

# 10433

# 10433

Diagram No. 8553-2

NOAA FORM 78-35A

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

## DESCRIPTIVE REPORT

Type of Survey .. Hydrographic ..  
Field No. .... RA-20-2-92 ..  
Registry No. .... H-10433 ..

### LOCALITY

State ..... Alaska ..  
General Locality .. Cook Inlet ..  
Sublocality .... Beluga Shoal ..

1992

CHIEF OF PARTY  
CAPT T.W. Richards

### LIBRARY & ARCHIVES

DATE ..... February 15, 1994 ..

HYDROGRAPHIC TITLE SHEET

H-10433

INSTRUCTIONS - The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD NO.

RA-20-2-92

State Alaska

General locality Cook Inlet

Locality Beluga Shoal

Scale 1:20,000 Date of survey June - July 1992

Instructions dated April 14, 1992 Project No. OPR-P319-RA  
May 8, 1992 (Change 1), May 27, 1992 (Change 2), August 18, 1992 (Change 3)

Vessel NOAA Ship RAINIER S221

Chief of party Captain Thomas W. Richards, NOAA

Surveyed by LT Waddell, LT Brown, LTJG Nelson, LTJG Lemke, ENS Klay, ENS Ramos  
ENS Pitts, SST Fleischmann, CH Lawson

Soundings taken by ~~hand track plot~~ echo sounder

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel

Verified by: S. Otsubo Automated plot by PHS Xynetics Plotter

Evaluation by: J. Green

Soundings in ~~fathoms~~ meters ~~feet~~ at ~~MLLW~~ MLLW and decimeters

REMARKS: Time in UTC. Revisions and marginal notes in black were generated  
during office processing. Separates are filed with the hydrographic  
data.

*Awois and SURE 2/94 TWD*

*S.W.W. 3/16/94*

61°20'00"

150°40'00"

150°20'00"

150°00'00"

61°20'00"

61°00'00"

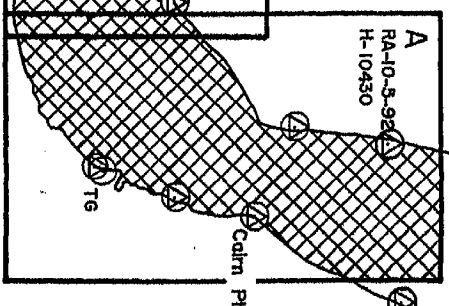
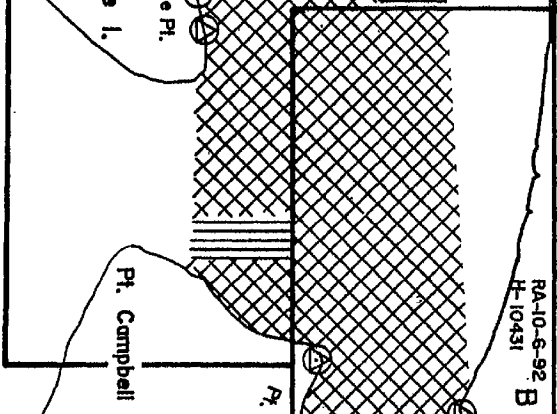
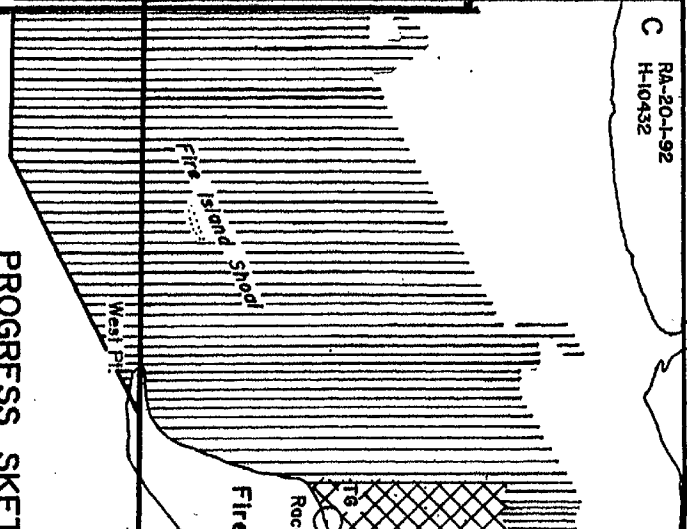
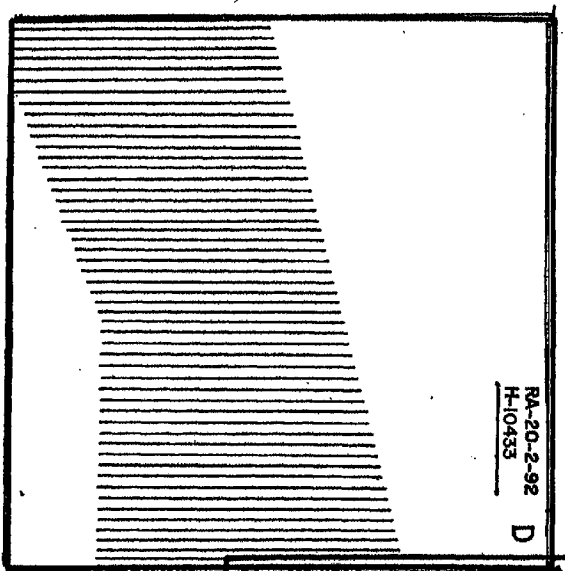
150°40'00"

150°20'00"

150°00'00"

61°00'00"

# COOK INLET



## PROGRESS SKETCH

OPR-P-319-RA  
HYDROGRAPHIC SURVEY  
COOK INLET, ALASKA

JUNE 9 - JULY 31, 1992

NOAA SHIP RAINIER  
THOMAS W. RICHARDS, CAPT.  
COMMANDING

SCALE OF CHART 16660

	JUN	JUL	AUG
SQ. N.M. SOUNDINGS	3465	818	01
L.M. SOUNDINGS	1171	2653	255
L.M. SIDE SCAN SONAR	90.4	68	0.43
BOTTOM SAMPLES (GRAB)	120	75	6
ELECT. CONTROL STATIONS	9		
TEMP., DEPTH, SOUND VEL. CAST	3	2	
NANSEN CAST	3	2	
TIDE GAGES	3	2	3
WATER SAMPLES ANALYZED	7	1	
GEODETIC CONTROL STATIONS EST.	30	14	2
AWOIS ITEMS INVESTIGATED			

