

10432

10432

Diagram No. 8553-2

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic
Field No. RA-20-1-92
Registry No. H-10432

LOCALITY

State Alaska
General Locality Cook Inlet
Sublocality Fire Island Shoal to
..... Woronzof Shoal

1992

CHIEF OF PARTY
CAPT T.W. Richards

LIBRARY & ARCHIVES

DATE February 28, 1994

HYDROGRAPHIC TITLE SHEET

H-10432

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-20-1-92

State Alaska

General locality Cook Inlet

Locality Fire Island to Woronzof Shoal

Scale 1:20,000 Date of survey June 30 - July 31, 1992

Instructions dated April 14, 1992
May 8, 1992 - Change No. 1 Project No. OPR-P319-RA

May 27, 1992 - Change No. 2, Aug. 18, 1992 - Change No. 3
Vessel NOAA Ship RAINIER

Chief of party CAPT Thomas W. Richards, NOAA

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

Soundings taken by echo sounder, ~~and lead, etc.~~

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel

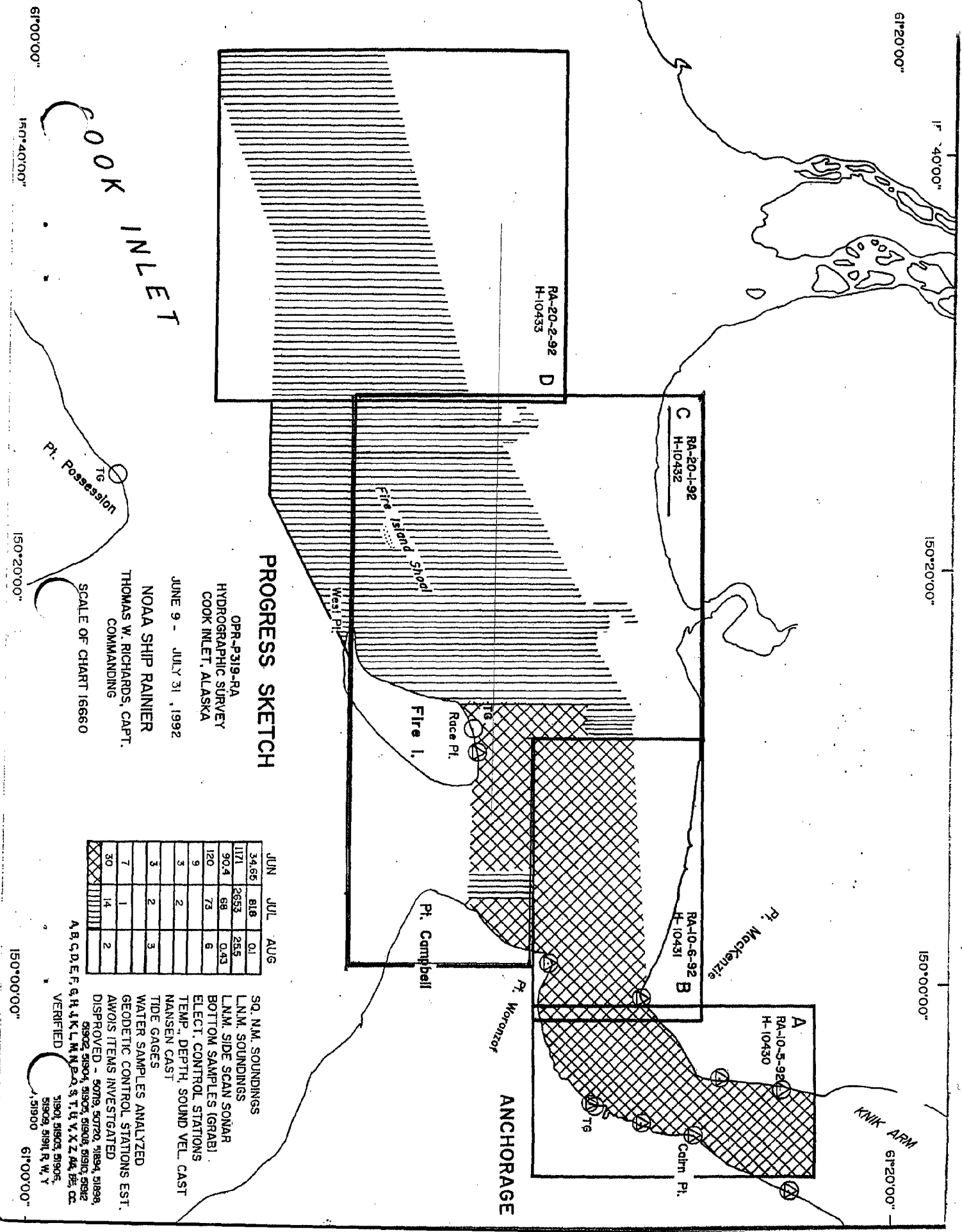
Verification by: R. Shipley, S. Otsubo Automated plot by PHS Xynetics Plotter

~~Processed by~~
Evaluation by: J. Green

~~Verification by~~
Soundings in ~~fathoms~~ ~~feet~~ at ~~MHW~~ Meters & Decimeters MLLW

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

AWOIS + SURF - 3/94 PWD
R.W.W. 3/16/94



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
34.65	81.8	01	
1171	2653	285	
90.4	68	0.43	
120	75	6	
9			
3	2		
3	2		
3	2		
7	1		
30	14		
XXXX			

A B C D E F G H J K L M N P Q R S T U V X Z AA AB AC

SQ. N.M. SOUNDINGS
 L.N.M. SOUNDINGS
 L.N.M. SIDE SCAN SONAR
 BOTTOM SAMPLES (GRAB)
 ELECT. CONTROL STATIONS
 TEMP. DEPTH. SOUND VEL. CAST
 NANSEN CAST
 TIDE GAGES
 WATER SAMPLES ANALYZED
 GEODETIC CONTROL STATIONS EST.
 AWOIS ITEMS INVESTIGATED
 DISAPPROVED - 5079, 50720, 51884, 51888,
 51902, 51904, 51905, 51906, 51907, 51908,
 51909, 51910, 51911, 51912, 51913, 51914,
 51915, 51916, 51917, 51918, 51919, 51920,
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 51981, 51982, 51983, 51984, 51985, 51986,
 51987, 51988, 51989, 51990, 51991, 51992,
 51993, 51994, 51995, 51996, 51997, 51998,
 51999, 52000

VERIFIED

Descriptive Report to Accompany Hydrographic Survey H-10432

Field Number RA-20-1-92

Scale 1:20,000

June - July 1992

NOAA Ship RAINIER

Chief of Party: Captain Thomas W. Richards

A. PROJECT

This basic hydrographic survey was completed in Northern Cook Inlet, Alaska, as specified by Project Instructions OPR-P319-RA dated April 14, 1992, Change Number One dated May 8, 1992, Change Number Two dated May 27, 1992, and Change Number Three dated August 18, 1992. ✓

Survey H-10432 corresponds to "Sheet C" as defined in the Project Instructions. ✓

This survey is one in a series that will identify all dangers to navigation in the navigable approaches to the Port of Anchorage. The survey was conducted as a response to requests from a U.S. Senator, Corps of Engineers (COE), Southwest Alaska Pilots Association, Totem Ocean Trailer Express, Inc. (TOTE), Defense Mapping Agency (DMA), Port Commission, and the Port of Anchorage. Data will be used by the U.S. Coast Guard (USCG) 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 to the Port of Anchorage. ✓

B. AREA SURVEYED

The survey is located in Northern Cook Inlet, Alaska, 10 NM west of Anchorage, Alaska, and includes Fire Island and West Point Shoals. The survey's limits are 150°28.5'W to the west, 150°01.0'W to the east, 61°07.0'N to the southwest, 61°10.0'N to the southeast, and it is bounded by land to the north. ✓

Data acquisition was conducted from June 30, Day Number (DN) 182, through July 30, DN 212. ✓

C. SURVEY VESSELS

Data were acquired by NOAA Ship RAINIER's four survey launches as noted below:

<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 Side Scan Sonar Bottom Samples Velocity Casts
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>Date 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	6.21	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
DP	2.00	4/14/92
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	194-201
Recorder 61475 Fish 0011902	RA-5	183-191

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 a bit using a stopper made of cotton line.

Due to high currents and nonexistent water visibility in the 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.

Problems

Occasionally, when the door to the recorder (SN 61475) used on launch RA-5 was opened for annotating the records, the unit would momentarily switch to the 25 meter range scale. These periods would last from two to four seconds, during which time the swath would be "pinched in" to 25 meters. In featureless areas with regular bottom topography these sections of line were not re-run.

In areas with boulders or other features evident, the areas where this occurred were re-run to ensure that no significant features were missed. The problem was isolated to a defective ribbon cable connecting the door to the recorder and was fixed.



When recorder (SN 61475) on RA-5 was operated on the 150 meter range scale, the sonagram exhibited narrow (3-5 mm) light or dark stripes near the center of the record. These do not obscure contacts on the record. The exact cause of the stripes was not determined, although they appear to have been caused by the recorder printer.



Processing

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

During Acquisition:

- Annotate sonagrams with pertinent data:
 - Vessel speed
 - Cable length
 - Conditions affecting record; 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 on reexamination
- Compute heights for all noted contacts
- Compare contact heights with corrected depths in area to determine significance:
 - Depth <=20 m, contact height >=1 m
 - Depth >20 m, contact height >=10% of depth
- Name contacts on sonagram 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 is pinched, examine records to determine cause (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 contact 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.

