10277

10277

Diagram No. 8802-3

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. FA-20-2-88

Registery No. H-10277

LOCALITY

State Alaska

General Locality Bristol Bay

Sublocality The Twins and Vicinity

1988

CHIEF OF PARTY
CAPT G.R. Schaefer

LIBRARY & ARCHIVES

DATE June 21, 1989

☆U.S. GOV. PRINTING OFFICE: 1985—566-054

"GP"
CHT

16315
16011
16006
} Cartog. sign off on FM. in back

NOAA FORM 77-28 (11-72)

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

HYDROGRAPHIC TITLE SHEET

REGISTER NO.
H-10277

FIELD NO.
FA 20-2-88

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

State Alaska

General locality Bristol Bay

Locality The Twins and Vicinity

Scale 1:20,000 Date of survey June 25, 1988 - August 15, 1988

Instructions dated March 6, 1987 Project No. OPR-R184-RA

Vessel FAIRWEATHER S220, 2020, 2023, 2024, 2025, 2026

Chief of party Captain Glen R. Schaefer, NOAA

Surveyed by LCDR, Mason, LT Ruiz, LTJG Bernard, LTJG Nodine, ENS Lemon, ENS Birk-Risheim, ENS Neander, ENS Niichel, and CST Krick

Soundings taken by echo sounder, ~~hand lead, pole~~ Raytheon DSF 6000N and leadline

Graphic record scaled by FAIRWEATHER Personnel

Graphic record checked by FAIRWEATHER Personnel

Verification by: ~~Protracted by~~ Leonardo Deodato Automated plot by PMC Xynetics Plotter

Evaluation by: ~~Xxxxxxxxxx~~ Gordon E. Kay

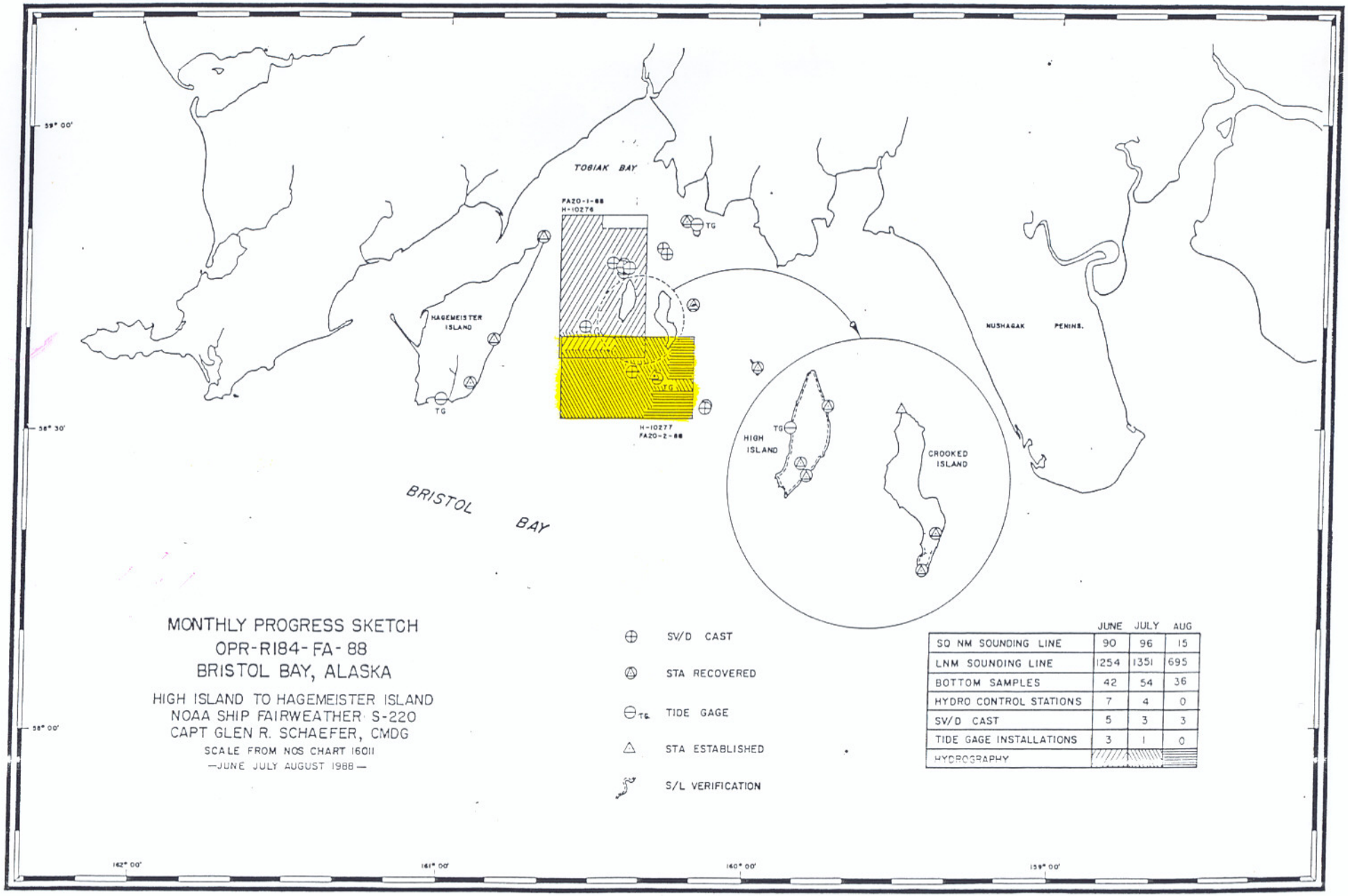
Soundings in fathoms ~~feet~~ at ~~MLW~~ MLLW and tenths of fathoms

REMARKS: All times are UTC. Revisions and marginal notes in black were generated during office processing. All separates are filed with the hydrographic data, as a result page numbering may be interrupted or non-sequential.

SC 3-28-97 AWOIS + SURF ✓ PHB 8/89
KWW 9/30/93

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978-665-010-1174



MONTHLY PROGRESS SKETCH
OPR-R184-FA-88
BRISTOL BAY, ALASKA

HIGH ISLAND TO HAGEMEISTER ISLAND
NOAA SHIP FAIRWEATHER S-220
CAPT GLEN R. SCHAEFER, CMDG
SCALE FROM NOS CHART 16011
—JUNE JULY AUGUST 1988—

⊕ SV/D CAST
⊙ STA RECOVERED
⊖TG TIDE GAGE
△ STA ESTABLISHED
S/L VERIFICATION

	JUNE	JULY	AUG
50 NM SOUNDING LINE	90	96	15
LNM SOUNDING LINE	1254	1351	695
BOTTOM SAMPLES	42	54	36
HYDRO CONTROL STATIONS	7	4	0
SV/D CAST	5	3	3
TIDE GAGE INSTALLATIONS	3	1	0
HYDROGRAPHY			

Descriptive Report
to Accompany Hydrographic Survey H-10277
Field Number FA-20-2-88, Scale 1:20,000
NOAA Ship FAIRWEATHER S220
Captain Glen R. Schaefer, Commanding
1988

A. PROJECT

Survey H-10277 is a basic hydrographic survey conducted in accordance with Project Instructions OPR-R184-FA-88, dated March ~~20~~, 1987; Change Number 1, dated March 20, 1987; Change Number 2, dated June 02, 1987; Change Number 3, dated August 10, 1987; Change Number 4, dated May 02, 1988; Change Number 5, dated July 19, 1988; the Hydrographic Manual (fourth edition) through Change Number 3; the PMC Oporder, and the Hydrographic Survey Guidelines.

The purpose of this survey is to provide contemporary hydrographic survey data for existing nautical charts, and for larger scale charts yet to be published.

This survey is designated sheet "R" in the Project Instructions.

B. AREA SURVEYED

Field work commenced on June 25, 1988 (DN 177) and concluded on August 15, 1988 (DN 228).

The survey was conducted in the state of Alaska, in northern Bristol Bay, in the vicinity of The Twins.

The northern survey limit is latitude 58°39'48"N and the southern shoreline of Crooked Island. The western limit is longitude 160°36'30"W, the eastern limit longitude 160°11'06"W, and the southern limit latitude 58°31'~~21~~18"N.

C. SOUNDING VESSEL

Hydrographic data for this survey were acquired using one vessel type. Jensen survey launches FA-3, FA-4, FA-5, and FA-6 were designated vessel numbers 2023, 2024, 2025, and 2026, respectively. Soundings for shoreline verification were accomplished using lead lines or sounding

poles. FAIRWEATHER (vessel number 2020) was used for all sound velocity casts; bottom samples were collected by Jensen survey launches.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

FAIRWEATHER's survey launches, equipped with dual-beam Raytheon DSF-6000N echo sounders, were used to obtain soundings (Table I).

Table I

Raytheon DSF-6000N Serial Numbers by Vessel

DN	2023	2024	2025	2026
177-192	B048N	A113N	B049N	A121N
193-228	A104N	A113N	B049N	A121N

Echo-sounding equipment was monitored continuously while on line. Hydrographic data were scanned to insert peaks and deeps between soundings and to ensure proper depth digitization.

No mechanical problems with the DSF-6000N echo sounders affected data quality during the survey. To ensure proper operation, bar-checks at 3 fms were conducted daily. However, the bar-check trace for VN 2025 on DN 216 is missing. The bar-check was on the end of a roll, and when the roll was changed before the start of hydrography, the section with the bar-check was lost. The bar-check information is recorded on the raw record, (Hydro Plot Listing).

On DN 192, launch 2023, echo sounder B048N (after replacement of the power supply) developed an intermittent trace and was later replaced (DN 193 to DN 228) with echo sounder A104N. No data were acquired on this survey on the day of the failure.

Sounding correctors determined for this survey apply to both the high- and low-frequency sounding data.

High-frequency beam data were digitized except in a limited number of cases. The low frequency trace was used for soundings by VN 2023, DN 219 and 220, position numbers 10768 through 10808. The low-frequency trace was used to verify depths when the high-frequency trace was lost due to steep relief or suspended particles in the water column. Use of the low-frequency trace is indicated on the raw record with the annotation "Low Frequency Trace" or "LFT."

Diver's least depths were obtained by tape measure or pneumatic depth gauge.* The depth gauge was manufactured by 3-D Instrument, Inc. (serial number 8302079N). System calibration data can be found in the separate Corrections to Echo Soundings report. *Positions 9001-9004, See Page 12.

Launches were tested for settlement and squat on April 20, 1988 (DN 111) in Excursion Inlet, Alaska. The test results were used to plot settlement and squat curves for each launch; measurements were conducted in accordance with section 4.9.4.2 of the Hydrographic Manual. The only application of settlement and squat correctors occurred on DN 197 and 198, launch 2025, with a -0.1-fm corrector. Refer to the Corrections to Echo Soundings report for details concerning settlement and squat determinations.

Launch transducer depths were determined by an oversize carpenter's square. The square was constructed of angle iron, with foot and tenth markings noted on the rise. Divers held the square flush against the transducer while the rise was plumbed by personnel on the pier using a bubble level. The static transducer draft measurement was made on April 20, 1988 (DN 111) in Excursion Inlet, Alaska. A correction of 0.3 fms was determined for all launches. All launch soundings on the final field sheet were plotted using this TRA value.

Velocity correctors were determined from nine SV/D casts in accordance with section 4.9.5.2 of the Hydrographic Manual (Table II). Program VELTAB was used to generate velocity tape data (Table III). Velocity corrections using the final velocity tapes (Appendix IV) were applied to all echo-sounder depths plotted on the final field sheet.

