

# 9660

Diag. Cht. 5502-2 & 540222.

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT (HYDROGRAPHIC)

Type of Survey ..... Basic Hydrographic .....  
Field No. .... RA-20-4-76 .....  
Office No. .... H-9660 .....

### LOCALITY

State ..... California .....  
General Locality ..... Northern Coast .....  
Locality ..... Offshore Point Reyes .....

1976

CHIEF OF PARTY  
J. P. Randall

### LIBRARY & ARCHIVES

DATE ..... 6/3/77 .....

9660

Area 5

Chts

5020 868  
5021 811  
5052 1,100  
5072 100  
5402 210  
5502 207  
5599 40  
5601 70

5603 -30  
5002 41,610

U.S. GOV. PRINTING OFFICE: 1975-668-353

H-9660

HYDROGRAPHIC TITLE SHEET

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-20-4-76

State California

General locality Northern Coast

Locality Offshore Point Reyes

Scale 1:20,000 Date of survey October 8-16, 1976

Instructions dated 22 June 1976 Project No. SP-PMC-4-RA-76

Vessel NOAA Ship RAINIER, MSS-21 (Vessel #2120)

Chief of party CAPT James P. Randall

Surveyed by ENS J. Peterson (team leader), LT F. Kleinschmidt, LTJG J. Osborn, ENS J. Davis, ENS K. Lerch, ENS M. Molchan

Soundings taken by echo sounder, ~~hand lead, etc~~ Raytheon Model UGR 196B-13 (S/N 75)

Graphic record scaled by RAINIER Survey Department

Graphic record checked by RAINIER Survey Department

Positions verified

~~checked~~ by Thelma O. Jones Automated plot by PMC/Xynetics Plotter

Soundings

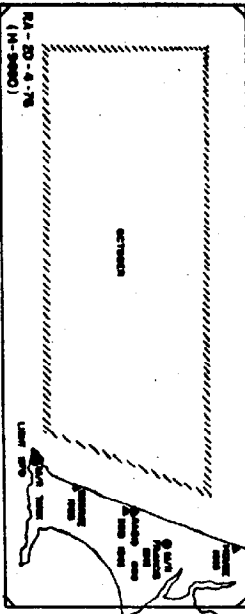
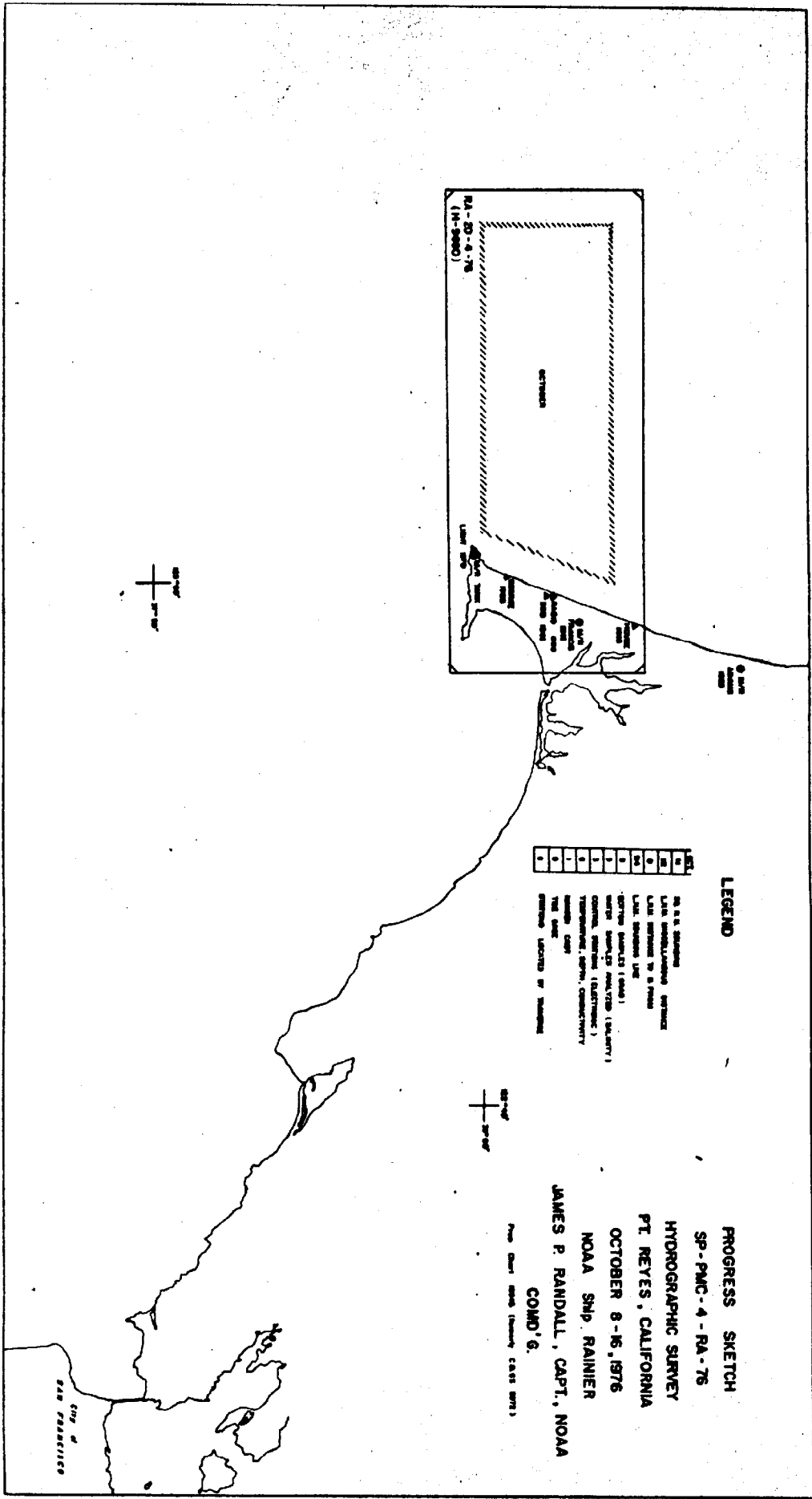
Verification by Thelma O. Jones

