H11555

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey *Multibeam and Side Scan Sonar*

Field No. *B*

Registry No. *H11555*

LOCALITY

State *Delaware*

General Locality *Atlantic Ocean*

Sublocality *30 NMI SE of Cape Henlopen*

2006

CHIEF OF PARTY

Jason M. Infantino, Gary R. Davis, & 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. **H11555**

HYDROGRAPHIC TITLE SHEET

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

FIELD NO. **B**

State Delaware

General Locality Atlantic Ocean

Sublocality 30 NMI SE of Cape Henlopen

Scale 1:20,000 Date of survey ~~23~~ ***14*** June 2006 - 09 September 2006

Instructions Dated 01 February 2006 Project No. OPR-D302-KR-06

Vessel *M/V Atlantic Surveyor* D582365

Chief of Party *Jason M. Infantino, Gary R. Davis, & Paul L. Donaldson*

Surveyed by: *Brian Biggert, Curtis Clement, Gary Davis, Paul Donaldson, Sean Halpin, Karen Hart, Chuck Holloway, Erick Huchzermeyer, Jason Infantino, Meme Lobecker, Matt Meyer, Rick Nadeau, Evan Robertson, Jeremy Shambaugh, Deb Smith, and Ryan Thomas*

Soundings taken by (**echo sounder**) hand lead, pole MULTIBEAM RESON SEABAT 8101

Graphic record scaled by

Graphic record checked by

Protracted by Automated plot by

Verification by ***Atlantic Hydrographic Branch Personnel.***
Bold, Italic, Red notes in Descriptive Report were made during office processing.
Soundings in ~~fathoms~~, ***Feet,*** ~~**meters**~~ at MLW, **MLLW**

REMARKS: **Contract** DG133C-05-CQ-1088
Contractor: Science Applications International Corp., 221 Third Street; Newport, RI 02840 USA
Subcontractors: Williamson & Associates, 1124 NW 53rd Street, Seattle WA 98107; Rotator Staffing Services, PO Box 366, 557 Cranbury Rd., E. Brunswick, NJ 08116
Times: All times are recorded in UTC
UTM Zone: Zone 18
Purpose: To provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area: Sheet B (H11555) in Mid–Atlantic Corridor, Coast of Delaware.

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537. ☆ U.S. GOVERNMENT PRINTING OFFICE: 1976—665-661/1222 REGION NO. 6

Science Applications International Corporation (SAIC) warrants only that the survey data acquired by SAIC and delivered to NOAA under Contract DG133C-05-CQ-1088 reflects the state of the sea floor in existence on the day and at the time the survey was conducted.

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Descriptive Report to Accompany
Hydrographic Survey H11555
Scale 1:20,000, Surveyed 2006
M/V Atlantic Surveyor
Science Applications International Corporation (SAIC)
Jason M. Infantino, Hydrographer

PROJECT
Project Number: OPR-D302-KR-06 **Original:** OPR-D302-KR-06
Dates of Instructions: 01 February 2006 **Task Order#:** T0001-Modification

Dates of Supplemental Instructions: 26 October 2006, 27 March 2006, 28, June 2006.
Sheet Letter: B
Registry Number: H11555
Purpose: To provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area.

A. AREA SURVEYED

The area surveyed was a section of the Atlantic Ocean off of Delaware, 30 NMI SE of Cape Henlopen (Figure A-1). The area was surveyed with multibeam sonar and towed side-scan sonar from ~~23~~ ***14*** June 2006 – 09 September 2006 (Table A-2). The depth range encountered in this area was from 15.35 meters with a 0.28 meter uncertainty to 37.21 meters with a 0.29 meter uncertainty. The final uncertainty range in this area was from 0.28 meters to 1.74 meters. The Statement of Work* area delivered to SAIC from NOAA combined the vertices for H11554 (Sheet A) and H11555 (Sheet B). SAIC divided the Statement of Work area at intermediate vertices to create separate survey areas for H11554 (Sheet A) and H11555 (Sheet B). The final survey outline for the H11555 survey is depicted in Appendix III.**

Filed digitally with original field records at AHB.
****Appended to this report.***

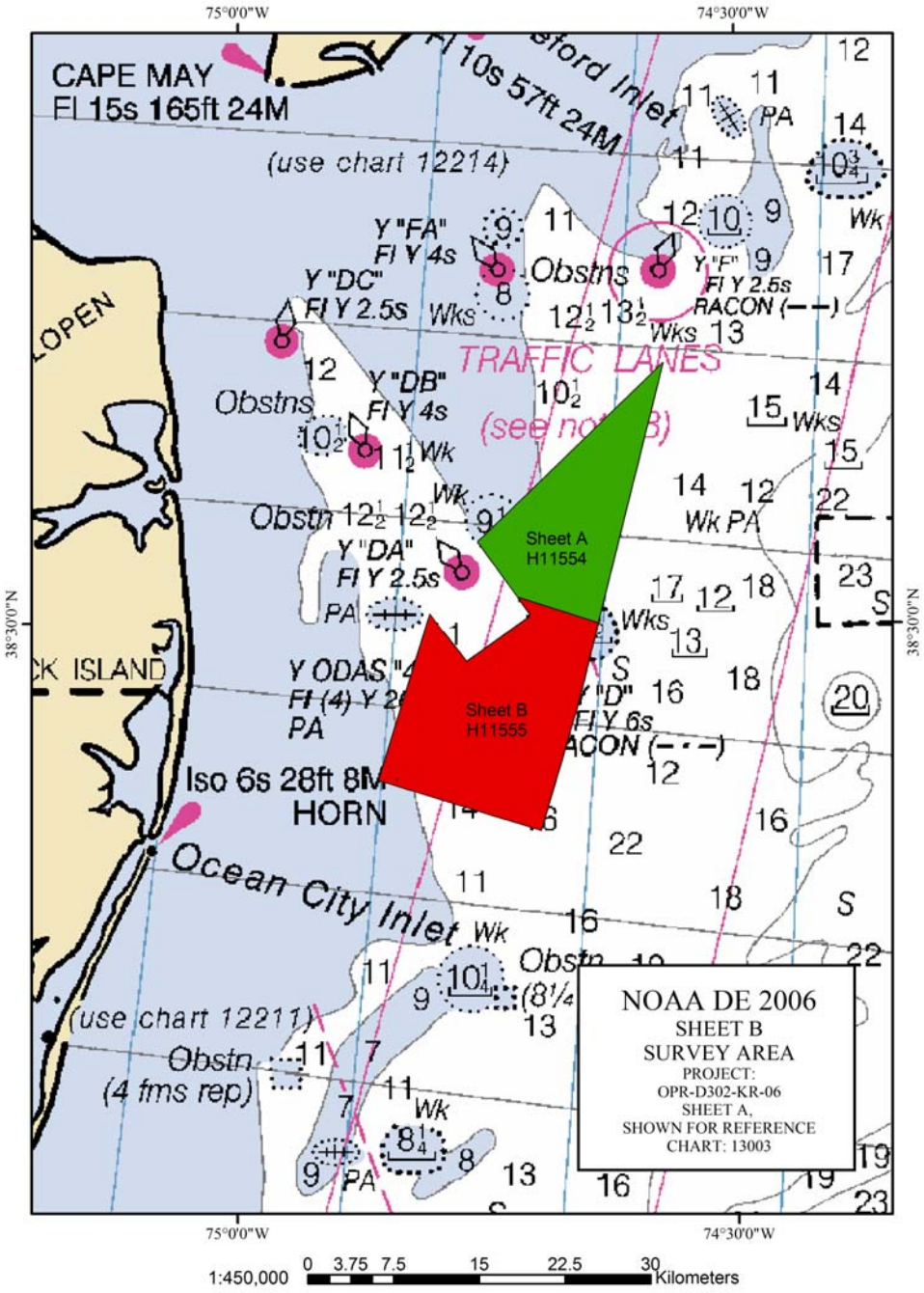

Figure A-1. H11555 Survey Bounds

Table A-1.Hydrographic Survey Statistics

***M/V Atlantic Surveyor*, Sheet B H11555**	
LNM Single beam mainscheme only	N/A
LNM Multibeam mainscheme only	3258.60
LNM Lidar mainscheme only	N/A
LNM Side Scan Sonar mainscheme only	3258.60
Lineal nautical miles of any combination of the above techniques (specify methods)	3258.60
LNM Crosslines singlebeam and multibeam combined	165.15
LNM Lidar Crosslines	N/A
LNM development lines non mainscheme	0
LNM shoreline/near shore investigations	0
Number of Bottom Samples	8
Number of items investigated that required additional time/effort in the field beyond the above survey operations	0
Total number of square nautical miles	70.02

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

Calendar Date	Julian Day	Calendar Date	Julian Day
14-June-2006	165	18-July-2006	199
23-June-2006	174	19-July-2006	200
24-June-2006	175	20-July-2006	201
25-June-2006	176	24-July-2006	205
26-June-2006	177	25-July-2006	206
08-July-2006	189	26-July-2006	207
09-July-2006	190	27-July-2006	208
10-July-2006	191	30-July-2006	211
11-July-2006	192	31-July-2006	212
12-July-2006	193	01-August-2006	213
13-July-2006	194	02-August-2006	214
14-July-2006	195	03-August-2006	215
15-July-2006	196	08-September-2006	251
16-July-2006	197	09-September-2006	252
17-July-2006	198		

B. DATA ACQUISITION AND PROCESSING *See also the Evaluation Report*

B.1 EQUIPMENT

A detailed description of the systems used to acquire and process these data has been included in the separate Data Acquisition and Processing Report* for OPR-D302-KR-06 delivered with Sheet H11554 on 09 April 2007 (SAIC document number 06-TR-017). The information in Table B-1 below summarizes the equipment configuration information in the report.

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

	Manufacturer / Model Number	Subsystem
Multibeam Sonar	RESON SeaBat 8101 ER	81P Sonar Processor
Side Scan Sonar	Klein 3000 Towfish	K-1 K-Wing Depressor, Transceiver/Processing Unit
Vessel Attitude System	TSS POS/MV 320 Inertial Navigation System	
Positioning Systems	TSS POS/MV	
	Trimble 4000 GPS Receiver	
	Trimble Probeacon Differential Beacon Receiver	
	Leica MX41R Differential Beacon Receiver	
Sound Speed Systems	Brooke Ocean Technology Ltd., Moving Vessel Profiler-30	Applied Microsystems Ltd. Smart SV and Pressure Sensor
	Sea-Bird Electronics, Inc. CTD Profiler	

Survey Vessel

The *M/V Atlantic Surveyor* was the platform for multibeam sonar, side-scan sonar and sound velocity data collection. Three 20-foot ISO containers were secured on the aft deck. One was used as the real-time, survey data collection office, one as a data processing office and the third for maintenance and repairs as well as spares storage. All data were shipped to the Data Processing Center in the SAIC Newport, RI office for final data processing. The Position Orientation System/Marine Vessels (POS/MV) Inertial Measurement Unit (IMU) was mounted below the main deck of the vessel, 0.39 meters port of centerline and 0.34 meters forward of, 0.12 meters starboard of and 1.64 meters above the RESON 8101 transducer. The multibeam sounder transducer was mounted on the hull 0.46 meters port of the keel. A Brooke Ocean Technologies Moving Vessel Profiler 30 (MVP-30) was mounted on the starboard stern quarter. Table B-2 is a list of vessel characteristics for the *M/V Atlantic Surveyor*. ***Concur.***

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Table B-2. Survey Vessel Characteristics

Vessel Name	LOA	Beam	Draft	Max Speed	Gross Tonnage	Power (Hp)	Registration Number
M/V Atlantic Surveyor	110’	26’	9’	14 knots	Displacement 68 net tons Deck load 65 long tons	900	D582365

Major Systems

SAIC used their Integrated Survey System (**ISS-2000**) software on a Windows XP platform to acquire these survey data. Survey planning and data analysis were conducted using SAIC’s **SABER** software on Red Hat Enterprise 4 Linux platforms. Klein 3000 side-scan data were collected on a Windows XP platform using Klein’s **SonarPro version 9.6** software. The Klein 3000 side scan sonar data were collected in eXtended Triton Format (XTF) and maintained at full resolution, with no conversion or down sampling techniques applied. All side-scan data were reviewed using Triton **Isis** software, while coverage mosaics were produced using **SABER**. A description of the software and versions used to acquire and process these data has been included in the separate Data Acquisition and Processing Report***** for OPR-D302-KR-06 delivered with Sheet A, H11554. Additional software and software version updates that were used during H11555 data processing are described in section B.4 of this DR.
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B.2 Quality Control

There were approximately 165 linear nautical miles of s surveyed and approximately 3258 linear nautical miles of main scheme lines surveyed. This resulted in approximately 5 percent ***(4.68%)*** of linear nautical miles of crosslines compared to main scheme survey lines. The crosslines were oriented at 107.1°/287.2° and were spaced at approximately 800 meters, while the main scheme lines were oriented at 17.3°/197.3° and were spaced at 40 meters. The range scale was set to 50 meters for the side-scan acquisition, while the swath width for the multibeam varied with depth. ***Concur.***

A Brooke Ocean Technology Moving Vessel Profiler (MVP) with an Applied Microsystems SV&P Smart Sensor or a Seabird Electronics SBE-19 CTD was used to collect sound speed profile (SSP) data. SSP data were obtained at intervals frequent enough to reduce sound speed errors. The frequency of casts was based on observed sound speed changes from previously collected profiles and time elapsed since the last cast. Multiple casts were taken along a survey line to identify the rate and location of sound speed changes. Subsequent casts were made based on the observed trend of sound speed changes. As the sound speed profiles changed, cast frequency and location were modified accordingly. Confidence checks of the sound speed profile casts were conducted weekly by comparing two consecutive casts taken with different SV&P Smart Sensors or with a SV&P Smart Sensor and a Seabird SBE-19 CTD.

Static draft measurements were taken on each side of the vessel at each port call, both after arrival and before departure, in order to prorate the daily draft for fuel and water consumption. Dynamic draft was determined from a look up table using shaft rpm counters for the input. The dynamic draft table was constructed from measurements taken during the pre-survey Sea Acceptance Trials.

Horizontal positioning of the multibeam transducer by the POS/MV was verified by daily confidence checks against an independent Trimble DGPS system. In addition, this comparison was running full time with an alarm to alert the survey watch should the position differences exceed the maximum allowable distance.

Multibeam confidence checks were conducted at least weekly by lead line measurement while in port.

Table B-3 presents a summary of these comparisons showing mean differences of 3 centimeters between the lead line and the multibeam. On JD 201 and 215 there are no valid readings available for the starboard side due to dock and tide restrictions.

Table B-3. Comparison Lead Line minus Multibeam

DAY	DATE	PORT MEAN	PORT STDEV	STBD MEAN	STBD STDEV
MEAN OF SETS =		0.030	0.021	0.025	0.019
160	6/9/2006	0.006	0.023	0.020	0.019
167	6/16/2006	0.033	0.018	0.026	0.013
173	6/22/2006	0.023	0.021	0.013	0.007
177	6/26/2006	0.066	0.029	0.063	0.016
188	7/7/2006	0.010	0.019	0.026	0.025
194	7/13/2006	-0.004	0.011	0.030	0.024
201*	7/20/2006	0.042	0.023		
209	7/28/2006	0.007	0.023	0.011	0.022
215*	8/3/2006	0.058	0.017		
249	9/6/2006	0.056	0.023	0.011	0.044
*** STBD Measurements not possible due to piling at measurement location.**					

All individual soundings applied to the grid meet the Horizontal Position Accuracy and Vertical Accuracy specified in the NOS Specifications and Deliverables.* Throughout the gridded depth surface, there are areas where the grid node uncertainty exceeds the specified values. All of these areas correlate to the edges of identified obstructions and wrecks and a small number of non-significant features which have steep vertical sides. There were no designated soundings set on these areas, except on the least depth of reported features.

Comparison of main scheme to crossline near nadir data was done daily to ensure there were no systematic errors introduced and to identify potential problems with the system. Comparisons of all crossing data in H11555 show that 99.60% of comparisons are within 25 centimeters and 99.96% of comparisons are within 35 centimeters. The comparisons larger than 35 centimeters are accounted for by the normal small DGPS position scatter in

Available from OCS Hydrographic Surveys Division through internet download.

areas of slopes, features and wrecks. All comparisons larger than 70 centimeters are accounted for by normal small DGPS position scatter in the AWIOIS area A1057. Table B-4 shows the comparison results of all crossings in H11555.

Table B-4. Junction Analysis All Main Scheme vs. Crosslines Near Nadir, H11555

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0-5	50156	44.09	23054	37.97	21217	45	5885	
5-10	38587	78.01	21623	73.59	16964	80.97		
10-15	19379	95.05	11800	93.02	7579	97.04		
15-20	3822	98.41	2692	97.46	1130	99.44		
20-25	1353	99.60	1111	99.29	242	99.95		
25-30	336	99.89	316	99.81	20	100		
30-35	76	99.96	74	99.93	2	100		
35-40	14	99.97	14	99.95	0	100		
40-45	12	99.98	12	99.97	0	100		
45-50	5	99.99	5	99.98	0	100		
50-60	8	100	8	99.99	0	100		
60-70	4	100	4	100	0	100		
70-80	0	100	0	100	0	100		
80-90	0	100	0	100	0	100		
90-100	1	100	1	100	0	100		
Total	113753	100.00%	60714	53.37%	47154	41.45%	5885	5.17%

Details of beam by beam comparison of selected crossings are presented in the Separates* to this report. The crossings for detailed comparison were randomly selected for spatial and temporal distribution over the entire survey area.

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Table B-5 depicts the junction analysis using all comparisons in the common area between H11555 and H11554. These comparisons show 97.37% were within 20 centimeters and 99.91% were within 30 centimeters. The single comparison larger than 50 centimeters is accounted for by the normal small DGPS position scatter relating to the steepness of Feature # 3.

Table B-5. Junction Analysis, H11555 vs. H11554 (all comparisons)

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0-5	11251	41.73	5157	35.22	4763	43.35	1331	
5-10	8737	74.13	4936	68.92	3801	77.94		
10-15	4999	92.67	3119	90.22	1880	95.05		
15-20	1267	97.37	902	96.38	365	98.37		
20-25	535	99.35	401	99.12	134	99.59		
25-30	150	99.91	114	99.9	36	99.92		
30-35	21	99.99	12	99.98	9	100		

Depth Difference Range (cm)	All		Positive		Negative		Zero	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
35-40	2	100	2	99.99	0	100		
40-45	0	100	0	99.99	0	100		
45-50	1	100	1	100	0	100		
Totals	26963	100.00%	14644	54.31%	10988	40.75%	1331	4.91%

On days when the vessel was heading into steep 3 to 4 foot seas, residual heave and pitch artifacts are seen in the CUBE Depth surface with a magnitude of approximately 10 cm. Analysis of crossings in these areas as well as the final depth uncertainties verifies that the data meet the specified accuracies.

The Klein 3000 side scan sonar was operated on 50-meter range scale for 200% bottom coverage. Vessel speed was controlled so that there were always more than three pings per meter along track for object detection. The Reson 8101 multibeam was used for bathymetry and object detection in a fixed line spacing mode. Vessel speed resulted in more than 3.2 beam footprints per three meters along track. In depths greater than about 17 meters, there was more than 100% bottom coverage with the multibeam. ***Concur.***

Multibeam Coverage Analysis

H11555 survey operations were conducted at line spacing optimized to achieve 200% side scan sonar coverage. Multibeam coverage was not required to be 100%. Main scheme lines were run at 40-meter line spacing while running the side scan at 50-meter range scale. The 1-meter node **BAG** made from the 1-meter node **PFM CUBE Depth Surface** was also used for the demonstration of coverage. The **SABER Gapchecker** routine flagged multibeam data gaps exceeding the allowable 3 contiguous nodes. In addition the entire surface was visually scanned for holidays. Additional survey lines were run to fill any detected holidays. There were no remaining holidays larger than three contiguous nodes.

Survey Systems Error Model

The Total Propagated Error (TPE) model that SAIC has adopted has its genesis at the Naval Oceanographic Office (NAVOCEANO), and is based on years of work by Rob Hare and others. The fidelity of any error model is coupled to the applicability of the equations that are used to estimate each of the components that contribute to the overall error that is inherent in each sounding. SAIC's approach to quantifying the TPE is to decompose the cumulative errors into many individual components and then further decompose those into a horizontal and vertical component. The model then combines the horizontal and vertical error components to yield an estimate of the system error as a whole. This cumulative system error is the Total Propagated Error (TPE). By using this approach, SAIC can more easily incorporate future error information provided by sensor manufacturers into the model. This also allows SAIC to continuously improve the fidelity of the model as understanding of the sensors increases or as more sophisticated sensors are added to a system.

The data needed to drive the error model are captured as parameters taken from the Error Parameter File (EPF), which is an ASCII text file typically created during survey system installation and integration. The parameters are also obtained from values recorded in the GSF file(s) during data collection and processing. While the input units vary, all error values that contribute to the cumulative TPE estimate are converted to meters by **SABER's Errors** program or have units of meters to begin with. The cumulative TPE estimates are separated into a horizontal and vertical component, and are recorded as the Horizontal Error and Vertical Error records in the GSF file. These error values are at the 95% confidence level. The intent is to use these error estimates to gauge the accuracy of each sounding's coordinates and depth.

Tables B-6 and B-7 show the values entered in the errors parameter file. All parameter uncertainties in this file are entered at the 68% confidence level, but the outputs from **SABER's Errors** program are at the 95% confidence level. Sign conventions are: X = positive forward, Y = positive starboard, Z = positive down.

Table B-6. 2006 *M/V Atlantic Surveyor* Error Parameters File

Parameter	Value	Units
static_draft	2.32	Meters
draft_error (uncertainty)	0.01	Meters
squat_error (uncertainty)	0.02	Meters
fixed_heave_error_component (uncertainty)	0.05	Meters
perc_swellheave_err_component (uncertainty)	5.00	Percent
roll_measurement_error (uncertainty)	0.02	Degrees
pitch_measurement_error (uncertainty)	0.02	Degrees
heading_measurement_error (uncertainty)	0.02	Degrees
speed_measurement_error (uncertainty)	0.016	meters/second (m/s)
SSSV_measurement_error (uncertainty)	1.00	meters/second (m/s)
predicted_tide_measurement_error (uncertainty)	0.17	Meters
observed_tide_measurement_error (uncertainty)	0.07	Meters
tide_zone_error (uncertainty)	0.10	Meters
positioning_device_x_offset	4.59	Meters
positioning_device_xoffset_err (uncertainty)	0.05	Meters
positioning_device_y_offset	-0.54	Meters
positioning_device_yoffset_err (uncertainty)	0.05	Meters
positioning_device_z_offset	-8.02	Meters
positioning_device_zoffset_err (uncertainty)	0.05	Meters
VRU_device_x_offset	0.34	Meters
VRU_device_x_offset_error (uncertainty)	0.01	Meters
VRU_device_y_offset	0.12	Meters
VRU_device_y_offset_error (uncertainty)	0.01	Meters
VRU_device_z_offset	-1.64	Meters
VRU_device_z_offset_error (uncertainty)	0.01	Meters
gps_latency	0.00	milliseconds (msec)
vru_latency	0.00	milliseconds (msec)
gps_latency_error (uncertainty)	1.00	milliseconds (msec)
vru_latency_error (uncertainty)	1.00	milliseconds (msec)
horizontal_navigation_error (uncertainty)	0.75	Meters
svp_measurement_error (uncertainty)	1.00	meters/second (m/s)

Table B-7. SONAR Parameters in the EPF - Reson8101

Parameter	Value	Units
transducer_device_x_offset	0.00	Meters
transducer_device_xoffset_error (uncertainty)	0.00	Meters
transducer_device_y_offset	0.00	Meters
transducer_device_yoffset_error (uncertainty)	0.00	Meters
transducer_device_z_offset	0.00	Meters
transducer_device_zoffset_error (uncertainty)	0.00	Meters
roll_offset_error (uncertainty)	0.005	Degrees
pitch_offset_error (uncertainty)	0.05	Degrees
heading_offset_error (uncertainty)	0.05	Degrees
sounder_latency	0.00	milliseconds (msec)
sounder_latency_error (uncertainty)	1.00	milliseconds (msec)
range_sampling_res	0.05	Meters

B.3 CORRECTIONS TO ECHO SOUNDINGS

Please refer to the Data Acquisition and Processing Report SAIC Doc 06-TR-017***** for a description of all corrections applied to echo soundings. There were no deviations from the corrections described therein.

B.4 DATA PROCESSING

A single BAG (H11555_1_of_1.bag) with a 1-meter node resolution is submitted for the entire area because all depths are greater than 15 meters. The data fully support this resolution. This bag serves for both the delivered bathymetric model and the demonstration of coverage for this survey.

On 16 July 2007 a new release of **SABER** (4.1.12.1) was issued and used during the final processing of H11555. Version 5.0 of HydroService's **dKart Inspector** software was used for quality control of the SABER generated S-57 feature file. Version 2.4.21 of SevenC's **SeeMyDENC** was used as a viewer of ENC files.

C. HORIZONTAL AND VERTICAL CONTROL *See also the Evaluation Report*

NOAA tide station 8557380 Lewes, DE was the source of verified water level heights for determining correctors to soundings. The primary means for analyzing the adequacy of zoning was observing zone boundary crossings in the navigated swath editor, SAIC's **Multi View Editor** (**MVE**). In addition the sun illuminated coverage plots were examined on screen for adequacy of zoning. Crossline comparisons were used to analyze zoning for the influence of wind and weather. The water level zoning parameters provided by NOS, and presented in Table C-1, were adequate for application of the observed verified water levels.

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Table C-1. Water Level Zoning Parameters Applied on Sheet H11555

Zone	Time Corrector (minutes)	Range Ratio	Reference Station
SA24	-78	0.86	8557380
SA26a	-72	0.86	8557380

The survey data for sheet H11555 were collected in horizontal datum NAD-83, using geodetic coordinates, while data display and products used the UTM Zone 18 projection. The following equipment was used for positioning on the *M/V Atlantic Surveyor*:

- TSS POS/MV, Serial Number 314
- Trimble 4000 DS GPS Receiver, Serial Number 3504A09516

Differential correctors used for H11555 online data were from the U.S. Coast Guard Stations at Moriches, NY, Reedy Point, DE, Annapolis, MD and Sandy Hook, NJ. The differential receiver was set to only receive data from these four corrector stations; however the POS/MV reported that it used additional stations during online data collection. Station 294 (Kodiak, AK), and erroneous station identification codes were reportedly used by the POS/MV for a total of 8 seconds of online data collection. SAIC believes that the POS/MV incorrectly reported the station identification it was using for correctors and was indeed using one of the four assigned stations. This behavior has been previously observed in the POS/MV system.

Please refer to the Horizontal and Vertical Control Report* (SAIC Doc 06-TR-018) delivered with this report for detailed descriptions of the procedures and systems used to attain hydrographic positioning.

D. RESULTS AND RECOMMENDATIONS *See also the Evaluation Report*

D.1 CHART COMPARISON

H11555 was compared to:

- **BSB Chart 12200**, 1/419,706 scale, 48th Edition, 06/01/2004, corrected to 06/09/2007.
- **BSB Chart 12211**, 1/80,000 scale, 42nd Edition, 07/01/2004, corrected to 06/09/2007.
- **BSB Chart 12214**, 1/80,000 scale, 47th Edition, 07/01/2006, corrected to 06/09/2007.
- **ENC Chart US3DE01M** 1/419,706 compilation scale 6th Edition Issued 6/12/2007 Update 1 6/25/2007.
- **ENC Chart US4DE11M** 1/80,000 compilation scale 9th Edition Issued 06/14/2007, Update 1 6/25/2007.
- **ENC Chart US4VA50M** 1/80,000 compilation scale 2nd Edition Issued 12/28/2006, Update 6 6/25/2007.

**** Filed with original field records and submitted with final AHB deliverables.***

The chart comparisons were conducted by using SAIC's **SABER** software to view the BSB Raster charts with overlain layers of H11555 data such as the CUBE gridded surface, selected soundings, and features. For ENC comparisons a combination of HydroService's **dKart Inspector** and 7C's **SeeMyDENC** were used in conjunction with **SABER**. Results from the comparisons are described below. Recommend reconstruction of the common areas of all charts using data from this survey. ***Concur.***

Sand waves exist throughout almost all the area; therefore, soundings are subject to change. In most areas the sand waves are 5 feet or less in height. Sand waves in the deeper eastern portion are 10 to 30 feet high. In the southwest corner the sand waves are 5 to 10 feet high while in the very northeast corner the bottom is essentially free of sand waves. ***Concur.***

AWOIS Item Investigations

A listing of all AWOIS investigations within the H11555 sheet boundary is provided in Table D-1. Discussions of AWOIS Investigations are provided below.

Table D-1. Complete AWOIS Listing Received from NOAA for H11555

AWOIS Item Investigations
AWOIS 1057- Full
AWOIS 1058- Full
AWOIS 1061- Undefined
AWOIS 1071- Undefined
AWOIS 13532- Full
AWOIS 13533- Informational

AWOIS #1057 (Full Investigation) – A full search of the 200-meter radius with 200% side scan and resulting multibeam sonar coverage was completed. An obstruction (Feature 3) with a least depth of 17.93 meters, 0.28 meter uncertainty (59 feet, 9 ¾ fathoms) was found in 38º 24´ 43.72"N 074º 50' 11.68"W (NAD83). This AWOIS is described as the wreck of the schooner *Elizabeth Palmer*. The side scan sonar and multibeam data were inconclusive as to whether the object was a wreck or obstruction. It is recommended that the object remain labeled Obstn on the charts. On chart 12211 recommend removing the label Obstn, danger circle, blue tint, and sounding cleared to 54 feet and chart a 59 foot sounding, and label Obstn in, 38º 24´ 43.72"N 074º 50' 11.68"W (NAD83). On chart 12200 recommend removing the label Obstn, danger circle, blue tint, and sounding cleared to 9 fathoms and chart a 9¾ fathom sounding with label Obstn in 38º 24´ 43.72"N 074º 50' 11.68"W (NAD83). ***Concur. Chart 59-ft Obstruction at surveyed location. Recommend update AWOIS database with H11555 survey results.***

AWOIS #1058 (Full Investigation) – All but approximately a 200 meter wide strip on the eastern side of the 3000-meter search radius was covered with 200% side scan and resulting multibeam sonar coverage. A wreck (Feature 27) with a least depth of 33.37 meters, 0.28 meter uncertainty (109 feet, 18¼ fathoms) was found in 38º 24´ 29.98"N

074º 42’ 10.52”W (NAD83). Recommend removal of the charted wreck symbol on chart 12200 in 38º 25´ 06”N 074º 42’ 00”W (NAD83) and charting a wreck symbol in 38º 24´ 29.98”N 074º 42’ 10.52”W (NAD83). ***Concur. Chart 18-fm (109-ft) Wreck at surveyed location. Recommend update AWOIS database with H11555 survey results.***

AWOIS #1061 (Undefined) – A full search of the 200-meter radius with 200% side scan and resulting multibeam sonar coverage was completed. A wreck (Feature 24) with a least depth of 18.42 meters, 0.28 meter uncertainty (60 feet, 10 fathoms) was found in 38º 25´ 51.16”N 074º 46’ 04.61”W (NAD83). On chart 12211, recommend removing the label Wk, danger circle, blue tint and sounding cleared to 57 feet and chart a 60 foot sounding, danger circle, blue tint and label Wk in 38º 25´ 51.16”N 074º 46’ 04.61”W (NAD83). On chart 12200, recommend removing the label Wk, danger circle, blue tint and sounding cleared to 9½ fathoms and chart a 10 fathom sounding, danger circle, blue tint and label Wk in 38º 25´ 51.16”N 074º 46’ 04.61”W (NAD83). ***Concur. Chart 60-ft (10-fm) Wreck at the surveyed location. Recommend update AWOIS database with H11555 survey results.***

AWOIS #1071 (Undefined) – A full search of the 200-meter radius with 200% side scan and resulting multibeam sonar coverage was completed. A wreck (Feature 23) with a least depth of 22.52 meters, 0.28 meter uncertainty (74 feet, 12¼ fathoms) was found in 38º 27´ 25.33”N 074º 47’ 06.89”W (NAD83). On charts 12211 and 12214, recommend removing the label Wk, danger circle, blue tint and sounding cleared to 61 feet and chart a 74 foot sounding, danger circle, blue tint and label Wk in 38º 27´ 25.33”N 074º 47’ 06.89”W (NAD83). On chart 12200, recommend removing the label Wk, danger circle, blue tint and sounding cleared to 10¼ fathoms and chart a 12¼ fathom sounding, danger circle, blue tint and label Wk in 38º 27´ 25.33”N 074º 47’ 06.89”W (NAD83). ***Concur. Chart 74-ft (12-fm) Wreck at the surveyed location. Recommend update AWOIS database with H11555 survey results.***

AWOIS #13532 (Full Investigation) – A full search of the 200-meter radius with 200% side scan and resulting multibeam sonar coverage was completed. No obstructions or wrecks were found. On chart 12214, recommend removing the label Obstn, danger circle, blue tint and sounding cleared to 57 feet in 38º 30´ 03”N 074º 39´ 00”W. On chart 12200, recommend removing the label Obstn, danger circle, blue tint and sounding cleared to 9½ fathoms in 38º 29´ 59”N 074º 39´ 05”W. ***Concur. Consider charted obstruction as disproved. Delete charted obstruction cleared to 57-ft from chart 12214 and obstruction cleared to 9.5-fm from chart 12200.***

AWOIS #13553 (Information Only) - The charted wreck labeled PA in 38º 23´ 58”N 074º 40’ 36”W (NAD83) on chart 12200, was not found within 300 meters of its charted position. The area was surveyed with 200% side scan sonar and resulting multibeam coverage. Recommend leaving charted information as is since this AWOIS is near the eastern limit of the survey coverage. ***Concur. AWOIS 13553 not considered disproved. Retain as charted.***

Chart 12200, 1/419,706 scale, 48th Edition, 06/01/2004, corrected to 06/09/2007

See AWOIS #s 1057, 1058, 1061, 1071, 13532, and 13553 above.

The charted 13 fathom ***(79-ft)*** wreck (Feature 1) in 38º30´49”N 074º 41 55”W (NAD83) is from Danger to Navigation Report 1 submitted during the H11554 survey. This report was submitted based on predicted tides and partial coverage of the wreck resulting from an item investigation. After full coverage of the wreck and final correctors and verified tides were applied, the least depth is 24.06 meters, 0.28 meter uncertainty (13 fathoms). After applying final correctors and verified tides there was no change to the charted depth. ***Concur with clarification. Reference Appendix 1 attached to this report. Although this feature was submitted as H11554 DtoN #1, this feature is within H11555 surveyed limits and included within H11555's H-cell.***

The charted 13 fathom wreck (Feature 8) in 38º 21´ 54”N 074º 46’ 13”W (NAD83) is from ***H11555*** Danger to Navigation Report 1 which was submitted based on predicted tides during the H11555 survey. After final correctors and verified tides were applied, the least depth is 23.58 meters, 0.28 meter uncertainty (13 fathoms). After applying final correctors and verified tides there was no change to the charted depth. ***Concur. Chart 13-fm wreck at the surveyed location. Reference Appendix 1 attached to this report.***

The charted dangerous 10¼ fathom wreck (Feature 18) in 38º 27´ 41”N 074º 49’ 13”W (NAD83) is from ***H11555*** Danger to Navigation Report 2 which was submitted based on predicted tides during the H11555 survey. After final correctors and verified tides were applied, the corrected least depth is 18.96 meters, 0.28 meter uncertainty (10¼ fathoms). After applying final correctors and verified tides there was no change to the charted depth. . ***Concur. Chart 10.25-fm wreck at the surveyed location. Reference Appendix 1 attached to this report.***

Chart 12211, 1/80,000 scale, 42nd Edition, 07/01/2004, corrected to 06/09/2007

See AWOIS #s 1057, 1058, 1061, and 1071 above.

The charted 78 foot wreck (Feature 8) in 38º 21´ 54”N 074º 46’ 13”W (NAD83) is from Danger to Navigation Report 1 which was submitted based on predicted tides during the H11555 survey. After final correctors and verified tides were applied, the corrected least depth is 23.58 meters, 0.28 meter uncertainty (77 feet). Recommended removing the 78 foot sounding and charting a 77 foot sounding in 38º 21´ 54.03”N 074º 46’ 13.23”W (NAD83). ***Concur. Recommend to delete charted 78-ft wreck. Recommend to append chart with 77-ft wreck at the surveyed location.***

The charted dangerous 62 foot wreck (Feature 18) in 38º 27´ 41”N 074º 49’ 13”W (NAD83) is from Danger to Navigation Report 2 which was submitted based on predicted tides during the H11555 survey. After final correctors and verified tides were

applied, the corrected least depth is 18.96 meters, 0.28 meter uncertainty (62 feet). After applying final correctors and verified tides there was no change to the charted depth. ***Concur. Retain as charted.***

Charted soundings are generally within 3 feet (1 meter) of those found in this survey. ***Concur.***

Chart 12214, 1/80,000 scale, 47th Edition, 07/01/2006, corrected to 06/09/2007

See AWOIS #s 1071, and 13532 above.

The charted 78 foot wreck (Feature 1) in 38º 30´ 49”N 074º 41’ 55”W (NAD83) is from Danger to Navigation Report 1 submitted during the H11554 survey. This report was submitted based on predicted tides and partial coverage of the wreck resulting from an item investigation. After full coverage of the wreck and final correctors and verified tides were applied, the least depth is 24.06 meters, 0.28 meter uncertainty (79 feet). After applying final correctors and verified tides there was no change to the charted depth. Recommended removing the 78 foot sounding and charting a 79 foot sounding in 38º 30´ 49.06”N 074º 41’ 55.03”W (NAD83). ***Concur with clarification. Reference Appendix 1 attached to this report. Although this feature was submitted as H11554 DtoN #1, this feature is within H11555 surveyed limits and included within H11555’s H-cell.***

The charted dangerous 62 foot wreck (Feature 18) in 38º 27´ 41”N 074º 49’ 13”W (NAD83) is from Danger to Navigation Report 2 which was submitted based on predicted tides during the H11555 survey. After final correctors and verified tides were applied, the corrected least depth is 18.96 meters, 0.28 meter uncertainty (62 feet). After applying final correctors and verified tides there was no change to the charted depth. ***Concur. Retain as charted.***

Charted soundings are generally within 3 feet (1 meter) of those found in this survey. ***Concur***
The following larger differences were found:

The charted 90 feet ***sounding*** within a 90-foot depth curve in 38º 29´ 01”N 074º 44’ 35”W was found to be in depths of 95 to 97 feet. ***Concur. Recommend updating all charted depth curves from H11555 bathymetry.***

The charted 77 feet in 38º 27´ 49”N 074º 41’06”W (NAD83) was found to be in depths of 80 to 91 feet. ***Concur. Recommend updating common charts with H11555 soundings within the common area.***

ENC Chart US3DE01M 1/419,706 compilation scale 6th Edition Issued 6/12/2007 Update 1 6/25/2007.

See AWOIS #s 1057, 1058, 1061, 1071, 13532, and 13553 above.

The charted 23.7 meter dangerous wreck (Feature 1) in 38º 30´ 49”N 074º 41’ 55”W (NAD83) is from Danger to Navigation Report 1 submitted during the H11554 survey. This report was submitted based on predicted tides and partial coverage of the wreck resulting from an item investigation. After full coverage of the wreck and final correctors and verified tides were applied, the least depth is 24.06 meters, 0.28 meter uncertainty. Recommend updating the VALSOU to 24.1 meters. ***Do not concur. Recommend to attribute feature’s VALSOU as 24.0m for US3DE01M ENC compilation.***

The charted 23.7 meter dangerous wreck (Feature 8) in 38º 21´ 54”N 074º 46’ 13”W (NAD83) is from Danger to Navigation Report 1 which was submitted based on predicted tides during the H11555 survey. After final correctors and verified tides were applied, the least depth is 23.58 meters, 0.28 meter uncertainty. Recommend updating the VALSOU to 23.6 meters. ***Do not concur. Recommend to attribute feature’s VALSOU as 23.5m for US3DE01M ENC compilation.***

The charted 18.7 meter dangerous wreck (Feature 18) in 38º 27´ 41”N 074º 49’ 13”W (NAD83) is from Danger to Navigation Report 2 which was submitted based on predicted tides during the H11555 survey. After final correctors and verified tides were applied, the corrected least depth is 18.96 meters, 0.28 meter uncertainty. Recommend updating the VALSOU to 19.0 meters. ***Do not concur. Recommend to attribute feature’s VALSOU as 18.9m for US3DE01M ENC compilation.***

Charted soundings are generally within 1 meter of those found in this survey. ***Concur.***

ENC Chart US4DE11M 1/80,000 compilation scale 9th Edition Issued 06/14/2007, Update 1 6/25/2007.

