FE350

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. ... RA-20-3-90 and RA-2.5-1-90

Registery No. ... FE-350

LOCALITY

State ... Alaska

General Locality ... Bristol Bay

Sublocality ... Vicinity of The Twins and Hagemeister Island

19 90

CHIEF OF PARTY
CAPT J.C. Albright

LIBRARY & ARCHIVES

DATE ... May 16, 1991

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

FE350

CHTS
16315
16006
16011

NOAA FORM 77-28 (11-72)

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

HYDROGRAPHIC TITLE SHEET

REGISTER NO.

FE-350

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 20-3-90 and RA 2.5-1-90*

State Alaska

General locality Bristol Bay

Locality Vicinity of The Twins and Hagemeister Island

Scale 1:20,000 and 1:2,500 Date of survey June 8-August 2, 1990
July 18-19, 1990 (AWOIS 51771)

Instructions dated April 23, 1990** Project No. OPR-R184-RA

Vessel Launches RA-3 (2123), RA-4 (2124), RA-5 (2125) and RA-6 (2126)

Chief of party CAPT J.C. Albright

Surveyed by LTJG Glang, LTJG Haines, ENS Muench, ENS Schoonover, ENS Ward, ENS Weber

Soundings taken by echo sounder, ~~hand lead, pole~~ DSF 6000N; Pneumatic depth gage

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel

Verification by: ~~Protracted by~~ Elizabeth H. Brown Automated plot by PHS Xynetics Plotter

Evaluation by: ~~Verification by~~ Bruce A. Olmstead

Soundings in ~~fathoms~~ ~~feet~~ meters & decimeters at ~~MLW~~ MLLW

REMARKS: All times UTC

*RA 20-3-90: H-10277 (1988) Additional Work

RA 2.5-1-90: AWOIS 51771 (H-10253)

**Change No. 1, dated August 15, 1990

Time in UTC. Revisions and marginal notes in black were generated during office processing.

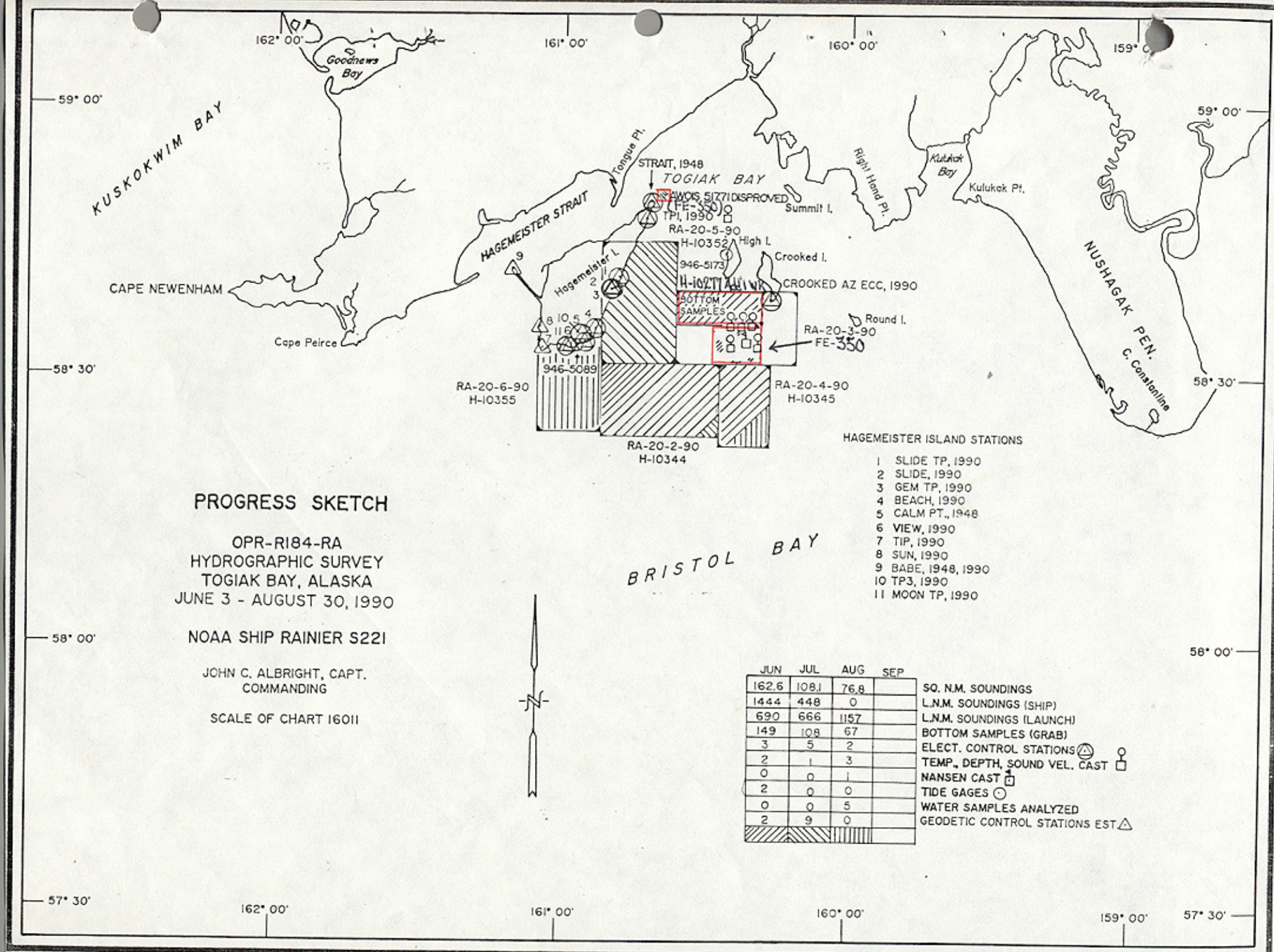
See "ADDENDUM" approval sheet. (KWW, 2/5/92) K.W.W.

