

H11608

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic Survey
Field No. OPR-P158-FA-06
Registry No. H11608

LOCALITY

State Alaska
General Locality Approaches to Cordova
Sublocality Makaka Point to Gravina Point

2006

CHIEF OF PARTY

CDR Andrew L. Beaver

LIBRARY & ARCHIVES

DATE

NOAA FORM 77-28
(11-72)

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

REGISTRY No

HYDROGRAPHIC TITLE SHEET

H11608

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

State Alaska

General Locality Approaches to Cordova

Sub-Locality Makaka Point to Gravina Point

Scale 1:20,000 Date of Survey 26 September - 27 October 2006

Instructions dated 8/4/2006, Change 2 10/6/2006 Project No. OPR-P158-FA-06

Vessel Skiff 1706, Jetboat 2302, Launch 1010, Launch 1018

Chief of party CDR Andrew L. Beaver, NOAA

Surveyed by CST Grant Froelich, LT Jennifer Dowling (FOO), LTJG Jonathan French

Soundings by echo sounder, hand lead, pole echo sounder

Graphic record scaled by N/A

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

Verification by Katie Reser Evaluation by Anthony Lukach

Soundings in Meters at MLLW

REMARKS: All times are UTC.

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts.

Descriptive Report to Accompany Hydrographic Survey H11608

Project OPR-P158-FA-06
Approaches to Cordova, Alaska
Scale 1:20,000
September 2006

NOAA Ship FAIRWEATHER

Chief of Party: Commander Andrew L. Beaver, NOAA

A. AREA SURVEYED

The survey area was located in Approaches to Cordova, within the sub-locality of Makaka Point to Gravina Point. This survey corresponds to Sheet E in the sheet layout provided with the Letter Instructions, as shown in Figure 1 below. The survey area is bounded on the Southwest corner at 60°28'00"N, 146°29'00"W and the Northeast corner at 60°38'00"N, 146°09'00"W.

Data acquisition was conducted from September 26, 2006 to October 27, 2006 (DN 269 to DN 300).

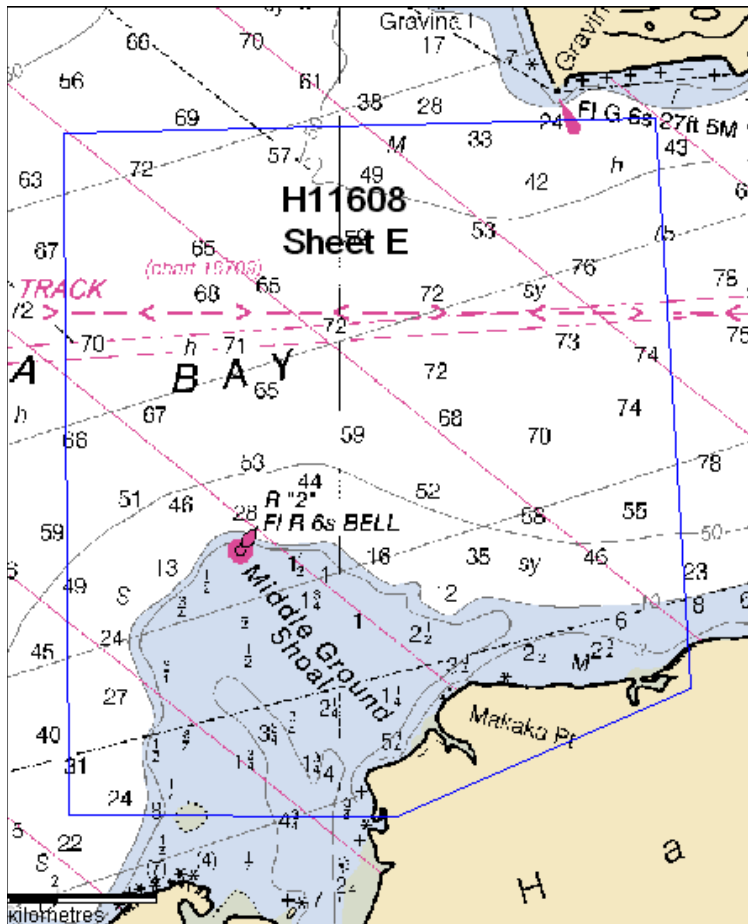


Figure 1: H116011

One hundred percent multibeam echosounder (MBES) coverage was obtained in the survey area offshore of the 8-meter depth curve¹. When conditions allowed, multibeam echosounder (MBES) data was acquired parallel to contours and at a line spacing of no more than 25 meters at depths between four and eight meters. Additional coverage was obtained when determining least depths over features or shoals offshore of the Navigational Area Limit Line (NALL), which is defined as the furthest offshore of the either the 4-meter depth contour or 0.8mm distance of the scale of the largest chart from the Mean High Water line².