Soundings in <sup>and tenths</sup> fathoms ~~XXXX~~ at ~~XXXX~~ MLLW

REMARKS: This survey is complete and adequate to supersede prior surveys.

Time meridian: 0° (GMT)

*Applied to stds 9/9/77*  
*[Signature]*



**LEGEND**

10	10 fathoms
9	9 fathoms
8	8 fathoms
7	7 fathoms
6	6 fathoms
5	5 fathoms
4	4 fathoms
3	3 fathoms
2	2 fathoms
1	1 fathom
0	0 fathoms

10 fathoms  
 9 fathoms  
 8 fathoms  
 7 fathoms  
 6 fathoms  
 5 fathoms  
 4 fathoms  
 3 fathoms  
 2 fathoms  
 1 fathom  
 0 fathoms

**PROGRESS SKETCH**  
 SP-PMC-4 - RA-76  
 HYDROGRAPHIC SURVEY  
 PT. REYES, CALIFORNIA  
 OCTOBER 8-16, 1976  
 NOAA SHIP RAINIER  
 JAMES P. RANDALL, CAPT., NOAA  
 COMD'G.  
 From Chart 9000 (Issued 1971)



City of  
SAN FRANCISCO

DESCRIPTIVE REPORT  
To Accompany Hydrographic Survey

SP-PMC-4-RA-76

H-9660

Pt. Reyes, California

1:20,000 Scale

October 1976

NOAA Ship RAINIER

CAPT. James P. Randall  
Commanding

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A. Project

This hydrographic survey was performed in accordance with PROJECT INSTRUCTIONS, SP-PMC-4-RA-76, Point Reyes and Pt. LaJolla, California. These instructions were dated 22 June, 1976.

B. Area Surveyed

The survey was conducted off the California coast at Point Reyes. The area surveyed was roughly rectangular in shape, covering 41 square miles with corners at the following points:

Northwest Corner	<u>38° 04' N</u>	<u>123° 14' W</u>
Northeast Corner	<u>38° 04' N</u>	<u>123° 00' W</u>
Southeast Corner	<u>38° 00' N</u>	<u>123° 02' W</u>
Southwest Corner	<u>38° 00' N</u>	<u>123° 14' W</u>

The survey began 8 October, 1976 (JD 282) and was completed on 16 October, 1976 (JD 290).

