

H-10544

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-10-5-94
Registry No. H-10544

LOCALITY

State Alaska
General Locality Alaska Peninsula
Sublocality Western End of Sutwik Island

1994

CHIEF OF PARTY
CAPT R.C. Arnold

LIBRARY & ARCHIVES

DATE March 22, 1996

HYDROGRAPHIC TITLE SHEET

H-10544

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-10-5-94

State Alaska

General locality Southern Alaska Peninsula

Locality Western End of Sutwik Island

Scale 1:10,000 Date of survey May 31 - June 29, 1994

Instructions dated May 5, 1994 Project No. OPR-P180-RA

Vessel NOAA Ship RAINIER(2120), RA-3(2123), RA-4(2124), RA-5(2125), RA-6(2126), RA-9(2129)

Chief of party CAPT Russell C. Arnold, NOAA

Surveyed by CAPT R. Arnold, LT D. Neander, LT D. Haines, LTJG D. Lemke, ENS A. Caron, ENS G. Glover, ENS S. Smith

Soundings taken by echo sounder, hand lead, pole DSF-6000N, Innerspace 448

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel

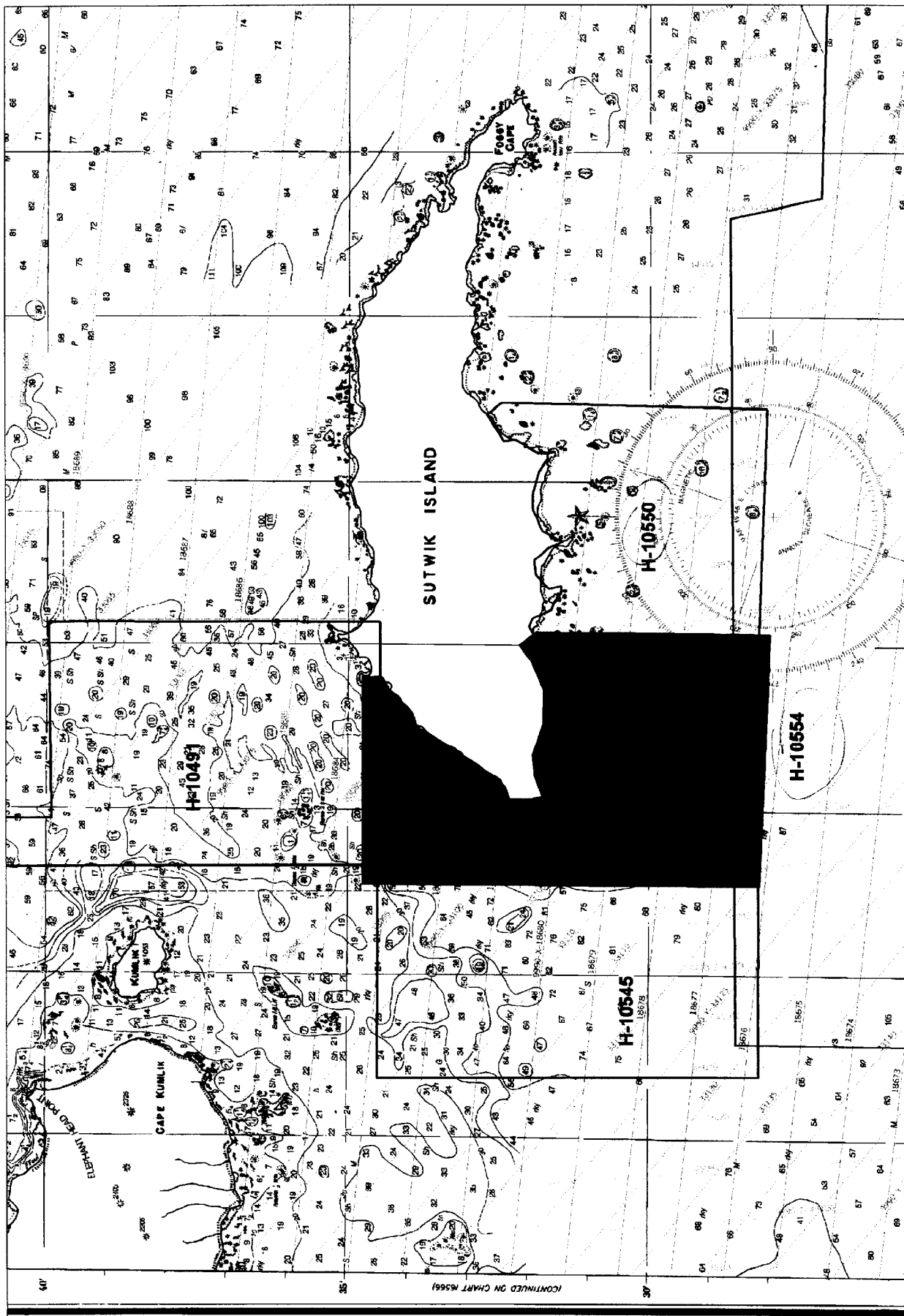
Evaluation by: B. Mihailov Automated plot by HP Design Jet 650C

Verification by R.A. Mayor

Soundings in ~~fathoms~~ ~~feet~~ at MLW MLLW

REMARKS: All times in UTC, revisions and marginal notes in black were generated during office processing. All separates are filed with the hydrographic data, as a result page numbering may be interrupted or non sequential. All depths listed in this report are referenced to mean lower low water unless otherwise noted.

SURE/AWOLIS chk 3/26/96 MCR



PROGRESS SKETCH

EAGLE I. A

GARDEN I. B

HYDRA

OPR-P180-RA
HYDROGRAPHIC SURVEY
SOUTHERN ALASKA PENINSULA, ALASKA

May 27 - August 16, 1994

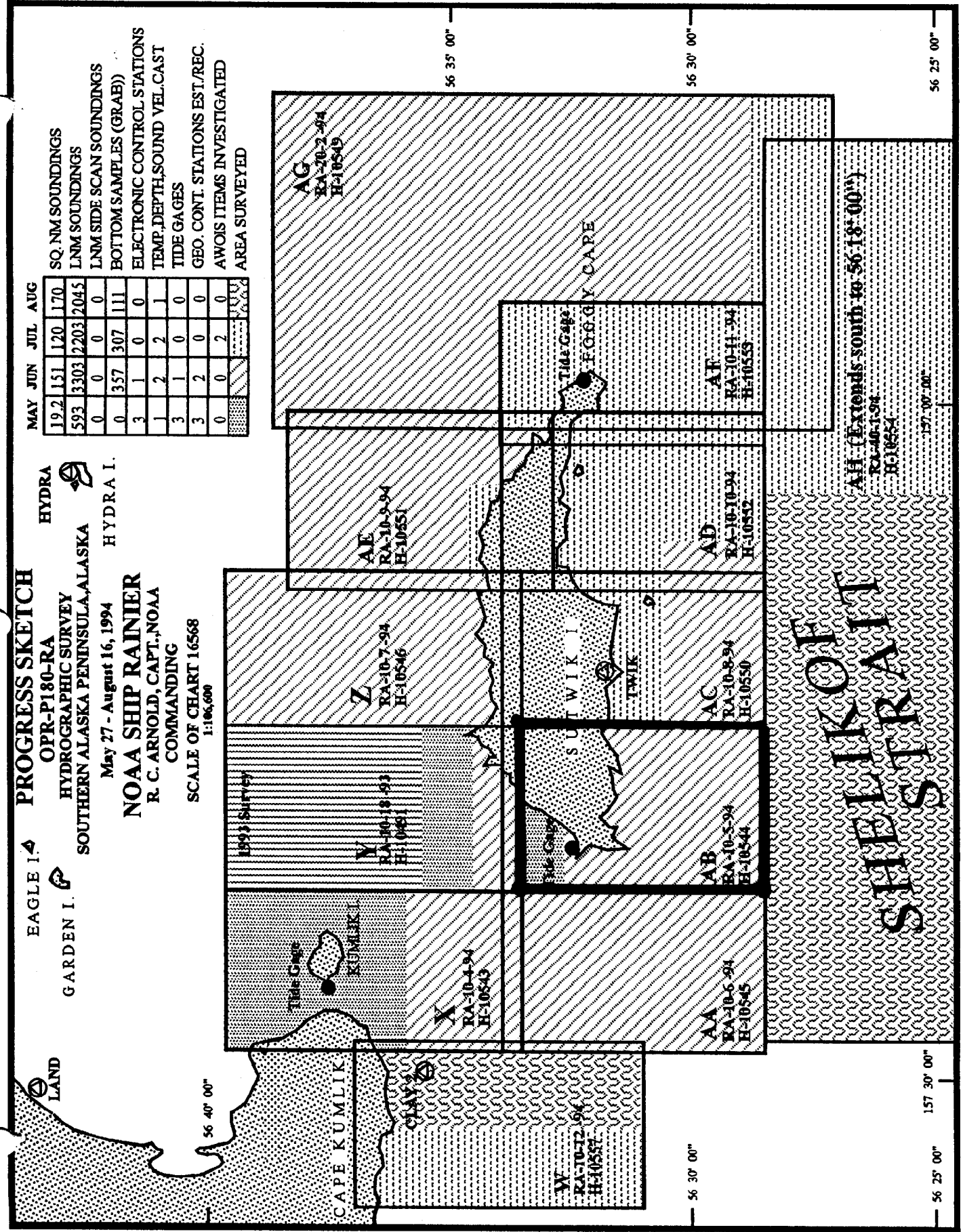
NOAA SHIP RAINIER
R. C. ARNOLD, CAPT., NOAA
COMMANDING

