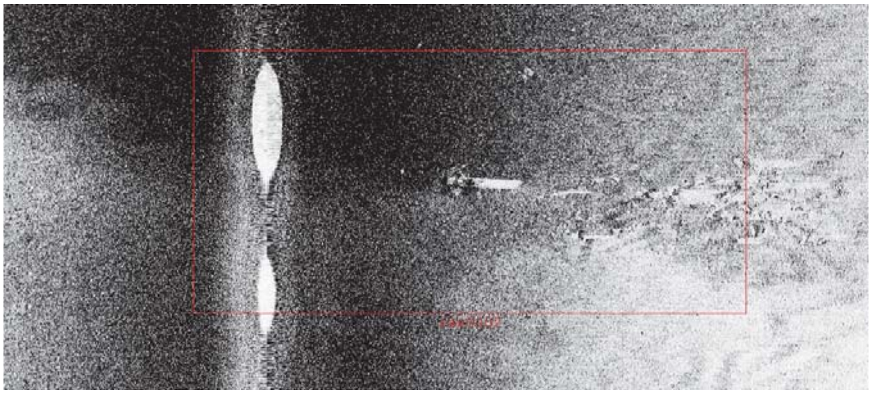

Figure 20: Uncharted Feature detected in CARIS Side Scan Editor.

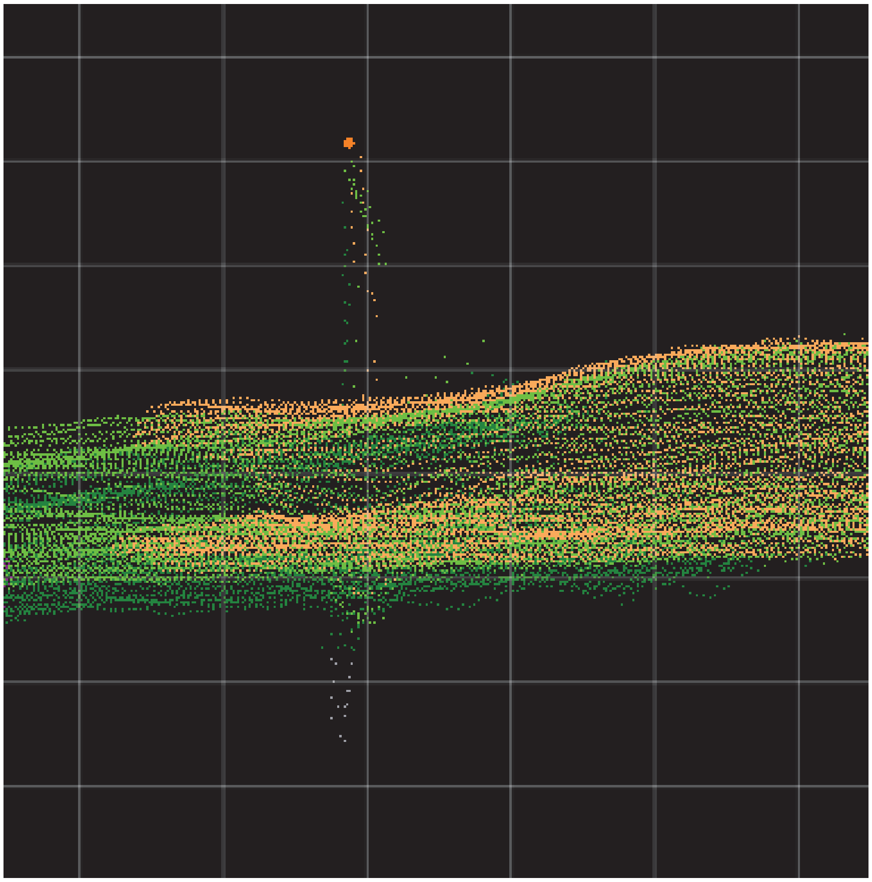

Figure 21: Feature illustrated above, evident in CARIS Subset Editor.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

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

Prior surveys of this area were utilized for reference, but formal comparison with the current survey was not performed or required by the project instructions.

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

A field of pock marks in the south west of the sheet is evident in the 1-meter BASE surface. A section of this field in shown in Figure 22. These depressions are approximately 15m wide and 0.10m deep, as seen in Subset Editor in Figure 23. The hydrographer does not recommend charting these features, but notes that they may be of interest to other users of the dataset.

