

H12146

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No.

Registry No. H12146

### LOCALITY

State Alaska

General Locality Southern Portion of Cook Inlet

Sublocality Vicinity of Bluff Point

**2009**

### CHIEF OF PARTY

**Captain Donald W. Haines, NOAA**

### LIBRARY & ARCHIVES

DATE

<p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;"><b>HYDROGRAPHIC TITLE SHEET</b></p>	<p>REGISTRY No</p> <p style="text-align: center;"><b>H12146</b></p>
<p><b>INSTRUCTIONS</b> – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.</p>	<p>FIELD No: <b>N/A</b></p>
<p>State <u>Alaska</u></p> <p>General Locality <u>Southern Portion of Cook Inlet</u></p> <p>Sub-Locality <u>Vicinity of Bluff Point</u></p> <p>Scale <u>1:10,000</u> Date of Survey <u>09/04/2009 to 09/08/2009</u></p> <p>Instructions dated <u>7/16/2009</u> Project No. <u>OPR-P357-RA-FA-09</u></p> <p>Vessel <u>RA1 (1101), RA2 (1103), RA3 (2803), RA4 (2801), RA5 (2802), RA6 (2804)</u></p> <hr/> <p>Chief of party <u>Captain Donald W. Haines, NOAA</u></p> <p>Surveyed by <u>RAINIER Personnel</u></p> <p>Soundings by <u>Reson SeaBat 8125, 7125 and Knudsen 320M</u></p> <p>SAR by <u>Martha Herzog</u> Compilation by <u>Fernando Ortiz</u></p> <p>Soundings compiled in <u>Fathoms</u></p>	
<p><b>REMARKS:</b> <u>All times are UTC. UTM Projection 5</u></p> <p><u>The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. Revisions and end notes in red were generated during office processing.</u></p> <p><u>Page numbering may be interrupted or non sequential.</u></p> <hr/> <p><u>All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via <a href="http://www.ngdc.noaa.gov/">http://www.ngdc.noaa.gov/</a>.</u></p>	

# Descriptive Report to Accompany Hydrographic Survey H12146

Project OPR-P357-RA-FA-09  
Southern Portion of Cook Inlet, Alaska  
Vicinity of Bluff Point  
Scale 1:10,000  
September 2009  
**NOAA Ship *Rainier* (s221)**  
Chief of Party: Captain Donald W. Haines, NOAA

## A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Project Instructions OPR-P357-RA-FA-09 dated July 16, 2009 and all other applicable direction<sup>1</sup>, with the exception of deviations noted in this report. The survey area is Vicinity of Bluff Point, Alaska and corresponds to sheet “H in the sheet layout provided with the Project Instructions. The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts, in addition to supporting a total regional examination of Kachemak Bay.

Complete multibeam echosounder (MBES) coverage was not achieved in the survey area in waters 8 meters and deeper. Due to operational time constraints the inshore areas of the assigned survey area were not completed.<sup>1</sup> Survey acquisition was blocked off, leaving no gaps in the acquired multibeam data. Total mileage acquired by each vessel and system is reference in Table 1.

Data Acquisition Type	Hull Number with Mileage (nm)							Total
	1101	1103	2801	2802	2803	2804	S221	
VBES (main scheme)	-	-	-	-	-	-	-	-
MBES (main scheme)	-	-	118.27	62.45	17.03	37.78	-	235.53
SSS (main scheme)	-	-	-	-	-	-	-	-
Crosslines	-	-	14.44	-	-	-	-	14.44
Developments	-	-	-	-	-	-	-	-
Shoreline	-	-	-	-	-	-	-	-
Bottom Samples	-	-	-	-	-	-	-	-
Total Number of Items Investigated	-	-	-	-	-	-	-	-
Total Area Surveyed (sq. nm)	-	-	-	-	-	-	-	11.86

Table 1: Statistics for survey H12146

Data acquisition was conducted from September 4 to September 8, 2009 (DN 247 to 251).

<sup>1</sup> NOS Hydrographic Surveys Specifications and Deliverables (April 2009), OCS Field Procedures Manual for Hydrographic Surveying (April 2009), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.