See AWOIS #s 1071, and 13532 above.

The charted 23.7 meter dangerous wreck (Feature 1) in 38º 30´ 49”N 074º 41’ 55”W (NAD83) is from Danger to Navigation Report 1 submitted during the H11554 survey. This report was submitted based on predicted tides and partial coverage of the wreck resulting from an item investigation. After full coverage of the wreck and final correctors and verified tides were applied, the least depth is 24.06 meters, 0.28 meter uncertainty. Recommend updating the VALSOU to 24.1 meters***. Do not concur. Recommend to attribute feature’s VALSOU as 24.0m for US4DE11M ENC compilation.***

The charted 18.5 meter dangerous wreck (Feature 18) in 38º 27´ 41”N 074º 49’ 13”W (NAD83) is from Danger to Navigation Report 2 which was submitted based on predicted tides during the H11555 survey. After final correctors and verified tides were applied, the corrected least depth is 18.96 meters, 0.28 meter uncertainty (10¼ fathoms). Recommend updating the VALSOU to 19.0 meters. ***Do not concur. Recommend to attribute feature’s VALSOU as 18.9m for US4DE11M ENC compilation.***

Charted soundings are generally within 1 meter of those found in this survey. ***Concur.*** The following larger differences were found:

The charted 23.4 meter depth in 38º 27´ 49”N 074º 41’06”W (NAD83) was found to be in depths of 24.66 to 27.75 meters. ***Concur.***

ENC Chart US4VA50M 1/80,000 compilation scale 2nd Edition Issued 06/19/2007 Update 6 6/25/2007.

See AWOIS #s 1057, 1058, and 1061 above.

The charted 23.7 meter wreck (Feature 8) in 38º 21´ 54”N 074º 46’ 13”W (NAD83) is from Danger to Navigation Report 1 which was submitted based on predicted tides during the H11555 survey. After final correctors and verified tides were applied, the corrected least depth is 23.58 meters, 0.28 meter uncertainty. Recommend updating the VALSOU to 23.6 meters. ***Concur with clarification. Recommend to delete ENC US4VA50M’s 23.7m wreck located in 38º 21´ 54.348”N, 074º 46’ 12.980”W. Recommend to append ENC US4VA50M with a 23.5m wreck located in 38º 21´ 54.030”N, 074º 46’ 13.230”W.***

Charted soundings are generally within 1 meter of those found in this survey. ***Concur.***

Uncharted Wrecks and Obstructions

No uncharted wrecks were found in H11555. ***Concur.***

Table D-2 lists uncharted obstructions found in H11555 that are recommended for charting. Note that feature 13 is a single obstruction near (within 500m) featured obstructions 10 (two distinct objects) and 11 (single object); therefore the recommendation is to plot the label as plural “Obstns”.

Table D-2. Uncharted Obstructions Recommended for Charting

Feature Number	Feature Position (NAD83)		Least Depth (Feet)	Least Depth (Meters)	Uncertainty (Meters)	Charting Recommendations
	Latitude (N)	Longitude (W)				
13	38 25 26.38	074 46 04.45	83.86	25.56	0.28	OBSTR, chart sounding and label “Obstns” ***Concur.***
15	38 27 37.58	074 45 37.97	83.30	25.39	0.28	OBSTR, chart sounding and label “Obstn” ***Concur.***

Danger to Navigation Reports

Three Danger to Navigation (DtoN) Reports were submitted for features identified on H11555. The first, H11554_dtn1_20060620.pdf*, was originally reported during the H11554 survey and describes a wreck that lies wholly within the bounds of H11555. All ****Filed with original field records.***

data collected over this wreck are included in the final delivered BAG for H11555. The second and third DtoN documents (H11555_dtn1.pdf*, H11555_dtn2.pdf*) also report wrecks. The DtoN Reports are presented in Appendix I**. All data for these DtoN features are also included in the final deliverable BAG.

Filed with original field records. All Dangers were submitted to Atlantic Hydrographic Branch for cartographic evaluation, submitted OCS Marine Chart Division, Nautical Data Branch, Dangers to Navigation section.

****Appended to this report.***

D.2 ADDITIONAL RESULTS

Shoreline verification was not required for this survey. ***Concur.*** Comparison with prior surveys was not required under this task order. ***Concur.*** See Section D.1 for comparison to the nautical charts.

Aids to Navigation

There was one navigational aid and one NOAA data buoy within the survey area for H11555, both listed in Table D-3. They were on station as listed in the USCG Light List, Volume II, Atlantic Coast, Shrewsbury River, New Jersey to Little River, South Carolina.

Table D-3. Floating Aid and Data Buoy

Light List #	Description	Latitude N	Longitude W	Light List Latitude N	Light List Longitude W
168	NOAA Data Lighted Buoy 44009 (ODAS) ***Included in H11555 H-Cell***	38º 27' 48.***130***"	074º 42' 07.***13***"	38º 27' 49"	074º 42' 07"
165	Delaware Lighted Buoy D ***Omitted from H11555 H-Cell***	38º 27' 18.***45***"	074º 41' 46.***22***"	38º 27' 18"	074º 41' 47"

E. APPROVAL SHEET

27 July 2007

LETTER OF APPROVAL

REGISTRY NUMBER H11555

This report and the accompanying digital data are respectfully submitted.

Field operations contributing to the accomplishment of survey H11555 were conducted under the supervision of myself, Gary R. Davis, and Paul L. Donaldson with frequent personal checks of progress and adequacy. This report and accompanying deliverable data items have been closely reviewed and are considered complete and adequate as per the Statement of Work.

Reports previously submitted to NOAA for this project include:

Report	Submission Date
Data Acquisition and Processing Report	04/09/2007
Descriptive Report for Sheet A, H11554	04/09/2007

Reports concurrently submitted to NOAA for this project include:

Report	Submission Date
Horizontal and Vertical Control Report	07/27/2007

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Jason M. Infantino

Digitally signed by Jason M. Infantino
DN: cn=Jason M. Infantino, c=US, o=MSTD, ou=SAIC, email=infantinoj@saic.com
Reason: I am approving this document
Date: 2007.07.26 10:56:09 -04'00'

Jason M. Infantino
Lead Hydrographer
Science Applications International Corporation
27 July 2007

APPENDIX I. DANGER TO NAVIGATION REPORTS

Danger to Navigation Report

This danger to navigation report was originally submitted for sheet H11554 however this feature is fully contained within sheet H11555. All data files and reports for this feature are delivered with sheet H11555 data.

Hydrographic Survey Registry Number: H11554~~4~~*5*

State: Delaware

Locality: Atlantic Ocean

Sublocality: 25 NMI ESE of Cape Henlopen

Project Number: OPR_C302-KR-06

Survey Date: June 13, 2006

Depths are reduced to Mean Lower Low Water using ***preliminary observed*** tides based on preliminary zoning. Positions are based on NAD-83. Positions were obtained using DGPS from a US Coast Guard Station.

Charts affected:

- 12214 46th Edition 12/01/2005 1:80,000 scale; Corrected through NM 05/20/2006

The following feature was found during hydrographic survey operations for H11554 but located within the area of H11555:

FEATURE	DEPTH (FT)	LATITUDE (N)	LONGITUDE (W)
Wreck	79	38° 30’ 49.0740”N	074° 41’ 55.0356”W

RECOMMENDATIONS:

Remove charted 78 foot sounding in 38° 30’ 48.7”N / 074° 41’ 55.5”W.

Chart 79 foot sounding, symbol Wk, and danger circle with blue tint (K-28) in 38° 30’ 49.0740”N / 074° 41’ 55.0356”W.

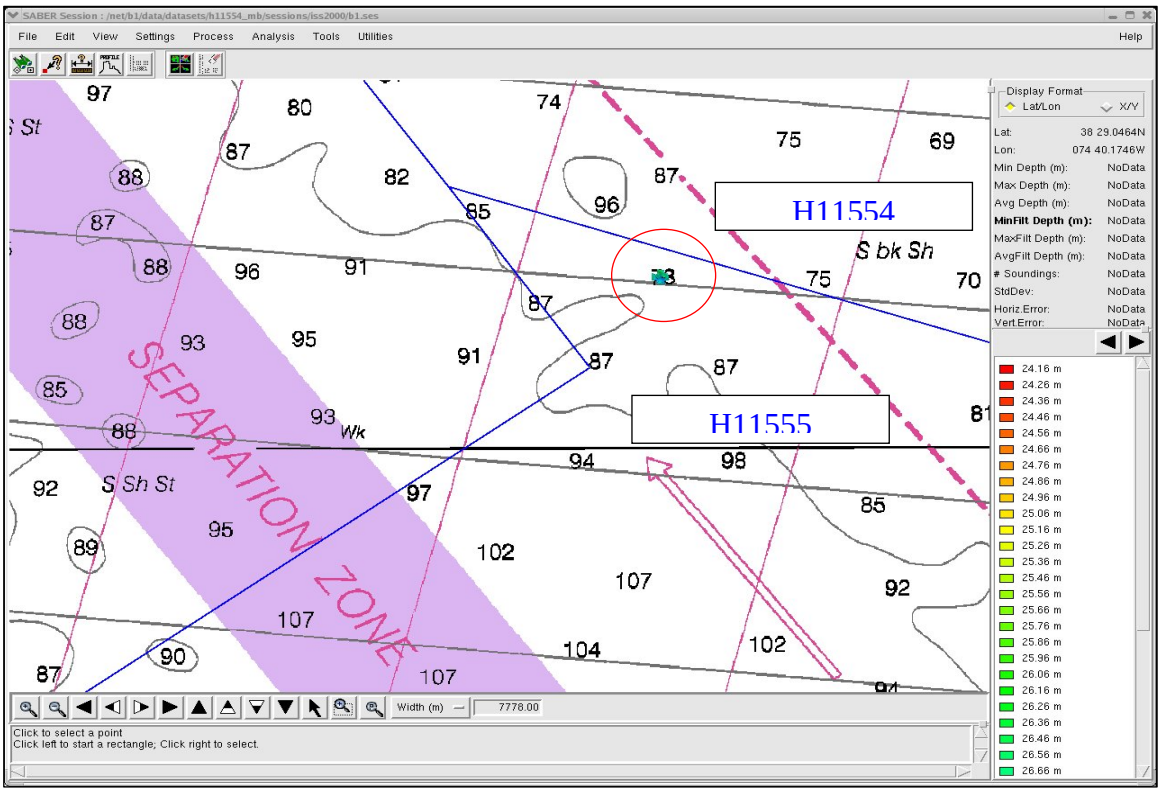


Figure 1 Chart 12214 Showing Area Covered by This Report with Location of Wreck with Minimum Depth of 79 feet within H115545.

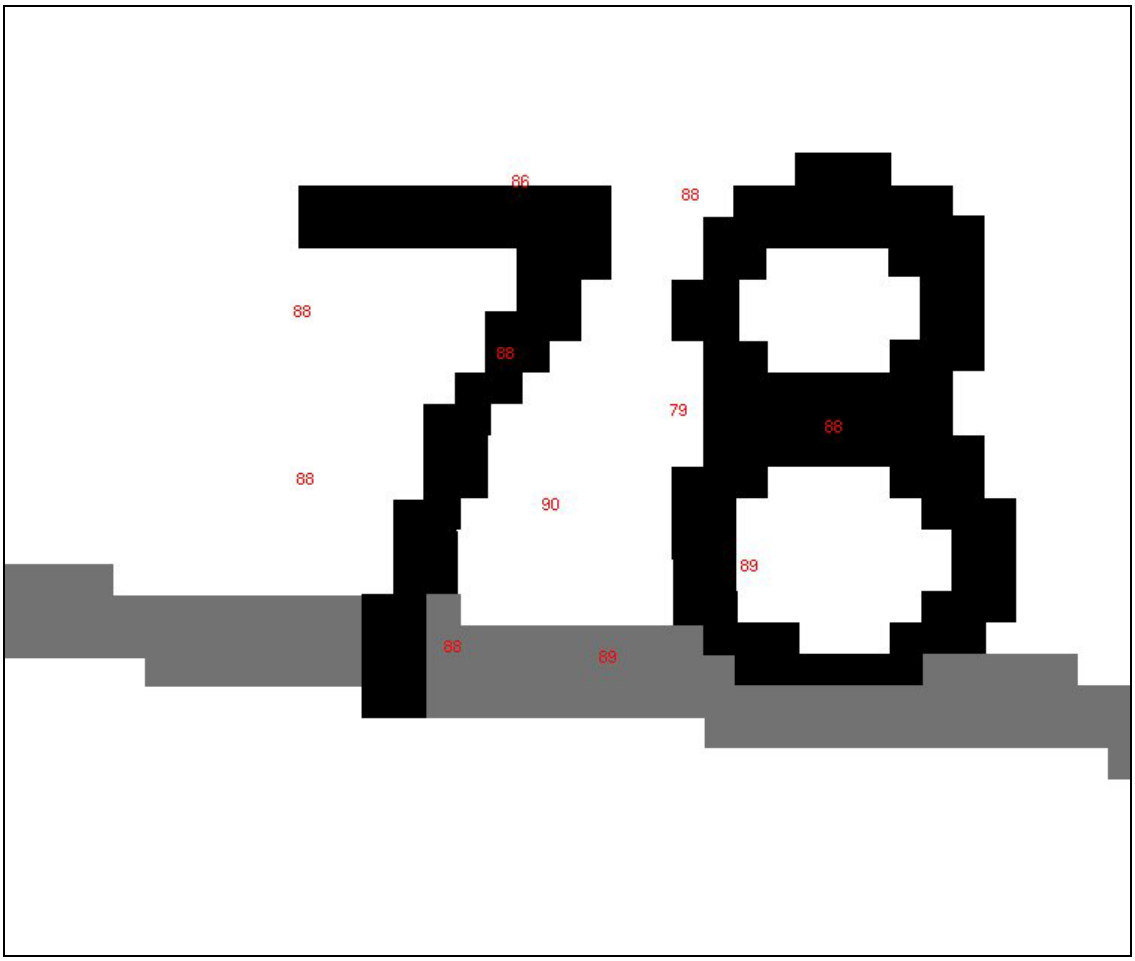


Figure 2 Chart 12214 Showing Selected Soundings of Wreck with Minimum Depth of 79 Feet (MLLW) within H11554*5*.

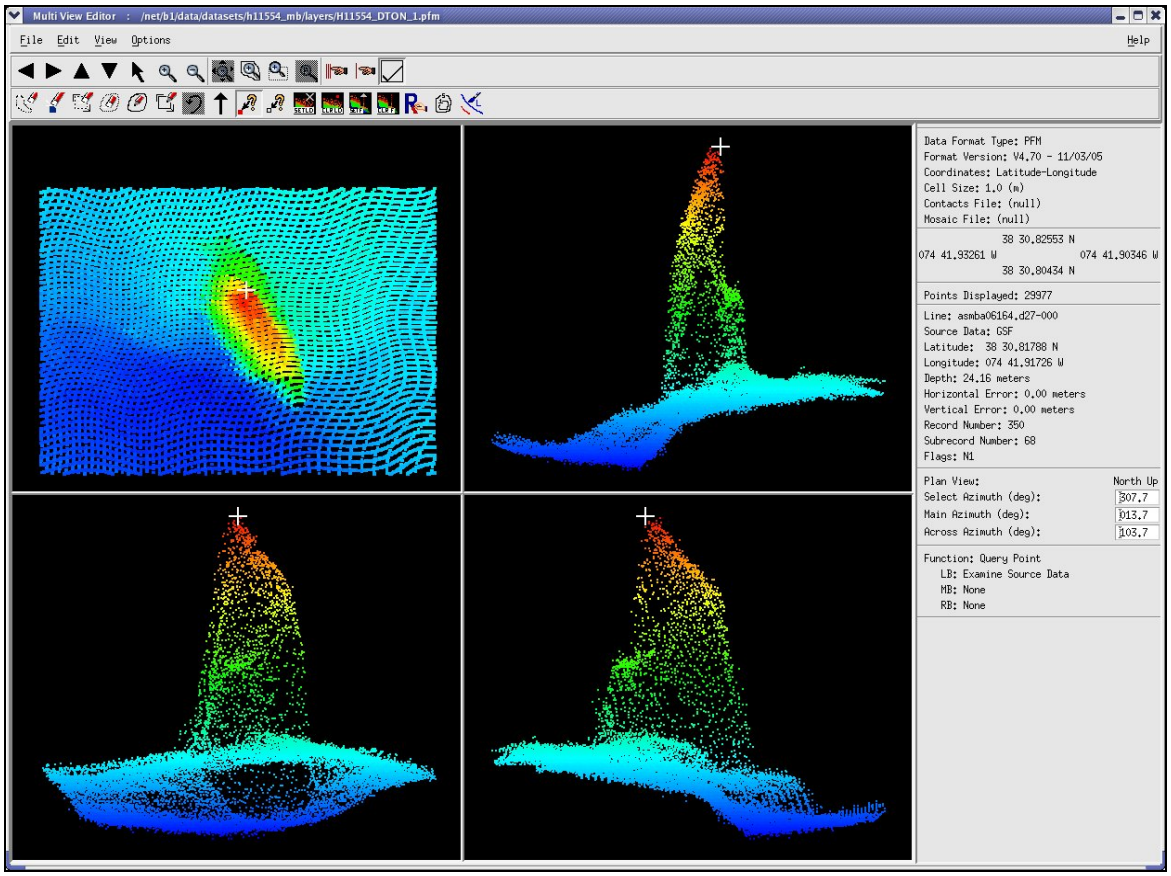


Figure 3. Multi-View Editor of a PFM Showing Wreck with Minimum Depth of 79 Feet (MLLW) located within H11554*5*.

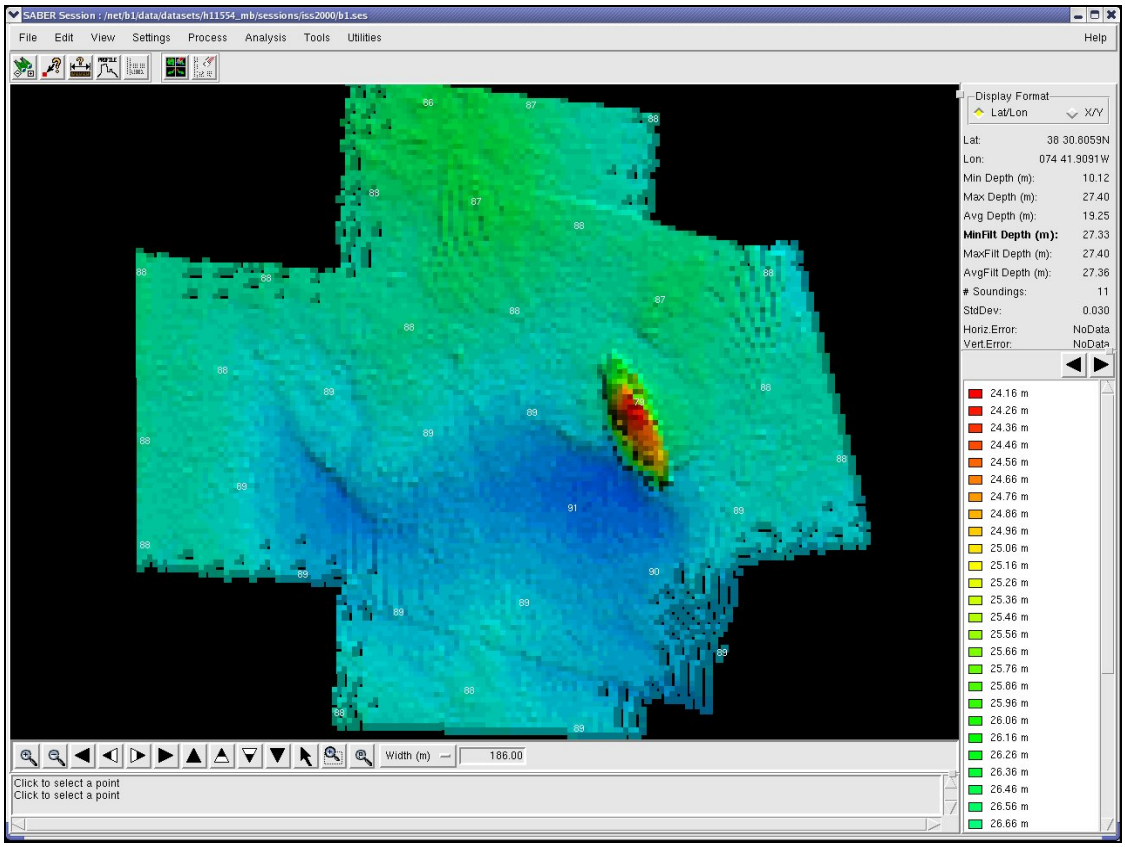


Figure 4. Color Coded Depth Grid and Selected Soundings Showing Wreck with Minimum Depth of 79 Feet within H1155~~4~~*5*.

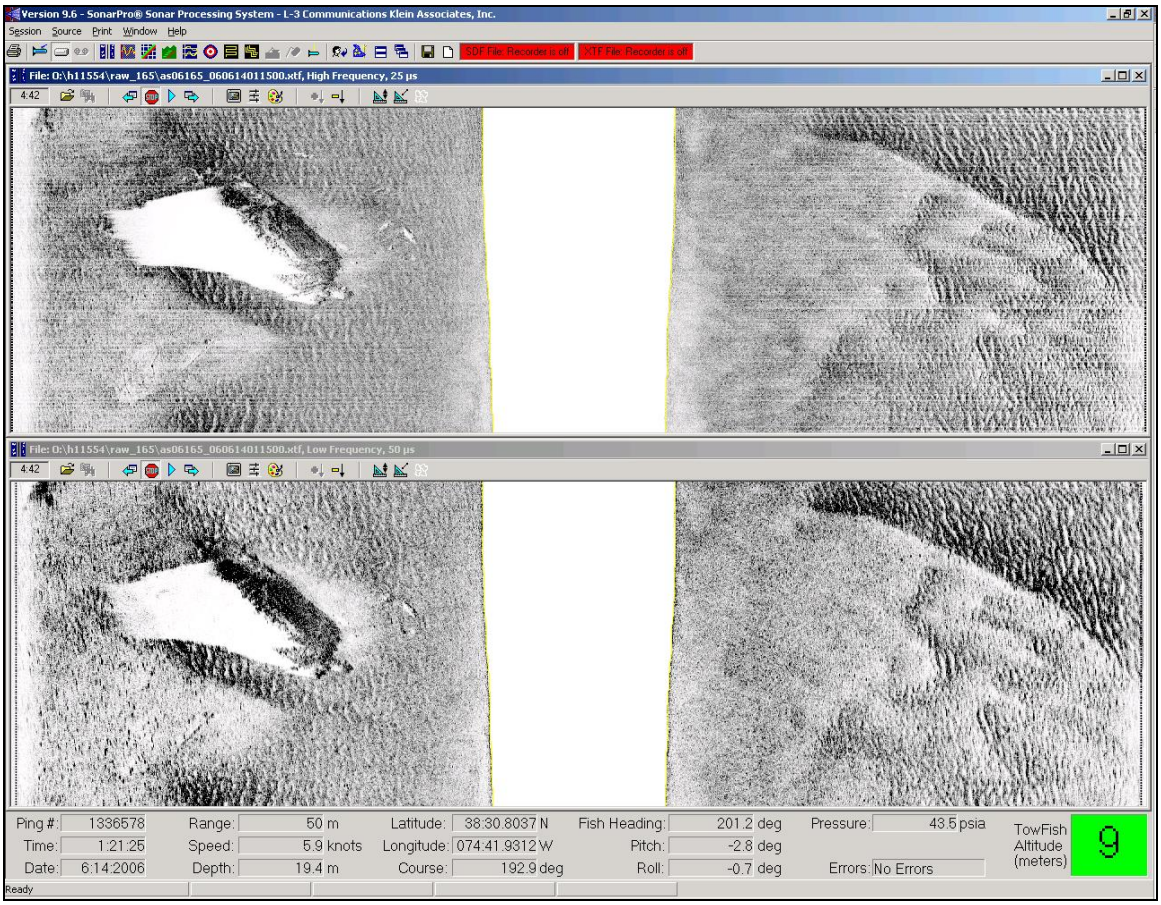


Figure 5 100 kHz and 500 kHz side scan image of Wreck within H11554~~5~~5.

REPORT OF DANGERS TO NAVIGATION
H11555 #1

Hydrographic Survey Registry Number: H11555

Survey Title: State: Delaware
Locality: Atlantic Ocean
Sub-locality: 30 NM SE of Cape Henlopen

Project Number: OPR-D302-KR-06

Field Unit: Science Applications International Corporation (SAIC)
Survey Vessel *Atlantic Surveyor*

Survey Date: July 18, 2006 and On Going

Depths are reduced to Mean Lower Low Water using ***predicted*** water levels and preliminary tidal zoning. Positions are referenced from USCG DGPS beacon and horizontal datum is North America Datum 83 (NAD83).

Charts affected:

- 12211_1 42nd Edition July 2004 1:80,000 scale Corrected through NM 07/10/04
  Corrected through LNM 07/06/04

ENC affected:

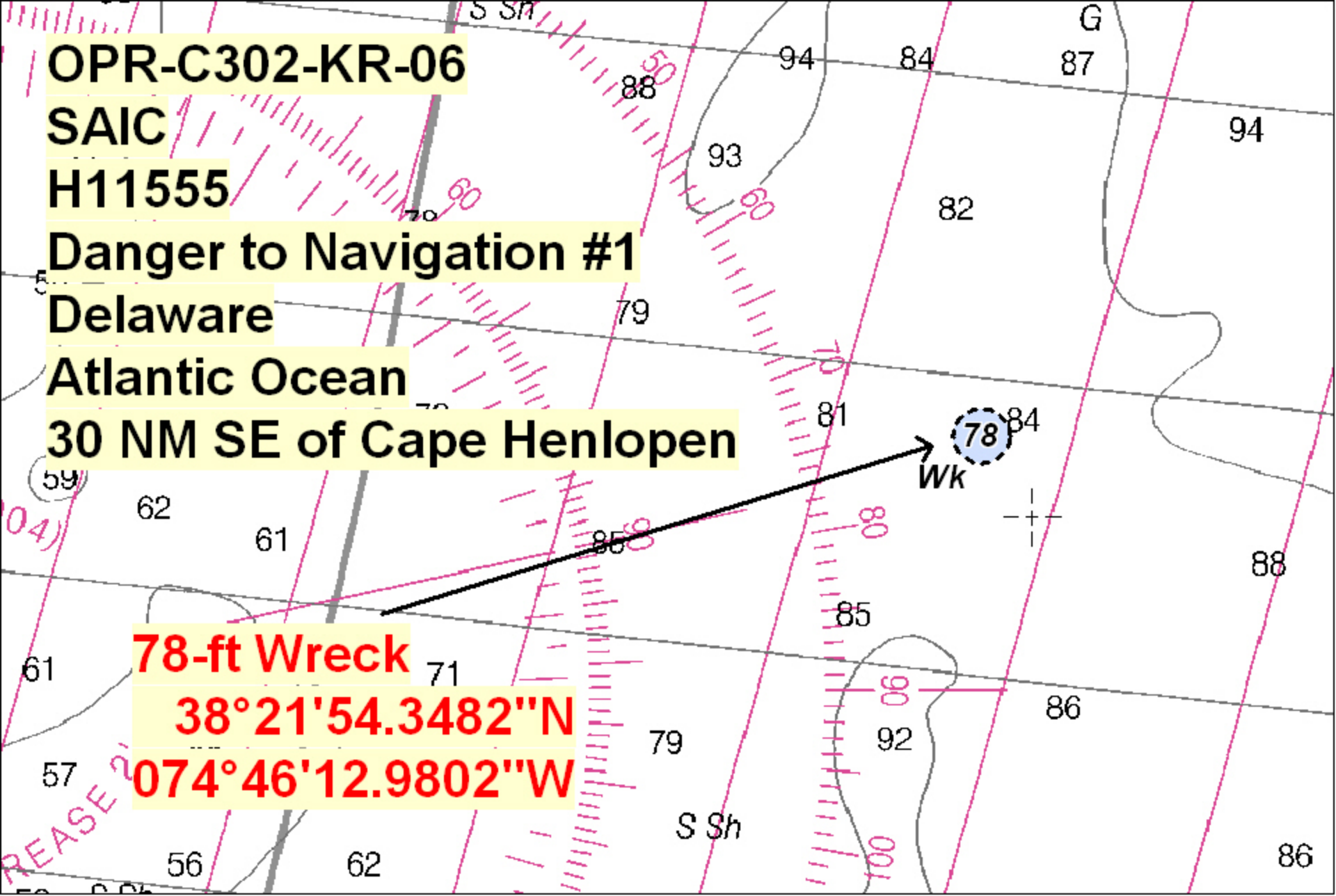
- US5DE01M 4th Edition July 14, 2006 Chart 12200 Cape May to Cape Hatteras

The following item was found during hydrographic survey operations:

DANGER TO NAVIGATION #1

	Feature	Depth (FT)	Latitude (N)	Longitude (W)
1.	Wreck	78	38°21’54.3482”	074°46’12.9802”

Questions concerning this report should be directed to the Chief, Atlantic Hydrographic Branch at (757) 441-6746.


OPR-C302-KR-06
SAIC
H11555
Danger to Navigation #1
Delaware
Atlantic Ocean
30 NM SE of Cape Henlopen
78
Wk
78-ft Wreck
38°21'54.3482"N
074°46'12.9802"W
S Sh
S Sh

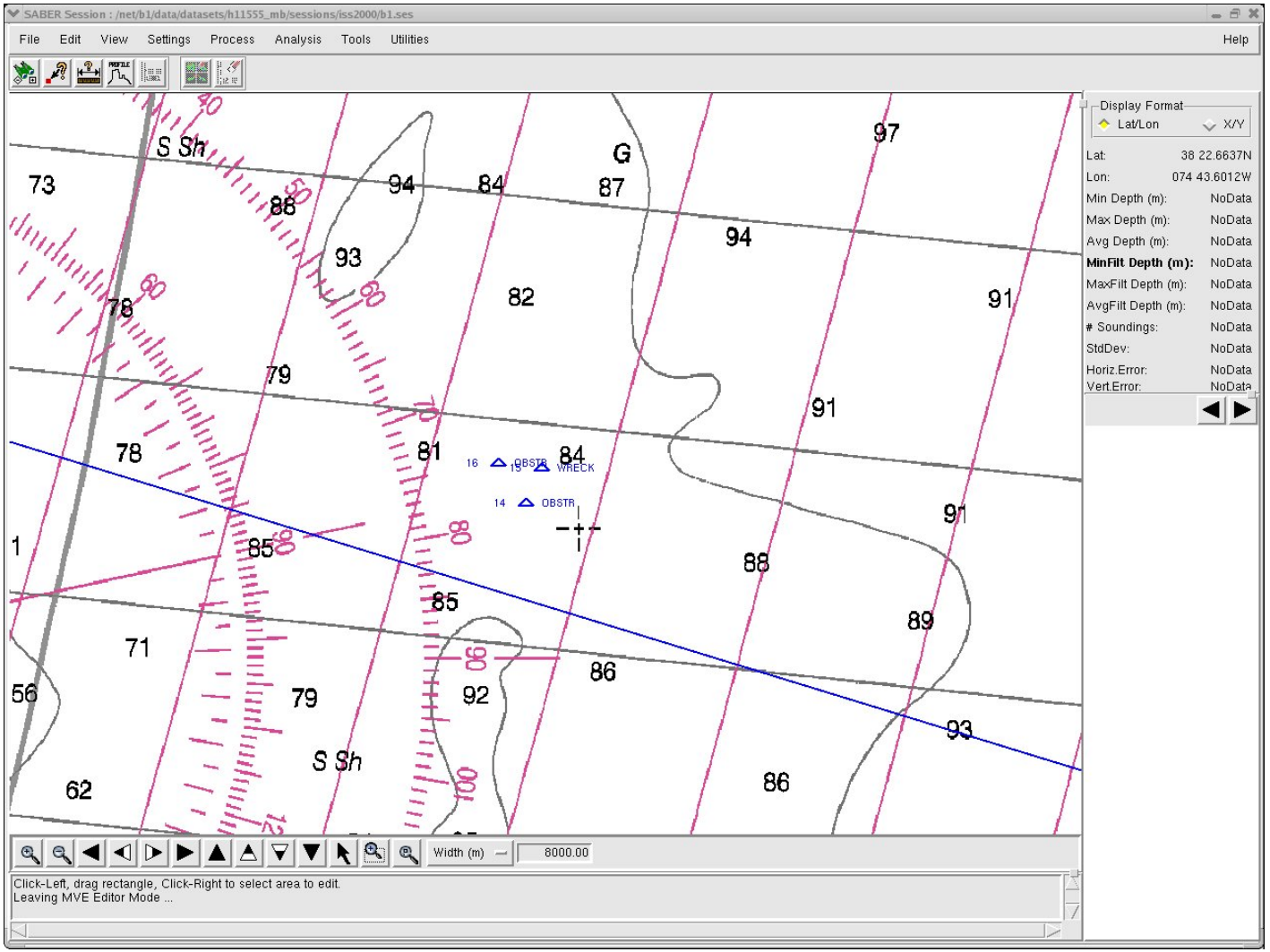


Figure 1 Chart 12211 Showing Area Covered by This Report with Location of Wreck (Feature 15) with Minimum Depth of 78 (MLLW) feet within H11555.

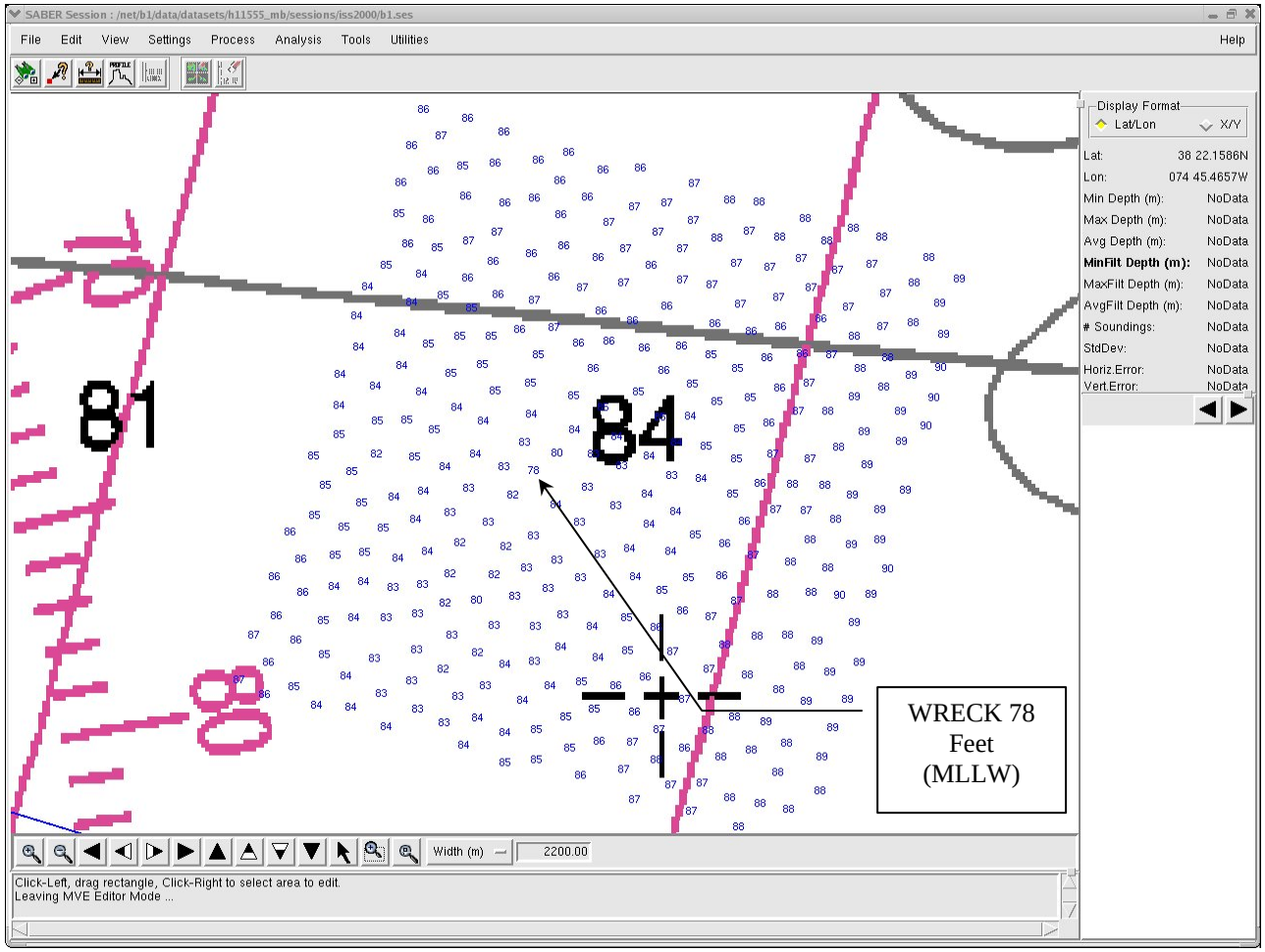


Figure 2 Chart 12211 Showing Selected Soundings of Wreck with Minimum Depth of 78 Feet (MLLW) within H11555.

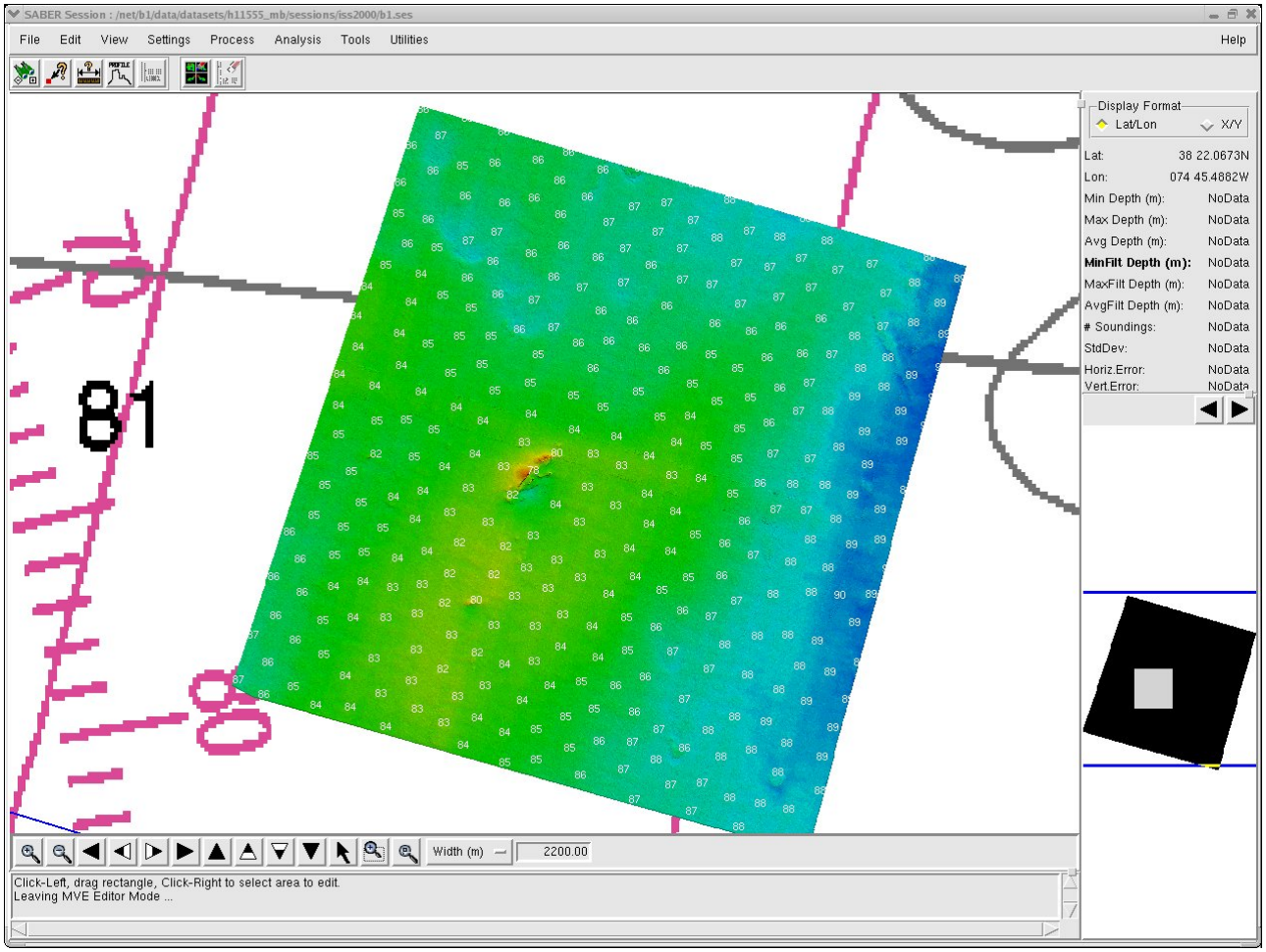


Figure 3 Color Coded Depth Grid and Selected Soundings Showing Wreck with Minimum Depth of 78 Feet (MLLW) within H11555.