Table II

Velocity Casts

Tape Number		DN	Latitude (N)	Longitude (W)
9	OFF SHEET LIMITS	167	58°47.8′	160°18.7′
10		175	58°45.9′	160°25.4′
11		182	58°45.3′	160°24.3′
12		182	58°32.1′	160°09.6′
13		193	58°46.5′	160°27.4′
14		197	58°45.6′	160°27.4′
15		197	58°40.0′	160°33.2′
16		216	58°45.8′	160°24.9′
17		217	58°32.2′	160°09.2′

Table III

Velocity Tapes

Velocity Tape Number	Based on Casts	DN
2	9,10,11,12	168-181
3	13,14,15,16,17	190-228

SV/D casts were conducted using a Plessy Model 9040 Environmental Profiling System (EPS), serial number 5653; the instrument was calibrated on April 4, 1988, at Northwest Regional Calibration Center (NRCC).

TC/TI tapes were made in accordance with PMC OPORDER, Section 3.5.1. Printouts of TC/TI tapes are included in Appendix IV.

Tide correctors applied to the final field sheet are based on predicted tides for Hagemeister Island, Alaska, and corrected to the survey area in accordance with Change Number 4, Project Instructions OPR-R184-FA-88. Tide correctors for the survey area are -0 hr 40 min for high water, -0 hr 30 min for low water, with a height ratio of x 1.03. The tidal regime is labeled Tide Zone "C" on the raw record. Refer to Appendix II, Field Tide Notes, for further information.

E. HYDROGRAPHIC SHEETS

Final field sheets were plotted onboard FAIRWEATHER using a PDP-8/e computer and Houston Instruments COMPLOT DP-3 plotter. The survey consists of two mylar final field sheets, one mylar DP overlay, and three paper development sheets (Table IV). The final field sheet was divided into two parts. One sheet has sounding lines, bottom samples, least depths from developments, dive investigations, depth curves, shoreline from shoreline maps, and point features (e.g., rocks) with heights only. The second sheet (overlay plot) provides shoreline from shoreline maps, position numbers for the least depths, and point features which are plotted on the final field sheet.

Table IV

Hydrographic Sheets

Sheet	Scale	Skew	Dimensions (inches)
FA-20-2N-88	1:20,000	0	21 x 54
Detached Positions	1:20,000	0	21 x 54
Developments A, B	1:20,000	0	15 x 13
Development C	1:20,000	0	19 x 12
FA-20-2S-88	1:20,000	0	21 x 54
Developments D, E, F, G	1:20,000	0	12 x 12

Least depths from developments were transferred to both final field sheets.

When a point feature position differs between the final field sheet and an overlay, the overlay position should be taken as the correct position.

Survey data will be forwarded to Pacific Marine Center, Seattle, Washington, for ~~verification~~ PROCESSING and smooth plotting.

Due to inaccuracies in predicted tides, dashed depth curves are used to indicate approximate bottom topography. The curves are faired and biased to main-scheme soundings due to significant alteration of the contour trend by split and development soundings. A non-standard depth curve (8 fms), drawn in brown ink, is used to further clarify bottom topography in extensive featureless areas. SEE EVALUATION REPORT SECTION 1

Hydrography west of Crooked Island, at latitude 58°39'48"N, and from the shoreline west to longitude 160°19'00"W, extends sheet FA-20-2N-88 to a width of 79 cm, exceeding the allowable limit of 76 cm as stated in section 1.2.4.1 of the Hydrographic Manual. This was done to allow development of a danger to navigation (a rock ~~awash~~ UNCOVERS)* at latitude 58°39'42.~~65~~64"N, longitude 160°18'28.~~70~~64"W, located on contemporary survey H-10222.

* POSITION NUMBER 6861 * (3)

F. CONTROL STATIONS

All existing horizontal control stations used in this survey were recovered by FAIRWEATHER personnel (Table V). Two permanently marked, recoverable points (QUICK and TWINS) were established by traverse methods. All geodetic positions are based on the North American Datum of 1927.

Hydrographic signals used in support of this survey are listed in Appendix V, List of Stations.

G. HYDROGRAPHIC POSITION CONTROL

Hydrographic positioning was accomplished using the Motorola Mini-Ranger III system (Table VI). The control configuration consisted of range/range for all positioning. FAIRWEATHER was not used for hydrographic positioning on survey H-10277. Base-line calibration (BLC) was conducted in accordance with PMC OPORDER, Section 3.3.1.1.

Table VI

Console and R/T Units by Sounding Vessel

VN	DN	Console	RT Number
2023	177-225	703	B1108
2023	227-228	710	B1212
2024	177-228	506042	E2716
2025	177-228	716	C1875
2026	177-228	B0323	B1398

Beginning BLCs were conducted (except for code 8) for data acquired during this survey from DN 138 through DN 140, and DN 144, along a measured distance of 1259.9 meters between two recoverable marks (Coast Guard Pier, Juneau, Alaska, to Union 76 tank farm). Code 8 was calibrated in Dutch Harbor, Alaska, on DN 183, along a measured distance of 1387.0 meters between two nonrecoverable marks.

Ending BLCs were conducted on DNs 237 through 239, along a measured distance of 973.5 meters between two nonrecoverable marks in Womens Bay, Kodiak, Alaska.

In addition, an ending base-line calibration was not obtained for Console/RT 703/1108 due to total system failure during August 12 (DN 225), position numbers 10937 through 11054. All critical and noncritical checks indicates that this system was operating properly from DN 177 to DN 225.

TABLE V

OPR-R184-FA-88 TOGIAK BAY, ALASKA

LIST OF GEOGRAPHIC POSITIONS (NAD 27)

SPN	STATION NAME	GPN CODE K	LATITUDE DEG MN SEC	LONGITUDE DEG MN SEC	G-NBR
5	BOO BOO	3	58 39 35.26926	160 15 14.56172	
22	BOO BOO RM1	UNIDENTIFIED			
23	BOO BOO RM2	UNIDENTIFIED			
24	CALM POINT RM1	UNIDENTIFIED			
25	CALM POINT RM2	UNIDENTIFIED			
14	CALM POINT 1948	9	58 34 44.05723	160 55 1.72860	15848
4	CROOKED 1948	9	58 42 10.70373	160 17 18.64189	15848
3	CROOKED 1948 AZ MK	5	58 38 21.88543	160 16 8.40471	
26	CROOKED 1948 RM1	UNIDENTIFIED			
27	CROOKED 1948 RM2	UNIDENTIFIED			
1	DRO	5	58 43 49.02136	160 23 .39818	
28	DRO RM1	UNIDENTIFIED			
29	DRO RM2	UNIDENTIFIED			
16	FOG	5	58 42 29.89770	160 11 23.67088	
17	FOG RM2	UNIDENTIFIED			
7	GEM	9	58 39 36.48300	160 49 29.18600	
20	HIGH 1948	9	58 43 35.34034	160 23 56.88201	15848
15	HIGH 1948 AZ MK	5	58 42 16.05548	160 23 57.55644	
30	HIGH 1948 RM1	UNIDENTIFIED			
31	HIGH 1948 RM2	UNIDENTIFIED			
2	LOW	5	58 41 27.93569	160 24 10.18255	
32	LOW RM1	UNIDENTIFIED			
33	LOW RM2	UNIDENTIFIED			
34	OWENS RM1	UNIDENTIFIED			
35	OWENS RM2	UNIDENTIFIED			
10	OWENS 1948	9	58 55 55.38383	160 14 24.30703	15848
6	QUICK	5	58 43 43.30095	160 18 3.79305	
9	QUIG	9	58 55 35.01010	160 42 13.67200	
21	ROUND 1948	9	58 36 19.28506	159 58 33.25742	15848
36	ROUND 1948 RM1	UNIDENTIFIED			
37	ROUND 1948 RM2	UNIDENTIFIED			
8	STRAIT 1948	9	58 49 4.24167	160 40 55.84692	15848
38	STRAIT 1948 RM1	UNIDENTIFIED			
18	SUMMIT 1948 AZ MK	9	58 50 49.89732	160 13 15.72029	15848
12	TP-1	5	58 38 52.07750	160 15 6.72876	
13	TP-2	5	58 39 1.61674	160 14 59.22851	
11	TWINS	5	58 35 55.75899	160 18 26.24620	
19	TWINS RM1	UNIDENTIFIED			

This unit was replaced by Console/RT 710/B1212 on August 14 (DN 227), which was not base-line calibrated until Kodiak, Alaska (DN 237 through DN 239). The beginning BLC values were used for final field sheet plotting. However, this unit was repaired in the first part of the season. Recommend the final BLCs be used for smooth plotting of positions 9000 through 9008 (DN 227 through 228).

Because the difference between beginning and ending BLCs were less than 8 meters, the beginning and ending calibrations were not averaged. The beginning correctors were used for the final field sheet plotting. Recommend the final BLC correctors be used for smooth plotting as they better represent survey conditions? Final BLCs and minimum signal strengths can be found in the Electronic Control Data report. * Final BLC were used to Plot Smooth Sheet

Hydrographic positioning equipment was critically system checked at least once per week until DN 220. From DN 220 to DN 227, critical system checks were not possible due to adverse conditions and poor visibility. Noncritical system checks were conducted once per day throughout this period and did not indicate equipment malfunction or substandard operations. Due to weather and time constraints, a closing critical system check was not conducted; recommend the closing BLCs be used as a substitute for critical calibrations during this period. Code 9 could not be critically calibrated due to failure of the unit on August 9 (DN 222). Noncritical system checks before DN 222 indicated that code 9 was operating within acceptable limits. Recommend that ending BLCs be used as a critical system check. All hydrographic positioning equipment was found to be accurate within the limits set forth by PMC OPORDER, Section 3.1.1.2. Critical system checks were accomplished using the theodolite intersection method or by EDMI (Table VII).

Table VII

Survey Instruments

Manufacturer	Instrument	Model	Serial Number
Hewlett-Packard	EDMI	3808A	1723A00172
Wild	theodolite	T-1	13008
Wild	theodolite	T-1	12932
Wild	theodolite	T-2	26336
Wild	theodolite	T-2	85652
Wild	theodolite	T-2	257219
Wild	theodolite	T-2	276503
Leitz	theodolite	TM1A	2151

In all cases, the launch R/T units were located directly over the transducers, eliminating the need for ANDIST correctors.

Because of the distances involved and atmospheric conditions, there were several instances where signal strengths were below beginning BLC console minimums. Sounding positions with signal strengths below minimum were kept when the plot was good and the rates were steady. These instances, noted on the raw computer printout, were few in number and do not constitute an error or problem with sounding positions. When compared with ending BLCs most of these signal strengths are acceptable, since the ending BLC minimums are slightly lower than the beginning BLC minimums.

H. SHORELINE

The survey shoreline was taken from two 1:20,000-scale Class III registered shoreline maps. Shoreline maps TP-01190 (1:20,000) and T-9248 (1:20,000)* were used for the shoreline of Crooked Island south of latitude 58°39'32"N; T-9248 was used for the shoreline of The Twins. Verified features from shoreline maps are shown in black on the final field sheet; no changes to verified shoreline features were made. New features (e.g., new rocks and foul limits) are in black.

* SEE EVALUATION REPORT SECTION 6

High winds and heavy sea conditions prevented the completion of shoreline verification for Crooked Island and The Twins. The mean high water line and foul limits, verified during hydrography, are correct as shown on the shoreline maps. Non verified features lie within foul limits defined by hydrography. No discrepancies were found with verified features, therefore it is reasonable to assume aerial photography was accurate, and nonverified features

are accurately depicted on the shoreline map. Recommend the nonverified features be kept for charting purposes. CONCUR
Features seaward of the mean high water line not verified are shown in blue on the final field sheet.

