

H11135

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.* ..... RA-20-01-05

*Registry No.* ..... H11135

### LOCALITY

*State* ..... Alaska

*General Locality* ..... Approaches to Sitka

*Sublocality* ..... Southern Offshore Approaches

**2005**

### CHIEF OF PARTY

..... CDR John W. Humphrey, NOAA

### LIBRARY & ARCHIVES

DATE .....

**HYDROGRAPHIC TITLE SHEET**

**H11135**

**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

**RA-20-01-05**

State Alaska

General Locality Approaches to Sitka

Sub-Locality Southern Offshore Approaches

Scale 1:20,000 Dates of Survey 5/24/2005 - 6/14/2005

Instructions dated 3/18/2005 Project No. OPR-O112-RA-05

Vessel RA5 (1006), RA6 (1015), RA3 (1021), RAINIER (S221)

Chiefs of party CDR John W. Humphrey, NOAA

Surveyed by RAINIER Personnel

Soundings by echo sounder, hand lead, pole Reson SeaBat 8101, Seabeam/Elac 1180, Seabeam/Elac 1050D MKII

Graphic record scaled by N/A

Graphic record checked by N/A Automated Plot N/A

Verification by Katie Reser, Martha Herzog

Soundings in Fathoms and Feet at MLLW

**REMARKS:** All times are UTC. UTM Projection (zone #8).

Revisions and annotations appearing as endnotes were generated during office processing. As a result, page numbering may be interrupted or non-sequential.

All separates are filed with the hydrographic data.

# Descriptive Report to Accompany Hydrographic Survey H11135

Project OPR-O112-RA-05  
Southern Offshore Approach to Sitka, AK  
Scale 1:20,000  
May - June 2005

## NOAA Ship RAINIER

Chief of Party: Commander John W. Humphrey, NOAA

### A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-O112-RA-05, dated April 4, 2005, Standing Instructions for Hydrographic Surveys dated March 2004, NOS Hydrographic Surveys Specifications and Deliverables Manual dated March 2003 and NOS Field Procedures Manual for Hydrographic Surveying dated March 2005 with the exception of deviations noted in this report. The survey area is located in Sitka Sound, East of Necker Islands. This survey corresponds to sheet AE in the sheet layout provided with the Letter Instructions.

One hundred percent multibeam echosounder coverage was obtained in the survey with the exception of minor holidays discussed in Section B2.<sup>1</sup>

Data acquisition was conducted from May 24 to June 14, 2005 (DN 144 to DN 165).

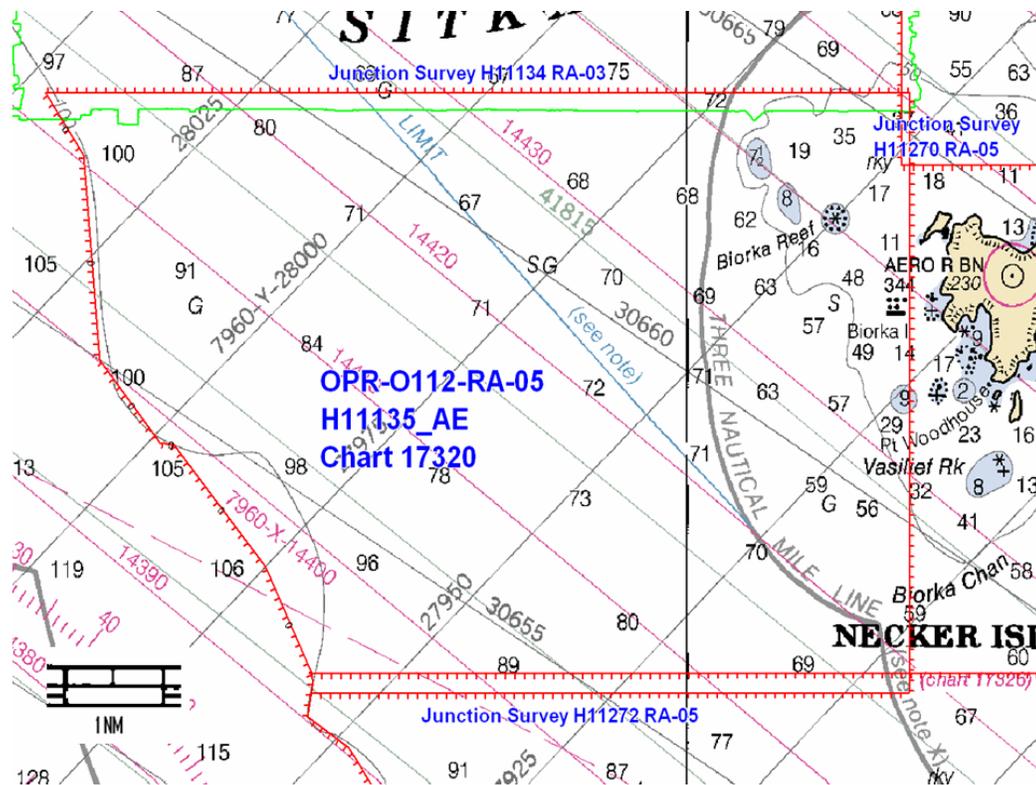


Figure 1. H11135 Survey Limits and Junctions

## 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-O112-RA-05 Data Acquisition and Processing Report (DAPR)*<sup>2</sup>, submitted under separate cover. Items specific to this survey, and any deviations from the aforementioned report are discussed in the following sections.

**FINAL APPROVED WATER LEVELS HAVE BEEN APPLIED** to these data. See Section C. for additional information.<sup>3</sup>

### B1. Equipment and Vessels

All data were acquired by RAINIER (using the Elac 1050D in 50 kHz mode), and RAINIER survey launches 1006 (RA5), 1015 (RA6) and 1021 (RA3). No unusual vessel configurations were used for data acquisition.

### B2. Quality Control

#### Crosslines

Multibeam Echosounder (MBES) crosslines totaled 49.52 nautical miles, comprising 11.55% of MBES hydrography. The mainscheme bathymetry was manually compared to the crossline nadir beams in CARIS subset mode and agreed well with differences no greater than one tenth of a meter.<sup>4</sup>

A statistical Quality Control Report was generated for SWMB data acquired on this project to validate launch offsets and sonar biases. A copy of this report is included in the *OPR-O112-RA-05 DAPR*.