Shoreline data for H11608 was not acquired as there were no navigationally significant features inside the Navigation Area Limit Line (NALL).

B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition/processing systems and survey vessels along with quality control procedures and data processing methods are included and described in the *OPR-P158-FA-06 Data Acquisition and Processing Report (DAPR)*³, submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections. This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-P158-FA-06, dated August 4, 2006 and Change No. 2, dated October 6, 2006.

B1. Equipment and Vessels

Equipment and vessels used for data acquisition and survey operations during this survey are listed below in Table 1.

	FAIRWEATHER	Jensen Launch 1010	Jensen Launch 1018
Hull Registration Number	S220	1010	1018
Builder	Aerojet-General Shipyard	The Boat Yard, Inc.	The Boat Yard, Inc.
Length Overall	231 feet	28' 10"	28' 10"
Beam	42 feet	10' 8"	10' 8"
Draft, Maximum	15' 6"	4' 0" DWL	4' 0" DWL
Cruising Speed	12.5 knots	24 knots	24 knots
Max Survey Speed	10 knots	10 knots	10 knots
Primary Echosounder	RESON 8111 & RESON 8160	RESON 8101	RESON 8101
Sound Velocity Equipment	SBE 19plus & 45, MVP 200	SBE 19plus	SBE19plus
Attitude & Positioning Equipment	POS/MV V3	POS/MV V3	POS/MV V3
Type of operations	MBES	MBES	MBES

Table 1: Vessel Inventory

No vessel configurations used during data acquisition deviated from the *DAPR*.

B2. Quality Control

Internal consistency and integrity of data collected for survey H11608 were manually examined by the Hydrographer in CARIS subset mode. The internal consistency and integrity of data collected for survey H11608 were found to be very good⁴.

Crosslines

Shallow water multibeam crosslines for this survey totaled 20.5 linear nautical miles (lnm), comprising 6.02% of the 360 lnm of total SWMB hydrography. Both main scheme and crossline mileage are summarized in Table 2.

MAIN SCHEME - Mileage	
Single Beam MS	0
Multibeam MS mileage	340.249539
SideScan MS	0
Total MS	340.249539
CROSSLINE - Mileage	
Single Beam XL	0
Multibeam XL	20.472332
Total XL	20.472332
OTHER	
Developments/AWOIS - Mileage	0
Shoreline/Nearshore Investigation - Mileage	0
Total # of Investigated Items	13
Total Bottom Samples	13
Total SNM	
Specific Dates of Acquisition	Sep 26,27; Oct 12,22,23,24,27
Specific Dn#s of Acquisition	DN 269,270,285,295,296, 297, and 300

Table 2: H11608 MBES Statistics

The Hydrographer has determined, through manual examination of the data, that the crossline agreement with main scheme data meet the vertical accuracy requirements as stated in the *NOS Hydrographic Surveys Specifications and Deliverables (HSSD)*, dated June 2006⁵.

Junctions

Survey H11608 junctions with H11610 which is Sheet H, H11609 Sheet G, and H11499 which is sheet D of the same project. The area of overlap between surveys H11608 and H11610 was approximately 600 meters wide. The area of overlap between Survey H11499 and Survey H11608 was approximately 1200

meters wide. Data were reviewed in Fledermaus and depths were found to be consistent between the two surveys, meeting the requirements as stated in the *HSSD*. The junction comparison between survey H11608 and H11609 were reviewed in Caris Hips and Sips. The area of overlap between surveys H11608 and H11609 was approximately 730 meters. There are some discrepancies between survey H11608 and H11609. These discrepancies are consistent with sound velocity errors⁶. The nadir beams match up, but the outer beams are up to 0.85 meters off as shown in figure 3. The sheet limits and area of overlap for Sheets D and H are shown in Figure 2.