See Eval Rpt, sect 1&3

Additional information is contained in the "Separates to be Included with Survey Data, V. Side Scan Sonar Data." Filed with the 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 Field Procedures Manual for Hydrographic Surveying (FPM).

Raytheon DSF-6000N Echo Sounders

<u>Vessel</u>	<u>Serial No.</u>	<u>DN</u>
2123	B044N	182-212
2124	A103N	182-212
2125	B048N	182-211
2126	A117N	182-201
	A119N	201
	A117N	202-211

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, 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 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 determined from the casts listed below:

<u>Velocity Table No.</u>	<u>Cast No.</u>	<u>Deepest Depth (m)</u>	<u>Applicable DN</u>	<u>Cast Position</u>	<u>Day</u>
2	3	49.6	174-184	61°15'38"N 149°54'01"W	176

3	4	39.6	188-207	61°11'12"N 150°08'45"W	189
5	7	46.7	208-219	61°13'10"N 149°59'29"W	215

The sound velocity casts were acquired with a SBE SEACAT Profiler, S/N 811, which was calibrated at the Northwest Regional Calibration Center in Bellevue, WA, on March 3, 1992. ✓

Velocity correctors were computed using the PC 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. ✓

Static Draft

The distance from the transducer face to the gunwale was measured with a large metal square for all launches. Static draft measurements were then determined by dropping a lead line 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 launches 2123, 2124, 2125 and 2126 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 submitting the data to the Pacific Hydrographic Section. ✓

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. 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 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 No.</u>
2123	3
2124	4
2125	5

Heave

Data acquired during periods of significant sea action were checked and scanned to remove any errors introduced into the digital data by vessel heave. ✓

Bar Check and Lead Lines

Bar check and lead lines were calibrated by RAINIER personnel on February 19, 1992 at PMC. Calibration forms are included in the "Summer 1992 Corrections to Echo Sounding 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>
IV	-42 minutes	x0.87
V	-38 minutes	x0.88
VI	-30 minutes	x0.90
VII	-20 minutes	x0.92
VIII	-10 minutes	x0.94

HDAPS listings of the data used in generating tide corrector tables are included in Appendix V of this report. *Filed with the survey records.* ✓

Tide gages were installed and maintained by RAINIER personnel at Fire Island, (945-5912) and at Point Possession (945-5866). The control station was Anchorage, Alaska (945-5920). Opening levels were completed by RAINIER personnel on June 12, 1992. Closing levels were completed by RAINIER personnel on August 5, 1992. ✓

The station descriptions, field tide records, and Field Tide Notes have been forwarded to N/OES212 in accordance with HSG 50 and FPM 4.3. Requests for approved tides have been forwarded to N/OES2. Copies of the Field Tide Notes and the request for approved tides are included in Appendix V. *Filed with the survey records.*

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 included in Appendix III of this report. *(attached)* ✓

Positions for all existing stations are from the National Geodetic Survey (NGS) data base. All existing stations were recovered in accordance with methods stated in Section 5.2.4 of the Field Procedures Manual. 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 Position Control

Soundings, bottom samples, and detached positions were positioned using either Ashtech Differential GPS, or Motorola Mini Ranger Falcon 484 microwave system. ✓

Falcon 484

Accuracy requirements specified in the Hydrographic Manual and in FPM 3.1.3.1 were met. When maximum residuals exceeded the specified limits, the launch was held at a constant speed and course while the station(s) causing the problem was deselected and hydrography was continued. These data were reviewed, and any off track data were smoothed (T&C'd) between good positions. No editing was done when the maximum Error Circle Radius (ECR) value was exceeded for one or two soundings, the data plotted on track, and was bracketed by good positioning information. If the data plotted off track but was still bracketed by good positions, it was smoothed between the good positions during processing. ✓

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 dead reckons the launch position during short periods of data interruption. The data were retained if the interruption lasted for only 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. ✓

Serial numbers for Falcon R/T units, RPU's and Ashtech equipment are annotated on the data printouts. Lists of all positioning equipment serial numbers are included in the "Summer 1992 Electronic Control Data Package." ✓

Calibrations & Systems Check Methods

Falcon 484

Baseline calibrations were conducted in accordance with FPM 3.1.2.1 and 3.1.3.2. Calibrations were performed at the MATTHEWS PARK BEACH BASELINE on May 21-28, 1992 (DN 142-149). Calibration data and a description of the baseline is included in the "Summer 1992 Electronic Control Data Package." ✓

In accordance with FPM 3.1.3.3, formal system checks were not documented for multiple LOP hydrography. Data acquired with two LOP's were always bracketed ✓

by multiple LOP data acquired with ECR and maximum residuals within acceptable limits, which served as critical system checks.

Ashtech GPS

VHF Differential shore stations were established at stations WOR 7 and WEST POINT. After each station was established, a remote sensor was directly connected 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 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. ✓

Offset

The launch GPS antenna is mounted on the mast as the Falcon R/T unit. Antenna offsets, and the side scan sonar tow point 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 records. ✓

J. SHORELINE

The shoreline shown on the final field sheet was transferred from 1:10,000 scale enlargements of Chart 16665, Second Edition, May 1990, scale 1:50,000. The shoreline is shown in brown for orientation purposes. ✓

The zero meter curve has changed significantly throughout the survey area and its location has been defined by hydrography. ✓

The Project Instructions stated that formal verification of the foreshore features and mean high water line was not necessary. Rocks charted in the foreshore area

were checked in the field for major changes. RAINIER used sequential numbers to track the checking of foreshore charted rocks. The foreshore rocks on this survey fall into three categories: as charted, new feature, or not found. Sequential numbers and associated notes are recorded in sounding volumes included with the survey.

Offshore rocks were verified by detached position, or disproven by hydrographic developments and detached positions at a minus tide. Field notes for all detached positions are located on the raw master printouts. ✓

Charted shoreline features are shown in brown on the final field sheets (FFS). Verified offshore features are shown in black on the FFS. *Shoreline shown in brown on smooth sheet from chart 1666 and prior survey H-9440 (1974) by orientation quip only.*
Disprovals

The vicinity of the charted rock awash at $61^{\circ}09'30''\text{N}$, $150^{\circ}14'12''\text{W}$ was inspected (Pos. No. 4704) and the rock was not seen. The average water depth was 4.0 meters. The search was conducted for 15 minutes and the search radius was 30 meters from the DP. The tide corrector was -0.3 meters at the time the DP was taken. *This rock is considered disproven and should be removed from the chart.*
New Features

The following is a significant new feature found and is shown on the FFS.

Position No. 4705 describes a rock at $61^{\circ}09'51.58''\text{N}$, $150^{\circ}13'45.77''\text{W}$ which *uncovered* ⁷ ^{56.78} ^{uncovered} bares 0.7 m at MLLW. The tide corrector was -0.4 meters at the time the DP was taken. ✓

Recommendation: The hydrographer recommends that shoreline detail below MLLW from this survey be used to supersede prior shoreline information. *Concur.*
See Eval Rpt, recs 6 & 7.

K. CROSSLINES

Both crosslines and rangelines were used for comparisons. These totaled 54.6 nautical miles, representing 5.9 % of the total hydrography; this percentage does not reflect developments run during additional investigations. ✓

Crossline soundings agree to within 1.0 meters with mainscheme soundings. These differences are believed to be attributable to predicted tides, bottom slope, or sand waves. *Concur*

The vessels acquiring crossline data did not always acquire the corresponding mainscheme data. ✓

L. JUNCTIONS

This survey junctions with survey H-10431 (1:10,000, 1992) to the east and north and survey H-10433 to the west and south. No irregularities were found when comparing soundings and depth curves. Agreement between overlapping soundings is between 0.5 and 1.2 meters. ✓

M. COMPARISON WITH PRIOR SURVEYS *See Eval Rpt, sect 6*

Six prior surveys were provided for comparison with H-10432. Two of the six prior surveys were superseded in their common area. Comparisons below were made with these four most recent 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 present throughout much of the common area of this survey. Fire Island Shoal has moved east ^{to the} southeast approximately 100 meters, and its southwest tip has eroded away. The present survey shows a least depth 0.2 meters where survey H-10250 depicts -0.6 meters. The shoal was developed with 25-meter line spacing. The differences are attributed to the changeable nature of the bottom. ✓

Recommendation: The hydrographer recommends sounding data from the present survey be used to supersede that of H-10250 within their common areas. *Concur*

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

The soundings from this survey are on average 2.0 meters deeper. ✓

Recommendation: The hydrographer recommends sounding data from the present survey be used to supersede that of H-10017 within their common areas. *Concur*

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

Significant change has occurred within the common areas of this survey. The Woronzof Shoal has grown and moved 0.2 nautical miles south. ^{east} The area bounded between 150°28'00"W and 150°17'00"W and north of 61°10'30"N has grown shoaler. ✓

Recommendation: The hydrographer recommends sounding data from the present survey be used to supersede that of H-10000 within their common areas. *Concur*

H-9442 (1:10,000; 1974)

Significant change is evident in the common area with this survey. The zero meter curve between Fire Island and Point Woronzof has moved 0.2 nautical miles to the south. ✓

Recommendation: The hydrographer recommends sounding data from the present survey be used to supersede that of H-9442 within their common areas. *Concur.*
See Eval Rpt, sect 6.