DISAPPROVED - 5078, 5079, 5189A, 5189B, 5190, 5190A, 5190B, 5190C, 5190D, 5190E, 5190F, 5190G, 5190H, 5190I, 5190J, 5190K, 5190L, 5190M, 5190N, 5190O, 5190P, 5190Q, 5190R, 5190S, 5190T, 5190U, 5190V, 5190W, 5190X, 5190Y, 5190Z, AA, BB, CC, DD, EE, FF, GG, HH, II, JJ, KK, LL, MM, NN, OO, PP, QQ, RR, SS, TT, UU, VV, WW, XX, YY, ZZ

VERIFIED

Pt. Possession

Fire Island  
Race Pt.  
West Pt.

Fire I.

Pt. Campbell

Pt. Woronzof

Caltn Pt.

Pt. Mockenzie

KNIK ARM

## ANCHORAGE

# Descriptive Report to Accompany Hydrographic Survey H-10433

Beluga Shoal  
Field Number RA-20-2-92  
Scale 1:20,000  
June 1992 - July 1992

NOAA Ship RAINIER  
Chief of Party: Captain Thomas W. Richards

## A. PROJECT

This basic hydrographic survey was conducted as specified by Hydrographic Project Instructions OPR-P319-RA, Cook Inlet, Alaska, dated April 14, 1992, Change Number One dated May 8, 1992, and Change Number Two dated May 27, 1992. Survey H-10433 is designated "Sheet D" in the Project Instructions. Also change 3, August 18, 1992.

This survey is part of a project designed to identify all dangers to navigation, and to monitor the continuing change in bottom topography beneath the waters approaching Port of Anchorage. This survey data will be used by the U.S. Coast Guard to select the best deep-draft approach route to the Port of Anchorage and determine if modification of aids to navigation are required in the approaches.

## B. AREA SURVEYED

The area surveyed includes Beluga Shoal and the approaches to the Port of Anchorage south of Fire Island. The survey's western limit is 150°45'00"W. The northern limit extends NE from 61°08'12"N at the western limit to 61°10'18"N, 150°28'00"W. The eastern limit follows the 150°28'00"W meridian south to 61°07'36"N, then west to 150°18'30"W. The southern limit is irregular, but generally runs SW from 61°10'18"N, 150°18'30"W to 61°04'18"N on the western limit. Data were acquired from July 9-30, 1992 (DN 191+212).

## C. SURVEY VESSELS

All data were acquired by the following survey launches:

<u>Vessel</u>	<u>EDP No.</u>	<u>Operation</u>
RA-3	2123	Hydrography Side Scan Sonar
RA-4	2124	Hydrography Shoreline Verification
RA-5	2125	Hydrography Bottom Samples Velocity Casts Side Scan Sonar
RA-6	2126	Hydrography

#### D. AUTOMATED DATA ACQUISITION AND PROCESSING

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

<u>Program Name</u>	<u>Version</u>	<u>Installed</u>
AUTOST	2.00	4/14/92
BACKOLD	1.12	4/14/92
BACKUP	2.00	4/14/92
BASELINE	1.12	4/14/92
BIGABST	2.00	4/14/92
CARTO	2.02	4/14/92
CONVERT	3.02	4/14/92
DAS_SURV	6.23	7/2/92
DIAGNOSTIC	3.00	4/14/92
DISC_UTIL	1.00	4/14/92
DP	2.11	7/2/92
EXCESS	3.04	4/14/92
FILESYS	2.16	4/14/92
GLOBAL	1.12	4/14/92
INVERSE	1.51	4/14/92
LISTAWOIS	2.01	4/14/92
LOADNEW	1.50	4/14/92
MAKEFIX	1.02	4/14/92
MANU_DATA	1.12	4/14/92
NEWCONT	1.17	4/14/92
PLOTALL	2.02	4/14/92
POSTSUR	5.21	4/14/92
PREDICT	1.11	4/14/92
PRINTOUT	3.00	4/14/92
QUICK	1.20	4/14/92
RAMSAVER	1.00	4/14/92
READPROJS	1.08	4/14/92
REAPPLY	1.33	4/14/92
REJECT	1.05	4/14/92
SOFTCHECK	1.13	4/14/92
SURVEY	6.11	4/14/92
SYMBOLS	1.00	4/14/92
ZOOMEDIT	1.10	4/14/92

Velocity corrections were determined using:

<u>Program Name</u>	<u>Version</u>	<u>Date Installed</u>
Velocity	1.11	09 Mar 1990

## E. SONAR EQUIPMENT

Side scan sonar operations were performed from survey launches RA-3 and RA-5. Both systems used were EG&G Model 260, 100 kHz side scan sonars equipped with Time Varied Gain (TVG).

<u>Serial Number</u>	<u>Platform</u>	<u>Days Used</u>
Recorder 015602 Fish 015598	RA-3	193, 202
Recorder 61475 Fish 0011902	RA-5	191-193

### Operations

The side scan units were operated in either the 100-meter or 150-meter range scale with a corresponding line spacing of either 170 meters or 270 meters. Water depths for these operations ranged from approximately 15 to 30 meters. Confidence checks were performed at least once per day by towing the side scan past known objects such as pier faces or anchor chains.

Two types of side scan coverage areas were defined in the Project Instructions: 1) areas requiring 100% coverage, and 2) tracklines to be covered with one swath.

The side scan fish were towed from the center stern bit on the launch. The cable was paid out to the appropriate length by hand and then secured to the bit using a stopper made of cotton line.

Due to the high currents and zero water visibility in the project area, dives were not performed on any features or obstructions. Any contacts that were flagged for further development were investigated using echo sounder development techniques.