AWOIS + SURF - RWD 6/91

K.W.W. 6-25-91, 9/30/93

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

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



HAGEMEISTER ISLAND STATIONS

1 SLIDE TP, 1990
2 SLIDE, 1990
3 GEM TP, 1990
4 BEACH, 1990
5 CALM PT., 1948
6 VIEW, 1990
7 TIP, 1990
8 SUN, 1990
9 BABE, 1948, 1990
10 TP3, 1990
11 MOON TP, 1990

PROGRESS SKETCH

OPR-R184-RA
HYDROGRAPHIC SURVEY
TOGIAK BAY, ALASKA
JUNE 3 - AUGUST 30, 1990

NOAA SHIP RAINIER S221

JOHN C. ALBRIGHT, CAPT.
COMMANDING

SCALE OF CHART 16011

JUN	JUL	AUG	SEP	
162.6	108.1	76.8		SQ. N.M. SOUNDINGS
1444	448	0		L.N.M. SOUNDINGS (SHIP)
690	666	1157		L.N.M. SOUNDINGS (LAUNCH)
149	108	67		BOTTOM SAMPLES (GRAB)
3	5	2		ELECT. CONTROL STATIONS △
2	1	3		TEMP., DEPTH, SOUND VEL. CAST
0	0	1		NANSEN CAST
2	0	0		TIDE GAGES ⊙
0	0	5		WATER SAMPLES ANALYZED
2	9	0		GEODETIC CONTROL STATIONS EST △

Descriptive Report to Accompany Field Examination, FE-350

(H-10277 Additional Work and AWOIS 51771)

Field Number RA-20-3-90 and RA-2.5-1-90
Scale 1:20,000 and 1:2,500
June-August 1990

NOAA Ship RAINIER
Chief of Party: Captain John C. Albright, NOAA

A. PROJECT

A field examination was conducted in Bristol Bay, Alaska, as specified by Project Instructions OPR-R184-RA dated April ~~30~~ 23 1990, and Change No. 1 dated August ~~21~~ 15, 1990.

This field examination (FE-350) completes shoal developments and bottom samples on hydrographic survey H-10277 (1988; 1:20,000) and investigates AWOIS 51771. The assignment of AWOIS 50914 was canceled by Change No. 1 to the project instructions.

B. AREA SURVEYED See Evaluation Report, Section 1

AWOIS 51771 is located in Togiak Bay, Alaska, at 58°49'15.20"N, 160°39'11.30"W (NAD27), approximately one nautical mile east of the northern tip of Hagemeister Island. Survey data were acquired July 18-19, 1990 (DN 199-200).

The additional work on survey H-10277 is located in Bristol Bay, Alaska, 27 NM south of Togiak, in the vicinity of The Twins. The northern and southern limits are 58°40'00"N and 58°31'00"N, respectively. The eastern and western limits are 160°15'00"W and 160°37'00"W, respectively. Survey data were acquired between June 8 and August 2, 1990 (DN 159-214). Soundings collected to further define shoal areas found on H-10277 cover that area from Lat. 58°31'18"N to 58°35'00"N, Long. 160°20'00"W to 160°27'00"W. Bottom samples collected as part of the additional work on H-10277 consisted of fine to medium black sand, coarse pebbles, and broken shells. The coordinates as listed by the hydrographer in the preceding paragraph encompass these data. Reference paragraph 0, Adequacy of Survey.

C. SURVEY VESSELS

All data were acquired by NOAA Ship RAINIER's automated survey launches shown below:

Vessel	EDP No.	Operation
RA-3	2123	Hydrography Bottom Sample
RA-4	2124	Dive Operations
RA-5	2125	Bottom Samples
RA-6	2126	AML Cast

No changes to the standard sounding configurations were necessary.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

Data acquisition and processing were accomplished with Hewlett-Packard (HP) 340M workstations and the following HDAPS programs:

Program Name	Version	Date Installed
SURVEY, w/ RAINIER mods	4.32	6-09-90
POSTSUR, w/ RAINIER mods	4.14	6-01-90
POSTSUR, w/ S&S mod	4.14	7-23-90
FILESYS	1.55	6-01-90
ABST, w/ RAINIER mods	3.05	6-01-90
PLOTALL, w/ RAINIER mods	1.60	6-01-90
	1.69	7-23-90
POINT	1.10	3-09-90
BACKUP	1.02	3-09-90
DIAGNOSTIC	2.15	3-09-90
INVERSE	1.10	7-03-90
INSTALL	1.20	3-09-90
CONPUTE	2.02	3-09-90
CONSTAT, w/ RAINIER mods	2.05	7-03-90
CONPLOT, w/ RAINIER mods	1.02	7-03-90
AUTOST (BIGAUTOST)	2.00	3-09-90
BASELINE	1.01	3-09-90

Velocity corrections were determined using:

Program Name	Version	Version Date
VELOCITY	1.11	3-09-90

The HDAPS Survey and Plotall programs are modified to print the tenth-meter fraction of each sounding as superscript. The position of each sounding is at the center of the integer character string.

The HDAPS Postsur program (version 4.14) was modified on July 23, 1990, to apply settlement and squat during both data acquisition and processing.

The HDAPS Constat and Conplot programs are modified to allow up to 25-character descriptions to be entered in the "Remarks" field of a Contact Table. This is necessary for plotting legible bottom sample descriptions.

E. SONAR EQUIPMENT

Not applicable.

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 ✓

Vessel	Serial No.	DN
2123	A117N	177-178
	A114N	199
	A117N	214

The echo sounders were continuously monitored during data acquisition. All sounding data were scanned at least two times, not only to ensure all significant peaks were inserted, but also to verify the digitized depths. ✓

The diver-obtained depth was determined with a 3D Instruments pneumatic depth gage, S/N 8504192N. The gage was operated in accordance with Hydrographic Survey Guideline (HSG) 55. ✓

G. CORRECTIONS TO SOUNDINGS

Corrections to echo soundings were determined for static draft, heave, velocity of sound through water, settlement and squat, and predicted tides. Sounding correctors apply to both narrow and wide beams of the DSF-6000N echo sounder. Supporting data and computations for all corrections to echo soundings, except heave, are included in the Summer 1990 Corrections to Echo Soundings Data Package for OPR-R184-RA. ✓

Sound Velocity

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

Cast No.	Deepest Depth (m)	DN	Geographic Position
3	24.1	198	58°35'24"N, 160°23'13"W

✓

Sound velocity correctors were acquired with an AML SVP Profiler, S/N 3042, which was calibrated at the Northwest Regional Calibration Center (NRCC) in Bellevue, WA, on March 27, 1990.

The cast used for the velocity table, and the days to which the velocity table is applied, are shown below:

Velocity Table No.	Cast No.	Applicable DN
5	3	177-214

✓

Velocity correctors were computed using the PC program VELOCITY in accordance with HSG 69. Printouts of velocity tables used in the HDAPS Post Survey program are included with the separates* supplementing this report.

* Filed with the survey records.

