NATIONA	NOAA FORM 76-35A U.S. DEPARTMENT OF COMMERCE L OCEANIC AND ATMOSPHERIC ADMINISTRATIC NATIONAL OCEAN SERVICE
DES	SCRIPTIVE REPOR
Type of Survey	HYDROGRAPHIC
Field No. Registry No.	H11516
State	Alaska
General Locality	Eastern Prince William Sound
Sublocality	Landlocked Bay
	2005
Com	CHIEF OF PARTY mander Guy T. Noll
	LIBRARY & ARCHIVES
DATE	LIBRARY & ARCHIVES

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NOAA FORM 77-28 (11-72)	U.S. DE NATIONAL OCEANIC AND A	PARTMENT OF COMMERCE TMOSPHERIC ADMINISTRATION	REGISTER NO.
	HYDROGRAPHIC TITLE S	HEET	H11516
INSTRUCTIONS - filled in as complete	The hydrographic sheet should be accelled as possible, when the sheet is forwa	companied by this form, rded to the office.	FIELD NO. n/a
State	Alaska		
General Locality	Eastern Prince William Sound		
Sublocality	Landlocked Bay		
Scale	1:79,291	Date of Survey <u>9/18/2005-10</u>	/3/2005
Instructions Dated	8/3/2005	Project No. OPR-P132-R.	A-08
Vessel	_RA5 (1006), RA6 (1015), RA1 (1101	l), RA2 (1103)	
Chief of Party	Commander Guy T. Noll		
Surveyed by	RAINIER Personnel		
Soundings taken by Graphic record scale	echo sounder <u>Reson Seabat 810</u> ed by <u>N/A</u>)1, Seabea,/Elac 1180, Knudser	n 320M
Graphic record chec	ked by <u>N/A</u>		
Evaluation by	Matthew Foss Auto	omated plot by <u>N/A</u>	
Verification by	Tyanne Faulkes		
Soundings in	Feet at	MLLW	
REMARKS:	Time in UTC. UTM Projection Ze	one 10	
	Revisions and annotations appear	ing as endnotes were	
	generated during office processing	g.	
	As a result, page numbering may	be interrupted or non-sequen	tial
	All separates are filed with the hy	drographic data.	

Descriptive Report to Accompany Hydrographic Survey H11516

Project OPR-P132-RA-05 Landlocked Bay¹ Eastern Prince William Sound, Alaska Scale 1:10,000 September-October 2005 **NOAA Ship RAINIER (s221)** Chief of Party: Commander Guy T. Noll, NOAA

A. AREA SURVEYED

This hydrographic survey was completed in accordance with Hydrographic Survey Letter Instructions OPR-P132-RA-05, dated August 3, 2005, and all other applicable direction², with the exceptions noted in this report. The survey area is Landlocked Bay, located in Eastern Prince William Sound. This survey corresponds to sheet "M" in the sheet layout provided with the Letter Instructions. OPR-P132-RA-05 responds to requests from the U.S. Coast Guard and the Alaskan Marine Highway system.

One hundred percent multi-beam echosounder (MBES) coverage was obtained in the survey area in waters 8 meters and deeper, with the exception of areas noted in Section B.2¹. In depths less than 8 meters additional MBES coverage was obtained to acquire least depths over significant features or shoals. Except as noted below, vertical-beam echo sounder (VBES) data were acquired in depths from 4 to 20 meters to define the navigable area limit, aid in the planning of SWMB data acquisition, and provide inshore bathymetry in navigationally significant areas.

Limited Shoreline Verification was performed for the survey.

Data acquisition was conducted from September 18 to October 3, 2005 (DN 261 to 276).

¹ The sub locality listed in OPR-P132-RA-05Letter Instruction for survey H11516 is incorrect; the corrected sublocality is given in this report.

² Standing Instructions for Hydrographic Surveys (March 2004), NOS Hydrographic Surveys Specifications and Deliverables (March 2004), OCS Field Procedures Manual for Hydrographic Surveying (March 2005), and all Hydrographic Surveys Technical Directives issued through November 2005.



Figure 1. H11516 survey area and junction (grey) on chart 16708.

B. DATA ACQUISTION 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-P132-RA-05 Data Acquisition and Processing Report* (DAPR)², 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 APPLIED³ to this survey. See Section C. for additional information.

B1. Equipment and Vessels

Hull Number	Name	Acquisition Type
1101	RA-1	Vertical-Beam Echosounder
		Detached Positions
1103	RA-2	Vertical-Beam Echosounder
		Detached Positions
		Bottom Samples
1021	RA-3	Multi-Beam Echosounder
1006	RA-5	Multi-Beam Echosounder
1015	RA-6	Multi-Beam Echosounder
817	RA-7	Vertical-Beam Echosounder
		Detached Positions

Data for this survey were acquired by the following vessels:

Table 1. Data Acquisition Vessels for H11516.

Sound velocity profiles were measured with SEACAT SBE-19 and 19+ profilers in accordance with the Specifications and Deliverables.⁴

Vertical beam echosounder data acquired with the Ross 950 system aboard vessel 817 (RA-7) was retained in the BASE surfaces generated for this survey. As described in the DAPR, bathymetry from this system is typically unreliable and is generally used for reconnaissance only. However, in the case of H11516, manual examination showed excellent agreement between the Ross data and MBES data in several areas of overlap.⁵ Since the Ross data provides inshore coverage where no other bathymetry is available and meets quality standards in this case, it was retained and is included in the final BASE surfaces.