### Processing

The following outlines the procedures used by RAINIER for side scan sonar processing:

#### During Acquisition:

- Annotate sonargrams with pertinent data:
  - Vessel speed
  - Cable length
  - Conditions affecting records; e.g. seas, wakes, etc.
- Note apparent contacts with an arrow
  - If time permits, compute heights on-line and note

#### During Scanning:

- Note additional contacts or remove on-line contacts that are doubtful upon reexamination
- Compute heights for all noted contacts

- Compare contact heights with corrected depths in area to determine significance
  - Depth  $\leq$  20 m, contact height  $\geq$  1 m
  - Depth  $>$  20 m, contact height  $\geq$  10% of depth
- Name contacts on sonargram and enter data into Contact Log form

During processing:

- Edit data and perform rejections, smoothing, etc.
- Enter contact information from Log form
- Plot swaths using "Selected Data" option
- Plot contacts
- Examine swaths for overlap and "pinching"
  - If swath pinched, examine records to determine cause (e.g. fish too low, wrong range scale, software problem, etc.)
  - If coverage looks good, possibly edit side scan information using the Edit Position function to correct the swath plot
- Examine contacts relative to plotted, corrected data in the area
  - Determine if contacts are still significant
  - Examine proximity of contacts to one another. Use criteria in Field Procedures Manual (FPM), Section 7.3.3 to determine if some contacts may be eliminated due to their proximity to a more significant feature.
- Evaluate remaining contacts for further development, etc.

Additional information is contained in the "Separates to be Included with Survey Data."

#### F. SOUNDING EQUIPMENT

All survey launches were equipped with the Raytheon DSF-6000N echo sounders shown below. The echo sounders were operated in the HIGH + LOW (HIGH DIGITIZED) function, using manual gain controls on both high and low frequencies to obtain the best analog trace. Soundings were recorded in meters and tenths of meters. Six-meter bar checks were conducted and recorded daily, using both the LOW and the HIGH + LOW (HIGH DIGITIZED) functions. The echo sounders were operated in accordance with the Provisional Instructions "Raytheon DSF-6000N Echo-Sounder Operating and Processing Instructions", dated July 5, 1983, and the FPM.

##### Raytheon DSF-6000N Echo Sounders

<u>Vessel</u>	<u>Serial No.</u>	<u>Days Used</u>
2123	B044N	191-202
2124	A103N	191-212
2125	B048N	191-210
2126	A117N	191-211

The echo sounders were continuously monitored during data acquisition. All sounding data were scanned at least two times, to ensure all significant peaks were inserted, and to verify the digitized depths.

## G. CORRECTIONS TO ECHO SOUNDINGS

Corrections to echo soundings were determined for static draft, heave, velocity of sound through water, settlement and squat. Predicted tides were used for all plots. Sounding correctors apply to both narrow and wide beams of the DSF-6000N echo sounder. Supporting data and computations for all corrections to echo soundings, except heave, are included in the "Summer 1992 Corrections to Echo Sounding Data Package" for OPR-P319-RA.

### Sound Velocity

Correctors for the velocity of sound through water were computed from data obtained with a SBE SEACAT Profiler, Serial Number 811. These data were then processed by the program VELOCITY in accordance with Hydrographic Survey Guideline (HSG) 69. A printout of the Sound Velocity Corrector Tables used in the HDAPS Post Survey program are included in the "Summer 1992 Corrections to Echo Sounding Data Package" for OPR-P319-RA.

<u>SV Corr.</u> <u>Table No.</u>	<u>Cast</u> <u>No.</u>	<u>Deepest</u> <u>Depth (m)</u>	<u>Day</u>	<u>Cast Position</u>	<u>Applicable</u> <u>Day No.</u>
3	4	39.6	189	61°11'12"N, 150°08'45"W	188-207
5	7	46.7	215	61°13'10"N, 149°59'29"W	208-219

The SEACAT was calibrated at the Northwest Regional Calibration Center (NRCC) in Bellevue, WA, on March 3, 1992.

### Static Draft

For all launches, the distance from the transducer face to the gunwale was measured with a large metal square. Static draft measurements were then determined by dropping a leadline from the gunwale to the water and subtracting this distance from the distance measured with the square. The measurements from the gunwale to the waterline were conducted with the fuel tanks averaging 3/4 full and three people aboard. A transducer depth of 0.6 meter was determined for all launches on March 21-22, 1992.

A draft of 0.66 meters was erroneously entered for launch 2123, which was rounded to 0.7 meters by HDAPS when applied. This error was detected after the final field sheets had been plotted. The final field sheets were not replotted to correct this error, but the digital file was corrected prior to submitting the data to the Pacific Hydrographic Section.

*Corrector  
re-applied during office processing.*

### Settlement and Squat

Settlement and squat correctors were determined in Shilshole Bay, WA, for launch 2123 on March 11, 2124 on March 16, and 2125 and 2126 on March 18, 1992. All tests were conducted over a hard bottom in depths well exceeding 7 times the vessels' drafts. Both sea and wind were calm. Observations were made through a Zeiss Ni2 leveling instrument (S/N 103453), to a rod held vertically on deck, directly over the transducer. Correctors were computed in accordance with Hydrographic Manual 4.9.4.2., using FPM Fig. 2.2 and 2.3, and are included in the "Summer 1992 Corrections to Echo Sounding Data Package" for OPR-P319-RA.



### Offset Tables

<u>Vessel</u>	<u>Offset Table Number</u>
2123	3
2124	4
2125	5
2126	6

### Heave

Corrections for heave were applied while scanning echograms. The scanning technique used in comparing the analog trace with the digital record eliminated significant fluctuations resulting from sea action. ✓

### Bar Check Lines

Bar check lines were calibrated by RAINIER personnel on February 19, 1992 at PMC. Calibration forms are included in the "Summer 1992 Corrections to Echo Sounding Data Package" for OPR-P319-RA. ✓

### Tide Correctors

Tidal zoning and correctors applicable to predicted tides for the Anchorage, Alaska reference station (945-5920) were provided in the Project Instructions. This survey was covered by the following tide zones as defined in the Project Instructions:

<u>Zone</u>	<u>Time Correction</u>	<u>Range Ratio</u>
I	-55 minutes	0.81
II	-50 minutes	0.83
III	-46 minutes	0.85
IV	-42 minutes	0.87
V	-38 minutes	0.88
VI	-30 minutes	0.90

Approved tides were applied during office processing

### H. CONTROL STATIONS

Geographic positions for all control stations are based on the North American Datum of 1983 (NAD83) and the Geodetic Reference System 1980 Ellipsoid. ✓

A listing of the geodetic stations used to control this survey is <sup>attached</sup> included in Appendix III.