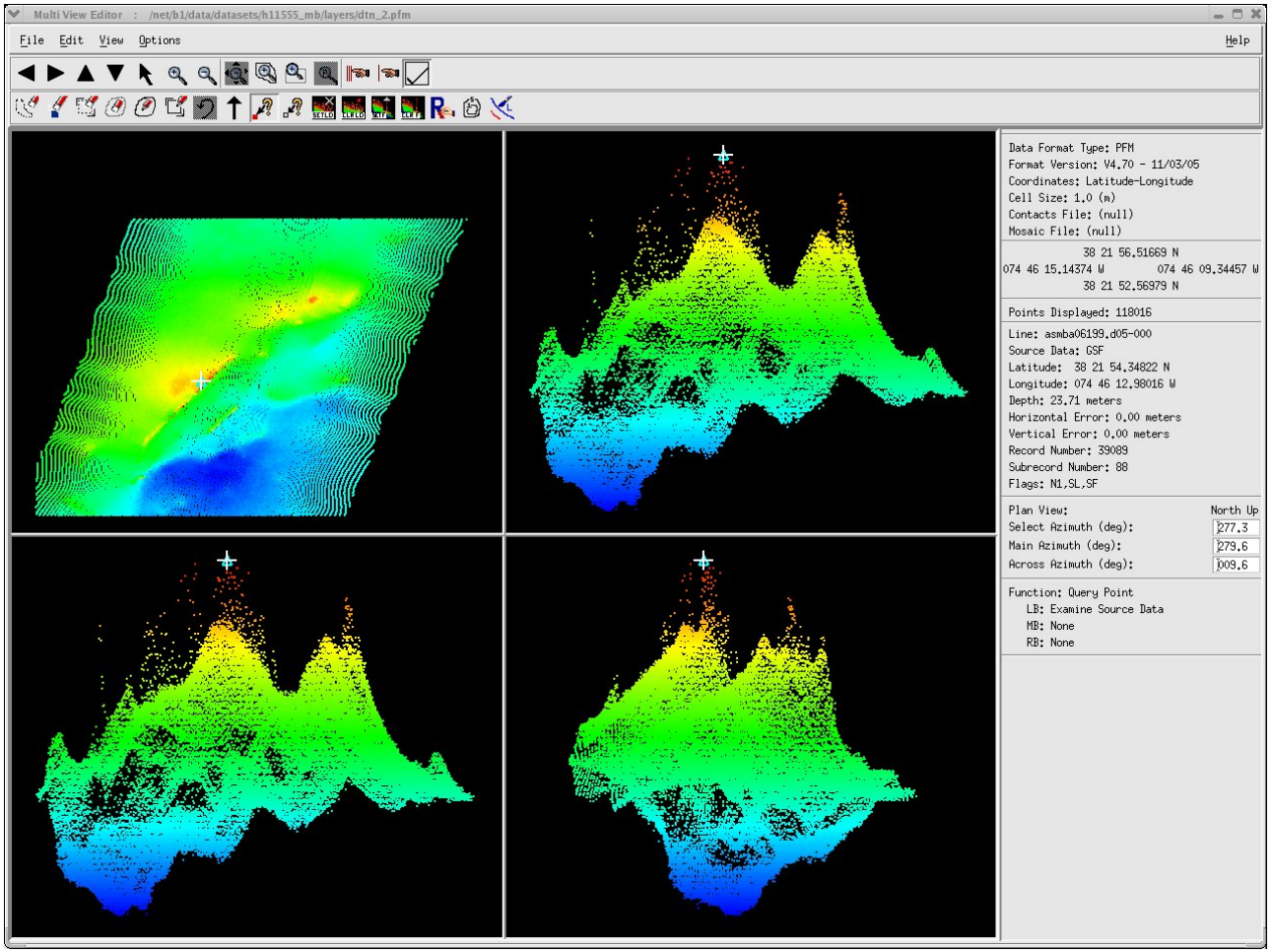


Figure 4 Multi-View Editor of PFM Grid Showing Wreck with Minimum Depth of 78 Feet (MLLW) located within H11555.

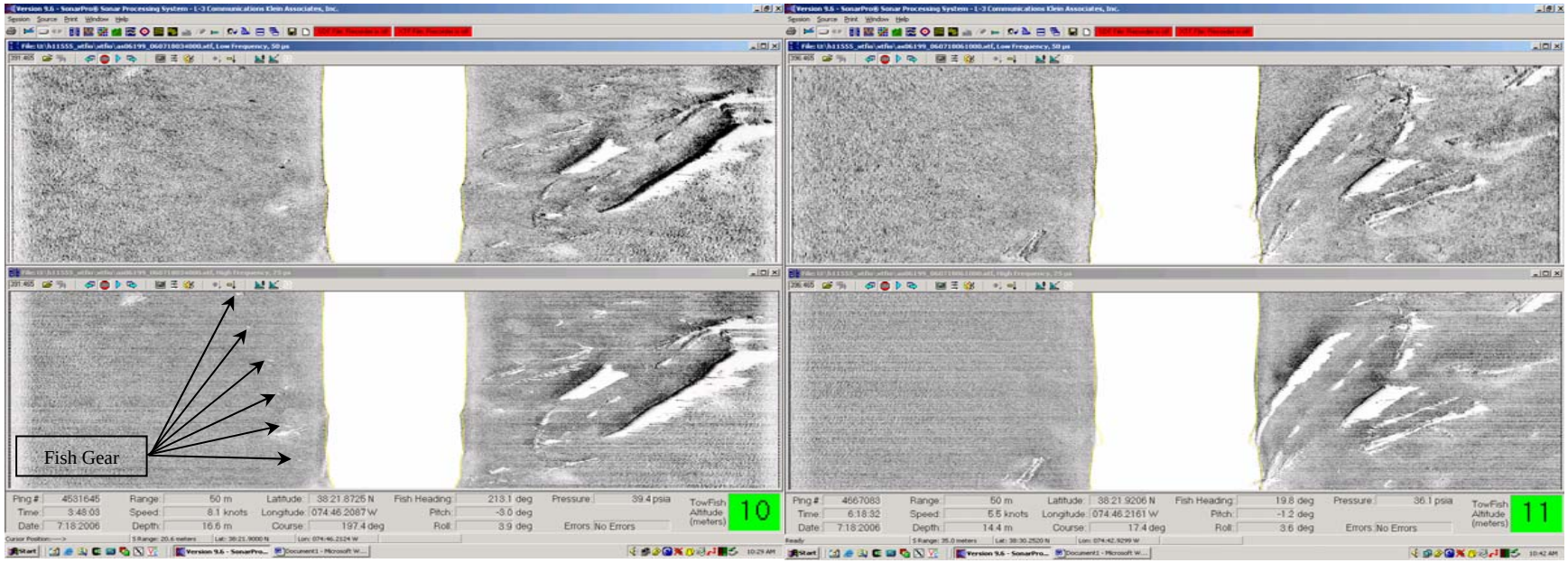


Figure 5 Two 100 kHz and 500 kHz side scan images of Wreck within H11555.

REPORT OF DANGERS TO NAVIGATION
H11555 #2

Hydrographic Survey Registry Number: H11555

Survey Title: State: Delaware
Locality: Atlantic Ocean
Sub-locality: 30 NM SE of Cape Henlopen

Project Number: OPR-D302-KR-06

Field Unit: Science Applications International Corporation (SAIC)
Survey Vessel *Atlantic Surveyor*

Survey Dates: July 18, 2006 and On Going
Wreck located on August 8, 2006

Depths are reduced to Mean Lower Low Water using ***predicted*** water levels and preliminary tidal zoning. Positions are referenced from USCG DGPS beacon and horizontal datum is North America Datum 83 (NAD83).

Charts affected:

• 12211_1	42nd Edition	July 2004	1:80,000 scale	Corrected through NM 07/10/04 Corrected through LNM 07/06/04
• 12214_1	47thEdition	July 2006	1:80,000 scale	Corrected through NM 07/01/06 Corrected through LNM 06/27/06

ENC affected:

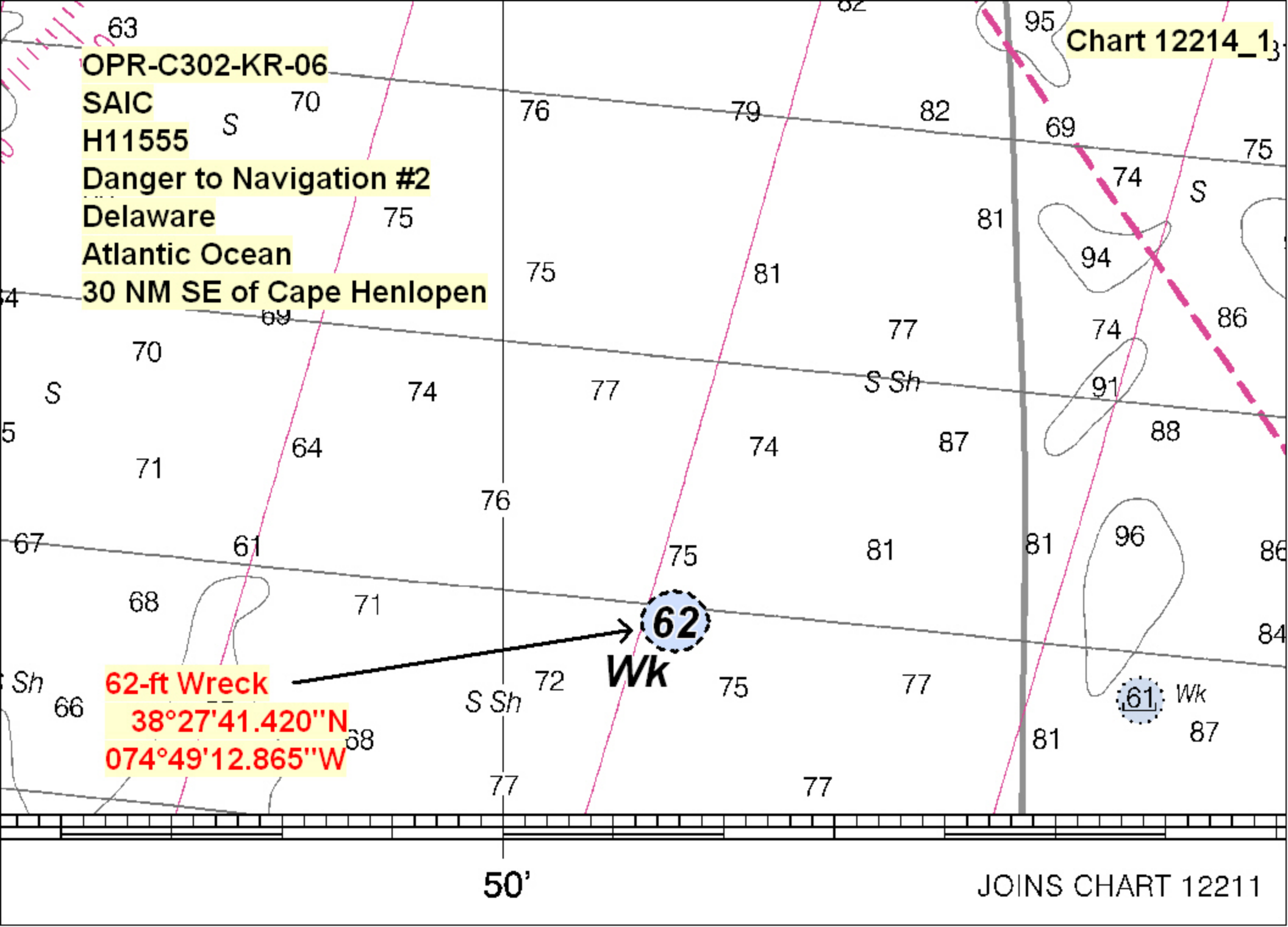
• US5DE01M	4th Edition	July 14, 2006	Chart 12200	Cape May to Cape Hatteras

The following item was found during hydrographic survey operations:

DANGER TO NAVIGATION #2

	Feature	Depth (FT)	Latitude (N)	Longitude (W)
1.	Wreck	62	38°27’41.420”	074°49’12.865”

Questions concerning this report should be directed to the Chief, Atlantic Hydrographic Branch at (757) 441-6746.


OPR-C302-KR-06
SAIC
H11555
Danger to Navigation #2
Delaware
Atlantic Ocean
30 NM SE of Cape Henlopen
Chart 12214_1
62
Wk
62-ft Wreck
38°27'41.420"N
074°49'12.865"W
50'
JOINS CHART 12211

4" eastward to agree with this

recent chart edition take precedence.

OPR-C302-KR-06

SAIC

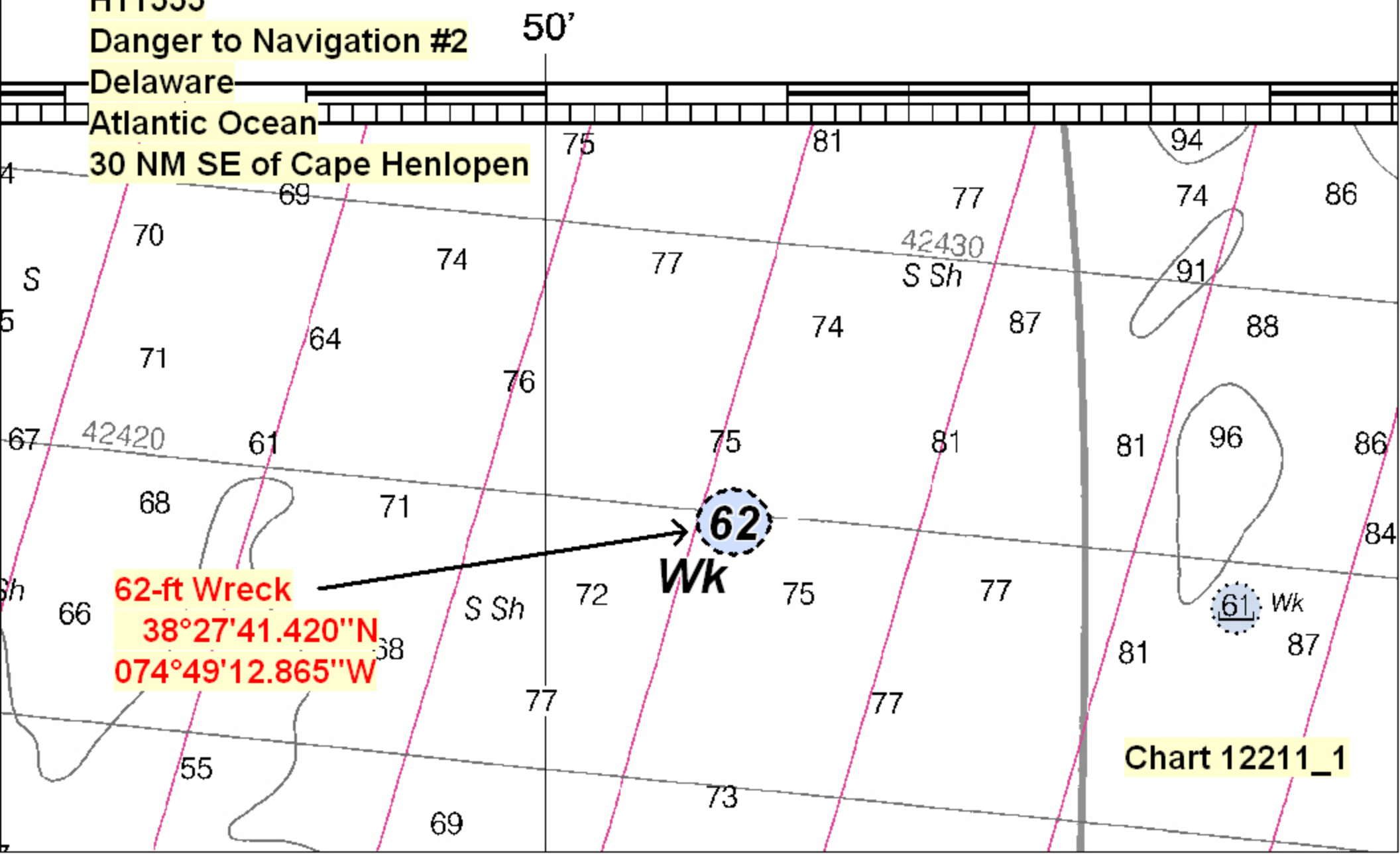
H11555

Danger to Navigation #2

Delaware

Atlantic Ocean

30 NM SE of Cape Henlopen



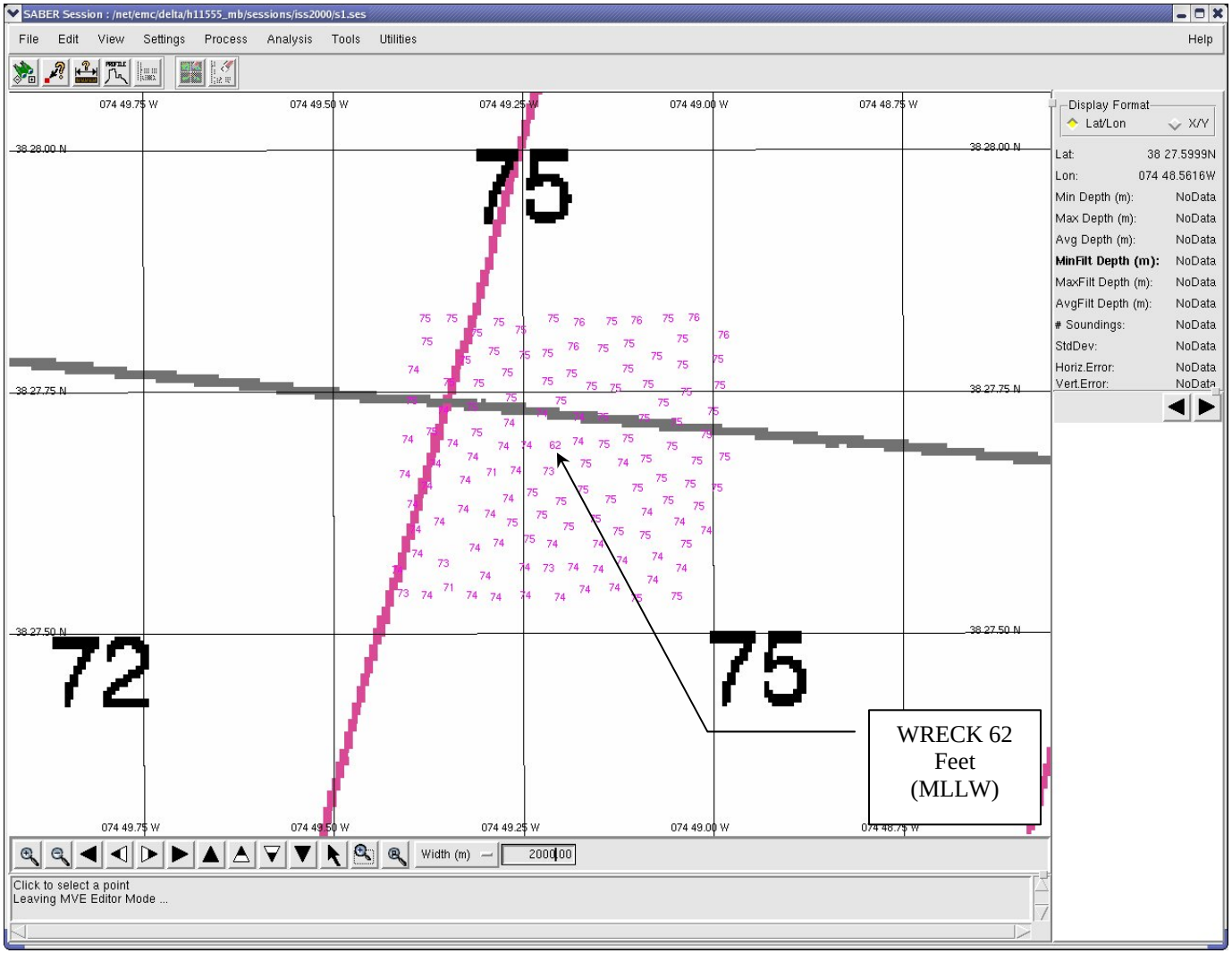


Figure 3 Chart 12214 Showing Selected Soundings of Wreck with Minimum Depth of 62 Feet (MLLW) within H11555.

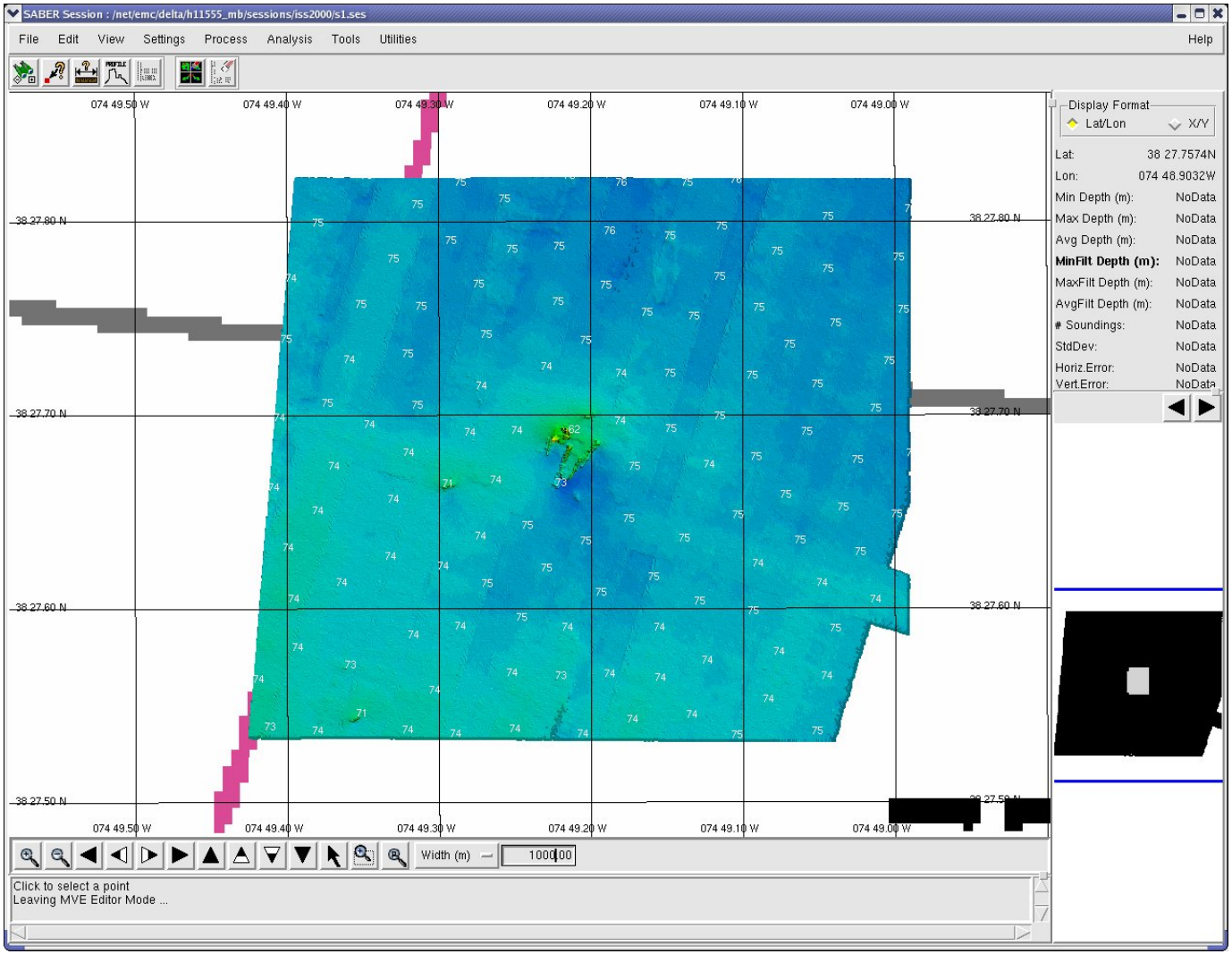


Figure 4 Color Coded Depth Grid and Selected Soundings Showing Wreck with Minimum Depth of 62 Feet (MLLW) within H11555.

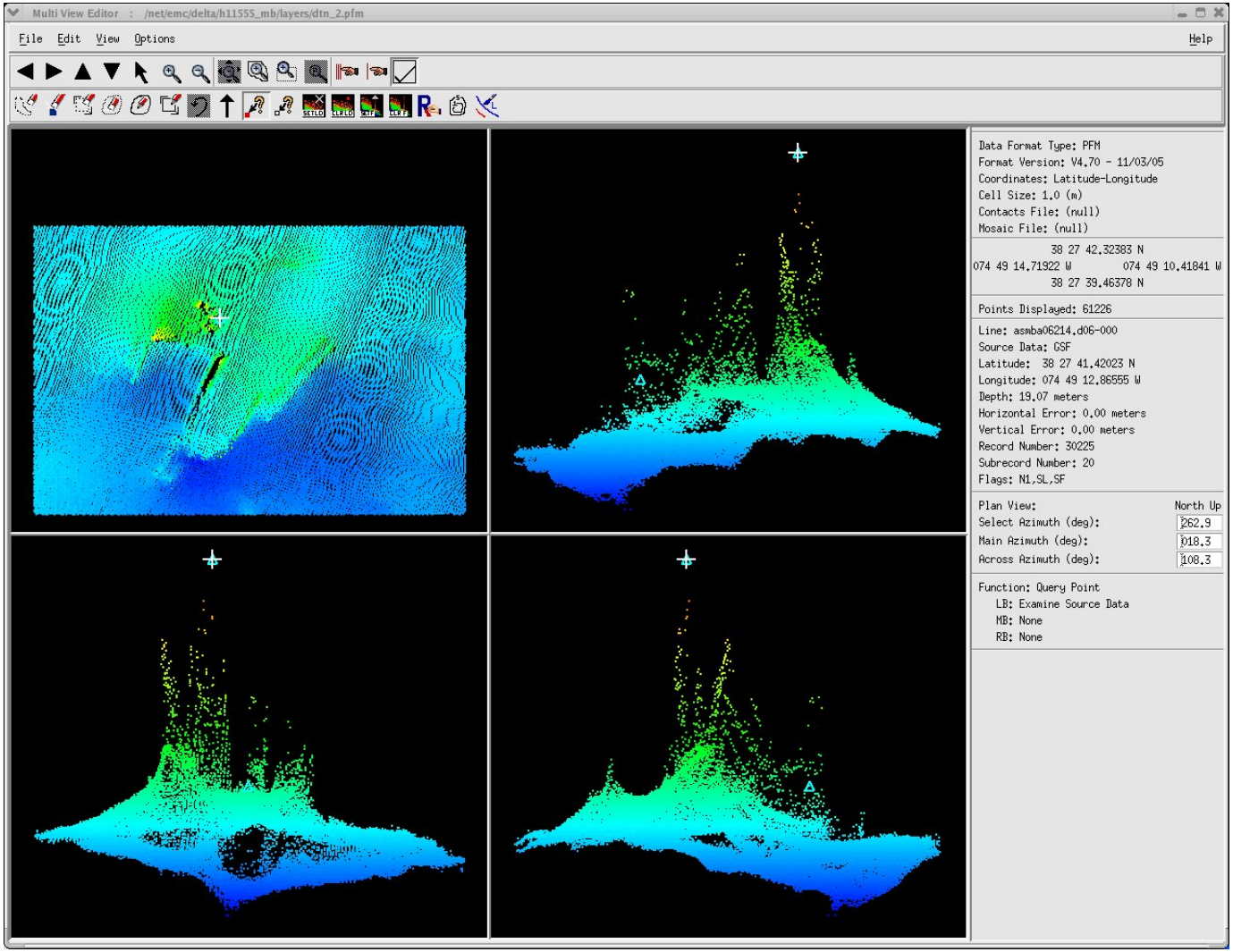


Figure 5 Multi-View Editor of PFM Grid Showing Wreck with Minimum Depth of 62 Feet (MLLW) located within H11555.

Figure 6 Two 100 kHz and 500 kHz side scan images of Wreck within H11555.

APPENDIX II. SURVEY FEATURE REPORT

This survey feature report consists of 31 files, including:

- One excel spreadsheet and one corresponding PDF file, titled *H11555_Multibeam_Feature_List.xls**, describing all multibeam features that can be observed in the S-57 feature file,
- One excel spreadsheet and one corresponding PDF file, titled *H11555_Side_Scan_Contact_List.xls*****, describing all side scan contacts identified on H11555, and
- 27 PDF files containing feature correlator sheets, listed below*,
  - H11555_F01.pdf
  - H11555_F02.pdf
  - H11555_F03.pdf
  - H11555_F04.pdf
  - H11555_F05.pdf
  - H11555_F06.pdf
  - H11555_F07.pdf
  - H11555_F08.pdf
  - H11555_F09.pdf
  - H11555_F10.pdf
  - H11555_F11.pdf
  - H11555_F12.pdf
  - H11555_F13.pdf
  - H11555_F14.pdf
  - H11555_F15.pdf
  - H11555_F16.pdf
  - H11555_F17.pdf
  - H11555_F18.pdf
  - H11555_F19.pdf
  - H11555_F20.pdf
  - H11555_F21.pdf
  - H11555_F22.pdf
  - H11555_F23.pdf
  - H11555_F24.pdf
  - H11555_F25.pdf
  - H11555_F26.pdf
  - H11555_F27.pdf

**** Files located on the following pages of Appendix II.***

*****Submitted with original field records and filed digitally at AHB. File not submitted with with H11555 Appendix II.***

Feature Number	Feature Position (NAD83)		Category	Multibeam File	Ping	Beam	Depth (Meters)	Vertical Error (Meters)	Horizontal Error (Meters)	Time (UTC)
	Latitude (N)	Longitude (W)								
1	38 30 49.06	074 41 55.03	WRECK	asmba06165.d04	5424	18	24.06	0.28	1.61	01:20:51
2	38 27 19.47	074 41 38.01	OBSTR	asmba06176.d08	17684	22	25.63	0.28	1.41	09:36:25
3	38 24 43.72	074 50 11.68	OBSTR	asmba06190.d15	36809	65	17.93	0.28	1.34	13:51:30
4	38 26 20.58	074 41 25.67	OBSTR	asmba06193.d16	24413	24	33.35	0.29	1.81	20:48:45
5	38 24 49.91	074 43 50.56	OBSTR	asmba06196.d16	17210	71	27.09	0.28	1.22	17:45:39
6	38 28 43.92	074 42 52.53	OBSTR	asmba06197.d15	13155	85	31.99	0.29	1.32	18:29:56
7	38 29 01.33	074 42 48.55	OBSTR	asmba06197.d17	11313	77	32.21	0.29	1.46	21:08:54
8	38 21 54.03	074 46 13.23	WRECK	asmba06199.d08	4468	62	23.58	0.28	1.23	06:18:04
9	38 21 55.50	074 46 26.22	OBSTR	asmba06199.d13	37499	86	24.91	0.28	1.44	12:56:46
10	38 25 15.92	074 45 48.22	OBSTRS	asmba06200.d17	24253	84	26.21	0.28	1.19	16:39:23
11	38 25 21.18	074 45 58.23	OBSTR	asmba06205.d02	17612	34	25.94	0.28	1.16	07:20:47
12	38 25 48.00	074 45 59.14	OBSTR	asmba06205.d07	15561	82	25.05	0.28	1.33	12:31:10
13	38 25 26.38	074 46 04.45	OBSTR	asmba06205.d09	18168	77	25.56	0.28	1.52	14:29:58
14	38 25 50.93	074 45 54.19	OBSTRS	asmba06205.d09	19921	87	25.12	0.29	1.56	14:32:59
15	38 27 37.58	074 45 37.97	OBSTR	asmba06206.d03	23887	32	25.39	0.28	1.63	02:02:34
16	38 27 39.83	074 49 17.55	OBSTR	asmba06208.d23	3519	80	21.38	0.28	1.44	19:37:25
17	38 23 12.96	074 50 29.32	OBSTR	asmba06213.d10	29353	70	16.59	0.28	1.24	09:04:08
18	38 27 41.42	074 49 12.87	WRECK	asmba06214.d06	30225	20	18.96	0.28	1.23	05:39:30
19	38 27 32.60	074 49 21.32	OBSTR	asmba06214.d10	31312	86	21.66	0.28	1.40	09:44:14
20	38 22 46.24	074 41 13.65	OBSTR	asmba06214.d26	8622	74	29.83	0.28	1.37	19:10:43
21	38 27 18.45	074 41 46.22	BUOY_Y_"D"							
22	38 27 16.97	074 41 48.70	OBSTR	asmba06215.d10	5263	76	27.39	0.28	1.39	02:05:23
23	38 27 25.33	074 47 06.89	WRECK	asmba06252.d12	1659	87	22.52	0.28	1.41	01:45:46
24	38 25 51.16	074 46 04.61	WRECK	asmba06252.d14	3896	58	18.42	0.28	1.42	02:05:35
25	38 27 48.47	074 42 07.13	BUOY_Y_ODAS"44009"							
26	38 27 35.45	074 39 03.58	OBSTR	asmba06190.d07	4270	8	29.91	0.31	1.66	06:24:48
27	38 24 29.98	074 42 10.52	WRECK	asmba06195.d01	40683	58	33.37	0.28	1.22	16:48:02

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0001 Least Depth: 79(ft), 24.06(m) Lat: 38 30 49.06N Lon: 074 41 55.030W Ping: 5424 Beam: 18

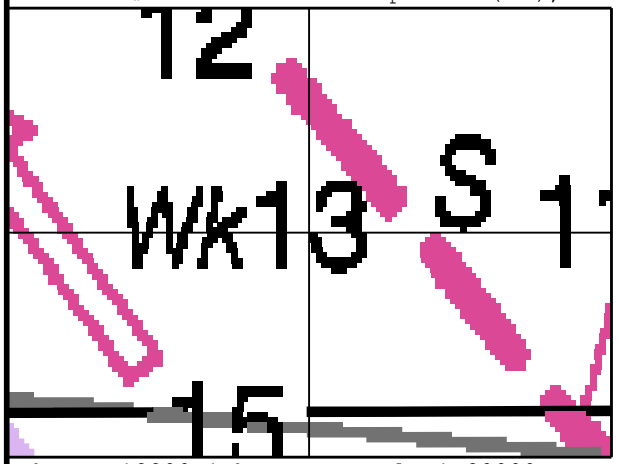


Chart: 12200_1.kap Scale 1:20000

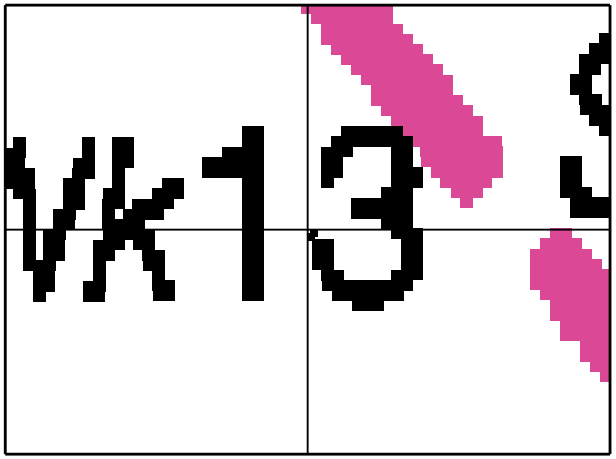
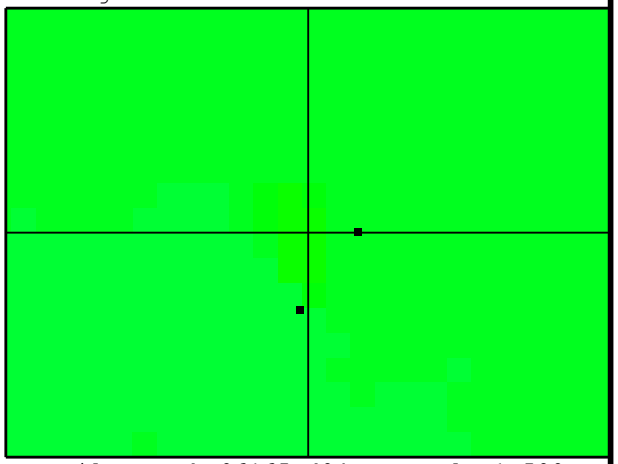
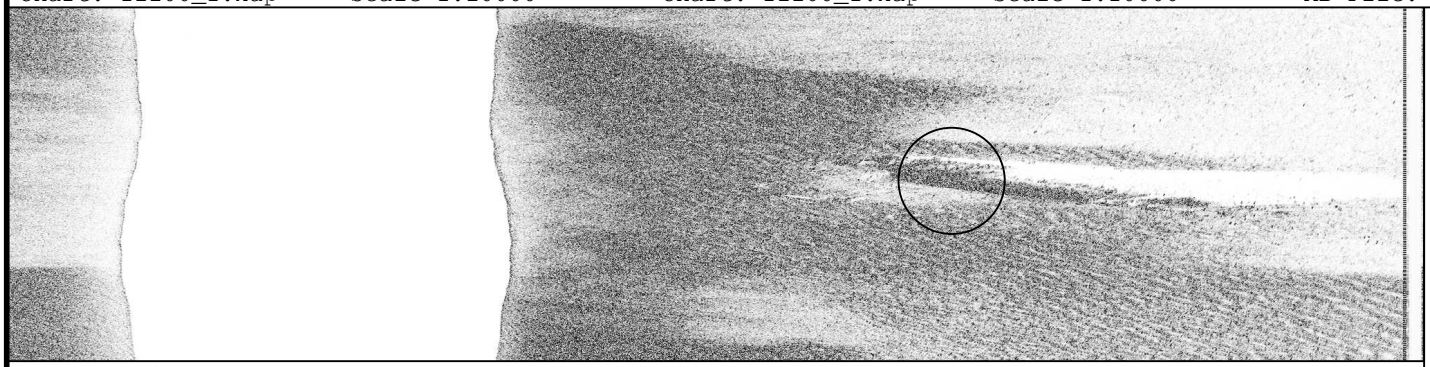


Chart: 12200_1.kap Scale 1:10000

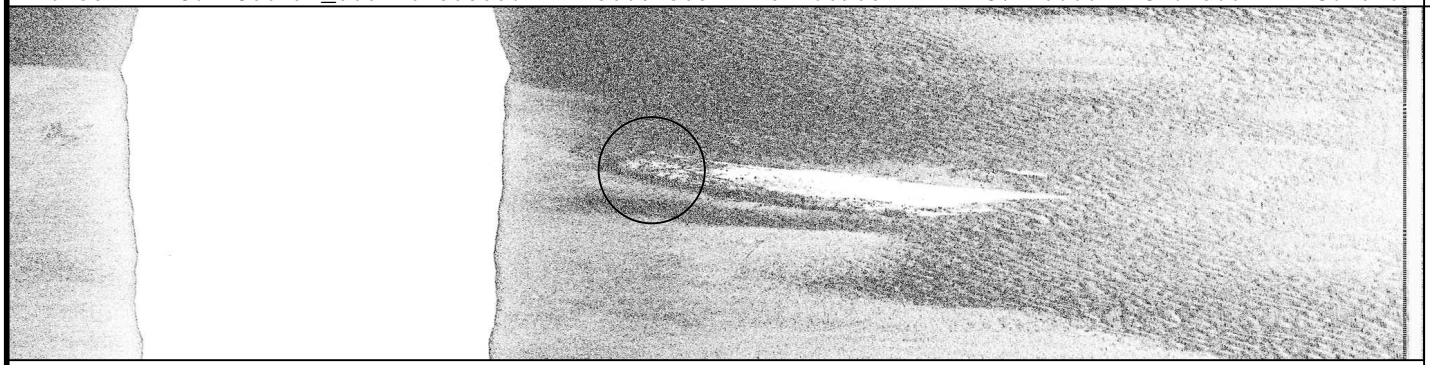


MB File: asmba06165.d04 Scale 1:500



ID: 35 File: AS06197_060716150500.XTF 38.513634N 074.698512W RNG: 28.66 HGT: 3.02 HDG: 016

COMMENT:
WRECK. NON-DANGEROUS WRECK.
Plot sounding and label
'Wk'.