No other unusual vessel configurations were used for data acquisition.

B2. Quality Control

Crosslines

Multi-beam echosounder crosslines totaled 10.12 nautical miles, comprising 7.0% of SWMB main scheme hydrography. The main scheme bathymetry was manually compared to the XL nadir beams in CARIS HIPS subset mode. There was no discernable offset between main scheme and crosslines.⁶

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 2006 Hydrographic System Readiness Review⁷ package submitted with this survey.

Junctions

The following contemporary survey junctions with H11516:

Registry #	Scale	Date	Junction side
H11492	1:10,000	2005	West

Surveys H11516 and H11492 were compared in CARIS HIPS subset mode. There was no discernable offset between the surveys.⁸

Data Quality Factors

No unusual conditions were encountered during the survey that affected the expected accuracy and quality of survey data.⁹

Minor Holidays and Inshore Coverage Gaps

RAINIER was forced to leave the project area earlier than planned due to impending inclement weather. As a result, some inshore holidays and gaps in coverage occurred.

In several areas, the finalized BASE surfaces include scattered unpopulated grid nodes. Where possible, outer beams of the MBES bathymetry were examined and reaccepted where found to be of sufficient quality to densify coverage in these sparse areas. None of the remaining holidays occur over significant features and there is no indication of shoaling in the unsounded areas. The hydrographer recommends that survey soundings supersede all prior survey and charted data in the common area.¹⁰

Inshore coverage for H11516 was not completed to the requirements of the Letter Instructions in all areas due to RAINIER's early departure from the area. Specifically:

- There are several areas of the survey where 100% multi-beam echosounder (MBES) coverage was not obtained to the 8 meter curve. These areas are indicated in Figure 2.
- Coverage between the 8 and 4m curve was not completed in all areas as required by the Letter Instructions. Although MBES coverage extended inshore of the 8m curve and a vertical beam echosounder (VBES) line defining the Navigable Area Limit along the approximate 4m curve was acquired, no VBES lines perpendicular to shore between 8 and 4m were completed.

The shoreline slope is steep in most regions of the H11516 survey area and the current chart scale does not support high resolution portrayal of near shore bathymetry. As a result, the Chief of Party determined that achieved coverage is adequate for existing charts.¹¹



Figure 2. Areas circled in red are locations where 100% SWMB coverage did not reach the 8m curve.

B3. Data Reduction

Data reduction procedures for survey H11516 conform to those detailed in the *OPR-P132-RA-05 DAPR*.

B4. Data Representation

Many BASE surfaces were used in processing H11516. Final BASE surface resolutions and depth ranges were set in accordance with the Field Procedures Manual. All depth thresholds were combined into the finalized field sheet H11516.¹²

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

Field sheet layouts are shown in Figures 3 and the field sheet and BASE Surface structure are shown in Figure 4.



Figure 3: Layout of field sheets for H11516

Figure 4: Field sheets and BASE surfaces submitted with H11516

C. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H11492 can be found in the OPR-P132-RA-05 Horizontal and Vertical Control Report,¹³ submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

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 2.

Location	Frequency	Custodian	Distance	Priority
Cape Hinchinbrook	292 kHz	USCG	34NM	Primary
Potato Point	298 kHz	USCG	14NM	Secondary
Table 2. Differential Corrector Sources				

The Cape Hinchinbrook beacon was used as the primary corrector source for this survey despite the longer distance from the survey grounds because of the more robust view of the satellite constellation available at this site.

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 Valdez, AK (945-4240) served as control for datum determination and as the primary source for water level reducers for survey H11516.

RAINIER personnel installed two Sutron 8210 "bubbler" tide gauges at the same site for redundancy at the following subordinate station in accordance with the Letter Instructions (see table 3). This station is described in detail in the *OPR-P132-RA-05 Horizontal and Vertical Control Report*.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Columbia Bay Glacier 1, AK	944- 44601	30-day	August 31 st , 2005	October 3 rd , 2005
Columbia Bay Glacier 2, AK	944- 44602	30-day	August 31 st , 2005	October 3 rd , 2005

Table 3°	Tide Station	is installed by	RAINIER	personnel	for H11516
abic 5.	I fue Dianoi	is misianca by	iu manun	personner	01 111 1510.

All bathymetry and elevations were reduced to MLLW using **FINAL APPROVED WATER LEVELS** from stations Columbia Bay Glacier, AK (944-4460) (computed from both gauge data sets) and Valdez, AK (945-4240) using the tide files: 9454460.tid and 9454240.tid. Time and height correctors were from the final zone corrector file H11516CORF.zdf.

A request for delivery of final approved tides for survey H11516 was forwarded to N/OPS1 on November 8, 2005 and water level data were received by RAINIER on February 21st, 2006.¹⁴ A copy of the request is included in Appendix IV. ¹⁵

The Columbia Glacier tide gauge was disassembled and removed at 2048 UTC on October 3, 2005 (DN 276) after consultation with CO-OPS and on the completion of the surveys in that area. Data acquisition on H11516 continued through 0101 UTC on DN277. The final ZDF file for survey H11492 supplied by CO-OPS designates the Columbia Glacier station (945-4460) as the primary station, and the Valdez station (945-4240) as the secondary station for water level application.