The portions of Crooked Island that remain to be verified are as follows: SEE EVALUATION REPORT SECTION 9 FOR ADDITIONAL WORK RECOMMENDATIONS.

Rock, 58°38'58.5"N, 160°16'07"W; ✓

Shoreline from 58°38'14"N, 160°16'20"W to 58°39'10"N, 160°15'03"W; ✓

Two map rocks, in the vicinity of 58°39'22"N, 160°14'54"W. ✓

The shoreline of The Twins is not verified;* additional north-to-south sounding lines on the southern and northern shoreline of both islands of The Twins is necessary to further define the shoreline. CONCUR

* NO CONTEMPORARY PHOTOGRAMMETRIC COVERAGE OF THESE ISLANDS IS AVAILABLE.

No control stations are located seaward of the shoreline.

I. CROSSLINES

Crosslines were run at a minimum of 45 degrees to main-scheme lines and account for 8.6% of main-scheme coverage. Due to the discrepancy in times and heights between actual and predicted tides, main-scheme and crossline soundings differ by as much as 1.3 fms. ✓

In some cases, the vessel used for a main-scheme line did not run the corresponding crossline. The discrepancy between actual and predicted tides prevents accurate comparison of soundings. ✓

J. JUNCTIONS

SEE EVALUATION REPORT SECTION 5

This survey junctions with surveys H-10219 (1986) and H-10216 (1986) to the east, and H-10222 (1986) and H-10276 (1988) to the north; all surveys are at 1:20,000 scale. Common soundings agree to within 0.6 fm. The source and actual amount of the discrepancy between soundings can be determined after smooth tides are applied. ✓

K. COMPARISONS WITH PRIOR SURVEYS

The survey area falls within the boundaries of prior survey H-7718 (1948), scale 1:100,000, and blueprint survey BP-18063 (1916), not otherwise identified. ✓

Agreement with survey H-7718 is acceptable considering the difference in scale and inaccurate predicted tide correctors used for survey H-10277, with the following exception: A block of soundings on survey H-7718, bordered by latitudes 58°33'10"N, 58°32'50"N, and longitudes 160°24'48"W, 160°25'50"W, and varying in depth from 1.5 to 4.5 fms, corresponds to 3.9 to 4.7 fms on survey H-10277. Inaccurate tide correctors and possible shoaling (indicated by sand waves) could account for the discrepancy. Survey H-10277 was conducted with more accurate positioning and determination of critical depths through closer line spacing than was accomplished during the prior survey. SEE EVALUATION REPORT SECTION 6 — SEE EVALUATION REPORT SECTION 1

There are no nonsounding features on survey H-7718. ✓

A copy of survey BP-18063 was unavailable for comparison; however, two soundings from survey BP-18063 appear on Preliminary Chart 16315, and are compared with this survey in Section L, Comparison with the Chart. A COMPARSION WAS NOT REQUIRED BY THE PROJECT INSTRUCTIONS.

Survey H-10277 is adequate to supersede the prior survey within common areas. CONCUR

L. COMPARISON WITH THE CHART — SEE EVALUATION REPORT SECTION 7

Eight soundings on Preliminary Chart 16315 (4th Edition, January 02, 1988, NAD 83, 1:100,000 scale) fall within the boundaries of survey H-10277; six soundings were obtained from survey H-7718 (1948), scale 1:100,000, and were described in section K. The two remaining soundings were obtained from blueprint survey BP-18063 (1916), not otherwise identified, and one compares well with survey H-10277, considering differences in scale and tide correctors. The 10-fm sounding on Preliminary Chart 16315 attributed to BP-18063, at latitude 58°31.6'N, longitude 160°35.7'W, occurs in a region of sand waves, with a maximum sounding of 9.4-fms. Inaccurate tide correctors and possible shoaling (indicated by sand waves) could account for the discrepancy. — SEE EVALUATION REPORT SECTION 1

No AWOIS items lie within survey limits. DO NOT CONCUR SEE EVALUATION REPORT SECTION 6

One danger to navigation was noted on this survey and reported to Commander, USCG Seventeenth District, Juneau, Alaska, and DMAHTC. A copy of the Danger to Navigation Report, dated September 26, 1988, is included in Appendix IX, Dangers to Navigation. A description of the danger to navigation, latitude and longitude, and position numbers are listed in the letter.

SEE EVALUATION REPORT SECTION 4

Other dangers to navigation were noted (Table VIII), but only the danger to navigation mentioned above was reported for survey H-10277. The danger to navigation mentioned above occurred on prior survey H-10222, an area which is now charted. Since the remaining area is unsurveyed, reporting these relatively isolated shoals may have implied that these were the only dangers to navigation, and that the rest of the area was safe for navigation.

do NOT CONCUR

Table VIII

Dangers to Navigation

Depth (fms)	Latitude (N)	Longitude (W)	Position Number(s)
3.~~5~~4	58°36.~~6~~'33.97"	160°18'~~.1~~'06.37"	9001 ✓
5.~~4~~3 RK	58°36'.~~3~~'19.36"	160°18'~~.8~~'48.71"	9002 ✓
3.~~1~~0 RK	58°38'~~.4~~' 21.53"	160°15'~~.2~~' 10.82"	9003 ✓
2.~~9~~8 RK	58°38'~~.6~~' 39.60"	160°14~~.7~~'43.28"	9004 ✓
~~1~~.~~9~~2.2	58°32'~~.2~~' 10.01"	160°23~~.8~~'26.03"	6634~~3~~ plus ~~7~~7 ✓
~~1.9~~	~~58°32.2'~~	~~160°23.4'~~	~~6634~~

Shoal Depth (fms)	Boundaries Latitude (N)	Boundaries Longitude (W)	Position Numbers
	58°32'45.67"	160°24'13.37"	6526/7
~~1.7~~ 2.1	~~58°32.9'~~	~~160°26.0'~~	~~6563 through 6564~~ ✓
	~~58°32.6'~~	~~160°26.6'~~	~~6544 through 6545~~
Shoalest depth on Shoals			~~6526 through 6528~~
			~~6508 through 6509~~
	58°33'21.58"	160°25'28.67"	2479/5
1.~~8~~8	~~58°33.5'~~	~~160°25.3'~~	~~2755 through 2757~~
	~~58°33.1'~~	~~160°26.1'~~	~~2734 through 2735~~ ✓
			~~2709 through 2711~~
			~~2689 through 2691~~
			~~2663 through 2664~~

Position numbers 9001 through 9004 in the above list represent dive investigations on point features. Recommend these depths be charted after accurate tides have been applied.

CONCUR

Depths shoaler than those listed above exist throughout the area and conform to the general depth curves. The dangers reported above are isolated features located during the survey which rise significantly above surrounding deeper depths. All depths and heights are reduced to MLLW using predicted tides.

M. ADEQUACY OF SURVEY

This survey is 95% complete and fully adequate to supersede all prior surveys in common areas. Additional field work is necessary in developments, shoreline verification, bottom samples, and dive investigations (refer to Section Q, Recommendations). SEE EVALUATION REPORT SECTION 9, FOR SUMMARY OF ADDITIONAL WORK.

Inaccuracies in the predicted tides and tidal zoning, based on Hagemeister Island, Alaska, have resulted in significant errors in the tide reducers applicable to survey H-10277. As a result, discrepancies of up to 0.7 fms occur in crossline comparisons, day-to-day comparisons, junctions with contemporary surveys, and elevations and depths associated with DP's and reference numbers during shoreline verification. Actual tides at Hagemeister Island occur up to 3 hours later for predicted high water, up to 1 hour later for predicted low water, and differ from the predicted tidal range by a factor of approximately 1.23. SEE EVALUATION REPORT SECTION 1

Additionally, the tides observed at the gage site on High Island differ significantly from Hagemeister tides corrected to the area between 58°40'N and 58°45'N as specified in Change 4, section 5.9.3, of the project instructions. The mean difference, based on a 46-day period from June 3 to July 20, is 0 minutes for low water and minus 50 minutes for high water. The mean range difference is approximately 1.52 greater than the predicted range. The values stated do not correctly reflect the true time or range differences which differ in time by up to minus 1 hour 24 minutes for low water, and up to minus 2 hours 35 minutes for high water. The range of tide can be up to 3 times the predicted range, especially during periods of small tidal fluctuation.

Due to significant discrepancies between crossline and main-scheme soundings in the area south of 58°40.0'N latitude and east of 161°20.0'W longitude, a supplemental tide station was installed at the larger of The Twins on July 30 to aid in tidal zoning. For the period of July 30 through August 2 the tides occurred approximately 1 hour later at The Twins than equivalent tides at High Island, with a ratio of approximately 0.68. For the same period, The Twins differed from the predicted tides at Hagemeister

Island by approximately 53 minutes for high water, 42 minutes for low water, and with a mean ratio of 1.10. On August 3 the gage dampening valve at The Twins was opened two additional turns, which drastically altered the time and range ratio in relation to both High and Hagemeister Islands tide gages. The values for the period August 3 to gage removal on August 19 are as follows: comparison with High Island gage shows a time difference of from +5 minutes to a maximum of -45 minutes and with a ratio of 1.00. Compared with Hagemeister Island the time difference is a mean of -17 minutes for high water, -32 minutes for low water and a ratio of 1.48. All times of high and low waters and tidal range during the period from gage installation through August 2 should be corrected for the effect of excessive attenuation. The record subsequent to August 2 at 2232 UTC is correct.

The extremely complex nature of the tides in the Walrus Islands area of Bristol Bay needs further investigation, possibly using numerous bottom moored pressure recorders over an extended time period. Perhaps the significant time differences between the rapid rise from low to high water and the subsequent slow fall back to low water, during the periods of diurnal tides, is the reason that a correct MLLW value could not be established.

N. AIDS TO NAVIGATION

No aids to navigation or landmarks fall within survey limits.

O. STATISTICS

	2020	2023	2024	2025	2026	Total
Positions	--	709 ~~721~~	1836 ~~1910~~	1514 ~~1602~~	1250 ~~1472~~	5309 ~~5705~~
Nautical Miles	--	223	621	465	438	1747
Square NM	--	--	--	--	--	111
Bottom Samples	0	0	17	0	15	32
Velocity Casts	10	--	--	--	--	10
Tide Stations	3	--	--	--	--	2
Production Days (hydrography only)	--	--	--	--	--	30

No current or magnetic stations were established during this survey.

P. **MISCELLANEOUS**

Bottom samples were collected and forwarded to the Smithsonian Institution, Washington, D.C..

No potentially dangerous currents were observed.

Tidal zoning was inaccurate for the survey area and should be revised. However, due to the complexity of the tides in this area an accurate analysis is beyond the scope of this report, and no recommendations are offered. Refer to Section M, Comparison with the Chart, for further discussion of tides.

Refer to the ~~final field~~ smooth sheets for areas of extensive sand waves noted during hydrographic operation west of longitude 160°~~21~~ 19'W.

Q. **RECOMMENDATIONS**

Survey H-10277 lies within the limits of sheet "R" and is in itself a complete survey; however, areas of sheet "R" remain to be developed. Recommend development work be accomplished during the 1989 field season and submitted as additional work. CONCUR

Recommend survey H-10277 not be used for preliminary charting purposes until accurate tide reducers are applied. Once accurate tide reducers are applied, hydrography over this area will be adequate to: CONCUR

Delineate the bottom configuration, determine least depths, and draw standard and supplemental depth curves;

Reveal that there are no significant discrepancies or anomalies requiring further investigation;

Show that the survey was properly controlled and that soundings are correctly plotted;

Supersede all prior surveys over this area.