ID: 34 File: AS06197_060716124100.XTF 38.513495N 074.698650W RNG: 15.09 HGT: 3.37 HDG: 193

CORRELATED SS CONTACTS:

Contact	Range/Height
197/152216	28.66/3.02
197/124808	15.09/3.37

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0002 Least Depth: 84(ft), 25.63(m) Lat: 38 27 19.47N Lon: 074 41 38.01W Ping: 17684 Beam: 22

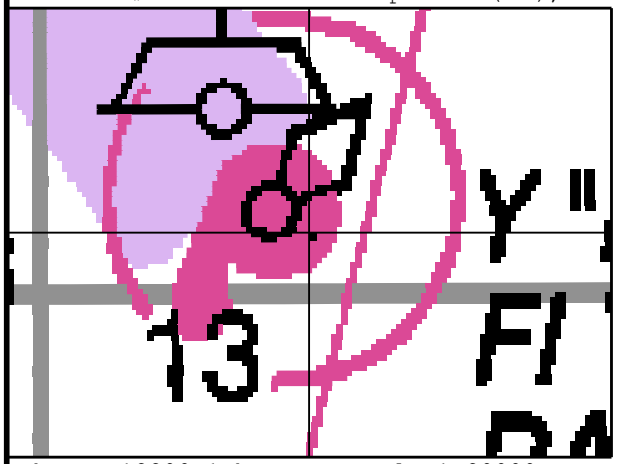


Chart: 12200_1.kap Scale 1:20000

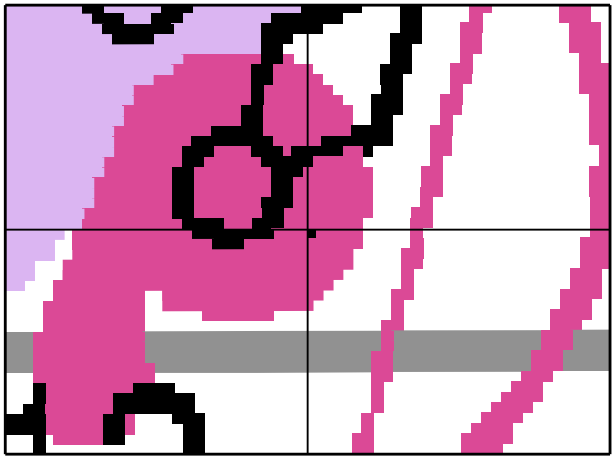
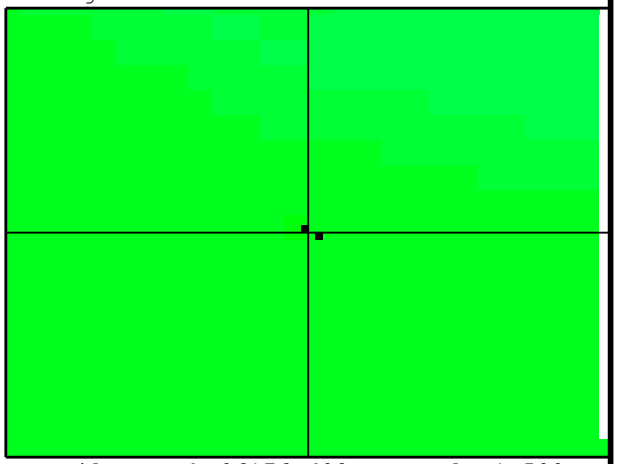
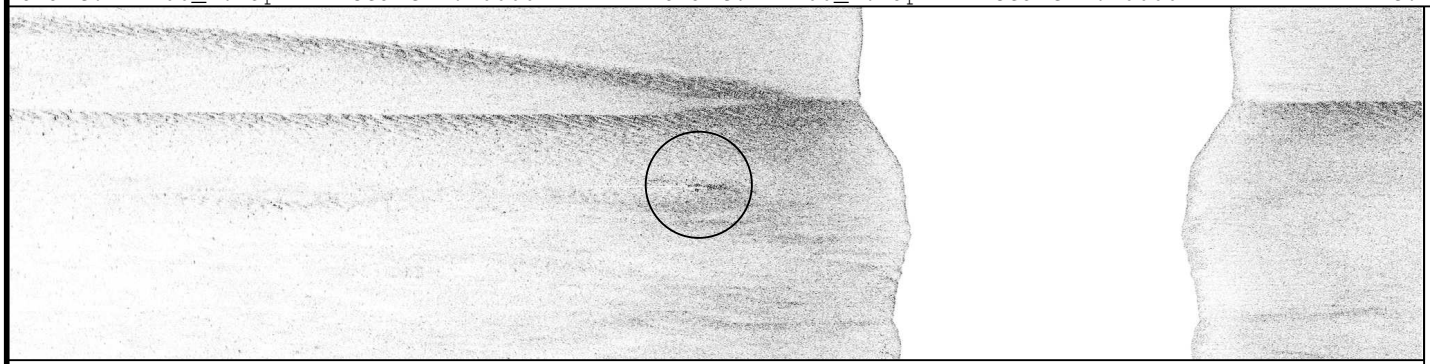


Chart: 12200_1.kap Scale 1:10000

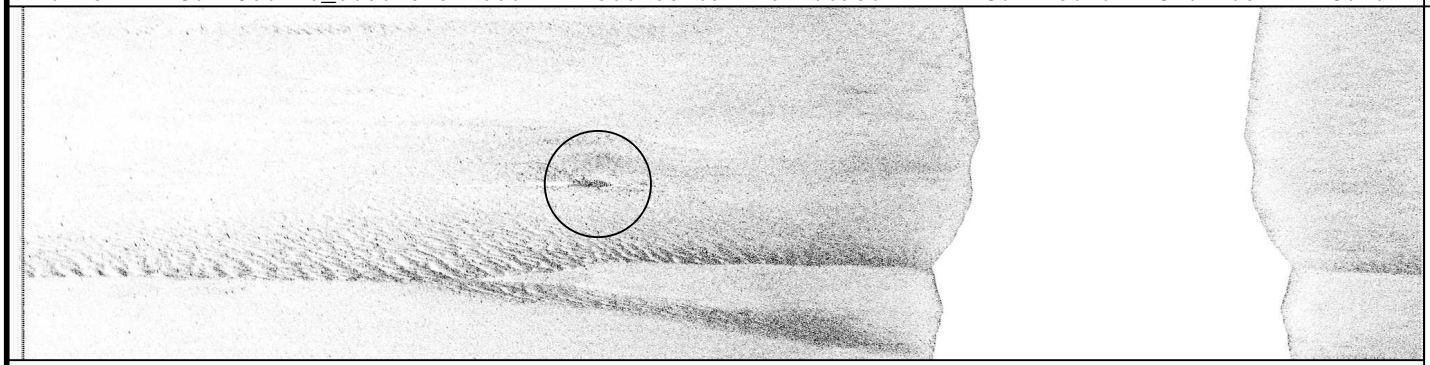


MB File: asmba06176.d08 Scale 1:500



ID: 13 File: AS06176_060625131200.XTF 38.455409N 074.693877W RNG: -15.78 HGT: 1.54 HDG: 021

COMMENT:
OBSTR. No plot NONSIG.



ID: 11 File: AS06176_060625090500.XTF 38.455422N 074.693909W RNG: -23.31 HGT: 0.57 HDG: 198

CORRELATED SS CONTACTS:

Contact	Range/Height
176/140246	-15.78/1.54
176/093646	-23.31/0.57

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0003 Least Depth: 59(ft), 17.93(m) Lat: 38 24 43.72N Lon: 074 50 11.68W Ping: 36809 Beam: 65

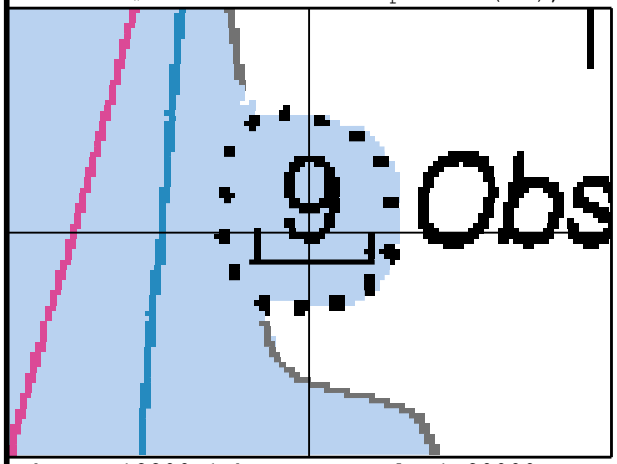


Chart: 12200_1.kap Scale 1:20000

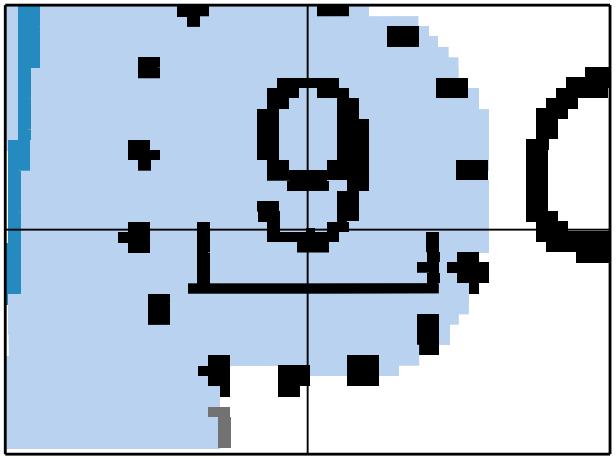
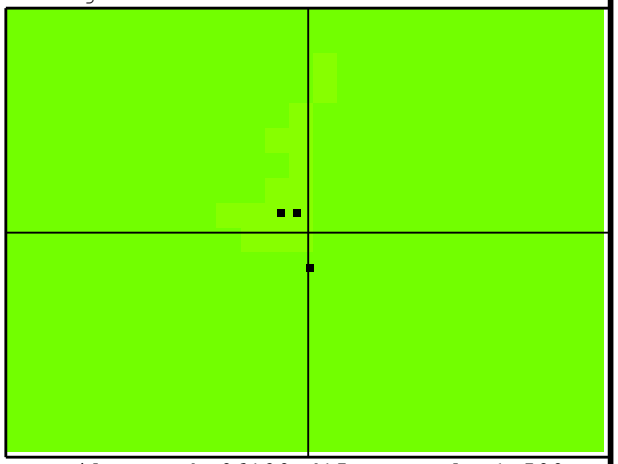
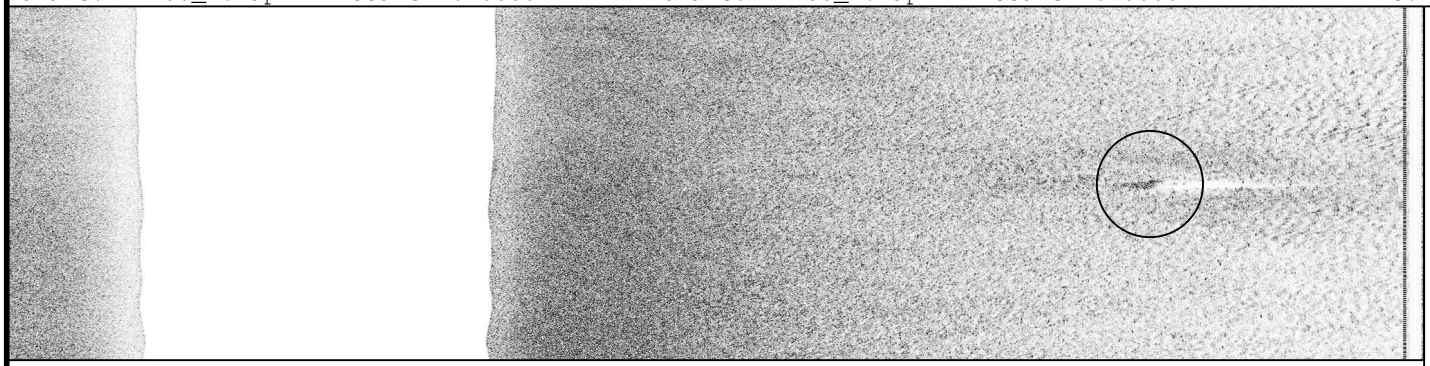


Chart: 12200_1.kap Scale 1:10000

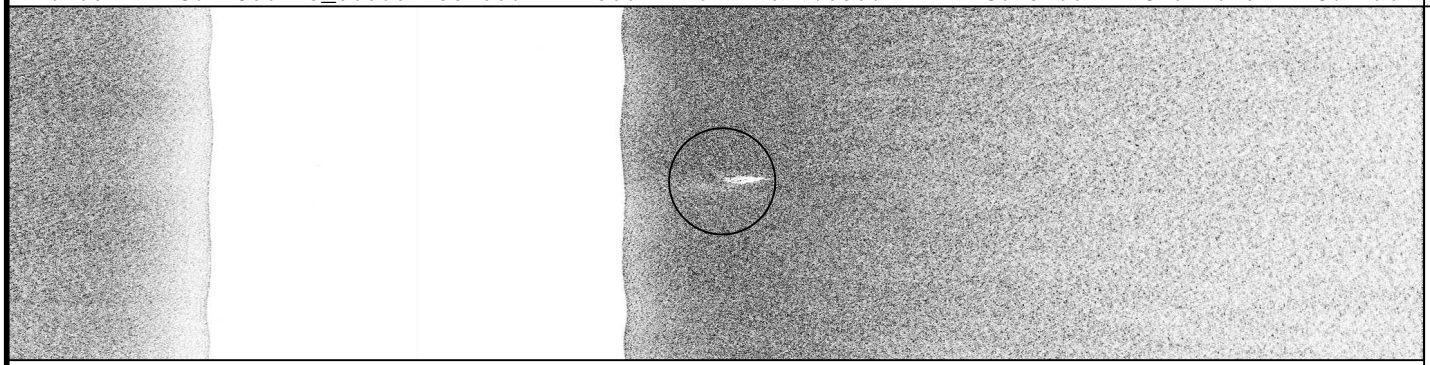


MB File: asmba06190.d15 Scale 1:500



ID: 85 File: AS06213_060801235100.XTF 38.412187N 074.836612W RNG: 37.62 HGT: 1.10 HDG: 198

COMMENT:
OBSTR. Plot symbol and label 'Obstn'.



ID: 83 File: AS06213_060801181600.XTF 38.412087N 074.836583W RNG: 13.72 HGT: 2.01 HDG: 017

CORRELATED SS CONTACTS:

Contact	Range/Height
214/003539	37.62/1.10
213/183536	13.72/2.01
213/223134	-42.84/0.67

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0004 Least Depth: 109(ft), 33.35(m) Lat: 38 26 20.58N Lon: 074 41 25.67W Ping: 24413 Beam: 24

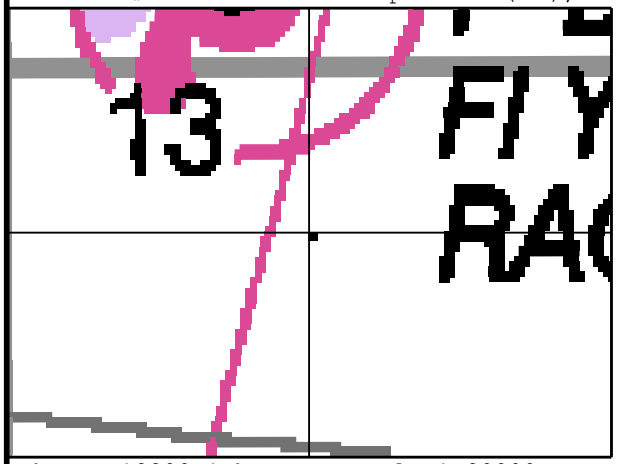


Chart: 12200_1.kap Scale 1:20000

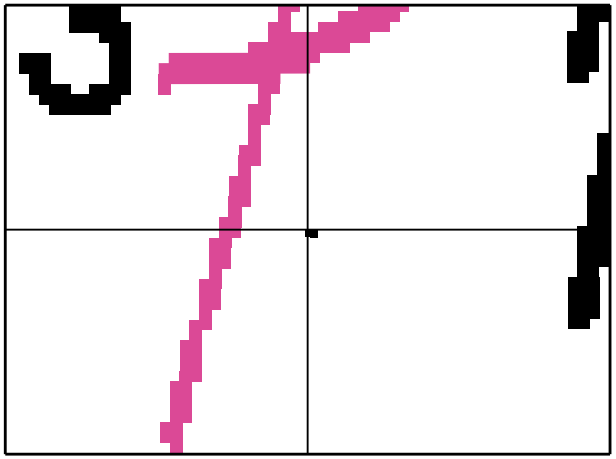
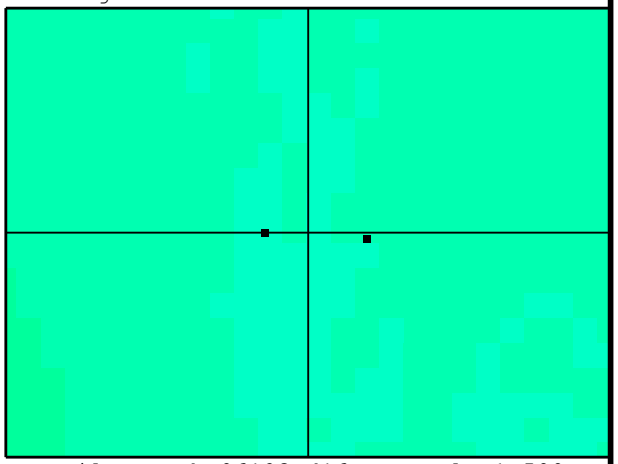
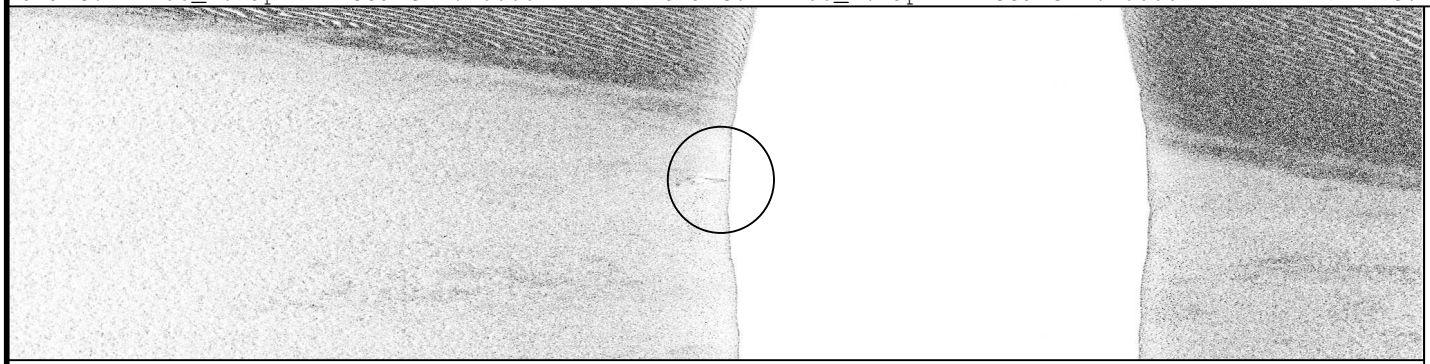


Chart: 12200_1.kap Scale 1:10000

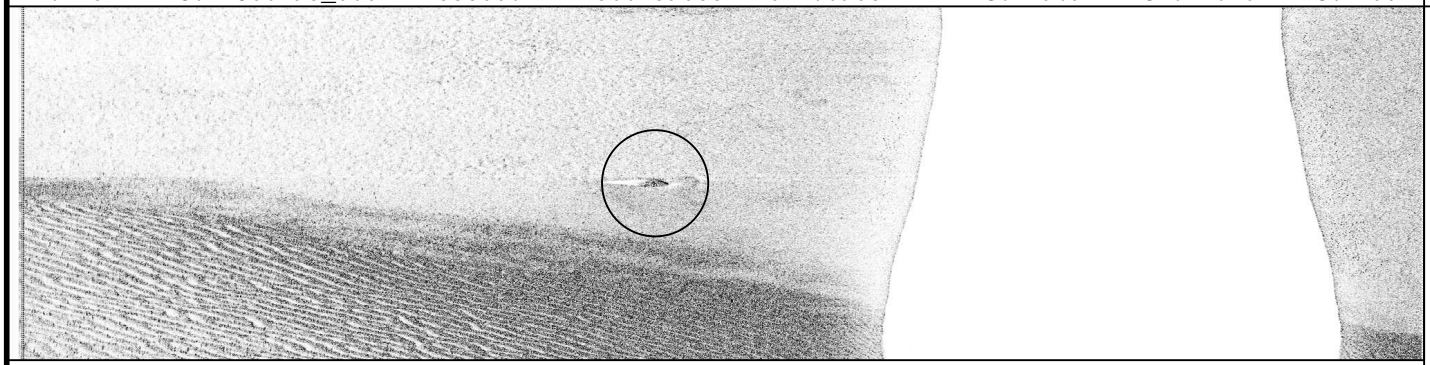


MB File: asmba06193.d16 Scale 1:500



ID: 23 File: AS06195_060714155500.XTF 38.439055N 074.690574W RNG: -9.94 HGT: 2.78 HDG: 199

COMMENT:
OBSTR. No plot NONSIG.



ID: 20 File: AS06193_060712200500.XTF 38.439045N 074.690333W RNG: -20.72 HGT: 0.83 HDG: 022

CORRELATED SS CONTACTS:

Contact	Range/Height
195/163401	-9.94/2.78
193/204912	-20.72/0.83

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0005 Least Depth: 89(ft), 27.09(m) Lat: 38 24 49.91N Lon: 074 43 50.56W Ping: 17210 Beam: 71

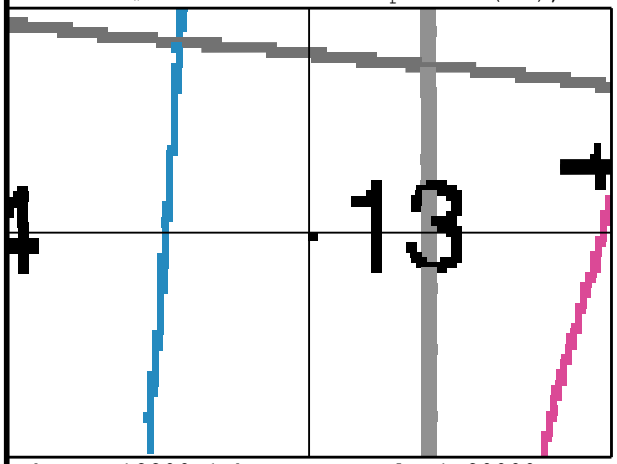


Chart: 12200_1.kap Scale 1:20000

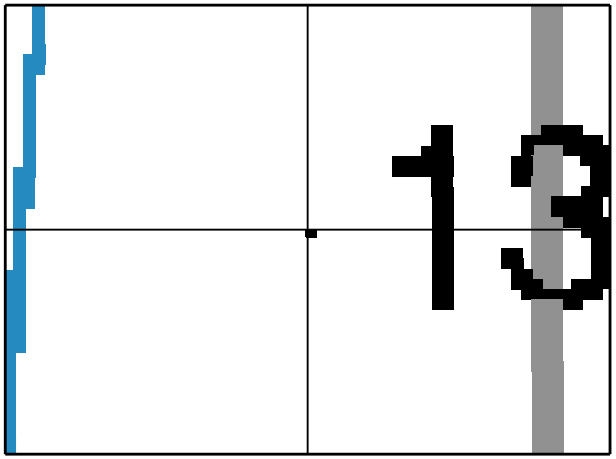
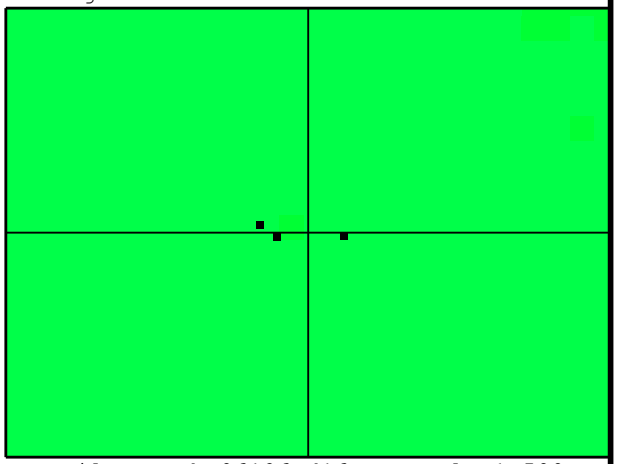
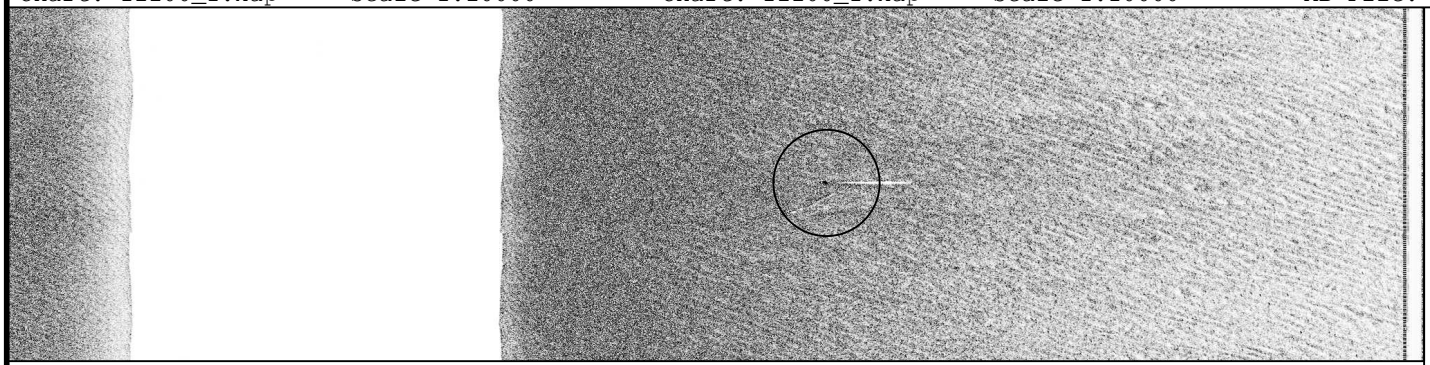


Chart: 12200_1.kap Scale 1:10000

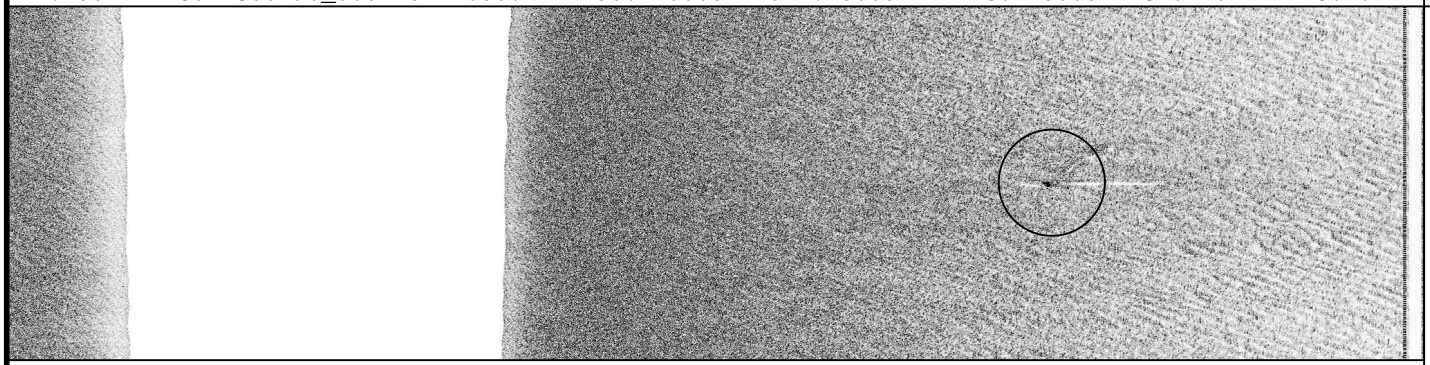


MB File: asmba06196.d16 Scale 1:500



ID: 30 File: AS06196_060715171600.XTF 38.413865N 074.730637W RNG: 23.00 HGT: 1.22 HDG: 014

COMMENT:
OBSTR. No plot NONSIG. See Feature 27.



ID: 29 File: AS06196_060715155200.XTF 38.413864N 074.730793W RNG: 33.19 HGT: 1.11 HDG: 197

CORRELATED SS CONTACTS:

Contact	Range/Height
196/174559	23.00/1.22
196/164509	33.19/1.11
196/192108	-44.31/0.72

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0006 Least Depth: 105(ft), 31.99(m) Lat: 38 28 43.92N Lon: 074 42 52.53W Ping: 13155 Beam: 85

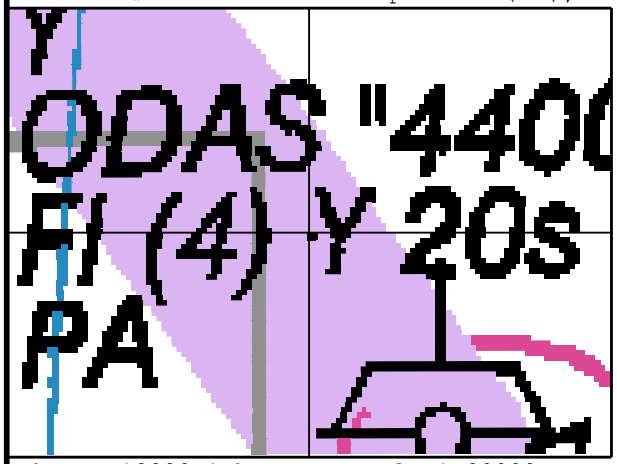


Chart: 12200_1.kap Scale 1:20000

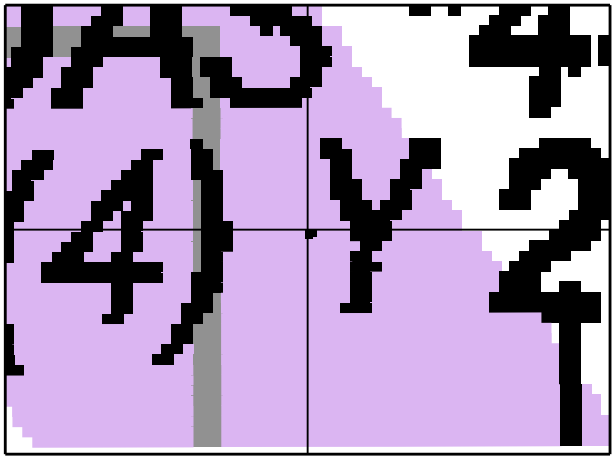
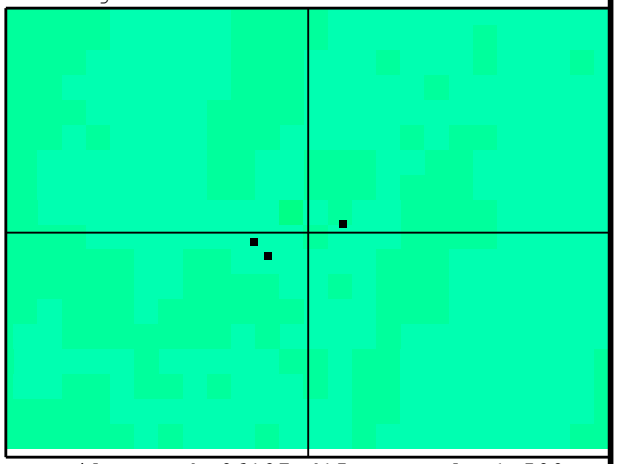
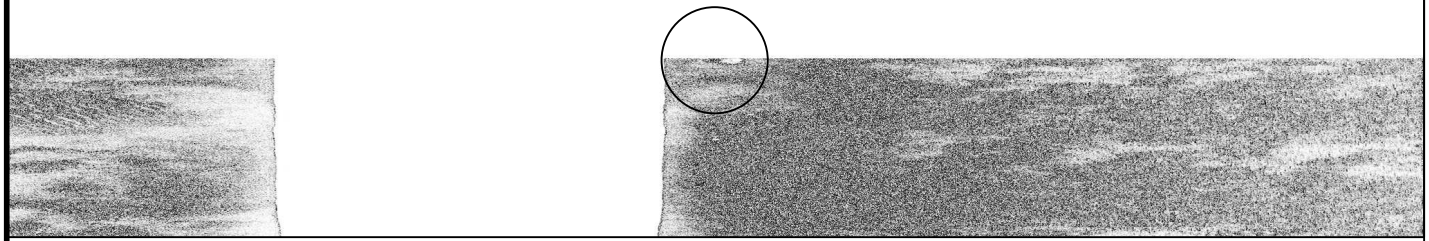


Chart: 12200_1.kap Scale 1:10000



MB File: asmba06197.d15 Scale 1:500



ID: 37 File: AS06197_060716193100.XTF 38.478888N 074.714517W RNG: 11.00 HGT: 1.56 HDG: 019

COMMENT:
OBSTR. No plot NONSIG.

ID: 36 File: AS06197_060716181100.XTF 38.478830N 074.714694W RNG: 42.78 HGT: 0.97 HDG: 195

CORRELATED SS CONTACTS:

Contact	Range/Height
197/203130	11.00/1.56
197/183027	42.78/0.97
197/211134	-33.59/0.90

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0007 Least Depth: 105(ft), 32.21(m) Lat: 38 29 01.33N Lon: 074 42 48.55W Ping: 11313 Beam: 77

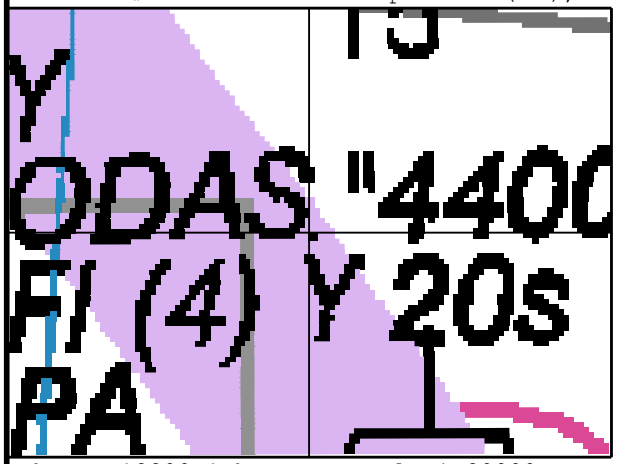
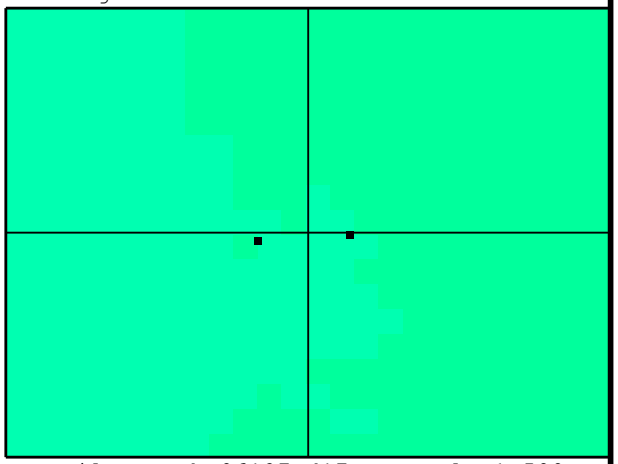
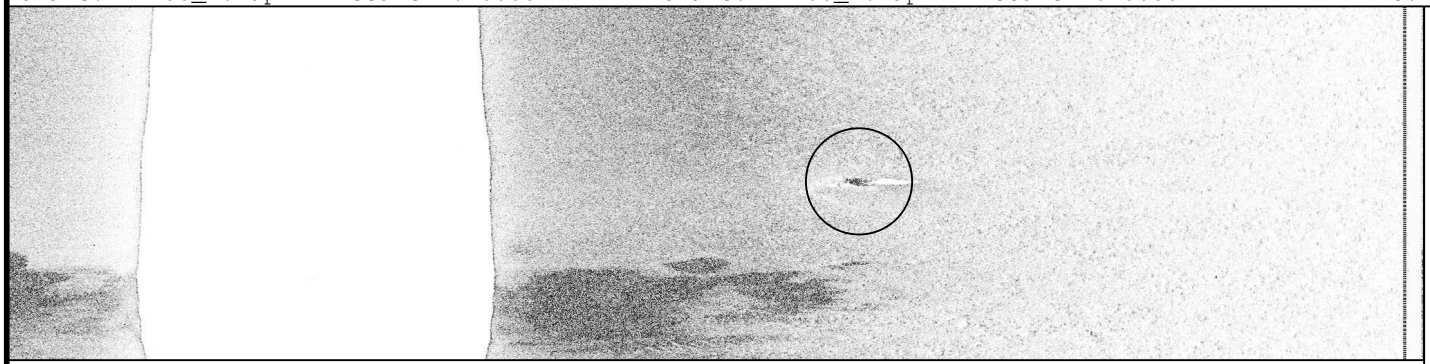


Chart: 12200_1.kap Scale 1:20000

Chart: 12200_1.kap Scale 1:10000

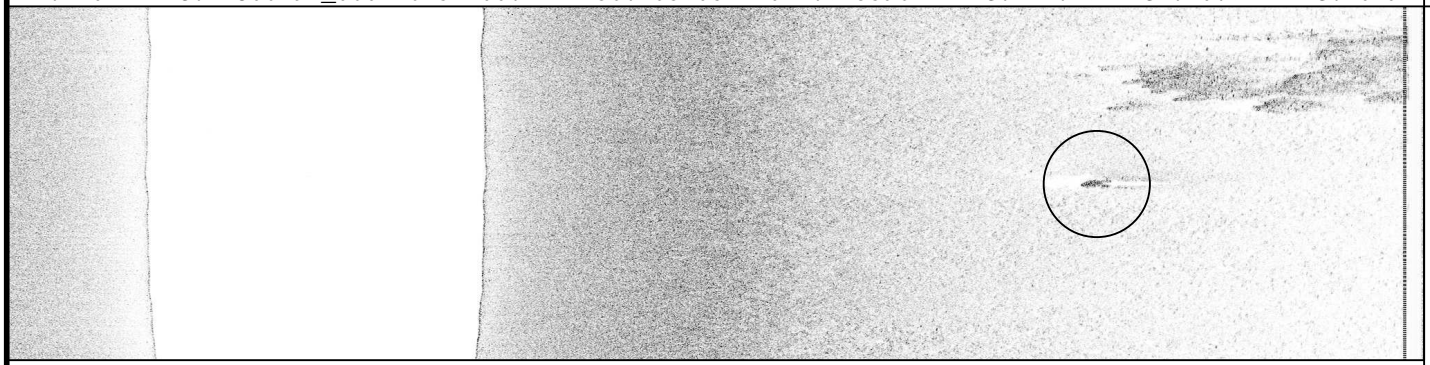


MB File: asmba06197.d17 Scale 1:500



ID: 40 File: AS06197_060716231200.XTF 38.483705N 074.713398W RNG: 24.47 HGT: 0.77 HDG: 019

COMMENT:
OBSTR. No plot NONSIG.