#### Junctions

The following contemporary surveys junctions with H11135 (see Figure 1):

<b>Registry #</b>	<b>Scale</b>	<b>Date</b>	<b>Junction side</b>
H11134	1:20,000	2003	Northern
H11272	1:20,000	2005	Southern
H11270	1:10,000	2005	North-East

Survey H11134 junctions well with these surveys, a cursory junction comparison in MapInfo indicates differences generally less than 2 meters in depth up to 100 meters and 4 meters or less in depths up to 220 meters.<sup>5</sup>

**Data Quality Factors**

Data for survey H11135 exhibited no major deficiencies. Several relatively minor issues are noted below:

Sound Speed Errors:

Sound speed errors are present in the southeast corner of the survey area in data acquired by RAINIER on DN159 (June 8, 2005). Bathymetry in this area exhibits the characteristic "smiles" and "frowns" indicative of inaccurate sound speed corrections. See Figures 2 and 3 for an example of data from this area. The CTD cast acquired to correct these data (05159015.sva) has no data above 54.9 m depth. This error was not detected at the time of acquisition, and subsequent attempts to correct the bathymetric errors by reprocessing the CTD data or applying other sound speed profiles from the area to the affected bathymetry did not improve the data. The problem was exacerbated by the fact that RAINIER is not equipped with a surface sound velocimeter.

Data affected by this cast were filtered to a swath angle of  $\pm 50^\circ$  (see Figure 2) to reject soundings with refraction errors exceeding the portion of the error budget reserved for sound speed (0.3 meters plus 0.5 percent of the water depth). This bathymetry was inspected for features prior to filtering and manually reaccepted where necessary to maintain coverage over shoal areas. Although this action produced minor along-track holidays (see Figure 3) in the BASE surface at the specified resolution, no shoaling is present in these gaps and the hydrographer considers H11135 adequate to supersede prior survey data throughout the survey area.<sup>6</sup>

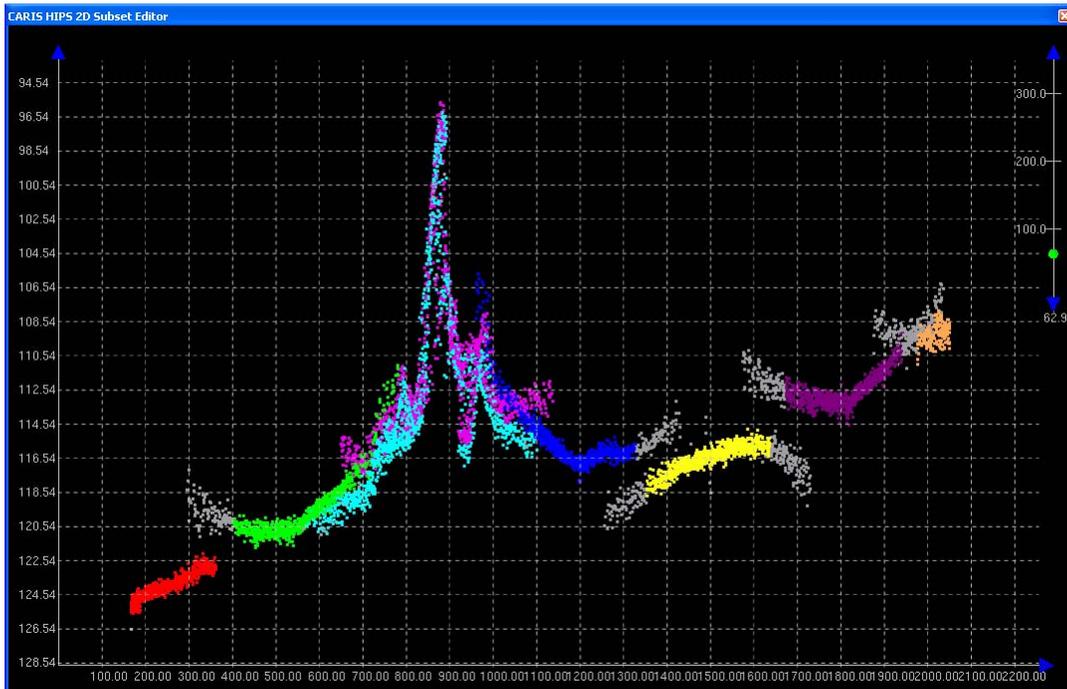
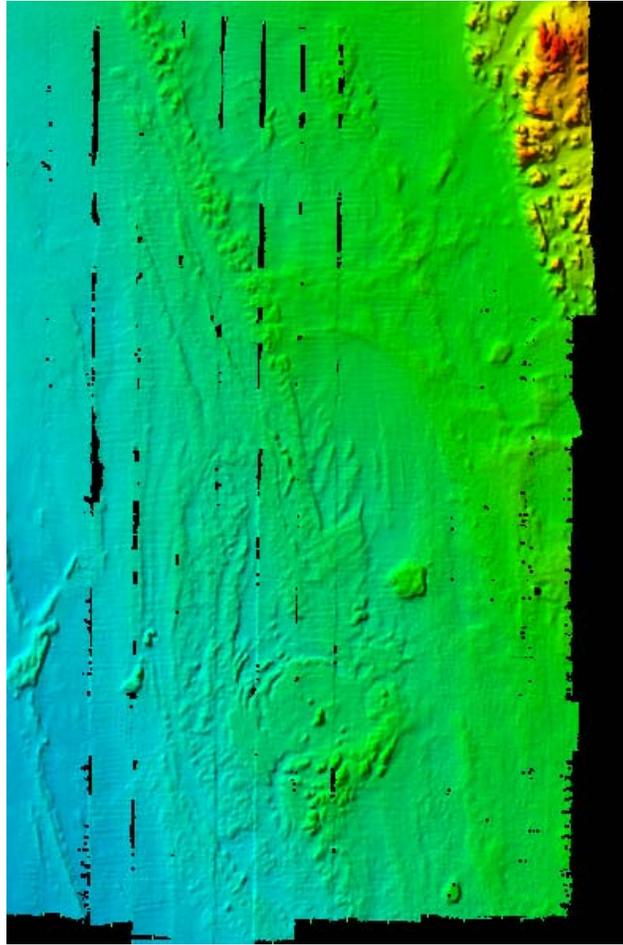