The areas bounded by the following latitudes and longitudes require further development: Do not concur; SEE EVALUATION REPORT SECTION 9 FOR ~~additional~~ other Field WORK RECOMMENDATIONS.

	Latitude (N)	Longitude (W)
	58°38.5′	160°31.0′
1.	58°38.0′	160°32.0′
	58°37.0′	160°31.1′
2.	58°36.2′	160°32.3′
	58°32.8′	160°20.4′
3.	58°32.4′	160°21.4′
	58°32.4′	160°19.0′
4.	58°32.2′	160°19.4′
	58°38.2′	160°19.9′
5.	58°38.0′	160°20.2′
	58°34.9′	160°23.2′
6.	58°34.6′	160°23.8′

EAST OF LONGITUDE 160°16'15"W, BETWEEN LATITUDE 58°38'14"N

In addition, the SW shoreline of Crooked Island, from 58°38′14"N to 58°39′10"N, requires further development out to one-half nautical mile. CONCUR

8. Forty-two bottom samples were collected; 40 bottom samples have yet to be collected. CONCUR

R. AUTOMATED DATA PROCESSING

The following programs were used for data acquisition or processing:

Number	Program	Version Date
RK 112	Range-Range Real Time Plot	04/23/84
RK 201	Grid, Signal, and Lattice Plot	04/18/75
RK 221	Range-Range Off-line Plot	07/25/86
RK 300	Utility Computations	10/21/80 ✓
RA 362	330 / 602 Combined	08/20/84
AM 500	Predicted Tide Generator	11/10/72
AM 602	ELINORE	12/08/82
	VELTAB	02/01/85

S. **REFERRAL TO REPORTS**

The following reports will be submitted separately:

Horizontal Control Report	November 1988
Electronic Control Data	October 1988
Corrections to Echo Soundings	October 1988 ✓
Coast Pilot Report	October 1988

LORAN-C data were acquired during bottom sampling operations and will be forwarded in accordance with Hydrographic Survey Guideline Number 41.

Field Tide Note
Hagemeister Island, Alaska
Station Number 946-5089
June to August, 1988

Field tide reduction of sounding data for survey H-10277 was based on predicted tides from Hagemeister Island, Alaska (946-5089), and corrected to the survey area. Tide correctors were interpolated by PDP/8e computer using AM 500.

The calculated correctors shown below were based on preliminary zone correctors specified by project instructions.

Survey	Time Correction		Height Correction
	High Water	Low Water	Range Ratio
H-10277	-0h 40m	-0h 30m	x 1.03

All times of predicted and reported tides are expressed in Coordinated Universal Time. Predicted tides were inadequate for hydrography due to discrepancies in the raw data attributed to tidal errors.

Two Bristol Gas-Purged Pressure Recording Tide Gages, Model 15 (gage A s/n 67A10294, gage B s/n 64A11028), range 0 to 30 feet, were installed in support of survey H-10277. Location and dates of operation are as follows:

Site	Location	Dates of Operation
Hagemeister Island, Alaska	58°33.4'N 161°00.2'W	June 19 to August 18

Hagemeister Island

The tide gages, staff and orifices were installed at Hagemeister Island, Alaska, on June 19. A three-hour observation on June 20 confirmed consistent gage-to-staff differences. Data collection began on June 20 at 1820 and continued until August 18 at 2341, when both gages were removed. The staff and orifices were left due to time and weather constraints.

Due to the gap in the tidal record from August 12 to August 13 at Hagemeister Island (while relocating the orifices), it is recommended that High Island (946-5173) be used as the control station for hydrography run during this period.

Gage A was consistently slow, as much as 1 hour 25 minutes on July 8. On August 9 the stylus was found to be out of adjustment; from August 3 at 1800 to August 9 at 1825 subtract 0.6 ft from the tidal record for accurate tides.

Gaps in the tidal record of approximately three days or more occurred on Gage B during the following periods:

July 17 at 1955 to July 20 at 1810 (paper jammed)
July 23 at 0655 to August 3 at 1800 (paper jammed)
August 9 at 1915 to August 14 at 0058 (chart drive stopped)

Both traces show the effects of a severe storm from August 4 at 0000 to August 6 at 2000. Storm surge moved the orifices on August 10 at approximately 0300. Divers secured the orifices on August 13 and new records begin on August 14 at 0058. A three-hour observation was started on August 13 at 2200 but was not finished due to the divers inspection and relocation of the orifices. Subsequent weather conditions precluded any further three-hour comparisons. The final gage-to-staff difference is determined from one comparison on August 14 at 0125.

Due to the storm surge that moved the orifices on August 10 and time taken to relocate the orifices and determine new gage-to-staff differences, gaps occur in both tidal records from August 10 at 0300 to August 14 at 0058.

The area surrounding the tide staff filled with sand to the point where it was necessary to level to the water's edge for gage-to-staff comparisons. Levels to the water's edge agreed to within 0.5 feet from July 20 to August 9, which is acceptable considering the surge and surf conditions at the gage site. From June 19 to August 10 at 0300 the zero mark on the tide staff corresponds to 14.7 feet on gage A, 14.4 feet on gage B; from August 14 at 0058 to the end of record, 15.2 feet on gage A, 15.0 feet on gage B.

Levels

Only four benchmarks were established due to steep terrain and unstable rock, and only three marks were connected on the closing run due to a landslide that covered benchmark "F." The comparison between opening and closing level runs of the remaining three benchmarks indicates no significant staff movement.

Zoning Recommendations

Tidal zoning was inaccurate for the survey area and should be revised. Due to the complexity of the tides in this area, however, an accurate analysis is beyond the scope of this report, and no recommendations are offered.

Approval

Submitted by:

Michael Lemon
Ensign, NOAA

Reviewed by:

Paul J. Ruiz
Lieutenant, NOAA
Field Operations Officer (Acting)

Date:

6 SEP 88

Field Tide Note
Larger of Twin Islands, Alaska
Station Number 946-5116
July to August, 1988

Field tide reduction of sounding data for survey H-10277 was based on predicted tides from Hagemeister Island, Alaska (946-5089), and corrected to the survey area. Tide correctors were interpolated by PDP/8e computer using AM 500.

The calculated correctors shown below were based on preliminary zone correctors specified by project instructions.

Survey	Time Correction High Water	Time Correction Low Water	Height Correction Range Ratio
H-10277	-0h 40m	-0h 30m	x 1.03

All times of predicted and reported tides are expressed in Coordinated Universal Time. Predicted tides were inadequate for hydrography due to discrepancies in the raw data attributed to tidal errors.

A Bristol Gas-Purged Pressure Recording Tide Gage, Model 15 (gage s/n 73A229), range 0 to 30 feet, was installed as a supplemental gage in support of survey H-10277. Location and dates of operation are as follows:

Site	Location	Dates of Operation
Larger of Twin Islands, Alaska	58°35'55"N 160°18'21"W	July 30 to August 18

Larger of Twin Islands

The tide gage, staff and orifice were installed at the larger of Twin Islands, Alaska, on July 30. A three-hour observation on August 03 confirmed consistent gage-to-staff differences. Data collection began on July 30 at 1948 and continued until August 19 at 0026, when the gage was removed. The staff and orifice were left due to time and weather constraints.

The gage ran well throughout the project. The only event of note concerned a storm surge displayed on the trace from August 10 at 0345 to 0355.

The zero mark on the tide staff corresponds to 7.3 feet on the trace.

Levels

Beginning levels were run to three temporary benchmarks (eyebolts) anchored in boulders, on July 30 and August 3. Final levels on August 18 include benchmark 5116 D 1988 and horizontal control station Twins. These were included in the event the gage site is used in future operations.

The comparison between opening and closing level runs indicates no significant staff movement.

Zoning Recommendations

Tidal zoning was inaccurate for the survey area and should be revised. Due to the complexity of the tides in this area, however, an accurate analysis is beyond the scope of this report and no recommendations are offered.

Approval

Submitted by:

Michael Lemon
Ensign, NOAA

Reviewed by:

Paul J. Ruiz
Lieutenant, NOAA
Field Operations Officer (Acting)

Date:

6 SEP 88

ORIGINAL

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: June 7, 1991

MARINE CENTER: Pacific

OPR: R-184

HYDROGRAPHIC SHEET: H-10277 **(REVISED)**

LOCALITY: Bristol Bay, Alaska

TIME PERIOD: June 25 - August 15, 1988

TIDE STATIONS USED: 946-5173 High Island, Alaska
Lat. 58° 43.3'N Lon. 160° 25.6'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): -4.27 ft.

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 8.7 ft.

REMARKS: RECOMMENDED ZONING

1. East of longitude 160° 20.0'W and north of latitude 58° 35.0'N, apply a -10 min. time correction and a x0.90 range ratio to High Island (946-5173).

2. East of longitude 160° 20.0'W and south of latitude 58° 35.0'N, apply a -10 min. time correction and a x0.82 range ratio to High Island (946-5173).

3. West of longitude 160° 20.0'W and north of latitude 58° 35.0'N, times are direct and apply a x0.90 range ratio to High Island (946-5173).

4. West of longitude 160° 20.0'W and south of latitude 58° 35.0'N, times are direct and apply a x0.82 range ratio to High Island (946-5173).

Note: Times are tabulated in Greenwich Mean Time.

CHIEF, TIDAL DATUM QUALITY
ASSURANCE SECTION

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: November 22, 1988

MARINE CENTER: Pacific

OPR: R184

HYDROGRAPHIC SHEET: H-10277

LOCALITY: Bristol Bay, Alaska

TIME PERIOD: June 25 - August 15, 1988

TIDE STATION(S) USED: 946-5173 High Island, AK

PLANE OF REFERENCE (MEAN LOWER LOW WATER): -4.27 ft.

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 8.7 ft.

REMARKS: RECOMMENDED ZONING

1. North of latitude 58 35.0', apply a X0.97 range ratio to all heights.
2. South of latitude 58 35.0', apply a -0hr 10 minute time correction and a X0.95 range ratio to all heights.

CHIEF, TIDAL DATUM QUALITY
ASSURANCE SECTION

APPENDIX V

SIGNAL LISTING
OPR-R184-FA-88
FA-20-2-88
H-10277

STRAIT 1948 1004 58160413
100 0 58 49 04242 160 40 55847 250 0012 000000

LOW RAINIER 58160134
120 0 58 41 27936 160 24 10182 250 0008 000000

CROOKED 1948 AZ MK 1003 58160131
135 0 58 38 21885 160 16 08405 250 0071 000000

HIGH 1948 AZ MK 1005 58160134
150 0 58 42 16055 160 23 57556 250 0468 000000

CALM POINT 1948 1002 58160433
175 0 58 34 44057 160 55 01729 250 0253 000000

GEM 1985 PHOTO PARTY 58160431
180 0 58 39 364~~16~~ 83 160 49 29~~224~~ 186 250 0244 000000

ROUND 1948 1010 58159433
185 0 58 36 19285 159 58 33257 250 0430 000000

FOG RAINIER 58160124
190 0 58 42 29898 160 11 23671 250 0038 000000

TWINS FAIRWEATHER 58160132
195 0 58 35 55759 160 18 26246 250 0008 000000

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
NOAA Ship FAIRWEATHER
1801 Fairview Avenue East
Seattle, WA 98102-3767

September 26, 1988

Commander (OAN)
Seventeenth Coast Guard District
P. O. Box 3-5000
Juneau, Alaska 99802-1217

Dear Sir:

One uncharted danger to navigation was found by NOAA Ship FAIRWEATHER during hydrographic survey operations (survey H-10277) west of Crooked Island, Bristol Bay, Alaska. The information below is submitted for inclusion in Local to Mariners (reference my radio message R 092220Z AUG 88). The enclosed copy of a chartlet is for your general information.