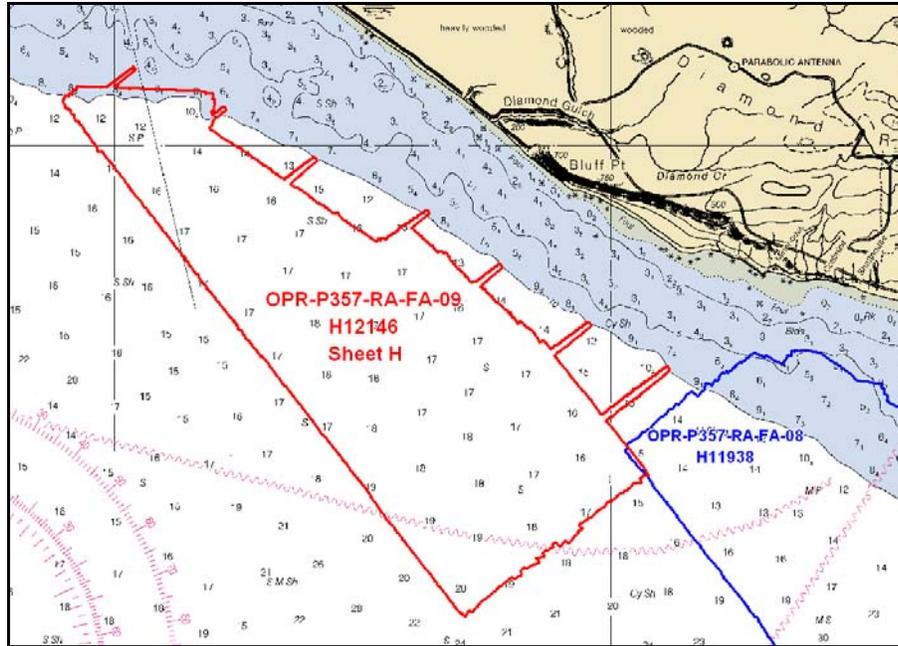


Figure 1: H12146 Survey Outline and Junctions

**B. DATA ACQUISITION AND PROCESSING**

A complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods can be found in the *OPR-P357-RA--09 Data Acquisition and Processing Report (DAPR)*, submitted under separate cover. Items specific to this survey, and any deviations from the DAPR are discussed in the following sections.

Final Approved Water Levels have been applied to this survey. See Section C. for additional information.

**B.1. Equipment and Vessels**

Data for this survey were acquired by the following vessels:

Hull Number	Name	Length (ft)	Draft (ft)	Acquisition Type
2801	RA-4	29	3.5	Reson 7125 Multibeam Echosounder
2802	RA-5	29	3.5	Reson 7125 Multibeam Echosounder
2803	RA-3	29	3.5	Reson 7125 Multibeam Echosounder
2804	RA-6	29	3.5	Reson 7125 Multibeam Echosounder

Table 2: Data acquisition vessels and systems for H12146

Sound speed profiles were measured in accordance with the Specifications and Deliverables using SEACAT SBE-19 and 19+ profilers, as well as the Brooke Ocean Technology Moving Vessel Profiler.

Multibeam vessel navigation and attitude data were measured and recorded using Applanix POS/MV 320 systems, version 4.

A complete description of survey vessels, hardware, and software systems is included in the *OPR-P357-RA-09 DAPR*.

No unusual vessel configurations were used for data acquisition.

## B.2. Quality Control

### B.2.b. Crosslines

Multibeam Echosounder (MBES) crosslines totaled 14.44 nautical miles, comprising 6.13% of main scheme MBES hydrography.

All crosslines acquired by survey launch 2801 (RA-4) on DN 250 exhibit a distinct along-track trough. It appears that this error was due to excessive gain settings during acquisition, resulting in “punching through” at nadir. The soundings in error, which were an average of 0.3 meters below the correctly-detected bottom, were rejected by the Hydrographer before analysis.

The main scheme bathymetry was compared to the crosslines in CARIS BathyDatabase by creating a differenced surface, subtracting a crossline surface from a main scheme multibeam surface. The difference surface is displayed below in Figure 2. Results show good agreement between crosslines and main scheme data with no greater than 0.3-m difference.<sup>2</sup>

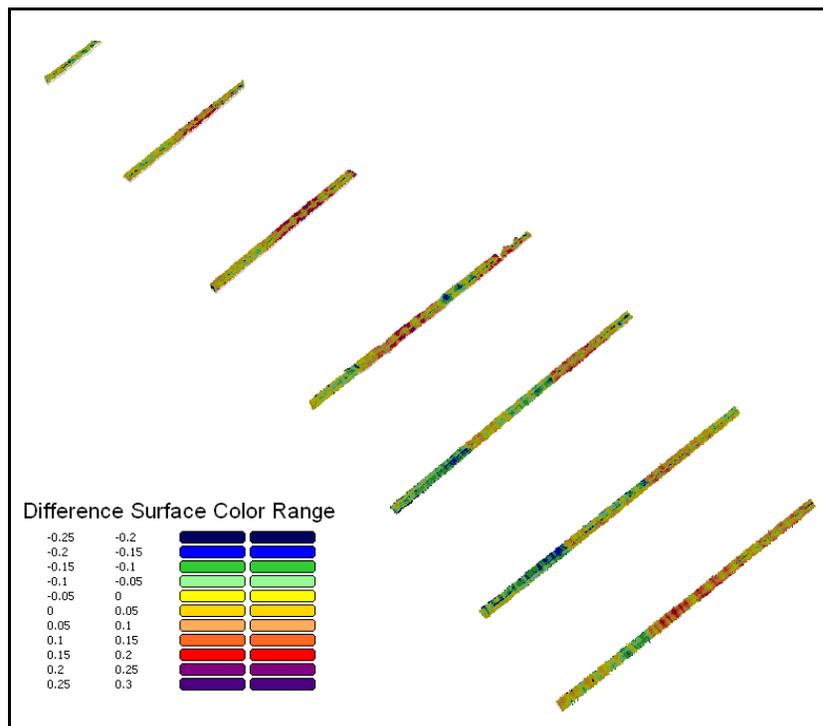


Figure 2: Resulting difference surface after subtracting the crossline data from mainscheme multibeam data

A statistical Quality Control Report has been conducted on representative data acquired with each system used on this survey. Results of these tests are included in the updated 2009 *Rainier* Hydrographic System Readiness Review package submitted with this survey.