Figure 2. ELAC 1050D data collected by RAINIER on DN 159



*Figure 3. Along-track holidays in base surface H11135\_final*

Some other sound speed errors are present in this survey area but do not exceed the allowable error. Figure 4 is one example of this in which the mainscheme lines cannot be adequately corrected for sound velocity.<sup>7</sup>

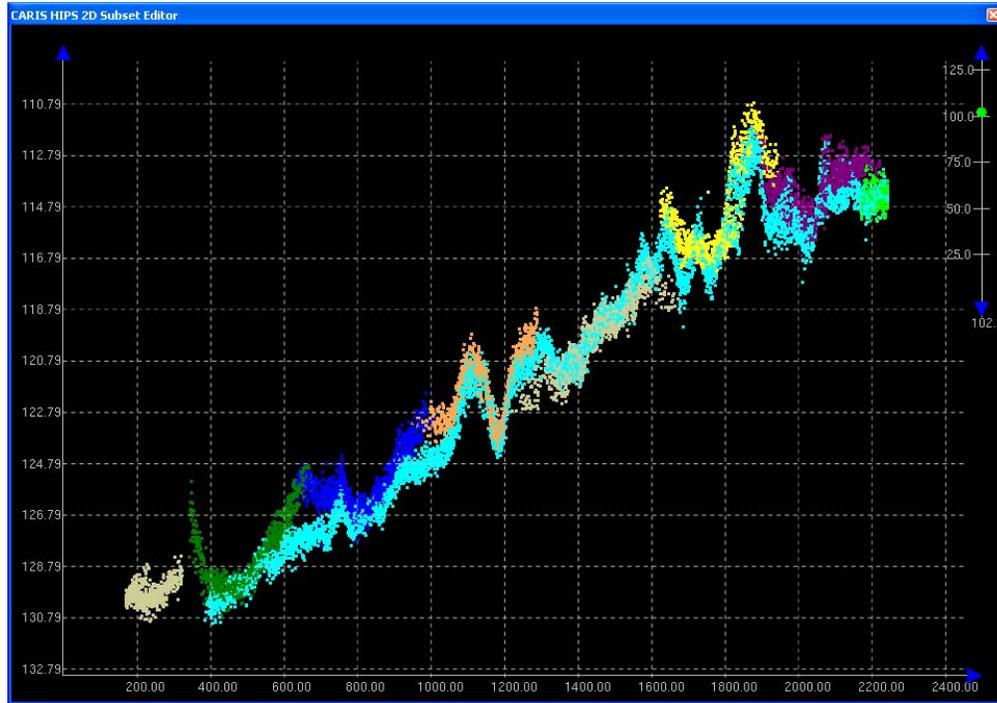


Figure 4. Crossline (turquoise) compared to mainscheme lines with sound speed errors

#### Unresolved heave:

A pervasive unresolved heave artifact with amplitude of up to +/-0.5 meter is present throughout the ELAC 1050D data (see Figure5). A complete description of this issue can be found in the *OPR-O112-RA-05 Data Acquisition and Processing Report (DAPR)*, submitted under separate cover. Despite efforts by shipboard and OCS Hydrographic Systems and Technology Programs personnel, this problem remains unexplained and unresolved. However, since the magnitude of the error is relatively small and the affected data is all in water depths of 90 m or greater, the bathymetry meets specified accuracy requirements.<sup>8</sup>

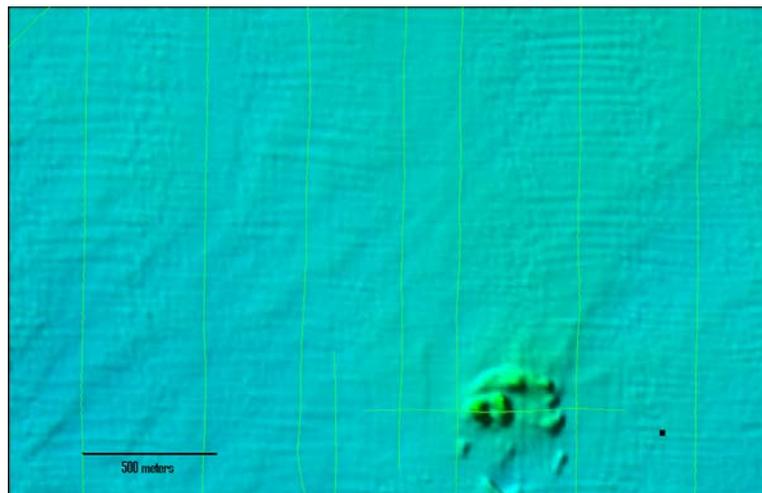


Figure 5. Unresolved heave in base surface H11135\_final, vertical exaggeration of 3

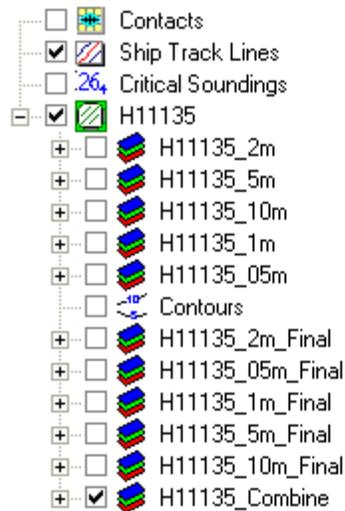
**B3. Data Reduction**

Data reduction procedures for survey H11135 conform to those detailed in the *OPR-O112-RA-05 DAPR*.