Chart 16315, 4th Ed., Jan 2/88, NAD 83
ALASKA, BRISTOL BAY, TOGIAK BAY AND WALRUS ISLANDS

ADD Rock awash 58°39'43"N 160°18'28"W

The rock is submerged zero fathoms and is 1.8 nm northwest (329° True) of the south end of Crooked Island.

The depth is from sounding datum of mean lower low water (MLLW) based on predicted tides. The position is on the North American Datum of 1927 (NAD 27). Note chart datum and datum of position listed are different datums.

Questions concerning this survey may be directed to the Chief, Nautical Branch, telephone (206) 526-6835.

Sincerely,

Glen R. Schaefer
Captain, NOAA
Commanding Officer

Enclosure

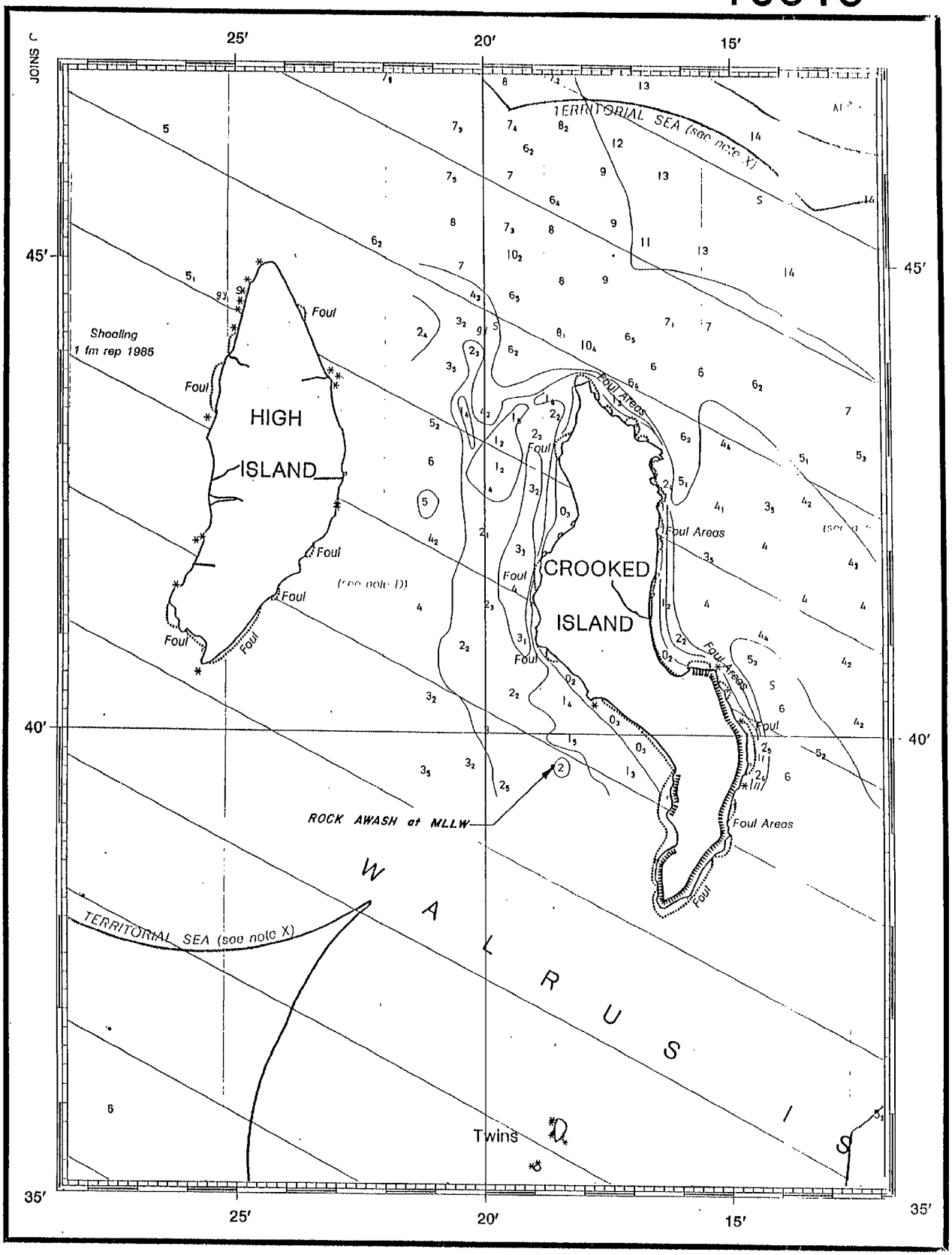
TOGIAK BAY AND WALRUS ISLANDS

SOUNDINGS IN FATHOMS - SCALE 1:100,000

IX-2

4th Ed., Jan. 2/88 ■

16315



TOT

IX-3 55

NOS | 1605452 AUG 88

Kad | 3287 KHZ RATT

CO

XO

FOO

ZCZYUW RUHPTEB0162 2222220-UUUU--RUHPSUU.
ZNR UUUUU
P 092220Z AUG 88
FM NOAAS FAIRWEATHER
TO CCGDSEVENTEEN JUNEAU AK
INFO NOAAMOP SEATTLE WA
DMAHTC WASHINGTON DC//NVS//
ACCT CM-VCAA
BT
UNCLAS
SUBJ: DANGERS TO NAVIGATION
1. AN UNCHARTED DANGER TO NAVIGATION WAS FOUND DURING SURVEY OPERATIONS (SURVEY H-10277) WEST OF CROOKED ISLAND, BRISTOL BAY, ALASKA.
2. CHART 16315, 4TH ED., JAN 2/88, NAD 83; ALASKA, BRISTOL BAY, TOGIAK BAY AND WALRUS ISLANDS. ADD ROCK AWASH 58/39/43N 160/18/28W. REPEAT 58/39/43N 160/18/28W.
3. THE ROCK AWASH (COVERS ZERO FEET) IS 1.8 NM NW (329 DEGREES TRUE) OF THE SOUTH END OF CROOKED ISLAND.
4. ROCK AWASH REFERENCED TO MEAN LOWER LOW WATER DATUM PREDICTED TIDES AND NAD 27. REPEAT NAD 27, WHICH DIFFERS FROM CHART DATUM.
5. CONFIRMATION LETTER TO BE MAILED NEXT INPORT.
BT
#0162

NNNN

TOGIAK BAY AND WALRUS ISLANDS

SOUNDINGS IN FATHOMS - SCALE 1:100,000

16315

4th Ed., Jan. 2/88 ■

101

NOS 100545Z AUG 88
KAS 3207 KHZ
RATT

57

CO
XO
FOO

ZYUW RUHPTEB0163 2222222-UUUU--RUHPSUU.
R 922222Z AUG 88
FM NOAAS FAIRWEATHER
TO NOAAMOP SEATTLE WA
ACCT CM-VCAA
BT
UNCLAS
FA-PMC-130-135
PASS TO MOP2:
SUBJ: TIDE STATION NUMBER REQUEST
1. TEMPORARY TIDE STATION ESTABLISHED 30 JUL 88 ON LARGEST ISLAND OF TWIN ISLANDS, ALASKA, LATITUDE 58/35/55N LONGITUDE 160/18/21W.
2. TIDE STATION INSTALLED TO AID IN ZONING AND TIDAL PREDICTIONS FOR OPR-R184-FA.
3. REQUEST TIDE STATION NUMBER FOR TWIN ISLANDS TIDE STATION.
BT
#0163

TOR X-2

58

NOJ	170830Z AUG 88
Kad	4332 KHZ RATT

WTEB WTEB

ZNR UUUUU
R 162330Z AUG 88
FM NOAAMOP SEATTLE WA
TO RUWMBBA/NOAAS FAIRWEATHER
ACCT CG-W2GLRC
BT
UNCLAS
FA146-140-118-133THRU139//MOP2X1
REF YR 092222Z AUG 88. THE TWIN ISLANDS TIDE STATION NUMBER IS 946-5116, REPEAT 946-5116.
BT

QRU K

NNNN

& CO XO FOO

NOJ 060525Z Aug 88
KAD 4332 KHz
KAHT

X-3 59

WTEB WTEB

ZNR UUUUU
P 052258Z AUG 88
FM NOAAMOP SEATTLE WA
TO RUWMBBA/NOAAS FAIRWEATHER
ACCT CG-W2GLRC
BT
UNCLAS
FA131-125-118//MOP2X1
TOGIAK TIDES AND T-SHEETS
A. YR 031841Z AUG 88
B. MY 252056Z JUL 88
1. IMPROVED PREDICTED TIDES WILL NOT BE AVAILABLE IN TIME TO PROCESS YOUR TOGIAK BAY SURVEYS. N/CG241 REQUESTS YOU USE THE CORRECTORS YOU HAVE.
2. YOUR CONTOUR LINES WILL NEED TO BE DASHED. SZCMIMNS I, J, K, L, M WILL REQUIRE SOME STATEMENT ABOUT THE BAD CORRECTORS. REQUEST SECTION M DETAIL THE PROBLEM INCLUDING A LIST OF THE RANGE OF DIFFERENCES OF TIMES AND HEIGHTS OF HIGHS AND LOWS; I.E., 0.5 - 1.0 FM AND 0-1 HOUR, ETC.
3. N/CG241 ALSO ASKED WHETHER THE OLD TOGIAK T-SHEETS ARRIVED, ACD IF SO, WERE YOU SUCCESSFUL IN RESOLVING ALL THE ROCKS ON THOSE T-SHEETS?
BT

NNNN

&
CO
LCDR Mas
LT Ruiz
CST

The final field sheets and accompanying records have been reviewed for accuracy, completeness, compliance with project instructions, and adherence to required standards and procedures. This survey is complete with the exception of developments over irregular bottom topography, bottom samples, and remaining shoreline point features. The data are forwarded for final review and processing.

Submitted by:

Michael R. Lemon
Ensign, NOAA

Reviewed by:

Paul J. Ruiz
Lieutenant, NOAA
Field Operations Officer (Acting)

Approved by:

Glen R. Schaefer 30 Sep 88
Captain, NOAA
Commanding Officer

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Pacific Marine Center
1801 Fairview Avenue East
Seattle, Washington 98102-3767

OCT 19 1988 N/MOP211/DJH

Commander (OAN)
Seventeenth Coast Guard District
P.O.Box 3-5000
Juneau, Alaska 99802-1217

Dear Sir:

During office review of hydrographic surveys H-10276 and H-10277, Alaska, Bristol Bay, vicinity of High Island and vicinity of The Twins, dangers to navigation affecting chart 16315 (4th ed.,Jan. 2, 1988; datum: NAD 83) and chart 16011 (31st ed., June 29,1985; datum: NAD 27) were found.

It is recommended that the enclosed Reports of Dangers to Navigation be included in the Local Notice to Mariners.

Questions concerning this report should be directed to the Pacific Marine Center at (206) 526-6835.