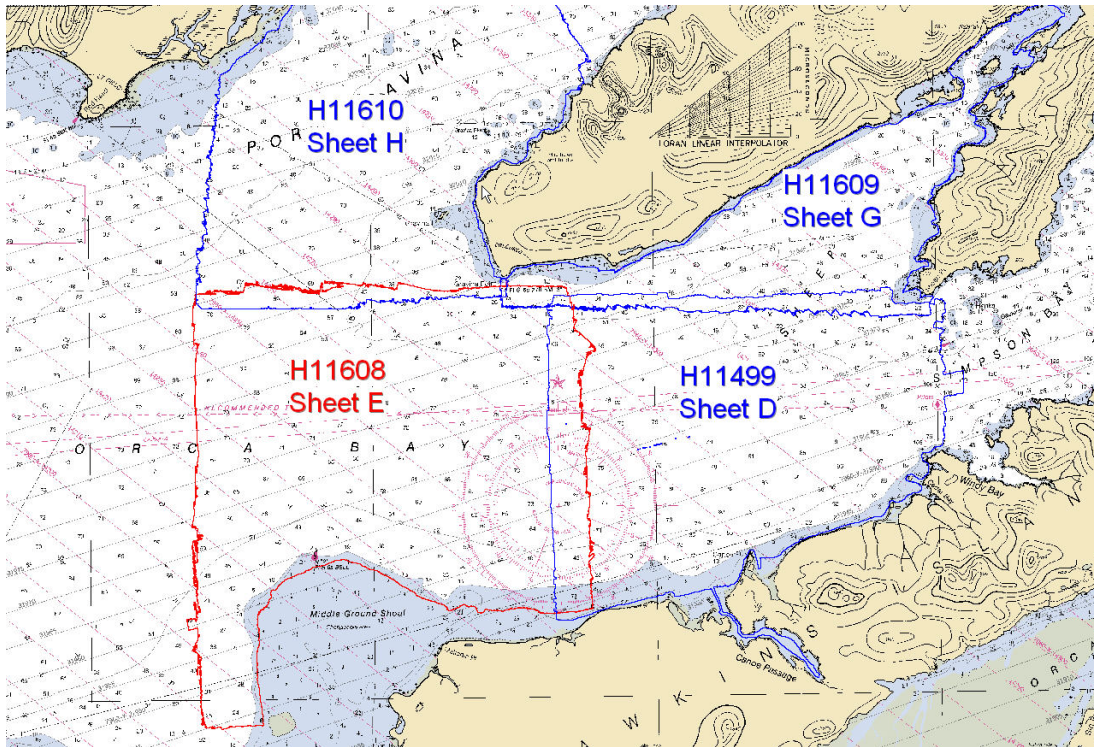


Figure 2: Junctions with H11608, H11610 and H11499

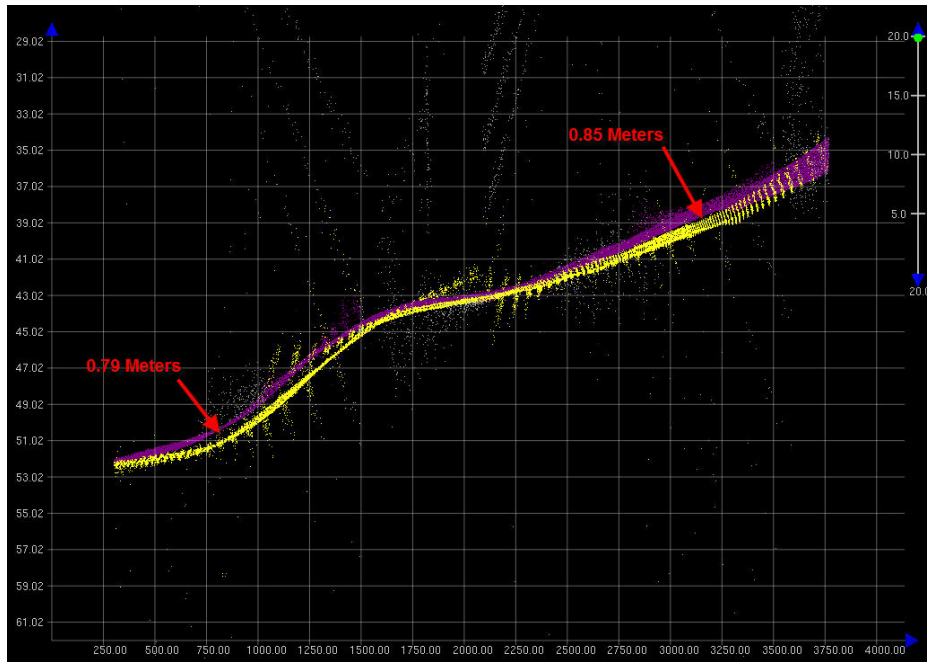


Figure 3: Junctions with H11608, H11610 and H11499

Quality Control Checks

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

Data Quality Factors

COVERAGE ASSESSMENT:

Coverage assessment was determined using the following base surface resolutions listed below in Table 3.

Depth Ranges (m)		Resolution (m)
Low	High	
0	40	2
30	70	5
50	120	10
100	200	20
180	350	35

Table 3: Depth Ranges and Resolutions

DESIGNATED SOUNDINGS:

Designation of soundings followed procedures as outlined in the *Field Procedures Manual v2p1*, dated May 2006 (*FPM*).