The ELAC 1050D produces lower sounding density than the 2005 Field Procedures Manual BASE Surface resolution specification. As a result, there are many small holidays in the 5 and 10 m BASE Surfaces because sounding density of the Elac system is not sufficient to populate every grid cell at these resolutions in the depth ranges specified by the FPM. All ELAC 1050D data was acquired in depths greater than 100 meters, and there is no evidence of shoaling around any of the gaps. All features of interest (specifically the major ridge running north-south on the west side of the survey area, and other rocky outcroppings) were developed with additional coverage to increase sounding concentration and ensure adequate data density. The hydrographer considers this data adequate to supersede all prior survey soundings in the common area and recommends the source diagram show full bottom coverage despite the small random deep water holidays.<sup>9</sup>

**B4. Data Representation**

Many BASE surfaces were used for the processing of H11135. Final BASE surface resolutions and depth ranges were set in accordance with the Field Procedures Manual. The submission Field Sheet and BASE Surface structure is shown in Figures 6 and 7.



*Figure 6: Field sheets and BASE surfaces submitted with H11135*

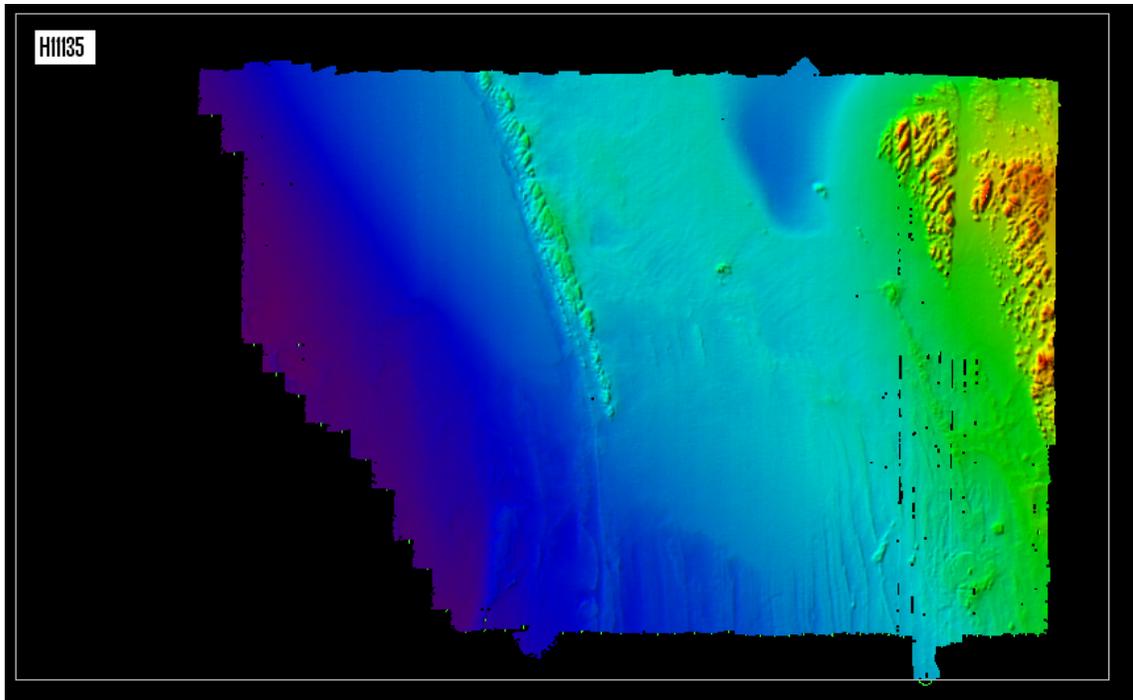


Figure 7: Plan view of survey area BASE Surfaces.

## C. VERTICAL AND HORIZONTAL CONTROL

Project OPR-O112-RA-05 did not require static GPS observations or other horizontal control work, and all tide corrections were generated from CO-OPS maintained tide stations. Thus, no Horizontal and Vertical Control Report will be submitted.<sup>10</sup> A summary of horizontal and vertical control for this survey follows.

### C1. 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 beacon utilized for this survey is the U.S. Coast Guard beacon at Biorka Island, transmitting on 305 kHz. This site is approximately 5 nm from the H11135 survey area.

### C2. Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary water level station at Sitka, AK (945-1600) served as control for datum determination and as the primary source for water level reducers for survey H11135.

No additional water level stations were required.

All data were reduced to MLLW using FINAL APPROVED WATER LEVELS from station Sitka, AK (945-1600) (in accordance with the *Hydrographic Survey Letter Instructions*) using the tide file 9451600.tid and time and height correctors using the zone corrector file

O122RA2005CORP.zdf. Documentation of the Approved Water Levels Request is included in Appendix III.<sup>11</sup>

## **D. RESULTS AND RECOMMENDATIONS**

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

No AWOIS items were located within the limits of H11135.

### **D.2 Chart Comparisons**

Survey H11135 was compared with the following charts:

<b>Chart</b>	<b>Scale</b>	<b>Edition and Date</b>	<b>Corrected for Notice to Mariners through:</b>
17326	1:40,000	13 <sup>th</sup> Ed.; Aug/00	June 2005
17320	1:80,000	15th Ed.; Mar/99	May 2005

#### **Chart 17320**

Depths from survey H11135 were generally in agreement with charted soundings within two fathoms, with the exception of one sounding in the northwest corner of the survey: A charted 91 fathom sounding in approximate position 56°51'23.29" N, 135°51'47.34" W was surveyed to 98 fathoms.<sup>12</sup>

#### **Chart 17326**

All charted depths agree well with discrepancies no greater than two fathoms with the exception of the vicinity of Biorka Reef. This is a rocky area of extremely rugged, variable bathymetry which is not accurately represented on the current chart. The hydrographer recommends that the full bottom coverage bathymetry of H11135 supersede all prior surveys and charted depths in the common area.<sup>13</sup>

### **D.3 Shoreline**

There was no shoreline work for H11135.<sup>14</sup>

### **Charted Features**

The charted rock awash on Biorka Reef was fully ensouffied with 100% SWMB. The pinnacle of the reef has a least depth of 0.9 m, and is located approximately 80 m NE of its charted position. The hydrographer recommends that the “rock awash” symbol be removed and replaced with a danger circle and 0.5 fathoms depth at the surveyed position, and “Rk” notation. The ENC should show an UWTRC at the surveyed position with VALSOU set to 0.5 fm and WATLEV “Always underwater/submerged”.<sup>15</sup>