N. COMPARISON WITH THE CHART *See Eval Rpt, sect 7*

This survey was compared to NOS chart 16665, 2nd Edition, May 19, 1990, 1:50,000 (NAD83) that was corrected through Local Notice to Mariners up to 33/91 (8/14/91). ✓

A majority of the charted soundings are from the prior surveys discussed in Section M. Several soundings originated from private surveys and are discussed later in this section. ✓

No navigable low water channel leads across the Susitna Tidal Flats to the Little Susitna River and none should be charted. *Concur.*

AWOIS Item 51909: Shoaling (4-7 feet) reported west of Fire Island in the vicinity of 61°09'00.40"N, 150°16'53.00"W. This item was investigated by a 50-meter line spacing development in a 750-meter radius around the charted location. The shoalest sounding located during the present survey was ~~11.8 meters~~ ^{17.08} meters at 61°09'00"N, 150°59'00"W. *See Eval Rpt, rect 7. b.*

Recommendation: Sounding data from the present survey should be used to supersede AWOIS item 51909. *Concur. See Eval Rpt, rect 7. b.*

Lettered AWOIS Items

Four charted soundings which fall within the limits of the present survey originated from surveys conducted by private contractors. These soundings were assigned as lettered AWOIS items and were investigated with the following results:

<u>Letter</u>	<u>Source</u>	<u>Reported Depth</u>	<u>Survey Depth</u>
B	BP140130	53 feet	⁵³ 16.3 59.0 ft (5.7m)
C	BP140130	34 feet	31 39 ft (11.9m) ^{9.4m}
E	BP142290	26 feet	26 29.2 ft (8.9m) ^{0m}
F	BP142290	27 feet	36.4 ft (11.1m)

See Eval Rpt, rect 7. b.

BP140130 is a survey conducted in 1989 by Besse, EPPS & Potts. BP142290 is a survey conducted in 1990 by Lounsbury and Associates, Inc. The above items were investigated using 25-meter line spacing. ✓

Recommendation: The hydrographer recommends sounding data from the present survey be used to supersede that of BP140130 and BP142290 within their common areas. *Concur*

Dangers to Navigation

~~Six~~ ^{Seven} dangers to navigation within the limits of this survey were reported to the Seventeenth Coast Guard District and DMAHTC. Copies of the radio messages and correspondence are ^{attached to} included in Appendix I of this report. ~~Position numbers associated with the items are noted on the radio message.~~ ✓

In addition, as the survey area has undergone significant change over a large area, two chartscale, excessed plots of all survey data have been forwarded to the Nautical Chart Division, with the recommendation that they be used to produce a preliminary chart of the area. *Edition 3 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. *Concurs.*

P. AIDS TO NAVIGATION

^{Eight} ~~Five~~ non-floating aids to navigation are located within the limits of this survey.

<u>Name</u>	<u>Light List Number</u>	<u>Light List Position</u>	<u>Charted Position</u>
Race Point Range Front Light	26395	61°09.9'N 150°13.6'W	61°09.92'N 150°13.62'W
Race Point Range Rear Light	26400	None	61°10.20'N 150°12.65'W
Race Point Light	26405	61°10.1'N 150°13.5'W	61°10.07'N 150°13.48'W
Fire Island Range Front Light	26410	61°10.3'N 150°12.0'W	61°10.35'N 150°12.00'W
Fire Island Range Rear Light	26415	None	61°10.22'N 150°12.45'W

See Eval Rpt, rect 7.d.

Light list positions are from the Light List, Volume IV, 1992. The charted positions are scaled from NOS chart 16665, Second Edition. All non-floating aids have characteristics which match those in the light list and on the chart. All non-floating aids have published Third Order positions. These positions were verified by observing azimuths from control stations, and comparing the observed value to the value computed using the published positions. All published positions were verified. These computations are contained in the Summer 1992 Horizontal Control Report for OPR-P319-RA. ✓

One floating aid to navigation is located within the limits of this survey: Fire Island Shoal Buoy 5. The aid is seasonal and is repositioned by the Coast Guard in the spring. The aid was positioned using hydrographic means, and the survey position agrees with the charted position. The characteristics of the aid matches those on the chart. ✓

Two landmarks shown on NOS Charts 16660, 16665, and 16667 are to be deleted. A tank at 61°14'54.0" N, 149°47'48.0" W is not useful as a navigation aid since it can not be seen from sea. A radar dome at 61°08'35.0" N, 150° 13'02.0" W was removed by the military in 1984.

See Eval Rpt rect 7.d

Q. STATISTICS

<u>Vessel:</u>	<u>2123</u>	<u>2124</u>	<u>2125</u>	<u>2126</u>	<u>Total</u>
# of Pos	1970	1359	371	1990	5690
NM Hydro	498.4	421.1	50.92	615.1	1585.5

NM ² Hydrography	42.8	Velocity Casts	3
Detached Positions	7	Tide Stations	2
Reference Numbers	8		
Bottom Samples	34		

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 Notices to Mariners, the hydrographer recommends that the Nautical Charting Division immediately issue a preliminary chart using the field survey data. Survey data have been excessed to chart scale to facilitate this preliminary chart compilation. *The preliminary chart has been issued as Edition 3 to chart 16665.*

The Race Point range should not be used by deep-draft vessels. Relatively shallow-draft ships, fishing boats and tug and barge traffic can still safely use the Race Point range. *Concur, just this time. The position and depth on West Point Shoal should be closely monitored.*

The safest deep-draft approach to the Port of Anchorage is presently north of Fire Island Shoal. A copy of the field survey data has been provided to the 17th U.S. Coast Guard District for use in constructing a range leading north of Fire Island Shoal and south of the Susitna Tidal Flats. An additional buoy should be placed north of Fire Island Shoal to better mark the shoal for deep-draft traffic. *Concur.*

The USCG is planning to place a RACON on the Susitna Tidal Flats to improve navigation past Fire Island Shoal. The present chart inset on 16665 will obstruct this RACON. In addition, the present positioning of the Port of Anchorage inset on chart 16665 in the upper left hand corner of the chart makes it inconvenient for plotting fixes. It is recommended that the 1:20,000 scale chart inset be shifted to the lower right hand corner of chart 16665. *This has been accomplished on the 3rd edition of chart 16665.*

An additional (see note B) notation, that the area is subject to dramatic change etc., should be added to the chart in the vicinity of 61°12'N, 150°20'W. *Concur, and elsewhere as necessary to clearly warn the mariner of the changing nature of this area.*

Due to the rapid rate of change in this area, it should be surveyed again in four to five years.

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	September 2, 1992	N/CG2333
Summer 1992 Electronic Control Data Package for OPR-P319-RA	September 1992 ¹	N/CG245
Summer 1992 Corrections to Echo Soundings Data Package for OPR-P319-RA	September 1992 ¹	N/CG245 ✓
Summer 1992 Coast Pilot Report for OPR-P319-RA	November 1992 ¹	N/CG245
Summer 1992 User Evaluation Report for OPR-P319-RA	October 1992 ¹	N/CG245
Corps of Engineers Trip Report - Field Data Collected in Upper Cook Inlet, 15 - 24 July, 1992	July 1992	PMC

Respectfully Submitted,



Ricardo Ramos
Ensign, NOAA

Approved and Forwarded,



Thomas W. Richards
Captain, NOAA
Commanding Officer

¹Estimated date

CONTROL STATIONS as of 4 Sep 1992

No	Type	Latitude	Longitude	H Cart	Freq	Vel	Code	MH/DD/YY	Station Name	Quad Nos.	
100	F	061:10:33.311	150:10:04.002	2	250	0.0	0.0	0	06/09/92	POLE 1975	611503
101	F	061:09:52.095	150:04:06.618	2	250	0.0	0.0	2	06/09/92	BELL	611503
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 RH 3 RH 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
106	F	061:17:31.011	149:54:50.867	8	250	0.0	0.0	9	06/14/92	ANDY TP 1992	611492
107	F	061:17:43.996	149:49:56.407	21	250	0.0	0.0	0	06/14/92	DEDECK 1992	611492
108	F	061:15:30.097	149:52:42.807	7	250	0.0	0.0	C	07/21/92	LOW RHI 1992	611492
109	F	061:15:31.147	149:52:46.645	3	250	0.0	0.0	C	06/14/92	LW	611492
110	F	061:16:07.258	149:55:18.204	6	250	0.0	0.0	5	07/21/92	SLAM 1992	611492
111	F	061:10:23.478	150:09:38.611	8	250	0.0	0.0	E	06/29/92	FIRE 1992	611503
112	F	061:09:16.928	150:03:27.311	72	250	0.0	0.0	1	07/01/92	KINCAID	611503
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