C. Sounding Vessels

All soundings for this survey were taken by RAINIER, MSS-21 (Vessel 2120). Main scheme soundings were plotted in black ink, crossline soundings in red ink, and soundings from prior surveys in blue ink.

D. Sounding Equipment

Sounding equipment used for this survey consisted of an Edo Model 248 transceiver (S/N 202), a Raytheon Universal Graphic Recorder Model UGR

196B-13 (S/N 75), and an Edo Model 261-C Digitizer (S/N 204). The transducer used was located in Sound Room #1 of RAINIER, which is located 2.4 meters forward of the electronic positioning equipment.

The sounding equipment was used exclusively by RAINIER during this survey. Velocity, draft, and instrument error corrections will be applied to all soundings obtained by this equipment.

Corrections due to the velocity of sound through the water were determined by means of a Nansen cast. Eight samples were taken, ranging from the surface to below seventy fathoms. The cast was performed 8 October, 1976 (JD 282) at Latitude  $38^{\circ} 07' 18''$  N, Longitude  $123^{\circ} 18' 06''$  W. Salinity of the samples was determined by Plessey Model 621 Salinometer (S/N 1011). The most recent calibration of this instrument was performed 23 December, 1975.

Standard procedures were followed in computing velocity corrections from the cast data in accordance with Section 4.9.5.2, Hydrographic Manual, Fourth Edition (Provisional). Computer program RK-530 was used to determine layers and corrections at mid-layer depths. A curve was then constructed from the computer data, and the velocity table was scaled from this curve.

Draft and instrument error corrections were determined by leadline comparison which was conducted 16 October, 1976 (JD 290). The value of the correction was found to be <sup>2.1 (see HIT report)</sup>~~2.4~~ fathoms.

All soundings obtained during this survey were digitized and no abstract of initial corrections was applied. Furthermore, no initial correction was present. The analog and digital values for the depths were identical and missed digital depths could be scaled directly from the

analog record without corrections.

All echo sounding correction tapes were prepared in accordance with the Instruction Manual, Automated Hydrographic Surveys, Sections 9-2 and 9-3. The velocity correction tapes and TC/TI tapes were logged in single indicator format. Copies of printouts of these tapes are included in the Separates to the Text. ✓

Settlement and squat for RAINIER was determined to be not appreciable during this survey.

#### E. Hydrographic Sheets

The transverse Mercator projection, soundings, and grid were plotted by RAINIER personnel using PDP-8/e computer (S/N 01015) with a COMLOT plotter Model DP-3 (S/N 5445-7).

The control meridian for the projection was 123° 07' 00" W. and the control latitude was 4,201,000 meters north of latitude zero. Rough sounding plots were made daily, and a semi-smooth sounding plot collated at the end of the survey. The final projection was prepared 25 September, 1976 and the final sounding plot was done 26 October, 1976 on Mylar 0.003 inch thick polyester drafting film. No discernable distortion could be detected in the boat sheet during the final plot. ✓

#### F. Station Control

Control Stations used during this survey consisted entirely of existing triangulation stations. A total of 15 stations were recovered, three of these were used as Mini-Ranger Sites and 4 were used as visual signals for ✓

calibration. No additional control was needed or established during the survey and no eccentric stations were used.

Elevations for two Mini-Ranger stations, PT. REYES WATER TANK 1968 and FRANCIS 1962, were determined by observing reciprocal zenith distances to known elevations. Computations of these elevations are included in this section. The elevation for Mini-Ranger Station ADAMS 1929 was taken from a topographic map which indicates the elevation of the station. ✓

The following stations were recovered and recovery notes have been submitted to NGS via Pacific Marine Center. Stations used for Hydrographic position control are listed on the Station List included in separates following the text.