Static Draft

For all launches, the distance from the transducer face to the gunwale was measured with a large metal square. Static draft measurements were then determined by dropping a leadline from the gunwale to the water and subtracting this distance from the distance measured with the square. The measurements from the gunwale to the waterline were conducted with the fuel tanks averaging 3/4 full and three people aboard. A transducer depth of 0.6 meter was determined for all launches on March 20, 1990. This transducer depth agrees with the launches' historical records. ✓

Settlement and Squat

On June 29, 1990, RAINIER determined the HDAPS Survey and Post Survey programs were not applying settlement and squat correctors. The corrected Post Survey program was installed on July 23, 1990; therefore, settlement and squat correctors* were applied to the final field sheet, but not applied during data acquisition. ✓

Settlement and squat correctors were determined for Vesno 2123 on April 12, 1990, near Pt. Aldolphus in Icy Strait, AK. ✓

The test was conducted over a hard bottom in depths well exceeding seven times the vessel's draft. Both sea and wind were calm. Observations were made through a Zeiss Ni2 leveling instrument (S/N 103453) to a rod held vertically on deck, directly over the transducer. Correctors were computed in accordance with Hydrographic Manual 4.9.4.2. ✓

The following Offset Table was used on this field examination:

Vessel No.	Offset Table No.*	Period used online (DN)
2123	3	177-214

✓

A copy of the offset table is included with the separates supplementing this report. (Filed with the Survey records)

Heave

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

Other Calibrations

The pneumatic depth gage was calibrated February 7, 1990, by the Pacific Operations Group (N/OMA1214). In addition, field system checks were performed each day the pneumatic gage was used. Calibration data and correctors applied to the pneumatic depth gage are included in the Summer 1990 Corrections to Echo Soundings Data Package for OPR-R184-RA. ✓

Bar check lines were calibrated by RAINIER personnel during January 1990 at PMC. Calibration forms are included in the Summer 1990 Corrections to Echo Soundings Data Package for OPR-R184-RA. ✓

* Offset Table No. 3 was not applied to the final field sheet. This resulted in plotted soundings being .6 meter (.3 FM) shoaler due to a misapplication of the TRA corrector.

Tide Correctors Reference Tide Note for approved tides dated Oct. 30, 1990 (attached).

Tidal zoning and correctors applicable to predicted tides for the Hagemeister Island, Alaska, reference tide station (946-5089) were provided in the Project Instructions, and are shown below for both H-10277 and AWOIS 51771. Examination of junctions and crosslines on adjacent surveys revealed the tidal zoning and corrections are inadequate.* Discrepancies will be resolved by N/CG241 per PMC message 0920402 AUG 90 (see ~~Appendix VI~~ See attached). HDAPS listings of data used in generating tide corrector tables are included in Appendix V. (Filed with the Survey records)

* Reference page 4, Settlement and Squat and Offset Table No. 3 as affecting depth discrepancies.

Investigation Item	Time Corrections	Ratio
H-10277	High water: -0 hr 30 min Low water: -0 hr 30 min	direct
AWOIS 51771	High water: -0 hr 30 min Low water: -0 hr 30 min	x1.14

Tide gages were installed and maintained by RAINIER personnel at stations on the southeast side of Hagemeister Island (946-5089) and on the west side of High Island (946-5173). The field tide records and the Preliminary Field Tide Notes for these stations have been forwarded to N/OMA1212 in accordance with HSG 50 and FPM 4.3. Requests for approved tides have been forwarded to N/OMA12. Copies of the Preliminary Field Tide Notes and the requests 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 North American Datum of 1983 (NAD83) and the Geodetic Reference System 1980 Ellipsoid.

Horizontal control stations are ~~listed in Appendix III of~~ attached to this report.

Positions for existing stations are from the NGS data base and prior surveys conducted in 1985 and 1987. Several geographic positions are NAD83 adjusted and were obtained from N/CG2333. Existing stations were recovered in accordance with FPM 5.2.4. New stations were positioned via traverse methods to meet third-order class I standards. Further information can be found in the Summer 1990 Horizontal Control Report for OPR-R184-RA.

I. HYDROGRAPHIC POSITION CONTROL

Soundings were located using DM-54 Automatic Ranging Grid Overlay (ARGO) medium-range positioning system and Motorola Mini-Ranger Falcon 484 microwave, short-range positioning system in the multiple-range mode. Bottom samples were located using Furuno LC-90 Mark-II Loran positioning system and the Mini-Ranger Falcon system. All systems were operated in a manner consistent with accuracy requirements specified in the Hydrographic Manual and the FPM.

Positioning Equipment

The following tables summarize the Falcon mobile console/RT pairs and shore transponders used during this survey:

Mobile Equipment ✓

EDP No	Vessel	Console/RT	DN
2123	RA-3	D0051/B1405	177,178
		E0148/F3413	199,214
2124	RA-4	D0031/D2395	200

Shore Equipment ✓

Transponder Serial No.	Code	Transponder Serial No.	Code
911059	1	B1413	5
B1106	2	C1883	11(B)*
E2713	3	G3501	15(F)*

* hexadecimal/numerical designations

Serial numbers of the ARGO range processing units and control display units are recorded in the survey data. A complete list of the serial numbers of the electronic equipment used during the project is included in the Summer 1990 Electronic Control Data Package for OPR-R184-RA. ✓

Baseline Calibrations (for Mini-Ranger equipment only)

All baseline calibrations were conducted in accordance with FPM 3.1.3.2. On May 20, 1990 (DN 140), calibrations were conducted in Bartlett Cove, Glacier Bay, Alaska, over a measured distance of 1678.4m. On July 10, 1990 (DN 191), calibrations were conducted on Hagemeister Island, Bristol Bay, Alaska, over a measured distance of 1224.3m. Detailed information, calibration data, and a description of the baselines can be found in the Summer 1990 Electronic Control Data Package for OPR-R184-RA. ✓

The final field sheets were plotted with the correctors determined from the baseline calibrations. System check results confirmed the calibration data applied to the raw positioning data was adequate for the scale of this survey. ✓

System Check Procedures

Falcon critical system checks were conducted in accordance with FPM 3.1.3.3 when not used in conjunction with ARGO. Printouts of HDAPS screen graphics displaying multiple lines of position confirmed that the error circle radius and maximum residual did not exceed allowable rejection limits. ✓

The ARGO positioning system was calibrated with the Falcon positioning system using the Secondary by Primary System Calibration function in the HDAPS Survey program. With this method, the Falcon was designated as the primary positioning system and the ARGO was designated as the secondary positioning system. The calibrated position fix was computed by using three Falcon lines-of-positions (LOPs). The program computes an inverse distance from the Falcon position fix to each secondary ARGO shore station. Partial lane correctors are shown as "residuals" on the secondary positioning screen. When the error circle radius (ECR) and maximum residual values fell within the allowable limits stated in FPM 3.1.3.3, the ARGO partial lane correctors were minimized to less than $\pm$0.05 units. Hard copies of both calibrated system checks were produced using the Dump Alpha function and can be found in the survey data. Residuals for the Falcon system ✓

were displayed in meters and residuals for the ARGO system were displayed in units of lanes.