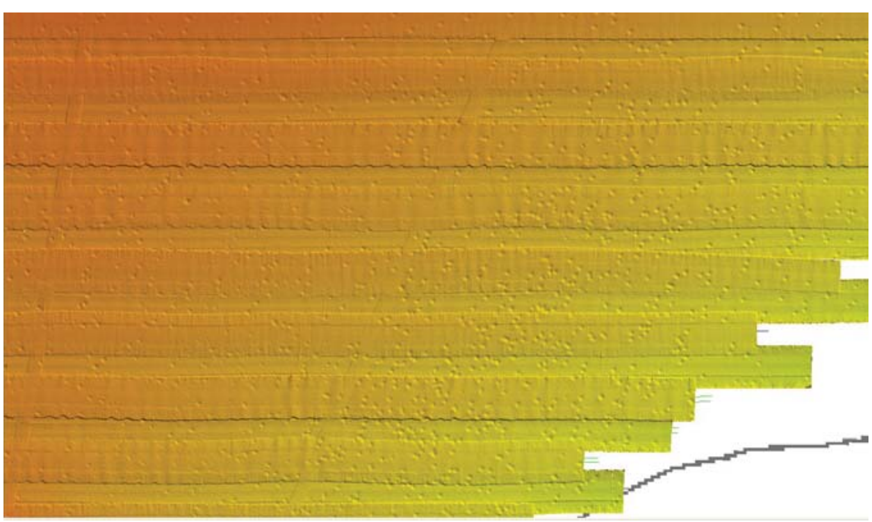

Figure 22: Pock marks visible in the H12423 1-meter CARIS BASE surface.

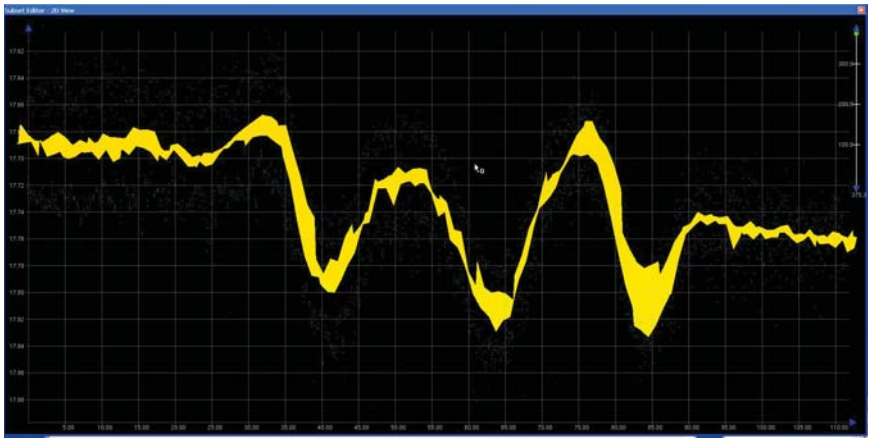

Figure 23: Pock marks detected in H12423 viewed in CARIS Subset Editor.

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 Construction and Dredging

There is no present or planned construction or dredging within the survey limits. The south west corner of the survey limits extends 1,170m south into a charted Dump Site (dredged material). No evidence of spoils were detected in SSS or MBES data of H12423.

E. Approval Sheet

As Chief of Party, field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are 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, Field Procedures Manual, Standing and Letter Instructions, and all HSD Technical Directives with the exception of discrepencies noted in this report. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2013-01-11

Approver Name	Approver Title	Approval Date	Signature
LCDR Benjamin K. Evans	Chief of Party	01/24/2013	
LT Samuel F. Greenaway	Field Operations Officer	01/24/2013	
LT Madeleine M. Adler	Sheet Manager	01/24/2013	

F. Table of Acronyms

Acronym	Definition
AFF	Assigned Features File
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference Staiton
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERZT	Ellipsoidally Referenced Zoned Tides
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division
HSSDM	Hydrographic Survey Specifications and Deliverables Manual

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Porpagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Exectutive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPENDIX I

TIDES AND WATER LEVELS

UNITED STATES DEPARMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : October 9, 2012

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-D304-FH-2012
HYDROGRAPHIC SHEET: H12423

LOCALITY: 10 NM East of Smith Island, Approaches to Chesapeake Bay, VA
TIME PERIOD: July 14 - August 28, 2012

TIDE STATION USED: 8651370 Duck, NC
Lat. 36° 11.0'N Long. 75° 44.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.026 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-D304-FH-2012, H12423, during the time period between July 14 to August 28, 2012.

Please use the zoning file D304FH2012CORP submitted with the project instructions for OPR-D304-FH-2012. Zones SA46, SA54, and SA55 are the applicable zones for H12423.