ADAMS	1929	
BENCH MARK 612 VA (USGS)	1930	
BOB (USN)	1968	
CABESA	1930	
DRAKE	1930	Refer to the separates
DRIFT	1930	following the text for the
FOSTER	1857	horizontal control data package.
FRANCIS	1962	
GEORGE (USN)	1968	
POINT REYES EAST 2	1930	
POINT REYES HEAD 3	1960	
POINT REYES LIGHTHOUSE	1870	
POINT REYES NORTH BEACH HOUSE WEST GABLE	1968	
POINT REYES RADIO COMPASS STATION 2	1968	
POINT REYES USCG WATER TANK	1968	



G. Position Control

The Motorola Mini-Ranger III SHF Range-Range System was used to provide position control for this survey. The equipment was free from hardware problems throughout the project, and operated continuously for the duration of hydrography. The system used for this survey consisted of range console S/N 720, transceiver S/N 727, a signal strength indicator aboard RAINIER, and three shore-based remote transponders. The transceiver was mounted at the top of the foremast, 25 meters above the waterline and 2.4 meters abaft the fathometer transducer. The reference transponders were placed over three points of known geodetic position as follows:

<u>Station</u>	<u>Name</u>	<u>Code</u>	<u>S/N</u>	<u>Antenna</u>	<u>Elev.</u>
103	TANK	4	777	Standard	166
105	ADAMS	1	774	High Gain	39
109	FRANCIS	3	776	Standard	72

Using these transponders, station pairs were selected to provide an arc intersection greater than 30 degrees. Power was applied by two 12 volt batteries at each station.

Electronic correctors to raw position data for this project were derived from baseline calibration data and supported by daily calibration checks.

The baseline calibration was performed on 22 September, 1976 (JD 265) at the Pacific Marine Center, over a measured distance of 1866.3 meters across Lake Union. Daily calibration checks by three-point sextant fix verified baseline correctors, generally falling within  $\pm 3$  meter and always

within  $\pm$  7 meters. Standard deviations of all calibrations varied from 3.2 meters (Code 3) to 4.4 meters (Code 1).

It was noticed during calibration on Julian Day 288 that there were consistently large distances between the fixes and check fixes using Signal # 116. If these check fixes are rejected, the data show much better performance, with a maximum difference of 5 meters between calibration and baseline, and with overall standard deviation varying from 2.93 (Code 3) to 3.87 (Code 4). Baseline calibration data are included with the survey data. ✓

Some null zone areas, caused by destructive interference from multi-path signal propagation, were encountered during the survey. Signal strengths were monitored continually and areas of low signal strength were closely examined for "busts".

No separate electronic control report will be submitted for this survey.

#### H. Shoreline

There was no shoreline present in this surveyed area. However, shoreline adjacent to the survey area was transferred to the boatsheet by pantograph from Chart 18647 1:40,000 and USGS Quad "Drake's Bay, CA." 1:24,000 for the hydrographer's convenience. No field edit was performed on this survey. ✓

#### I. Crosslines

Crosslines run on this survey amounted to 48.0 n.m. which is equivalent to 6% of the mainscheme mileage. This percentage is within the limits specified in the Hydrographic Manual, 4th Edition (Provisional). ✓

Agreement between the crossline and mainscheme soundings was excellent, with 86.5% of the comparisons showing no discrepancy. The remaining 13.5% showed a maximum discrepancy of one fathom, which could be attributed to rounding error.

J. Junctions

There were no junctions between this survey and any other contemporary surveys.

K. Comparison with Prior Surveys

Comparison of the present survey with H-5169, 1:40,000 scale, performed in 1931-32, showed very good agreement throughout. Prior survey soundings, plotted in blue on the boatsheet, were distributed throughout the survey area. The maximum discrepancy of one fathom was exhibited by 22% of the comparisons. This difference represents a maximum of 3% error at these depths, and can be attributed to rounding error. The remaining 88% of the comparisons showed no discrepancy.

No Pre-survey Review Items were issued with this project.