Enclosures

cc: DMAH/TC
N/CG221

Sincerely,

Sigmund R. Petersen

Sigmund R. Petersen
Rear Admiral, NOAA
Director, Pacific Marine Center

REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10276
Survey Title: State: Alaska
General Locality : Bristol Bay
Sublocality : Vicinity of High Island
Project Number: OPR- R184-FA
NOAA Ship / Field Party: FAIRWEATHER S220

The following items were discovered during hydrographic survey operations:

Objects Discovered: Shoals and Rocks

Covered/uncovers/bare covered

Corrected to MLLW

Tides: Predicted YES Observed

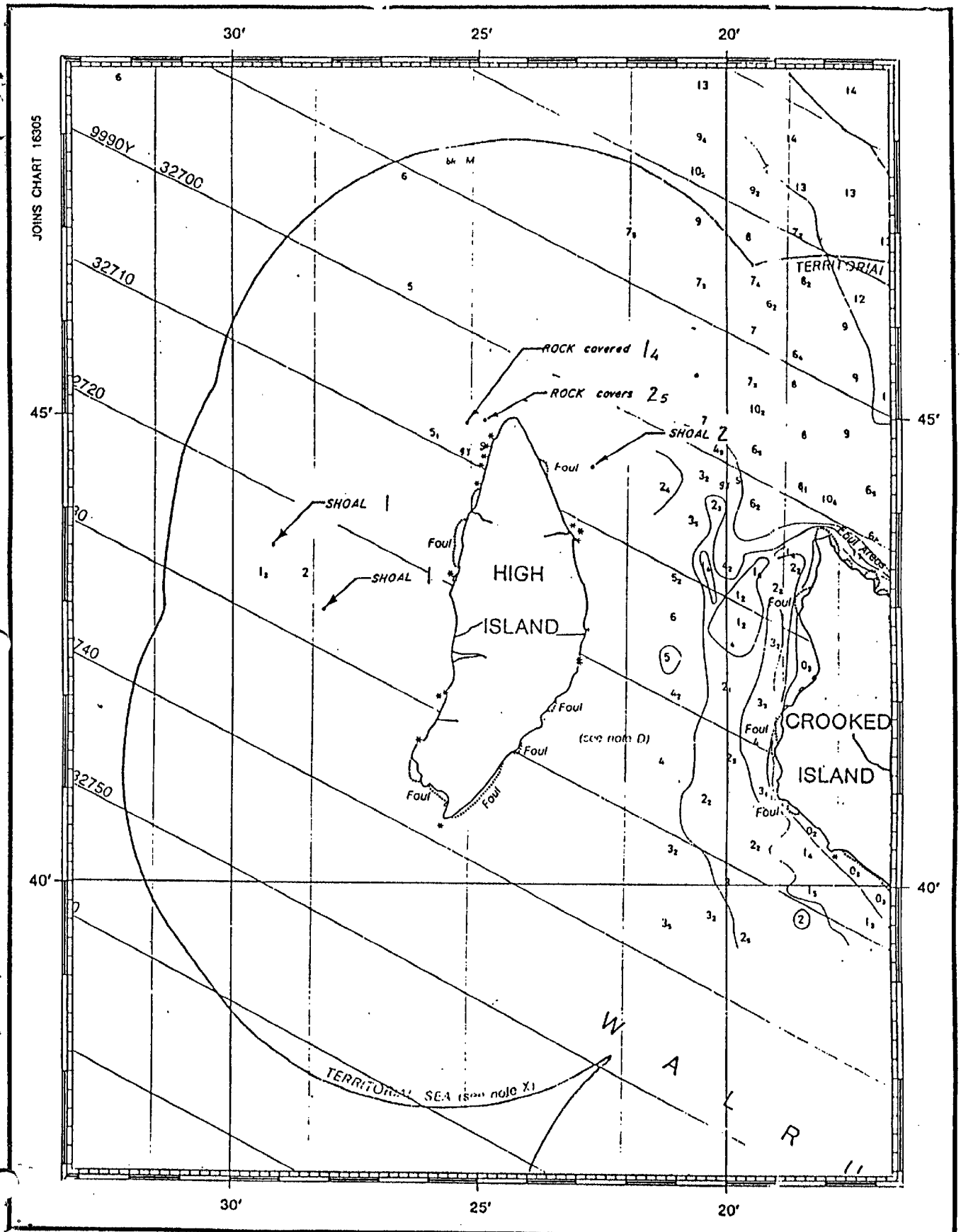
CHART NUMBER	EDITION NO	EDITION DATE	REPORTED DEPTH	CHART HORIZ. DATUM	GEOGRAPHIC POSTION LATITUDE	GEOGRAPHIC POSTION LONGITUDE
16011	31	Jun. 29,1985	2 fm	NAD 27	58/44/30.0N	160/22/30.0W
16011	31	Jun. 29,1985	1 fm	NAD 27	58/44/00.0N	160/27/00.0W
16011	31	Jun. 29,1985	1 fm	NAD 27	58/43/45.0N	160/29/00.0W
16011	31	Jun. 29,1985	1 1/2 fm	NAD 27	58/45/00.0N	160/25/02.0W
16315	4	Jan.2, 1988	2 fm	NAD 83	58/44/32.8N	160/22/22.1W
16315	4	Jan.2, 1988	1 fm	NAD 83	58/44/02.8N	160/26/52.1W
16315	4	Jan.2, 1988	1 fm	NAD 83	58/43/47.8N	160/28/52.1W
16315	4	Jan.2, 1988	1 fm and 4 ft Rk	NAD 83	58/45/02.8N	160/24/54.1W
16315	4	Jan 2, 1988	2 fm and 5 ft Rk	NAD 83	58/45/04.8N	160/24/32.1W

Questions concerning this report should be directed to the Pacific Marine Center at (206) 526-6835.

H-10276 NAD 83

TOGIAK BAY AND WALRUS ISLANDS

SOUNDINGS IN FATHOMS - SCALE 1:100,000



16315 4th Ed., Jan. 2/88 ■

REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10277
Survey Title: State: Alaska
General Locality : Bristol Bay
Sublocality : Vicinity of The Twins
Project Number: OPR- R184-FA
NOAA Ship / Field Party: FAIRWEATHER S220

The following items were discovered during hydrographic survey operations:

Objects Discovered: Shoals and Rocks

Covered/uncovers/bare covered

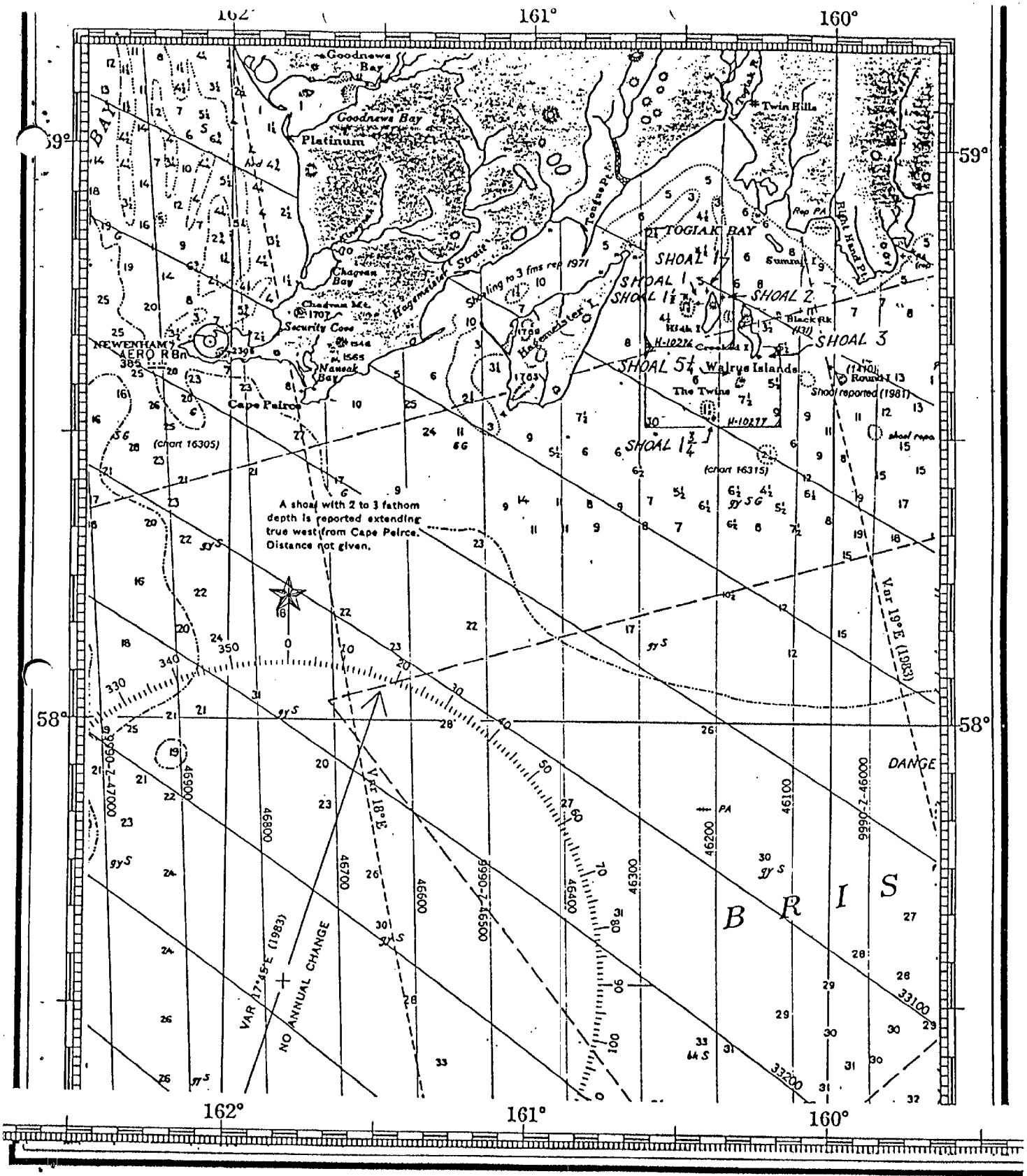
Corrected to MLLW

Tides: Predicted YES Observed

CHART NUMBER	EDITION NO	EDITION DATE	REPORTED DEPTH	CHART HORIZ. DATUM	GEOGRAPHIC POSTION LATITUDE	GEOGRAPHIC POSTION LONGITUDE
16011	31	Jun. 29,1985	5 1/4 fm	NAD 27	58/36/18.0N	160/18/48.0W
16011	31	Jun. 29,1985	3 fm	NAD 27	58/38/24.0N	160/15/12.0W
16011	31	Jun. 29,1985	1 3/4 fm	NAD 27	58/32/12.0N	160/23/48.0W
16315	4	Jan. 2,1988	3 fm and 3 ft Rk	NAD 83	58/36/38.8N	160/17/58.1W
16315	4	Jan. 2,1988	5 fm and 2 ft Rk	NAD 83	58/36/20.8N	160/18/40.1W
16315	4	Jan. 2,1988	3 fm Rk	NAD 83	58/38/26.8N	160/15/04.1W
16315	4	Jan. 2,1988	2 fm and 5 ft Rk	NAD 83	58/38/38.8N	160/14/34.1W
16315	4	Jan. 2,1988	1 fm and 5 ft Rk	NAD 83	58/32/14.8N	160/23/40.1W
16315	4	Jan. 2,1988	1 fm and 5 ft Rk	NAD 83	58/32/14.8N	160/23/16.1W
16315	4	Jan. 2,1988	1 fm and 4 ft	NAD 83	58/32/44.8N	160/26/10.1W
16315	4	Jan. 2,1988	1 fm and 3 ft	NAD 83	58/33/20.8N	160/25/34.1W

not plotted

Questions concerning this report should be directed to the Pacific Marine Center at (206) 526-6835.