There are no other features to report for H11135.<sup>16</sup>

## Recommendations

The hydrographer recommends that survey H11135 supersede all prior survey data in the common area.<sup>17</sup>

### D.4 Dangers to Navigation

One danger to navigation (DTONs) was found within the limits of H11135. The DTON report is included in Appendix I.<sup>18</sup>

### D.5 Aids to Navigation

No Aids to Navigation (ATONs) are located within the limits of H11135.<sup>19</sup>

### D.6 Miscellaneous

RAINIER personnel observed breaking swell in the vicinity of Biorka Reef in the moderate sea state prevalent during field operations on H11135. The hydrographer recommends that the notation "Breakers" be added to the chart in approximate position 56° 52' 02" N, 135° 36' 50" W.<sup>20</sup>

Bottom samples were not collected during H11135.<sup>21</sup>

## E. ADDITIONAL DOCUMENTATION

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>
Data Acquisition and Processing Report for OPR-O112-RA-05	<7/16/2006>	N/CS34
Coast Pilot Report for OPR-O112-RA-05	<5/10/2006>	N/CS26



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NOAA Marine and Aviation Operations  
Marine Operations Center  
1801 Fairview Avenue East  
Seattle, Washington 98102-3767

MEMORANDUM FOR: CDR Donald Haines, NOAA  
Chief, Pacific Hydrographic Branch

FROM: CDR Guy Noll, NOAA  
Commanding Officer  
NOAA Ship RAINIER

DATE: May 6, 2006

TITLE: Approval of Hydrographic Survey H11135

Field operations for hydrographic survey H11135 were conducted under the direct supervision of the previous Commanding Officer, CDR John W. Humphrey, 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, Field Procedures Manual, Standing and Letter Instructions, and HSD Technical Directives. These data are adequate to supersede charted data in their common areas with the exceptions noted in the Descriptive Report. This survey is complete and no additional work is required. Data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

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

Survey Manager:

Nicola Samuelson  
Lieutenant (junior grade), NOAA

Chief Survey Technician:

James B. Jacobson  
Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer:

Benjamin K. Evans  
Lieutenant, NOAA



---

<sup>1</sup> Concur.

<sup>2</sup> Filed with project reports.

<sup>3</sup> Concur.

<sup>4</sup> Concur.

<sup>5</sup> Concur.

<sup>6</sup> Concur. All correctors are adequate. Survey H11135 is adequate to supersede charted data within the common area.

<sup>7</sup> Although the SV errors cannot be completely corrected, all data included in HCell H11135 meets specification.

<sup>8</sup> Concur.

<sup>9</sup> Concur.

<sup>10</sup> Concur.

<sup>11</sup> Tide note is appended to this report.

<sup>12</sup> Concur.

<sup>13</sup> Concur.

<sup>14</sup> Concur.

<sup>15</sup> Concur. Submerged rock included in HCell H11135.

<sup>16</sup> Concur. See note 19 for “breakers.”

<sup>17</sup> Concur.

<sup>18</sup> DTON Report is appended to this report.

<sup>19</sup> Concur.

<sup>20</sup> Concur. WATTUR point feature included in HCell H11135

<sup>21</sup> All charted bottom samples from US3AK3BM.000, US3AK4PM.000, US3AK3GM.000, and US3AK3VM.000 within the limits of US511135\_CS.000 were retained.

# H11135\_DTON

**Registry Number:** H11135  
**State:** AK  
**Locality:** Approach to Sitka  
**Sub-locality:** Southern Offshore Approach to Sitka  
**Project Number:** OIPR-O112-RA-06  
**Survey Date:** 06/07/2005

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
17326	14th	06/01/2005	1:40,000 (17326_1)	[L]NTM: ?
17320	17th	11/01/2005	1:217,828 (17320_1)	[L]NTM: ?
16016	20th	11/01/2003	1:969,756 (16016_1)	[L]NTM: ?
531	23rd	01/01/2006	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
530	31st	06/01/2005	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

\* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

## Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	72/16	Shoal	11.78 m	56° 52' 41.2" N	135° 38' 18.3" W	---

## **1 - Danger To Navigation**

## 1.1) Profile/Beam - 72/16 from h11135 / 1006\_reson8101\_hvf / 2005-158 / 013\_1815

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 56° 52' 41.2" N, 135° 38' 18.3" W  
**Least Depth:** 11.78 m (= 38.64 ft = 6.440 fm = 6 fm 2.64 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.376$  m ; **TVU (TPEv)**  $\pm 0.423$  m  
**Timestamp:** 2005-158.18:16:16.150 (06/07/2005)  
**Survey Line:** h11135 / 1006\_reson8101\_hvf / 2005-158 / 013\_1815  
**Profile/Beam:** 72/16  
**Charts Affected:** 17326\_1, 17320\_1, 16016\_1, 531\_1, 500\_1, 530\_1, 50\_1

#### Remarks:

Shoal Sounding

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h11135/1006_reson8101_hvf/2005-158/013_1815	72/16	0.00	000.0	Primary

#### Hydrographer Recommendations

Chart sounding only

#### Cartographically-Rounded Depth (Affected Charts):

6 ½fm (17326\_1, 17320\_1, 16016\_1, 530\_1)

6fm 2ft (531\_1)

11.8m (500\_1, 50\_1)