When applying water level correctors to bathymetric data, Caris HIPS 5.4.1 applies water levels from the station designated as primary in the .ZDF file unless there is a gap in this data, in which case it switches to the secondary station. However, since the data missing from the Columbia Bay water levels for H11516 is at the end of the times series, there is no gap, and therefore the program does not switch to the secondary gauge data. A "tide data out of range" error is produced when the water levels are applied. In order to solve this processing problem, a gap was manually created in the primary station data (Columbia Glacier 945-4460) by appending a false data point 24 hours after the last recorded water level. This point was given a value of 20 meters, which is significantly different from the measured water levels. The 20-meter water level value was chosen to ensure that there would be a detectable error if

Caris HIPS 5.4.1 interpolated between primary station data points rather than switching to the secondary station. This obviously erroneous value would also alert any reviewer to the manual entry of the final data point. This "workaround" process required by a deficiency in the data processing software allowed successful application of final approved water levels to the data, and is not an error in the acquired data set.

Although this software bug was fixed in later versions of HIPS 5.4, it was reintroduced in HIPS version 6.0. A request for a hot fix (Caris request #00601774) was again made on June 26, 2006, but is still outstanding at the time of this report.

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Survey H11516 was compared with the following largest scale chart of the survey area.

Chart	Scale	Edition and Date	Latest Notice to Mariners Applied
16708	1:80,000	26 th Ed, Oct 2004	NM:05/20/2006

Table 4. Chart compared with H11516

In offshore areas (deeper than \sim 30 fathoms), survey soundings generally agree well with charted depths. However, there are significant discrepancies near shore. The hydrographer suggests that these are the result of three factors:

- The current chart scale is not adequate to portray the detail of the rugged nearshore bathymetry in the survey area.
- The prior survey was conducted with lead line methods, leaving significant gaps between soundings which have now been fully surveyed with MBES.
- Horizontal control for the prior survey and current chart appear to be suspect. Shoreline and features in the interior of Landlocked Bay were found to be as much as 70m south of their charted positions. Surveyed positions agree with modern photogrammetric data provided for shoreline verification (see Section D.2.b. below).

The hydrographer recommends that survey soundings supersede all charted and prior survey depths in the common area.¹⁶

D.1.b. Dangers to Navigation

Five (5) Dangers to Navigation (DTONs) were identified in survey H11516 and reported to the Marine Chart Division via email on July 18, 2006. The original DTON submission package is included in Appendix I.¹⁷ Descriptions of each DTON are included in the H11516 DtoN Report in Appendix I.¹⁸

D.1.c. Other Features

Automated Wreck and Obstruction Information System (AWOIS) Investigations

There are no AWOIS items within the limits of H11516.¹⁹

D.2. Additional Results

D.2.a. Prior Survey Comparison

Prior survey comparison with H11516 was not performed.²⁰

D.2.b. Shoreline Verification

Shoreline Source

Vector photogrammetric data from project AK0310 were supplied by N/NGS3 in the form of digital Cartographic Feature File (CFF) GC10560. RAINIER conducted limited shoreline verification of the CFF. In addition, features and shoreline shown on the current edition of chart 16708 that were not depicted on the shoreline source document were digitized in MapInfo by RAINIER personnel and displayed in Hypack for field verification.

Shoreline Verification

Limited shoreline verification was conducted near predicted low water in accordance with the Standing Project Instructions and FPM sections 6.1 and 6.2. Detached positions (DPs) taken during shoreline verification were recorded in HYPACK and on DP forms, processed in Pydro, and then translated into CARIS Notebook. These DPs indicate revisions to features and features not found on the verified shoreline. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline, and transferred to the "remrks" attribute on the corresponding features in Notebook. DP forms are included in the Detached Position directory of the *Separates to be Included with Survey Data*.²¹

All shoreline data is submitted in Caris Notebook .hob files, collected in session file "H11516_M_Notebook". The contents of this session are listed in Table 5.

HOB File	Purpose and Contents
H11516_M_CFF_Shoreline	CFF shoreline and point features that did not require
	revision or were not addressed.
H11516_M_CFF_ShorelineHOB	Additional hydrographer notes on object in
(marker layer)	H11516_M_CFF_Shoreline
H11516_M_Chd_Shoreline	Charted shoreline and point features not included in the
	CFF, which did not require revision or were not
	addressed.
H11516_M_Chd_ShorelineHOB	Additional hydrographer notes on object in
(marker layer)	H11516_M_Chd_Shoreline
H11516_M_Add_Notebook	New features and changes to the shoreline that did not
	require a DP.
H11516_M_Add_Pydro	New features which required a DP and were therefore
	processed in Pydro.
H11516_M_Modify_Notebook	Features found to be accurately positioned in source
	data or on the chart, but incorrectly classified or
	attributed. (Example: a rock that was actually the high
	point of a reef or ledge.)
H11516_M_Modify_Pydro	Features that were accurately positioned in source data
	or on the chart, but were found to have missing or
	incorrect height/depth attribution, and were therefore
	"DPed for height."
H11516_Delete_Notebook	Source data and charted shoreline and features found to
	be inadequately positioned or disproved.

Table 5. List and Description of Notebook HOB files.

Note: Final approved water levels have been applied to survey H11516. All elevation and depth values on Notebook features have been updated to reflect these correctors. "DPs for height" have been removed from Notebook, but are retained in the Pydro PSS.