ROLL

A roll error was detected in the data acquired by launch 1018 on day number (DN) 285. This error is negligible and does not affect the least depth of the base surface. All data is within tolerance. An example is shown in Figure 4⁷.

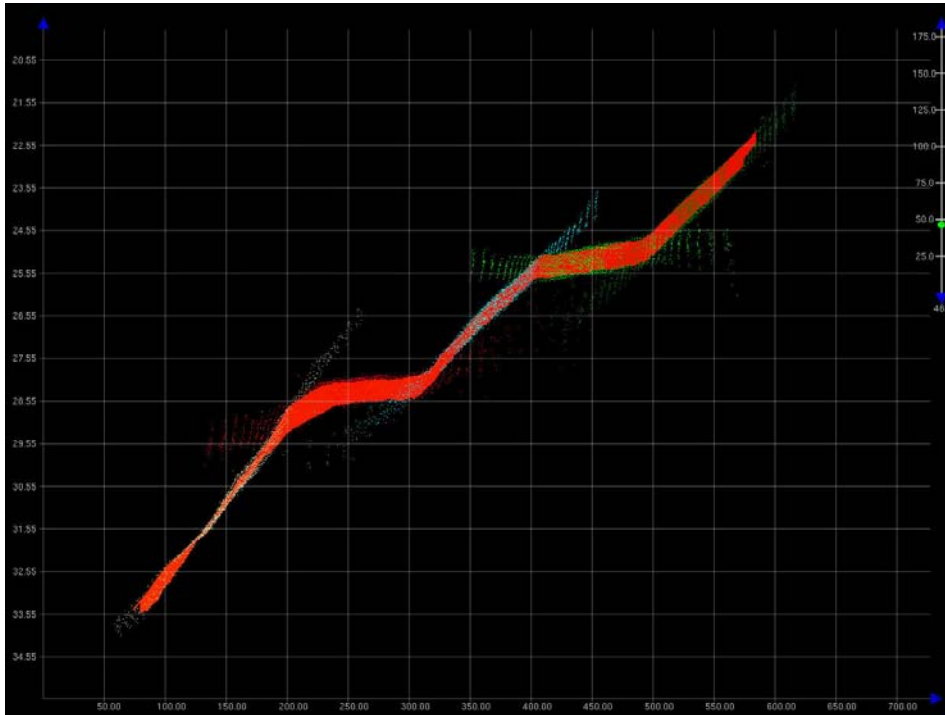


Figure 4: Roll error from Launch 1018 on DN 285

Accuracy Standards

All data meet the data accuracy specifications as stated in the *HSSD*⁸.

B3. Corrections to Echo Soundings

Data reduction procedures for survey H11608 conform to those detailed in the *DAPR*, with the exceptions as discussed below.

B4. Data Processing

There is one field sheet created for survey H11608. The field sheet named H11608 encompasses the entire survey area and includes the 2 meter, 5 meter, 10 meter and 20 meter BASE surface resolutions⁹.

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H11608 can be found in the *OPR-P158-FA-06 Horizontal and Vertical Control Report*, submitted under separate cover¹⁰. 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. Differential corrections came from the U.S. Coast Guard beacons at Cape Hinchinbrook (292 kHz), Potato Point (298 kHz) and Kenai (310 kHz).

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 Cordova (945-4050) served as control for datum determination and as the primary source for water level reducers for survey H11608 during acquisition.

A request for delivery of final approved water level data (smooth tides) for survey H11608 was forwarded to N/OPS1 on November 1, 2006 in accordance with the *FPM*. A copy of the request is included in Appendix V.

FAIRWEATHER received the Tide Note for Hydrographic Survey H11608 on November 8, 2006. The note states that the preliminary zoning was accepted as the final zoning correctors. Final approved water level data were received by the FAIRWEATHER on November 16, 2006 for NWLON primary tide station Cordova (945-4050). The Tide Note for Hydrographic Survey H11608 and ancillary correspondence are included in Appendix V¹¹.

As per the Letter Instructions, all data were reduced to MLLW using the final approved water levels (smooth tides) from station Cordova (945-4050) by applying tide file 9454050.tid and time and height correctors through the zone corrector file P158FA2006CORP.zdf.¹² It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels (smooth tides) to the survey data during final processing.

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

Chart comparisons were carried out using Caris and MapInfo. CUBE surfaces, created for the appropriate resolutions dependent on survey depths, were finalized and brought into Field Sheet Editor in HIPS 6.1. A sounding layer was created for each surface and then exported to an S57 file. This file was then converted to a MapInfo Table, enabling chart comparisons to be carried out in MapInfo where the soundings from the ENC could be imported and overlaid on the soundings generated from the survey CUBE surfaces.