ID: 38 File: AS06197_060716204900.XTF 38.483694N 074.713616W RNG: 35.22 HGT: 0.58 HDG: 197

CORRELATED SS CONTACTS:

Contact	Range/Height
197/231326	24.47/0.77
197/210924	35.22/0.58

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0008 Least Depth: 77(ft), 23.58(m) Lat: 38 21 54.03N Lon: 074 46 13.23W Ping: 4468 Beam: 62

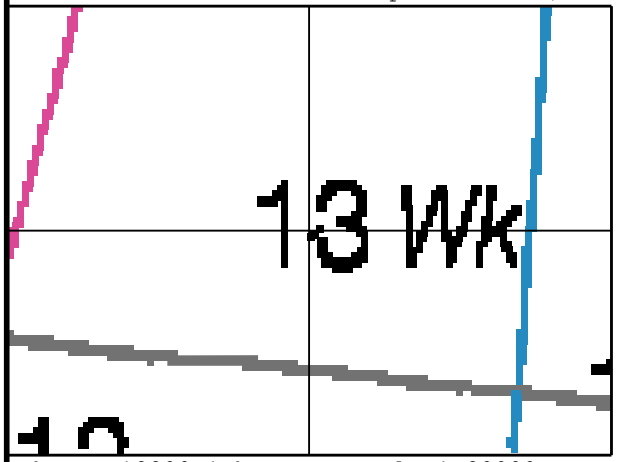


Chart: 12200_1.kap Scale 1:20000

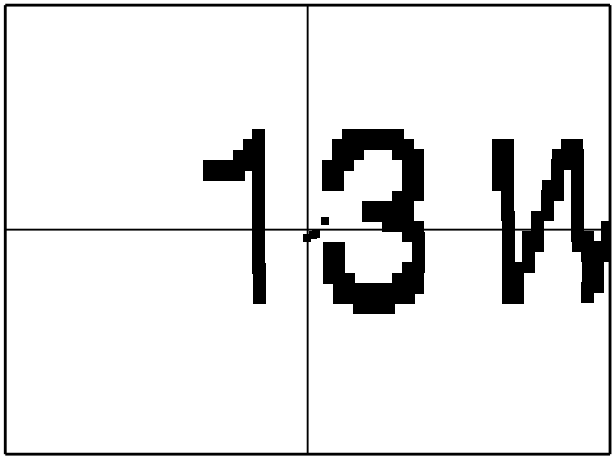
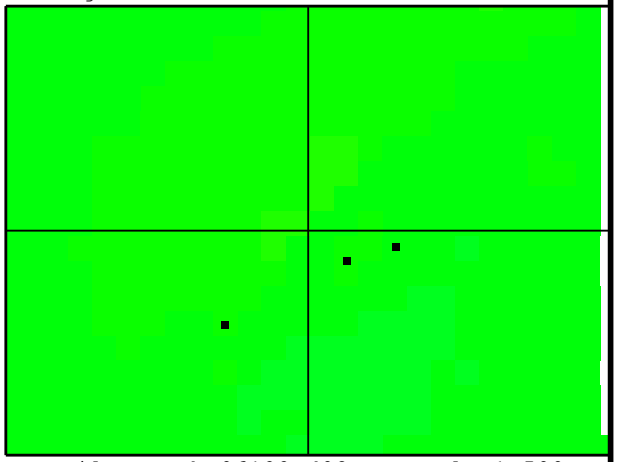
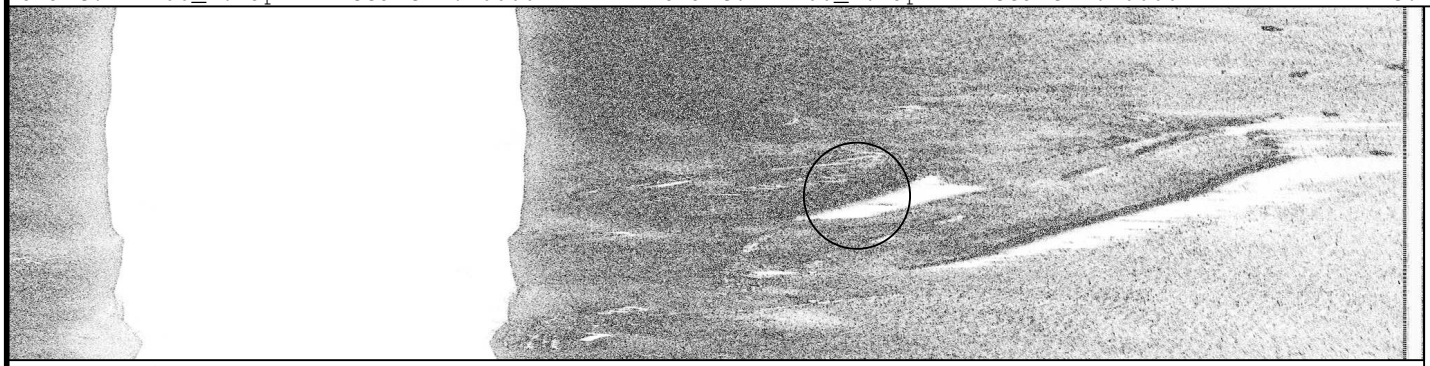


Chart: 12200_1.kap Scale 1:10000

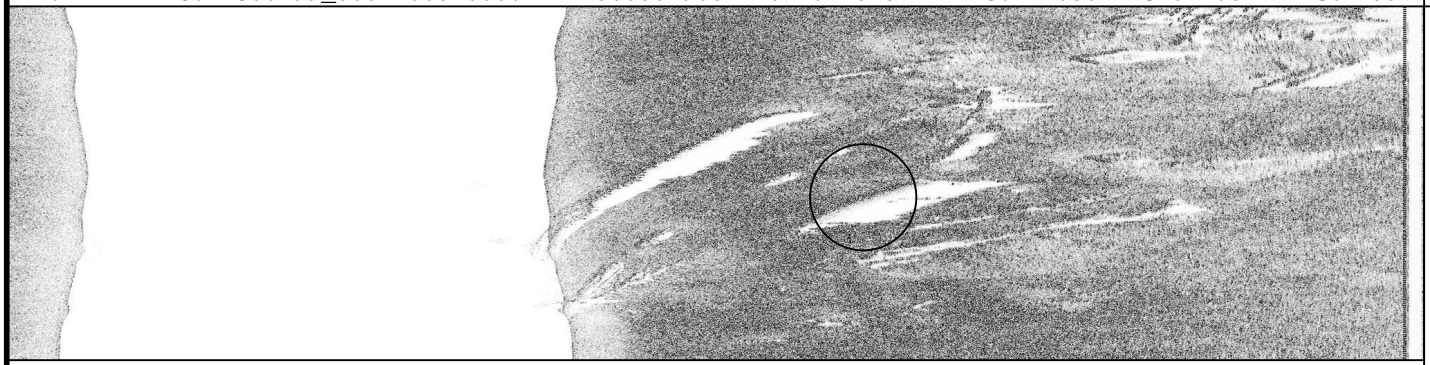


MB File: asmba06199.d08 Scale 1:500



ID: 47 File: AS06199_060718034000.XTF 38.364960N 074.770257W RNG: 24.38 HGT: 1.07 HDG: 199

COMMENT:
WRECK. NON-DANGEROUS WRECK.
Plot sounding and label
'Wk'.



ID: 49 File: AS06199_060718061000.XTF 38.364985N 074.770142W RNG: 24.66 HGT: 1.45 HDG: 013

CORRELATED SS CONTACTS:

Contact	Range/Height
199/034752	24.38/1.07
199/061819	24.66/1.45
199/012836	-35.56/1.40
198/230236	-36.97/0.51

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0009 Least Depth: 81(ft), 24.91(m) Lat: 38 21 55.50N Lon: 074 46 26.22W Ping: 37499 Beam: 86

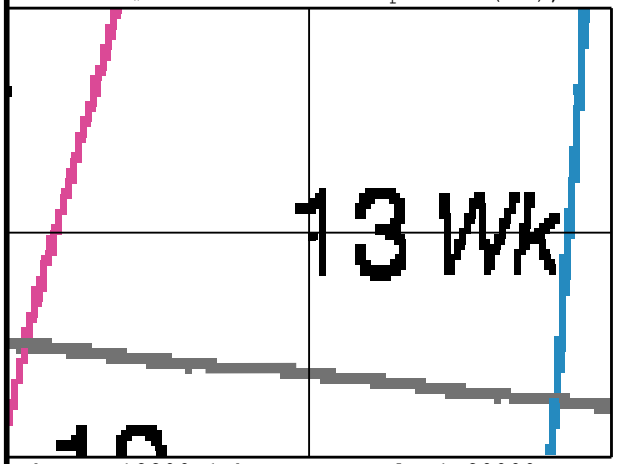


Chart: 12200_1.kap Scale 1:20000

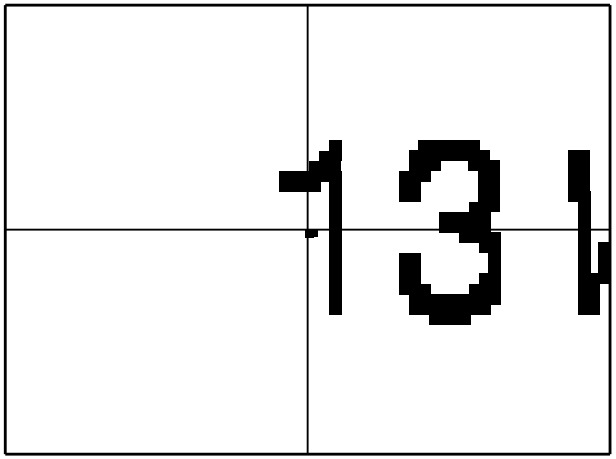
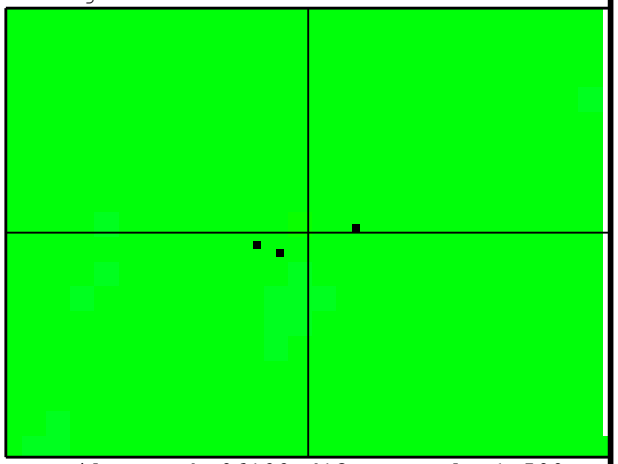
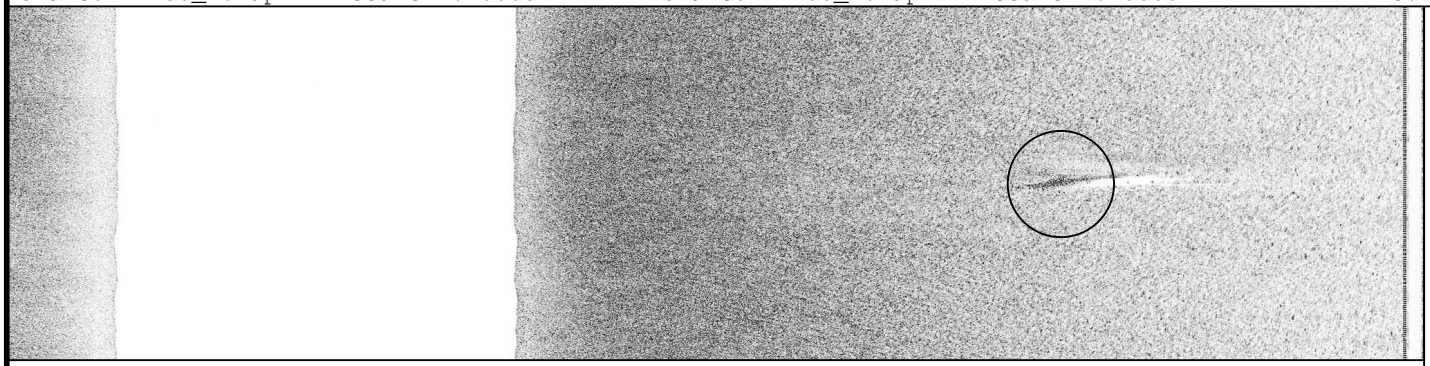


Chart: 12200_1.kap Scale 1:10000

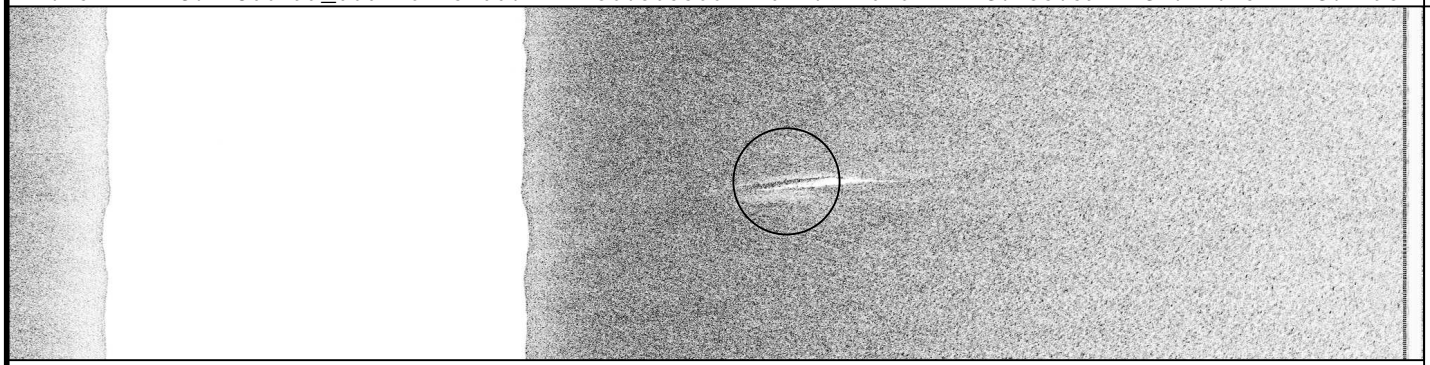


MB File: asmba06199.d13 Scale 1:500



ID: 51 File: AS06199_060718125100.XTF 38.365388N 074.774028W RNG: 33.59 HGT: 1.45 HDG: 193

COMMENT:
OBSTR. No plot NONSIG. See Feature 8.



ID: 52 File: AS06199_060718152000.XTF 38.365434N 074.773846W RNG: 21.19 HGT: 1.44 HDG: 015

CORRELATED SS CONTACTS:

Contact	Range/Height
199/125703	33.59/1.45
199/152901	21.19/1.44
199/103908	-43.31/0.75

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0010 Least Depth: 86(ft), 26.21(m) Lat: 38 25 15.92N Lon: 074 45 48.22W Ping: 24253 Beam: 84

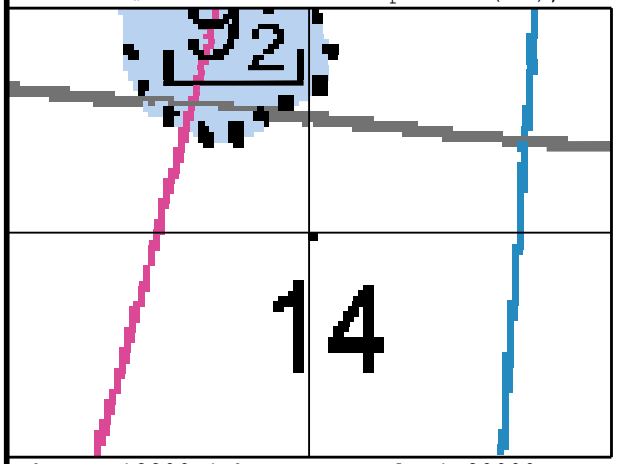


Chart: 12200_1.kap Scale 1:20000

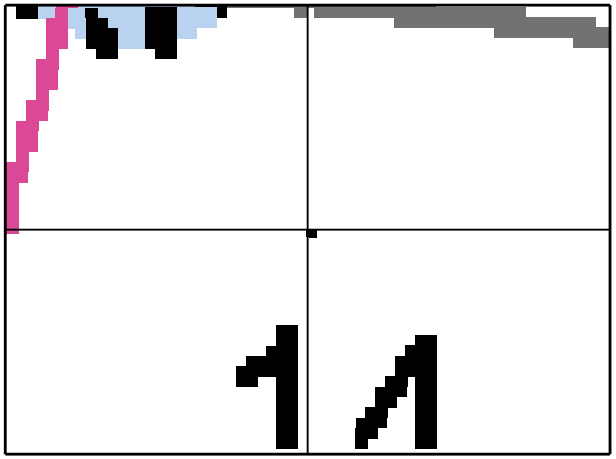
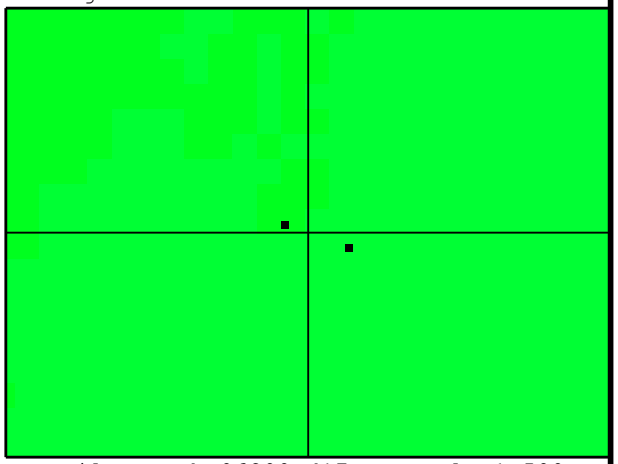
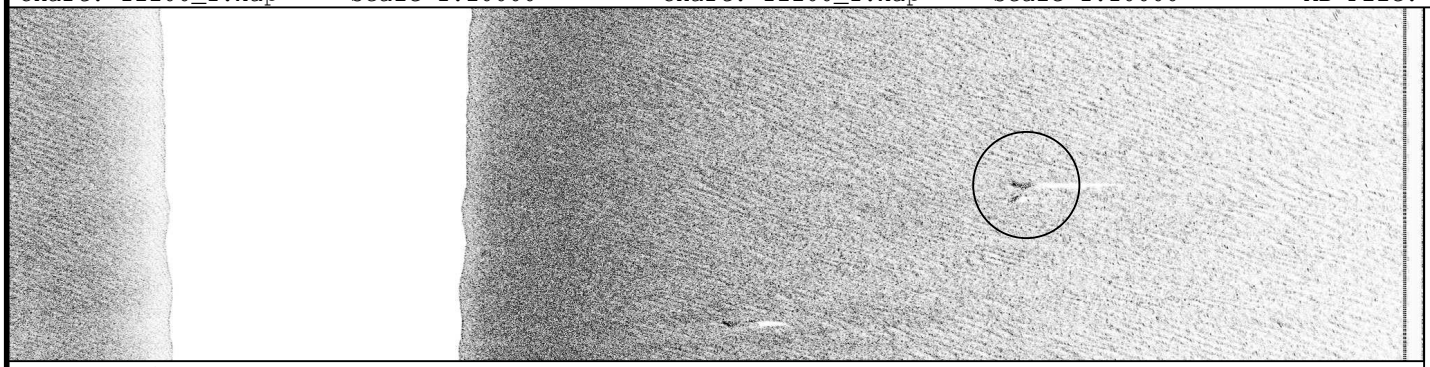


Chart: 12200_1.kap Scale 1:10000

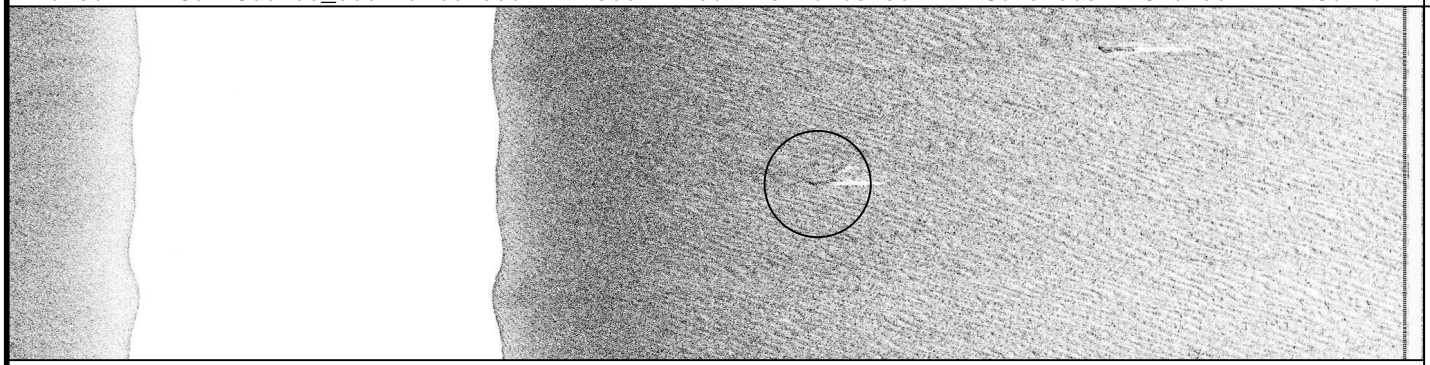


MB File: asmba06200.d17 Scale 1:500



ID: 56 File: AS06200_060719160100.XTF 38.421108N 074.763458W RNG: 32.03 HGT: 0.77 HDG: 197

COMMENT:
OBSTRS. No plot NONSIG. See Feature 13.



ID: 58 File: AS06200_060719191700.XTF 38.421067N 074.763307W RNG: 22.59 HGT: 0.88 HDG: 015

CORRELATED SS CONTACTS:

Contact	Range/Height
200/163945	32.03/0.77
200/194846	22.59/0.88

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0011 Least Depth: 85(ft), 25.94(m) Lat: 38 25 21.18N Lon: 074 45 58.23W Ping: 17612 Beam: 34

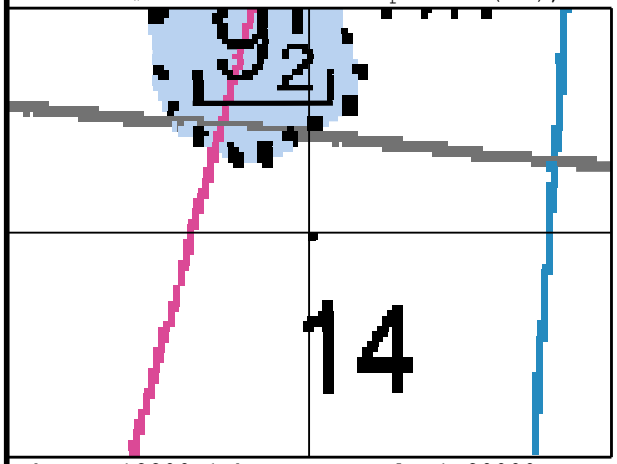


Chart: 12200_1.kap Scale 1:20000

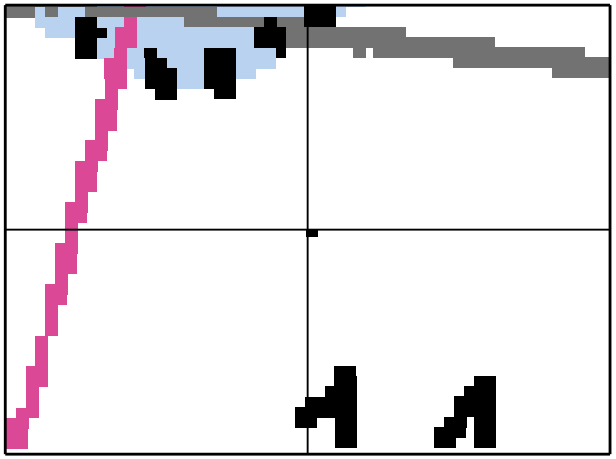
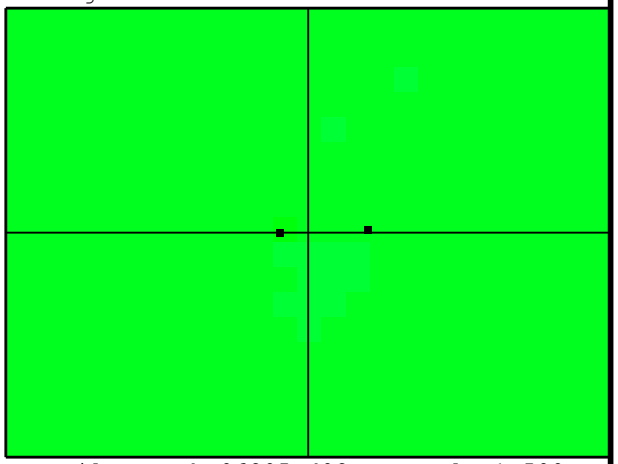
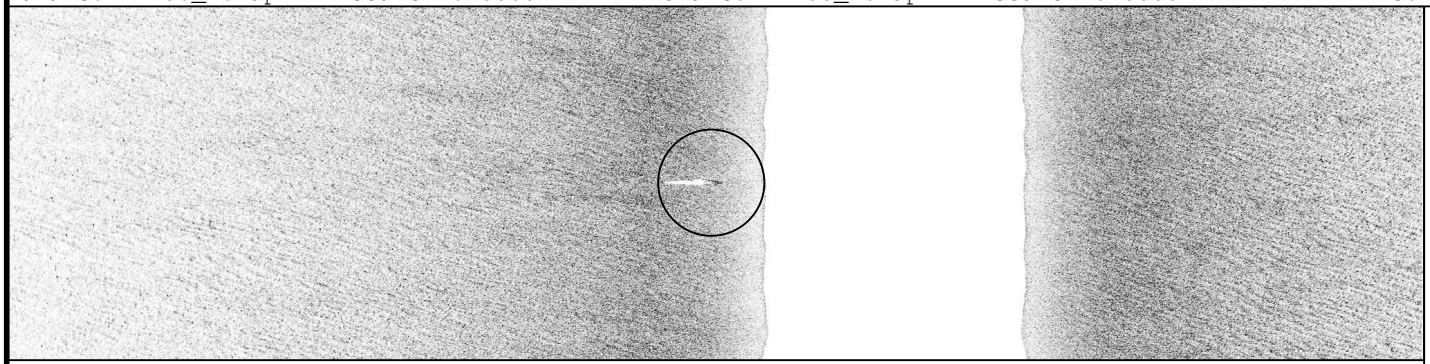


Chart: 12200_1.kap Scale 1:10000

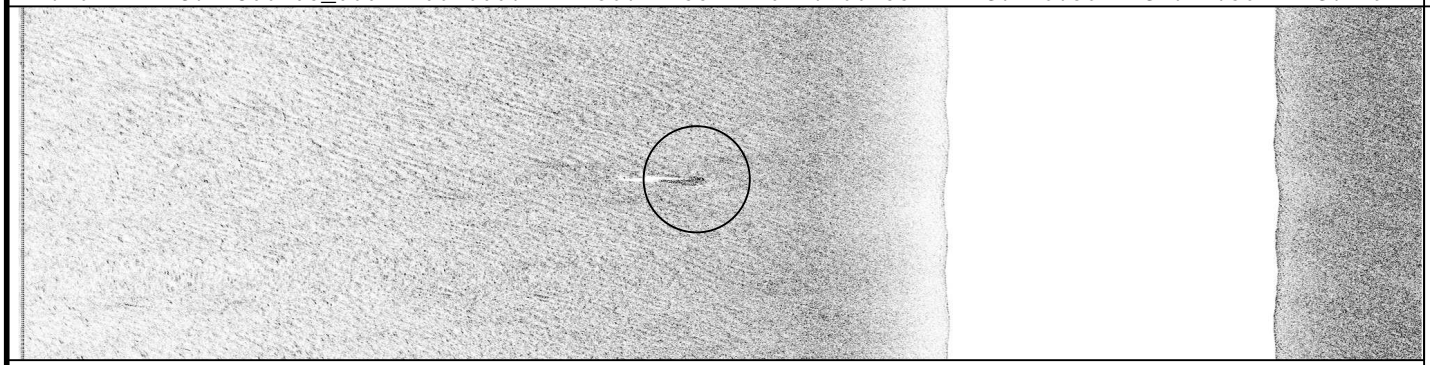


MB File: asmba06205.d02 Scale 1:500



ID: 62 File: AS06205_060724064600.XTF 38.422557N 074.766253W RNG: -8.38 HGT: 1.38 HDG: 194

COMMENT:
OBSTR. No plot NONSIG. See Feature 13.



ID: 60 File: AS06200_060719212500.XTF 38.422561N 074.766044W RNG: -18.84 HGT: 0.78 HDG: 021

CORRELATED SS CONTACTS:

Contact	Range/Height
205/072107	-8.38/1.38
200/215825	-18.84/0.78

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0012 Least Depth: 82(ft), 25.05(m) Lat: 38 25 48.00N Lon: 074 45 59.14W Ping: 15561 Beam: 82

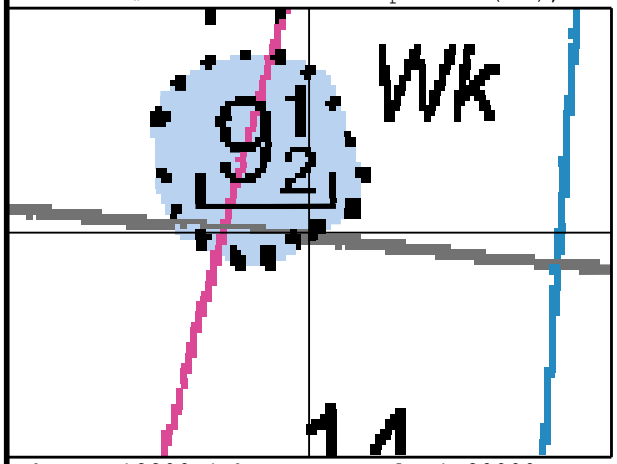


Chart: 12200_1.kap Scale 1:20000

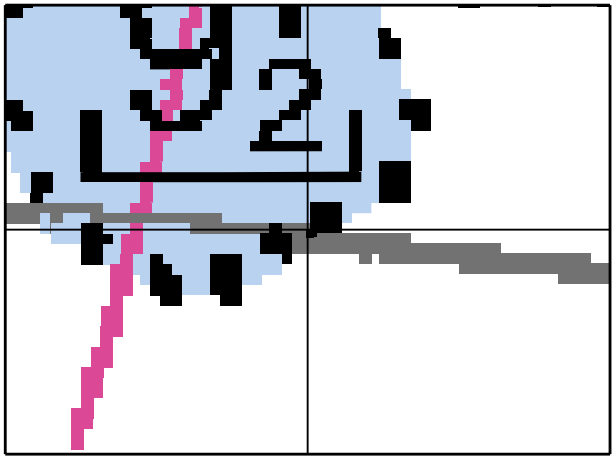
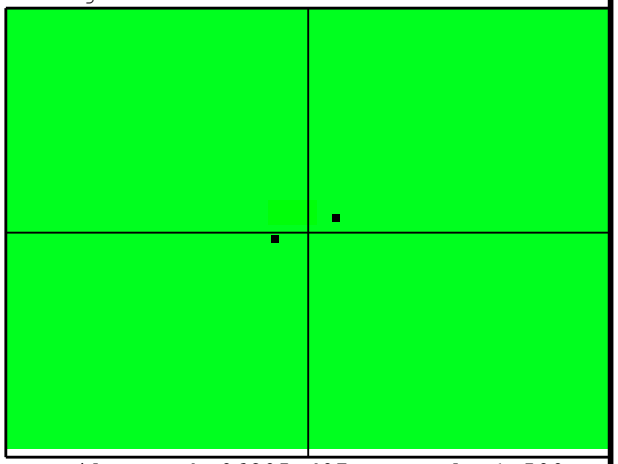
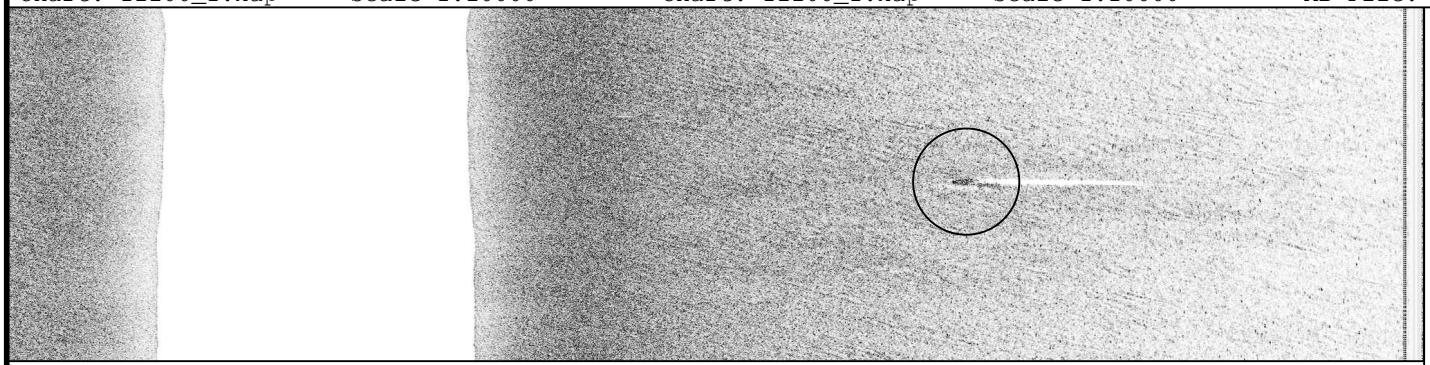


Chart: 12200_1.kap Scale 1:10000

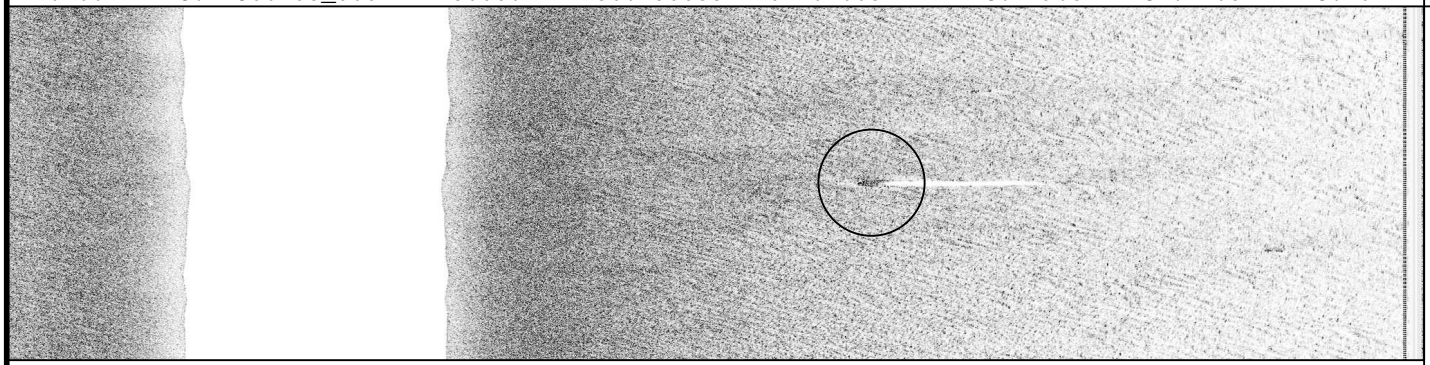


MB File: asmba06205.d07 Scale 1:500



ID: 66 File: AS06205_060724115800.XTF 38.430033N 074.766371W RNG: 29.31 HGT: 1.37 HDG: 011

COMMENT:
OBSTR. No plot NONSIG. See Feature 24.



ID: 72 File: AS06205_060724170000.XTF 38.429996N 074.766517W RNG: 25.03 HGT: 1.32 HDG: 194

CORRELATED SS CONTACTS:

Contact	Range/Height
205/123129	29.31/1.37
205/173031	25.03/1.32

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0013 Least Depth: 84(ft), 25.56(m) Lat: 38 25 26.38N Lon: 074 46 04.45W Ping: 18168 Beam: 77

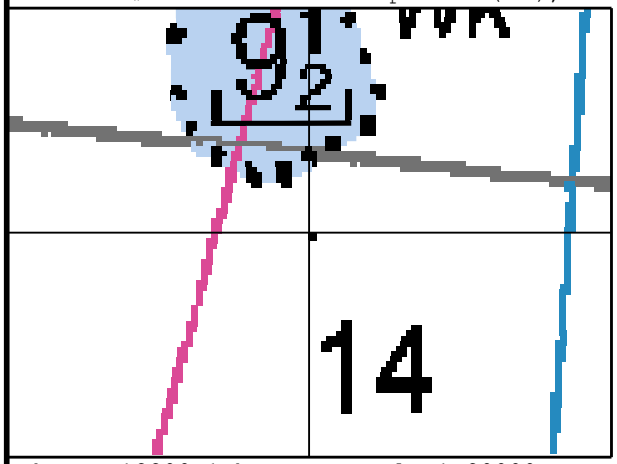


Chart: 12200_1.kap Scale 1:20000

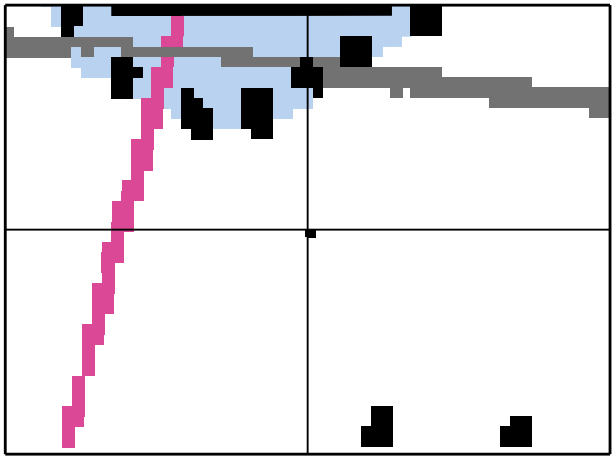
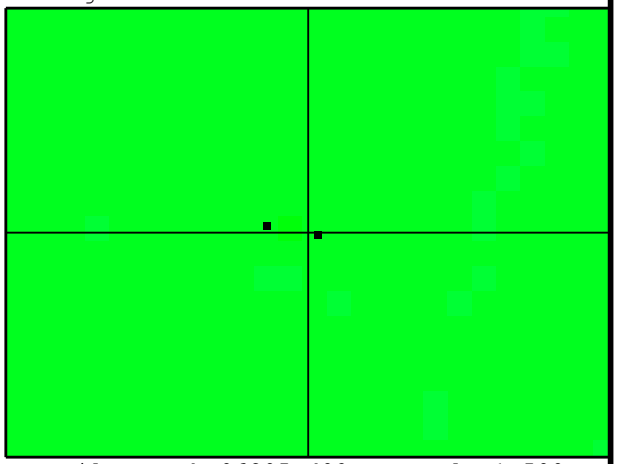
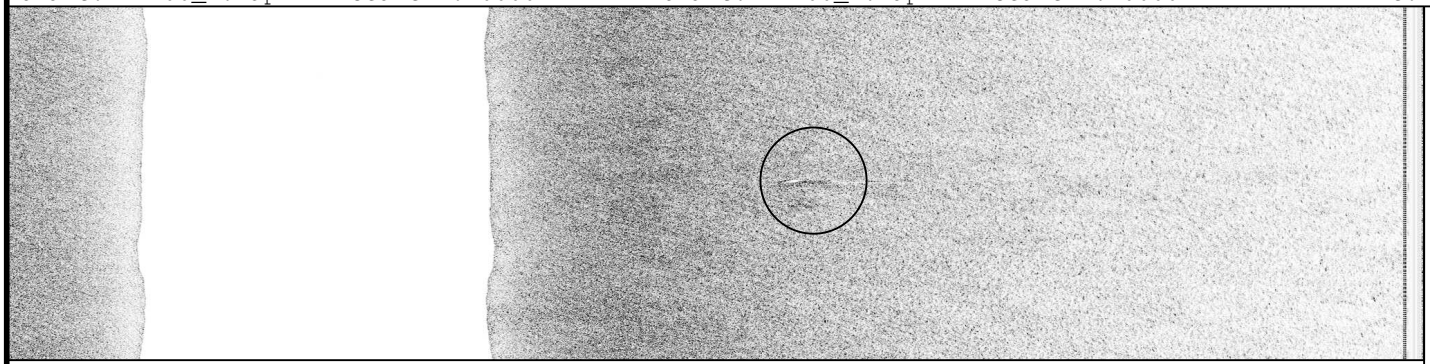


Chart: 12200_1.kap Scale 1:10000

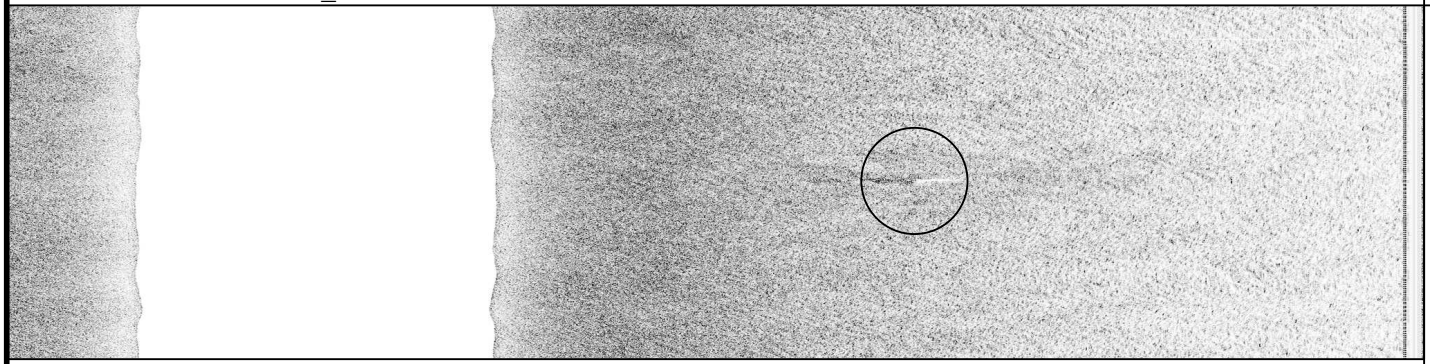


MB File: asmba06205.d09 Scale 1:500



ID: 68 File: AS06205_060724135800.XTF 38.423996N 074.767890W RNG: 22.41 HGT: 1.13 HDG: 019

COMMENT:
OBSTR. Plot Sounding and label 'Obstns'.