31st Ed., June 29/85

1011

Mercator Projection
Scale 1:1,023,188 at Lat. 56°00′
North American 1927 Datum

SOUNDINGS IN FATHOMS
AT MEAN LOWER LOW WATER

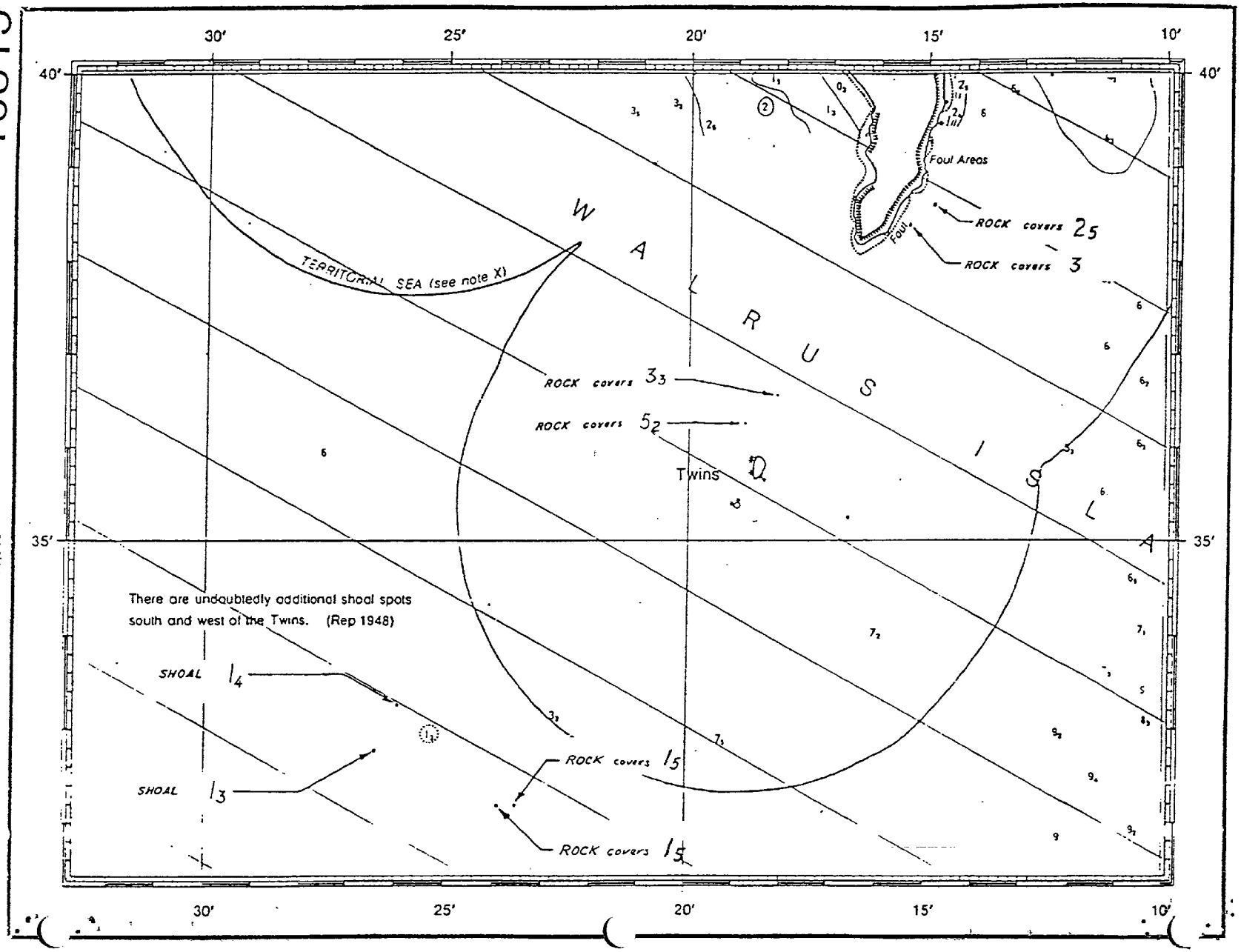
H-10277

NAD 83

4th Ed., Jan. 2/88 ■ 16315

TOGIAK BAY AND WALRUS ISLANDS

SOUNDINGS IN FATHOMS - SCALE 1:100,000



NOAA FORM 76-155 (11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10277

Name on Survey
ALASKA, BRISTOL BAY
THE TWINS AND VICINITY

	A ON CHART NO. 1615	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS T-9248	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K See Note	
ALASKA (TITLE)	X									1
BRISTOL BAY	X									2
CROOKED ISLAND	X									3
TWINS, THE			X						X	4
										5
										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
				Approved:						18
										19
				Charles L. Harrington						20
				Chief Geographer						21
				JAN - 4 1989						22
										23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOTE: "The Twins" is the correct name of the feature per TELCON with Chuck Harrington, 14 Sept 88.

NOAA FORM 77-27(H) (9-83) | U.S. DEPARTMENT OF COMMERCE | REGISTRY NUMBER

HYDROGRAPHIC SURVEY STATISTICS

H-10277

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1 #1-2	SMOOTH OVERLAYS: POS., ARC, EXCESS	6
DESCRIPTIVE REPORT	1	FIELD SHEETS AND OTHER OVERLAYS	2

DESCRIPTION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS	
ACCORDION FILES						
ENVELOPES						
VOLUMES	5					
CAHIERS	4					
BOXES						

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			5309
POSITIONS REVISED			34
SOUNDINGS REVISED			326
CONTROL STATIONS REVISED			
	TIME-HOURS		
	VERIFICATION	*EVALUATION*	*TOTALS*
PRE-PROCESSING EXAMINATION			
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS	71		71
VERIFICATION OF SOUNDINGS	68		68
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	34		34
COMPARISON WITH PRIOR SURVEYS AND CHARTS		26	26
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT			
GEOGRAPHIC NAMES		17	17
OTHER*			
*USE OTHER SIDE OF FORM FOR REMARKS — TOTALS	173	43	216

Pre-processing Examination by J. Miller	*Beginning Date* 9/30/88	*Ending Date* 10/21/88
Verification of Field Data by L. Deodato, J. Shofner, E. Domingo	*Time (Hours)* 173	*Ending Date* 4/7/89
Verification Check by S. Otsubo, B. Olmstead, J. Stringham	*Time (Hours)* 56	*Ending Date* 4/13/89
Evaluation and Analysis by G.E. Kay, A. Luceno	*Time (Hours)* 43	*Ending Date* 5/22/89
Inspection by Dennis Hill	*Time (Hours)* 2	*Ending Date* 5/23/89

☆ U.S. GOVT. PRINTING OFFICE 1983: 764-006/6061

PACIFIC MARINE CENTER
EVALUATION REPORT
H-10277

1. INTRODUCTION

Survey H-10277 is a basic hydrographic survey accomplished by the NOAA Ship FAIRWEATHER under the following Project Instructions.

OPR-R184-RA, dated March 6, 1987
CHANGE NO. 1, dated March 20, 1987
CHANGE NO. 2, dated June 2, 1987
CHANGE NO. 3, dated August 10, 1987
CHANGE NO. 4, dated May 2, 1988
CHANGE NO. 5, dated July 19, 1988

This survey occurred in Alaska and covers an area in Bristol Bay southwest of the Walrus Islands. The survey surrounds the islands The Twins and covers the southern shoreline of Crooked Island. The surveyed area extends from latitude 58°39'48"N, south to latitude 58°31'18"N and from longitude 169°36'30"W, east to longitude 160°11'06"W. The ocean floor in the survey area consists of fine sand, shells and pebbles; sand waves are also noted west of longitude 160°19'00"W. Depths range from zero to fifteen fathoms.

Survey H-10277 was submitted by the field as an incomplete survey. Section Q of the hydrographer's report and section 9 of this report contains specific additional work items.

Predicted tides for Hagemeister Island, Alaska, were used for the reduction of soundings during field processing. Approved hourly heights zoned from High Island, gage 946-5173, were used during office processing.

The field party observed deficiencies between the observed and predicted tides. With the application of actual tides the conflicts as described by the hydrographer in sections E, K and M of the hydrographer's report have been resolved. The smooth sheet displays the corrected data.

The field sheet parameters have been revised to center the hydrography on the smooth sheet and to change the projection to polyconic. As recommended by the hydrographer, final electronic control base line correctors were used to plot the smooth sheet. TRA, sound velocity and electronic control correctors are adequate. An accompanying computer printout contains the parameters and the correctors.

A digital file, generated for this survey, includes categories of information required to comply with N/CG2 Hydrographic Survey Guideline No. 23, Completion of Digital Hydrographic Surveys, September 7, 1983. Certain

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.

The surveyed area exceeds the standard width specifications. N/MOP21 requested approval for a sheet 106 centimeters by 148 centimeters with the plotting area 80 centimeters by 125 centimeters. Verbal approval for an oversized sheet was granted by N/CG241 on October 10, 1988.

2. CONTROL AND SHORELINE

Sections F and G of the hydrographer's report and the 1988 Horizontal and Electronic Control Reports for OPR-R184-FA contain adequate discussions of horizontal control and hydrographic positioning.

Positions of horizontal control stations used during hydrography are published and 1985, 1986 and 1988 field values based on NAD 27. These values were used during office processing for the computation of positions. The smooth sheet and accompanying overlays are annotated with NAD 83 adjustment ticks based on values determined by N/CG121. Geographic positions based on NAD 83 may be plotted on the smooth sheet utilizing the NAD 27 projection by applying the following corrections.

Latitude:	2.794 seconds	86.4 meters
Longitude:	-7.907 seconds	-127.5 meters

The year of establishment of control stations shown on the smooth sheet originates with the field records and the published NGS data.

There are 294 weak fixes (angles of intersection less than 30 degrees or more than 150 degrees) noted in this survey. There are no significant plotting differences between the soundings located by these fixes and those in adjacent areas. Also, none of these fixes are used to position dangers to navigation. These fixes are considered adequate for charting.

The following registered shoreline map applies to this survey.

	Photo Date	Class
TP-01190	July 1983	III

Due to a lack of coverage by this map shoreline around The Twins is shown in brown from chart 16315, 5th edition, dated February 11, 1989 and is for orientation purposes only.

Section 6 of this report contains a comparison with prior shoreline map T-9248(1947).

3. HYDROGRAPHY

With the exception of several least depths listed in section 9 of this report, 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.

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; and the PMC OPORDER, except as follows.

a. The hydrographer did not transmit to the Seventeenth Coast Guard District the complete group of nine dangers to navigation that were discovered while conducting this hydrographic survey. The dangers were listed in section L of the hydrographer's report. The reporting of dangers demands prompt action as required by Hydrographic Survey Guideline No. 66. During the pre-processing examination information on the additional items were reported to the Seventeenth Coast Guard District. A copy of this danger report is attached.

b. The hydrographer failed to investigate AWOIS item 50905 as required by section 6.12. of the Project Instructions. Section 6 of this report contains the analysis and disposition of this AWOIS item investigation.

5. JUNCTIONS

Survey H-10277 junctions with the following surveys.

Survey	Year	Scale	Area
H-10216	1986	1:20,000	east
H-10219	1986	1:20,000	east
H-10222	1986	1:20,000	north
H-10276	1988	1:20,000	north

The junction with survey H-10276 is complete.

The junctions with surveys H-10216, H-10219 and H-10222 have not been formally completed since these surveys were previously processed and forwarded for charting. The junction comparisons were made using copies.

Soundings are in good agreement. However, some soundings have been transferred from survey H-10219 to survey H-10277 to better portray the bottom in the common area.

There are no contemporary surveys to the south or west of this survey. A comparison with charted depths (chart 16315, 5th edition) was not possible because of the lack of charted information in this junction area.