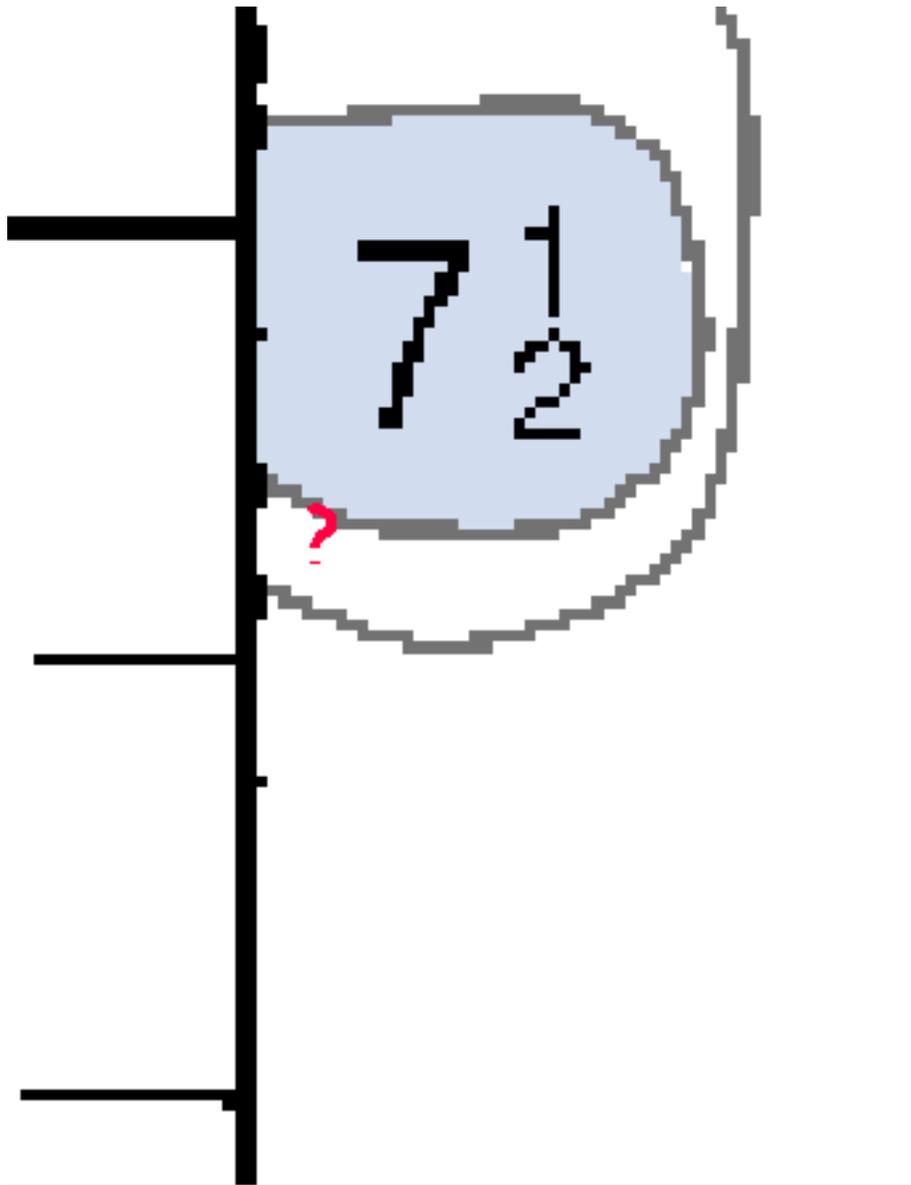
#### S-57 Data

**Geo object 1:** Sounding (SOUNDG)

## Office Notes

Concur

### Feature Images



*Figure 1.1.1*



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

**TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**DATE :** August 2, 2005

**HYDROGRAPHIC BRANCH:** Pacific  
**HYDROGRAPHIC PROJECT:** OPR-O112-RA-2005  
**HYDROGRAPHIC SHEET:** H11135

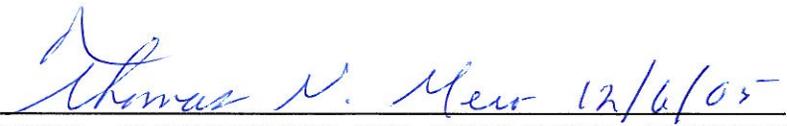
**LOCALITY:** Southern Offshore Approaches, Sitka Sound, AK  
**TIME PERIOD:** May 24 - June 14, 2005

**TIDE STATION USED:** 945-1600 Sitka, Alaska  
Lat. 57 03.1'N Long. 135 20.5' W  
**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters  
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 2.791 meters

**REMARKS:** RECOMMENDED ZONING  
Use zone(s) identified as: PAC294 & SEA200

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).

  
CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION



**Final tide zone node point locations for OPR-O112-RA-2005, H11135**

Format: Tide Station (in recommended order of use)  
 Average Time Correction (in minutes)  
 Range Correction  
 Longitude in decimal degrees (negative value denotes Longitude West),  
 Latitude in decimal degrees

	Tide Station Order	AVG Time Correction	Range Correction
Zone SEA200	945-1600	0	1.00
-135.560208 56.847672			
-135.542365 56.857201			
-135.513529 56.850654			
-135.50839 56.861868			
-135.472042 56.890618			
-135.413912 56.927046			
-135.37942 56.944575			
-135.345146 56.937479			
-135.148538 56.891767			
-135.096503 56.976245			
-135.219418 57.152377			
-135.294235 57.2785			
-135.435854 57.285735			
-135.536277 57.284567			
-135.677763 57.256337			
-135.665367 57.054404			
-135.816846 57.006056			
-135.678821 56.918667			
-135.578921 56.858887			
-135.560208 56.847672			
Zone PAC294	945-1600	0	1.00
-135.440188 54.935465			
-135.614954 55.795537			
-135.492618 56.147404			
-135.115122 56.61479			
-135.10454 56.644458			
-135.126555 56.659616			
-135.148569 56.649656			
-135.223263 56.683423			
-135.384031 56.742995			
-135.483657 56.799068			
-135.560208 56.847672			
-135.578921 56.858887			