ID: 65 File: AS06205_060724105200.XTF 38.424014N 074.768009W RNG: 26.97 HGT: 0.61 HDG: 200

CORRELATED SS CONTACTS:

Contact	Range/Height
205/143016	22.41/1.13
205/112659	26.97/0.61

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0014 Least Depth: 82(ft), 25.12(m) Lat: 38 25 50.93N Lon: 074 45 54.19W Ping: 19921 Beam: 87

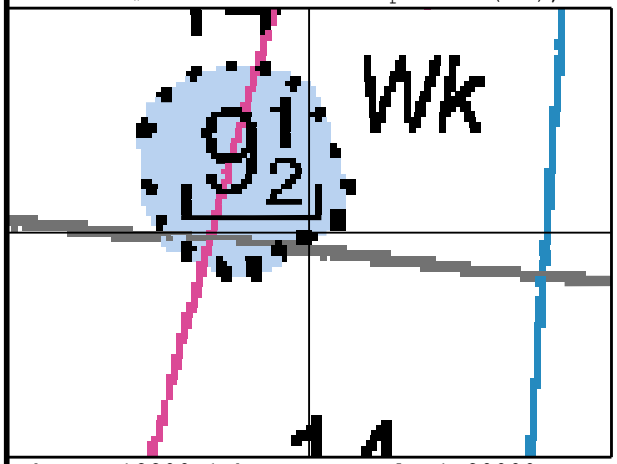


Chart: 12200_1.kap Scale 1:20000

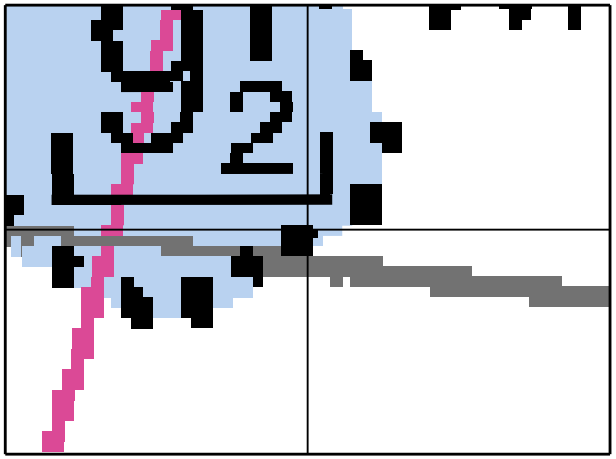
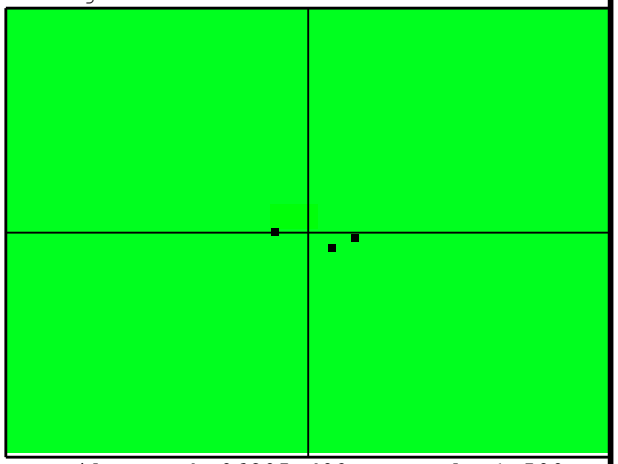
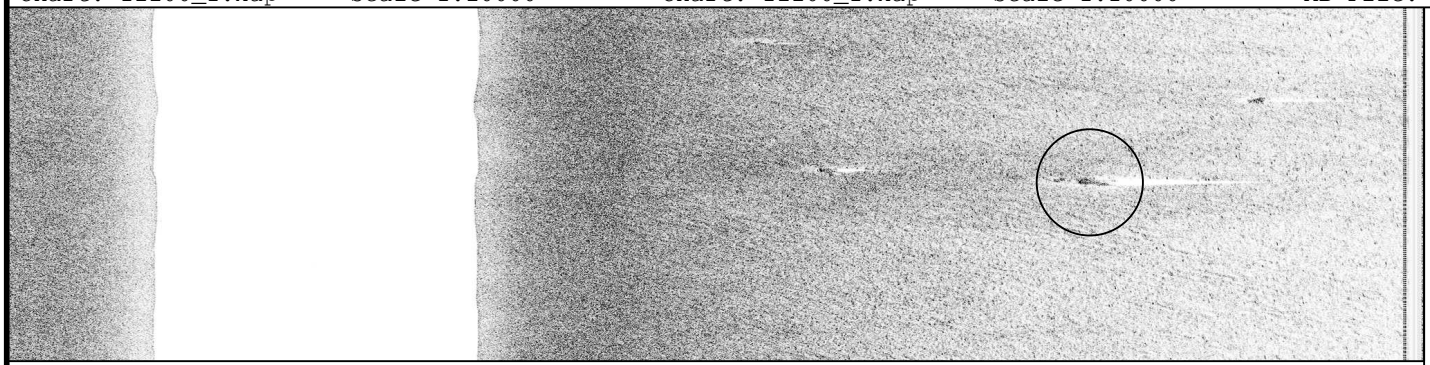


Chart: 12200_1.kap Scale 1:10000

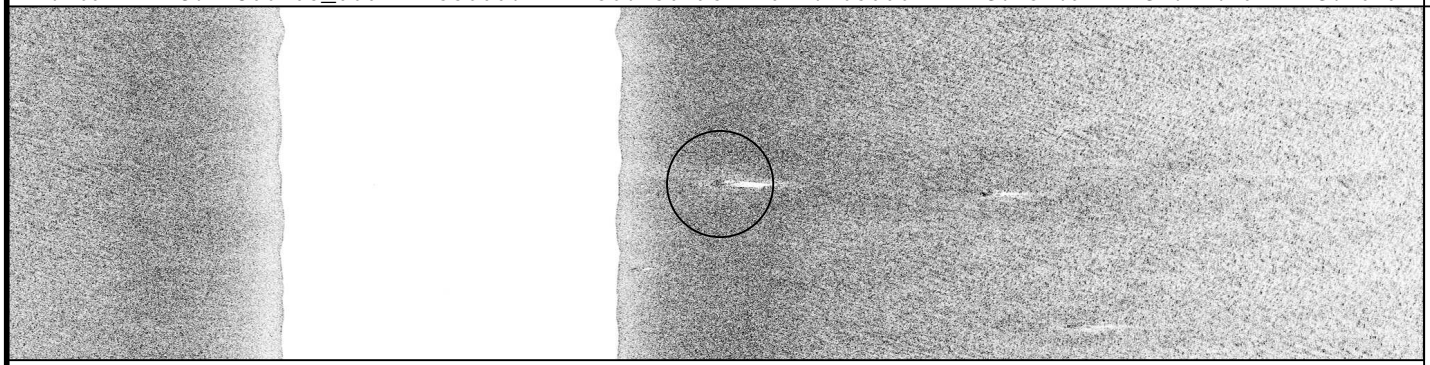


MB File: asmba06205.d09 Scale 1:500



ID: 69 File: AS06205_060724135800.XTF 38.430795N 074.765006W RNG: 34.91 HGT: 1.19 HDG: 019

COMMENT:
OBSTRS. No plot NONSIG. See Feature 24.



ID: 64 File: AS06205_060724105200.XTF 38.430824N 074.765141W RNG: 12.12 HGT: 1.53 HDG: 197

CORRELATED SS CONTACTS:

Contact	Range/Height
205/143316	34.91/1.19
205/112345	12.12/1.53
205/082426	-40.00/1.35

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0015 Least Depth: 83(ft), 25.39(m) Lat: 38 27 37.58N Lon: 074 45 37.97W Ping: 23887 Beam: 32

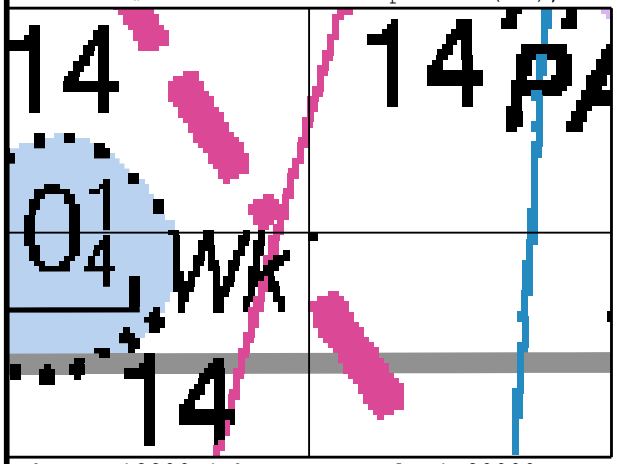


Chart: 12200_1.kap Scale 1:20000

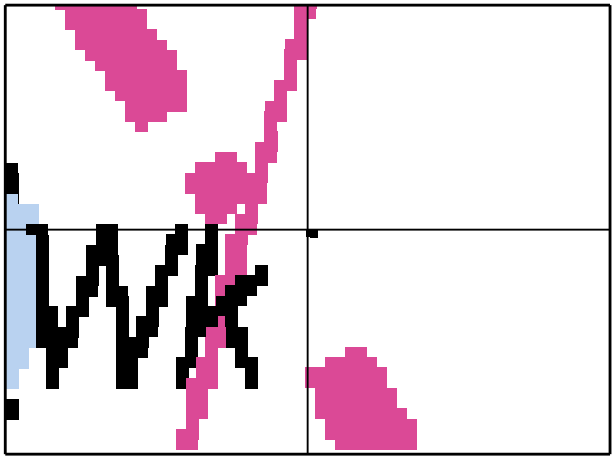
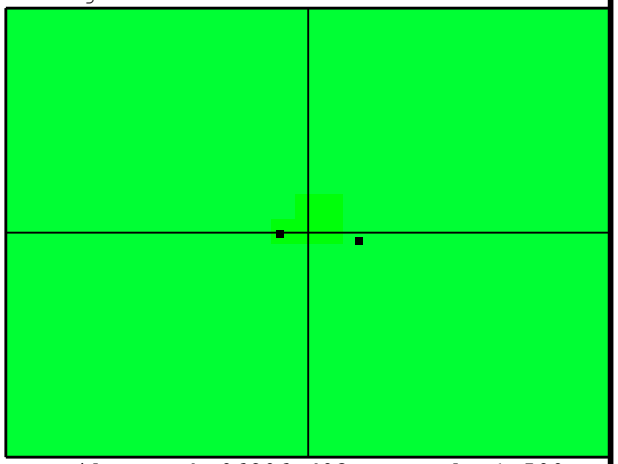
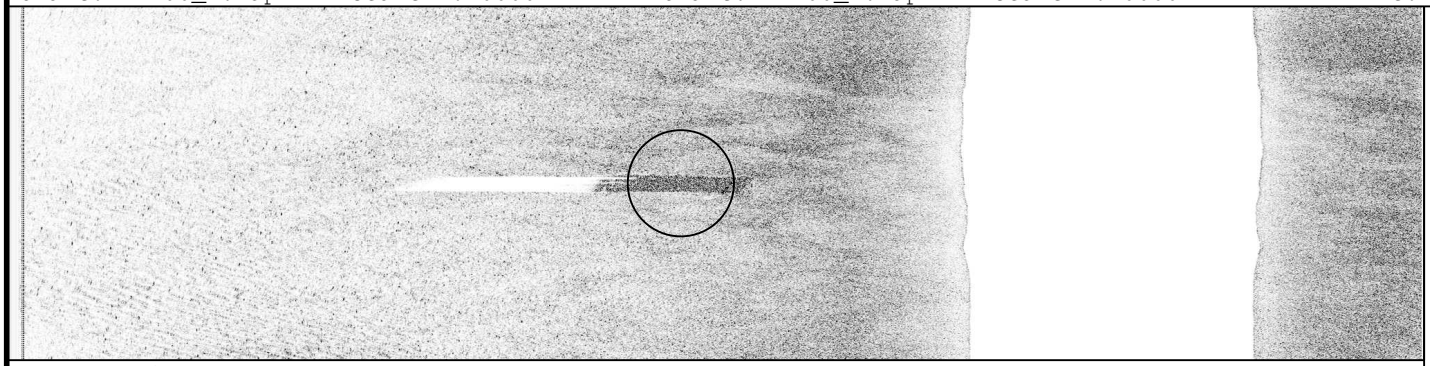


Chart: 12200_1.kap Scale 1:10000

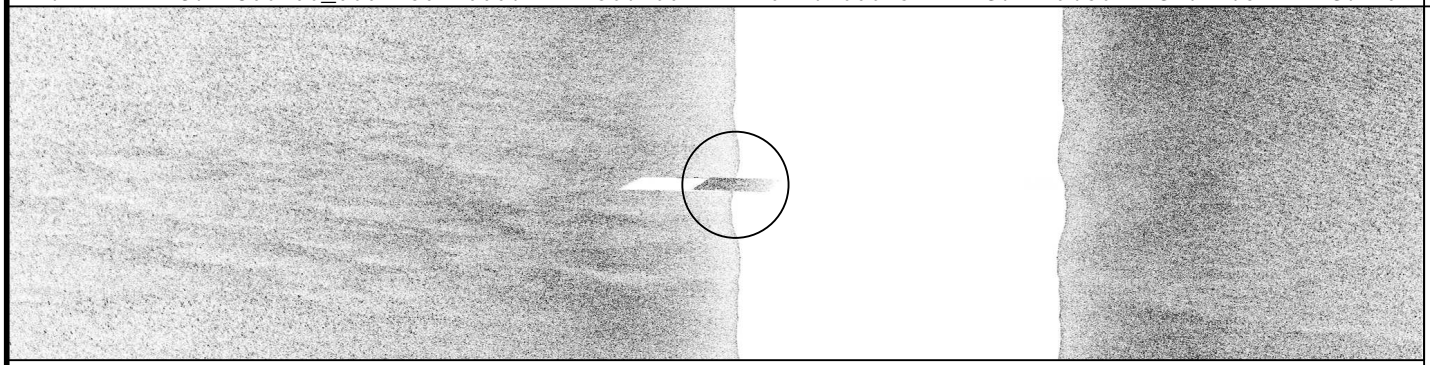


MB File: asmba06206.d03 Scale 1:500



ID: 77 File: AS06206_060725041000.XTF 38.460444N 074.760623W RNG: -19.56 HGT: 1.54 HDG: 197

COMMENT:
OBSTR. Plot Sounding and label 'Obstn'.



ID: 76 File: AS06206_060725011800.XTF 38.460430N 074.760437W RNG: -7.47 HGT: 1.20 HDG: 016

CORRELATED SS CONTACTS:

Contact	Range/Height
206/042206	-19.56/1.54
206/020254	-7.47/1.20

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0016 Least Depth: 70(ft), 21.38(m) Lat: 38 27 39.83N Lon: 074 49 17.55W Ping: 3519 Beam: 80

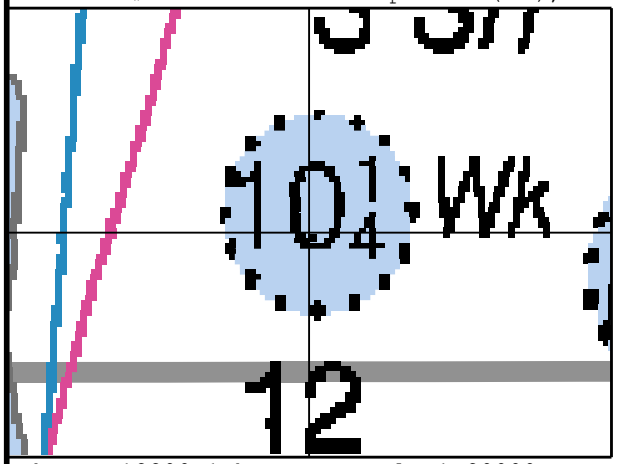


Chart: 12200_1.kap Scale 1:20000

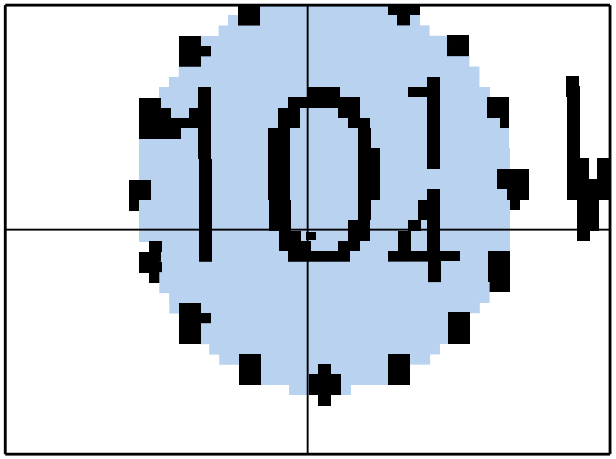
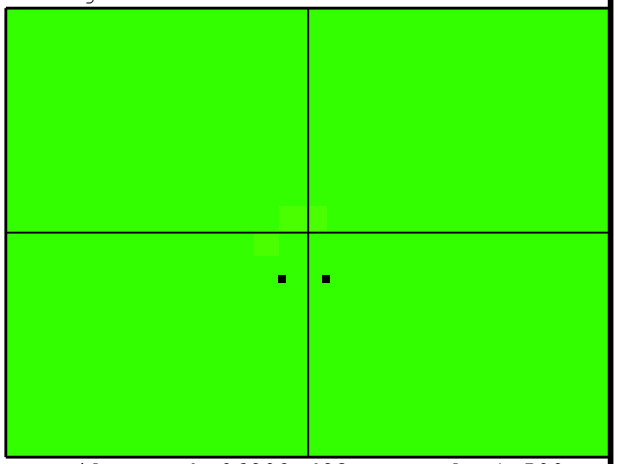
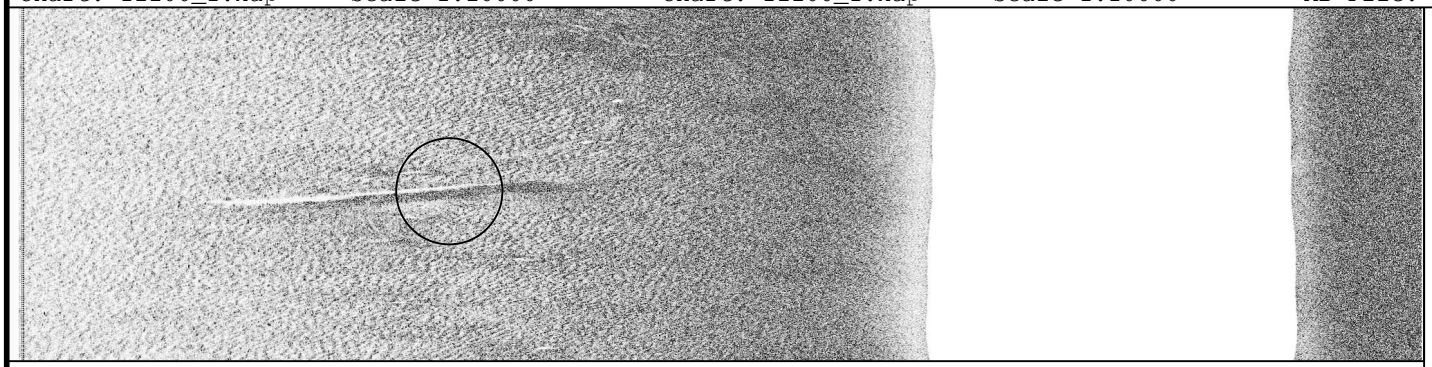


Chart: 12200_1.kap Scale 1:10000

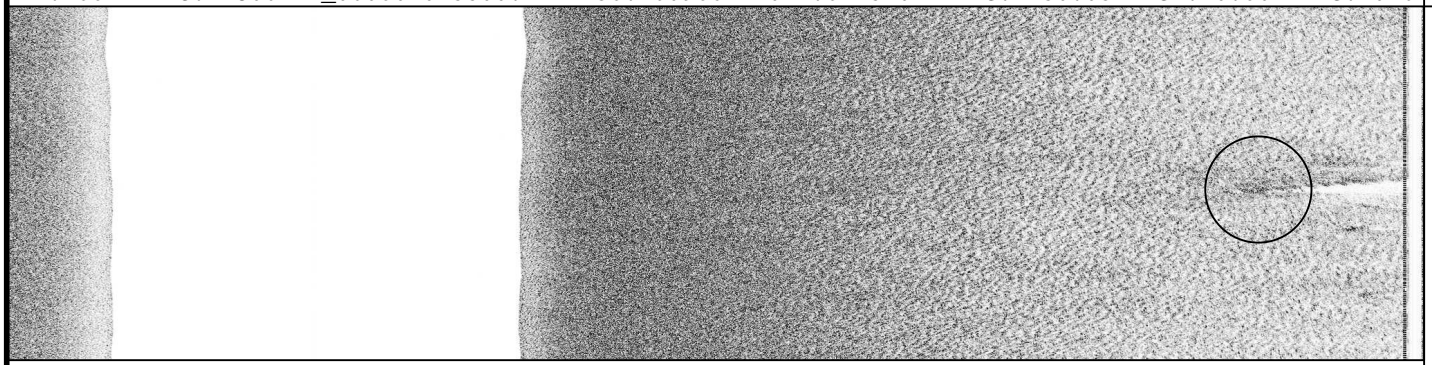


MB File: asmba06208.d23 Scale 1:500



ID: 88 File: AS06214_060802025500.XTF 38.460988N 074.821510W RNG: -30.03 HGT: 0.80 HDG: 016

COMMENT:
OBSTR. No plot NONSIG. See Feature 18.



ID: 96 File: AS06214_060802090300.XTF 38.460989N 074.821614W RNG: 42.53 HGT: 1.14 HDG: 015

CORRELATED SS CONTACTS:

Contact	Range/Height
214/033645	-30.03/0.80
214/094522	42.53/1.14

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0017 Least Depth: 54(ft), 16.59(m) Lat: 38 23 12.96N Lon: 074 50 29.32W Ping: 29353 Beam: 70

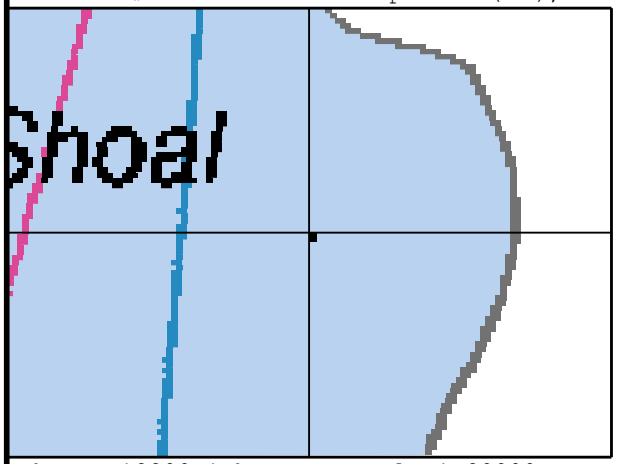


Chart: 12200_1.kap Scale 1:20000

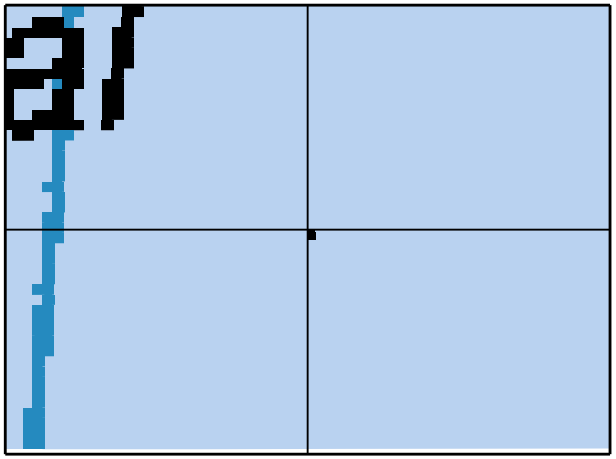
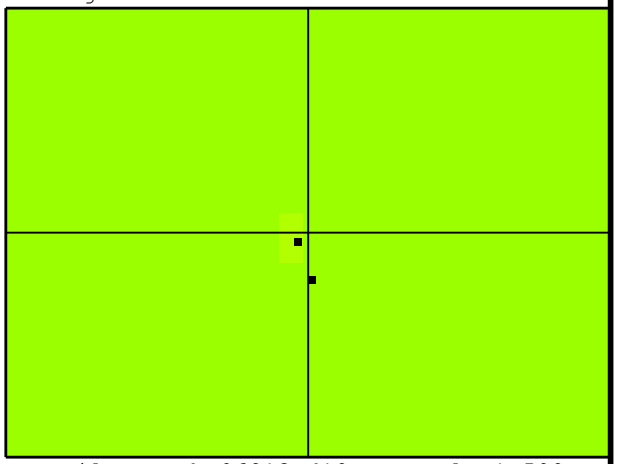
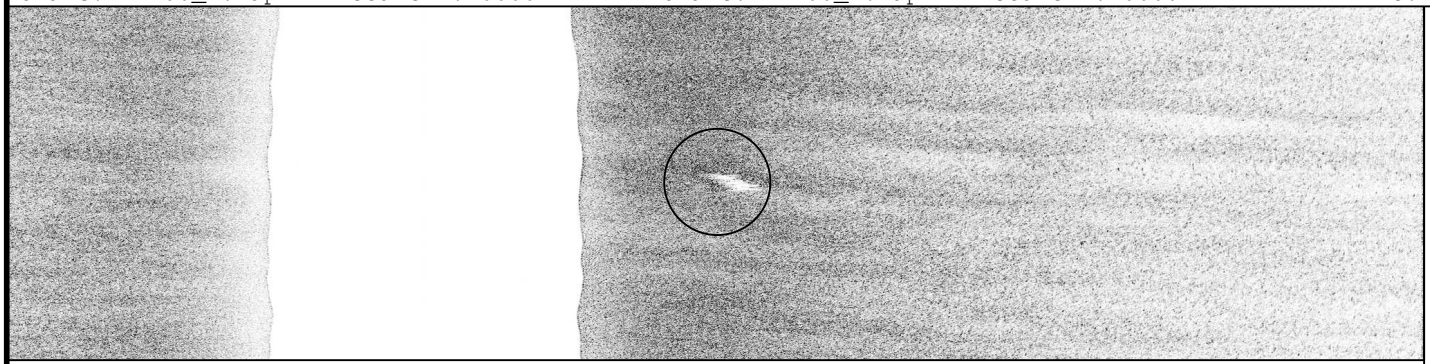


Chart: 12200_1.kap Scale 1:10000

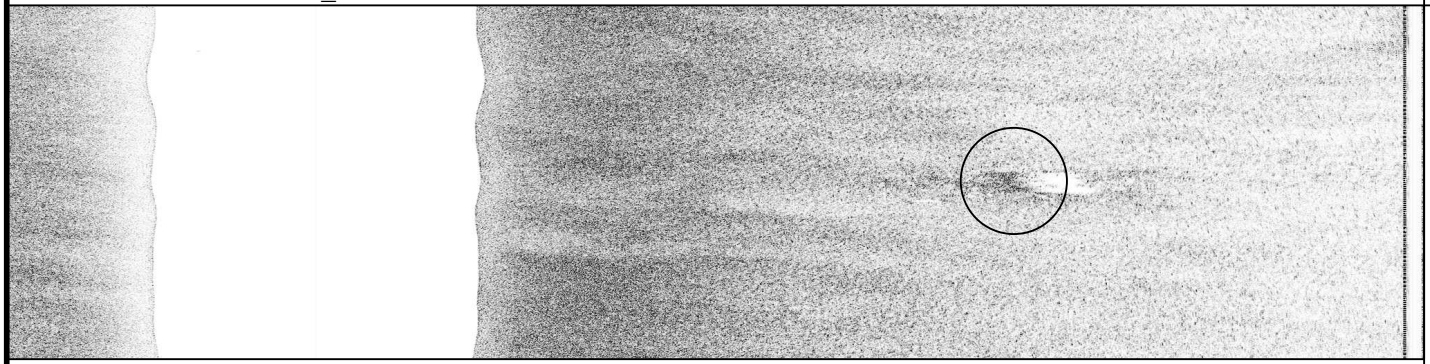


MB File: asmba06213.d10 Scale 1:500



ID: 81 File: AS06213_060801081200.XTF 38.386924N 074.841511W RNG: 13.12 HGT: 0.75 HDG: 200

COMMENT:
OBSTR. No plot NONSIG.



ID: 82 File: AS06213_060801111000.XTF 38.386856N 074.841476W RNG: 31.47 HGT: 0.56 HDG: 018

CORRELATED SS CONTACTS:

Contact	Range/Height
213/090418	13.12/0.75
213/112014	31.47/0.56

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0018 Least Depth: 62(ft), 18.96(m) Lat: 38 27 41.42N Lon: 074 49 12.87W Ping: 30225 Beam: 20

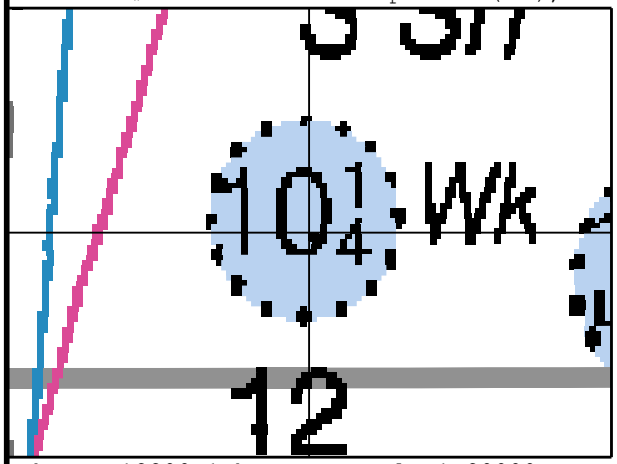


Chart: 12200_1.kap Scale 1:20000

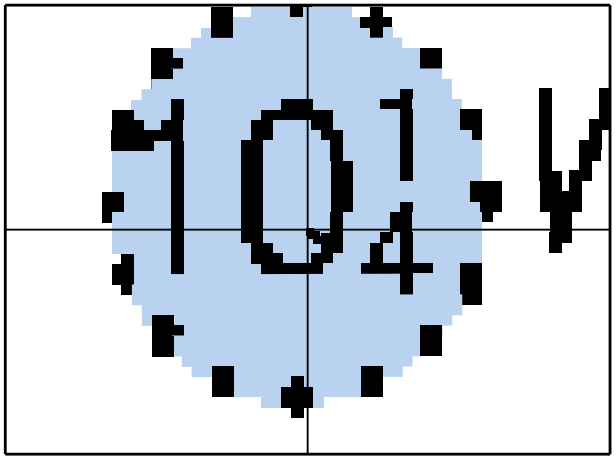
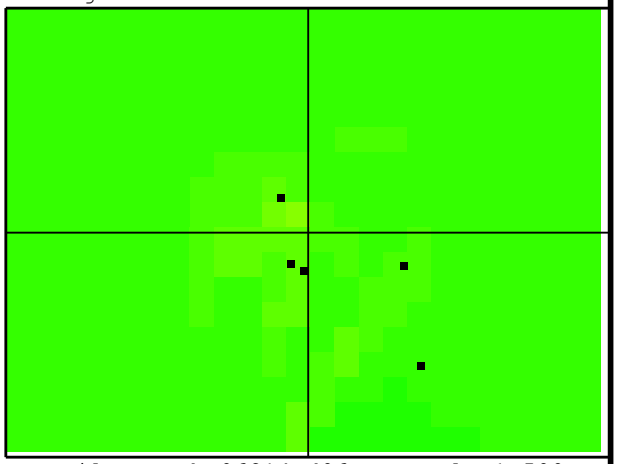
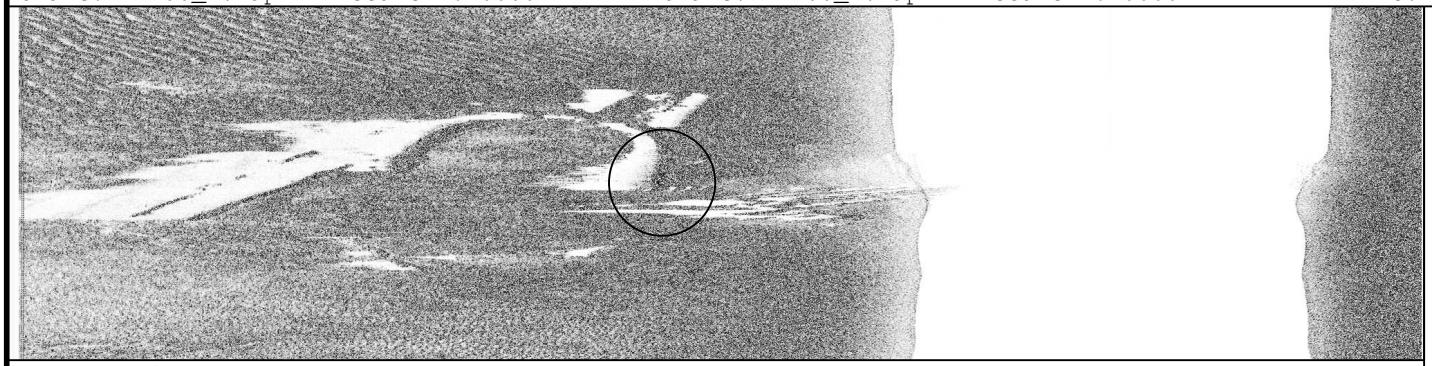


Chart: 12200_1.kap Scale 1:10000

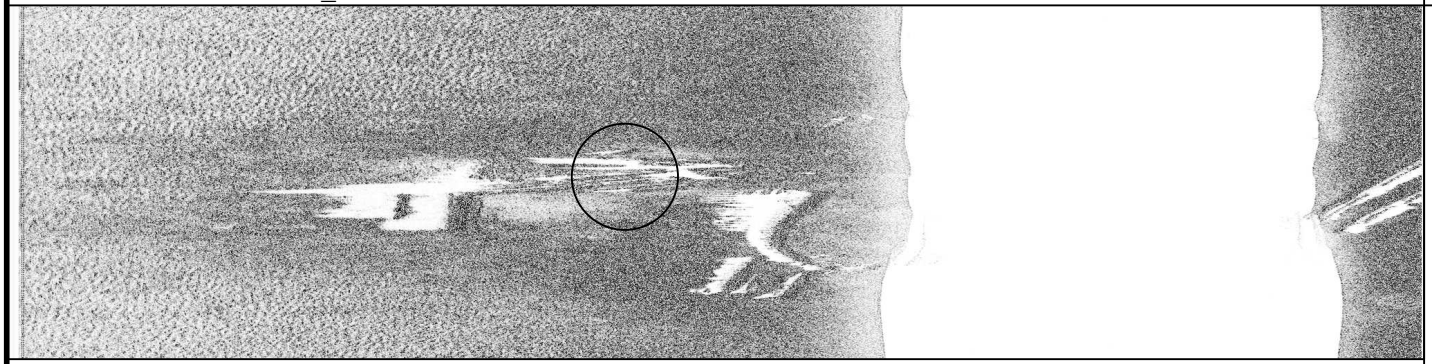


MB File: asmba06214.d06 Scale 1:500



ID: 94 File: AS06214_060802080300.XTF 38.461455N 074.820290W RNG: -20.41 HGT: 1.97 HDG: 195

COMMENT:
"WRECK. DANGEROUS WRECK. Plot sounding and label ""Wk""."



ID: 90 File: AS06214_060802045700.XTF 38.461443N 074.820259W RNG: -22.09 HGT: 2.02 HDG: 023

CORRELATED SS CONTACTS:

Contact	Range/Height
214/082530	-20.41/1.97
214/053943	-22.09/2.02
214/082528	-15.38/2.86
214/021656	42.12/1.14
214/053941	13.31/0.84

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0019 Least Depth: 71(ft), 21.66(m) Lat: 38 27 32.60N Lon: 074 49 21.32W Ping: 31312 Beam: 86

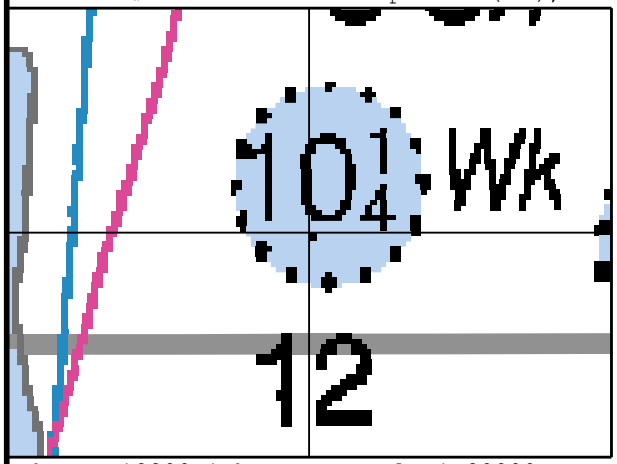


Chart: 12200_1.kap Scale 1:20000

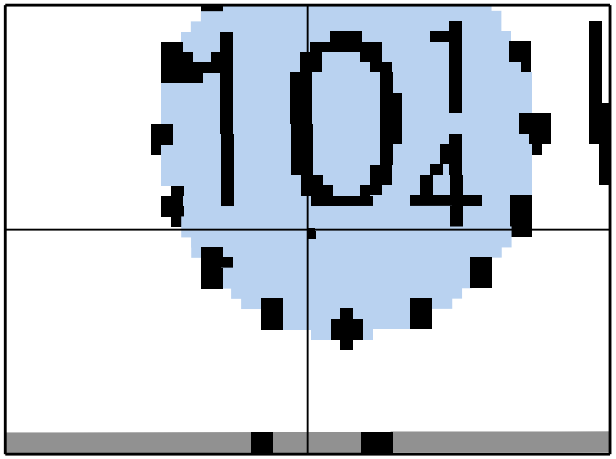
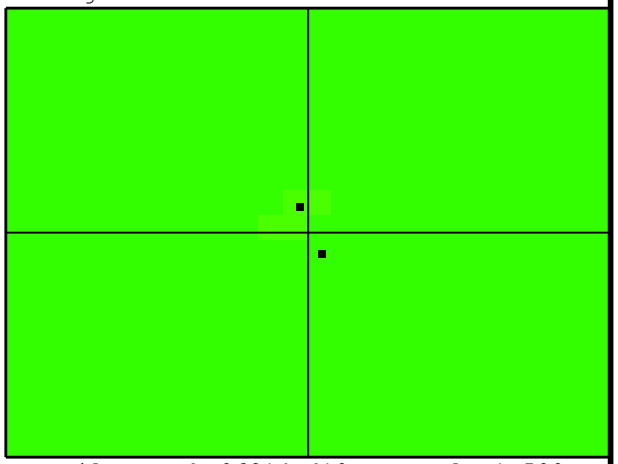
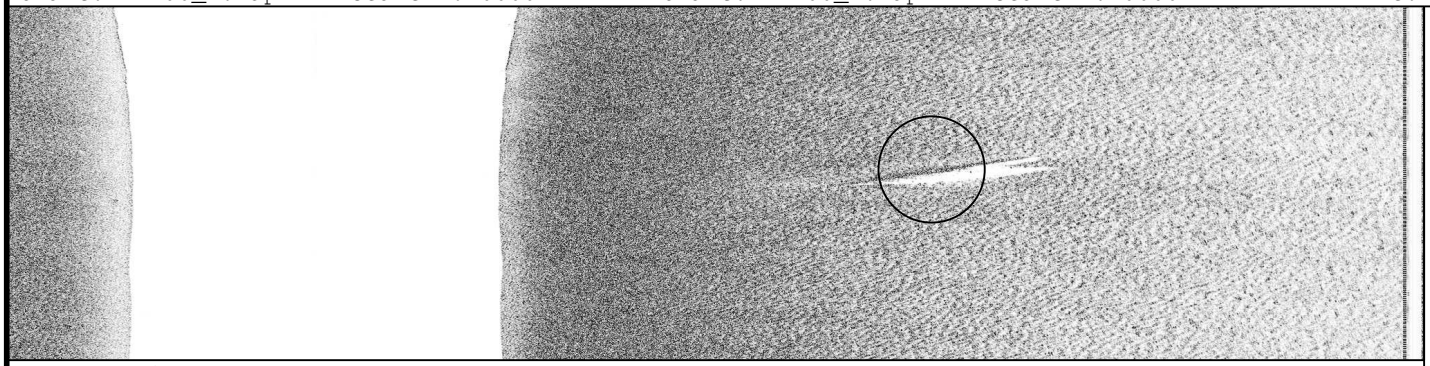


Chart: 12200_1.kap Scale 1:10000

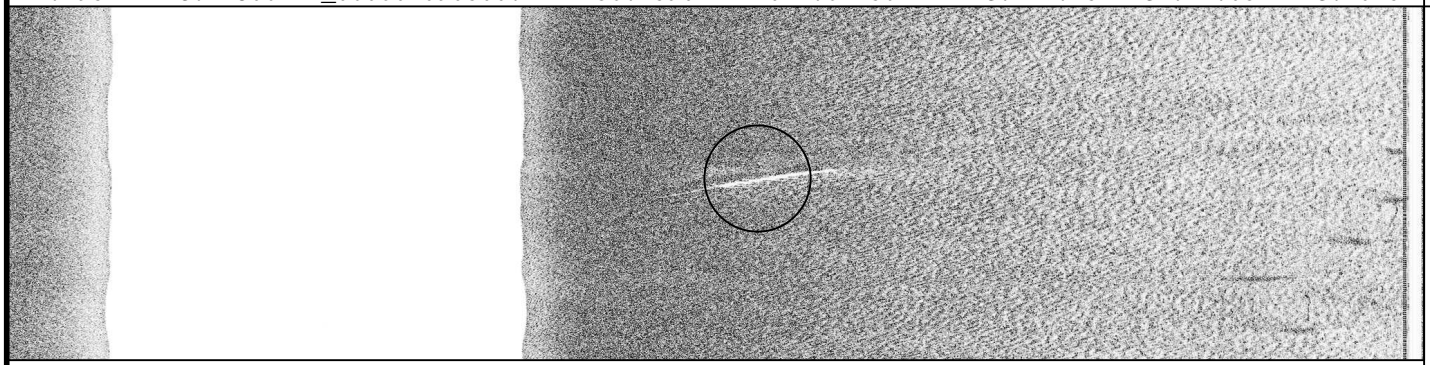


MB File: asmba06214.d10 Scale 1:500



ID: 95 File: AS06214_060802090300.XTF 38.459024N 074.822564W RNG: 27.75 HGT: 1.03 HDG: 015

COMMENT:
OBSTR. No plot NONSIG. See Feature 18.