Positions for all existing stations are from the NGS data base. All existing stations were recovered in accordance with methods stated in Section 5.2.4 of the FPM. New stations were positioned via traverse methods to meet third-order class I standards. Further information can be found in the "Summer 1992 Horizontal Control Report" for OPR-P319-RA. ✓

### I. HYDROGRAPHIC POSITION CONTROL

Method of Sounding Position Control *See Evaluation Report, Sect 2.*

Soundings, bottom samples, and detached positions (DPs) were located using Ashtech Differential GPS, ~~or Motorola Mini Ranger Falcon 484 microwave positioning system.~~  
*Mini Ranger used for GPS System checks only.*

Accuracy Requirements/Problems

Accuracy requirements specified in the Hydrographic Manual and in FPM 3.1.3.1 were met. When maximum residuals exceeded the specified limits, OIC's deselected the station(s) with the highest residual value and continued hydrography. ~~Occasionally, ECR's and maximum residuals exceeded the specified limits. When this happened data were usually rejected and the area rerun with different control. If maximum residuals exceeded tolerances, they were flagged and reviewed. Data between good positions were smoothed when maximum residuals showed unusual accelerations off the intended track.~~

Ashtech GPS

Accuracy requirements as stated in the FPM were met. Occasionally, the data from the Ashtech was interrupted due to extreme corrector age. The HDAPS DR's the launch positon during short periods of data interruption. The data were retained if the interruption lasted for only a one or two soundings, and was bracketed by good positions. No editing was performed if the soundings plotted on line. If they plotted off line, they were smoothed during processing.

~~Some data were acquired with only two LOP's because stations were blocked or deselected. When this occurred, critical system checks using multiple LOP hydrography were acquired when ECR's and maximum residuals fell within survey specifications.~~

Equipment

Serial numbers for all R/T units and RPU's are annotated on the RMPO for each day of hydrography. A complete list of all electronic equipment serial numbers is included in the "Summer 1992 Electronic Control Data Package" for OPR-P319-RA.

Calibrations & Systems Check Methods

Falcon 484

Baseline calibrations were conducted in accordance with the FPM. Calibrations were performed at the MATTHEWS PARK BEACH BASELINE on May 21-28, 1992 (DN 142-149). Calibration data are included in the "Summer 1992 Electronic Control Data Package."

~~Formal system checks were not documented for hydrography run with three or more LOP's, in accordance with Section 3.1.3.3 of the FPM. Data acquired with two LOP's were always bracketed by data acquired with three or more LOP's.~~ *The Mini Ranger was not used to acquire data.*

Ashtech GPS

VHF Differential shore stations were established at stations WOR 7 and WEST POINT. After each station was established, a remote sensor was connected directly to the MXII shore station and its antenna was collocated with that of the shore station. The computed position was transmitted back to the ship via VHF radio modem link. The difference

between the computed location and the station's published position were 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 either station.

Launch system checks were performed by a direct comparison of the Falcon position with the GPS position. HDAPS Survey Screen Two was used for this comparison, and was dumped to the system printer to record the results. Three such dumps were made for each system check. System checks were normally performed each day, and days with no system checks are always bracketed by days with good checks. ✓

#### Problems

Initially, the GPS system was not functioning properly. The system would output positions for several minutes, and then at random intervals would stop computing positions. The problem was traced to the VHF radio link and the shore station broadcast rate. The differential correctors were being broadcast at approximately seven second intervals. The various other delays built into the system, combined with this update rate, caused the correctors to exceed the allowed age of 30 seconds. The final solution was to increase the transmit rate and shorten the radio modem packet length, which has the effect of decreasing the age of the correctors. The GPS system performed without fault once this was done. ✓

#### Offsets

The launch GPS antenna is mounted on the same mast as the Falcon R/T unit. Antenna offsets, and the side scan sonar tow points 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, III. Horizontal Position Control and Corrections to Position Data." Filed

with the survey data  
J. SHORELINE

The shoreline shown on the final field sheet was transferred from a 1:20,000 scale enlargement of Chart 16665, Second Edition, May 1990, scale 1:50,000. The shoreline is shown in brown for orientation purposes. See Eval Rpt, rect 2

#### K. CROSSLINES

A total of 62 nautical miles of crosslines were run perpendicular to or at a 45° angle to mainscheme lines, representing 6.2% of the mainscheme hydrography. Crossline soundings agree to within one meter with mainscheme soundings. The vessel acquiring crossline data did not always collect the corresponding mainscheme data. Agreement between soundings acquired by different echo sounders in a common area is as stated above. ✓

#### L. JUNCTIONS

This survey junctions with H-10432 (1:20,000; 1992) to the east and north. Agreement between overlapping soundings is within one meter. No irregularities in the contours were found at the survey junction. ✓

M. COMPARISON WITH PRIOR SURVEYS See Eval Rpt, rect 6

This survey was compared to three prior surveys. The entire Upper Cook Inlet area is extremely changeable due to the presence of high current velocities and large amounts of sand and sediment. The results of the comparisons with the prior surveys reveals that the bottom has changed significantly in parts of the survey area, while remaining stable in others. Detailed sounding by sounding discrepancies are not listed as this area has changed significantly since the last surveys were performed.

H-10250 (1:20,000; 1987):

Shoaler depths are prevalent throughout much of the common area with this survey. A change of 5 to 10 meters exists near West Point on Fire Island. The differences are attributed to the changeable nature of the bottom.

Recommendation: The sounding data from the present survey should supersede that of H-10250 within their common area. Concur

H-10017 (1:20,000; 1982):

Significant change is evident in the common area with this survey. Beluga shoal has moved southeast approximately 400 yds, and has deepened considerably with a least depth of 8.0 to 8.3 meters (26 feet). The present survey shows a 17.6 meter depth, where survey H-10017 depicts the shoalest point of Beluga shoal at 9.0 feet. This shoal was developed with 25 meter line spacing. There is no trend in change between these surveys. Some areas have become deeper, others shoaler, and still others remain stable. The differences are attributed to the changeable nature of the bottom in the high currents of Cook Inlet.