HYDRA I. C

SCALE OF CHART 16568
1:106,600

| | MAY | JUN | JUL | AUG |
|-------------------------------|------|------|------|------|
| SQ. NM SOUNDINGS | 19.2 | 151 | 120 | 170 |
| LN.M SOUNDINGS | 593 | 3303 | 2203 | 2045 |
| LN.M SIDE SCAN SOUNDINGS | 0 | 0 | 0 | 0 |
| BOTTOM SAMPLES (GRAB) | 0 | 357 | 307 | 111 |
| ELECTRONIC CONTROL STATIONS | 3 | 1 | 0 | 0 |
| TEMP. DEPTH SOUND VEL. CAST | 1 | 2 | 2 | 1 |
| TIDE GAGES | 3 | 1 | 0 | 0 |
| GEO. CONT. STATIONS EST./REC. | 3 | 2 | 0 | 0 |
| AOWIS ITEMS INVESTIGATED | 0 | 0 | 2 | 0 |
| AREA SURVEYED | 100 | 100 | 100 | 100 |

- SQ. NM SOUNDINGS
- LN.M SOUNDINGS
- LN.M SIDE SCAN SOUNDINGS
- BOTTOM SAMPLES (GRAB)
- ELECTRONIC CONTROL STATIONS
- TEMP. DEPTH SOUND VEL. CAST
- TIDE GAGES
- GEO. CONT. STATIONS EST./REC.
- AOWIS ITEMS INVESTIGATED
- AREA SURVEYED



AH (Extends south to 56° 18' 00")
RA-10-1-94
H-10554

157° 10' 00"

SHEET NO. 11
SHELTER COTTAGE

Descriptive Report to Accompany Hydrographic Survey H-10544

Field Number RA-10-5-94
Scale 1:10,000
June 1994

NOAA Ship RAINIER
Chief of Party: Captain Russell C. Arnold

A. PROJECT ✓

This basic hydrographic survey was completed along the Southern Alaska Peninsula, Alaska, as specified by Project Instructions OPR-P180-RA dated May 5, 1994.

Survey H-10544 corresponds to "sheet AB" as defined in the Project Instructions.

This survey will provide contemporary hydrographic survey data for updating existing nautical charts, and for constructing two 1:100,000 scale metric charts. The new charts will cover inshore and offshore areas between Sutwik Island and Mitrofanina Island along the Southern Alaska Peninsula. Requests for hydrographic surveys and updated charts have been received from the U.S. Coast Guard, Alaska congressional delegates, NOAA, Defense Mapping Agency, and local fishermen.

B. AREA SURVEYED ✓ *See Eval Report, Section B.*

The survey area is located along the Southern Alaska Peninsula, at the west end of Sutwik Island. The survey's northern limit is bounded by latitude 56°34.5' N, and the southern limit is bounded by latitude 56°28.25' N. The western limit is bounded by 157°21.7' W. The eastern limit is bounded by 157°14.8' W and the west end of Sutwik Island.

Data acquisition was conducted from May 31, 1994, Day Number (DN 151) , through June 29, 1994, (DN 180).

C. SURVEY VESSELS ✓

Data were acquired by the NOAA SHIP RAINIER, four survey launches and a Munson Hammerhead skiff as noted below:

| <u>Vessel</u> | <u>EDP #</u> | <u>Operation</u> |
|---------------|--------------|---|
| RAINIER | 2120 | Sound Velocity Casts Bottom Samples |
| RA-3 | 2123 | Hydrography Shoreline Verification |
| RA-4 | 2124 | Hydrography |
| RA-5 | 2125 | Hydrography Bottom Samples Shoreline Verification |
| RA-6 | 2126 | Dives |

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓

Data acquisition and processing were accomplished with the following HDAPS and Coastal Oceanographics HYPACK programs:

| <u>HDAPS 1994</u> | | |
|---------------------|----------------|-----------------------|
| <u>Program Name</u> | <u>Version</u> | <u>Date Installed</u> |
| BACKUP | 2.00 | 3/7/94 |
| BASELINE | 1.14 | 3/7/94 |
| BIGABST | 2.07 | 3/7/94 |
| BIGAUTOST | 3.01 | 3/7/94 |
| BLKEDIT | 2.02 | 3/7/94 |
| CARTO | 2.13 | 5/12/94 |
| CLASSIFY | 1.05 | 3/7/94 |
| CONVERT | 3.62 | 3/7/94 |
| DAS_SURV | 6.70 | 5/12/94 |
| DIAGNOSE | 3.04 | 5/12/94 |
| DISC-UTIL | 1.00 | 3/7/94 |
| DP | 2.14 | 3/7/94 |
| EXCESS | 4.21 | 3/7/94 |
| FILESYS | 3.24 | 5/12/94 |
| GRAFEDIT | 1.06 | 3/7/94 |
| LISTDATA | 1.02 | 3/7/94 |
| LOADNEW | 2.10 | 3/7/94 |
| LSTAWOIS | 3.07 | 5/12/94 |
| MAINMENU | 1.20 | 3/7/94 |
| MAN_DATA | 2.01 | 3/7/94 |
| NEWPOST | 6.01 | 3/7/94 |
| PLOTALL | 2.27 | 5/12/94 |
| POINT | 2.10 | 3/7/94 |
| PREDICT | 2.01 | 3/7/94 |
| PRESURV | 7.08 | 5/12/94 |
| PRINTOUT | 4.03 | 5/3/94 |
| QUICK | 2.05 | 5/12/94 |
| RAMSAVER | 1.02 | 3/7/94 |
| REAPPLY | 2.10 | 3/7/94 |
| SCANNER | 1.00 | 3/7/94 |
| SELPRINT | 2.04 | 3/7/94 |
| SYMBOLS | | 3/7/94 |
| VERSIONS | 1.00 | 3/7/94 |
| ZOOMEDIT | 2.24 | 5/12/94 |