OPR-P319-RA NORTHERN COOK INLET SUMMER 1992
LIST OF GEOGRAPHIC POSITIONS

SPN	STATION NAME	GPN CODE	LATITUDE		LONGITUDE		G-NBR
			K	DEG MN. SEC	DEG MN. SEC		
3	ANCHOR STEAM	9	61	13 11.22958	149	54 9.30785	
20	ANCHORAGE ACS MICROWAVE TWR	9	61	13 54.00049	149	52 29.59687	
21	ANCHORAGE MUNICIPAL TANK	9	61	13 44.52485	149	52 43.28156	
24	ANCHORAGE RADIO TWR KENT	9	61	12 23.19316	149	55 28.30202	
15	ANDY TP	5	61	17 31.01065	149	54 58.86677	
19	DEDELK	5	61	17 43.99578	149	49 56.40663	
27	ELMENDORF MICROWAVE TWR	5	61	18 40.06582	149	48 46.63855	
28	ELMENDORF RADIO TWR	5	61	17 20.01629	149	50 10.79296	
31	FIRE	5	61	10 23.47791	150	9 38.61078	
32	FIRE ECC	5	61	10 22.94138	150	9 37.85359	
10	FIRE ISLAND FRONT RANGE LT	9	61	10 20.66951	150	11 59.53801	
11	FIRE ISLAND LT NO 6	9	61	7 33.78978	150	16 55.98979	
1	FIRE ISLAND REAR RANGE LT	9	61	10 13.58100	150	12 27.04300	
30	KINCAID	5	61	9 16.92770	150	3 27.31110	
26	KNIK ARM MICROWAVE RELAY TWR	5	61	25 19.90572	149	52 27.61700	
12	LOW	9	61	15 31.14720	149	52 46.64504	
17	LOW RM1	5	61	15 30.09659	149	52 42.80700	
6	MAC RM3 RM1	9	61	14 17.46080	149	59 13.83611	
29	NOT USED						
23	NOT USED						
5	NOT USED						
4	PATCO INTL CONTROL TWR	9	61	10 36.21367	149	58 58.61367	
33	PT MACKENZIE FRONT RANGE LT	9	61	14 20.64850	149	59 25.23084	
16	PT MACKENZIE LT NO 11	9	61	14 17.55928	149	59 13.95138	
7	PT MACKENZIE REAR RANGE LT	9	61	14 27.20500	149	59 52.000	
9	PT WORONZOF FRONT RANGE LT	9	61	12 7.03998	150	1 19.05667	
18	PT WORONZOF REAR RANGE LT	9	61	12 8.38878	150	1 1.29385	
25	PT WORONZOF SUB STATION	9	61	12 13.43558	150	1 8.84312	
37	RACE POINT FRONT RANGE LT	9	61	9 54.58700	150	13 36.79500	
8	RACE POINT LIGHT	9	61	10 3.18936	150	13 29.76320	
22	RACE POINT NO 3	9	61	10 2.97020	150	13 29.40126	
2	RACE POINT REAR RANGE LT	9	61	10 11.87300	150	12 39.70600	
34	RAINIER	9	61	7 48.31339	150	14 53.18804	
36	RIFE	9	61	10 20.81370	150	12 19.34542	
14	SLAM	5	61	16 7.25813	149	55 18.20370	
35	WEST POINT	9	61	7 33.79897	150	16 55.99186	
13	WOR 7	9	61	12 8.53411	150	0 59.32367	

SEE L-1163(92)

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

TO BE CHARTED
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT
(Field Party, Ship or Office)

NOAA Ship RAINIER

STATE

AK

LOCALITY

COOK INLET

DATE

7/20/92

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

NON-FLOATING AID OR LANDMARKS FOR CHARTS

ORIGINATING ACTIVITY

- HYDROGRAPHIC PARTY
 - GEODETIC PARTY
 - PHOTO FIELD PARTY
 - COMPILATION ACTIVITY
 - FINAL REVIEWER
 - QUALITY CONTROL & REVIEW GRP.
 - COAST PILOT BRANCH
- (See reverse for responsible personnel)

OPR PROJECT NO. P319-RA

JOB NUMBER

SURVEY NUMBER

DATUM

NAD83

POSITION

LATITUDE

LONGITUDE

D.M. Meters

D.P. Meters

61 14

149 47

48.0

54.0

61 08

150 13

02.0

35.0

DESCRIPTION
(Record reason for deletion of landmark or aid to navigation.
Show triangulation station names, where applicable, in parentheses)

Not useful as Nav aid as observed from sea.

Station removed in 1984 by military.

METHOD AND DATE OF LOCATION
(See instructions on reverse side)

OFFICE

FIELD

F-Vis-5
6-17-92

F-Vis-5
6-17-92

CHARTS
AFFECTED

16660
16665
16667

16660
16665
16667



FOO

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 S221

June 28, 1992

Director
DMAHTC
Attn: MCNM
6500 Brookes Lane
Washington, DC 20315-0300

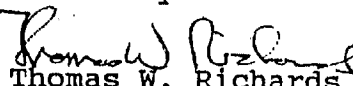
Dear Sir:

NOAA Ship RAINIER is presently conducting hydrographic survey operations in Cook Inlet, Alaska and has installed a temporary tide gauge with a forty-five foot support structure at 061/10/23N, 150/12/28W. The tide gauge and structure will be removed in August 1992.

While in transit to Anchorage an uncharted oil rig at 061/02/39N, 150/58/48W was noted. Radio communications with the oil rig tender indicated the oil rig will be repositioned in November 1992.

These dangers have been reported to DMAHTCNAVWARN and the Seventeenth Coast Guard District. A copy of the radio message regarding these dangers is enclosed, along with chartlets showing the areas in which the dangers exist.

Sincerely


Thomas W. Richards
Captain, NOAA
Commanding Officer

Enclosures





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 S221

June 28, 1992

Commander(OAN)
Seventeenth U.S. Coast Guard District
P.O. Box 3-5000
Juneau, Alaska 99802


Dear Sir:

NOAA Ship RAINIER is presently conducting hydrographic survey operations in Cook Inlet, Alaska and has installed a temporary tide gauge with a forty-five foot support structure at 061/10/23N, 150/12/28W. The tide gauge and structure will be removed in August 1992.

While in transit to Anchorage an uncharted oil rig at 061/02/39N, 150/58/48W was noted. Radio communications with the oil rig tender indicated the oil rig will be repositioned in November 1992.

These dangers have been reported to DMAHTCNAVWARN and the Seventeenth Coast Guard District. A copy of the radio message regarding these dangers is enclosed, along with chartlets showing the areas in which the dangers exist.

Sincerely


Thomas W. Richards
Captain, NOAA
Commanding Officer

Enclosures



P JUN 92
FM NOAA S RAINIER
TO CCGDSEVENTEEN JUNEAU AK
DMAHTCNAVWARN WASHINGTON DC/ / MCNM/ /
INFO NOAA MOP SEATTLE WA
ACCT CM-VCAA

BT
UNCLASS

REF: MY 240022Z JUN 92

NOAA SHIP RAINIER SUBMITS THE FOLLOWING UPDATED DANGER TO
NAVIGATION INFORMATION FOR PUBLICATION IN THE LOCAL NOTICE TO
MARINERS. FURTHER INVESTIGATION INDICATES THE LATITUDE OF THE
TEMPORARY TIDE GAUGE SUPPORT IS 061/10/23N AND NOT 061/13/48N.

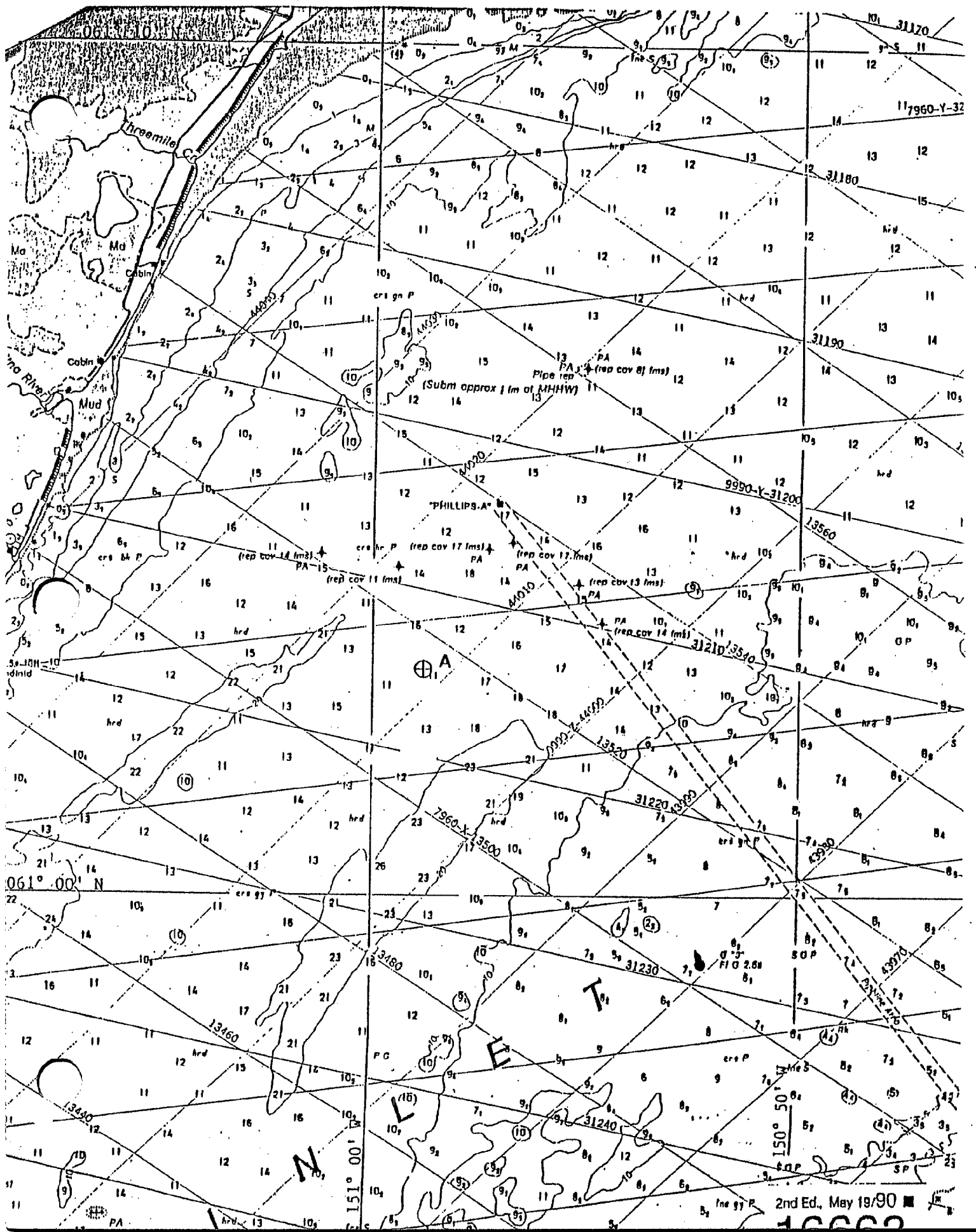
CHARTS AFFECTED: 16663 2ND ED MAY 19/90 1:100,000 NAD83
16665 2ND ED MAY 19/90 1:50,000 NAD83