Recommendation: The sounding data from the present survey should supersede that of H-10017 within their common area. Concur

H-10000 (1:20,000; 1982):

As with survey H-10250, shoaler depths now exist throughout much of the common area with this survey, particularly near West Point on Fire Island. Some areas have become deeper, and others remain stable. The differences are attributed to the changeable nature of the bottom.

Recommendation: The sounding data from the present survey should supersede that of H-10000 within their common area. Concur

N. COMPARISON WITH THE CHART See Eval Rpt, rect 7

This survey was compared to an 1:20,000-scale enlargement of NOS chart 16665, 2nd Edition, 19 May 1990, 1:50,000 (NAD 83) to this survey. All charted soundings originate from the prior surveys discussed in Section M and are not discussed further here.

One AWOIS item was investigated during the course of this survey.

AWOIS Item 51894: Rock awash, reported at 61°06'18"N, 150°22'08"W. This item was (Rep 1984)

investigated visually and with echo sounder at a -0.2-meter tide for a total of 55 minutes, and no evidence of a rock was detected (Position No. 5215). The area has a gently sloping bottom with an average depth of 10 meters. The visibility was approximately 8 miles. Six additional spot investigations were made surrounding the item position. No rocks or sea surface irregularities were observed. The average depth within the AWOIS search area was 15 meters. ✓

**Recommendation:** Delete the charted rock awash symbol. *Rock awash not charted on 3rd edition. Rock disproven at reported position.*

#### Dangers to Navigation

No dangers to navigation were reported for this survey area. ✓

Since the survey area has undergone significant change over a large area, two chart scale, excessed plots of all survey data have been forwarded to the Nautical Charting Division with the recommendation that they be used to produce a preliminary chart of the area. *Edition 3 of the chart is the result of this recommendation.*

#### O. ADEQUACY OF SURVEY

This survey is complete and adequate to supersede the areas common to the prior surveys listed in Section 6.10 of the Project Instructions. *Concur*

#### P. AIDS TO NAVIGATION

One non-floating aid to navigation is located within the limits of this survey.

<u>Name</u>	<u>Light List Number</u>	<u>Light List Position</u>	<u>Charted Position</u>
Fire Island Light 6	26390	61°07.6'N 150°16.9'W	61°07.56'N 150°16.94'W

The Light List position is from the Light List, Volume VI, 1992. The charted position was scaled from NOS chart 16665, Second Edition. The characteristics of this aid matched those in the Light List, and on the corrected chart. Changes to the characteristics of this light were published in Notice to Mariners 40/91 and 51/91. This aid has a published Third Order position. This position was verified by observing azimuths from control stations, and comparing the observed value to the value computed using the published position. The verification computations are contained in the "Summer 1992 Horizontal Control Report" for OPR-P319-RA. ✓

There are no bridges, overhead cables, or ferry routes through the survey area. ✓

#### Q. STATISTICS

<u>Vessel:</u>	<u>2123</u>	<u>2124</u>	<u>2125</u>	<u>2126</u>	<u>Total</u>
# of Pos	631	1430	501	819	3381
NM Hydro	218.24	406.18	136.25	136.25	1060.9

NM <sup>2</sup> Hydrography	8.8	Velocity Casts	2	
Detached Positions	7	Tide Stations	2	✓
Bottom Samples	39	Current/Magnetic Stations	0	

#### R. MISCELLANEOUS

Loran-C comparisons were sent to DMAHTC and U.S. Coast Guard.

In accordance with the Project Instructions, bottom samples were not sent to the Smithsonian Institution. They were, however, given to the U.S. Army Corps of Engineers for analysis and use in their ongoing Cook Inlet study. ✓

#### S. RECOMMENDATIONS

Since the survey area has undergone significant change over an area too large to disseminate as chartlets in Notice to Mariners, the hydrographer recommends that the Nautical Charting Division immediately issue a preliminary chart using the field survey data. *The preliminary chart has been issued.*

A magenta note on NOS chart 16660 at 61°04'30"N, 150°37'30"W reads "(chart 16663)." This note should read "(chart 16665)." ✓

#### T. REFERRAL TO REPORTS

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

<u>Title</u>	<u>Date Sent</u>	<u>to office</u>
Summer 1992 Horizontal Control Report for OPR-P319-RA:	Sept 2, 1992	N/CG2333
Summer 1992 Electronic Control Data Package for OPR-P319-RA:	Sept 1992 <sup>1</sup>	N/CG245
Corrections to Echo Soundings Data Package for OPR-P319-RA:	Sept 1992 <sup>1</sup>	N/CG245 ✓
Summer 1992 Coast Pilot Report for OPR-P319-RA:	Nov 1992 <sup>1</sup>	N/CG245
Summer 1992 User Evaluation Report for OPR-P319-RA:	Oct 1992 <sup>1</sup>	N/CG245
Corps of Engineers Trip Report - Field Data Collected in Upper Cook Inlet, 15-24 July 1992	July 1992	PMC