| <u>HYPACK Program Name</u> | <u>Version</u> | <u>Date Installed</u> |
|----------------------------|----------------|-----------------------|
| HYPACK.EXE | 4.16 | 2/24/94 |
| PLOTFILE.EXE | 4.16 | 2/25/94 |
| SETUP.EXE | 4.16 | 2/15/94 |
| VIEW.EXE | 4.16 | 12/12/93 |
| DESIGN.EXE | 4.16 | 2/1/94 |
| VOLUME.EXE | 4.16 | 1/27/94 |
| FORGP.EXE | 4.16 | 11/12/93 |
| NAVITRACK.EXE | 4.16 | 2/1/93 |
| CONTPICK.EXE | 4.16 | 12/8/92 |
| DIGITIZE.EXE | 4.16 | 1/12/94 |
| HYDROLIN.EXE | 4.16 | 8/20/93 |
| UPLOAD.EXE | 4.16 | 8/12/92 |
| TESTFIG.EXE | 4.16 | 11/30/93 |
| INVERSE.EXE | 4.16 | 11/12/94 |
| NAV.EXE | 4.16 | 2/21/94 |
| DATUM.EXE | 4.16 | 11/23/94 |
| GRIDCONV.EXE | 4.16 | 12/21/93 |
| DXF.EXE | 4.16 | 2/11/94 |
| MENUCOLO.EXE | 4.16 | 8/12/92 |
| IOTEST.EXE | 4.16 | 2/22/94 |
| TRANS.EXE | 4.16 | 1/6/94 |
| OVERLAY.EXE | 4.16 | 5/19/93 |
| UNITCONV.EXE | 4.16 | 11/12/93 |
| POINTFIG.EXE | 4.16 | 11/12/93 |
| TRACKS.EXE | 4.16 | 12/12/93 |
| MANDIG.EXE | 4.16 | 9/30/92 |
| DATADIRS.EXE | 4.16 | 12/17/93 |
| COM1SET.EXE | 4.16 | 9/15/92 |
| NEWSETUP.EXE | 4.16 | 2/22/94 |
| IONEW.EXE | 4.16 | 2/9/94 |
| MANAGER.EXE | 4.16 | 12/13/93 |
| PRINTFIG.EXE | 4.16 | 10/25/93 |

Some data were collected using a Munson Hammerhead Skiff equipped with a laptop computer, Coastal Oceanographics HYPACK data acquisition software, standard Ashtech DGPS, and an Innerspace 448 fathometer.

Post processing was conducted using the HDAPS HP system. HYPACK files were translated to a PC-DAS format using a modified PowerBasic program provided by N/CG24. The PowerBasic program, CONV_HYP.BAS, was run through an accompanying batch routine called HYPCON.BAT (2/14/94). OSWEGO HPCOPY was used to copy the data onto a HP formatted disk. Data were then processed in the same manner as PC-DAS on the HP system.

In addition, the following batch routine, GPSINIT.BAT(5/19/94), was used to initialize the Ashtech GPS receiver.

Velocity corrections were determined using:

| <u>Program Name</u> | <u>Version</u> | <u>Date Installed</u> |
|---------------------|----------------|-----------------------|
| VELOCITY | 2.10 | 15 Mar 1994 |

E. SONAR EQUIPMENT ✓

Sonar equipment was not used on sheet AB. Concur

F. SOUNDING EQUIPMENT ✓

The Raytheon DSF-6000N is a dual frequency (100 kHz, 24 kHz), paper trace echo sounder. Serial numbers are included on the headers of the daily Raw Master Printouts. *The InnerSpace 448, serial number 300, is a single frequency thermal depth sounder recorder (208 kHz). No problems which affect survey data were encountered. All DSF-6000N soundings were acquired using the High + Low, high frequency digitized setting.

G. CORRECTIONS TO ECHO SOUNDINGS

Correctors for the velocity of sound through water were determined from the casts listed below:

| <u>Velocity Table #</u> | <u>Cast#</u> | <u>DN</u> | <u>Cast Position</u> | <u>Deepest Depth</u> | <u>Applicable DN</u> | |
|-------------------------|--------------|-----------|-----------------------------|----------------------|----------------------|-------------------------|
| 2 | 2 | 160 | 56°36'24" N 157°22'58" W | 220 | 150 - 170 | outside of survey area. |
| 3 | 3 | 172 | 56°36'08" N 157°10'08" W | 240 | 171 - 182 | outside of survey area. |
| 13 | 3 | 172 | " " | 240 | 171-182 | (ship) |

The sound velocity casts were acquired with SBE SEACAT Profiler (S/N 811), calibrated 12/17/93. Velocity correctors were computed using the PC program VELOCITY in accordance with Hydrographic Survey Guideline (HSG) No. 69. A printout of the Sound Velocity Corrector Tables used in the HDAPS Post Survey program is included in the "Separates to be Included with Survey Data, IV. Sounding Equipment Calibrations and Corrections". *

Static Draft ✓

A transducer depth was determined using FPM Fig 2.2 for launches 2123, 2124, 2125, 2126 and 2129 in the spring of 1994 and was entered into the offset tables for each launch. *

Settlement and Squat ✓

Correctors were computed in accordance with Hydrographic Manual Section 4.9.4.2., using FPM Fig. 2.3, and are included with project data for OPR-P180-RA. The data used was collected in Shilshole Bay, Washington in March of 1994.

* Filed with the hydrographic data.

Offset Tables ✓

Offset tables contain offsets for the GPS antenna, as well as static draft measurements, and settlement and squat data. Offset tables 3-6 and 9 correspond to the number of the launch. The offset tables were compiled with new measurements in the spring of 1994 and are contained in the "Separates to be Included with Survey Data". *

Heave ✓

The launches are not equipped with heave, pitch and roll sensors. Data acquired during periods of significant sea action were scanned to account for inaccuracies caused by heave.

Bar Check and Lead Lines ✓

Bar check and lead lines were calibrated by RAINIER personnel during the winter inport 1993-1994. Calibration forms are included with project data for OPR-P180-RA. Bar checks were performed weekly and served as a functional check of the DSF-6000N and the InnerSpace 448.

Tide Correctors

Predicted tides for the project were provided on diskette by N/OES334 for the Ugaishak, Alaska reference station (945-8553).

Tidal correctors as provided in the project instructions for this sheet are:

| <u>Time Correction</u> | <u>Height Correction</u> <u>Range Ratio</u> |
|------------------------|--|
| 0 hr 0 min. | X 0.95 |

HDAPS listings of the data used in generating tide corrector tables are included in Appendix V of this report. *

RAINIER personnel installed an 8200 digital gage at West End of Sutwik Island (945-8665) on 26 May 1994. Opening levels of the staff were conducted upon installation. Closing levels for the tide station will be completed by RAINIER personnel at the conclusion of the project. Bracketing levels were completed at the end of June.

The control station was Sand Point, Alaska (945-9450). Opening levels of the control station were performed by RAINIER personnel on May 21 and 22, 1994. Closing levels at Sand Point, Alaska will be completed by the Pacific Operation Section N/OES214 during their annual visit in late July as per phone conversation with Mr. Mike Gibson (OES212).

The station description, field tide records, and Preliminary Field Tide Note (Appendix V) were forwarded to N/OES212 in accordance with HSG 50 and FPM 4.3 at the end of June. The final tide package will be forwarded to N/OES212 at the end of the project. A request for approved tides was forwarded to N/OES2 in accordance with FPM 4.2.3. Tide note dated October 28, 1994 is attached.

* Filed with the hydrographic data.

H. CONTROL STATIONS ✓ See Eval Rpt, Section H

A listing of the geodetic stations used to control this survey is included in ~~Appendix III~~ of this report. The horizontal datum for this project is NAD83.

DGPS stations were setup on existing stations LAND, CLAY 2 and HYDRA. Station LAND is located on a small islet in northern Aniakchak Bay, station CLAY 2 is located on a small islet southwest of Kumlik Island, and station HYDRA is located on Hydra Island. These stations were recovered in accordance with methods stated in Section 5.2.4 of the FPM.

An additional DGPS station, TWIK, was established by RAINIER personnel on a small peninsula on the south shore of Sutwik Island. This station was positioned to Third-Order Class I accuracy using static GPS methods. Existing stations LAND and CLAY2 were used as control stations. For further information see the "Summer 1994 Horizontal Control Report" that will be submitted at the end of the project.