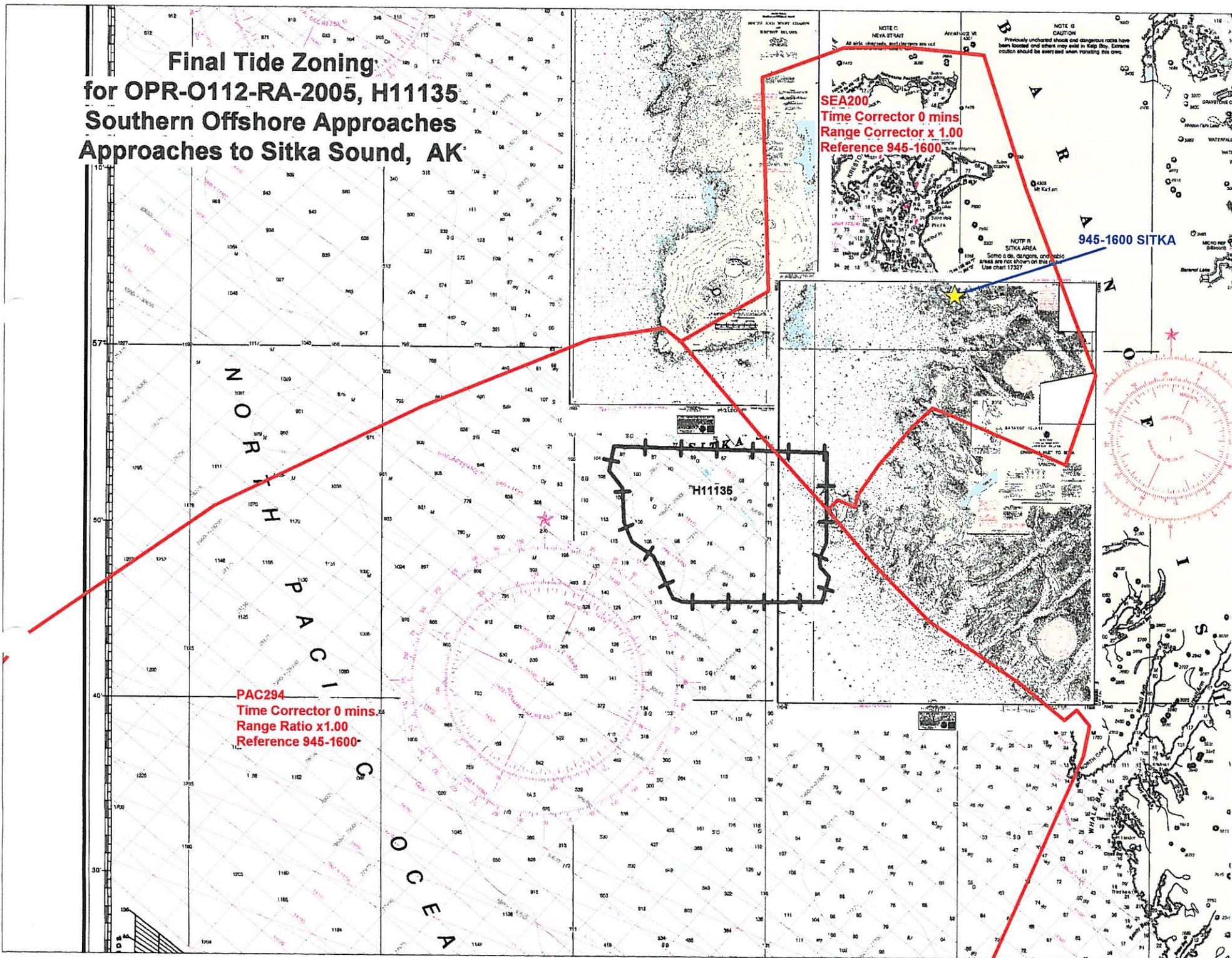
-135.678821 56.918667  
-135.816846 57.006056  
-135.846324 57.019177  
-135.973296 57.007633  
-136.264491 56.943316  
-136.624163 56.848139  
-136.947944 56.725833  
-137.436839 56.413838  
-138.019247 55.780057  
-137.347411 55.196148  
-136.26123 54.471396  
-136.071777 54.627221  
-135.440188 54.935465

# Final Tide Zoning for OPR-O112-RA-2005, H11135 Southern Offshore Approaches Approaches to Sitka Sound, AK

**PAC294**  
Time Corrector 0 mins.  
Range Ratio x1.00  
Reference 945-1600

**SEA200**  
Time Corrector 0 mins  
Range Corrector x 1.00  
Reference 945-1600

945-1600 SITKA



**H11135 HCell Report**  
Martha Herzog, Physical Scientist  
Pacific Hydrographic Branch

**Introduction**

The primary purpose of the HCell is to directly update NOAA ENC's with new survey information in International Hydrographic Organization (IHO) format S-57. HCell compilation of survey H11135 utilized Office of Coast Survey H-Cell Specifications Version 3.0, May 2008 and HCell User Guide Version 1.1, June 2008. HCell H11135 will be used to update charts 17320, 1:80,000 (18<sup>th</sup> Ed.; March 2008, NM 02/28/2009), 17326, 1:40,000 (16<sup>th</sup> Ed.; November 2007, NM 02/28/2009), US3AK3BM, US3AK4PM, US3AK3GM, and US3AK3VM.

**1. Compilation Scale**

The density of soundings in the HCell are compiled as appropriate to emulate those soundings of Chart 17320, 1:80,000 and 17326, 1:40,000. Position and density of non-bathymetric features included in the HCell have not been generalized from the scale of the hydrographic survey H11135.

**2. Soundings**

**2.1 Source Data**

One 10-meter resolution Combined BASE surface, **H11135\_Combined\_New** was used as the basis for HCell production following Branch certification.

A survey-scale sounding (SOUNDG) feature object source layer was built from the **H11135\_Combined\_New** surface in CARIS BASE Editor. A shoal-biased selection was made at 1:20,000 survey scale for the portion of the survey covering 17320 not overlapping chart 17326. A 1:10,000 survey scale for the portion covering chart 17326 using table with values shown in **Table 1**.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	200	5

**Table 1.**

**2.2 Sounding Feature Objects**

In CARIS BASE Editor soundings were manually selected from the high density sounding layer from H11135 and imported into a new layer created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution

that more closely represents the seafloor morphology and that emulates density and distribution of soundings on charts 17320 and 17326 than is possible using automated methods. See section 10.1, Data Processing Notes, for details about the use of manual sounding selection for H11135.

### **3. Depth Areas**

#### **3.1 Source Data**

Using the combined BASE surface **H11135\_Combined\_New** one depth area was generated. Additional depth contours at the intervals on the largest scale chart were delivered per latest guidance from the 2009 Field Procedures Workshop. The depth contours are included in the US511135\_SS.000 file.