Survey H11608 was compared with the following ENC's (Electronic Navigation Charts) as per the Letter of Instructions: Chart US4AK24M.000 (9th Ed.; March 2007, 1:79,291), chart US4AK25M.000 (9th Ed.; February 2007, 1:80,000) and chart US5AK2CM.000 (5th Ed.; January 2007, 1:30,000). All of the ENC's have been updated with the Notice to Mariners through January 2007. There was one new update to the survey area which was applied to the ENC's. Chart comparisons were done in MapInfo, where the soundings from the ENC's could be imported and overlain on the soundings generated from the survey BASE surface. For easier viewing, the ENC soundings were colored red and the survey soundings colored black.

Chart US4AK24M.000

Depths from survey H11608 agreed within one to two meters with depths on chart US4AK24M.000¹³. There were however two charted soundings that had a difference exceeding two fathoms from the depths collected during survey H11608:

- 60°36'33.88" N 146°18'03.03" W, 74.49 meters deepest sounding at a charted 78.6 meters¹⁴
- 60°37'09.59" N 146°14'33.98" W, 33.24 meters deepest sounding at a charted 40.2 meters¹⁵

Chart US4AK25M.000

Chart US4AK25M.000 includes the area around Middle Ground Shoal. Coast Pilot 9 and chart 16709 describe Middle Ground Shoal as a "changeable area". Chart US4AK25M.000 does not display this note, likewise the associated text file does not mention Middle Ground Shoal. The majority of the discrepancies between survey H11608 and Chart US4AK25M are in the general area of the shoal.

Other than the area around Middle Ground Shoal depths from survey H11608 agreed within one to two meters with depths on chart US4AK25M.000. There were however eight charted soundings that had a difference exceeding two meters from the depths collected during survey H11608:

- 60°31'39.85" N 146°24'05.68" W, 9.60 meters deepest sounding at a charted 3.6 meters¹⁶
- 60°31'54.25" N 146°24'21.37" W, 41.74 meters deepest sounding at a charted 27.4 meters¹⁷
- 60°32'23.29" N 146°22'34.79" W, 44.19 meters deepest sounding at a charted 4.9 meters¹⁸
- 60°32'58.40" N 146°21'32.42" W, 58.71 meters deepest sounding at a charted 64.0 meters¹⁹
- 60°32'38.48" N 146°18'40.38" W, 66.03 meters deepest sounding at a charted 69.4 meters²⁰
- 60°32'24.81" N 146°12'49.79" W, 73.78 meters deepest sounding at a charted 76.8 meters²¹

Both of the below soundings were brought to the attention of the Chief of Party. They were not named as DTONs do to the proximity to Middle Ground shoal area.

- 60°32'09.28" N 146°18'55.46" W, 13.30 meters deepest sounding at a charted 29.2 meters²²
- 60°31'46.31" N 146°17'33.90" W, 5.19 meters deepest sounding at a charted 21.9 meters²³

Chart Comparison Recommendations

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the *HSSD*. The BASE surfaces with the application of designated soundings are adequate to supersede prior surveys in their common areas²⁴. Based on the application of verified water level data (smooth tides) by FAIRWEATHER, final chart comparisons are not required by the Pacific Hydrographic Branch. Charts of Middle Ground Shoal indicate that it is a changeable area. The Hydrographer recommended that the ENC of this area also should indicate the changeable nature of this area this shoal.

Automated Wreck and Obstruction Information System (AWOIS) Investigations

There were no AWOIS items located within the limits of H11608²⁵.

Dangers to Navigation

There were no dangers to navigation found within the survey limits²⁶.

D.2 Additional Results

Aids to Navigation

Survey H11608 included one (1) aid to navigation (ATON). Red number two buoy at position (60°32.48N, 146°22.08W) with characteristics of red flashing six second light and a bell is depicted correctly on Chart 16709²⁷.

Bottom Samples

Bottom samples were collected on October 27, 2006 (DN 300) and are included as seabed classifications along with the other S57 features in the Pydro Preliminary Smooth Sheet²⁸. The bottom sample positions were also imported to the Notebook H11608_Pydro_Updates.hob file.