System checks were conducted prior to data collection, and any time ECR and maximum residual values exceeded allowable limits. ✓

Problems and Unusual Position Configurations ✓

Three positioning configurations were used for collecting sounding data: ARGO, Falcon, and a hybrid of ARGO and Falcon.

On DN 184, (July 3) the RT unit, S/N B1405, in Vesno 2123 failed. The console/RT pair in Vesno 2123 was replaced with console/RT E0148/F3413. No data was gathered on DN 184 during this field examination.

On DN 196, (July 15) the range processing unit (RPU) and control display unit (CDU) in Vesno 2123 were changed out because the ARGO system would not stay calibrated. Maximum residuals and ECRs drifted above the limits stated in FPM 3.1.3.3. Serial numbers of the equipment are recorded with the survey data. No data was gathered on DN 196 during this field examination.

On occasion, while using ARGO, maximum residuals would gradually increase over a period of minutes, indicating a jump in lanes. At these times, data acquisition was halted and a re-calibration conducted. Probable causes of lane jumps were fog, rain, skywaves, or ground changes to the antenna load. There were no significant problems encountered with the ARGO positioning system during data acquisition.

A lack of ARGO equipment made it necessary to position bottom samples using a Furuno LC-90 Mark-II Loran positioning system. Because this system uses the WGS 72 datum, for which no shift to NAD 83 was available, RAINIER determined an average offset distance and azimuth from the Furuno positions to ARGO and MiniRanger positions on this survey. The records and calculations for this offset are included with the bottom sample records in the separates accompanying the survey data. This empirically determined shift to NAD 83 has been applied to all bottom samples on this survey. Reference Paragraph O, Adequacy of Survey concerning disposition of these data.

Antenna Offset Distances

Antenna offset and layback correctors were determined and applied to the raw data. ✓
Copies of the Offset Tables are in Section IV of separates included with the survey data.

J. SHORELINE ✓

Not applicable.

K. CROSSLINES ✓

Not applicable.

L. JUNCTIONS ✓

Not applicable.

M. COMPARISON WITH PRIOR SURVEYS See Evaluation Report, Section 6

Field sheet RA-20-3S-90 of this examination was compared with depths on H-10277 (1988, 1:20,000). Additional sounding lines were acquired over several shoal features. In general, soundings agree within less than 1.8 meters (1 fathom). The 2-fathom shoal on H-10277 at 58°33'12"N, 160°25'50"W (NAD27) appears on FE 350 to be more extensive. A depth of 2.7 meters (1.5 fathoms) on the field examination at 58°33'21.03"N, 160°25'38.31"W (NAD83) (DN 177, pos. no. 2030+6), is 0.3 meter (0.2 fathom) shoaler than depths on H-10277. Although field examination depths appear to be shoaler than H-10277 depths, a meaningful comparison of soundings will not be possible until smooth tides can be applied to 1990 RAINIER data. AWOIS 50905 (1.6 FM depth) is part of add'l work.

* Reference page 4, Settlement and Squat re: Offset Table No. 3. Positions and depths

Recommendation: reflect results of office processing.

The sounding data and bottom samples from this field examination supplement survey H-10277 and should be applied in conjunction with survey H-10277. Reference paragraph 0, Adequacy of Survey.

AWOIS 51771 is described as an obstruction with an estimated depth of 3 fathoms (5.5 meters). Its source is survey H-10253 (1987, 1:20,000). The obstruction "was observed on the sonargram at Hdqts". Located on a turnabout, the position was back plotted by calculating time and course to 58°49'15.20"N, 160°39'11.30"W, NAD27 (58°49'12.43"N, 160°39'19.22"W, NAD83). It is shown on Chart 16315, 6th ed., Jan. 6/90, as a 3-fathom obstruction, position approximate.

The investigation of AWOIS 51771 was two-fold: Sounding data were acquired and diver investigations were conducted.

On DN 199 a 10-meter development was conducted in an area of approximately 225m X 275m centered around the above position. No shoal was found. A least depth of ~~8.2~~ 7.0 meters (~~4.5~~ 3.8 fathoms) was found at 58°49'13.12"N, 160°39'17.35"W, NAD83 (pos. no. 2053).

On DN 200 divers searched the area with a 50-meter circle search. The bottom was flat, sand and mud, with no specific feature identifiable. A least depth of ~~8.2~~ 7.1 meters (~~4.5~~ 3.9 fathoms) was found with a pneumatic depth gage at 58°49'13.26"N, 160°39'20.22"W, NAD83 (pos. no. 9000).

Differences between this field examination and AWOIS 51771 no doubt are a result of invalid methods used to determine the AWOIS position. It is impossible to accurately back plot positions when a vessel is maneuvering to start another line. Unless the hydrographer provides accurate positioning between lines or documents course and speed changes during line breaks, the attempt to fix a feature becomes highly suspect. Concur

Recommendation:

AWOIS 51771 was sufficiently investigated and disproved by this field examination. Delete the ~~obstruction~~ 3 Obstn PA charted at latitude 58°49'12.43"N, longitude 160°39'19.22"W, NAD83. Concur

N. COMPARISON WITH THE CHART

This field examination was compared to Chart 16315, 6th ed., Jan. 6/90. No new dangers to navigation were found or reported. Comparisons of soundings and non-sounding features was discussed in Section M.

O. ADEQUACY OF SURVEY ✓

This is a field examination of supplemental hydrographic data and one AWOIS item. It is complete and adequate to be used for charting purposes. The hydrographic data adequately supplements survey H-10277 and disproves AWOIS 51771. Hydrographic data supersedes H-10277(1988) within the common areas. Thirty-nine bottom samples were collected as additional work and supplement H-10277. Concur that AWOIS 51771 is disproved.