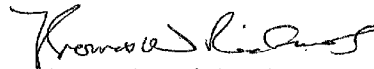
<sup>1</sup> Estimated date

Respectfully Submitted,



Eric P. Nelson  
Lieutenant(jg), NOAA

Approved and Forwarded,



Thomas W. Richards  
Captain, NOAA  
Commanding Officer

CONTROL STATIONS as of 4 Sep 1992

No	Type	Latitude	Longitude	H	Cart	Freq	Vel	Code	MM/DD/YY	Station Name	Quad Nos.
<del>100</del>	<del>F</del>	<del>061:10:37.311</del>	<del>150:10:04.002</del>	<del>2</del>	<del>250</del>	<del>0.0</del>	<del>0.0</del>	<del>0</del>	<del>06/09/92</del>	<del>POLE 1973</del>	<del>611503</del>
<del>101</del>	<del>F</del>	<del>061:09:52.095</del>	<del>150:04:06.618</del>	<del>2</del>	<del>250</del>	<del>0.0</del>	<del>0.0</del>	<del>2</del>	<del>06/09/92</del>	<del>BELL</del>	<del>611503</del>
102	F	061:13:11.230	149:54:09.308	47	250	0.0	0.0	7	06/09/92	ANCHOR STEAM 1982	611492
103	F	061:14:17.461	149:59:13.836	29	250	0.0	0.0	8	06/09/92	MAC 1960 RM 3 RM 1 USE	611492
104	F	061:12:08.534	150:00:59.324	49	250	0.0	0.0	2	06/10/92	WOR 7 1992(GPS)	611503
105	F	061:10:20.814	150:12:19.345	2	250	0.0	0.0	0	06/12/92	RIFE 1960	611503
<del>106</del>	<del>F</del>	<del>061:17:31.011</del>	<del>149:54:58.067</del>	<del>8</del>	<del>250</del>	<del>0.0</del>	<del>0.0</del>	<del>9</del>	<del>06/14/92</del>	<del>ANDY TP 1992</del>	<del>611492</del>
<del>107</del>	<del>F</del>	<del>061:17:43.996</del>	<del>149:49:56.407</del>	<del>21</del>	<del>250</del>	<del>0.0</del>	<del>0.0</del>	<del>0</del>	<del>06/14/92</del>	<del>DEDELK 1992</del>	<del>611492</del>
<del>108</del>	<del>F</del>	<del>061:15:30.097</del>	<del>149:52:42.807</del>	<del>7</del>	<del>250</del>	<del>0.0</del>	<del>0.0</del>	<del>6</del>	<del>07/21/92</del>	<del>LOW RM 1992</del>	<del>611492</del>
<del>109</del>	<del>F</del>	<del>061:15:31.147</del>	<del>149:52:46.645</del>	<del>3</del>	<del>250</del>	<del>0.0</del>	<del>0.0</del>	<del>6</del>	<del>06/14/92</del>	<del>LOW</del>	<del>611492</del>
<del>110</del>	<del>F</del>	<del>061:16:07.258</del>	<del>149:55:18.204</del>	<del>6</del>	<del>250</del>	<del>0.0</del>	<del>0.0</del>	<del>5</del>	<del>07/21/92</del>	<del>SLAM 1992</del>	<del>611492</del>
111	F	061:10:23.478	150:09:38.611	8	250	0.0	0.0	E	06/29/92	FIRE 1992	611503
<del>112</del>	<del>F</del>	<del>061:09:16.928</del>	<del>150:03:27.311</del>	<del>72</del>	<del>250</del>	<del>0.0</del>	<del>0.0</del>	<del>1</del>	<del>07/01/92</del>	<del>KINCAID</del>	<del>611503</del>
113	F	061:07:33.790	150:16:55.990	9	250	0.0	0.0	3	07/07/92	WEST POINT 1992(GPS)	611503



# APPROVAL SHEET

for

**H-10433**

**RA-20-2-92**

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.



Thomas W. Richards  
Captain, NOAA  
Commanding Officer

GEOGRAPHIC NAMES

H-10433

Name on Survey	ON CHART NO. 16665 ON PREVIOUS SURVEY NO. ON U.S. QUADRANGLE MAPS FROM LOCAL INFORMATION ON LOCAL MAPS P.O. GUIDE OR MAP GRAND McNALLY ATLAS U.S. LIGHT LIST											
	A	B	C	D	E	F	G	H	I	J	K	
ALASKA (TITLE)	X											1
BELUGA SHOAL	X											2
COOK INLET	X		X									3
FIRE ISLAND	X											4
WEST POINT	X											5
												6
												7
												8
												9
												10
												11
												12
												13
												14
												15
												16
												17
												18
												19
												20
												21
												22
												23
												24
												25

Approved

*Charles E. Harrington*  
Chief Geographer - N/CG 2x5

JUL 27 1993

Rec'd 5-26-93 AM



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL OCEAN SERVICE  
Office of Ocean and Earth Sciences

**TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**ORIGINAL**

**DATE:** May 14, 1993

**MARINE CENTER:** Pacific

**OPR:** P319-RA

**HYDROGRAPHIC SHEET:** H-10433 (amended)

**LOCALITY:** Beluga Shoal, Cook Inlet, Alaska

**TIME PERIOD:** June 16 - August 2, 1992

**TIDE STATION USED:** 945-5912 Fire Island, Alaska  
Lat. 61° 10.4'N Lon. 150° 12.3'W

**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 2.32 ft.

**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 26.0 ft.

**TIDE STATION USED:** 945-5920 Anchorage, Alaska  
Lat. 61° 14.3'N Lon. 149° 53.3'W

**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 6.41 ft.

**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 28.3 ft.

**REMARKS:** RECOMMENDED ZONING

**A. Use the following corrections applied to Fire Island (945-5912), when data are available:**

1. In Cook Inlet, east of 150° 20.0'W and west of 150° 15.0'W, apply a -5 minute time correction and a x0.99 range ratio.
2. In Cook Inlet, east of 150° 25.0'W and west of 150° 20.0'W, apply a -10 minute time correction and a x0.97 range ratio.
3. In Cook Inlet, east of 150° 30.0'W and west of 150° 25.0'W, apply a -15 minute time correction and a x0.95 range ratio.
4. In Cook Inlet, east of 150° 35.0'W and west of 150° 30.0'W, apply a -20 minute time correction and a x0.92 range ratio.