In the Pydro PSS, the combination of *modify*, *add*, and *none* layers depict the shoreline as surveyed. The *delete* tables depict all disproved or modified features.

Source Shoreline Changes and New Features

Items for survey H11516 that require further discussion, and are associated with a detached position have been flagged "Report" in Pydro in H11516.pss. Investigation methods and recommendations are listed in the Remarks and Recommendation tabs. These features are included in the Survey Feature Report in Appendix II.

Recommendations

The Hydrographer recommends that the shoreline as depicted in the CARIS Notebook session supersede and complement shoreline information compiled on the CFF and charts as noted

D.2.c. Aids to Navigation

There are no Aids to Navigation (ATON) within the limits of H11516.²²

D.2.d. Overhead features

There are no overhead features in survey H11516.²³

D.2.e. Submarine Cables and Pipelines

There are no submarine cables or pipelines charted within the limits of H11516, and none were detected by the survey.²⁴

D.2.f. Ferry Routes

There are no charted ferry routes within the limits of H11516, and no ferries were observed operating in the survey area.²⁵

D.2.g. Bottom Samples

Six (6) bottom samples were collected on this survey. In most cases the collected samples were found to differ from the closest charted bottom type. Refer to the Survey Feature Report in Appendix II for a detailed list of bottom samples.²⁶

D.2.h Miscellaneous

A submerged rocky outcropping was surveyed at the extreme eastern edge of the sheet, in approximate position 60° 48' 37.4" N, 146°29'16.2" W. This outcrop lies just outside the survey limits, but was partially covered by MBES during the run-in and run-out of lines on H11516. Due to RAINIER's hastened departure from the survey grounds, the significance of this feature was not recognized until after the ship had left the area. The hydrographer recommends that this feature be specifically assigned for further investigation by the field unit completing the next sheet to the east of H11516.²⁷

Ruins of mining operations were found in several locations along the shoreline at the north end of Landlocked Bay. One particularly conspicuous site was found in approximate position 60° 51' 22.1" N, 146° 34' 27.2" W. High accuracy positioning was not performed, but the ruins were observed from a boat while conducting shoreline verification and noted on the boat sheet. This feature is included in the "H11516_M_Add_Notebook" file as a Cartographic Symbol.²⁸

E. ADDITIONAL DOCUMENTATION

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

<u>Title</u>	Date Sent	Office
Data Acquisition and Processing Report for OPR- P132-RA-05	10/4/06	N/CS34
Horizontal and Vertical Control Report for OPR- P132-RA-05	06/02/06	N/CS34
Tides and Water Levels Package for OPR- P132-RA-05	10/11/05	N/OPS1
Coast Pilot Report for OPR- P132-RA-05	08/18/06	N/CS26

⁶ Concur.

⁷ Filed with project reports.

⁸ Concur.

⁹ Concur.

¹⁰ Concur.

¹¹ Concur.

¹² Surfaces were refinalized and recombined upon office review.

¹³ Filed with project reports.

¹⁴ Concur.

¹⁵ Filed with the hydrographic data

¹⁶ Concur.

¹⁷ Filed with the hydrographic records.

¹⁸ All DTONs were depicted on Chart 16708 upon chart review performed by the compiler. DTONs are also reflected in the HCell. DTON's are attached to this report.

¹⁹ Concur.

²⁰ Compiler performed a junction comparison with surveys. Junctions agreed within 2-meters in offshore areas.

²¹ Filed with the hydrographic records.

²² Concur.

²³ Concur.

²⁴ Concur.

²⁵ Concur.

²⁶ Bottom samples were not found in the Survey Feature File in Appendix II. Compiler found bottom samples in delivered .hob files.

 27 A rock with a least depth of 0.608 fathoms was found at latitude 60/48/39.16N, longitude 146/29/15.06W. This feature is included in the HCell.

²⁸ A bluenote has been added at the location of the mine ruins.

¹ Concur.

² Filed with project reports.

³ Final water levels have been appended to this document.

⁴ Concur.

⁵ Concur.



UNITED STATES DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration Office of Marine and Aviation Operations NOAA Ship RAINIER (S221) 1801 Fairview Ave E, Seattle, WA 98102

December 15, 2006

MEMORANDUM FOR:

CDR Donald W. Haines, NOAA Chief, Pacific Hydrographic Branch

FROM:

CDR Guy T. Noll, NOAA Commanding Officer

SUBJECT:

Approval of Hydrographic Survey H11516

Field operations for hydrographic survey H11516 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, 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 exception of deficiencies noted in the Descriptive Report. This survey is complete and no additional work is required. All 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 Sheet Manager:

Daniel C. Boles Hydrographic Assistant Survey Technician

Tides Officer:

Nicola Samuelson FOR. Lieutenant Junior Grade, NOAA

Horizontal Control Officer:

Andrew P. Halbach Lieutenant Junior Grade, NO.