**B.2.b. Final Uncertainty**

Uncertainty values of submitted, finalized grids are calculated in CARIS using the “Greater of the Two” of total propagated uncertainty and standard deviation (scaled to 95%). An ‘IHOness’ child attribute layer was created for the H12146\_Final\_Combined\_2m surface in CARIS HIPS for analysis. Throughout the majority of the survey, uncertainty values for H12146 fall below the IHO levels as described in the NOS Specifications and Deliverables.<sup>3</sup>

**B.2.c. Junctions**

Survey H12146 junctions with survey H11938.<sup>4</sup> A CARIS BAG for H11938 was provided by Pacific Hydrographic Branch for junction comparison. H12146 BASE surfaces were compared to this junction surface in CARIS HIPS. The two surfaces agreed within 0.1 meters, and no discernable trends.<sup>5</sup> The sheet limits and area of overlap for H12146 and H11938 are shown in Figure 1.

Junction Survey	Survey Scale	Date of Survey	Survey Location
H11938	1:10,000	August 2008	Southeast

*Table 3: Junction Surveys*

**B.2.d. Quality Control Checks**

MBES quality control checks were conducted as discussed in the quality control section B of the DAPR.

**B.2.e. Data Quality Factors**

Sound Speed Artifacts

Due to fresh water runoff and the effects of tidal currents, the sound velocity profile was difficult to capture in the field, and sound velocity artifacts can be seen in much of the data from sheet H12146. Despite the best efforts of the Hydrographer to conduct sufficient sound velocity casts distributed both spatially and temporally, sound velocity errors were still noticeable in several regions. After correction for sound velocity in CARIS, some lines still exhibited the characteristic "smiles" and "frowns" indicative of inaccurate sound velocity corrections (see Figure 3). To compensate, the Hydrographer, where possible, rejected soundings obviously in error on the outer beams.<sup>6</sup>

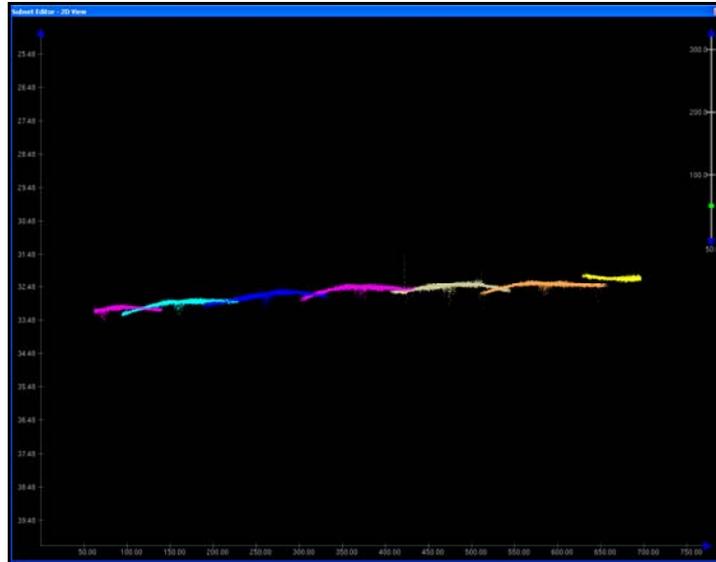


Figure 3: Sound speed artifacts seen throughout survey H12146

Trough at Nadir

Data acquired by survey launch 2801 on DN 250 exhibited a trough at nadir, likely caused by excessive gain settings used during acquisition. Nadir beams, along-track, on average were found to be 0.30 m below the surrounding seafloor (see Figure 4), affecting the CARIS CUBE surface. To compensate, the Hydrographer, where possible, rejected soundings obviously in error at nadir.<sup>7</sup>

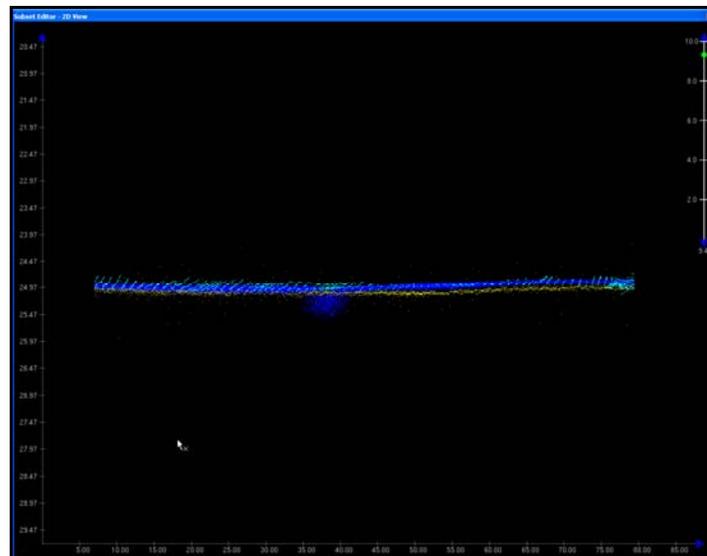


Figure 4: Trough seen in raw data at nadir from data collected by launch 2801 on DN 250

**B.2.f. Object Detection and Coverage Assessment**

Several small holidays were noted in data from launch 2803 (RA-3) on DN 251, the last day of the survey, as indicated in Figure 5 by the red circles. Rough sea conditions during this acquisition day resulted in momentary loss of bottom track throughout the data. For holidays

larger than 3 nodes across, the corresponding multibeam backscatter side scan was examined and no navigationally significant items were found; additionally, the least depths were represented.<sup>8</sup>