#### **3.2 Depth Area Feature Objects**

One depth range, 0 meters to 200 meters, was used for the depth area object. Upon conversion to NOAA charting units, this depth range is 0 fathoms to 110 fathoms.

### **4. Meta Areas**

The following Meta object areas are included in HCell 11135:

M\_QUAL  
M\_COVR  
M\_CSCL

Meta area objects were constructed on the basis of perimeter lines delineating the surveyed limits and extents of data gaps inside the survey area. These perimeters were first used to create the Skin of The Earth (SOTE) layer, then were duplicated to the Meta object layers and attributed per the HCell Specifications, ver. 3.0 and HCell User Guide ver. 1.1.

### **5. Survey Features**

One rock was compiled to the HCell as mentioned in section D.3 of the Descriptive Report. One “Breaker” notation was compiled to the HCell as mentioned in section D.6 of the Descriptive Report. Four rocky seabed areas were delineated using the 10 meter resolution BASE surface and are included in the HCell as delivered.

Bottom sample features were imported from ENC's US3AK3BM, US3AK4PM, US3AK3GM, and US3AK3VM.

## 6. Shoreline / Tide Delineation

Depth areas (DEPARE) were created for all SOTE features.

## 7. Attribution

All S-57 Feature Objects have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with OCS HCell Specifications, ver. 3.0 and Hcell User Guide ver. 1.1.

## 8. Layout

### 8.1 CARIS S-57 Composer Scheme

SOUNDG	Chart scale soundings
DEPARE	Group 1 objects (Skin of the Earth)
SBDARE	Bottom samples from chart and rocky seabed areas
M_COVR	Data coverage meta object
M_QUAL	Data quality meta object
M_CSCL	Delineation of compilation scale.
\$CSYMB	Blue notes
UWTROC	Rock

### 8.2 Blue Notes

Notes regarding data sources are in S-57 Composer as a \$CSYMB feature with the blue note located in the INFORM field and the survey registry number, chart number, chart edition and edition date located in the NINFOM field. The blue notes are included in the HCell when it is exported to .000. The blue notes are also included as a separate ASCII file **H11135\_Bluenotes.txt**.

## 9. Spatial Framework

### 9.1 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.

### 9.2 Horizontal and Vertical Units

During creation of sounding sets in CARIS BASE Editor, and creation of the HCell in CARIS S-57 Composer, units are maintained as metric with millimeter resolution. NOAA rounding is applied at the same time that conversion to chart units is made to the

metric HCell base cell file, at the end of the HCell compilation process.

A CARIS environment variable, `uslXsounding_round`, controls the depth at which rounding occurs. Setting this variable to NOAA fathoms and feet displays all soundings equal to or greater than 11 fathoms as whole units. Depths shoaler than 11 fathoms are shown in fathoms and feet.

In an ENC viewer fathoms and feet display in the format `X.YZZZ`, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. For fathoms and feet between 0 and 10 fathoms 4.5 feet (10.75 fms), soundings round to the deeper foot if the decimals of the foot are `X.Y75000` or greater. For fathoms and feet deeper or equal to 11 fathoms, soundings round to the deeper fathom if feet and decimals of the foot are `X.45000` (`X.Y75000`) or greater. Drying heights are in feet and are rounded using arithmetic methods. In an ENC viewer, heights greater than 6 feet will register in fathoms and feet using the above stated rules.

#### S-57 Composer Units

Sounding Units: Meters rounded to the nearest millimeter

Spot Height Units: Meters rounded to the nearest meter

#### Chart Unit Base Cell Units

Depth Units (DUNI): Fathoms and feet

Height Units (HUNI): Feet (or fathoms and feet above 6 feet)

Positional Units (PUNI): Meters

## **10. QA/QC**

### **10.1 Data Processing Notes**

Manual chart scale sounding selections were made for this survey. Experience has shown that in areas where bathymetry is varied, as in the case of varied topography on the sea floor, automated sounding selection is impractical. None of the default sounding suppression options offered in CARIS BASE Editor or S-57 Composer yields an acceptable density and distribution of depths, generally bunching soundings nearshore with too sparse coverage seaward. While the customized options are more practical for this type of terrain, an inordinate amount of time must be spent in experimentation with variations on the algebraic terms in order to devise the most suitable formula, and manual adjustments are still required to the resulting sounding set.

### **10.2 ENC Validation Checks**

H11135 was subjected to QA and Validation checks in S-57 Composer prior to exporting to the HCell base cell (000) file. Full millimeter precision was retained in the export of the metric S-57 base cell data set. This data set was converted to a chart unit 000 file. dKart Inspector 5.1 was then used to further check the data set for conformity using the

S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and errors investigated and corrected where necessary.

## 11. Products

### 11.1 HSD, MCD and CGTP Deliverables

- H11135 Base Cell File, Chart Scale, Soundings compiled to 1:40,000.
- H11135 Base Cell File, Survey Scale, Soundings compiled to 1:20,000.
- H11135 Descriptive Report including end notes compiled during office processing and certification
- H11135 HCell Report
- Blue Notes ASCII file

### 11.2 File Naming Conventions

S-57 Composer Product prefix: *H11135\_CS.prd and H11135\_SS.prd*

MCD Chart units base cell file: *US511135\_CS.000*

MCD Chart units base cell file, survey scale soundings: *US511135\_SS.000*

### 11.3 Software

HIPS 6.1:	Management and inspection of Combined BASE surfaces
BASE Editor 2.1:	Combination of Product Surfaces and initial creation of the S-57 bathymetry-derived features
S-57 Composer 2.0:	Assembly of the HCell, S-57 products export, QA
HOM 3.3:	Assembly of the HCell, S-57 products unit conversion and sounding rounding
GIS 4.4a:	Setting the sounding rounding variable
dKart Inspector 5.1:	Validation of the base cell file

## 12. Contacts

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

Martha Herzog, Physical Scientist, PHB, Seattle, WA; 206-526-6730;  
Martha.herzog@noaa.gov.

APPROVAL SHEET  
H11135

Initial Approvals:

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