E. Supplemental Reports

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 2006	May 18, 2006	N/CS34
OPR-P158-FA-06 Data Acquisition and Processing Report	April 10, 2007	N/CS34
OPR-P158-FA-06 Horizontal & Vertical Control Report	Nov. 8, 2006	N/CS34, N/OPS1

-
- ¹ Concur.
 - ² Concur.
 - ³ Filed with the project records.
 - ⁴ Concur.
 - ⁵ Concur.
 - ⁶ Concur.
 - ⁷ Concur with clarification, Data from launches 1010 and 1018 was edited due to the roll error. The HVF files did not match the values documented in DAPR.
 - ⁸ Concur with clarification. Issues with incorrect HVFs and TPE values were found during the survey acceptance review; these issues were corrected to meet NOAA standards.
 - ⁹ Surfaces recreated, coarsest surface used in compilation was 5m.
 - ¹⁰ Filed with project records.
 - ¹¹ See attached tide note.
 - ¹² Concur.
 - ¹³ Concur.
 - ¹⁴ Concur with clarification. Charted sounding is located at 60-36-33.73N 146-18-07.61W and has a surveyed depth of 75.634m.
 - ¹⁵ Disagree. Charted sounding at 60-37-10.78N 146-14-34.53W does not fall within survey's depth area.
 - ¹⁶ Concur with clarification. Charted sounding has actual surveyed depth of 27.98m.
 - ¹⁷ Concur with clarification. Charted sounding has actual surveyed depth of 50.72m.
 - ¹⁸ Concur with clarification. Charted sounding has actual surveyed depth of 39.20m.
 - ¹⁹ Do not concur. Charted sounding of 64m has actual surveyed depth of 64.30m, within 2m range of acceptable accuracy.
 - ²⁰ Do not concur. Charted sounding of 69.4m has actual surveyed depth of 69.88m, within 2m range of acceptable accuracy.
 - ²¹ Do not concur. Charted sounding of 76.8m has actual surveyed depth of 74.85m, within 2m range of acceptable accuracy.
 - ²² Concur with clarification. Charted sounding has actual surveyed depth of 16.65m.
 - ²³ Concur with clarification. Charted sounding has actual surveyed depth of 4.68m.
 - ²⁴ Concur.
 - ²⁵ Concur.
 - ²⁶ Concur.
 - ²⁷ Chart per latest ATONIS information.
 - ²⁸ 13 bottom samples were collected, all of which were included in compilation. An additional 8 were imported from pre-existing charts to be retained.



UNITED STATES DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration
NOAA Marine and Aviation Operations
NOAA Ship FAIRWEATHER S-220
1010 Stedman Street
Ketchikan, AK 99901

May 2, 2007

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

FROM: CDR Andrew L. Beaver, NOAA
Commanding Officer

Andrew L. Beaver
I am approving this
document
2007.05.03 07:42:55 -08'00'

TITLE: Approval of Hydrographic Survey H11608,
OPR-P158-FA

As Chief of Party, I have ensured that standard field surveying and processing procedures were adhered to during acquisition and processing of hydrographic survey H11608 in accordance with the Hydrographic Manual, Fourth Edition; Hydrographic Survey Guidelines; Field Procedures Manual, May 2006 Version 2.1; and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for June 2006. Additional guidance was provided by applicable Hydrographic Technical Directives. 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.

I acknowledge that all of the information contained in this report is complete and accurate to the best of my knowledge.

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

Jonathan French
2007.05.03 09:13:26 -08'00'

LTJG Jonathan R. French
Survey Manager

Jennifer Dowling
2007.05.02 20:33:32 -08'00'

LT Jennifer N. Dowling
Field Operations Officer

Digitally signed by Grant Froelich
Date: 2007.05.03 07:42:51 -08'00'

CST Grant D. Froelich
Chief Survey Technician

Attachment





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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 9, 2006

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P158-FA-2006
HYDROGRAPHIC SHEET: H11608

LOCALITY: Makaka Point to Gravina Point, AK
TIME PERIOD: September 26 - October 28, 2006

TIDE STATION USED: 945-4050 Cordova, AK
Lat. 60° 33.5'N Long. 145° 45.3' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.559 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-P158-FA-2006, H11608, during the time period between September 26 and October 28, 2006.

Please use the zoning file "P158FA2006CORP" submitted with the project instructions for Approaches to Cordova, AK. Zones PWS60, PWS61 & PWS64 are the applicable zones for H11608.

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).

Fu [Signature]

CHIEF, PRODUCT AND SERVICES DIVISION



Final Tidal Zoning for OPR-P158-FA-2006, H11608 Orca Bay, AK (Preliminary As Final)

while transiting the water adjacent to the 10 fathom curve around Montague and Green Islands. Numerous uncharted rocks and islets are known to exist in these areas, 75% of the inshore waters surrounding these islands have not been surveyed since the 1984 earthquake, consequently the presence of underwater dangers is conceivable.

Revisions to Chapter 2 are published in the Notices to Mariners. Information concerning the regulations may be obtained at the Office of the Commander, 17th Coast Guard District in Juneau, Alaska, or at the Office of the District Engineer, Corps of Engineers in Anchorage, Alaska.

Note: In charted navigation sector numbers.