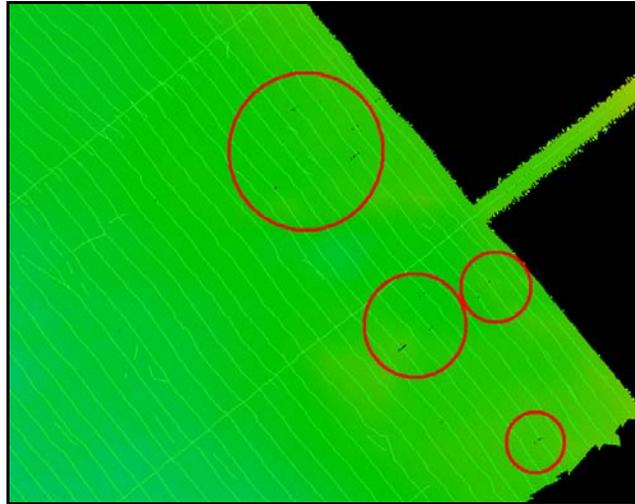


Figure 5: Holidays, highlighted by red circles, caused by increment survey conditions from survey launch 2803 on DN 251

**B.2.g. Unusual Conditions**

No unusual conditions were encountered during the survey that affected the expected accuracy and quality of survey data.

**B.3. Corrections to Echo soundings**

Data reduction procedures for survey H12146 conform to those detailed in the *OPR-P357-RA--09 DAPR*.

**B.4. Data Processing**

Data processing procedures for survey H12146 conform to those detailed in the DAPR. Data were processed using CARIS HIPS & SIPS v6.1, Service Pack 2, and Hotfix 8. Additional processing details regarding Total Propagated Uncertainty (TPU/TPE) and CUBE Surfaces and Parameters utilized, along with any the deviations from the processing procedures outlined in the DAPR are discussed below.

**TPU VALUES:**

The survey specific parameters used to compute TPU in CARIS for H12146 are listed in Table 4.

<b>Tide values:</b>	Measured	0.01 m	Zoning	0.07 m
<b>Sound Speed Values:</b>	Measured	0.50 m/s	Surface	As per DAPR

Table 4: Survey Specific CARIS TPU Parameters

Many BASE surfaces were used in processing H12146. Final BASE surface resolutions and depth ranges were set according to Table 5 below, with field sheets smaller than 25 million nodes. Because crosslines were acquired prior to completion of acquisition, the northeasterly portions of the lines extend past the limits of main scheme hydrography and into waters shoaler than the majority of the survey area. For this reason, one meter surfaces were not created for field sheets H12146\_B and H12146\_C because only the crosslines extended into this depth resolution range. CUBE surfaces were processed with a parameter set corresponding to each resolution as per HTD 2009-2. The CUBE parameter XML file is included with the data deliverables. The submission Field Sheet and BASE Surface structure are shown in figures 6 and 7.

Depth Range (m)	Resolution (m)
0-23	1
20-52	2

Table 5: Depth range and surface resolutions for H12146

Soundings and contours were generated in CARIS HIPS from the final combined BASE surface for field unit review purposes.<sup>9</sup> They are included for reference only and are not intended as a deliverable.

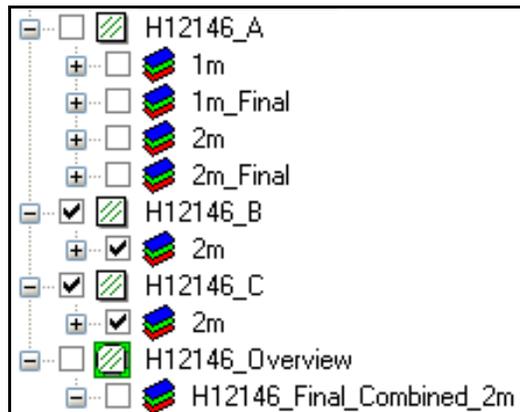


Figure 6: Field sheets and BASE surfaces submitted with H12146

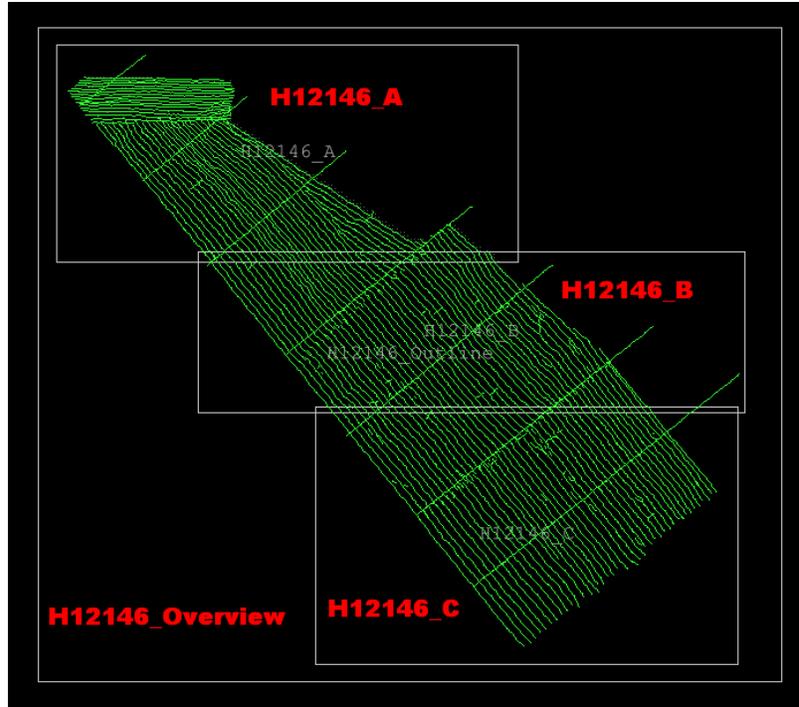


Figure 7: H12146 Field Sheet Layout

**C. VERTICAL AND HORIZONTAL CONTROL**

A complete description of vertical and horizontal control for survey H12146 can be found in the *OPR-P357-RA-FA-09 Horizontal and Vertical Control Report*, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

**C.1. Horizontal Control**

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. The differential corrector beacons utilized for this survey are given in Table 6.