I. HYDROGRAPHIC POSITION CONTROL ✓ See Eval Rpt, Section I.

Method of Position Control

All soundings and features were positioned using differential GPS. Serial numbers for Ashtech GPS equipment are annotated on the data printouts. *

Ashtech GPS

VHF differential shore stations were established at stations LAND, CLAY 2, HYDRA and TWIK. The difference between the computed location and the station's published position was recorded by the MONITOR program on a PC. Data from a 24-hour period were recorded and examined for signs of multi-path signal reflection, which was not evident at any of the stations. Scatterplot results are included in the "Project related data for OPR-P180-RA". The scatterplot results for stations LAND and HYDRA were obtained last year. The areas around stations LAND and HYDRA remain undeveloped, and the geography unchanged.

Calibrations & Systems Check Methods

System checks were performed by launch to launch comparisons of position. Three observations of position were made by each launch using correctors from two independent DGPS base stations. System checks were performed on a weekly basis. The results were transferred to forms which are included in the project data for OPR-P180. An abstract of the system checks is included in the "Separates to be Included with Survey Data, III. Horizontal Position Control and Corrections to Position Data" *

Problems

None

Offset

The launch GPS antenna offsets are stored in the HDAPS Offset Tables as listed in Section G. Copies of the Offset Tables are included in the "Separates to be Included with Survey Data". *

* Filed with the hydrographic data.

J. SHORELINE *See Evaluation Report, section J.*

The shoreline map (T-sheet) used to transfer shoreline detail to the final sheets was TP-01158 (enlarged to 1:10,000 from 1:20,000, NAD 27).

Method of Shoreline Verification

Shoreline verification was conducted near predicted lower low water in accordance with FPM 7.1. Shoreline verification was accomplished by assigning sequential reference numbers and taking detached positions (DPs), as explained later in this section.

Shoreline and T-sheet features verified via visual inspection were assigned sequential reference numbers, described, and recorded in the field using reference forms and corresponding 1:10,000 photocopies of the T-sheet. Reference numbers, descriptions, and heights corrected to MLLW using predicted tides are recorded on the reference form. Corresponding notes were annotated on the photocopies of the T-sheet when deemed necessary. The annotated photocopies of the T-sheet and the reference forms are included with the survey data.

DPs taken during shoreline verification were recorded on the master printouts and on the DP forms. These indicate significant T-sheet features and features not found on the T-sheet. Where possible, positions of some T-sheet features were verified during inshore mainscheme hydrography and annotated on the master printouts.

Detailed 1:10,000 "Rough Bottom Sample and Detached Position Plots" are provided showing all DPs, reference numbers, and notes relating to each feature. The information from these plots was transferred to a final field plot where possible. Where such information would interfere with the legibility of the final plot the appropriate cartographic symbol has been transferred, but height and position number information remains on the rough plot, which serves as an overlay (FPM 6.1.2.5). Verified T-sheet features were retained and shown in black. Changes to the shoreline were shown in red, and new features are depicted in black. Field cartographic codes were assigned using the HDAPS DP editor. Heights are recorded in meters and are corrected to predicted MLLW. *No red shoreline is shown on the smooth sheet.*

Changes and New Features

Many new features and changes to the T-sheet shoreline were found and are depicted on the final field plot. Ledges were found to extend further than their depicted positions on the T-sheet, and T-sheet rocks were often identified as high points of ledges or reefs. *The new features and revisions offshore of the mean high water line have been shown on the smooth sheet as warranted.*

Numerous rocks and shoals exist along the southern shore of Sutwik Island inside the 20-meter curve. A predominant swell from the southeast coupled with sparse T-sheet information made this a dangerous area to work.

The hydrographer believes that sufficient information has been portrayed on the final field sheet to characterize the general area as one where you can pick your way through the rocks in a small boat on a calm day. No small boat anchorages are apparent inshore. This generally foul area warrants no further risks or effort on the part of the hydrographer.

Recommendations ✓

The hydrographer recommends that the shoreline changes from this survey be used to supersede prior shoreline information compiled on T-sheet TP-01158. **CONCUR**

Charted Features ✓

Charted rocks were either identified as T-sheet rocks, high points or extensions of T-sheet ledges and reefs except as noted below.

Twelve rocks depicted on NOS chart 16568 (1:106,600) are not shown on NOS chart 16566 (1:77,477). These rocks originated with USGS Quad Sutwik Island, 1:63,360, 1963, and were transferred only to chart 16568. Mainscheme hydrography revealed no indication of the ten listed below. The other two, depicted further inshore, are discussed below.

| Latitude (N) | Longitude (W) | Surrounding Depths (meters) | Line Spacing (meters) |
|--------------|----------------|--------------------------------|--------------------------|
| 56° 30' 15" | 157° 17' 06" ✓ | 38-42 | 100 |
| 56° 30' 42" | 157° 20' 31" ✓ | 40-50 | 50 |
| 56° 31' 12" | 157° 19' 36" ✓ | 20-30 | 50 |
| 56° 31' 24" | 157° 20' 48" ✓ | 40-45 | 100 |
| 56° 31' 30" | 157° 21' 27" ✓ | 40-50 | 100 |
| 56° 34' 09" | 157° 18' 38" ✓ | 40-50 | 100 |
| 56° 34' 08" | 157° 20' 30" ✓ | 70-80 | 100 |
| 56° 34' 19" | 157° 20' 30" ✓ | 80-90 | 100 |
| 56° 34' 20" | 157° 21' 15" ✓ | 60-80 | 50 |
| 56° 34' 26" | 157° 21' 24" ✓ | 30-60 | 50 |

This rock is likely offshore most point of a ledge as shown on the smooth sheet.

One inshore rock from the USGS Quad, in the vicinity of latitude 56°33'16"N, longitude 157°18'42"W, was depicted approximately 250 meters from a T-sheet rock in 15 meters of water. *See Evaluator's recommendation below.*

Another inshore rock from the USGS Quad, in the vicinity of latitude 56° 32' 06"N, longitude 157° 20' 05"W, was depicted near a shoal with a least depth of 3.9 meters, approximately 300 meters offshore from a ledge extension. *See Evaluator's recommendation below.*

Recommendations

The hydrographer recommends that the rocks noted above be deleted from chart 16568. **CONCUR, delete charted rocks and chart rocks, ledges and foul area limits as shown on smooth sheet.**

K. CROSSLINES ✓
Crosslines are within 1-2 meter agreement with mainscheme hydrography except in areas of complex bathymetry. Crosslines totaled 33.1 nautical miles, representing 8.7% of the total mainscheme hydrography.

L. JUNCTIONS See Evaluation Report, Section L.

This survey junctions with survey H-10491 (1:10,000, 1993) to the north, H-10545 (1:10,000, 1994) to the west, and H-10550 (1:10,000, 1994) to the east. These soundings were found to be in general agreement with this survey. H-10554 (1:10,000, 1994) to the south.

Final comparisons will be made at the Pacific Hydrographic Section (PHS).

M. COMPARISON WITH PRIOR SURVEYS See Evaluation Report, Section M.

Two prior surveys were compared: H-4495 (1:20,000, 1925) and H-4506 (1:60,000, 1925). Sparse soundings from these prior surveys were in general agreement with the present survey. However, the present survey, due to much greater sounding density, revealed numerous shoal soundings not found during the prior surveys. There were no instances where prior survey soundings were shoaler in a corresponding area.

Final comparisons will be conducted by PHS.

N. ITEM INVESTIGATIONS ✓

There were no item investigations on sheet AB.

O. COMPARISON WITH THE CHART See Evaluation Report, Section O.

This survey was compared to NOS chart 16568, 9th Edition, March 21, 1992, 1:106,600 (NAD83), and NOS chart 16566, 7th Edition, October 28, 1989, 1:77,477 (NAD83). The charted soundings were found to be in general agreement with this survey.

Non-sounding charted features are discussed in Section J, Shoreline.

Final comparisons will be made at PHS.

Dangers to Navigation

Eight dangers to navigation within the limits of this survey were reported to the Seventeenth Coast Guard District on July 12, 1994. Copies of the correspondence can be found in ~~Appendix I~~ of this report.