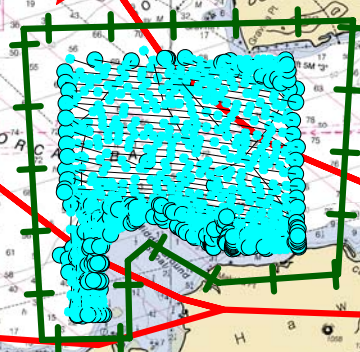
AA	SOURCE	DESCRIPTION
19	Vessel Traffic Services calling point with numbers, sector indicators, direction of vessel movement	
B1	1990-2000 NOS Surveys	full bottom coverage
B2	1960-1990 NOS Surveys	partial bottom coverage
B3	1970-1980 NOS Surveys	partial bottom coverage
B4	1900-1950 NOS Surveys	partial bottom coverage
B5	Pre-1900 NOS Surveys	partial bottom coverage



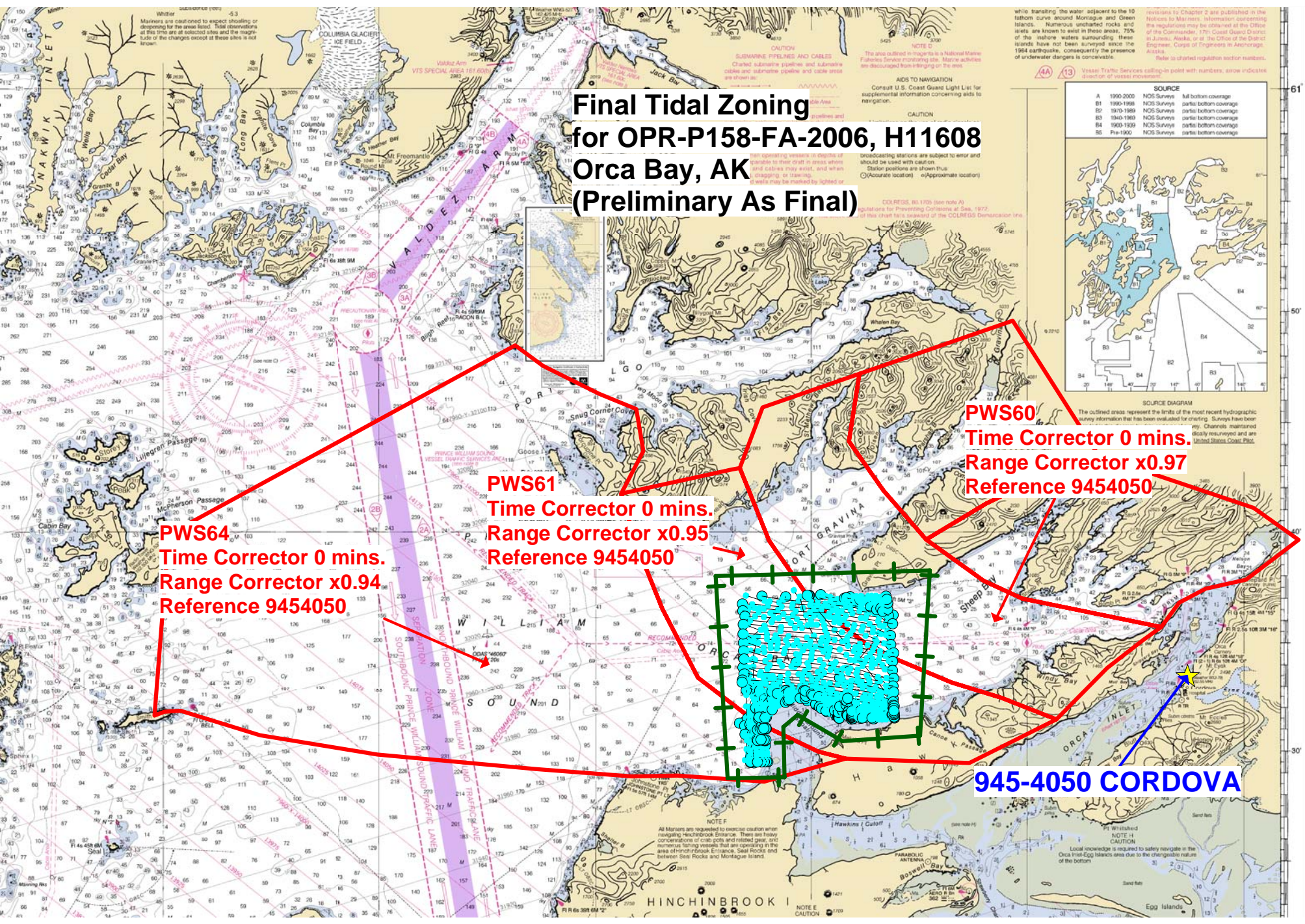
PWS64
Time Corrector 0 mins.
Range Corrector x0.94
Reference 9454050

PWS61
Time Corrector 0 mins.
Range Corrector x0.95
Reference 9454050

PWS60
Time Corrector 0 mins.
Range Corrector x0.97
Reference 9454050



945-4050 CORDOVA



H11608 HCell Report
Anthony Lukach, Cartographer
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 ENCs, US4AK24M and US4AK25M; and NOAA RNC, 16709.