Location	Frequency	Operator	Priority
Kenai	310 kHz	USCG	Primary
Kodiak	313 kHz	USCG	Secondary

Table 6: Differential Corrector Sources for H12146

**C.2. Vertical Control**

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Seldovia, AK (945-5500) served as control for datum determination and as the primary source for water level reducers for survey H12146.

*Rainier* personnel installed Sutron 8210 “bubbler” tide gauge at the following subordinate station in accordance with the Project Instructions. The gauges were installed in order to provide information to the Center for Operational Oceanographic Products and Services (CO-OPS N/OPS1) for the determination of time and height correctors. This station is described in detail in the *OPR-P357-RA-FA-09 Horizontal and Vertical Control Report*.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Bear Cove	945- 5595	30-day	11 August 2009	18 September 2009

Table 7: Tide Stations installed by Ship personnel for H12146

As per the Project Instructions, all data were reduced to MLLW using the final approved water levels from the Seldovia, AK station (954-5500) by applying tide file 9455500.tid and time and height correctors through the zone corrector file P357FARA2009CORP.zdf. **It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels to the survey data during final processing.**

The request for Final Approved Water Levels for H12146 was submitted to CO-OPS on September 9, 2009 in accordance with the Field Procedures Manual (FPM), dated April, 2009. The Final Tide Note was received on October 9, 2009. This documentation is included in Appendix IV. <sup>10</sup>

## D. RESULTS AND RECOMMENDATIONS

### D.1. Chart Comparison

#### D.1.a. Survey Agreement with Chart

Chart comparison procedures were followed as outlined in section 4.5 of the FPM and section 8.1.3-D.1 of the HSSDM, utilizing CARIS HIPS software program.

Survey H12146 was compared with the following charts: <sup>11</sup>

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
16645	1:82,662	18 <sup>th</sup> Ed, Jan 2002	Feb 20, 2010
16646	1:20,000	13 <sup>th</sup> Ed; Nov 2007	Feb 20, 2010
16647	1:100,000	3 <sup>rd</sup> ; May 2001	January 31, 2009

Table 8: Charts compared with H12146

During acquisition and subsequent processing it was noted that significant discrepancies existed between chart 16645 (1:82,662 scale) and chart 16647 (1:100,000 scale). In spite of the fact that chart 16645 is larger scale than chart 16647, the shoreline of chart 16647 appears to have been compiled at a higher resolution than that of chart 16645. Shoreline as depicted on chart 16647 appears to be consistent with shoreline features from the most recent prior surveys and observations made during shoreline acquisition for survey H12086, while chart 16645 shows inconsistencies in common areas. <sup>12</sup>

While charted depths were far less dense on chart 16647, significant bathymetric features and least depths appeared to agree with survey soundings from this project and prior survey soundings far better than charted depths on chart 16645. For this reason, chart comparison was conducted with chart 16647 in addition to chart 16645. In both cases, prior survey data supported the charted depths on chart 16647.

It appears that the most recent prior survey data may not have been applied to chart 16645, but was applied to chart 16647. These discrepancies were noted during acquisition and brought to the attention of Laurie Bennett, a visiting cartographer from the Marine Charting Division (MCD). Additionally, an e-mail was sent to MCD reiterating these issues by the Chief of the Pacific Hydrographic Branch and the Field Operations Officer, *Rainier*. This e-mail correspondence is included in Appendix V.<sup>13</sup>

Soundings from survey H12146 agreed within 0.5 fathoms of charted depths on raster charts 16645 and 16646.

#### **D.1.b. Automated Wreck and Obstruction Information System (AWOIS) Items**

No AWOIS items were located within the survey limits of H12146.<sup>14</sup>

#### **D.1.c. Other Investigated Features**

No additional charted items were investigated and no other features were located on survey H12146.

#### **D.1.d. Dangers to Navigation**

No dangers to navigation (DTONs) were found within the limits of survey H12146.<sup>15</sup>

### **D.2. Additional Results**

#### **D.2.a. Shoreline Verification**

Shoreline verification was not performed for survey H12146. No CARIS Notebook or HOB files will be submitted.<sup>16</sup>

#### **D.2.b. Prior Survey Comparison**

Prior survey comparison was not performed.

#### **D.2.c. Aids to Navigation**

There are no Aids to Navigation within the limits of survey H12146.<sup>17</sup>

#### D.2.d. Overhead Features

There are no overhead features within the limits of survey H12146.