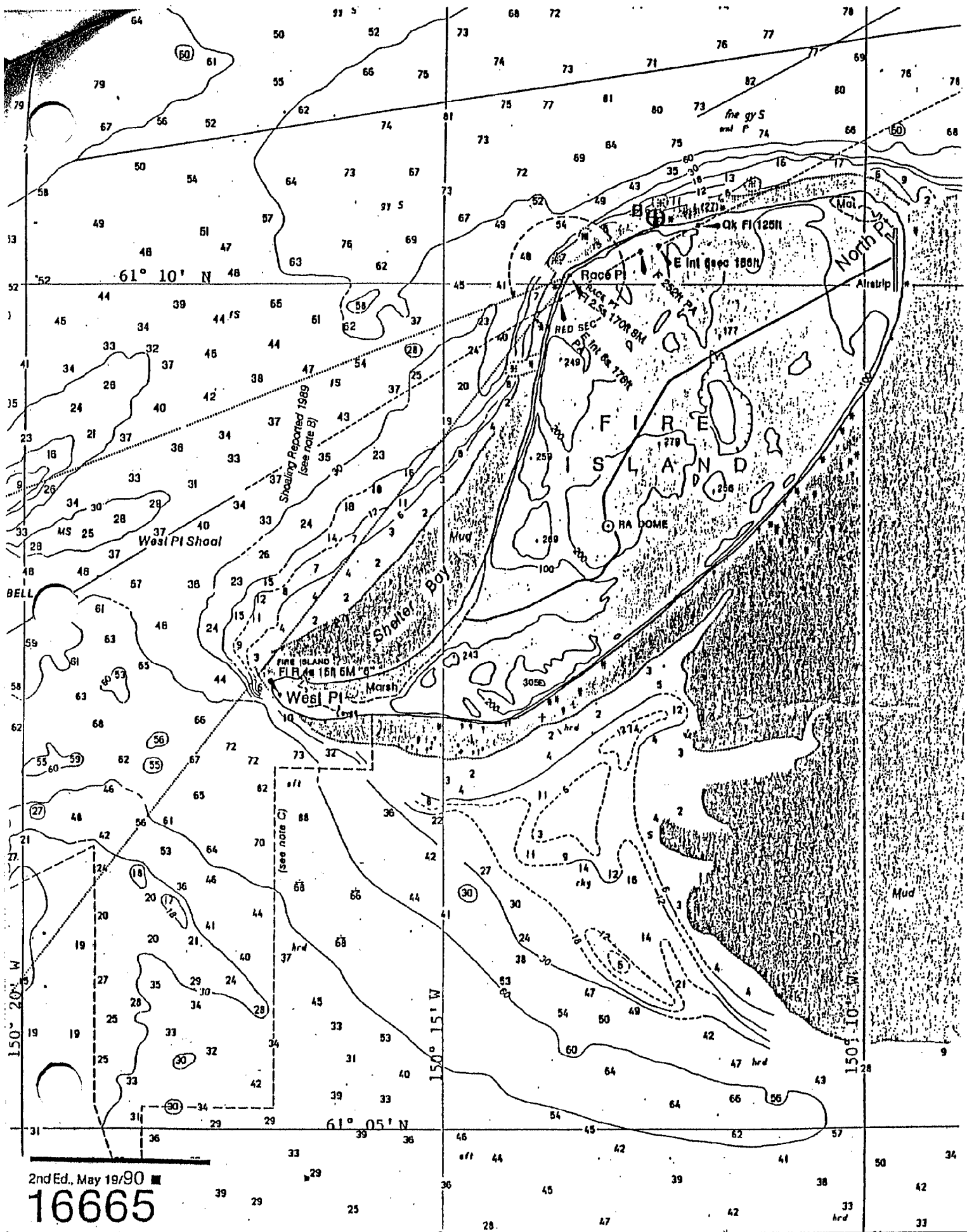
HEIGHTS ARE REFERENCED TO MLLW BASED ON PREDICTED TIDES.

<u>ITEM</u>	<u>DANGER</u>	<u>CHART</u>	<u>HEIGHT</u>	<u>DATUM</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>
A.	JACK UP OIL RIG "ADRIATIC 8"	16663		NAD 83	061/02/39N	150/58/48W
B.	TEMPORARY TIDE GAUGE SUPPORT	16665	45 FT	NAD 83	061/10/23N	150/12/28W

A LETTER WITH ATTACHED CHARTLET AND ORIGINAL RADIO MESSAGE IS BEING
MAILED TO CONFIRM THIS MESSAGE.

**ADVANCE
INFORMATION**





2nd Ed., May 1990
16665



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

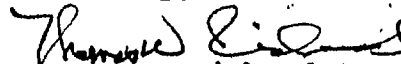
August 18, 1992

Commander
Seventeenth Coast Guard District
Post Office Box 25517
Juneau, AK 99802-5517

Dear Sir:

Attached is a confirmation copy of the radio message 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,


Thomas W. Richards
Captain, NOAA
Commanding Officer

Enclosures

cc: DMAHTC
N/CG221
PMC





DK
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

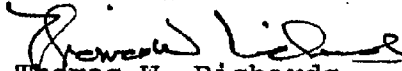
August 18, 1992

Director
DMAHTC
Attn: MCNM
6500 Brookes Lane
Washington, DC 20315-0030

Dear Sir:

While conducting hydrographic survey operations in Cook Inlet, Alaska, NOAA Ship RAINIER discovered five dangers to navigation. They have been reported to DMAHTCNAVWARN and the Seventeenth Coast Guard District. A copy of the correspondence describing the dangers is enclosed.

Sincerely,


Thomas W. Richards
Captain, NOAA
Commanding Officer

Enclosures



**ADVANCE
INFORMATION**

Tax

22:06, Thursday, 6 August 1992
tPostOUT : McDaniel

P 071930Z AUGUST 92
FM NOAA S RAINIER
TO CCGDSEVENTEEN JUNEAU AK
DMAHTCNAVWARN WASHINGTON DC//MCNM//
INFO NOAA MOP SEATTLE WA
ACCT CM-VCAA
BT

UNCLAS

NOAA SHIP RAINIER LOCATED THE FOLLOWING DANGERS TO NAVIGATION
WHILE CONDUCTING HYDROGRAPHIC SURVEY OPERATIONS IN COOK INLET,
ALASKA.

THIS INFORMATION IS PROVIDED FOR PUBLICATION IN LOCAL NOTICE TO
MARINERS:

CHARTS AFFECTED: 16665 2ND ED MAY 19/90 1:50,000 NAD83
16663 2ND ED MAY 19/90 1:100,000 NAD83

DEPTHS ARE REDUCED TO MLLW BASED ON PREDICTED TIDES.

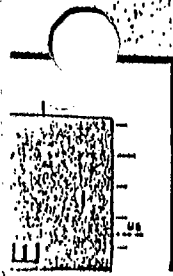
SIGNIFICANT SHOALING HAS OCCURRED ON WEST POINT SHOAL, AND NORTH
OF FIRE ISLAND NEAR THE SUSITNA FLATS. SOME SOUNDINGS
REPRESENTATIVE OF THIS SHOALING ARE:

ITEM	CHART	DANGER	DEPTH	LATITUDE	LONGITUDE
A.	16665 16663	SOUNDING 3 FM AND 4 FT	22 FT <i>6.7m</i>	61/08/35.31N	150/19/13.89W <i>C</i>
B.	16665 16663	SOUNDING 4 FM AND 5 FT	29 FT <i>8.8m</i>	61/08/29.28N	150/18/23.91W <i>* ←</i>
C.	16665 16663	SOUNDING 1 FM	6 FT <i>1.8m</i>	61/11/50.83N	150/13/32.92W <i>D</i>
D.	16665 16663	SOUNDING 2 FM AND 2 FT	14 FT <i>4.2m</i>	61/11/38.04N	150/15/13.51W <i>E</i>
E.	16665 16663	SOUNDING 0 FM AND 1 FT	1 FT <i>0.3m</i>	61/11/35.49N	150/19/34.46W <i>F</i>