P. ADEQUACY OF SURVEY ✓

Prior to final approval, survey H-10544 is complete and adequate to supersede charted depths and features in their common areas. Concur

Q. AIDS TO NAVIGATION ✓

None

R. STATISTICS ✓

| <u>Vessel:</u> | <u>2120</u> | <u>2123</u> | <u>2124</u> | <u>2125</u> | <u>2126</u> | <u>2129</u> | <u>Total</u> |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Number of Positions | 46 | 623 | 1038 | 1357 | 7 | 2642 | 5713 |
| NM Hydrography | 0 | 95.1 | 315.0 | 209.5 | 0 | 81.3 | 700.9 |
| Velocity Casts | 2 | | | | | | |
| Detached Positions | 74 | | | | | | |
| Bottom Samples | 58 | | | | | | |
| Tide Stations | 1 | | | | | | |
| NM ² Hydrography | 20.4 | | | | | | |

S. MISCELLANEOUS ✓

Bottom samples were sent to the Smithsonian Institution in accordance with the Project Instructions.

Coast Pilot current comparisons were made in accordance with Project Instructions. No tidal current predictions are available within the sheet limits.

No unusual magnetic variations were noted.

T. RECOMMENDATIONS ✓


None

U. REFERRAL TO REPORTS ✓

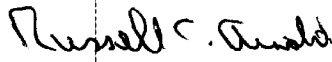
The following supplemental reports contain additional information relevant to this survey:

| <u>Title</u> | <u>Date Sent</u> | <u>Office</u> |
|---|------------------|---------------|
| Summer 1994 Horizontal Control Report for OPR-P180-RA | August 1994 | N/CG245 |
| Summer 1994 Coast Pilot Report for OPR-P180-RA | August 1994 | N/CG245 |
| Project related data for OPR-P180-RA | Incremental | N/CG245 |

Respectfully Submitted,


Shepard M. Smith
Ensign, NOAA

Approved and Forwarded,


Russell C. Arnold
Captain, NOAA
Commanding Officer

CONTROL STATIONS as of 6 Jun 1994 ✓

| No | Type | Latitude | Longitude | H | Cart | Freq | Vel | Code | MM/DD/YY | Station Name |
|----------------|--------------|--------------------------|--------------------------|---------------|----------------|----------------|----------------|------|---------------------|------------------------|
| 100 | F | 056:45:19.732 | 157:29:28.737 | 42 | 250 | 0.0 | 0.0 | | 05/24/94 | LAND(DGPS), 1945 |
| 101 | F | 056:44:35.925 | 157:00:57.249 | 50 | 250 | 0.0 | 0.0 | | 05/24/94 | HYDRA(DGPS) |
| 102 | F | 056:36:08.811 | 157:29:12.200 | 44 | 250 | 0.0 | 0.0 | | 05/24/94 | CLAY 2(DGPS), 1944 |
| 103 | F | 056:31:22.546 | 157:11:42.067 | 35 | 250 | 0.0 | 0.0 | | 06/03/94 | TWIK(DGPS) |



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

NOAA Ship RAINIER

July 12, 1994

**ADVANCE
INFORMATION**

Commander
Seventeenth Coast Guard District
Post Office Box 25517
Juneau, Alaska 99802

Dear Sir:

Attached is a confirmation copy of the radio messages sent to your office regarding the dangers to navigation which I recommend for inclusion in the Local Notice to Mariners for the Seventeenth Coast Guard District. A copy of the chart showing the areas in which the dangers exist is also attached.

Sincerely,

A handwritten signature in cursive script that reads "Russell C. Arnold".

Russell C. Arnold
Captain, NOAA
Commanding Officer

Enclosures

cc: DMAHTC
N/CG221
PMC



RCA
FOO

AB

**ADVANCE
INFORMATION**

P 121930Z JUL 94
FM NOAAS RAINIER
TO CCGDSEVENTEEN JUNEAU AK
DMAHTCCNAVWARN WASHINGTON DC//MCNM//
INFO NOAMOP SEATTLE WA
ACCT CM-VCAA
BT
UNCLAS

| | |
|--|-----------|
| NOAA SHIP RAINIER | |
| XMIT 122335Z JUL 94 | |
| JFT RAPM193A.ZIP RLE | |
| CO <input checked="" type="checkbox"/> | XO _____ |
| FOO _____ | NAV _____ |
| SHIPS OFFICE _____ | |
| RDO_FILE <input checked="" type="checkbox"/> | |

NOAA SHIP RAINIER HAS LOCATED 8 DANGERS TO NAVIGATION IN SOUTHERN ALASKA PENINSULA, ALASKA (PROJECT OPR-P180-RA) WITHIN THE LIMITS OF HYDROGRAPHIC SURVEY H-10544. THE FOLLOWING INFORMATION IS PROVIDED FOR PUBLICATION IN LOCAL NOTICE TO MARINERS:

CHARTS AFFECTED: 16568 9TH ED MAR 21/92 1:106,600 (NAD83)
16566 7TH ED OCT 28/89 1:77,477 (NAD83)

DEPTHS ARE REDUCED TO MLLW BASED ON PREDICTED TIDES.

| ITEM | DANGER | DEPTH | LATITUDE | LONGITUDE | |
|------|--------|------------------|-----------|------------|---------------|
| A. | SHOAL | COVERS 1 3/4 fms | 56/31/53N | 157/20/39W | 1373 + 2 3.2m |
| B. | SHOAL | COVERS 5 fms | 56/31/21N | 157/21/21W | 1463 + 4 9.5m |
| C. | SHOAL | COVERS 2 1/2 fms | 56/31/11N | 157/19/02W | 6665 + 3 4.8m |
| D. | SHOAL | COVERS 3 1/4 fms | 56/30/55N | 157/17/34W | 6698 + 8 6.0m |
| E. | SHOAL | COVERS 2 fms | 56/30/56N | 157/16/07W | 6713 + 3 3.8m |
| F. | ROCK | UNCOVERS 2 ft | 56/30/59N | 157/15/47W | 6546 + 0 0.6m |
| G. | ROCK | UNCOVERS 4 ft | 56/31/10N | 157/14/53W | 6539 + 0 1.2m |
| H. | SHOAL | COVERS 2 fms | 56/33/55N | 157/18/48W | 4176 + 1 3.8m |