#### D.2.e. Submarine Cables and Pipelines

Survey H12146 includes one charted submarine cable route, as shown in Figure 8. No visible indication of cables was evident in the bathymetry in the southern corner of field sheet H12146\_C in the vicinity of the charted cable route. The Hydrographer recommends retaining the cable route as charted.<sup>18</sup>

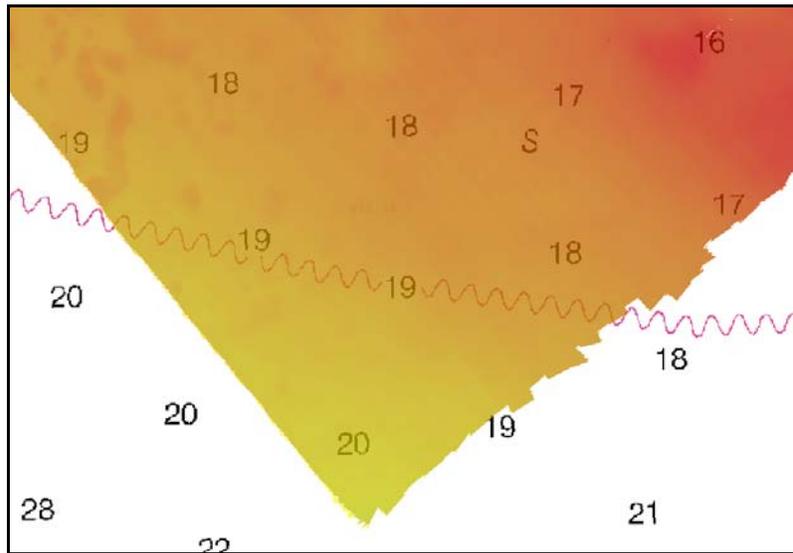


Figure 8: H12146 charted cable route.

#### D.2.f. Ferry Routes

There are no ferry routes charted within the limits of survey H12146. Alaska State Ferries do operate in the region and transit east of Homer Spit, but these ferries do not operate on a regular schedule or route. The Hydrographer does not recommend that this ferry route be charted due to the intermittent schedule and undefined transit route.<sup>19</sup>

#### D.2.g. Bottom Samples

Bottom samples were not performed on survey H12146.<sup>20</sup>

#### D.2.h. Other Findings

There are no other findings to report for this survey.

**E. APPROVAL**

As Chief of Party, field operations for hydrographic survey H12146 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (April 2009 edition), Field Procedures Manual (April 2009 edition), Standing and Project Instructions, and all HSD Technical Directives issued through September 2009. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Hydrographic Systems Readiness Review Package	<i>Under separate cover</i>	N/CS34
Data Acquisition and Processing Report for OPR-P357-RA-FA-09	February 8, 2010	N/CS34
Coast Pilot Report for OPR-P357-RA-FA-09	<i>To be submitted</i>	N/CS26
Horizontal and Vertical Control Report for OPR-P357-RA-FA-09	December 14, 2009	N/CS34
Tides and Water Levels Package for OPR-P357-RA-FA-09	October 21, 2009	N/OPS1

Approved and Forwarded:



Donald W. Haines, CAPT/NOAA  
I am approving this document  
2010.03.15 15:31:42 -07'00'

Captain Donald W. Haines, NOAA  
Commanding Officer, NOAA Ship *Rainier*

In addition, the following individuals were also responsible for overseeing data acquisition and processing of this survey:

Survey Sheet Manager:



Christine L. Schultz  
I am the author of this document  
2010.03.15 13:58:31 -07'00'

Lieutenant (junior grade) Christine L. Schultz, NOAA  
Junior Officer, NOAA Ship *Rainier*

Chief Survey Technician:



James B. Jacobson  
I have reviewed this document  
2010.03.15 20:34:42 Z

James B. Jacobson  
Chief Survey Technician, NOAA Ship *Rainier*

Field Operations Officer:



Brent Pounds  
I have reviewed this document  
2010.03.15 13:07:44 -08'00'

Lieutenant Brent J. Pounds, NOAA  
Field Operations Officer, NOAA Ship *Rainier*

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**Revisions and Corrections Compiled During Office Processing and Certification.**

<sup>1</sup> Concur.

<sup>2</sup> Concur.

<sup>3</sup> Concur.

<sup>4</sup> H12146 junctions with H11938 to the SE. A common junction was made with an adjoining portion of this survey.

<sup>5</sup> Concur. The areas of overlap were adequate and within specifications.

<sup>6</sup> The data is adequate and within specifications to supersede charted data in the common area despite the SV errors.

<sup>7</sup> The data is adequate and within specifications to supersede charted data in the common area.

<sup>8</sup> Concur. Areas around holidays were examined at PHB. There is no evidence of shoaling or significant features.

<sup>9</sup> During SAR processing the field sheet H12146\_OFFICE\_Combined was created and contains the H12146\_Final\_Combined\_2m base surface that was used for cartographic compilation.

<sup>10</sup> Tide note is attached to this report.

<sup>11</sup> Concur with clarifications. Survey H12146 is out of the limits of chart 16646.

<sup>12</sup> Concur.

<sup>13</sup> E-mail correspondence is included to this report.

<sup>14</sup> Concur.

<sup>15</sup> Concur.

<sup>16</sup> Concur.

<sup>17</sup> Concur.

<sup>18</sup> Concur with the hydrographers recommendations. A blue note was added to the HCell to retain the submerged cable.

<sup>19</sup> Concur.

<sup>20</sup> Four bottom samples were imported from the ENC to be retained.