5. In Cook Inlet, east of  $150^{\circ} 40.0'W$  and west of  $150^{\circ} 35.0'W$ , apply a -25 minute time correction and a x0.90 range ratio.
  6. In Cook Inlet, east of  $150^{\circ} 45.0'W$  and west of  $150^{\circ} 40.0'W$ , apply a -30 minute time correction and a x0.88 range ratio.
- B. When data for Fire Island are not available, use the following corrections applied to Anchorage (945-5920):**
1. In Cook Inlet, east of  $150^{\circ} 20.0'W$  and west of  $150^{\circ} 15.0'W$ , apply a -30 minute time correction and a x0.90 range ratio.
  2. In Cook Inlet, east of  $150^{\circ} 25.0'W$  and west of  $150^{\circ} 20.0'W$ , apply a -35 minute time correction and a x0.88 range ratio.
  3. In Cook Inlet, east of  $150^{\circ} 30.0'W$  and west of  $150^{\circ} 25.0'W$ , apply a -40 minute time correction and a x0.87 range ratio.
  4. In Cook Inlet, east of  $150^{\circ} 35.0'W$  and west of  $150^{\circ} 30.0'W$ , apply a -45 minute time correction and a x0.85 range ratio.
  5. In Cook Inlet, east of  $150^{\circ} 40.0'W$  and west of  $150^{\circ} 35.0'W$ , apply a -50 minute time correction and a x0.83 range ratio.
  6. In Cook Inlet, east of  $150^{\circ} 45.0'W$  and west of  $150^{\circ} 40.0'W$ , apply a -55 minute time correction and a x0.81 range ratio.

**Notes:**

Hourly heights for Fire Island (945-5912) are tabulated in Greenwich Mean Time.

Hourly heights for Anchorage (945-5920) are tabulated in Alaskan Standard Time.

  
CHIEF, DATUMS SECTION

**HYDROGRAPHIC SURVEY STATISTICS**

H-10433

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT
SMOOTH SHEET		1	SMOOTH OVERLAYS: POS., ARC, EXCESS		3
DESCRIPTIVE REPORT		1	FIELD SHEETS AND OTHER OVERLAYS		6
DESCRIP-TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/SOURCE DOCUMENTS
ACCORDION FILES	2		1		
ENVELOPES					
VOLUMES					1
CAHIERS					
BOXES				1	

**SHORELINE DATA**

- SHORELINE MAPS (List):
- PHOTOBATHYMETRIC MAPS (List):
- NOTES TO THE HYDROGRAPHER (List):
- SPECIAL REPORTS (List):
- NAUTICAL CHARTS (List):

**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			3213	
POSITIONS REVISED				
SOUNDINGS REVISED	1655		1655	
CONTROL STATIONS REVISED				
	TIME-HOURS			
	VERIFICATION	EVALUATION	TOTALS	
PRE-PROCESSING EXAMINATION				
VERIFICATION OF CONTROL				
VERIFICATION OF POSITIONS	29		29	
VERIFICATION OF SOUNDINGS	87		87	
VERIFICATION OF JUNCTIONS				
APPLICATION OF PHOTOBATHYMETRY				
SHORELINE APPLICATION/VERIFICATION				
COMPILATION OF SMOOTH SHEET	34		34	
COMPARISON WITH PRIOR SURVEYS AND CHARTS		7	7	
EVALUATION OF SIDE SCAN SONAR RECORDS		10	10	
EVALUATION OF WIRE DRAGS AND SWEEPS				
EVALUATION REPORT		16	16	
GEOGRAPHIC NAMES				
OTHER*				
*USE OTHER SIDE OF FORM FOR REMARKS	TOTALS	150	33	183

Pre-processing Examination by <b>LT John Griffin</b>	Beginning Date 9/23/92	Ending Date 10/23/92
Verification of Field Data by <b>S. Otsubo</b>	Time (Hours) 150	Ending Date 9/9/93
Verification Check by <b>S. Otsubo, J. Green</b>	Time (Hours) 26	Ending Date 11/3/93
Evaluation and Analysis by <b>J. Green</b>	Time (Hours) 40	Ending Date 11/4/93
Inspection by <b>D. Hill</b>	Time (Hours) <b>4</b>	Ending Date <b>2/7/94</b>

**EVALUATION REPORT  
H-10433**

**1. INTRODUCTION**

Survey H-10433 is a basic hydrographic survey accomplished by the NOAA Ship *Rainier* under the following Project Instructions.

OPR-P319-RA, dated April 14, 1992  
CHANGE NO. 1, dated May 8, 1992  
CHANGE NO. 2, dated May 27, 1992  
CHANGE NO. 3, dated August 18, 1992

This survey was conducted in Alaska and covers an area in Cook Inlet west of Fire Island, including Beluga Shoal. The surveyed area extends from latitude 61/04/08N north to latitude 61/10/18N and longitude 150/16/30W west to longitude 150/45/00. The sea floor consists primarily of sand. Depths range from zero in the vicinity of Fire Island to 28.6 meters at the western limit of the survey area.

Side scan sonar was utilized during this survey along the center line of the deep draft shipping route approaching the Port of Anchorage, along a line segment approximately 1000 meters south of the shipping route center line and along two lines south and west of Fire Island as shown on the presurvey review chart. The side scan data was processed utilizing the procedures contained in Hydrographic Surveys Branch memorandum, *Side Scan Sonar Processing Procedures*, dated June 28, 1993. Significant side scan sonar contacts identified in the field were adequately investigated by echo sounder developments. The recommended disposition of the side scan investigations may be found in Section 3 of this report.

Predicted tides for Anchorage, Alaska, zoned for the survey area, were used for the reduction of soundings during field processing. Approved hourly heights zoned from Fire Island, Alaska, gage 945-5912, supplemented by data from Anchorage, gage 945-5920, when Fire Island tides were not available, were used during office processing.

The field sheet parameters have been revised to center the hydrography on the smooth sheet and to change the projection to polyconic. Daily systems checks by comparison with Miniranger positions confirmed that the DGPS was operating properly. The dynamic draft and sound velocity correctors are adequate. An accompanying computer printout contains the parameters and the correctors.

A digital file has been generated for this survey that includes categories of information required to comply with Hydrographic Survey Guideline No. 52, Standard Digital Data Exchange Format, April 15, 1986. Certain feature descriptive information, however, may not be in the digital record due to the restrictions of the presently available cartographic codes. The user should refer to the smooth sheet for complete information.

## 2. CONTROL AND SHORELINE

Sections H and I of the hydrographer's report and the Summer 1992 Horizontal and Electronic Control Reports for OPR-P319-RA contain adequate discussions of horizontal control and hydrographic positioning.

Positions of horizontal control stations used during hydrography are 1992 field and published values based on NAD 83. These values were used to confirm the accuracy of DGPS positions. The smooth sheet and accompanying overlays are annotated with NAD 27 adjustment ticks based on values determined with the NGS program NADCON. Geographic positions based on NAD 27 may be plotted on the smooth sheet using the NAD 83 projection by applying the following correction.