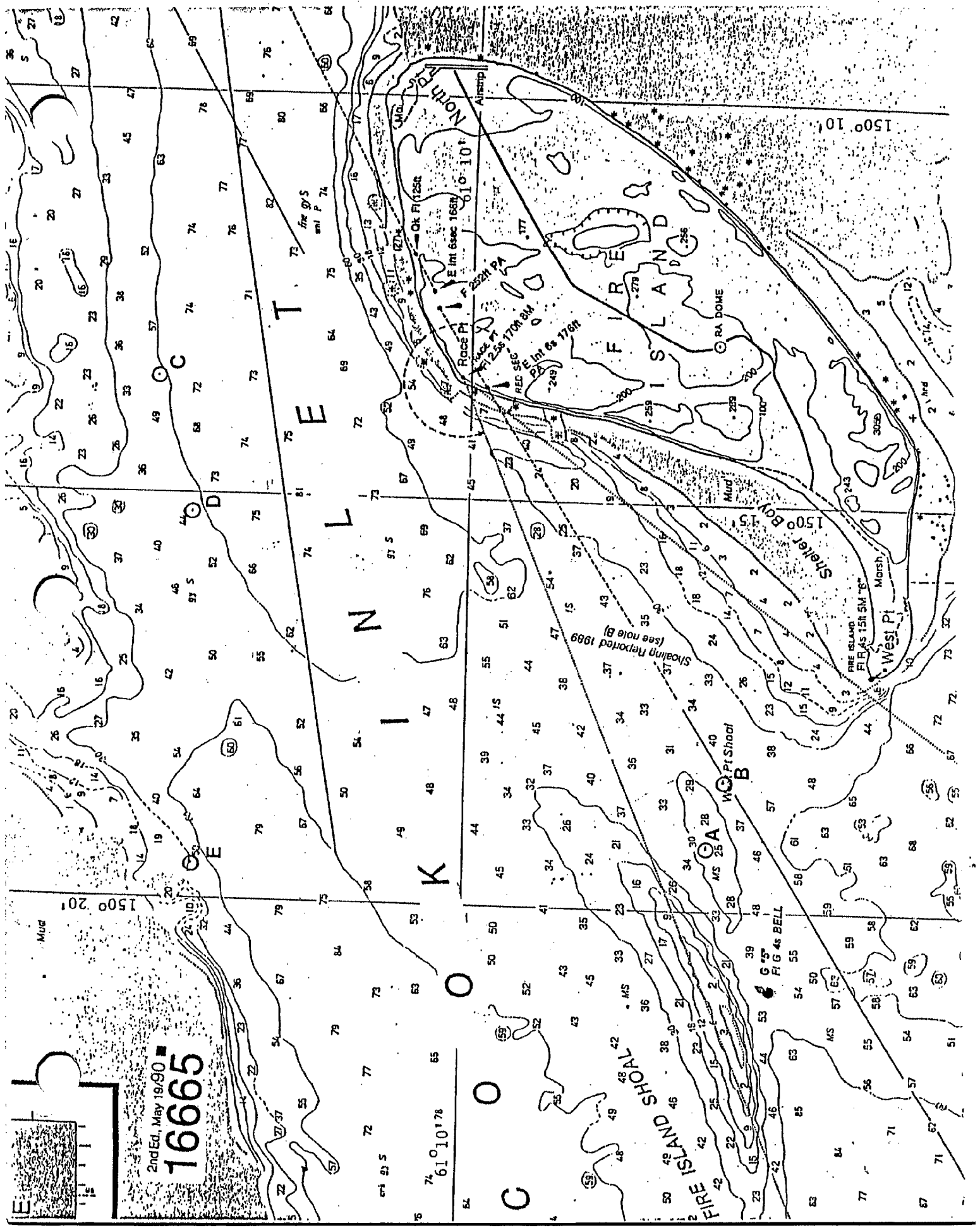
SURVEY DATA ARE STILL BEING PROCESSED AND IT IS LIKELY THAT
ADDITIONAL DANGERS TO NAVIGATION EXIST IN THIS VICINITY.

QUESTIONS CONCERNING THIS MESSAGE SHOULD BE DIRECTED TO:
COMMANDING OFFICER, NOAA SHIP RAINIER, 1801 FAIRVIEW AVENUE EAST,
SEATTLE, WA 98102-3767 OR VIA RADIO CONTACT ON 2182 MHZ OR VHF
CHANNELS 13 AND 16, CALL LETTERS WTEF. A LETTER WITH ATTACHED
CHARTS IS BEING MAILED TO CONFIRM THIS MESSAGE.

BT



2nd Ed., May 19/90
16665





DR
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

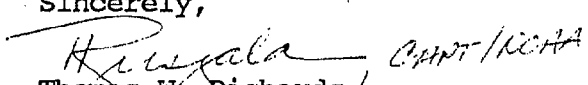
July 17, 1992

Director
DMAHTC
Attn: MCNM
6500 Brookes Lane
Washington, DC 20315-0030

Dear Sir:

While conducting hydrographic survey operations in Cook Inlet, Alaska, NOAA Ship RAINIER discovered six dangers to navigation. They have been reported to DMAHTCNAVWARN and the Seventeenth Coast Guard District. A copy of the correspondence describing the dangers is enclosed.

Sincerely,

for  *Captain/NOAA*
Thomas W. Richards,
Captain, NOAA
Commanding Officer

Enclosures





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

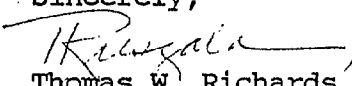
July 17, 1992

Commander
Seventeenth Coast Guard District
Post Office Box 25517
Juneau, AK 99802-5517

Dear Sir:

Attached is a confirmation copy of the radio message 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,

for  *CAPT/NOAA*
Thomas W. Richards
Captain, NOAA
Commanding Officer

Enclosures

cc: DMAHTC
N/CG221
PMC



**ADVANCE
INFORMATION**

17:05, Wednesday, 8 July 1992
tPostOUT : Hellickson

:
:
P 081704Z JUL 92
FM NOAA S RAINIER
TO CCGDSEVENTEEN JUNEAU AK
DMAHTCNAVWARN WASHINGTON DC//MCNM//
INFO NOAA MOP SEATTLE WA
ACCT CM-VCAA

BT
UNCLAS

NOAA SHIP RAINIER FOUND THE FOLLOWING DANGERS TO NAVIGATION WHILE
CONDUCTING HYDROGRAPHIC SURVEY OPERATIONS IN COOK INLET, ALASKA.

THIS INFORMATION IS PROVIDED FOR PUBLICATION IN LOCAL NOTICE TO
MARINERS:

CHARTS AFFECTED: 16663 2ND ED MAY 19/90 1:100,000 NAD83
 16665 2ND ED MAY 19/90 1:50,000 NAD83

DEPTHS ARE REDUCED TO MLLW BASED ON PREDICTED TIDES.

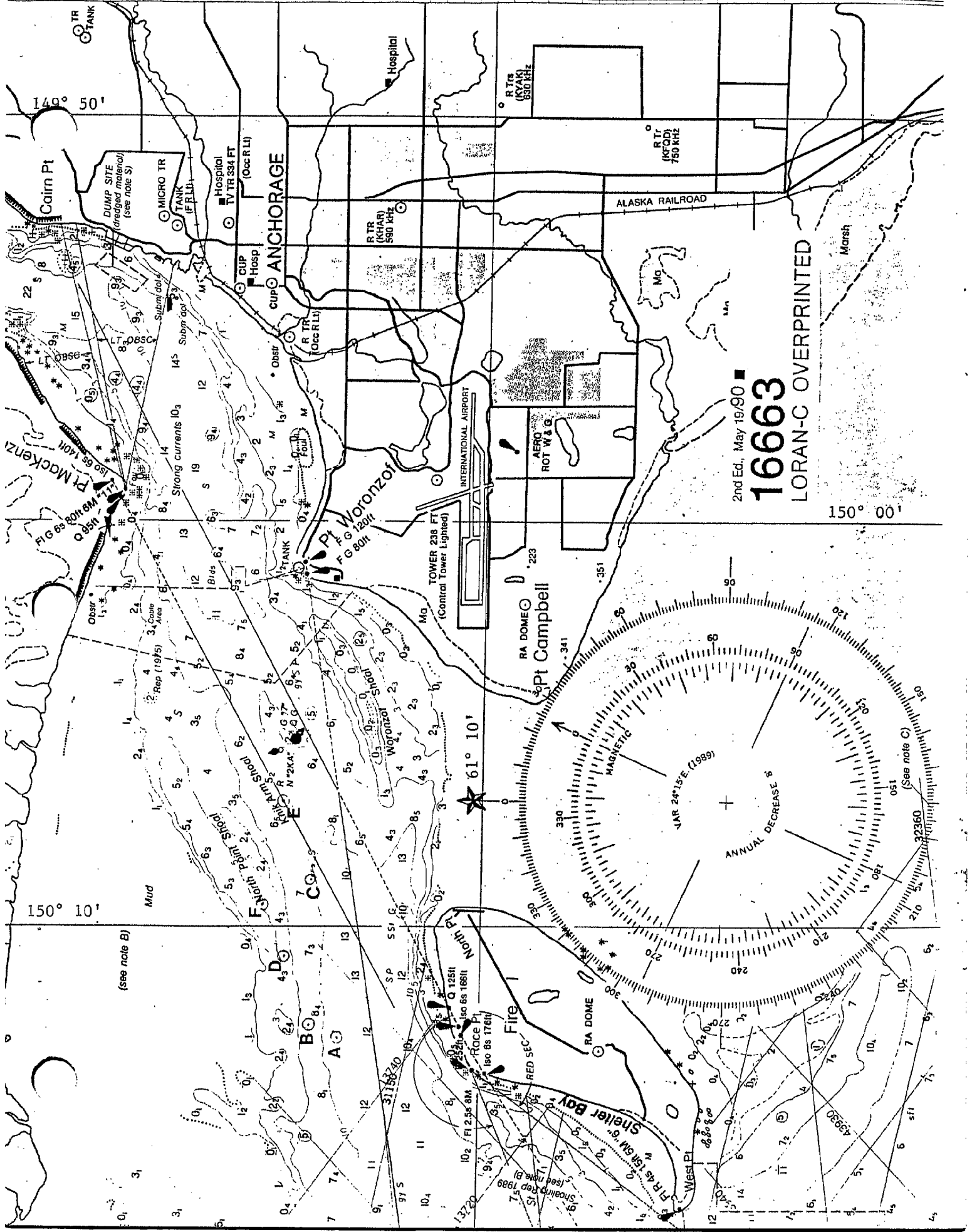
GNIFICANT SHOALING HAS OCCURRED NORTH OF THE POINT WORONZOF AND
POINT MACKENZIE RANGES ADJACENT TO NORTH POINT SHOAL. SOME
SOUNDINGS REPRESENTATIVE OF THIS SHOALING ARE:

ITEM	DANGER	DEPTH	LATITUDE	LONGITUDE
A.	SOUNDING	47 FT	61/11/42.57N	150/12/46.14W
B.	SOUNDING	3 FT	61/12/02.16N	150/12/26.08W
C.	SOUNDING	25 FT	61/12/02.24N	150/08/51.12W
D.	SOUNDING	6 FT	61/12/20.82N	150/10/45.24W
E.	SOUNDING	25 FT	61/12/22.42N	150/06/54.71W
F.	SOUNDING	0 FT	61/12/36.68N	150/09/28.65W

ADDITIONAL SHOALING MAY BECOME EVIDENT AS SURVEY WORK PROGRESSES.

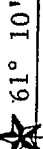
QUESTIONS CONCERNING THIS MESSAGE SHOULD BE DIRECTED TO:
COMMANDING OFFICER, NOAA SHIP RAINIER, 1801 FAIRVIEW AVENUE EAST,
SEATTLE, WA 98102-3767 OR VIA RADIO CONTACT ON 2182 MHZ OR VHF
CHANNELS 13 AND 16, CALL LETTERS WTEF. RAINIER'S CELLULAR PHONE
NUMBER WHILE IN THE VICINITY OF ANCHORAGE IS (206) 799-0498. A
LETTER WITH ATTACHED CHARTLET IS BEING MAILED TO CONFIRM THIS
MESSAGE.

BT



2nd Ed., May 19/90
16663
 LORAN-C OVERPRINTED

150° 00'



61° 10'

(see note B)

(See note C)

22360

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APPROVAL SHEET

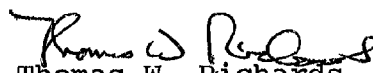
for

H-10432

RA-20-1-92

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

ORIGINAL



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Ocean and Earth Sciences
Rockville, Maryland 20852

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: March 15, 1993

MARINE CENTER: Pacific

OPR: P319-RA

HYDROGRAPHIC SHEET: H-10432

LOCALITY: Fire Island Shoal To Woronzof Shoal, Cook Inlet, Alaska

TIME PERIOD: June 10 - July 31, 1992

TIDE STATION USED: 945-5912 Fire Island, Alaska
Lat. $61^{\circ} 10.4'N$ Lon. $150^{\circ} 12.3'W$
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. $61^{\circ} 14.3'N$ Lon. $149^{\circ} 53.3'W$
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, north of $61^{\circ} 10.0'N$, south of $61^{\circ} 15.6'N$, east of $150^{\circ} 1.4'W$ and west of $149^{\circ} 59.0'W$, apply a +20 minute time correction and a x1.05 range ratio.
2. In Cook Inlet, north of $61^{\circ} 10.0'N$, south of $61^{\circ} 15.6'N$, east of $150^{\circ} 5.0'W$ and west of $150^{\circ} 1.4'W$, apply a +15 minute time correction and a x1.03 range ratio.
3. In Cook Inlet, north of $61^{\circ} 7.0'N$, south of $61^{\circ} 15.6'N$, east of $150^{\circ} 15.0'W$ and west of $150^{\circ} 5.0'W$, times and heights are direct.



4. In Cook Inlet, north of $61^{\circ} 7.0'N$, east of $150^{\circ} 20.0'W$ and west of $150^{\circ} 15.0'W$, apply a -5 minute time correction and a x0.99 range ratio.
5. In Cook Inlet, north of $61^{\circ} 7.0'N$, east of $150^{\circ} 25.0'W$ and west of $150^{\circ} 20.0'W$, apply a -10 minute time correction and a x0.97 range ratio.
6. In Cook Inlet, east of $150^{\circ} 30.0'W$ and west of $150^{\circ} 25.0'W$, apply a -15 minute time correction and a x0.95 range ratio.

B. When data for Fire Island are not available, use the following corrections applied to Anchorage (945-5920):

1. In Cook Inlet, north of $61^{\circ} 10.0'N$, south of $61^{\circ} 15.6'N$, east of $150^{\circ} 1.4'W$ and west of $149^{\circ} 59.0'W$, apply a -5 minute time correction and a x0.96 range ratio.
2. In Cook Inlet, north of $61^{\circ} 10.0'N$, south of $61^{\circ} 15.6'N$, east of $150^{\circ} 5.0'W$ and west of $150^{\circ} 1.4'W$, apply a -10 minute time correction and a x0.94 range ratio.
3. In Cook Inlet, north of $61^{\circ} 7.0'N$, south of $61^{\circ} 15.6'N$, east of $150^{\circ} 15.0'W$ and west of $150^{\circ} 5.0'W$, apply a -20 minute time correction and a x0.92 range ratio.
4. In Cook Inlet, north of $61^{\circ} 7.0'N$, 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.
5. In Cook Inlet, north of $61^{\circ} 7.0'N$, 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.
6. 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.

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.

for Brian S. Lundy

CHIEF, DATUMS SECTION

NOAA FORM 76-155 (11-72)		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION						SURVEY NUMBER			
GEOGRAPHIC NAMES		H-10432									
Name on Survey	<div style="display: flex; justify-content: space-between;"> A ON CHART No. 16665 B ON PREVIOUS SURVEY No. C ON U.S. QUADRANGLE MAPS D FROM LOCAL INFORMATION E ON LOCAL MAPS F P.O. GUIDE OR MAP G GRAND McNALLY ATLAS H U.S. LIGHT LIST K </div>										
	ALASKA (title)	X		X							
CAMPBELL, POINT	X		X								2
COOK INLET	X		X								3
FIRE ISLAND	X		X								4
FIRE ISLAND SHOAL	X										5
NORTH POINT	X		X								6
RACE POINT	X		X								7
SHELTER BAY	X		X								8
WEST POINT	X		X								9
WEST POINT SHOAL	X										10
WORONZOF, POINT	X		X								11
WORONZOF SHOAL	X										12
											13
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											24
											25

Approved:

Charles E. Harrington
 Chief Geographer - N/CG 2x3

JUL 13 1993

HYDROGRAPHIC SURVEY STATISTICS

H-10432

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		4
DESCRIP-TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/SOURCE DOCUMENTS
ACCORDION FILES	4		w/depth records		
ENVELOPES					
VOLUMES	1				
CAHIERS					
BOXES				2	

SHORELINE DATA

- SHORELINE MAPS (List):
- PHOTOBATHYMETRIC MAPS (List):
- NOTES TO THE HYDROGRAPHER (List):
- SPECIAL REPORTS (List): Summer 1992 Elec. Cont. Rpt. & Corr. to Echo Sounding Data Package
- 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			5581	
POSITIONS REVISED			2	
SOUNDINGS REVISED			94	
CONTROL STATIONS REVISED				
	TIME-HOURS			
	VERIFICATION	EVALUATION	TOTALS	
PRE-PROCESSING EXAMINATION				
VERIFICATION OF CONTROL				
VERIFICATION OF POSITIONS	85		85	
VERIFICATION OF SOUNDINGS	145		145	
VERIFICATION OF JUNCTIONS				
APPLICATION OF PHOTOBATHYMETRY				
SHORELINE APPLICATION/VERIFICATION				
COMPILATION OF SMOOTH SHEET	64		64	
COMPARISON WITH PRIOR SURVEYS AND CHARTS		12	12	
EVALUATION OF SIDE SCAN SONAR RECORDS				
EVALUATION OF WIRE DRAGS AND SWEEPS				
EVALUATION REPORT				
GEOGRAPHIC NAMES		20	20	
OTHER*				
*USE OTHER SIDE OF FORM FOR REMARKS	TOTALS	294	32	326

Pre-processing Examination by LT John Griffin	Beginning Date 9/23/92	Ending Date 10/22/92
Verification of Field Data by R. Shipley, S. Otsubo	Time (Hours) 294	Ending Date 10/15/93
Verification Check by J. Green	Time (Hours) 4	Ending Date 12/1/93
Evaluation and Analysis by J. Green	Time (Hours) 32	Ending Date 12/1/93
Inspection by D.Hill	Time (Hours) 4	Ending Date 2-16-94

**EVALUATION REPORT
H-10432**

1. INTRODUCTION

Survey H-10432 is a basic hydrographic survey, under the navigable area concept, accomplished by the NOAA Ship *Rainier* according to 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

The inshore limit for soundings for this survey is the 0-meter curve, except that features between MLLW and MHW were only to be addressed if they were AWOIS items or significant changes or additions to the chart.