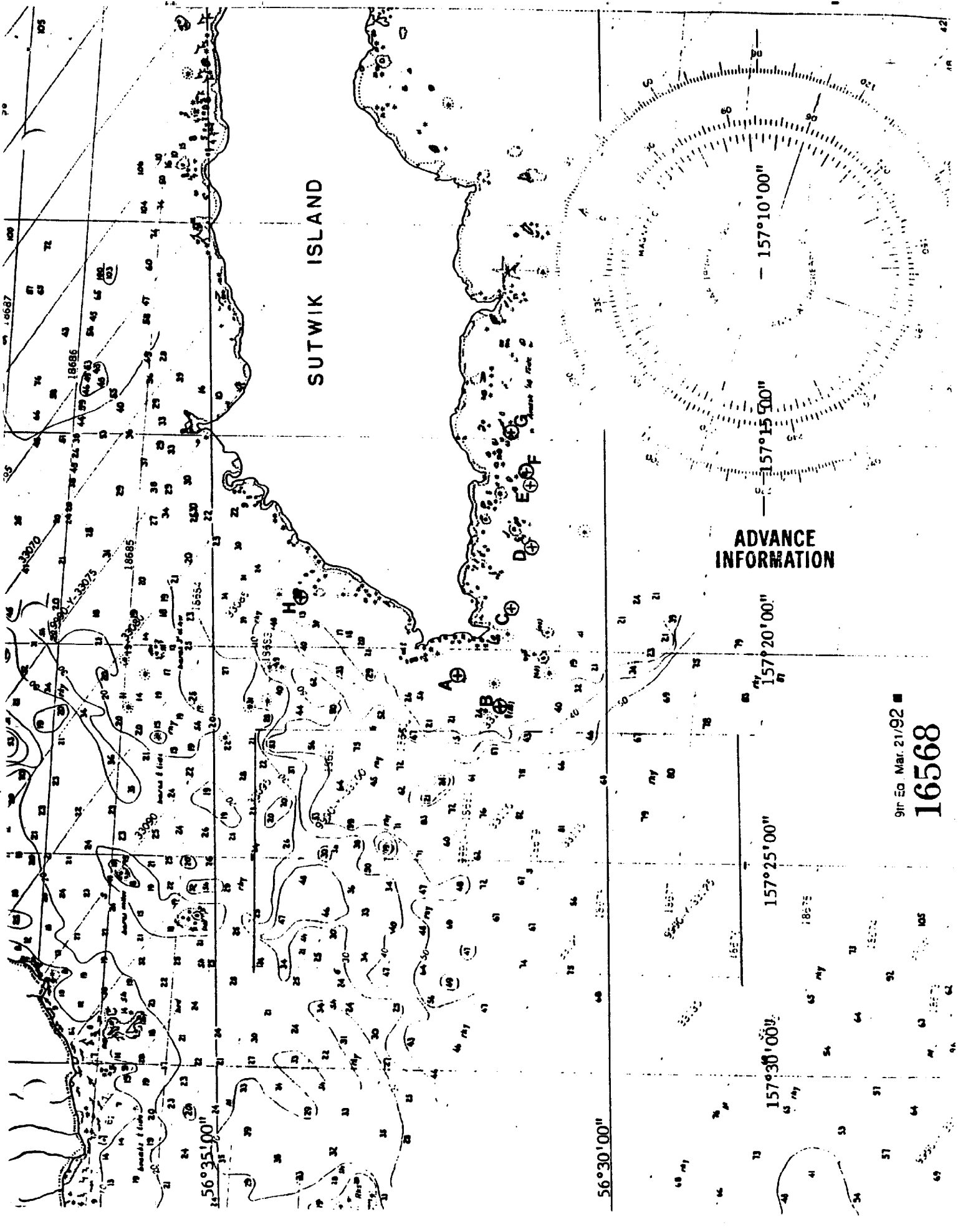
THIS IS ADVANCE INFORMATION SUBJECT TO OFFICE REVIEW. QUESTIONS CONCERNING THIS MESSAGE SHOULD BE DIRECTED TO THE CHIEF, PACIFIC HYDROGRAPHIC SECTION AT (206)526-6835. A LETTER WITH ATTACHED CHARTLET WILL BE MAILED TO CONFIRM THIS MESSAGE.

BT

NNNN

16568

KKKK



SUTWIK ISLAND

ADVANCE INFORMATION

56°35'00"

56°30'00"

157°30'00"

157°25'00"

157°20'00"

157°15'00"

157°10'00"

9th Ed. Mar. 21/92

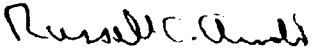
16568



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

June 5, 1994

MEMORANDUM FOR: Captain Dean Seidel, NOAA
Chief, Hydrographic Surveys Branch

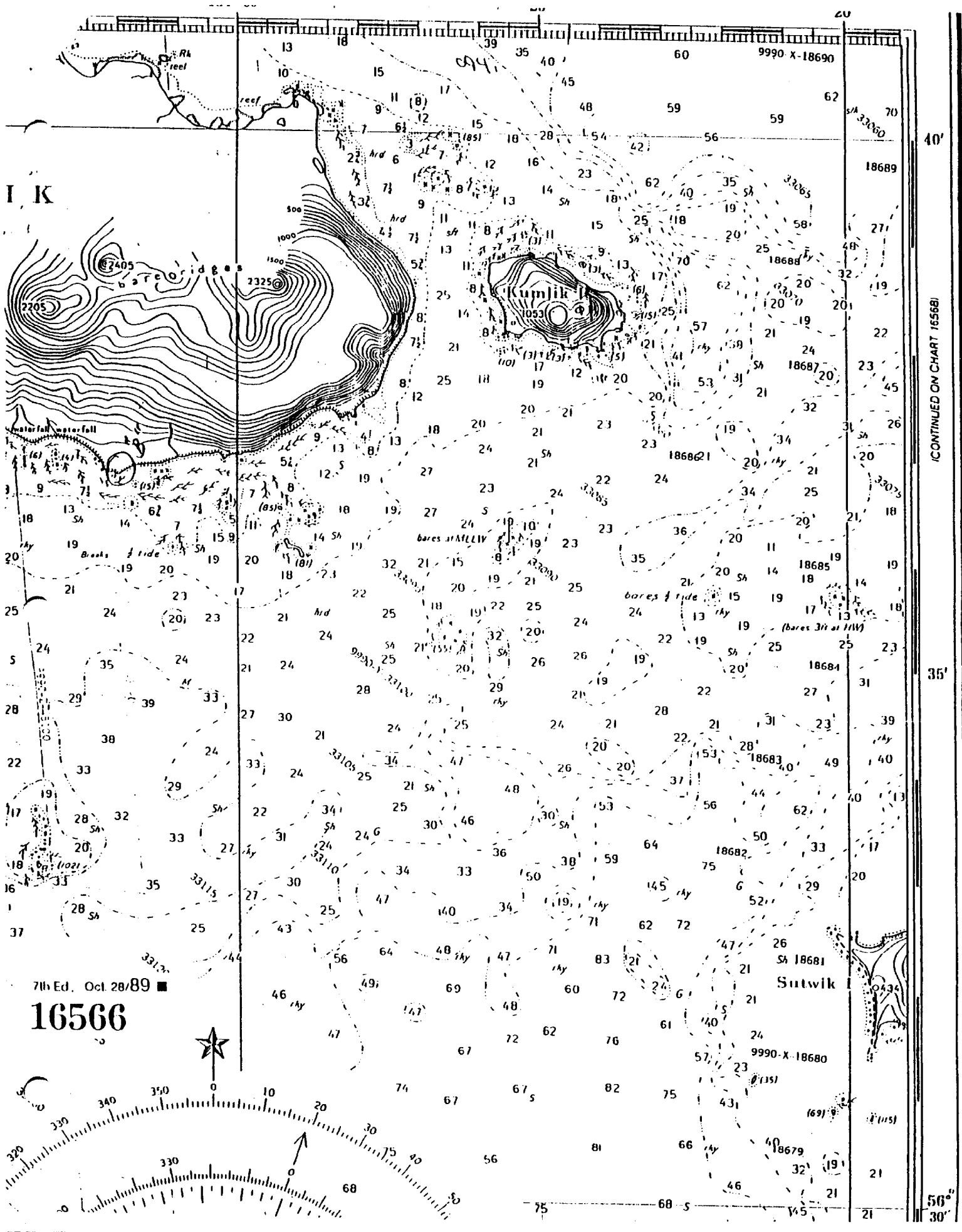
FROM: 
Captain Russell C. Arnold, NOAA
Commanding Officer, NOAA Ship RAINIER

SUBJECT: Differences between Chart 16566 and 16568

RAINIER has started conducting surveys in the vicinity of the western end Sutwik Island and has noticed numerous differences between NOS Chart 16566 (1:77,477, 7thEd., October 28, 1989, NAD83) and NOS Chart 16568 (1:106,600, 9thEd., March 21, 1992, NAD83). Numerous rocks are depicted on Chart 16568 that are not shown on Chart 16566. Investigation of these rocks during surveys H-10491, H-10543, and H-10544 has revealed that the rocks depicted on Chart 16566 are correct and the origin the rocks shown on Chart 16568 is unknown. A chartlet of each chart is attached with the rocks in question highlighted.

Attachments





40'

(CONTINUED ON CHART 16568)

35'

50'
30'

APPROVAL SHEET

for

H-10544

RA-10-5-94

Standard procedures were followed in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; and the Field Procedures Manual in producing this survey. The data were examined daily during data acquisition and processing.

The field sheet and accompanying records have been examined by me, are considered complete and adequate for charting purposes, and are approved.