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**From:** "foo.rainier" <foo.rainier@noaa.gov>  
**To:** <Andrew.Kampia@noaa.gov>  
**Cc:** <Doug.Baird@noaa.gov>; <laurie.bennett@noaa.gov>; "CO Rainier" <co.rainier@noaa.gov>; "Gary Nelson" <Gary.Nelson@noaa.gov>; "james.m.crocker" <James.M.Crocker@noaa.gov>  
**Sent:** Wednesday, March 03, 2010 4:07 PM  
**Subject:** Chart 16645 and 16647 Discrepancies from OPR-P357-RA-FA-09  
Andrew,

During shoreline acquisition for the Katchemak Bay Project (OPR-P357-RA-FA-09) it was noted that significant discrepancies existed between chart 16645 (1:82,662 scale) and chart 16647 (1:100,000 scale) throughout the survey project area. At the time these discrepancies were identified they were brought to the attention of Laurie Bennett, who was visiting the ship from the Marine Charting Division (MCD). The inconsistencies between these two charts have again been noted during final processing of the surveys from this project and this e-mail is intended to reiterate the inaccuracies in this area.

In spite of the fact that chart 16645 is larger scale than chart 16647, the shoreline of chart 16647 appears to have been compiled at a higher resolution than that of chart 16645. Shoreline as depicted on chart 16647 appears to be consistent with shoreline features from the most recent prior surveys and observations made during this season's shoreline acquisition. Chart 16645 has numerous inaccuracies in comparison to prior surveys and observed shoreline during this project, including many mischarted islets and rocks. While charted depths were far less dense on chart 16647, significant bathymetric features and least depths appeared to agree with survey soundings from this project and prior survey soundings far better than charted depths on chart 16645.

It appears that the most recent prior survey data may not have been applied to chart 16645, but was applied to chart 16647.

Additionally, an apparent compilation error was noted on chart 16647 in the area covered by survey H09941. While low water features are depicted on the smooth sheet for survey H09941, the mean high water (MHW) line is conspicuously absent from the smooth sheet. Chart 16647 reproduces this error depicting reefs or mean lower-low water (MLLW) lines in the place of islands. While chart 16645 does correctly depict the MHW features as islands, the location of these islands often does not match with actual observed location or the location as depicted on survey H09941.

If you would like specific examples of the discrepancies between these charts or have any other questions regarding this matter, please do not hesitate to contact me.

V/R,  
LT Brent Pounds  
Field Operations Officer  
NOAA Ship /Rainier/



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

**TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**DATE :** October 7, 2009

**HYDROGRAPHIC BRANCH:** Pacific  
**HYDROGRAPHIC PROJECT:** OPR-P357-RA-FA-2009  
**HYDROGRAPHIC SHEET:** H12146

**LOCALITY:** Vicinity of Bluff Point, Kachemak Bay, AK  
**TIME PERIOD:** September 4 - 8, 2009

**TIDE STATION USED:** 945-5500 Seldovia, AK  
Lat. 59° 26.4'N Long. 151° 43.2' W  
**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters  
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 5.252 meters

**REMARKS: RECOMMENDED ZONING**

Preliminary zoning is accepted as the final zoning for project OPR-P357-RA-FA-2009, H12146, during the time period between September 4 and September 8, 2009.

Please use the zoning file "P357FARA2009CORP" submitted with the project instructions for OPR-P357-FA/RA-2009. Zones CIC75, CIC76, & CIC77 are the applicable zones for H12146.