This survey was conducted in Alaska and covers an area in Cook Inlet from Fire Island Shoal to Point Woronzof. The surveyed area includes West Point Shoal and Woronzof Shoal. The surveyed area extends from latitude 61/07/21N north to latitude 61/14/18N and longitude 150/01/30W west to longitude 150/28/24. The sea floor consists primarily of sand. Depths range from zero to 37 meters

Side scan sonar was utilized during this survey along the center line of the deep draft shipping route approaching the Port of Anchorage, along two line segments approximately 1000 meters north and south of the shipping route center line, along two additional lines south of Fire Island Shoal and an area of 100 percent coverage centered at latitude 61/11/30N, longitude 150/11/00W, as specified on a chart accompanying the project instructions. The side scan data was processed utilizing the procedures contained in Hydrographic Surveys Branch memorandum, *Side Scan Sonar Processing Procedures*, dated June 28, 1993. 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, sound velocity and electronic control 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: -1.986 seconds (-61.479 meters)
Longitude: 7.998 seconds (119.517 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 either DGPS or Miniranger. Several DGPS positions exceeded the 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. Several additional positions acquired by Miniranger control also exceed the accuracy specification limit in terms of ECR and residual. The review of this data also indicates that none of these positions are used to locate dangers to navigation. The features located by these positions from both methods of control are consistent with the adjoining data. They have been accepted.

There are 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 15, 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.

The required side scan sonar coverage, as depicted on the presurvey review chart, was accomplished. The 22 contacts deemed significant were adequately developed by echo

sounder and the results of these hydrographic developments are shown 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 and the Field Procedures Manual, March 1992 Edition, except for the following.

Contacts discovered during side scan sonar operations were not recorded on the Sonar Contact List nor were the results of the investigations on the contacts properly recorded on the Sonar Contact Examination Record form as prescribed by the Side Scan Sonar Manual. A summary of contacts was instead recorded on a field improvised form, however, no summarized information relevant to the hydrographic investigation of the items was compiled. The deficiency caused significant delays in processing the data but did not compromise the data quality.

5. JUNCTIONS

Survey H-10432 junctions with the following surveys.

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Area</u>
H-10431	1992	1:10,000	Northeast
H-10433	1992	1:20,000	Southwest

The junctions with surveys H-10431 and-10433 are complete.

6. COMPARISON WITH PRIOR SURVEYS

Survey H-10432 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
H-9966(1981) 1:20,000
H-9441(1974) 1:10,000
H-9442(1974) 1:10,000
H-9444(1974) 1:20,000

Survey H-10250 covers the area of this survey surrounding Fire Island and West Point Shoals. The hydrographer's discussion in section M is supplemented by the following. While Fire Island Shoal has migrated east northeast by approximately 600 meters, the point of minimum depth on West Point Shoal has remained relatively stationary, the minimum depth is now 200 meters to the southwest. This has resulted in the channel between these shoals being less distinct, as Fire Island Shoal approaches West Point Shoal. The minimum depth on West Point Shoal is now 6.5 meters, compared to 7.6 meters (25 feet) found during the 1987 survey. In addition, West Point Shoal has grown in size and is

encroaching into the channel between it and Fire Island. See section 7.b of this report for further discussion of changes in this area. Survey H-10432 is adequate to supersede survey H-10250 within the area of common coverage.

Survey H-10017 covers a small area at the southwestern tip of the present survey. The soundings on the present survey are generally about 2 meters deeper. Survey H-10432 is adequate to supersede prior survey H-10017 for the area of common coverage.

Survey H-10000 covers most of the area included within the present survey, except for the southwestern portion that is covered by prior survey H-10017, for the area superseded by survey H-10250 and for the inshore area covered by the 1974 basic surveys. Survey H-10432 extends significantly more inshore than the prior, providing complete delineation of the MLLW line. See section M of the hydrographer's report for the comparison with this survey. Survey H-10432 is adequate to supersede prior survey H-10000 within the area of common coverage.

Survey H-9966 is a 1981 investigation of Fire Island Shoal, and except for two soundings near West Point, has been superseded by survey H-10000. These soundings are about a meter shoaler than found on the present survey. However, because of the changeable nature of this area, survey H-10432 supersedes prior survey H-9966 within the area of common coverage.

Survey H-9441 covers the area inshore of survey H-10000 from the shore at Point Woronzof south towards Point Campbell. It is the charting source for the inshore soundings in this area. The area has changed, varying from deeper and shoaler in areas. As there are no features between the MLLW line and the MHW line for the area covered by this survey, survey H-10432 supersedes prior survey H-9441 within the area of common coverage.

Survey H-9442 covers the inshore area north of Fire Island, between Race Point and North Point. Four rocks, at the positions listed below, have been brought forward to the present survey.

<u>Feature</u>	<u>Latitude N</u>	<u>Longitude W</u>
rock awash	61/10/19	150/09/24
rock awash	61/10/23	150/12/21
rock awash	61/10/22	150/12/30
rock awash	61/10/25	150/11/42

With the transfer of these rocks, survey H-10432 supersedes prior survey H-9442 within the area of common coverage.

Survey H-9444 covers the northern edge and the inshore area of the present survey area, inshore of the area superseded by survey H-10000. This area has shoaled significantly. The natural channel leading towards the Little Susitna River is now over 20 feet shallower and blocked by the zero depth curve. Four rocks, at the positions listed below, have been brought forward to the present survey.

<u>Feature</u>	<u>Latitude N</u>	<u>Longitude W</u>
rock awash	61/09/30	150/14/11
rock awash	61/09/31	150/13/58
rock awash	61/09/44	150/13/49
rock awash	61/09/59	150/13/41

With the transfer of these rocks, prior survey H-9444 is superseded by the present survey 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-10432 was compared to the following charts.

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>	<u>Datum</u>
16665	2nd	May 19, 1990	1:50,000/1:20,000	NAD 83
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 and has been updated by the chartlet submitted by the field party as a danger to navigation for this survey. Charted hydrography on the 2nd edition originates with the prior surveys discussed in section 6 of this report and miscellaneous sources.

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

b. AWOIS

AWOIS item 51909, "Shoaling Reported 1989 (see note B)", in the vicinity of latitude 61/09/00N, longitude 150/15/53W, was adequately investigated. The shoaling in this area was confirmed. West Point Shoal has grown significantly in size and is encroaching to the northeast. The channel between West Point Shoal and Fire Island, although still deeper than 10 meters (33 feet), is narrower than it was previously. The note, "Shoaling Reported 1989", should be deleted and representative soundings charted. In addition, the reference to Note B should continue to be charted in the vicinity, warning the mariner of the changing nature of this area.

Lettered investigation item B, a reported 53-foot depth at latitude 61/11/19.5N, longitude 150/18/18W, was investigated using 25-meter line spacing. A 16.3-meter depth (53 feet) was found 160 meters to the east. The reported 53-foot depth is presently not charted. This depth should not be charted.

Lettered investigation item C, a reported 34-foot depth at latitude 61/11/24N, longitude 150/16/48W, was investigated using 25-meter line spacing. A 9.4-meter depth (31 foot)

was found 200 meters to the northeast. The reported 34-foot depth is presently not charted. This sounding is superseded by data from this survey.

Lettered investigation item E, a reported 26-foot depth at latitude 61/08/51N, longitude 150/17/30W, was investigated using 25-meter line spacing. This reported depth falls on the northeast portion of West Point Shoal. The minimum depth found is 8 meters (26 feet) 200 meters to the southwest. The charted "26 reported 1990", should be deleted.

Lettered investigation item F, a reported 27-foot depth at latitude 61/09/18N, longitude 150/17/00W, was investigated with 25-meter line spacing. This reported depth falls just north of West Point Shoal, in present depths of 10.7 meters (35 feet). A minimum depth of 8.7 meters (28 feet) is found 360 meters south. The charted, "27 reported 1990", is considered disproved and should be deleted from the chart.

c. Controlling Depths

There are no channels with controlling depths on survey H-10432.

d. Aids to Navigation

There are eight non-floating aids to navigation within the area of this survey. The positions for these aids are shown on the attached List of Geographic Positions. The source of the positions for Fire Island Rear Range Light, Fire Island Light No 6, Race Point Front Range Light and Race Point Rear Range Light shown on the attached List of Geographic Positions is unknown. They are depicted on the smoothsheet as aids of less than third order accuracy. The positions of the aids shown on the smoothsheet agree with the charted positions and the aids appear to serve their intended purpose.

Both landmarks recommended for deletion on the attached NOAA Form 76-40 have been removed from the 3rd Edition. The remaining landmarks common to this survey area should be retained as charted.

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

Seven dangers to navigation were submitted by the field party for the area of this survey. Copies of these reports are attached. In addition, 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.

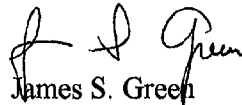
No additional dangers were found during the office processing of this survey.

8. COMPLIANCE WITH INSTRUCTIONS

Survey H-10432 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-10432

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.

Dennis J. Hill

Date: *2/16/94*

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.

Douglas G. Hennick

Date: *2/16/94*

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

Final Approval

Approved:

J. Austin Yeager

Date: *3/15/94*

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

MARINE CHART BRANCH
RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. _____

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
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			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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