Latitude: -1.991 seconds (-61.634 meters)  
Longitude: 8.002 seconds (119.822 meters)

The year of establishment of control stations shown on the smooth sheet originates with the previously listed horizontal control report and the published data.

The features shown on this survey were positioned by DGPS. Several positions exceeded the geometrical accuracy specification limit in terms of HDOP values. A review of the data indicates that none of these positions are used to locate dangers to navigation. The features located by these positions are consistent with the adjoining data. They have been accepted.

Except for a small area of the western tip of Fire Island, there is no shoreline shown on this survey. As there are also no shoreline maps applicable to this project, the shoreline shown on the smooth sheet was compiled from an enlarged copy of chart 16665, 3rd Edition, May 1993. It is shown in brown ink for orientation purposes only.

## 3. HYDROGRAPHY

Hydrography is adequate to:

- a. delineate the bottom configuration, determine least depths, and draw the standard 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.

There were no significant side scan sonar contacts in the center line of the deep draft shipping route approaching the Port of Anchorage. One contact was found on the line segment 1000 meters south of the shipping route center line. This contact was adequately developed by echo sounder and the results of the hydrographic development are depicted on the smooth sheet. Thirteen contacts noted as significant were found along the two lines south and west of Fire Island. These items were also adequately developed by echo

sounder and the results of the hydrographic development are depicted on the smooth sheet.

#### **4. CONDITION OF SURVEY**

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, the Side Scan Sonar Manual, September 1988 Edition, and the Field Procedures Manual, March 1992 Edition, except for the following.

Complete reports for each of the investigations of significant side scan contacts were not included in the hydrographic records as required by section 7.1 of the project instructions.

#### **5. JUNCTIONS**

Survey H-10433 junctions with the following survey.

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Area</u>
H-10432	1992	1:20,000	Northeast

The junction with survey H-10432 is complete.

There are no junction surveys to the northwest, west and south. A comparison with chart 16665, 3rd Edition, May 1993, scale 1:50,000, shows adequate agreement.

#### **6. COMPARISON WITH PRIOR SURVEYS**

Survey H-10433 was compared to the following prior surveys.

H-10250(1987) 1:20,000  
H-10017(1982) 1:20,000  
H-10000(1982) 1:20,000

Survey H-10250 covers a small area of this survey just west of Fire Island. Depths usually agree to within 2 meters, both deeper or shoaler on this survey. Survey H-10433 is adequate to supersede survey H-10250 within the area of common coverage.

Survey H-10017 covers the present survey area west of approximately longitude 150/28/00W. See section M of the hydrographer's report for the comparison with this survey. Because of the extremely changeable nature of the survey area, survey H-10433 is adequate to supersede prior survey H-10017 within the area of common coverage.

Survey H-10000 covers the eastern portion of the surveyed area, generally east of longitude 150/28/00W. A small portion of the surveyed area was superseded by prior survey H-10250. See section M of the hydrographer's report for the comparison with this survey. Survey H-10433 is adequate to supersede prior survey H-10000 within the area of common coverage.



There are no AWOIS items originating from prior surveys applicable to this survey.

## 7. COMPARISON WITH CHART

Survey H-10430 was compared to the following charts.

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>	<u>Datum</u>
16665	3rd	May 15, 1993	1:50,000/1:20,000	NAD 83

### a. Hydrography

The 3rd edition of this chart is noted as preliminary. The revisions appearing on this edition originated with the preliminary field data submitted by the field party as a danger to navigation.

The "See Warning Note" charted at latitude 61/08/22N, longitude 150/28/30W, should be modified to apply to NOTE B. NOTE B warns the mariner of the drastic and continuing change occurring in this area. The magenta Warning Note warns the mariner to not rely on a single mode of navigation. The note within the sounding area warning of the changeable nature of the area would be more useful.

Survey H-10430 is adequate to supersede charted hydrography within the common area.

### b. AWOIS

The only AWOIS item within the limits of this survey is discussed in section N of the hydrographer's report.

### c. Controlling Depths

There are no channels with controlling depths on survey H-10433.

### d. Aids to Navigation

Fire Island Light 6 is the only aid to navigation within the area of this survey. The published third order position for this aid was verified as accurate. This aid serves its intended purpose.

There are no landmarks within the area of this survey.

### e. Geographic Names

Names appearing on the smooth sheet and in the survey title have been approved by the Chief Geographer.

f. Dangers to Navigation

As the survey area has changed significantly, a chartlet was submitted by the field party with the recommendation that a preliminary chart of the area be produced. The 3rd edition of chart 16665 (preliminary) is a result of this recommendation.


No additional dangers were found during the office processing of this survey.

**8. COMPLIANCE WITH INSTRUCTIONS**

Survey H-10433 adequately complies with the Project Instructions.

**9. ADDITIONAL FIELD WORK**

This is an adequate hydrographic survey. No additional field work is required.

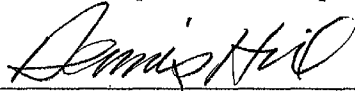


James S. Green  
Supervisory Cartographer

APPROVAL SHEET  
H-10433

Initial Approvals:

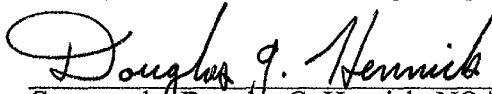
The completed survey has been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, comparison with prior surveys and verification or disapproval of charted data. The digital data have been completed and all revisions and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



Date: 2/7/94

Dennis J. Hill  
Chief, Hydrographic Processing Unit  
Pacific Hydrographic Section

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.



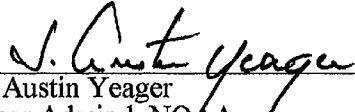
Date: 2/7/94

Commander Douglas G. Hennick, NOAA  
Chief, Pacific Hydrographic Section

\*\*\*\*\*

Final Approval

Approved:



Date: 3/15/94

J. Austin Yeager  
Rear Admiral, NOAA  
Director, Coast and Geodetic Survey