P. AIDS TO NAVIGATION ✓

Not applicable.

Q. STATISTICS ✓

Vessel:	2123	2124	2125	TOTAL
# of Pos.	1975	1	41	239
NM of Hydrography:	30.5	0	00	30.5

NM^2 Hydrography:	1.5	Velocity Casts:	1
Detached Positions:	1	Tide Stations:	2
Bottom Samples:*	42	Current/Magnetic Stations:	0

Thirty-nine samples were added to H-10277 as additional work.

R. MISCELLANEOUS ✓

All bottom samples were forwarded to the Smithsonian Institution.

S. RECOMMENDATIONS ✓

N/CG241 needs to review the assignment of AWOIS items more closely to prevent waste of expensive field time. AWOIS item 50914 was in fact ~~deleted~~ postponed on RAINIER's recommendation that it did not warrant investigation. AWOIS item 51771 was of minimal navigational significance since it fell in a charted foul area. at this particular time.

T. REFERRAL TO REPORTS ✓

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

	Date sent to N/CG245
Summer 1990 Corrections to Echo Soundings Data Package for OPR-R184-RA	September 1990
Summer 1990 Electronic Control Data Package for OPR-R184-RA	September 1990
Summer 1990 Horizontal Control Report for OPR-R184-RA	September 1990

Respectfully Submitted,

Thomas R. Shumway
Cartographer

Approved and Forwarded,

John C. Albright
Captain, NOAA
Commanding Officer

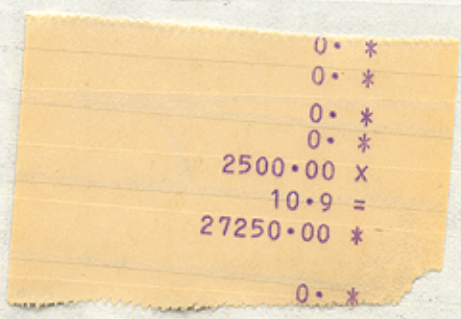
CONTROL STATIONS

No	Type	Latitude	Longitude	H	Cart	Freq	Vel	Code	MM/DD/YY
100	A	058:34:41.239	160:55:09.657	0	250	1658.4	299670.0	1	06/08/90
101	A	058:39:23.968	160:50:01.293	0	254	1658.4	299670.0	2	06/08/90
102	A	058:38:19.199	160:16:16.481	0	254	1658.4	299670.0	3	06/08/90
200	F	058:34:41.239	160:55:09.657	253	250	0.0	0.0	2	06/08/90
201	F	058:39:23.968	160:50:01.293	232	254	0.0	0.0	5	06/08/90
202	F	058:38:19.199	160:16:16.481	71	254	0.0	0.0	3	06/08/90
203	F	058:49:01.447	160:41:03.793	22	250	0.0	0.0	B	07/11/90
~~204~~	~~F~~	~~058:40:51.508~~	~~160:47:58.431~~	~~7~~	~~254~~	~~0.0~~	~~0.0~~	~~E~~	~~07/15/90~~
~~205~~	~~F~~	~~058:39:30.556~~	~~160:49:14.911~~	~~10~~	~~250~~	~~0.0~~	~~0.0~~	~~4~~	~~07/15/90~~
~~206~~	~~F~~	~~058:35:04.044~~	~~160:52:45.530~~	~~14~~	~~250~~	~~0.0~~	~~0.0~~	~~F~~	~~07/15/90~~
207	F	058:47:14.904	160:42:20.529	5	254	0.0	0.0	1	07/11/90
~~208~~	~~F~~	~~058:33:38.440~~	~~160:55:35.694~~	~~16~~	~~254~~	~~0.0~~	~~0.0~~	~~1~~	~~08/05/90~~
~~209~~	~~F~~	~~058:33:16.040~~	~~160:57:09.142~~	~~10~~	~~250~~	~~0.0~~	~~0.0~~	~~4~~	~~08/05/90~~
~~210~~	~~F~~	~~058:33:04.248~~	~~160:57:49.321~~	~~21~~	~~254~~	~~0.0~~	~~0.0~~	~~C~~	~~08/05/90~~
~~211~~	~~F~~	~~058:32:46.208~~	~~161:04:32.374~~	~~15~~	~~250~~	~~0.0~~	~~0.0~~	~~B~~	~~08/05/90~~

100 CALM PT., 1948
101 ~~GEM TP, 1990~~ (Field position) GEM, 1985 TP
102 CROOKED AZ ECC, 1990 (Field position) CROOKED, 1948 AZ MK ECC
200 CALM PT., 1948
201 ~~GEM TP, 1990~~ (Field position) GEM, 1985 TP
202 ~~CROOKED AZ ECC, 1990~~ (Field position) CROOKED, 1948 AZ MK ECC
203 STRAIT, 1948
207 TP 1, 1990 (Field position)

For ARGO stations, the height of the base of the antenna was the station elevation.

ARGO Station	Antenna Elevation (m)	
100	253	
101	232	✓
102	71	



ORIGINAL

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

SUPERSEDED
6/7/91

DATE: October 30, 1990

MARINE CENTER: Pacific

OPR: R184

HYDROGRAPHIC SHEET: FE-350

LOCALITY: The Twins and vicinity, Bristol Bay, Alaska

TIME PERIOD: June 8 - August 2, 1990

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

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 10.63 feet

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 8.5 feet

REMARKS: RECOMMENDED ZONING
East of 160° 30′, zone direct on 946-5173.

West of 160° 30′ and east of 160° 40′, apply a x0.96 range ratio to all heights and a +15 min time correction on 946-5173.

James R. Hubbard
CHIEF, TIDAL DATUM QUALITY ASSURANCE SECTION

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: FE-350 **(REVISED)**

LOCALITY: The Twins and Vicinity, Bristol Bay, Alaska
(additional to H-10277)

TIME PERIOD: June 8 - August 2, 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): 10.63 ft.