ID: 91 File: AS06214_060802060000.XTF 38.459109N 074.822617W RNG: 19.88 HGT: 0.00 HDG: 199

CORRELATED SS CONTACTS:

Contact	Range/Height
214/094428	27.75/1.03
214/062419	19.88/0.00

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0020 Least Depth: 98(ft), 29.83(m) Lat: 38 22 46.24N Lon: 074 41 13.65W Ping: 8622 Beam: 74

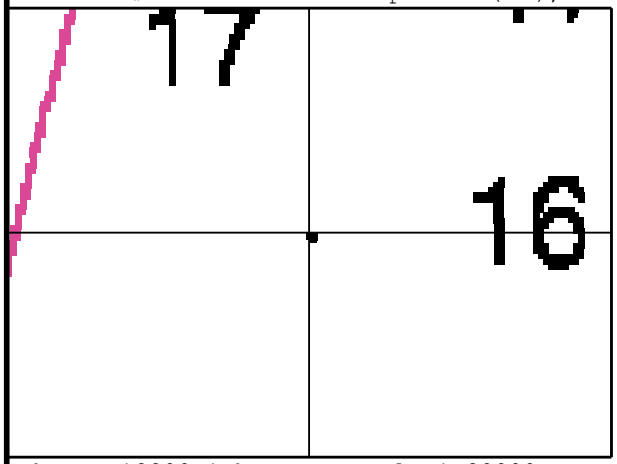


Chart: 12200_1.kap Scale 1:20000

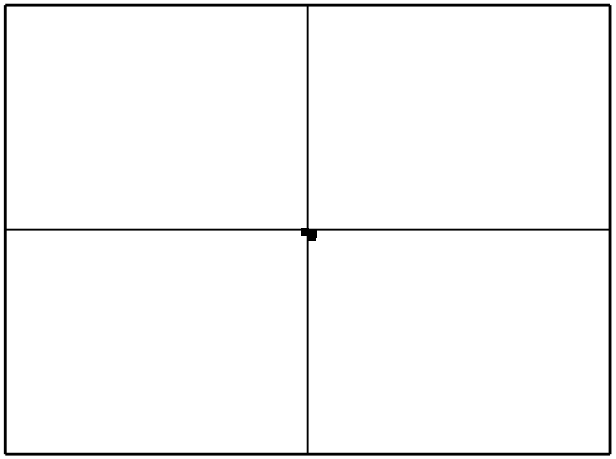
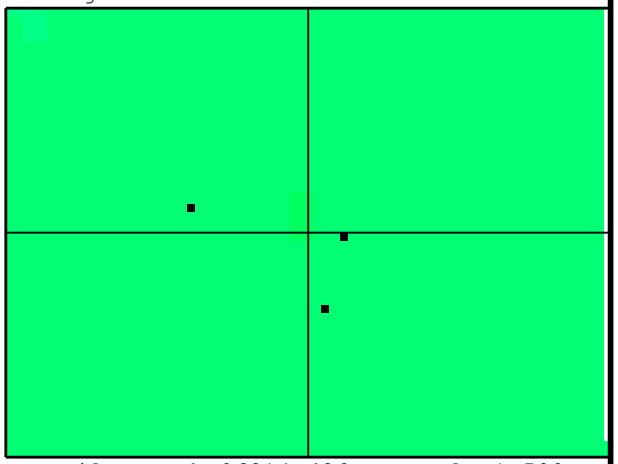
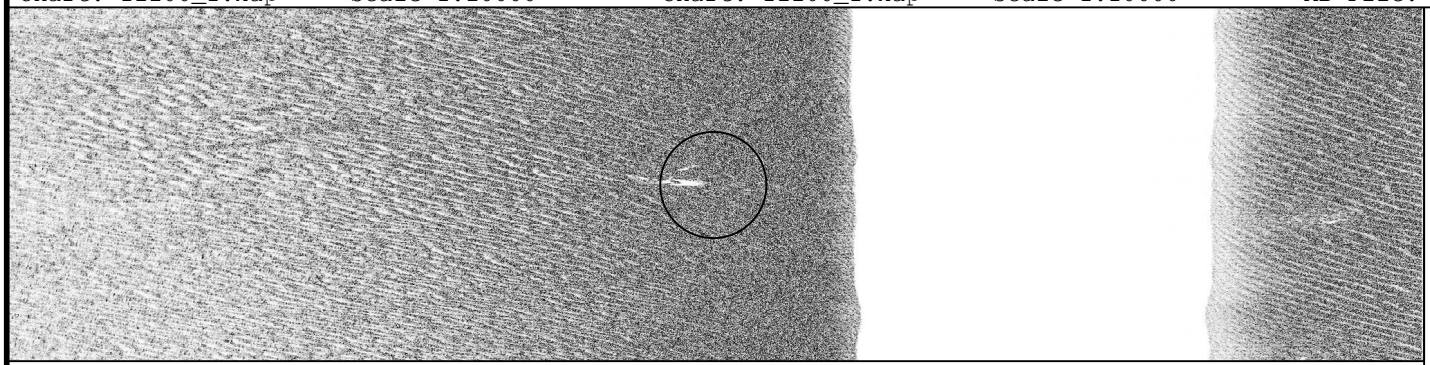


Chart: 12200_1.kap Scale 1:10000

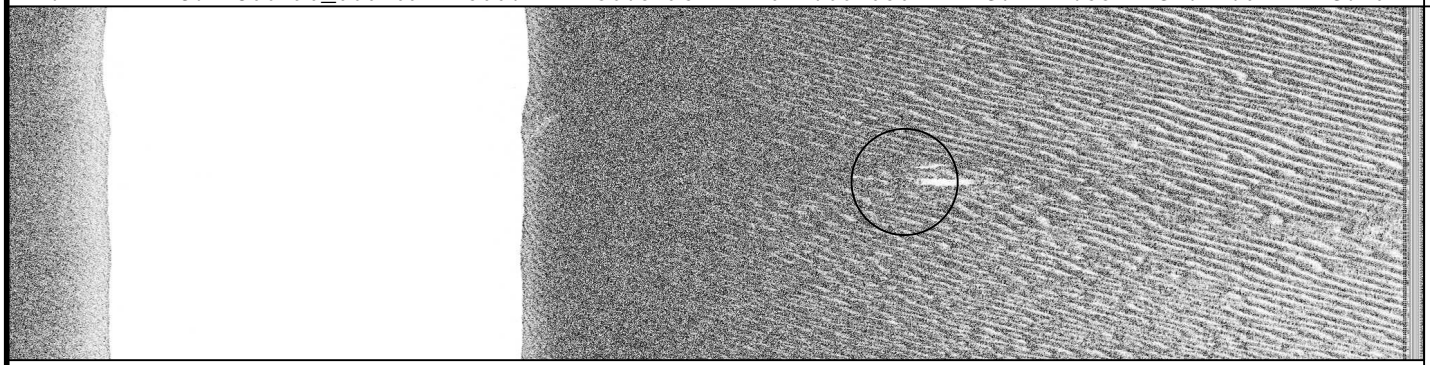


MB File: asmba06214.d26 Scale 1:500



ID: 17 File: AS06190_060709172500.XTF 38.379511N 074.687050W RNG: -14.53 HGT: 1.02 HDG: 014

COMMENT:
OBSTR. No plot NONSIG.



ID: 97 File: AS06214_060802190500.XTF 38.379381N 074.687095W RNG: 26.53 HGT: 0.86 HDG: 024

CORRELATED SS CONTACTS:

Contact	Range/Height
190/174757	-14.53/1.02
214/191107	26.53/0.86
190/194459	-8.12/1.03

Feature excluded from H11555 H-Cell (H-Cell Specs Ver.3, 2008)

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0021 Least Depth: Lat: 38 27 18.45N Lon: 074 41 46.22W

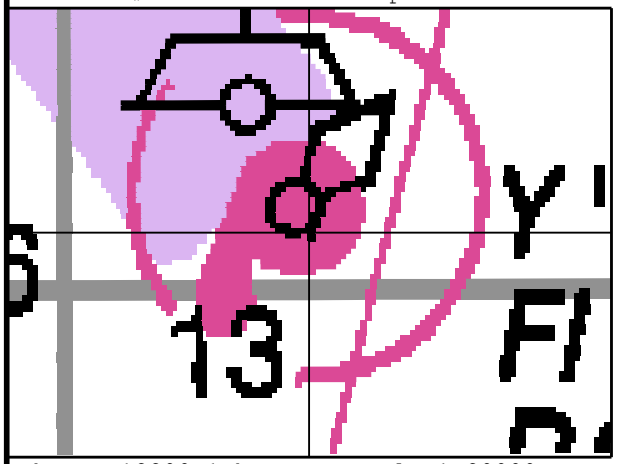


Chart: 12200_1.kap Scale 1:20000

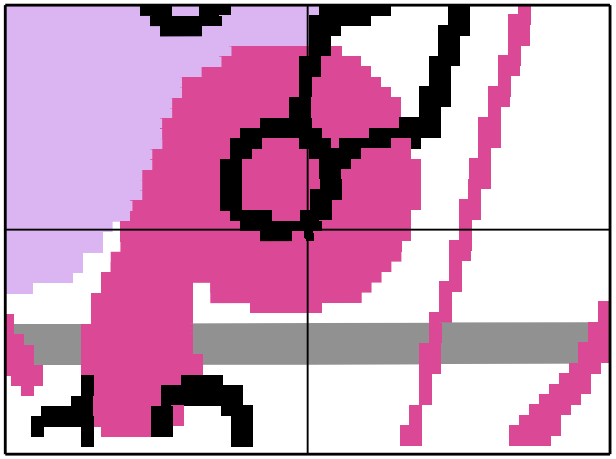
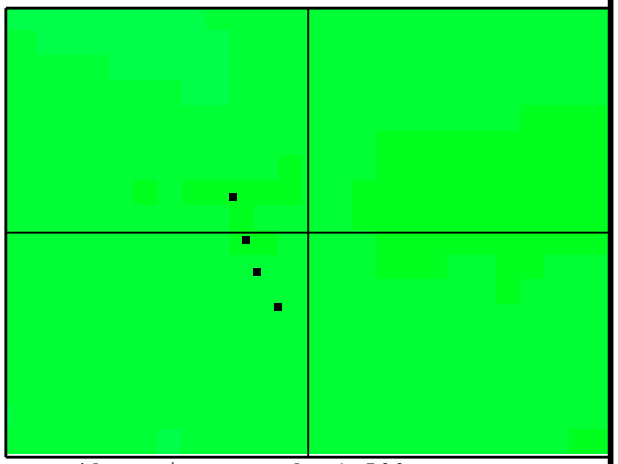
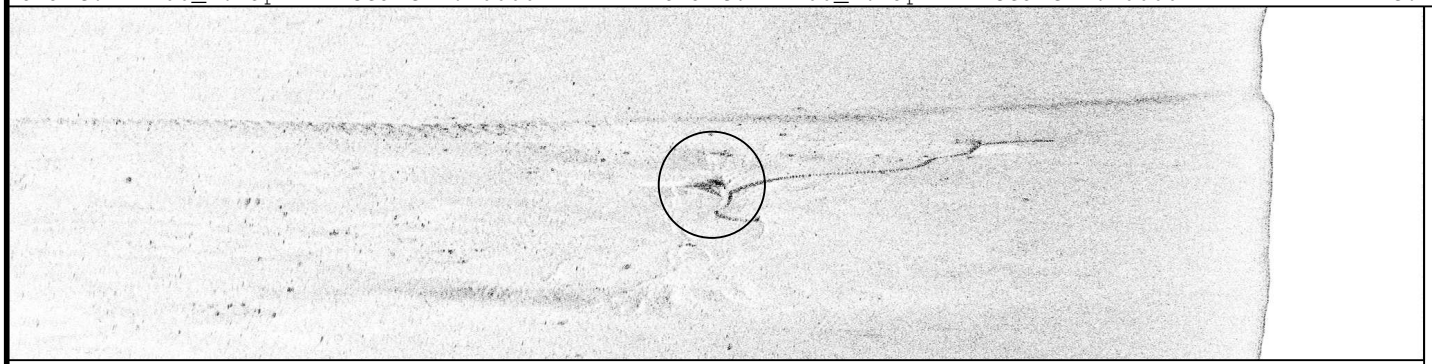


Chart: 12200_1.kap Scale 1:10000

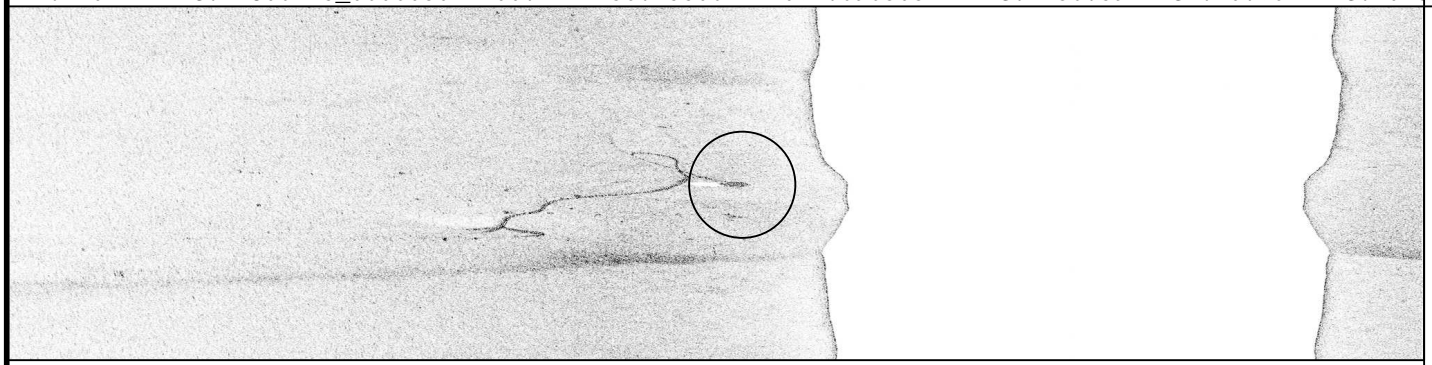


MB File: n/a Scale 1:500



ID: 102 File: AS06215_060803021100.XTF 38.455062N 074.696303W RNG: -36.59 HGT: 0.78 HDG: 015

COMMENT:
BUOY. Plot symbol and label 'Y 'D' Fl Y 6s'.



ID: 100 File: AS06215_060803015600.XTF 38.455120N 074.696328W RNG: -15.16 HGT: 1.78 HDG: 202

CORRELATED SS CONTACTS:

Contact	Range/Height
215/021833	-36.59/0.78
215/020522	-15.16/1.78
176/084058	-39.09/0.62
176/145911	-32.81/0.92

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0022 Least Depth: 90(ft), 27.39(m) Lat: 38 27 16.97N Lon: 074 41 48.70W Ping: 5263 Beam: 76

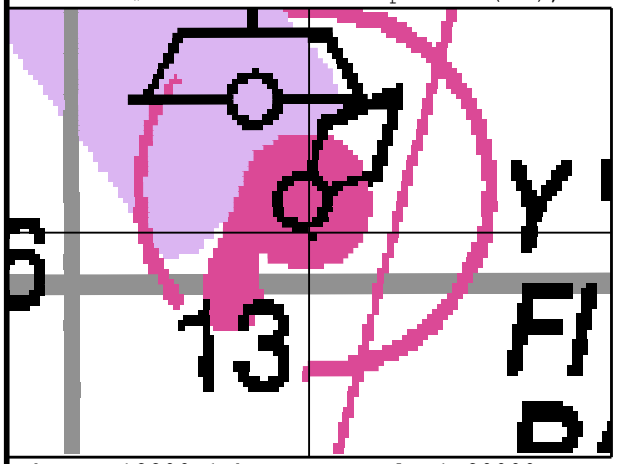


Chart: 12200_1.kap Scale 1:20000

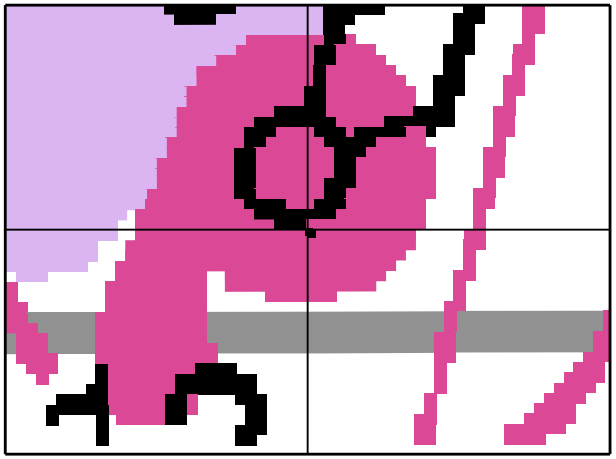
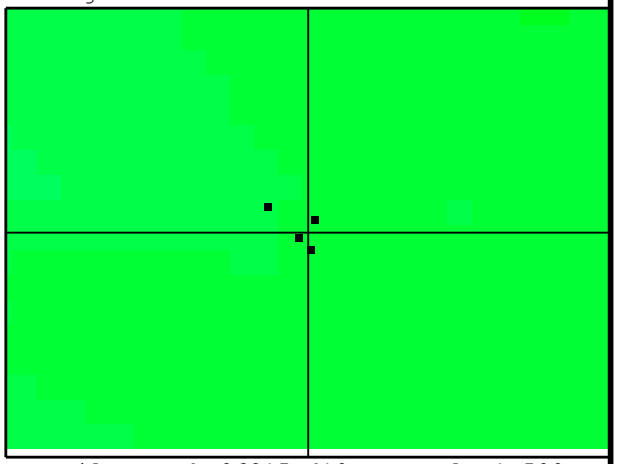
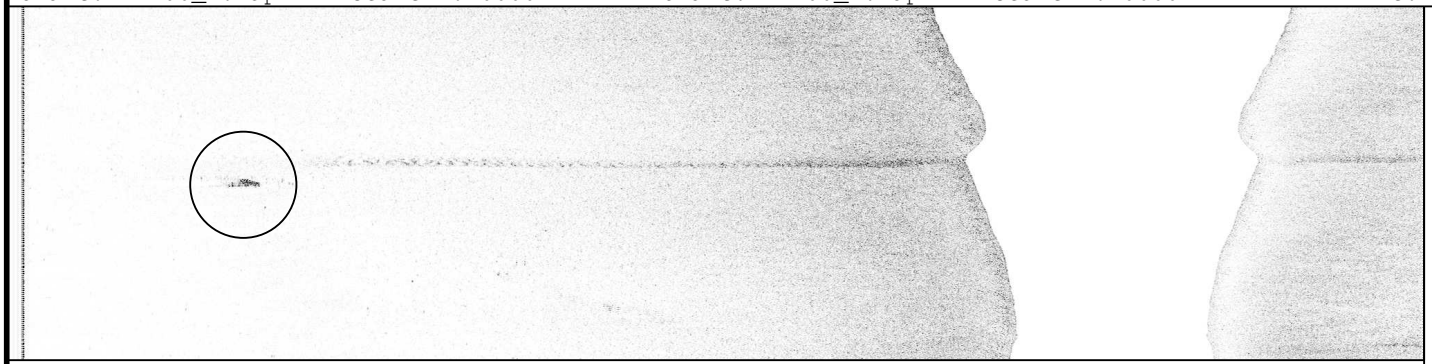


Chart: 12200_1.kap Scale 1:10000

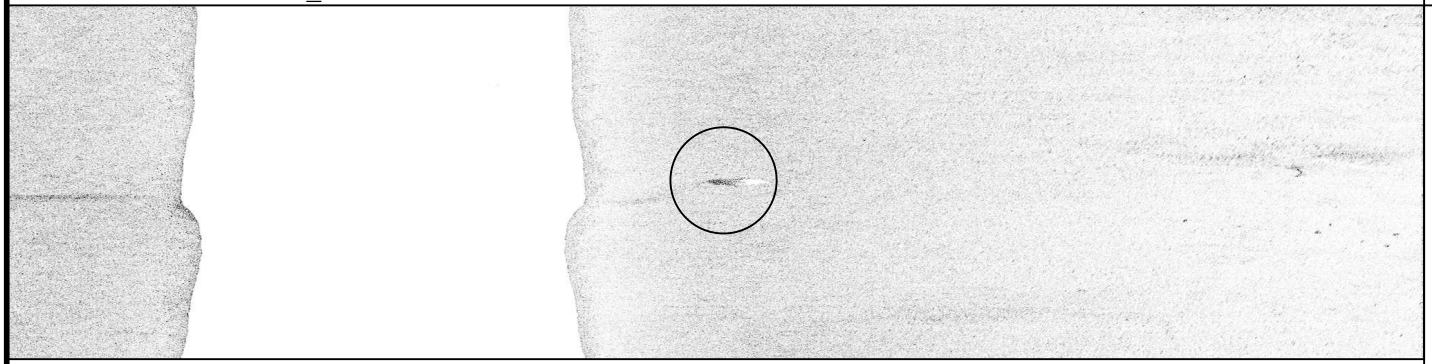


MB File: asmba06215.d10 Scale 1:500



ID: 9 File: AS06176_060625062900.XTF 38.454712N 074.696892W RNG: -39.34 HGT: 0.63 HDG: 205

COMMENT:
OBSTR. No plot NONSIG.



ID: 12 File: AS06176_060625103100.XTF 38.454689N 074.696864W RNG: 15.31 HGT: 0.81 HDG: 022

CORRELATED SS CONTACTS:

Contact	Range/Height
176/065901	-39.34/0.63
176/112032	15.31/0.81
215/020540	24.09/0.97
176/145928	-14.03/1.09

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0023 Least Depth: 74(ft), 22.52(m) Lat: 38 27 25.33N Lon: 074 47 06.89W Ping: 1659 Beam: 87

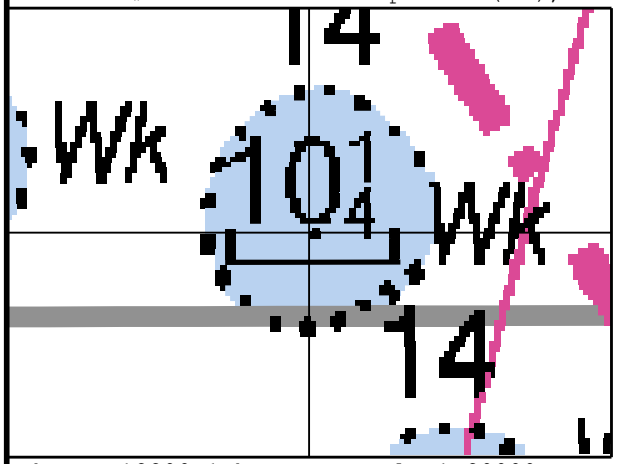


Chart: 12200_1.kap Scale 1:20000

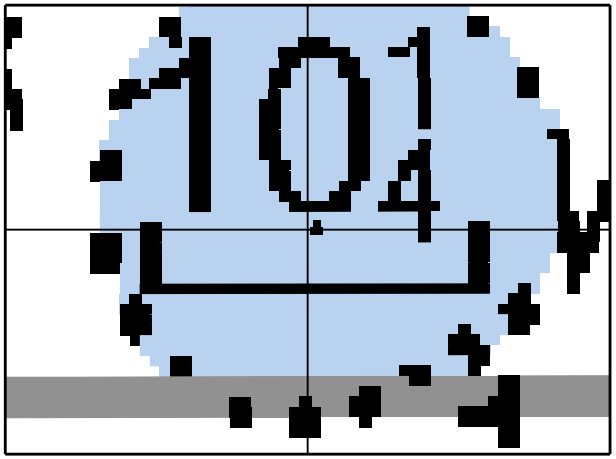
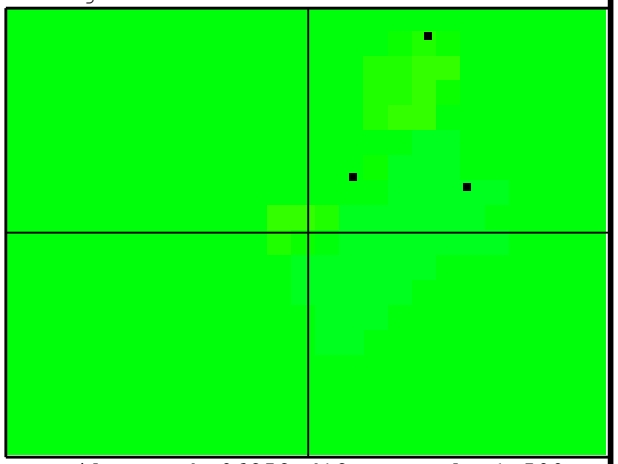


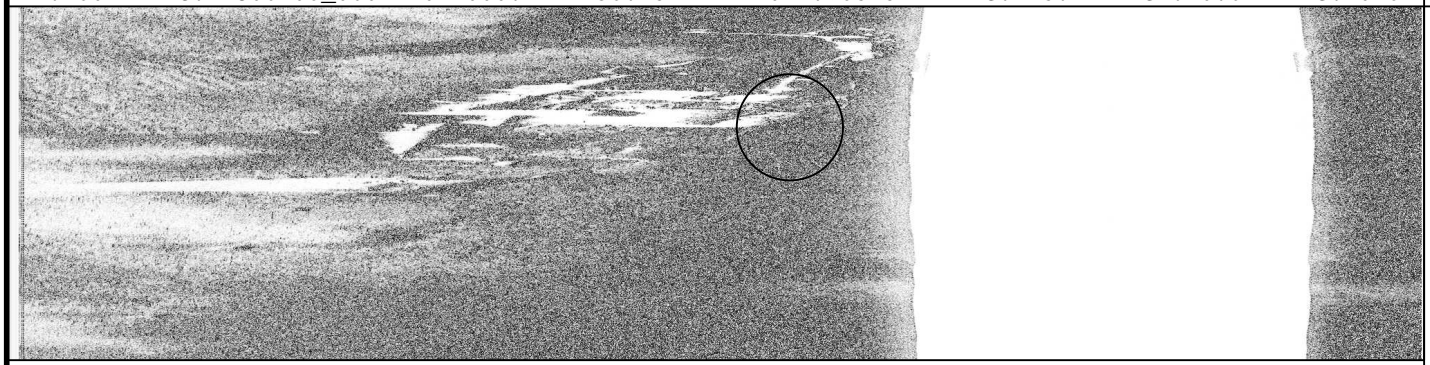
Chart: 12200_1.kap Scale 1:10000



MB File: asmba06252.d12 Scale 1:500

ID: 80 File: AS06208_060727041000.XTF 38.457144N 074.785152W RNG: 45.41 HGT: 0.67 HDG: 018

COMMENT:
WRECK. DANGEROUS WRECK. AWOIS A1071. Plot sounding and label 'Wk'.



ID: 78 File: AS06207_060726225000.XTF 38.457126N 074.784880W RNG: -14.62 HGT: 2.74 HDG: 021

CORRELATED SS CONTACTS:

Contact	Range/Height
208/045236	45.41/0.67
207/233245	-14.62/2.74
208/014053	-14.75/3.02

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0024 Least Depth: 60(ft), 18.42(m) Lat: 38 25 51.16N Lon: 074 46 04.61W Ping: 3896 Beam: 58

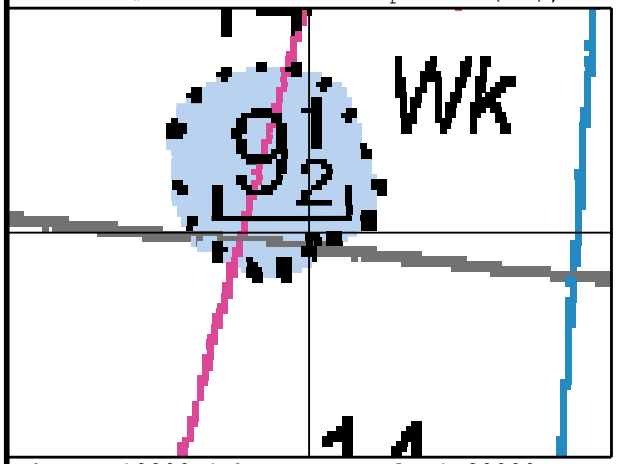


Chart: 12200_1.kap Scale 1:20000

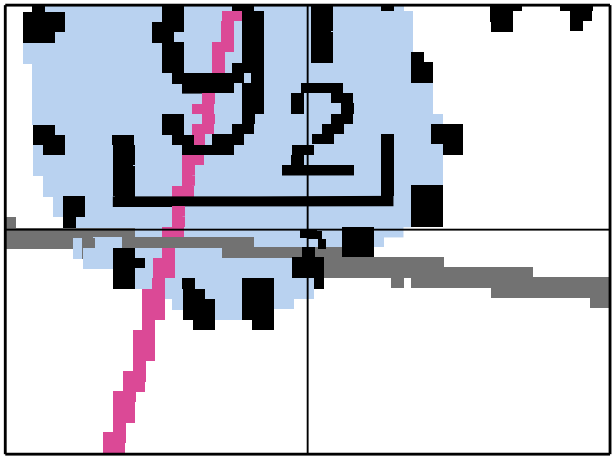
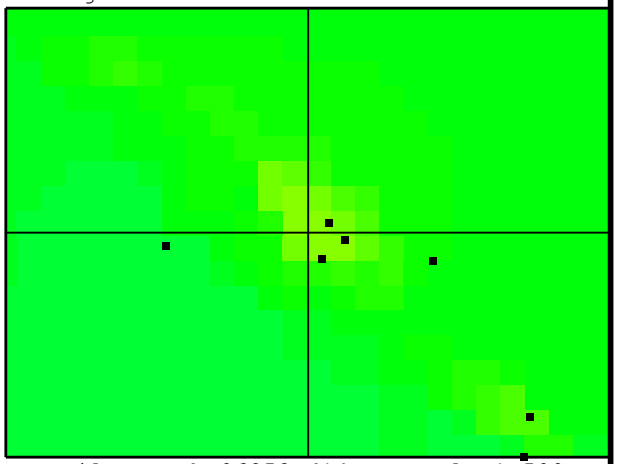
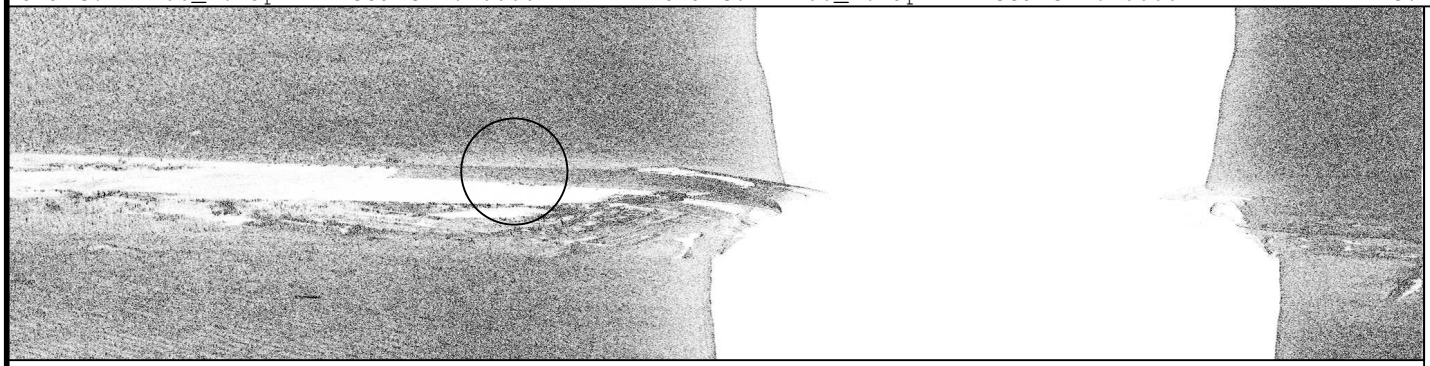


Chart: 12200_1.kap Scale 1:10000

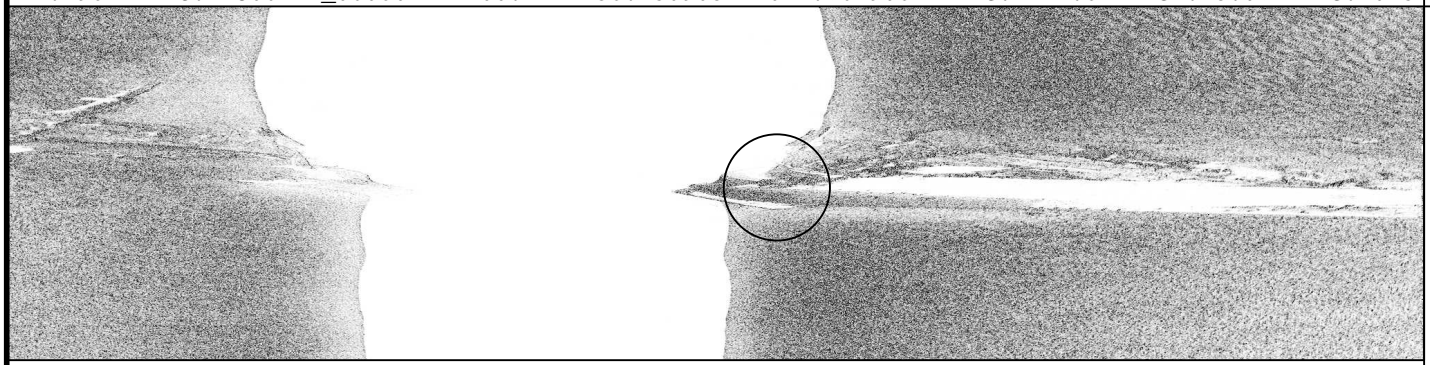


MB File: asmba06252.d14 Scale 1:500



ID: 98 File: AS06214_060802224200.XTF 38.430903N 074.767908W RNG: -21.84 HGT: 3.07 HDG: 013

COMMENT:
WRECK. DANGEROUS WRECK. AWOIS A1061. Plot sounding and label 'Wk'.



ID: 67 File: AS06205_060724125500.XTF 38.430838N 074.767924W RNG: 10.41 HGT: 3.78 HDG: 190

CORRELATED SS CONTACTS:

Contact	Range/Height
214/224454	-21.84/3.07
205/132535	10.41/3.78
205/163547	29.50/1.38
205/183712	-9.62/4.49
205/205156	-43.56/0.61
214/225149	11.78/3.00
205/152831	35.84/2.19

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0025 Least Depth: Lat: 38 27 48.47N Lon: 074 42 07.13W Ping: Beam:

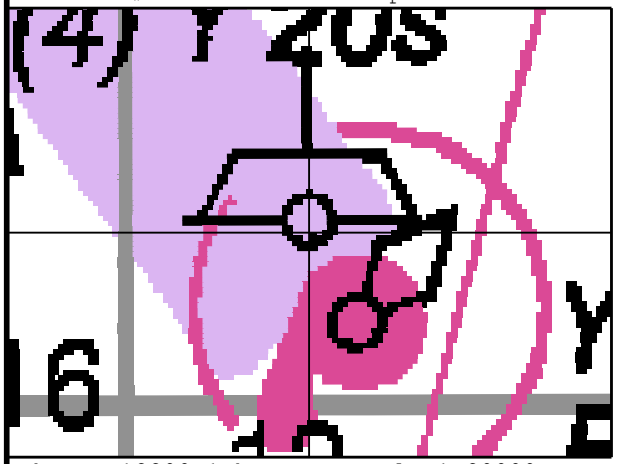


Chart: 12200_1.kap Scale 1:20000

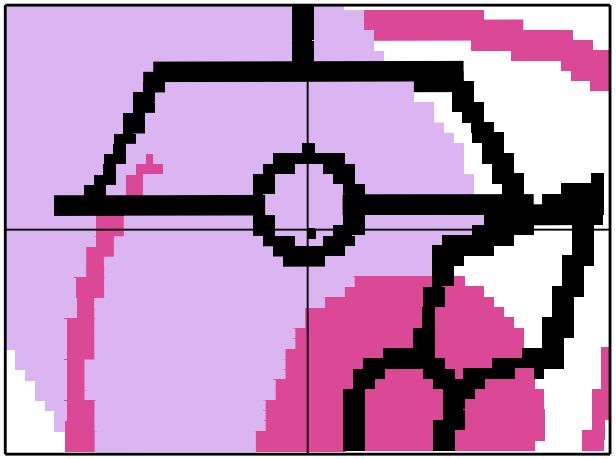
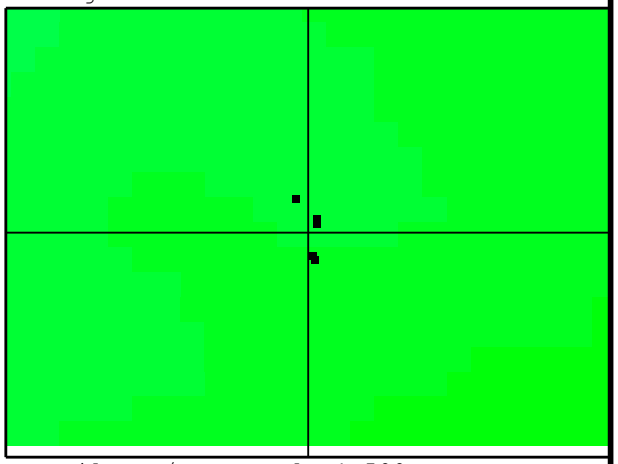
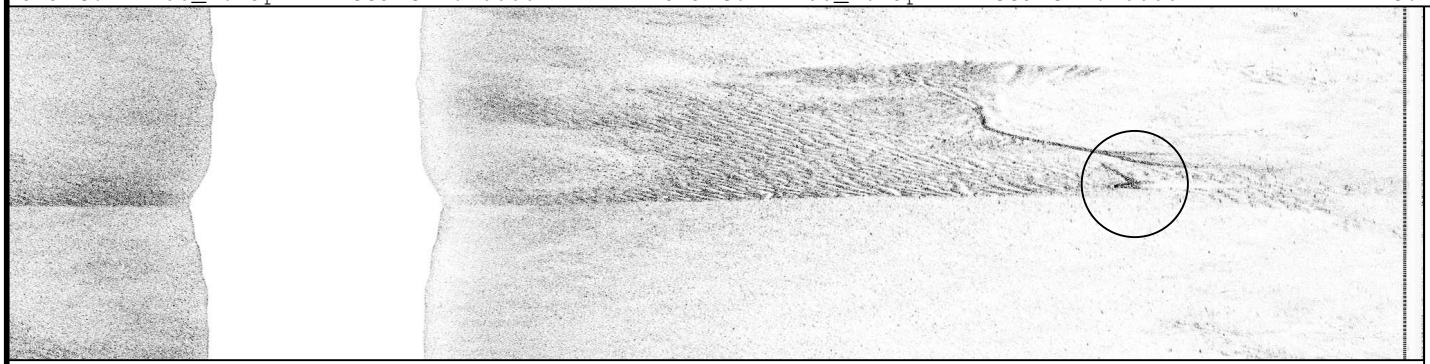


Chart: 12200_1.kap Scale 1:10000

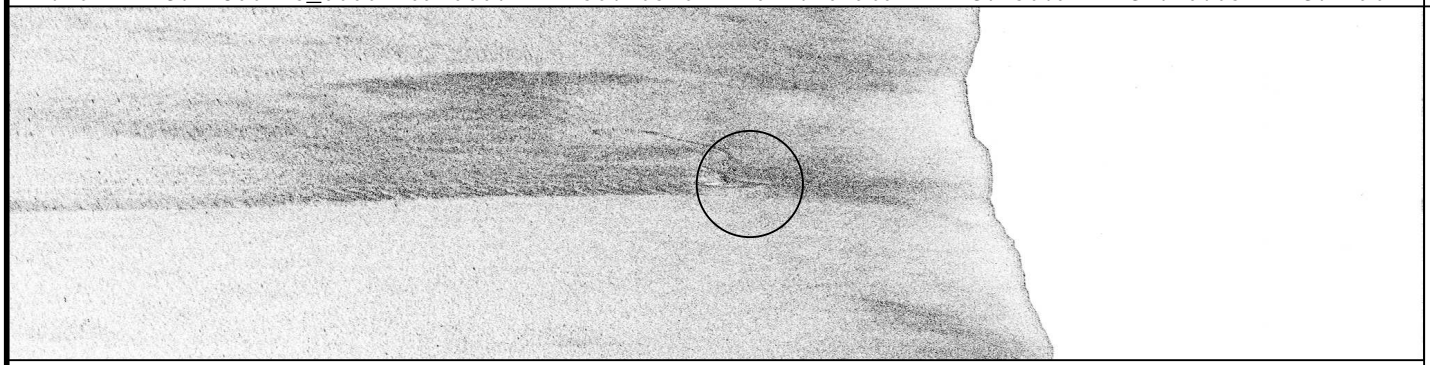


MB File: n/a Scale 1:500



ID: 8 File: AS06175_060624091000.XTF 38.463487N 074.701969W RNG: 36.94 HGT: 0.63 HDG: 196

COMMENT:
BUOY. Plot symbol and label 'Y ODAS '44009' Fl(4) Y 20s'.