Chief Survey Technician:

mas James B. Jacobson

Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer:

Benjamin K. Evans

Benjamin K. Evans Lieutenant, NOAA



H11516 Feature Report

Registry Number:	H11516
State:	Alaska
Locality:	Prince William Sound
Sub-locality:	Landlocked Bay
Project Number:	OPR-P132-RA-05
Survey Dates:	9/18/2005 - 10/3/2005

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16708	26th	10/01/2004	1:79,291 (16708_1)	[L]NTM: ?
16700	29th	07/01/2004	1:200,000 (16700_1)	[L]NTM: ?
16013	29th	11/01/2003	1:969,761 (16013_1)	[L]NTM: ?
531	22nd	03/01/2004	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_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")

Feature	Survey	Survey	Survey	AWOIS
Type	Depth	Latitude	Longitude	Item
Rock	0.65 m	60° 51' 02.4" N	146° 34' 21.7" W	
Shoal	4.42 m	60° 48' 28.0" N	146° 33' 25.4" W	
Rock	-2.07 m	60° 49' 56.5" N	146° 34' 01.8" W	
Rock	-2.39 m	60° 50' 39.3" N	146° 34' 13.0" W	
Rock	2.06 m	60° 48' 29.0" N	146° 32' 56.8" W	
Shoal	-0.75 m	60° 48' 30.2" N	146° 32' 58.6" W	
Rock	-0.09 m	60° 48' 26.5" N	146° 33' 17.5" W	
Shoal	8.47 m	60° 49' 41.0" N	146° 34' 40.7" W	
Shoal	12.03 m	60° 50' 32.4" N	146° 34' 19.4" W	
Shoal	12.29 m	60° 51' 18.0" N	146° 33' 54.5" W	
Rock	1.74 m	60° 48' 55.9" N	146° 34' 23.3" W	
Shoal	5.75 m	60° 51' 02.4" N	146° 35' 10.8" W	

Features

1 - Charted Features

1.1) Profile/Beam - 3/1 from h11516_m / 1103_nonechosounder_dp / 2005-263 / dp_1103_263

Survey Summary

Survey Position:	60° 51' 02.4" N, 146° 34' 21.7" W
Least Depth:	0.65 m (= 2.14 ft = 0.357 fm = 0 fm 2.14 ft)
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-263.17:46:43.000 (09/20/2005)
DP Dataset:	h11516_m / 1103_nonechosounder_dp / 2005-263 / dp_1103_263
Profile/Beam:	3/1
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

New RK

QUA: GPSmode=2, SVs=8, HDOP=1.10

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11516_m/1103_nonechosounder_dp/2005-263/dp_1103_263	3/1	0.00	000.0	Primary

Hydrographer Recommendations

Chart new rk

Cartographically-Rounded Depth (Affected Charts):

0 ¼fm (16708_1, 16700_1, 16013_1)

0fm 2ft (531_1)

.7m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC) Attributes: VALSOU - 0.653 m WATLEV - 5:awash

Concur, chart new rock

1.2) Profile/Beam - 5/1 from h11516_m / 817_nonechosounder_dp / 2005-263 / dp_817_263

Survey Summary

Survey Position:	60° 48' 28.0" N, 146° 33' 25.4" W
Least Depth:	4.42 m (= 14.51 ft = 2.419 fm = 2 fm 2.51 ft)
TPU (±1.965):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-263.18:02:01.000 (09/20/2005)
DP Dataset:	$h11516_m \ / \ 817_nonechosounder_dp \ / \ 2005-263 \ / \ dp_817_263$
Profile/Beam:	5/1
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

CHD RK disp

QUA: GPSmode=2, SVs=7, HDOP=1.20

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11516_m/817_nonechosounder_dp/2005-263/dp_817_263	5/1	0.00	000.0	Primary

Hydrographer Recommendations

Reviewer Note: Remove chd rk and position new rock DP817_263_39 (~120 m east). -Shyla Allen

Cartographically-Rounded Depth (Affected Charts):

2 ¼fm (16708_1, 16700_1, 16013_1)

2fm 2ft (531_1)

4.4m (500_1, 50_1)

S-57 Data

Geo object 1: Cartographic symbol (\$CSYMB)

Do not concur. Retain charted rk at current position and chart new rk at position at 60-48-26.54N, 146-33-17.538.

2 - New Features

2.1) Profile/Beam - 1/1 from h11516_m / 1103_nonechosounder_dp / 2005-263 / dp_1103_263

Survey Summary

Survey Position:	60° 49' 56.5" N, 146° 34' 01.8" W
Least Depth:	-2.07 m (= -6.80 ft = -1.133 fm = -1 fm 0.80 ft)
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-263.16:33:16.000 (09/20/2005)
DP Dataset:	h11516_m / 1103_nonechosounder_dp / 2005-263 / dp_1103_263
Profile/Beam:	1/1
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

New RK

QUA: GPSmode=2, SVs=7, HDOP=1.30

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11516_m/1103_nonechosounder_dp/2005-263/dp_1103_263	1/1	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

-1fm (16708_1, 16700_1, 16013_1)

-1fm 1ft (531_1)

-2.1m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC) Attributes: VALSOU - -2.072 m WATLEV - 5:awash

Concur, chart new rock

Feature Images



Figure 2.1.1

2.2) Profile/Beam - 2/1 from h11516_m / 1103_nonechosounder_dp / 2005-263 / dp_1103_263

Survey Summary

Survey Position:	60° 50' 39.3" N, 146° 34' 13.0" W
Least Depth:	-2.39 m (= -7.83 ft = -1.306 fm = -1 fm 1.83 ft)
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-263.17:18:44.000 (09/20/2005)
DP Dataset:	h11516_m / 1103_nonechosounder_dp / 2005-263 / dp_1103_263
Profile/Beam:	2/1
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

New position CHD RK

QUA: GPSmode=2, SVs=8, HDOP=1.00

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11516_m/1103_nonechosounder_dp/2005-263/dp_1103_263	2/1	0.00	000.0	Primary

Hydrographer Recommendations

Delete CHD(16708) rk. Chart new rk.