Russell C. Arnold
Captain, NOAA
Commanding Officer, NOAA Ship RAINIER



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Ocean and Earth Sciences
Silver Spring, Maryland 20910

ORIGINAL

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: October 28, 1994

MARINE CENTER: Pacific

OPR: P180

HYDROGRAPHIC SHEET: H-10544

LOCALITY: Western end of Sutwik Island, Shelikof Strait, Alaska

TIME PERIOD: May 31 - June 29, 1994

TIDE STATION USED: 945-8665 West Sutwik Island
Alaska
Lat. $56^{\circ} 32.4'N$ Lon. $157^{\circ} 19.6'W$

PLANE OF REFERENCE (MEAN LOWER LOW WATER): = 1.40 feet

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: = 8.6 feet

REMARKS: RECOMMENDED ZONING

Times and heights are direct on West Sutwik Island, Ak.
(945-8665).

NOTES: Hourly heights are tabulated on Greenwich Mean Time.
The data for West Sutwik Island, Ak. (945-8665) is stored
in the Next Generation Water Level Measurement System
temporary file #745-8665.

William M. Hobbs

CHIEF, DATUMS SECTION



GEOGRAPHIC NAMES

H-10544

| Name on Survey | <div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">A ON CHART NO. 16568</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">B ON PREVIOUS SURVEY NO.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">C ON U.S. QUADRANGLE MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">D FROM LOCAL INFORMATION</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">E ON LOCAL MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">F P.O. GUIDE OR MAP</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">G RAND McNALLY ATLAS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">H U.S. LIGHT LIST</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">K</div> </div> | | | | | | | | | | |
|--------------------------|--|---|---|---|---|--------------------|---|---|---|--|----|
| | A | B | C | D | E | F | G | H | K | | |
| ALASKA (title) | X | | X | | | | | | | | 1 |
| ALASKA PENINSULA (title) | X | | X | | | | | | | | 2 |
| NORTH PACIFIC OCEAN | X | | X | | | (BGN Decision) | | | | | 3 |
| SUTWIK ISLAND | X | | X | | | | | | | | 4 |
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| | | | | | | Approved: | | | | | 20 |
| | | | | | | <i>Antia Clark</i> | | | | | 21 |
| | | | | | | Chief Geographer | | | | | 22 |
| | | | | | | JUN 13 1995 | | | | | 23 |
| | | | | | | | | | | | 24 |
| | | | | | | | | | | | 25 |

RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed.

| RECORD DESCRIPTION | AMOUNT | RECORD DESCRIPTION | AMOUNT |
|---------------------|--------------------------|------------------------------------|--------------------|
| SMOOTH SHEET | 1 | SMOOTH OVERLAYS: POS., ARC, EXCESS | |
| DESCRIPTIVE REPORT | 1 | FIELD SHEETS AND OTHER OVERLAYS | |
| DESCRIP-TION | DEPTH/POS RECORDS | HORIZ. CONT. RECORDS | SONAR-GRAMS |
| ACCORDION FILES | 3 | | |
| ENVELOPES | | | |
| VOLUMES | | | |
| CAHIERS | | | |
| BOXES | | | |

SHORELINE DATA

SHORELINE MAPS (List): TP-01157, TP-01158

PHOTOBATHYMETRIC MAPS (List):

NOTES TO THE HYDROGRAPHER (List):

SPECIAL REPORTS (List):

NAUTICAL CHARTS (List): 16568, 16566

OFFICE PROCESSING ACTIVITIES
The following statistics will be submitted with the cartographer's report on the survey

| PROCESSING ACTIVITY | AMOUNTS | | |
|--|---------------|------------|--------|
| | VERIFICATION | EVALUATION | TOTALS |
| POSITIONS ON SHEET | | | 5713 |
| POSITIONS REVISED | | | |
| SOUNDINGS REVISED | | | |
| CONTROL STATIONS REVISED | | | |
| | TIME-HOURS | | |
| | VERIFICATION | EVALUATION | TOTALS |
| PRE-PROCESSING EXAMINATION | | | |
| VERIFICATION OF CONTROL | | | |
| VERIFICATION OF POSITIONS | 46.5 | | 46.5 |
| VERIFICATION OF SOUNDINGS | 16.5 | | 16.5 |
| VERIFICATION OF JUNCTIONS | | | |
| APPLICATION OF PHOTOBATHYMETRY | | | |
| SHORELINE APPLICATION/VERIFICATION | | | |
| COMPILATION OF SMOOTH SHEET | 361.0 | | 361.0 |
| COMPARISON WITH PRIOR SURVEYS AND CHARTS | | | |
| EVALUATION OF SIDE SCAN SONAR RECORDS | | | |
| EVALUATION OF WIRE DRAGS AND SWEEPS | | | |
| EVALUATION REPORT | | 30 | 30 |
| GEOGRAPHIC NAMES | | | |
| OTHER* | | | |
| *USE OTHER SIDE OF FORM FOR REMARKS | TOTALS | 424.0 | 30 |
| | | | 454.0 |

| | | |
|--|----------------------------------|--------------------------------|
| Pre-processing Examination by LT M. Larsen | Beginning Date 7/19/94 | Ending Date 8/8/94 |
| Verification of Field Data by R. Mayor, J. Stringham | Time (Hours) 424.0 | Ending Date 11/13/95 |
| Verification Check by B. Olmstead, J. Stringham | Time (Hours) 2.0 | Ending Date 1/2/96 |
| Evaluation and Analysis by B. Mihailov | Time (Hours) 30.0 | Ending Date 12/27/95 |
| Inspection by B.A. Olmstead | Time (Hours) 8.0 | Ending Date 1/5/96 |

**EVALUATION REPORT
H-10544**

A. PROJECT

Project information is discussed in the hydrographer's report.

B. AREA SURVEYED

This survey was conducted in Alaska, and is located along the Southern Alaska Peninsula, approximately eighty nautical miles southwest of Kodiak Island. The surveyed area is bounded by the southwest portion of Sutwik Island to the north and latitude 56/28/15N to the south. Specifically, the survey area includes the southwest and west portions of shoreline along Sutwik Island and extends southward four nautical miles. The area is characterized by alongshore and offshore ledges, isolated reefs and rocks. Numerous rock pinnacles rising at or near surface levels were found from the foreshore area to depths out to thirty meters. The bottom consists mainly of sand and broken shells. Depths range from 0 meters to 159 meters.

C. SURVEY VESSELS

Survey vessel information is found in the hydrographer's report.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

Survey data were processed using the same Hydrographic Data Acquisition/Processing System (HDAPS) software used by the hydrographer, the Hydrographic Processing System (HPS) and AutoCad, Version 12.0.

At the time of the survey certification the format for transmission of digital data had not been formally approved. In the interim, digital data for this survey exists in the standard HPS format which is a database format using the .dbf extension. In addition, the sounding plot was created with .dbf (extension) and enhanced using the AutoCad system, are filed both in the AutoCad drawing format, .dwg (extension); and in the more universally recognized graphics transfer format, .dxf (extension). Copies of these files will be retained at PHB until data transfer protocols are developed and improved.

The drawing files necessarily contain information which is not part of the HPS data set such as geographic names text, line-type data, and minor symbolization. In addition, those soundings deleted from the drawing for clarity purposes, remain unrevised in the HPS digital files to preserve the integrity of the original hydrographic data set. Cartographic codes used to describe the digital data are those authorized by Hydrographic Survey Guideline No. 75.

The field sheet parameters have been revised to center the hydrographer on the office plot. The data is plotted using a Modified Transverse Mercator projection and are depicted on a single sheet.

E. SONAR EQUIPMENT

Side scan sonar was not used on survey H-10544.

F. SOUNDING EQUIPMENT

Sounding equipment is discussed in the hydrographer's report.

G. CORRECTIONS TO SOUNDINGS

The sounding data have been reduced to Mean Lower Low Water (MLLW). The reducers include corrections for actual tides, dynamic draft, and sound velocity. These reducers have been reviewed and are consistent with NOS specifications. Actual tide reduction is derived from the West Sutwik Island, Alaska gage (945-8665).