ID: 103 File: AS06215_060803022800.XTF 38.463495N 074.701969W RNG: -23.34 HGT: 1.08 HDG: 201

CORRELATED SS CONTACTS:

Contact	Range/Height
175/093858	36.94/0.63
215/023225	-23.34/1.08
215/024601	-24.25/0.86
175/060133	-42.75/0.62
175/013932	-37.88/0.72

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0026 Least Depth: 98(ft), 29.91(m) Lat: 38 27 35.45N Lon: 074 39 03.58W Ping: 4270 Beam: 8

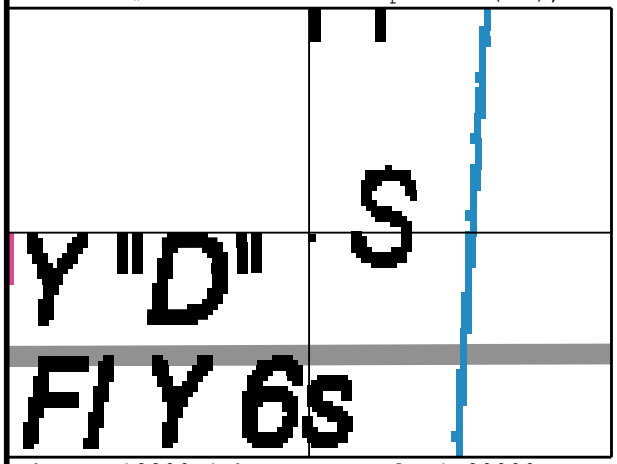


Chart: 12200_1.kap Scale 1:20000

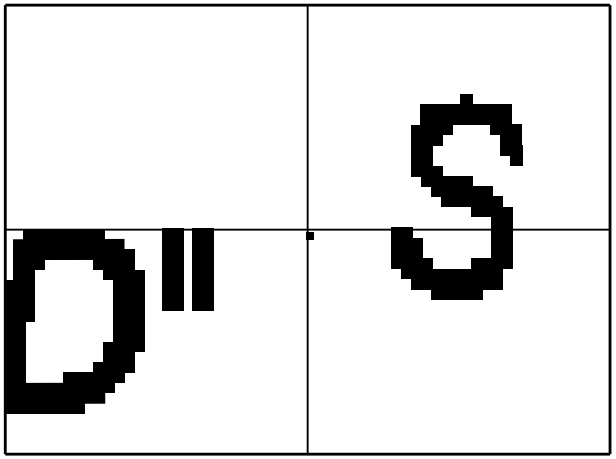
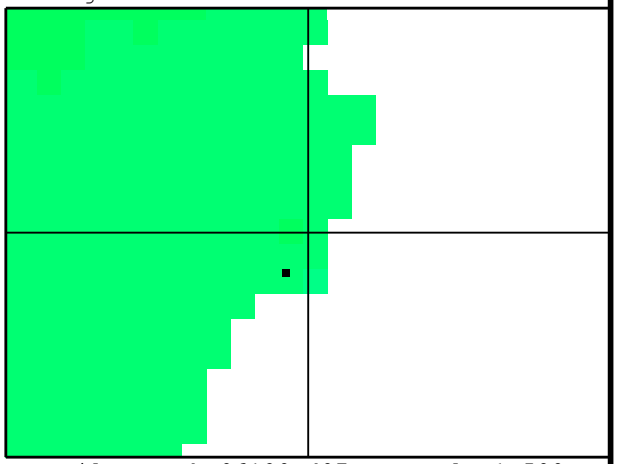
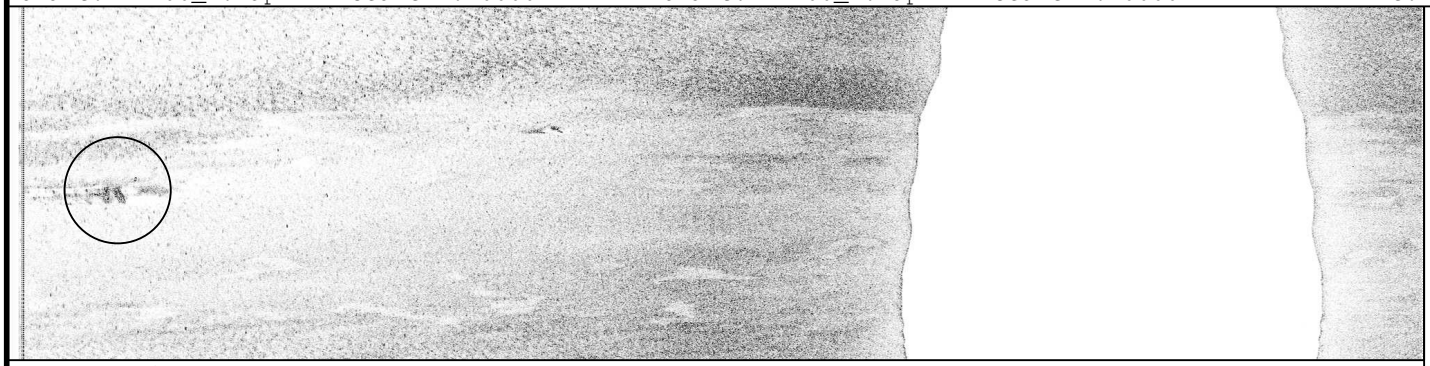


Chart: 12200_1.kap Scale 1:10000



MB File: asmba06190.d07 Scale 1:500



ID: 16 File: AS06190_060709061700.XTF 38.459783N 074.651055W RNG: -45.03 HGT: 0.70 HDG: 203

COMMENT:
OBSTR. No plot NONSIG.

CORRELATED SS CONTACTS:

Contact	Range/Height
190/062509	-45.03/0.70

FEATURE CORRELATOR SHEET Job: H11555

Feature #: 0027 Least Depth: 109(ft), 33.37(m) Lat: 38 24 29.98N Lon: 074 42 10.52W Ping: 40683 Beam: 58

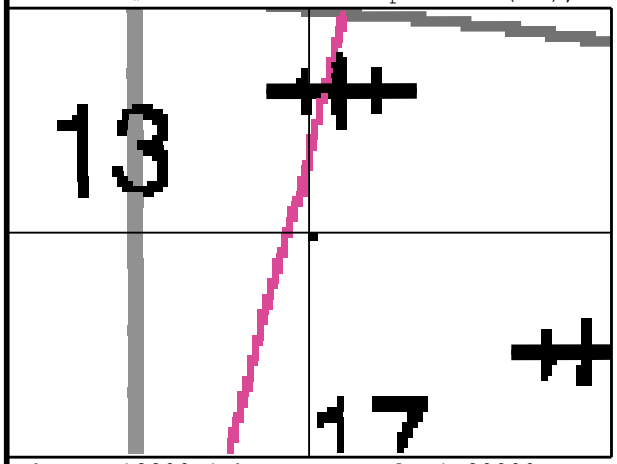


Chart: 12200_1.kap Scale 1:20000

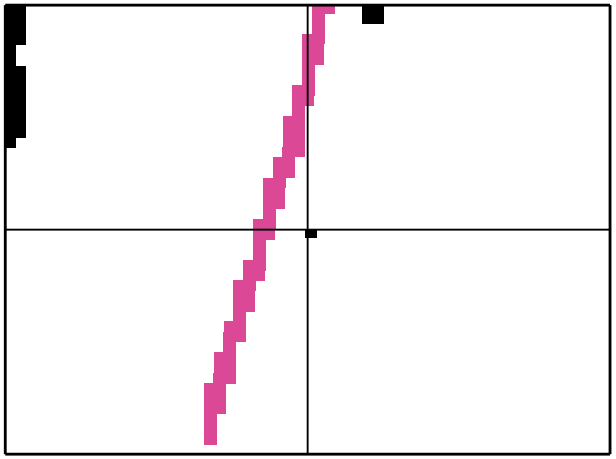
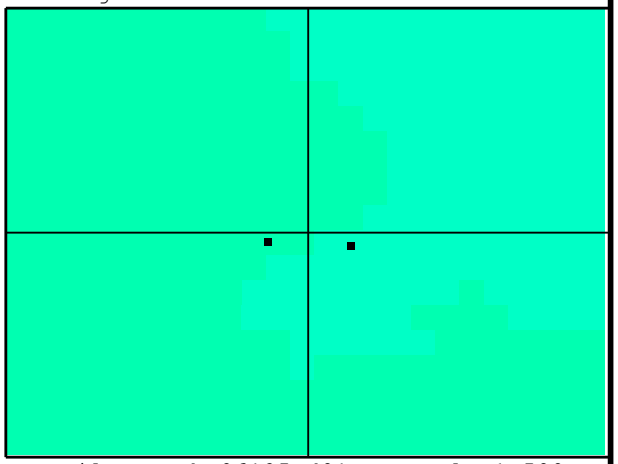
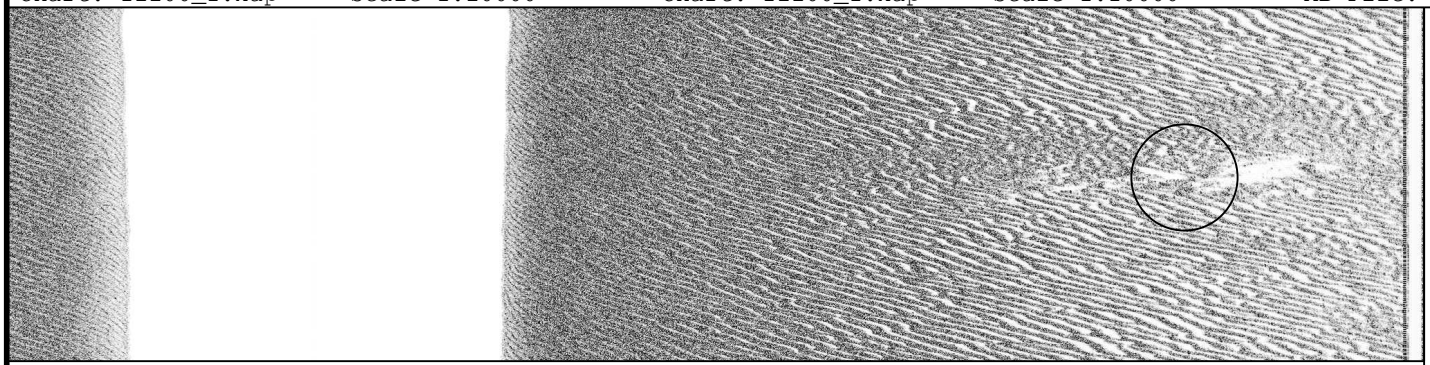


Chart: 12200_1.kap Scale 1:10000

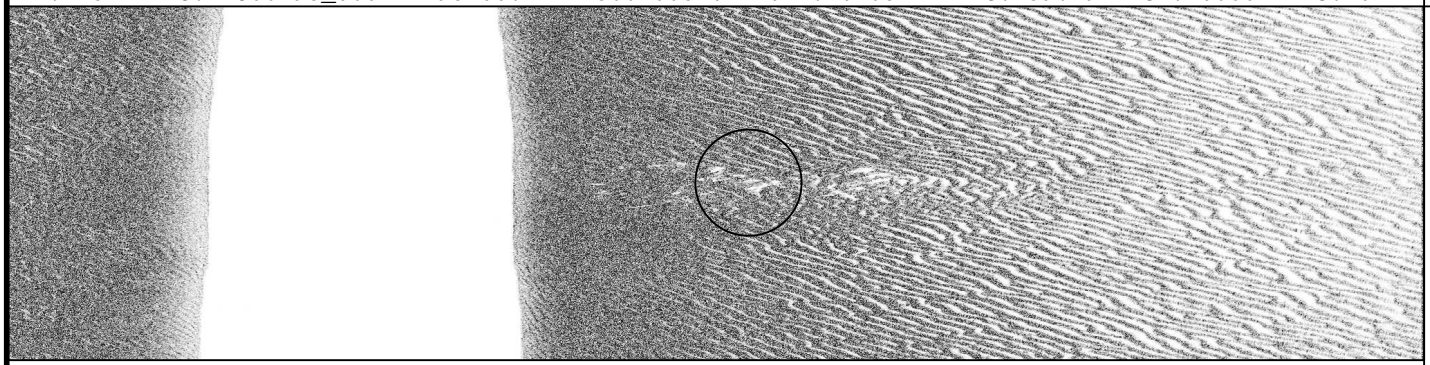


MB File: asmba06195.d01 Scale 1:500



ID: 25 File: AS06195_060714195200.XTF 38.408310N 074.702832W RNG: 39.19 HGT: 0.00 HDG: 017

COMMENT:
WRECK. NON-DANGEROUS WRECK. AWOIS A1058. Plot sounding and wreck symbol.

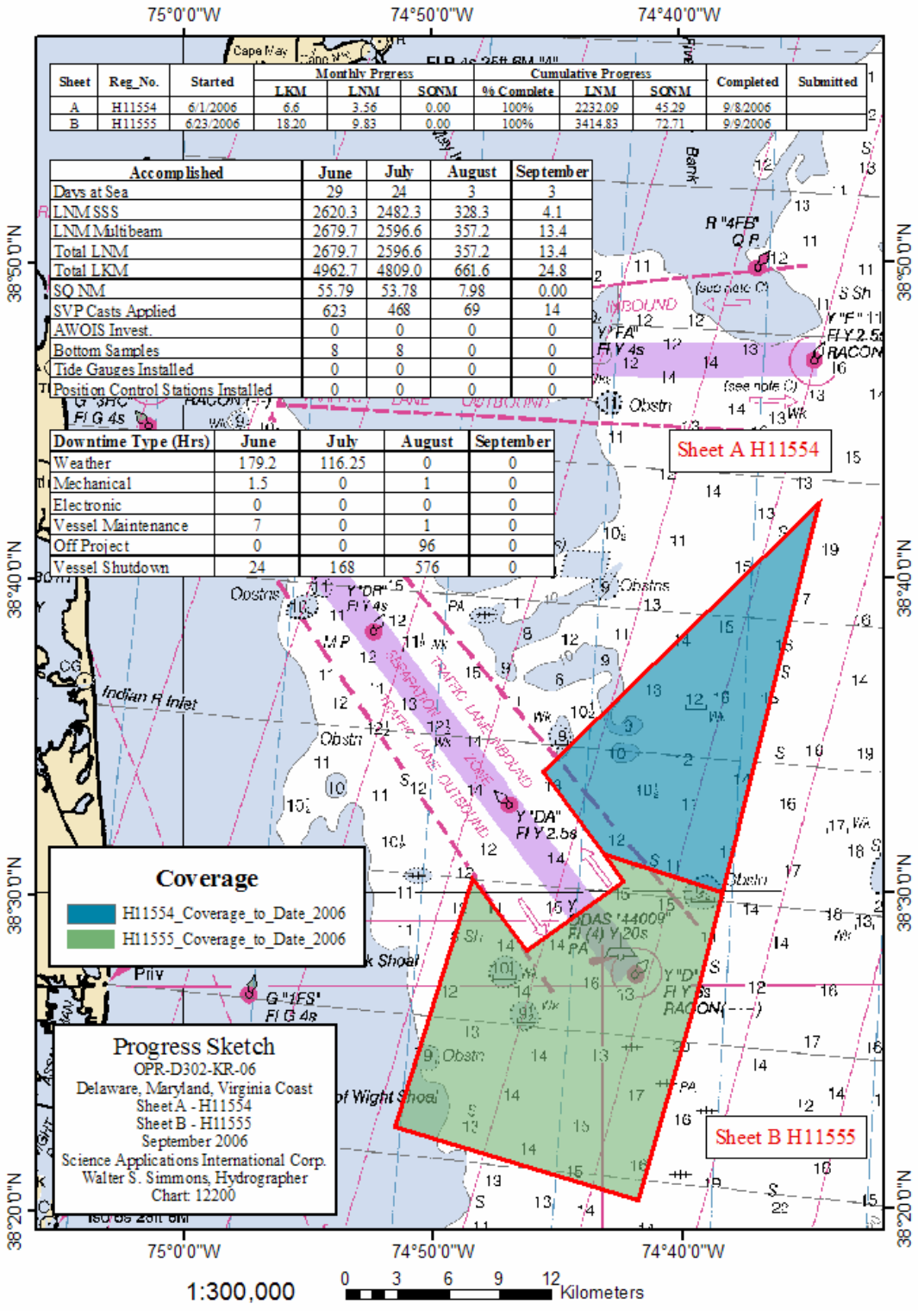


ID: 24 File: AS06195_060714155500.XTF 38.408318N 074.703028W RNG: 17.44 HGT: 0.00 HDG: 196

CORRELATED SS CONTACTS:

Contact	Range/Height
195/202425	39.19/0.00
195/164835	17.44/0.00

APPENDIX III. FINAL PROGRESS SKETCH AND SURVEY OUTLINE



Sheet	Reg_No.	Started	Monthly Progress			Cumulative Progress			Completed	Submitted
			LKM	LNM	SQNM	% Complete	LNM	SQNM		
A	H11554	6/1/2006	6.6	3.56	0.00	100%	2232.09	45.29	9/8/2006	
B	H11555	6/23/2006	18.20	9.83	0.00	100%	3414.83	72.71	9/9/2006	

Accomplished	June	July	August	September
Days at Sea	29	24	3	3
LNM SSS	2620.3	2482.3	328.3	4.1
LNM Multibeam	2679.7	2596.6	357.2	13.4
Total LNM	2679.7	2596.6	357.2	13.4
Total LKM	4962.7	4809.0	661.6	24.8
SQ NM	55.79	53.78	7.98	0.00
SVP Casts Applied	623	468	69	14
AWOIS Invest.	0	0	0	0
Bottom Samples	8	8	0	0
Tide Gauges Installed	0	0	0	0
Position Control Stations Installed	0	0	0	0

Downtime Type (Hrs)	June	July	August	September
Weather	179.2	116.25	0	0
Mechanical	1.5	0	1	0
Electronic	0	0	0	0
Vessel Maintenance	7	0	1	0
Off Project	0	0	96	0
Vessel Shutdown	24	168	576	0

Figure App. III-1. Final Progress Sketch for H11555

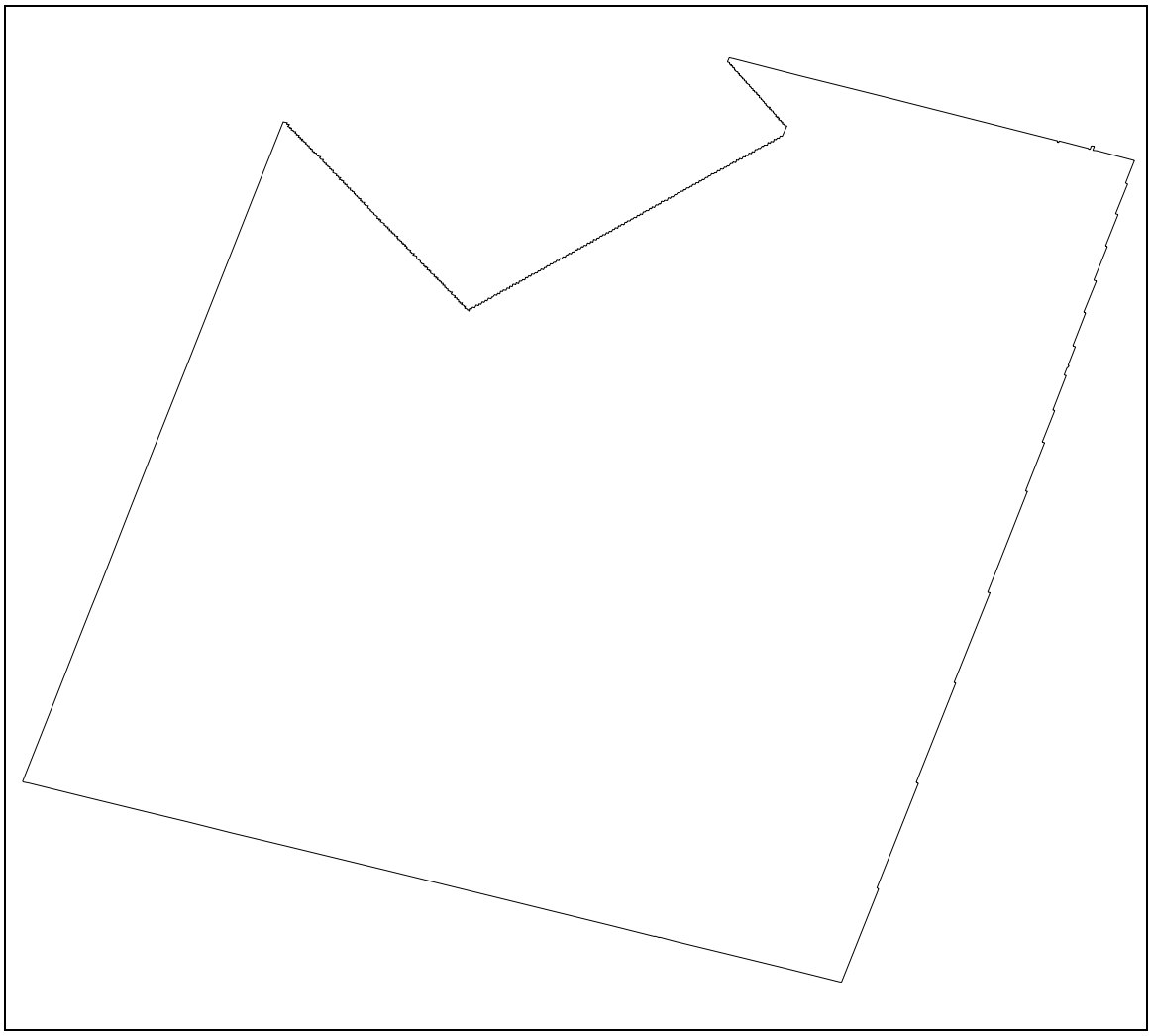


Figure App. III-2. Survey Outline for H11555

APPENDIX IV. TIDES AND WATER LEVELS

The on-line times for acquisition of valid hydrographic data are presented in Abstract of Times of Hydrography, H11555.

Project: OPR-D302-KR-06.
Registry No.: H11555
Contractor Name: Science Applications International Corporation
Date: 09 September 2006
Sheet Letter: B
Inclusive Dates: 23 June 2006 – 09 September 2006

Field work is complete.

Table App. IV-1. H11555 Abstract Times of Hydrography

Year	Julian Day	Begin Time	Julian Day	End Time
2006	165	01:13:27	165	01:21:15
2006	174	22:38:32	177	11:27:19
2006	189	22:25:42	194	00:45:27
2006	195	16:01:12	201	00:32:12
2006	205	06:52:33	208	21:57:36
2006	211	14:34:11	215	04:16:35
2006	251	17:37:44	252	06:31:35

Final Tide Note

Observed verified water levels were downloaded from the http://co-ops.nos.noss.gov web site for Lewes, DE (8557380). Water Level correctors were prepared for each zone using the **SABER/Tools/Create Water Level Files** software. **SABER/Apply Correctors /Tides** software applied these files to the multibeam data according to the zone containing the nadir beam of each ping.

Analysis of the H11555 multibeam data in the **SABER Multi-View Editor** and in depth grids revealed minimal depth jumps across the junction of zones based on Lewes, DE (8557380). A spreadsheet analysis also confirmed the adequacy of zoning correctors based on Lewes, DE (8557380). The water level zoning correctors based entirely on Lewes, DE (8557380) were applied to all multibeam data for H11555.

APPENDIX V. SUPPLEMENTAL SURVEY RECORDS & CORRESPONDENCE

This appendix contains two sections, the first containing 3 email correspondences and the second containing a list of bottom samples obtained.

Correspondence

Three emails are contained in this section. The emails are 1) October 26, 2006 Mark Lathrop to Rod Evans regarding which specification and deliverables to deliver sheet L, A and B to. 2) March 27, 2006 Jeff Ferguson to Rod Evans Discussing AWOIS areas for Task order #1. 3) June 28, 2006 Gary Davis to Gene Parker regarding Gene's request for additional information in the Danger to Navigation Reports.

From: Mark.T.Lathrop@noaa.gov on behalf of mark.t.lathrop
[Mark.T.Lathrop@noaa.gov]
Sent: Thursday, October 26, 2006 10:53 AM
To: Evans, Rhodri E.
Cc: Jeffrey.Ferguson@noaa.gov; Quintal, Rebecca T.
Subject: Re: Task Order #1 Sheet L (NJ) and A-B (Del)
Rod,
Please refer to the June 2006 Specs for all your current surveys.

Thanks,
Mark

"Evans, Rhodri E." wrote:
Mark,

We are in the process of drafting specific questions regarding our deliverables for Sheet L, A&B (H11536, H11554 and H11555, respectively) and the new NOS Specifications and Deliverables. However we would like to ask one question up front which will help us determine the follow on questions. Our SOW for these sheets is from May 2006 and states that Specifications and Deliverables (dated February, 2006 and marked DRAFT) are the technical specifications. We would like permission to deliver Sheet L, A&B (H11536, H11554 and H11555, respectively) products based on the official June 2006 Specifications and Deliverables. While the differences between the two documents are fairly minor, they do exist and we feel it would be more straightforward to work toward the official version. Is this change acceptable?

I have copied Jeff Ferguson, as Jeff was the POC for us during the proposal phase and discussions on this Task Order #1.

Regards, RE.

Rod Evans Ph.D.,
Assistant Vice President,
Marine Survey Manager,

SAIC Marine Science and Technology Division,
221 Third Street,
NewportRI02840
USA.
Tel (401) 848.4783.
Mobile (401) 439.1037.
Email: evansrh@saic.com
http://www.saic.com

All,

See attached files on AWOIS items for the new NOAA task order. Thx, RE.

-----Original Message-----
From: Jeffrey Ferguson [mailto:Jeffrey.Ferguson@noaa.gov]
Sent: Monday, March 27, 2006 4:12 PM
To: Evans, Rhodri E.
Subject: Re: AWOIS

try this...

"Evans, Rhodri E." wrote:
I spoke too soon! The files were blocked by our firewall. Could you
kindly re-send them within a zip file. That should get through to me.

Thanks, RE.
-----Original Message-----
From: Evans, Rhodri E.
Sent: Monday, March 27, 2006 4:02 PM
To: 'Jeffrey Ferguson'
Subject: RE: AWOIS

Jeff,
Received with thanks. I mentioned to Mark Lathrop earlier today that I
will resume the weekly status report soon. We are re-commencing on
Sheet J and K off New Jersey by mid-April 2006, then straight into
Task Order #1 which was awarded last week (our thanks!).

Regards, RE.

Rod Evans Ph.D.,
Assistant Vice President,
Marine Survey Manager,
SAIC Marine Science and Technology Division,
221 Third Street,
Newport RI 02840

USA.
Tel (401) 848.4783.
Mobile (401) 439.1037.
Email: evansrh@saic.com
http://www.saic.com
http://www.saicnewport.com

-----Original Message-----
From: Jeffrey Ferguson [mailto:Jeffrey.Ferguson@noaa.gov]
Sent: Monday, March 27, 2006 3:59 PM
To: Evans, Rhodri E.
Subject: AWOIS

Rod,

Attached are two Access Database files for the AWOIS items assigned to TO1.

As mentioned previously, none of the items require any additional field work over the area already assigned. The assigned items will just need to be discussed in the Descriptive Report and the info will help in your planning process.

Let me know if you have any questions.
Jeff

Gene,
In reference to the H11554 Danger to Navigation Report #1 reporting a 79-foot Wreck, the following additional information is provided:

The wreck is actually located outside the survey bounds of H11554 (Sheet A) and inside the bounds of H11555 (Sheet B). It was initially seen during a turn between survey lines. Because of its height and location (inside the inbound Delaware to Cape Henlopen Traffic Lane) the survey crew thought it was best to treat it as an item investigation to determine its position and least depth as part of the H11554 survey.

The wreck appears to be intact, lying nearly upside down. It has the smooth shape of the underside of a hull with no visible structures or protrusions. The side scan sonargram shows several very small objects are in the vicinity of the wreck.

The wreck is approximately 23 meters long, 3 meters wide and 3 meters high. There is significant scouring (2-3 feet) on the southwest side of the wreck.

We will include the requested additional information in future Danger to Navigation Reports.

If you need any additional information on this or any other Danger to Navigation reports previously submitted please feel free to ask.

Regards,
Gary R. Davis, ACSM Certified Hydrographer Lead Hydrographer SAIC Marine Science and Technology Division
221 Third Street
Building A
Newport, RI 02840
Tel (401)847-4210
Email: gary.r.davis@saic.com
-----Original Message-----
From: gene_parker [mailto:Castle.E.Parker@noaa.gov]
Sent: Wednesday, June 28, 2006 8:00 AM
To: Evans, Rhodri E.
Cc: SIMMONS, WALTER S.; Donaldson, Paul L.; Davis, Gary R.; Quintal, Rebecca T.; Jeffrey Ferguson
Subject: DtoN Submission: Dimensional Information Inquiries

Good Day Folks,
Recently I have been receiving information requests from Navigation Services Branch regarding the most recent Danger submissions from SAIC.
NSB is currently requesting dimensional information and feature condition regarding H11455 DtoN #1 79-ft Wreck. The NOAA Nav Mangers would like to know the length, width, shape, and condition of the wreck that SAIC located; this info will forwarded to the local pilots.

The Danger submissions are based upon preliminary data and considered unverified until the surveys are submitted to AHB. This information is always mentioned in the Danger submissions that are forwarded to Marine Chart Division. Due to the numerous inquiries from the Nav Managers, AHB requests that feature dimensions, shape, and condition be included in the Danger document that SAIC submits. The Danger submissions forwarded by SAIC is adequate for AHB and the processing of the Dangers, but the additional information would assist other chart users.

I appreciate your assistance with this issue and inquiry.

Regards,
Gene

Bottom Composition

There were 8 bottom samples taken to verify the bottom types charted for H11555. Table App. V- 1 compares information for each sample collected to the charted bottom type.

Table App. V-1. H11555 Bottom Sample Characteristics

Bottom Sample Position (NAD83)		Sample Number	Depth of Bottom Sample (m)	Depth Uncertainty	Observed Bottom Type	Charted Bottom Type		
Latitude (N)	Longitude (W)					12200	12211	12214
038° 30’ 22.2”	074° 48’ 18.2”	BS5	25.8	0.280	S G Sh			S Sh P
038° 28’ 30.5”	074° 48’ 12.9”	BS4	25.4	0.280	S G Sh	S Sh	S Sh	S Sh
038° 27’ 30.9”	074° 44’ 08.3”	BS3	30.8	0.282	S G Sh		S	S
038° 27’ 29.2”	074° 43’ 30.1”	BS2	32.2	0.280	S Sh		Sh	Sh
038° 27’ 29.2”	074° 39’ 22.0”	BS1	30.5	0.281	S Sh	S		S Sh
038° 25’ 35.1”	074° 48’ 26.2”	BS6	24.4	0.280	S crsG Sh		S Sh	
038° 23’ 11.4”	074° 48’ 03.1”	BS7	25.2	0.280	S medSh	S	S Sh	
038° 23’ 09.6”	074° 45’ 48.0”	BS8	27.4	0.280	S Sh G		G	

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

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT to ACCOMPANY
SURVEY H11555 (2006)

This Evaluation Report has been written to supplement and/or clarify the original Descriptive Report. Sections in this report refer to the corresponding sections of the Descriptive Report.

B. DATA ACQUISITION AND PROCESSING

B.1 DATA PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

CARIS HIPS/SIPS version 6.1 SP2 Hot Fix 1-6
CARIS Bathy DataBASE (BDB) version 2.1 HF 1
DKART INSPECTOR, version 5.0 Build 732 SP1
CARIS HOM version 3.3 SP3 Hot Fix 7
CARIS S57 Composer version 2.0

B.2. QUALITY CONTROL

B.2.1. H-Cell

The Atlantic Hydrographic Branch (AHB) source depth grid for the survey's nautical chart update product deviated from normal AHB processing procedures. Processing problems were encountered when attempting to read the submitted 1-m Bathymetric Attributed Grid (BAG). Based upon the 3.19 GB file size of the BAG, the Caris Bathy DataBASE (BDB) program was unable to read the submitted BAG and create a Caris BDB generalized Product Surface. In order to get past this issue, AHB's processing method entailed sourcing the submitted and converted General Sensor Format multibeam data. AHB created a 1m BASE Uncertainty grid for a small section of the survey for comparison. In order to compare the 1m BAG to the AHB generated 1-m grid, the same geographic limits were used for the comparison and extracted from the 1m BAG. The next step entailed generating a Caris BDB difference surface grid which compared the extracted 1m BAG to the AHB 1m CUBE gird. The outcome of the comparison resulted in a zero difference.

In order to make the grid file size more manageable, AHB divided the entire survey area into 4 regions and generated BASE Uncertainty grids using a resolution of 2m. The four 2m grids were then combined into one 2m grid, from which a Product Surface was generated. The Product Surface was generated using the default parameters of 800m generalization radius, with a resolution of 40-m, and no defocusing.

The survey scale selected sounding set was extracted from the 40m Product Surface grid using the parameter of 5mm at a scale of 1:20,000. The chart scale selected sounding set

was manually selected and imported into a chart scale sounding Stand Alone Hydrographic Object (SAHOB) layer. This method ensured the chart scale selections were a subset of the survey scale selected soundings. The surface model was referenced when selecting the chart scale soundings to ensure that the chart scale selected soundings honored the bathymetry within the common area.

Depth curves were created from a vertically shifted grid. The source of the shifted grid was the same 40m resolution Product Surface grid from which the soundings were extracted. The depth curve grid was vertically shifted upward -0.229m (-0.75ft) in order to generate depth curves that complied with Marine Chart Division specifications. The depth curve index file used represented the charted depth curves currently portrayed on NOAA Charts #11211 and #11214. The depth curve intervals are detailed in the Pre-Compile Log appended to the end of this report. The depth curves are forwarded to MCD for reference only. The depth curves were utilized during chart scale sounding selection and quality assurances efforts at AHB. The depth curves are incorporated into the S57 chart scale (CS) deliverable.

The pre-compilation products or components (SAHOB files) are detailed in the Pre-Compile Process Log attached at the end of this document. The SAHOB files included depth curves (DEPCNT), sounding selections (SOUNDG), features (OBSTRN, WRECKS, SBDARE), Meta objects (M_COVR, M_QUAL, M_CSCL), and cartographic Blue Notes. The individual SAHOB files were inserted into one Caris BDB feature layer and exported to S57 format in order to create the H-Cell deliverable.

The completed H-Cell was exported in S-57 format with all values in metric units. The metric equivalent H-Cell.000 file was then converted to NOAA chart units with all values measured in feet following NOAA sounding rounding rules.

H11555 H-Cell's final deliverables include the following products:

US411555_CS.000	**1:80,000 Scale**	**H11555 H-Cell with Chart Scale Selected Soundings, Features, and Depth Curves**
US411555_SS.000	**1:20,000 Scale**	**H11555 Selected Soundings (Survey Scale)**
H11555_BlueNtoes.000	**1:80,000 Scale**	**H11555 Cartographic Notes**

B.22. Junctions

Survey H11555 (2006) junctions with survey H11554 (2006) to the north. Present survey sounding compare between 0.0-ft to 1.14-ft (0.0-0.35m) with survey H11554. Present survey depths are in harmony with the charted hydrography.

C. VERTICAL AND HORIZONTAL CONTROL

Final vertical correction processing was completed by the field unit with no additional correction required by Atlantic Hydrographic Branch. The field unit applied verified water levels in conjunction with the preliminary tidal zoning which was accepted and approved by N/OPSI CO-OPS as the final zoning for H11555. Sounding datum is Mean Lower Low Water (MLLW). Vertical datum is Mean High Water (MHW)

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD83), UTM projection zone 18. Office ENC processing of this survey required translating the datum to meet S-57 ENC requirements.

D. RESULTS AND RECOMMENDATIONS

D.1 CHART COMPARISON

12211 (43rd Edition, 10/01/2007)
Corrected through NM 05/24008
Corrected through LNM 05/20/2008
Scale 1:80,000

12214 (48th Edition, 10/01/2007)
Corrected through NM 06/07/2008
Corrected through LNM 06/03/2008
Scale 1:80,000

11200 (49th Edition, 06/01/2007)
Corrected through NM 06/07/2008
Corrected through LNM 06/03/2008
Scale 1:419,706

ENC Comparison

US4VA50M
Fenwick Island to Chincoteague Inlet
Edition 5
Application Date 2008-08-22
Issue Date 2008-08-29
Chart 12211

US4DE11M
Cape May to Fenwick Island
Edition 13
Application Date 2008-04-03
Issue Date 2008-07-22
Chart 12214

ENC Comparison **US3DE01M**

Cape May to Cape Hatteras
Edition 7
Application Date 2007-08-29
Issue Date 2008-09-03
Chart 12200

D.1.1 Hydrography

The charted hydrography originates with prior surveys and requires no other considerations. The hydrographer makes adequate chart comparisons in section "D" and Appendix 1&2 of the Descriptive Report.

D.2. ADDITIONAL RESULTS

All field unit Dangers to Navigation were submitted to AHB for review and cartographic evaluation. The field unit submitted three applicable Dangers that were reviewed and submitted to Marine Chart Division, Nautical Data Branch, Silver Spring, Maryland. All submitted Dangers are included in Appendix 1 of the Descriptive Report.

D.3. MISCELLANEOUS

Chart compilation was done by Atlantic Hydrographic Branch personnel, in Norfolk, Virginia. Compilation data will be forwarded to Marine Chart Division, Silver Spring, Maryland. See Section D.1. of this report for a list of the Raster Charts and Electronic Navigation Charts (ENC) used for compiling the present survey:

D.4. ADEQUACY OF SURVEY

The present survey is adequate to supersede the charted bathymetry within the common area. Any features not specifically addressed either in the H-Cell BASE Cell File or the Blue Notes should be retained as charted. Refer to the Descriptive Report for further recommendations by the hydrographer.

APPROVAL SHEET
H11555

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, disposition of critical depths, cartographic symbolization, and verification or disproval of charted data. All revisions and additions made to the H-Cell files during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with National Ocean Service and Office of Coast Survey requirements except where noted in the Descriptive Report and the Evaluation Report.

All final products have undergone a comprehensive reviews per the Hydrographic surveys Division Office Processing Manual and are verified to be accurate and complete except where noted.

M.Leonard Tyson

Digitally signed by M.Leonard Tyson
DN: cn=M.Leonard Tyson, c=US, o=NOAA, ou=AHB/OCS, email=leonard.tyson@noaa.gov
Date: 2008.09.30 09:02:14 -04'00'

Leonard Tyson
Hydrographic Intern
Atlantic Hydrographic Branch

Digitally signed by Castle Eugene Parker
DN: cn=Castle Eugene Parker, c=US, o=NOAA, ou=Atlantic Hydrographic Branch, email=castle.e.parker@noaa.gov
Reason: I attest to the accuracy and integrity of this document
Date: 2008.09.29 13:58:06 -04'00'

Castle Eugene Parker
Physical Scientist
Atlantic Hydrographic Branch

I have reviewed the H-Cell files, accompanying data, and reports. This survey and accompanying Marine Chart Division deliverables meet National Ocean Service requirements and standards for products in support of nautical charting except where noted.

Approved:

Shepard Smith
I am approving this document
2008.09.29 15:17:00 -04'00'

Shepard Smith
Lieutenant Commander, NOAA
Chief, Atlantic Hydrographic Branch

Mark Lathrop

Digitally signed by Mark Lathrop
DN: cn=Mark Lathrop, o=NOAA, ou=HSD, email=mark.t.lathrop@noaa.gov, c=US
Date: 2008.10.08 13:43:45 -04'00'