Cartographically-Rounded Depth (Affected Charts):

-1 ¼fm (16708_1, 16700_1, 16013_1)

-1fm 2ft (531_1)

-2.4m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC) Attributes: VALSOU - -2.388 m WATLEV - 2:always dry

Delete charted rock, chart new rock at survey position

2.3) Profile/Beam - 2/1 from h11516_m / 817_nonechosounder_dp / 2005-263 / dp_817_263

Survey Summary

Survey Position:	60° 48' 29.0" N, 146° 32' 56.8" W
Least Depth:	2.06 m (= 6.77 ft = 1.128 fm = 1 fm 0.77 ft)
TPU (±1.96 5):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-263.17:44:35.000 (09/20/2005)
DP Dataset:	h11516_m / 817_nonechosounder_dp / 2005-263 / dp_817_263
Profile/Beam:	2/1
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

New RK

QUA: GPSmode=2, SVs=8, HDOP=1.10

Feature Correlation

Address		Range	Azimuth	Status
h11516_m/817_nonechosounder_dp/2005-263/dp_817_263	2/1	0.00	000.0	Primary

Hydrographer Recommendations

Chd new rk

Cartographically-Rounded Depth (Affected Charts):

1fm (16708_1, 16700_1, 16013_1)

1fm 1ft (531_1)

2.1m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: VALSOU - 2.063 m

Concur, chart new rock

2.4) Profile/Beam - 3/1 from h11516_m / 817_nonechosounder_dp / 2005-263 / dp_817_263

Survey Summary

Survey Position:	60° 48' 30.2" N, 146° 32' 58.6" W
Least Depth:	-0.75 m (= -2.47 ft = -0.412 fm = 0 fm 3.53 ft)
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-263.17:47:53.000 (09/20/2005)
DP Dataset:	h11516_m / 817_nonechosounder_dp / 2005-263 / dp_817_263
Profile/Beam:	3/1
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

ext new LDG

QUA: GPSmode=2, SVs=8, HDOP=1.10

Feature Correlation

Address		Range	Azimuth	Status
h11516_m/817_nonechosounder_dp/2005-263/dp_817_263	3/1	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

0 ¼fm (16708_1, 16700_1, 16013_1)

0fm 2ft (531_1)

-.8m (500_1, 50_1)

S-57 Data

Geo object 1: Seabed area (SBDARE)

Ledge could not be adequately depicted at chart scale. Retain area as charted.

Feature Images



Figure 2.4.1

2.5) Profile/Beam - 4/1 from h11516_m / 817_nonechosounder_dp / 2005-263 / dp_817_263

Survey Summary

Survey Position:	60° 48' 26.5" N, 146° 33' 17.5" W
Least Depth:	-0.09 m (= -0.28 ft = -0.046 fm = 0 fm 5.72 ft)
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-263.17:53:59.000 (09/20/2005)
DP Dataset:	h11516_m / 817_nonechosounder_dp / 2005-263 / dp_817_263
Profile/Beam:	4/1
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

New RK

QUA: GPSmode=2, SVs=7, HDOP=1.20

Feature Correlation

Address		Range	Azimuth	Status
h11516_m/817_nonechosounder_dp/2005-263/dp_817_263	4/1	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

0fm (16708_1, 16700_1, 16013_1)

0fm 0ft (531_1)

-.1m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: VALSOU - -0.085 m

Concur, chart new rock

Feature Images



Figure 2.5.1

3 - Dangers to Navigation

3.1) Profile/Beam - 548/11 from h11516_m / 1006_reson8101_hvf / 2005-261 / 018_1559

DANGER TO NAVIGATION

Survey Summary

Survey Position:	60° 49' 41.0" N, 146° 34' 40.7" W
Least Depth:	8.47 m (= 27.78 ft = 4.630 fm = 4 fm 3.78 ft)
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-261.16:00:10.147 (09/18/2005)
Survey Line:	h11516_m / 1006_reson8101_hvf / 2005-261 / 018_1559
Profile/Beam:	548/11
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

Designated sounding on uncharted shoal. 100% SWMB coverage.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11516_m/1006_reson8101_hvf/2005-261/018_1559	548/11	0.00	000.0	Primary

Hydrographer Recommendations

Chart sounding only.

Cartographically-Rounded Depth (Affected Charts):

4 ½fm (16708_1, 16700_1, 16013_1)

4fm 4ft (531_1)

8.5m (500_1, 50_1)

S-57 Data

Attributes: QUASOU - 1:depth known TECSOU - 3:found by multi-beam

3.2) Profile/Beam - 703/23 from h11516_m / 1006_reson8101_hvf / 2005-261 / 079_1653

DANGER TO NAVIGATION

Survey Summary

Survey Position:	60° 50' 32.4" N, 146° 34' 19.4" W
Least Depth:	12.03 m (= 39.47 ft = 6.578 fm = 6 fm 3.47 ft)
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-261.16:56:24.838 (09/18/2005)
Survey Line:	h11516_m / 1006_reson8101_hvf / 2005-261 / 079_1653
Profile/Beam:	703/23
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

Designated sounding on uncharted shoal. 100% SWMB coverage.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11516_m/1006_reson8101_hvf/2005-261/079_1653	703/23	0.00	000.0	Primary

Hydrographer Recommendations

Chart sounding only.