6. COMPARISON WITH PRIOR SURVEYS

H-7718(1948) 1:100,000 (RECONNAISSANCE)

Survey H-7718 is a reconnaissance survey with two lines of soundings running along the central and eastern portions of the present survey area. The present survey is up to 0.4 fathoms deeper than this prior. Other discrepancies between the two surveys were noted and are discussed in section K of the hydrographer's report. Taking into consideration the differences in the scales of the surveys and the methods of surveying, comparison with this prior survey is satisfactory.

AWOIS Item 50905, a 1.6-fathom sounding charted at latitude 58°33'00.0"N, longitude 160°25'15.0"W, originates with prior survey H-7718. This sounding is discredited, as it falls in general depths of 4-fathoms on the present survey (the sounding is probably out of position) and considering the scale, survey methods and positional accuracy of the prior survey. A large 3-fathom shoal was located during the present survey 800 meters west of the charted position of this item. The minimum depth found on this shoal is 1.8-fathoms. This shoal, however, was not adequately developed and lesser depths may exist, for example 1.6 fathoms. See section 9 of this report for the recommendation for additional field work on this item.

Survey H-10277 is adequate to supersede this prior survey as a source for charted hydrography.

T-9248(1947) 1:20,000

This prior shoreline map was compared to survey H-10277. The prior shoreline map was used in the field as a contemporary shoreline map. Rocks on this prior shoreline map agree with the rocks found on the present survey along the coast of Crooked Island. Eight prior shoreline map rocks, located around The Twins, have been transferred to the present survey in violet ink. With the transfer of these rocks, survey H-10277 is adequate to supersede this prior shoreline map as a source for charted hydrography.

7. COMPARISON WITH CHART

Chart 16315, 4th edition, dated January 2, 1988; scale 1:100,000
Chart 16315, 5th edition, dated February 11, 1989; scale 1:100,000

a. Hydrography

Charted hydrography on the 4th edition originates with survey H-7718, shoreline map T-9248 and miscellaneous sources and requires no further discussion.

Charted hydrography on the 5th edition originates with survey H-10277 preliminary reports and field sheets, survey H-7718, shoreline map T-9248 and miscellaneous sources. Differences of up to 1/2-fathom shoaler are noted, which are attributed to the use of predicated tides on the field sheet.

Survey H-10277 is adequate to supersede charted hydrography within the common area.

b. AWOIS

There are no AWOIS items originating from miscellaneous sources.

c. Controlling Depths

There are no charted channels with controlling depths within the area of this survey.

d. Aids to Navigation

There are no fixed or floating aids located 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

The hydrographer reported one danger to the Seventeenth Coast Guard District on September 26, 1988. Eight additional dangers were reported during the pre-processing examination to the Seventeenth Coast Guard District and DMA on October 19, 1988. Copies of these reports are attached.

8. COMPLIANCE WITH INSTRUCTIONS

Survey H-10277 adequately complies with the Project Instructions.

9. ADDITIONAL FIELD WORK

This is an adequate basic hydrographic survey. The recommendations for additional field work discussed in the hydrographer's report, section Q, page 16, items 1-6, have been reviewed. Based upon the information provided on this survey and line spacing requirements, additional field work does not appear warranted in the above mentioned areas. In addition to the remaining areas noted in section Q of the hydrographer's report, additional field work is recommended to determine the least depths on shoals centered at:

a. latitude 58°33'00.0"N, longitude 160°26'08.0"W (resolve AWOIS Item 50905).
b. latitude 58°31'22.0"N, longitude 160°23'00.0"W.
c. latitude 58°31'48.0"N, longitude 160°20'36.0"W.

Gordon E. Kay
Cartographer

This survey has been examined and it meets Charting and Geodetic Services' standards and requirements for use in nautical charting. Approval is recommended.

Dennis Hill
Chief, Hydrographic Section

APPROVALS

I have reviewed the smooth sheet, accompanying data, and reports associated with hydrographic survey H-10277. This survey meets or exceeds Charting and Geodetic Services' standards for products in support of nautical charting.

5/30/89

Chief, Nautical Chart Branch (Date)

After review of the smooth sheet and accompanying reports, I hereby certify this survey is accurate, complete, and meets appropriate standards.

6/2/89

For, Director, Pacific Marine Center (Date)

ADDENDUM to Evaluation Report H-10277

Project Instructions OPR-R184, dated April 23, 1990, required that additional work be conducted to collect bottom samples previously not accomplished during 1988 field operations. The area involved extends from latitude 58°36'00"N to latitude 58°39'30"N, longitude 160°16'00"W to longitude 160°36'30"W. Thirty-nine bottom samples, positions 6002-6040, were taken with the Furuno LC Mark II Loran positioning system (WGS 72) and converted to NAD 83. The conversion was accomplished by determining an offset distance and azimuth from the Furuno positions to ARGO and Mini-Ranger positions on this survey. After adjustment to NAD 27, bottom characteristics were drafted onto smooth sheet H-10277(1988), and positional information was added to the digital file. Per Project Instructions, paragraph 6.7, Bottom Characteristics, associated records and plots generated during 1990 were included with survey FE-350. Upon completion of office processing, these data were separated from survey FE-350 and are now included with H-10277.

The data have been verified and evaluated for compliance with specifications and are considered acceptable for their intended purpose.

Bruce A. Olmstead 4/19/91
Bruce A. Olmstead Date
Senior Cartographer

Dennis Hill 4.19.91
Dennis Hill Date
Chief, Hydrographic Processing Unit

4/19/91
Pamela Chelgren-Koterba Date
Chief, Pacific Hydrographic Section

ADDENDUM
H-10277

Survey H-10277 has been revised. This revision consists of a recomputation of depths and heights based on the establishment of a new tidal datum. The revisions are displayed on a film overlay which is intended to supplement hydrographic information previously displayed on the smooth sheet. The latest Tide Note, documenting the new tidal datum, has been attached to the descriptive report. The completed revision plot has been inspected with regard to delineation of depth curves, depiction of critical depths, junctions, cartographic symbolization, comparison with prior surveys and the verification or disproval of charted features. The digital data have been completed and all revisions and processing have been entered into the magnetic tape record for this survey. A final sounding listing has been made and is included with the survey records. The revised data and records comply with NOS requirements for use in nautical charting.

Dennis Hill Date 1-29-92

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

I have reviewed the smooth sheet revision overlay and accompanying data. This overlay and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting.

Douglas G. Hennick Date 1/29/92

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

****

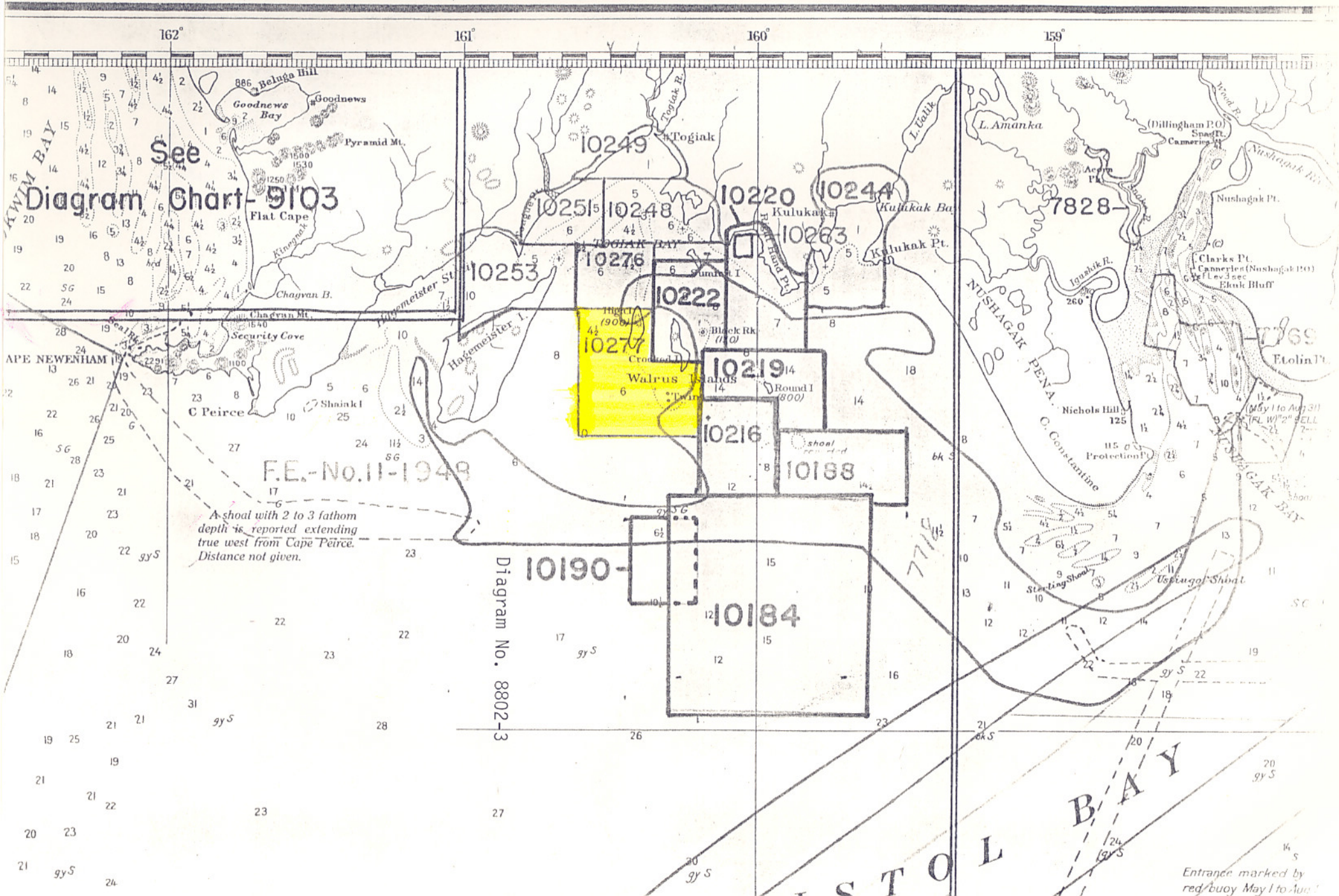
Final Approval

Approved:

J. Austin Yeager Date 9/28/93

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

10188
7718


See
Diagram Chart- 9103
F.E.-No.11-1948
A shoal with 2 to 3 fathom depth is reported extending true west from Cape Peirce. Distance not given.
Diagram No. 8802-3
10249
10251
10248
10220
10244
10263
10276
10253
10222
10277
10219
10216
10188
10190
10184
7828
Togiak
Togiak Bay
Kulukak
Kulukak Bay
Kulukak Pt.
Flat Cape
Goodnews Bay
Goodnews
Beluga Hill
Pyramid Mt.
Chagvan B.
Chagvan Mt.
Security Cove
Hagemeister St
Hagemeister I.
Summit I
Walrus Islands
Round I
Shaink I
C Peirce
Cape Newenham
L. Amanka
L. Ualik
Nushagak Pt.
Nushagak Peninsula
C. Constantine
Clarks Pt.
Etolin Pt.
Etolin Bluff
Nichols Hill
Protection Pt
Sterling Shoal
Usurungol Shoal
Entrance marked by red buoy May 1 to Aug
BRISTOL BAY
162°
161°
160°
159°

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

GDBU
Ams 10/5/89

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10277

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
16315	10/17/89	Ed Martin	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 5
16006	3-21-90	John Pierce	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 26 Exam, NC through chart 16315
16315 (Overlay)	9/25/92	Fannie B Powers	Full ~~Part Before~~ After Marine Center Approval Signed Via Applied
			Drawing No. #8
16011	6/23/93	Kenny O'Dell	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 31 Revised 5 fm curve & 3 fm sq. No Correction from C-16315 #8.
			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.
			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.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.