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

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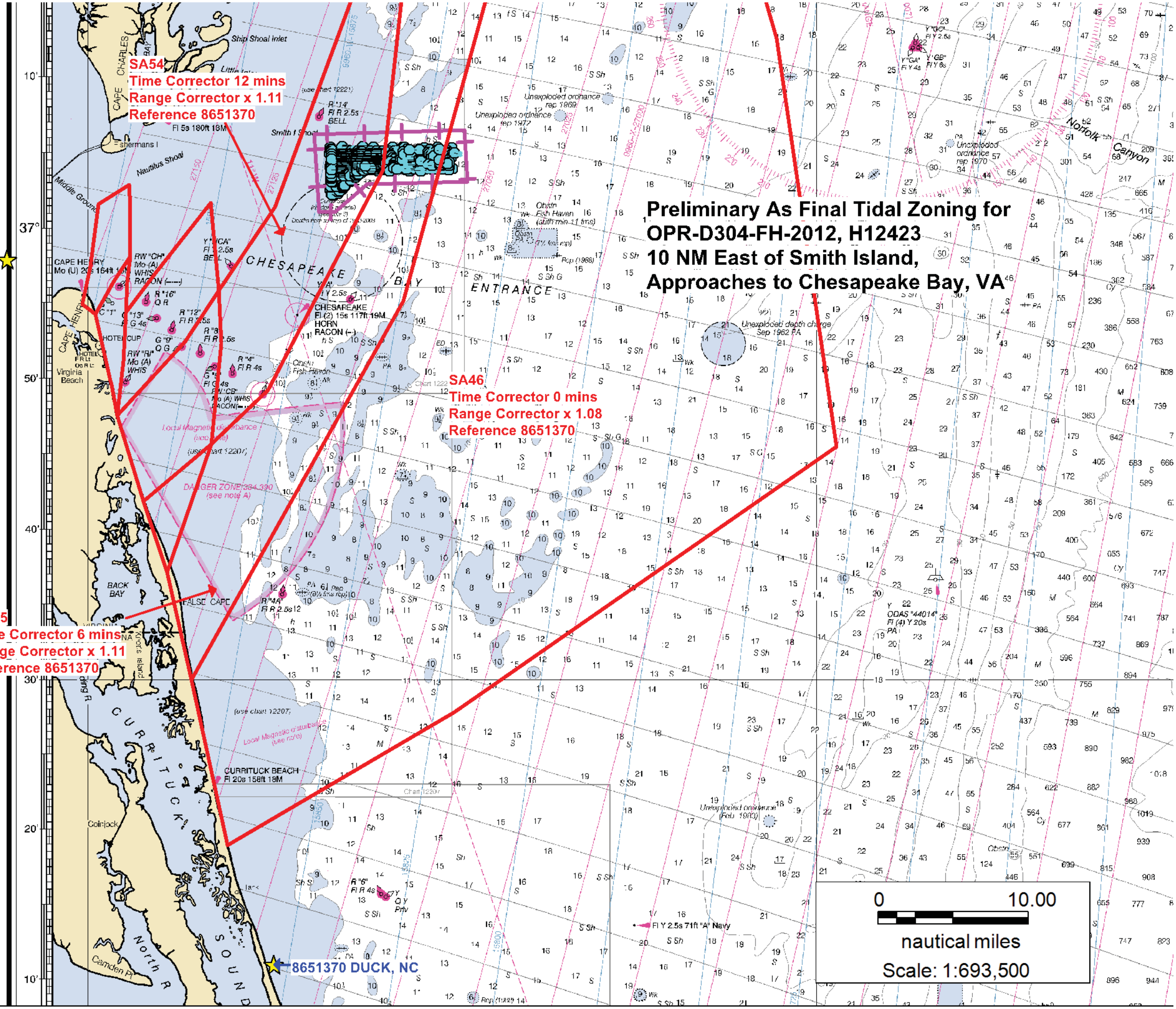
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.1365860250
Date: 2012.10.11 08:25:42 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary As Final Tidal Zoning for
OPR-D304-FH-2012, H12423
10 NM East of Smith Island,
Approaches to Chesapeake Bay, VA
SA54
Time Corrector 12 mins
Range Corrector x 1.11
Reference 8651370
SA46
Time Corrector 0 mins
Range Corrector x 1.08
Reference 8651370
SA55
Time Corrector 6 mins
Range Corrector x 1.11
Reference 8651370
8651370 DUCK, NC
0
10.00
nautical miles
Scale: 1:693,500
CHESAPEAKE BAY
ENTRANCE
CURRITUCK SOUND
Norfolk Canyon
CAPE CHARLES
CAPE HENRY
Virginia Beach
BACK BAY
FALSE CAPE
CURRITUCK BEACH
Smith I Shoal
Ship Shoal Inlet
Nautilus Shoal
Middle Ground
DANGER ZONE 334.390
(see note A)
Local Magnetic disturbance
North R
Coinjock
Camden Pt
37°
50'
40'
30'
20'
10'

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

NO SUPPLEMENTAL SURVEY RECORDS OR CORRESPONDENCE IN SURVEY H12423

APPENDIX III

FEATURES REPORT

DTONS -- NONE

AWOIS -- NONE

WRECK -- NONE

MARITIME BOUNDARIES -- NONE

APPROVAL PAGE

H12423

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

- H12423_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12423_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.

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DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=HIGGINS.ABIGAIL.SARAH.1267671750
Date: 2013.08.30 13:44:01 -04'00'

Approved:____

LT Abigail Higgins, NOAA
Chief, Atlantic Hydrographic Branch