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 8.5 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

NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

FE-350

Name on Survey	A ON CHART NO. 16315	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 RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
ALASKA (title)	X									1
BRISTOL BAY	X									2
HAGEMEISTER ISLAND (title)	X									3
TOGIAK BAY	X									4
TWINS, THE (title)	X									5
										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
				Approved:						16
										17
				Charles E. Harrington						18
				Chief Geographer - N/CG2x5						19
				DEC 31 1990						20
										21
										22
										23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

KUS / TPOST
ESA / 102215Z AUG 90

R 092040Z AUG 90
FM NOAAMOP SEATTLE WA
TO NOAAS RAINIER
BT
UNCLAS
RA-PMC-160-189/PMC1X2/PMC1
SUBJ: SOUNDING DISCREPANCIES
NOREP
1. N/CG241 INDICATES RESOLUTION OF SOUNDING DISCREPANCIES CAUSED BY INADEQUATE TIDE CORRECTORS IS EXPECTED TO OCCUR WHEN TIDAL DATA IS THROUGHLY ANALYZED IN ROCKVILLE.
2. ACCURATE TIDE CORRECTORS MAY NOT BE DETERMINED BEFORE YOU LEAVE PROJECT AREA.
BT

APPROVAL SHEET

FOR

Field Examination

FE-

RA-20-3-90 and RA-2.5-1-90

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

John C. Albright
Captain, NOAA
Commanding Officer

NOAA FORM 77-27(H) (9-83) | U.S. DEPARTMENT OF COMMERCE | REGISTRY NUMBER FE-350

HYDROGRAPHIC SURVEY STATISTICS

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET (page size)	3	SMOOTH OVERLAYS: POS., ARC, EXCESS	13
DESCRIPTIVE REPORT	1	FIELD SHEETS AND OTHER OVERLAYS	6

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

SHORELINE DATA

SHORELINE MAPS (List): NA

PHOTOBATHYMETRIC MAPS (List): NA

NOTES TO THE HYDROGRAPHER (List): NA

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			195
POSITIONS REVISED			
SOUNDINGS REVISED	22		22
CONTROL STATIONS REVISED			
	TIME-HOURS		
	VERIFICATION	*EVALUATION*	*TOTALS*
PRE-PROCESSING EXAMINATION	-		
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS	32		32
VERIFICATION OF SOUNDINGS	59		59
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	40		40
COMPARISON WITH PRIOR SURVEYS AND CHARTS		5	5
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		47	43
GEOGRAPHIC NAMES			
OTHER*			
*USE OTHER SIDE OF FORM FOR REMARKS TOTALS	131	52	179

Pre-processing Examination by M. Brown	*Beginning Date* 9/10/90	*Ending Date* 9/26/90
Verification of Field Data by E. Brown	*Time (Hours)* 131	*Ending Date* 3/5/91
Verification Check by J. Stringham	*Time (Hours)* 13.5	*Ending Date* 3/6/91
Evaluation and Analysis by B.A. Olmstead	*Time (Hours)* 52.0	*Ending Date* 4/23/91
Inspection by D. Hill	*Time (Hours)* 4	*Ending Date* 4/24/91

EVALUATION REPORT
FE-350

1. INTRODUCTION

Survey FE-350 is a field examination accomplished by the NOAA Ship RAINIER under the following Project Instructions.

OPR-R184-RA dated April 23, 1990
CHANGE NO. 1, dated August 15, 1990

This survey occurred in Alaska as a result of recommended additional work for surveys previously accomplished in 1987 and 1988 and covers two distinct areas. One area, an investigation of AWOIS 51771, is located approximately one nautical mile northeast of the northern tip of Hagemeister Island in Togiak Bay. The remaining portion of the field examination covers shoal developments in the vicinity of The Twins, approximately 27 nautical miles south of Togiak. The two surveyed areas are; latitude 58°49'13"N, longitude 160°39'18"W, and latitude 58°31'18"N to latitude 58°35'00"N, longitude 160°20'00"W to longitude 160°27'30"W. Additionally, 39 bottom samples were gathered as part of FE-350 to supplement H-10277(1988). The bottom samples have been included with the survey records, plotted on the original smooth sheet and included in the digital file for H-10277. Surveyed areas are characterized as follows: the area off the northern tip of Hagemeister Island is extensively foul with dangerous submerged rocks and depths less than five meters, while the area in the vicinity of The Twins is composed of several isolated shoals of less than five meters. This area is otherwise relatively flat with a sandy bottom. Depths from the present survey range from 6.4 meters to 8.0 meters, centered about the investigation of AWOIS 51771. Depths in the vicinity of The Twins range from 2.3 meters to 14.8 meters.

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 sheet parameters have been revised to center the hydrography on the smooth sheet and to change the projection to polyconic. The final field sheet for AWOIS 51771 was plotted at 1:2500 scale. The smooth sheet was revised to 1:10000 scale during office processing since additional work disproved the charted feature and provided no new chartable information. The TRA and sound velocity correctors are adequate. An accompanying computer printout contains the parameters and the correctors. The electronic control correctors have been determined according to the established procedures and are adequate.

A digital file has been generated for this survey as required by Hydrographic Survey Guideline No. 52, Standard Digital Data Exchange Format, April 15, 1986.

2. CONTROL AND SHORELINE

Sections H and I of the hydrographer's report and the Horizontal and Electronic Control Reports for OPR-R184-RA 1990 contain adequate discussions of horizontal control and hydrographic positioning.

Positions of horizontal control stations used during hydrography are published and 1990 field values based on NAD 83. These values were checked during office processing and found to be acceptable. The smooth sheet and accompanying overlays are annotated with NAD 27 adjustment ticks based on values determined by using the North American Datum Conversion Program (NADCON). Geographic positions based on NAD 27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections. The values listed below are an average correction between the two surveyed areas.

Latitude: -2.798 (-86.565 meters)
Longitude: 7.916 (127.536 meters)

The year of establishment of control stations originates with the National Geodetic Survey data base and the horizontal control data for this project. All control stations are located beyond the sheet limits.

There were no positional data exceeding specification tolerances for error circle radius and residual.

There is no shoreline within the limits of the present survey. As such, there are no shoreline maps or charted mean high water line applicable to the survey area.

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.

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 3, the Hydrographic Survey Guidelines, and the Field Procedures Manual, April 1990.

5. JUNCTIONS

There are no contemporary junction surveys. This field examination resides entirely within the area of prior surveys H-10253 and H-10277. The soundings and depth curves in the junction areas are in adequate agreement.

6. COMPARISON WITH PRIOR SURVEYS

H-10253 (1987) 1:20000
H-10277 (1988) 1:20000

Survey H-10253 covers the area northeast of the northern tip of Hagemeister Island, while H-10277 is located within the vicinity of The Twins. The present work revealed no significant depth discrepancies or added dangers. Depths have remained essentially unchanged since the prior survey work, with differences of between one-tenth and three-tenths of a meter being common. There appears to be no consistent pattern of shoaling or deepening. The application of approved tidal correctors generally resolved those discrepancies with the present survey as discussed in sections G and M of the hydrographer's report.