H. CONTROL STATIONS

Control stations are discussed in the hydrographer's report and separates. A list of control stations used on survey H-10544 is attached to this report.

The positions of horizontal control stations used during hydrographic operations are published values based on NAD 83. The geographic positions of all survey data are based on NAD 83. The smooth sheet is annotated with an NAD 27 adjustment tick based on values determined with the NGS program NADCON.

Data based on NAD 27 may be referenced to this survey by applying the following corrections:

Latitude: -2.702 seconds (-83.575 meters)
Longitude: 7.288 seconds (124.643 meters)

The year of establishment of the control stations originates with the above mentioned horizontal control report and the hydrographer's signal list.

I. HYDROGRAPHIC POSITION CONTROL

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 3.75 was computed for survey operations. No positions exceeded this limit. Additional information concerning calibrations and system checks can be found in the hydrographer's report and in the separates related to Horizontal Position Control and Corrections to Position Data.

J. SHORELINE

The following registered shoreline maps compiled on NAD 27 apply to this survey.

| <u>Map Number</u> | <u>Photo Date</u> | <u>Scale</u> |
|-------------------|--------------------------|--------------|
| TP-01157 | July 1982 August 1983 | 1:20,000 |
| TP-01158 | July 1982 August 1983 | 1:20,000 |

Shoreline drawn on the smooth sheet originates from 1:10,000 scale photographic enlargements of the shoreline map.

Shoreline from TP-01157 and TP-01158 were digitized at PHB and merged with the survey file during office ACAD processing. There were no changes to the photogrammetric mean high water line. Changes to alongshore and offshore features shown on the shoreline manuscript were verified and revised as warranted during survey operations. These changes have been shown on the smooth sheet.

K. CROSSLINES

Crosslines are discussed in the hydrographer's report.

L. JUNCTIONS

Survey H-10544 junctions with the following surveys.

| <u>Survey</u> | <u>Year</u> | <u>Scale</u> | <u>Area</u> |
|---------------|-------------|--------------|-------------|
| H-10491 | 1993 | 1:10,000 | North |
| H-10545 | 1994 | 1:10,000 | West |
| H-10550 | 1994 | 1:10,000 | East |
| H-10554 | 1994 | 1:20,000 | South |

The junction with survey H-10491 has not been formally completed as this survey was previously forwarded for charting. The junction was made using a copy. There is good agreement between soundings within the common areas. There are no common depth curves within the junction area.

The junctions with surveys H-10545, H-10550 and H-10554 are complete. There is good agreement between depth curves and soundings within the common areas.

M. COMPARISON WITH PRIOR SURVEYS

Survey H-10545 was compared with the following prior surveys.

H-4495 (1925) 1:20,000

H-4506 (1925) 1:60,000

Survey H-4495 and H-4506 cover the entire area of the present survey. The majority of the charted sounding information originates from survey H-4506. The sounding agreement is good. Comparison with the prior soundings reveals differences of 1-2 meters. Differences between the prior surveys and the present survey can be attributed to increased bottom coverage and less accurate positioning and sounding methods available in 1925.

Survey H-10544 is adequate to supersede the prior surveys within the common area.

N. ITEM INVESTIGATIONS

There were no item investigations assigned to survey H-10544.

O. COMPARISON WITH CHART

Survey H-10544 was compared with the following charts.

| <u>Chart</u> | <u>Edition</u> | <u>Date</u> | <u>Scale</u> | <u>Datum</u> |
|--------------|----------------|-------------------|--------------|--------------|
| 16566 | 7th | October 28, 1989 | 1:77,477 | NAD83 |
| 16568 | 10th | February 18, 1995 | 1:106,600 | NAD83 |

a. Hydrography

Charted miscellaneous source data originates from Sutwik Island (C-4), 1963, USGS Quad, T-4153 (1925), USC&GS, BP-39181 (1944), USC&GS Recon, TP-01157 and TP-01158 (1982-83) NOS. These documents largely comprise the charted nearshore rocks, reefs and ledge information. These features have been satisfactorily addressed during survey operations.

Numerous charted rocks shown on 16568 do not appear on 16566. These features have been adequately addressed in the hydrographers report and attachment dated June 5, 1994.

Survey H-10544 is adequate to supersede the charted data within the common area.

b. Dangers to Navigation

The hydrographer reported six shoals and two rocks as dangers to navigation. These dangers were reported to the local United States Coast Guard District, DMAHTC and

N/CG 221 and are shown on the current edition of chart 16568. A copy of this report is attached. No additional dangers to navigation were discovered during office processing.

P. ADEQUACY OF SURVEY

Hydrography contained on survey H-10544 is adequate to:

- a. delineate the bottom configuration, determine least depths, and draw the required depth curves;
- b. reveal there are no significant discrepancies or anomalies requiring further investigation; and
- c. show the survey was properly controlled and soundings are correctly plotted.

The hydrographic records and reports received for processing are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change No. 3, the Hydrographic Survey Guidelines, and the Field Procedures Manual, April 1994 Edition.

Q. AIDS TO NAVIGATION

There are no fixed or floating aids to navigation located within the survey area. There are no features of landmark value located within the area of this survey.

R. STATISTICS

Statistics are itemized in the hydrographer's report.

S. MISCELLANEOUS

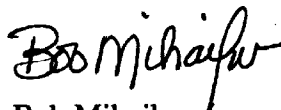
No additional miscellaneous items were noted during office processing.

T. RECOMMENDATIONS

This is a good hydrographic survey. No additional work is recommended.

U. REFERRAL TO REPORTS

Referral to reports is discussed in the hydrographer's report.


Bob Mihailov
Cartographer

APPROVAL SHEET
H-10544

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, comparison with prior surveys and verification or disproval of charted data. The digital data have been completed and all revisions and processing have been entered in the magnetic tape record for this survey. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report. Final control, position and sounding printouts have been included with the survey records.

Bruce A. Olmstead Date: 1/5/96
Bruce A. Olmstead
Senior Cartographer, Cartographic Section
Pacific Hydrographic Branch

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

Kathy Timmons, CDR NOAA Date: 1/8/96
Kathy Timmons
Commander, NOAA
Chief, Pacific Hydrographic Branch

Final Approval

Approved:

Andrew A. Armstrong III Date: 3-22-96
Andrew A. Armstrong III
Captain, NOAA
Chief, Hydrographic Surveys Division

MARINE CHART BRANCH
RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10544

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.

1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

| CHART | DATE | CARTOGRAPHER | REMARKS |
|-------|---------------------|---|---|
| 16568 | 1/22/96 | B. Michafu | Full Part Before After Marine Center Approval Signed Via Full application of Drawing No. Soundings and Features from smooth sheet. |
| 16566 | 6/1/96 13 Jan 96 | D. M. [Signature] D. Champagne | Full Part Before After Marine Center Approval Signed Via Drawing No. 14 17TH EDITION FULL APPLICATION OF SOUNDINGS, DEPTH CURVES ETC THROUGH 16568 BP 157660 |
| 16013 | 6/16/96 | D. M. [Signature] D. Champagne | Full Part Before After Marine Center Approval Signed Via Drawing No. 30 26TH ED. AUG 92 REVISED SOUNDINGS THRU CHART 16568 H-DRAWING BP 157660 |
| 16011 | 6-21-96 | D. Champagne William J. [Signature] | Full Part Before After Marine Center Approval Signed Via Revised Hydro Thru Drawing No. 32 16013 |
| 16006 | 8/3/96 | Christopher [Signature] William J. [Signature] | Full Part Before After Marine Center Approval Signed Via Revised Hydro Thru Drawing No. 28 16011 |
| 531 | 8.21.96 | William J. [Signature] | Full Part Before After Marine Center Approval Signed Via Revised hydro thru Drawing No. 22 16006 |
| 530 | 2/5/99 | D. [Signature] | Full Part Before After Marine Center Approval Signed Via Drawing No. 38 Edition 27 |
| | | | Full Part Before After Marine Center Approval Signed Via Drawing No. |
| | | | Full Part Before After Marine Center Approval Signed Via Drawing No. |
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