HCell compilation of survey H11608 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

Density of soundings for HCell H11608 were compiled to the largest scale chart in the region, Chart 16709, 1:80,000.

2. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 5-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:40,000 survey scale using a Radius Table file with values shown in the table, below. The resultant sounding layer contains 3,367 depths ranging from 0 to 144.4 meters.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	500	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). The depth area was then clipped to the overlapping extents of surveys located to East, West, and North of the survey area (H11499, H11637, and H11610, respectively).

3.2 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 generalized metric and fathom equivalent contour values are shown in the table below.

Chart Contours in Fathoms	Metric Equivalent of Chart Contours	Metric Equivalent of Chart Contours Generalized	Actual Value of Chart Contours
0	0	0.2286	0
3	5.4864	5.715	3.125
10	18.288	18.5166	10.125
50	91.44	92.8116	50.750

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

4. Meta Areas

The following Meta object areas are included in HCell H11608:

M_QUAL
M_COVR
M_CSCL

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

5. Features

5.1 Generalization of Features to Chart Scale

Features gathered by field units are delivered to PHB and applied to the preliminary HCell without reduction in number or character. This preliminary HCell is used to perform evaluation and verification of survey soundings and features, features are deconflicted against hydrography, and geometry is corrected as needed. Linear and area features are also digitized against the BASE Surfaces, and features to be retained are imported from the chart. This features file is used as the basis for the final HCell compilation with features reduced to the largest scale RNC and ENC. In addition, the product of the survey scale features file, H11608_Features.000, is archived at PHB.

Pending further guidance from MCD, features generalization has been accomplished primarily through reduction in the number of features included in the HCell. Generalizing area features to point objects is entrusted to the RNC division. Where line and area objects are included in the HCell, complexity of the lines and edges comprising the features have been smoothed commensurate with chart scale.

5.2 Compilation of Features to the HCell

The source of all features included in the H11608 HCell can be determined by the SORIND field.

6. S-57 Objects and Attributes

The *_CS HCell contains the following Objects:

\$CSYMB	Blue Notes
DEPARE	The all-encompassing depth area
M_COVR	Data coverage Meta object
M_QUAL	Data quality Meta object
SBDARE	Bottom samples and rocky seabed areas
SOUNDG	Soundings at the chart scale density

The *_SS HCell contains the following Objects:

DEPCNT	Generalized contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

All S-57 Feature Objects in the *_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. By agreement with MCD, the NINFOM field is populated with an abbreviated version of the Blue Note (30 characters or less), describing the chart disposition, to be used by MCD in generating their Chart History spreadsheet.

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

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 fathoms and feet charting units with NOAA rounding ensures that:

- All depths deeper or equal to 11 fathoms display as whole fathoms.
- All depth units between 0 fathoms (MLLW) and 11 fathoms display as fathoms and whole feet.
- All depth units skyward of 0 fathoms (MLLW) to 2.0 feet above MHW display in feet for values that round to 5 feet or less, and in fathoms and feet skyward of that.
- All height units (HUNI) which have been converted to charting units, and that are 2.00 feet above MHW and greater, are shown in feet.

In an ENC viewer fathoms and feet depth units (DUNI) display in the format X.YZZZ, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. In an ENC viewer, heights (HUNI) display as whole feet.

9. Data Processing Notes

9.1 Junction with H11637

Refer to section B.2 of the Descriptive Report for detailed information regarding adjunct surveys.

10. QA/QC and ENC Validation Checks

H11608 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 are MCD approved as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

- H11608 Base Cell File, Chart Units, Soundings and features compiled to 1:80,000.
- H11608 Base Cell File, Chart Units, Soundings compiled to 1:40,000.
- H11608 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items.

- H11608 Survey outline to populate the SURDEX.

11.2 File Naming Conventions

- Chart units base cell file, chart scale soundings H11608_CS.000
- Chart units base cell file, survey scale sounding set H11608_SS.000
- Descriptive Report package H11608_DR.pdf
- Survey outline H11608_Outline.gml & *.xsd

11.3 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.3	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	Validation of the base cell file.
Newport 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
H11608

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 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 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.