AWOIS item 51771 originates with prior survey H-10253. Refer to section M of the hydrographer's report for the disposition of this item.

AWOIS item 50905, latitude 58°33'00"N, longitude 160°25'15"W (NAD 27), is a 1.6 fathom depth which originates from H-7718 (1948). During the evaluation of survey H-10277, it was determined that the 1.6 fathom depth was inaccurately positioned on the prior survey and likely falls on a charted shoal delineated by a 1.8 fathom depth found in 1988. As the above charted shoal was not adequately developed in 1988, additional work was recommended to further define the area centered about latitude 58°33'00"N, longitude 160°26'08"W (NAD 27), and determine if depths less than the 1.8 fathoms (3.3 meters) found on survey H-10277 may exist. Three separate locations were identified from this field examination where 3 meter (1.6 fathoms) depths were found. These depths are closely grouped and centered at latitude 58°33'24"N, longitude 160°25'33"W (NAD 83). AWOIS 50905 has been sufficiently investigated, delete the presently charted soundings and chart a 1.6 fathom (3 meters) depth and this shoal as found on the present survey.

AWOIS item 50928, latitude 58°52'00"N, longitude 160°03'00"W (NAD 27), a dangerous submerged wreck, position doubtful, originates from a miscellaneous source. The project instructions stated that two side scan sonars were required for this investigation. This item was not investigated during this survey apparently because of a lack of the required side scan sonar equipment.

Several shoaler soundings from H-10277 have been transferred in red to the present survey. This was accomplished in areas of insufficient survey coverage or where the shoalest depth originated from prior data.

With the transfer of the above soundings, survey FE-350 is adequate to supersede prior surveys H-10253(1987) and H-10277(1988) within the common areas.

7. COMPARISON WITH CHART

Chart 16315, 6th edition, dated Jan. 6, 1990; scale 1:100,000.

a. Hydrography

All charted hydrography originates with prior surveys H-10253(1987) and H-10277(1988) and requires no further discussion.

Survey FE-350 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

No reports of dangers to navigation were generated during the survey or office processing.

8. COMPLIANCE WITH INSTRUCTIONS

Survey FE-350 adequately complies with the Project Instructions.

9. ADDITIONAL FIELD WORK

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

Bruce A. Olmstead

Bruce A.Olmstead
Senior Cartographer

APPROVAL SHEET
FE-350

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, comparison with prior surveys and verification or disproval of charted data. The digital data have been completed and all revisions and processing have been entered in the magnetic tape record for this survey. 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: 4-24-91
Dennis J. Hill
Chief, Hydrographic Processing Unit
Pacific Hydrographic Section

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

Date: 4/26/91
Commander Pamela Chelgren-Koterba, NOAA
Chief, Pacific Hydrographic Section

****

Final Approval

Approved: J. Austin Yeager Date: 6/21/91
J. Austin Yeager
Rear Admiral, NOAA
Director, Charting and Geodetic Services

ADDENDUM
FE-350

Survey FE-350 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

160° 24' 00" 160° 23' 00" 160° 22' 00" 160° 21' 00" 160° 20' 00"

FE-350

ALASKA, BRISTOL BAY
VICINITY OF THE TWINS AND
HAGEMEISTER ISLAND

58° 32' 00" 58° 32' 00"

Date of Survey: June-August 1990
Scale: 1:20,000
Soundings in METERS and DECIMETERS at MLLW
Datum: NAD 83
Sheet 1 of 3

Soundings in red from H-10277(1988)

AWOIS Item: 50905

BRISTOL BAY

58° 31' 00" 58° 31' 00"

160° 22' 00"

NAD 27
2/22/91 B.H.B

58° 31' 00"

160° 24' 00" 160° 23' 00" 160° 22' 00" 160° 21' 00" 160° 20' 00"

160° 28' 00"
160° 27' 00"
160° 26' 00"
160° 25' 00"
160° 24' 00"
160° 23' 00"
160° 22' 00"
160° 21' 00"

58° 35' 00"

B R I S T O L B A Y

med bk S
fine P

160° 22' 00"
58° 34' 00"

NAD 27
2/22/91 B.H.B

58° 34' 00"

FE-350

ALASKA, BRISTOL BAY
VICINITY OF THE TWINS AND HAGEMEISTER ISLAND

Date of Survey: June-August 1990
Scale: 1:20,000
Soundings in METERS and DECIMETERS at MLLW
Datum: NAD 83
Sheet 2 of 3

58° 33' 00"

Soundings in red from H-10277 (1988)

AWOIS Item: 50905

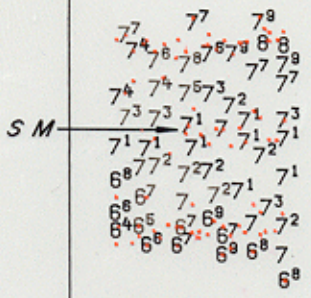
med bk S
crs bk S

160° 28' 00"
160° 27' 00"
160° 26' 00"
160° 25' 00"
160° 24' 00"
160° 23' 00"
160° 22' 00"
160° 21' 00"

160° 40' 00" 160° 39' 30" 160° 39' 00" 160° 38' 30"

58° 49' 30"

TOGIAK BAY



160° 39' 00" 58° 49' 00"

NAD 27

58° 49' 00"

2/22/91 B.H.B

FE-350

ALASKA, BRISTOL BAY VICINITY OF THE TWINS AND HAGEMEISTER ISLAND

Date of Survey: June-August 1990

Scale: 1:10,000

Soundings in METERS and DECIMETERS at MLLW

Datum: NAD 83

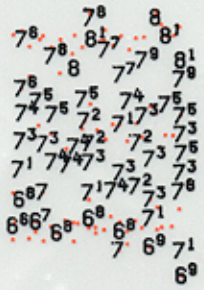
58° 48' 30"

AWOIS Item: 51771

Sheet 3 of 3

160° 40' 00" 160° 39' 30" 160° 39' 00" 160° 38' 30"

160° 40' 00" 160° 39' 30" 160° 39' 00" 160° 38' 30"



160° 39' 00" 58° 49' 00"

NAD 27 58° 49' 00"

FE-350

58° 48' 30"

REVISION OVERLAY, REFER TO EVALUATION REPORT ADDENDUM FOR DETAILS.