Cartographically-Rounded Depth (Affected Charts):

6 ½fm (16708_1, 16700_1, 16013_1)

6fm 3ft (531_1)

12.0m (500_1, 50_1)

S-57 Data

Attributes: QUASOU - 1:depth known

TECSOU - 3: found by multi-beam

3.3) Profile/Beam - 512/12 from h11516_m / 1006_reson8101_hvf / 2005-261 / 086_2128

DANGER TO NAVIGATION

Survey Summary

Survey Position:	60° 51' 18.0" N, 146° 33' 54.5" W
Least Depth:	12.29 m (= 40.31 ft = 6.719 fm = 6 fm 4.31 ft)
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-261.21:30:10.448 (09/18/2005)
Survey Line:	h11516_m / 1006_reson8101_hvf / 2005-261 / 086_2128
Profile/Beam:	512/12
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

Designated sounding on uncharted shoal. 100% SWMB coverage.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11516_m/1006_reson8101_hvf/2005-261/086_2128	512/12	0.00	000.0	Primary

Hydrographer Recommendations

Chart sounding only.

Cartographically-Rounded Depth (Affected Charts):

6 ³/₄fm (16708_1, 16700_1, 16013_1)

6fm 4ft (531_1)

12.3m (500_1, 50_1)

S-57 Data

Geo object 1:	Sounding (SOUNDG)

Attributes: QUASOU - 1:depth known TECSOU - 3:found by multi-beam

3.4) Profile/Beam - 729/25 from h11516_m / 1021_reson8101_hvf / 2005-276 / 081_2005

DANGER TO NAVIGATION

Survey Summary

Survey Position:	60° 48' 55.9" N, 146° 34' 23.3" W
Least Depth:	1.74 m (= 5.71 ft = 0.952 fm = 0 fm 5.71 ft)
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-276.20:05:59.266 (10/03/2005)
Survey Line:	h11516_m / 1021_reson8101_hvf / 2005-276 / 081_2005
Profile/Beam:	729/25
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1

Remarks:

Designated sounding on least depth of new rock. 100% SWMB coverage.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11516_m/1021_reson8101_hvf/2005-276/081_2005	729/25	0.00	000.0	Primary

Hydrographer Recommendations

Chart dangerous rock with survey sounding.

Cartographically-Rounded Depth (Affected Charts):

1fm (16708_1, 16700_1, 16013_1)

0fm 5ft (531_1)

1.7m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC) Attributes: QUASOU - 1:depth known TECSOU - 3:found by multi-beam VALSOU - 1.741 m WATLEV - 3:always under water/submerged

Office Notes

3.5) Profile/Beam - 357/18 from h11516_m / 1021_reson8101_hvf / 2005-276 / 101_1905

DANGER TO NAVIGATION

Survey Summary

Survey Position:	60° 51' 02.4" N, 146° 35' 10.8" W	
Least Depth:	5.75 m (= 18.86 ft = 3.144 fm = 3 fm 0.86 ft)	
TPU (±1.96σ):	THU (TPEh) [None] ; TVU (TPEv) [None]	
Timestamp:	2005-276.19:06:05.037 (10/03/2005)	
Survey Line:	h11516_m / 1021_reson8101_hvf / 2005-276 / 101_1905	
Profile/Beam:	357/18	
Charts Affected:	16708_1, 16700_1, 16013_1, 531_1, 500_1, 50_1	

Remarks:

Designated sounding on uncharted shoal. 100% SWMB coverage.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11516_m/1021_reson8101_hvf/2005-276/101_1905	357/18	0.00	000.0	Primary

Hydrographer Recommendations

Chart sounding only.

Cartographically-Rounded Depth (Affected Charts):

3fm (16708_1, 16700_1, 16013_1)

3fm 1ft (531_1)

5.7m (500_1, 50_1)

S-57 Data

Attributes: QUASOU - 1:depth known TECSOU - 3:found by multi-beam

H11516 HCell Report

Tyanne Faulkes, ERT Associate Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest ENC and RNC in the region: NOAA ENC: US4AK25M; and NOAA RNCs: 16708.

HCell compilation of survey H11516 utilized Office of Coast Survey HCell Specifications Version 3.1, with approved modifications to better align with PHB's HCell process and to meet MCD needs.

1. Compilation Scale

The density of soundings in the HCell are compiled as appropriate to emulate those soundings of Charts 16708 1:79,291.

2. Soundings

A survey-scale sounding (SOUNDG) feature object source layer was built from the **H11516_Combined** surface in CARIS BASE Editor. A shoal-biased selection was made at 1:15,000 survey scale for the area of the survey covered by chart 16708 (1:79,291). These shoal-based selections were made using a Radius Table file with values shown in the table, below. The resultant sounding layer contains 6,317 depths ranging from 0-116 fathoms.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	150	5

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

3. Depth Areas and Depth Contours

3.1 Depth Areas

The extents of the highest resolution BASE Surface together with the extents of the soundings layer were used to digitize the hydrographic extents, which were then used to

create the single, all encompassing depth area (DEPARE). One depth range, from 0 to 212.4 meters, was used for depth area objects. Upon conversion to NOAA charting units, the depth range is 0 to 116 fathoms.