**Refer to attachments for zoning information.**

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

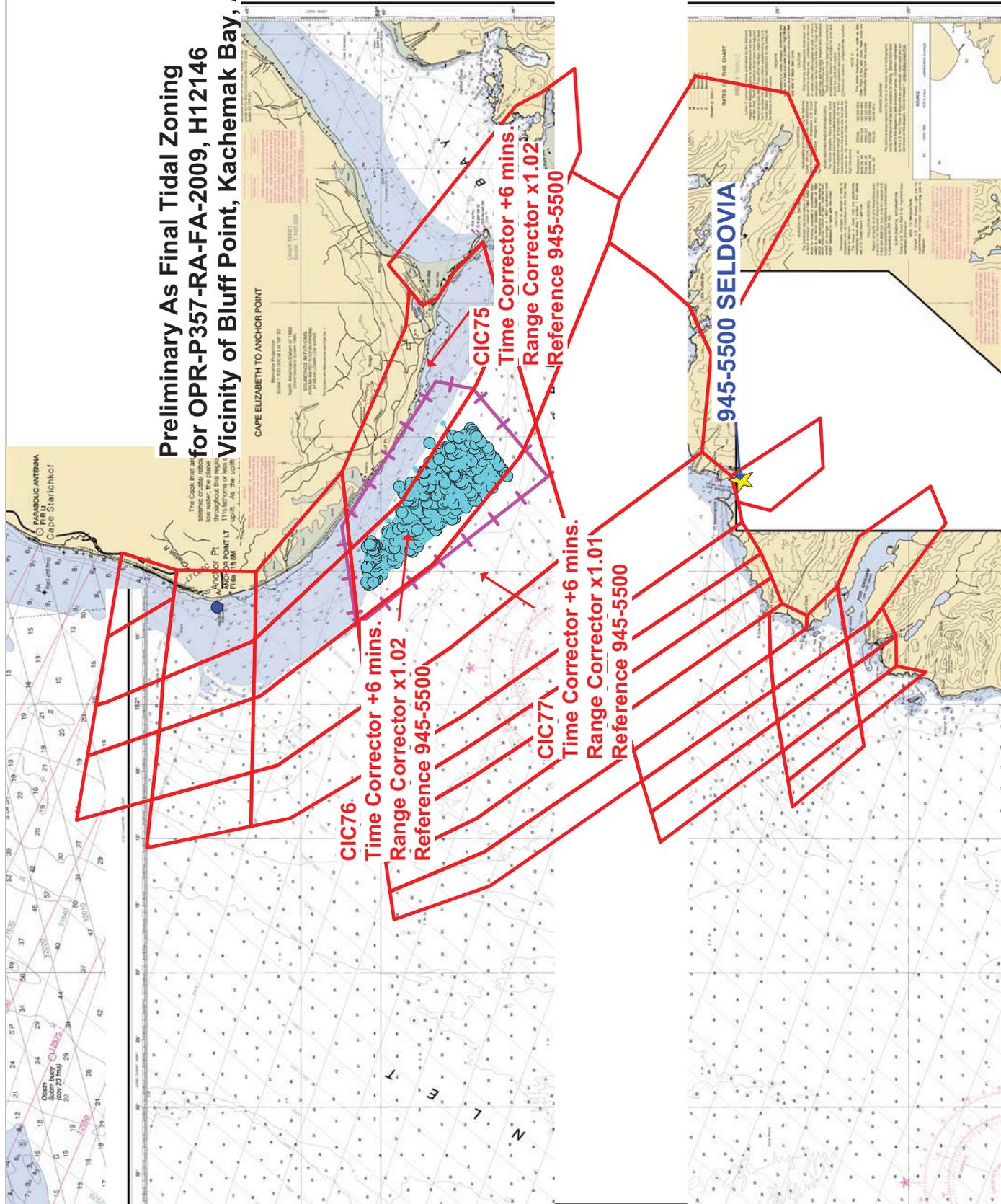
**Peter J. Stone**

Digitally signed by Peter J. Stone  
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Date: 2009.10.09 08:08:28 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION



**Preliminary As Final Tidal Zoning  
for OPR-P357-RA-FA-2009, H12146  
Vicinity of Bluff Point, Kachemak Bay, AK**



**H12146 HCell Report**  
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Pacific Hydrographic Branch

**1. Specifications, Standards and Guidance Used in HCell Compilation**

HCell compilation of survey H12146 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March 2010.  
HCell Reference Guide: Version 2.0, July 29, 2010.

**2. Compilation Scale**

Depths and features for HCell H12146 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
16645	1:82,662	19th	06/2010	11/02/2010

The following ENC's were also used during compilation:

Chart	Scale
US5AK1AM	

**3. Soundings**

A survey-scale sounding (SOUNDG) feature object layer was built from the 2-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:35,000 for the 16645 chart at survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-5	10	2
10	20	3
20	50	3.5
50	500	4

In CARIS BASE Editor soundings were manually selected from the high density sounding layers (SS) and imported into a new layer (CS) created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that closely represents the seafloor morphology.

#### 4. Depth Contours

Depth contours at the intervals on the largest scale chart are included in the \*\_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The metric and fathom equivalent contour values are shown in the table below.

Chart Contour Intervals in fathoms from Chart 16645	Metric Equivalent to Chart Fathoms, Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied	Fathoms with NOAA Rounding Removed for Display on H12146_SS.000
10	18.288	18.5166	10.125	10

#### 5. Meta Areas

The following Meta object area is included in HCell H12146:

M\_QUAL

The Meta area object was constructed on the basis of the limits of the hydrography.

#### 6. Features

Features addressed by the field units are delivered to PHB where they are deconflicted against the hydrography and the largest scale chart. These features, as well as features to be retained from the chart and features digitized from the Base Surface, are included in the HCell. The geometry of these features may be modified to emulate chart scale per the HCell Reference Guide on compiling features to the chart scale HCell.

## 7.S-57 Objects and Attributes

The \*\_CS HCell contains the following Objects:

\$CSYMB	Blue Notes-Notes to the MCD chart Compiler
M_QUAL	Data quality Meta object
SBDARE	Bottom samples- rocky seabed areas
SOUNDG	Soundings at the chart scale density

The \*\_SS HCell contains the following Objects:

DEPCNT	Contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

## 8. Spatial Framework

### 8.1 Coordinate System

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datums.

### 8.2 Horizontal and Vertical Units

DUNI, HUNI and PUNI are used to define units for depth, height and horizontal position in the chart units HCell, as shown below.

Chart Unit Base Cell Units:

Depth Units (DUNI):	Fathoms and Feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

During creation of the HCell in CARIS BASE Editor and CARIS S-57 Composer, all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

Sounding Units:	Meters rounded to the nearest millimeter
Spot Height Units:	Meters rounded to the nearest decimeter

See the HCell Reference Guide for details of conversion from metric to charting units, and application of NOAA rounding.

## 9. Data Processing Notes

There were no significant deviations from the standards and protocols given in the HCell Specification and HCell Reference Guide.

**10. QA/QC and ENC Validation Checks**

H12146 was subjected to QA checks in S-57 Composer prior to exporting to the metric HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they are MCD approved as inherent to and acceptable for HCells.

**11. Products**

**11.1 HSD, MCD and CGTP Deliverables**

H12146_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:82,662
H12146_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:35,000
H12146_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12146_outline.gml	Survey outline
H12146_outline.xsd	

**11.2 Software**

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 3.0	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.1	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1, SP 1	Validation of the base cell file.
Northport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

## **12. Contacts**

Inquiries regarding this HCell content or construction should be directed to:

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APPROVAL SHEET  
H12146

The survey evaluation and verification has been conducted according to branch processing procedures and the HCell compiled per the latest OCS HCell Specifications.

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproof of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

I have reviewed the HCell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.