160° 40' 00" 160° 39' 30" 160° 39' 00" 160° 38' 30"

160° 24' 00" 160° 23' 00" 160° 22' 00" 160° 21' 00" 160° 20' 00"

FE-350

REVISION OVERLAY, REFER TO EVALUATION REPORT ADDENDUM FOR DETAILS.

58° 32' 00"

58° 32' 00"

Soundings in red from H-10277 (1988)

58° 31' 00"

58° 31' 00"

160° 22' 00"

NAD 27

58° 31' 00"

160° 24' 00" 160° 23' 00" 160° 22' 00" 160° 21' 00" 160° 20' 00"

160° 28' 00"

160° 27' 00"

160° 26' 00"

160° 25' 00"

160° 24' 00"

160° 23' 00"

160° 22' 00"

58° 35' 00"

58° 34' 00"

58° 33' 00"

160° 22' 00"

58° 34' 00"

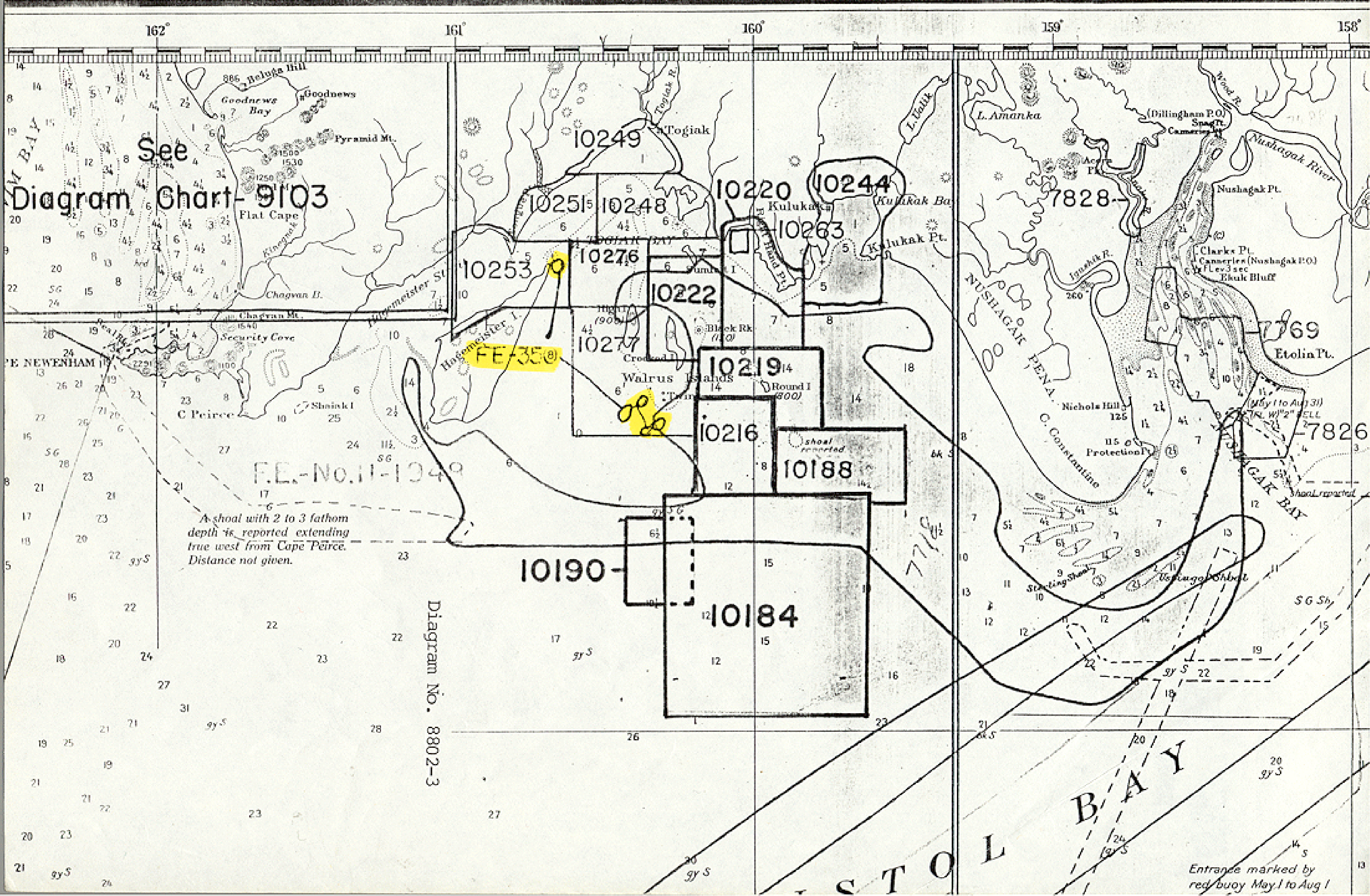
NAD 27

FE-350

Soundings in red from H-10277 (1988)

REVISION OVERLAY, REFER TO EVALUATION REPORT ADDENDUM FOR DETAILS.

7718



162°
161°
160°
159°
158°
See
Diagram Chart-9103
Goodnews Bay
Goodnews
Beluga Hill
Pyramid Mt.
Flat Cape
Chagvan B.
Chagvan Mt.
Security Cove
C Peirce
Shaiak I
E NEWENHAM
Hagemeister St.
Hagemeister I.
Togiak
10249
10251
10248
10253
10276
10222
10277
10220
10244
10263
10219
10216
10188
10190
10184
FE-358
Kulukak
Kulukak Bay
Kulukak Pt.
Black Rk
Crooked I.
Walrus Islands
Round I
7828
7769
7826
L. Amanka
Nushagak Pt.
Nushagak River
Clarks Pt.
Ekuk Bluff
Etolin Pt.
Nichols Hill
Protection Pt.
NUSHAGAK PENA
C. Constantine
NUSHAGAK BAY
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
BRISTOL BAY
Entrance marked by red buoy May 1 to Aug 1

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. FE-350

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	7/22/91	H. Unruh	Full Part Before After Marine Center Approval Signed Via
	8-15-91	D.C. Harpine	Drawing No. 7
16011	6/23/93	Kenny O'Dell	Full ~~Part Before~~ After Marine Center Approval Signed Via
		DCH	Drawing No. 31. Applied THRU C-16315 # 8.
16006	6/23/93	Kenny O'Dell	Full ~~Part Before~~ After Marine Center Approval Signed Via
		DCH	Drawing No. 27 No CORRECTION THRU C-16011 # 31.
			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.
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			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.