3.2 Depth Contours

Depth contours at the intervals on the largest scale chart are included in the H11516_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The generalized metric and fathom equivalent contour values are shown in the table below.

Chart Contours in	Metric Equivalent	Metric Equivalent of	Actual Value of Chart
Fathoms	of Chart Contours	Chart Contours NOAA	Contours
		Rounded	
0	0	0.2286	0.125
3	5.4864	5.715	3.125
10	18.288	18.5166	10.125
20	36.576	37.9476	20.750
50	91.44	92.8116	50.750
100	182.88	184.2516	100.750

Contours delivered in the H11516_SS file have not been deconflicted against soundings and hydrography as all other features in the H11516_CS file and soundings in the H11516_SS have been. This results in conflicts between the H11516_SS file contours and HCell features at or near the survey limits. Conflicts with M_COVR, M_QUAL, and DEPARE objects should be expected. HCell features should be honored over H11516_SS.000 file contours in all cases where conflicts are found.

4. Meta Areas

The following Meta object areas are included in HCell H11516:

M_QUAL M_COVR

Meta area objects were constructed on the basis of the limits of the hydrography. (See 3.1 *Depth Areas.*)

5. Features

Features files H11516_M_Add_Notebook, H11516_M_Add_Pydro, H11516_M_Modify_Notebook, H11516_M_Modify_Pydro, and

H11516_Delete_Notebook were delivered. The features files have been combined into one feature file for delivery to MCD for historical purposes called H11516_Features.000. There were five DTONs reported by the field unit. These Dangers to Navigation were discovered to be depicted on Chart 16708 during chart comparison and are reflected in H11516_CS.000.

12 bottom sample features were imported into the HCell, 5 from the survey and 7 from chart 16708. The source of all features included in the H11516 HCell can be determined by the SORIND field.

6. S-57 Objects and Attributes

The H11516_CS HCell contains the following Objects:

SOUNDC	Chart goals coundings
SUUNDG	Chart scale soundings
DEPARE	All-encompassing depth area and intertidal areas
SBDARE	Bottom samples
M_COVR	Data coverage Meta object
M_QUAL	Data quality Meta object
\$CSYMB	Blue notes
OBSTRN	Foul areas
UWTROC	Rocks
WEDKLP	Kelp

The H11516_SS HCell contains the following Objects:

SOUNDG	Soundings at the survey scale density
DEPCNT	NOAA rounded contours at chart scale intervals

All S-57 Feature Objects in the H11516_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the OCS HCell Specifications.

7. Blue Notes

Notes to the RNC and ENC chart compilers are included in the HCell as \$CSYMB features with the Blue Note information located in the INFORM field.

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
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, and therefore have lower precision. 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

Conversion to charting units and application of NOAA rounding is completed in the same step, at the end of the HCell compilation process.

Conversion to charting units with NOAA rounding ensures that:

- All depths will display as whole feet.
- All depth units above MLLW (0 feet) to 2.0 feet above MHW display in whole feet.
- All height units (HUNI) which have been converted to charting units, and that are 2.0 feet above MHW and greater, are shown in feet.

In an ENC viewer, depths (DUNI) and heights (HUNI) display as whole feet.

9. Data Processing Notes

9.1 Junctions

Refer to section B.2 of the Descriptive Report for information on junction surveys.

10. QA/QC and ENC Validation Checks

H11516 was subjected to QA checks in S-57 Composer prior to exporting to the HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to a 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 have been approved by MCD as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

- H11516_CS, Chart Units, Soundings compiled to 1:79,291
- H11516_SS, Chart Units, Soundings compiled to 1:15,000
- H11516_Features, survey scale features compiled to 1:15,000
- H11516_DR including end notes compiled during office processing and certification, the HCell Report, and supplemental items
- H11516 Survey Outline to populate to SURDEX

11.2File Naming Conventions

- Chart units base cell file, chart scale soundings
- Chart units base cell file, survey scale soundings
- Chart units base file, survey scale features
- Descriptive Report
- Survey outline

H11516_CS.000 H11516_SS.000 H11516_Features.000 H11516_DR.pdf H11516_Outline.gml&*.xsd

11.3 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.2	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. 2.0	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	Validation of the base cell file.
Newport Systems, Inc., Fugawi View ENC	Independent inspection of final HCells
Ver.1.0.0.3	using a COTS viewer.

12. Contacts

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

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : January 17, 2006

HYDROGRAPHIC BRANCH: Pacific HYDROGRAPHIC PROJECT: OPR-P132-RA-2005 HYDROGRAPHIC SHEET: H11516

LOCALITY: Landlocked Bay, Prince William Sound, AK TIME PERIOD: September 18 - October 4, 2005

TIDE STATION USED: Columbia Glacier, AK 945-4460 Lat. 61 01.4' N Long. 147 05.1' W PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.384 meters

TIDE STATION USED: Valdez, AK 945-4240 Lat.61 07.5' N Long. 146 21.8' W PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.417 meters

REMARKS: RECOMMENDED ZONING Use zone(s) identified as: PWS65 & PWS66

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).
- Note 2: Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the Tidezone corrector file (*.ZDF). For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available.

CHIEF, PRODUCTS AND SERVICES DIVISION





APPROVAL SHEET H11516

Initial Approvals:

The survey evaluation and verification has been conducted according to branch processing procedures and the H-Cell 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 disproval 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 H-Cell, 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.

Survey Review Complete.