L. Comparison with the Chart

Comparison with Chart 18645 (C&GS 5072), 12th Edition 3 January 1976, showed a maximum discrepancy of two fathoms, which was equivalent to an 8% error, in only one case. The sounding located at  $38^{\circ} 03.3'N$ ,  $123^{\circ} 02.7'W$  indicates a 27 fathom shoal. This survey includes a 45 meter spaced development which exhibits a shoalest depth of  $2\frac{4}{5}$  fathoms in this area. It is

recommended that the current 2<sup>4</sup>/<sub>5</sub> fathom sounding replace the previous 27 fathom sounding. No communication of this information to the Coast Guard was initiated as this feature was not deemed an immediate hazard to navigation

A discrepancy of one fathom was exhibited by 22% of the comparison soundings. This represents an error of approximately 3%, and could be attributed to rounding in most cases. However, the charted sounding located at 38° 00.3'N, 123° 02.2'W indicates a 10 fathom <sup>5</sup> foot shoal. This survey indicates the shoalest depth in this area as <sup>11<sup>8</sup>/<sub>5</sub></sup> ~~12~~ fathoms. The 45 meter development in this area is sufficient to disprove the 10 fathom sounding and it is recommended that it be replaced by a ~~12~~ fathom sounding on the chart. *Disregard recommendation. See Verifier's Report - section VII*

The remaining 76% of the sounding comparisons showed no discrepancy. Depth curves from the survey also showed very good agreement with the chart.

#### M. Adequacy of Survey

The survey (H-9660) is complete and adequate to super<sup>s</sup>cede all prior surveys for charting purposes. All fathogram field survey records were scanned and checked for peaks and deeps, and appropriate changes made to the original records where necessary.

#### N. Aids to Navigation

No floating aids were within the survey area and no fixed aids were located during the course of the survey.

O. Statistics

During this survey 854.1 n.m. of sounding line were run with electronic control, covering 41 square nautical miles. There were 2121 positions used. ✓  
As per Project Instructions, no bottom samples were taken during this survey.

P. Miscellaneous

There were no other significant scientific observations made during this survey. No unusual submarine features or tidal phenomena were encountered. ✓

Q. Recommendations

No part of this survey is considered inadequate or incomplete for charting. No additional field work is required. No dredging or construction is planned that will effect the survey area. No special inserts are required on either the smooth sheet or the chart for clarity. ✓

R. Data Processing Procedures

Data acquisition and processing was accomplished as per instructions in the Hydrographic Manual, 4th Edition (Provisional) and the PMC OORDER. Soundings and position data were obtained by the Hydroplot System utilizing computer program RK 111. ✓

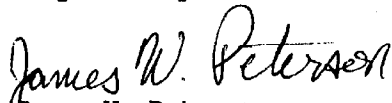
For each master tape there is a corresponding corrector tape which includes the ship's TRA, electronic control calibration corrections and all corrections to depths. Velocity correctors generated from Nansen Cast data are recorded on the accompanying Velocity Corrector Tapes.

<u>PDP-8 Computer Programs</u>	<u>Latest Version</u>
RK 111 Range-Range Real Time Plot	1/30/76
RK 201 Grid, Signal, and Lattice Plot	7/12/75
RK 211 Range-Range Non-Real Time Plot	1/15/76
RK 300 Utility Computations	2/10/76
PM 360 Electronic Corrector Abstract	2/02/76
RK 407 Geodetic Inverse/Direct	10/23/75
RK 409 Geodetic Utility Package	9/05/73
RK 500 Predicted Tide Generator	11/10/72
RK 530 Layer Corrections for Velocity	5/10/76
RK 561 H/R Geodetic Calibration	2/19/75
RK 602 Elinore	5/21/75

S. References to Reports

No additional reports have been compiled for this project. All information necessary for complete evaluation and understanding of this survey is included in "Separates Following the Text".

Respectfully submitted;

  
James W. Peterson  
ENS., NOAA

Separates To The Text

	<u>Page</u>
✓ Hydrographic Sheet Projection Parameters	12
Field Tide Note	13
Corrections to Echo Sounding Package	14
✓ TC/TI Tape Listing	24-25
Horizontal Control Package	26
✓ Recovery Notes - Triangulation stations	30-51
✓ Electronic Corrector Package	52-62
✓ Abstract of Positions	63
Approval Sheet	64

✓ = Misc. items removed from this D.R. and filed in the cahier

Field Tide Note

H-9660

SP-PMC-4-RA-76

Pt Reyes, California

Field tide reduction of soundings was based on predicted tides for Fort Point, Presidio Primary Tide Station (Golden Gate), San Francisco, California as published in the 1976 TIDE TABLES. The following time and height correctors for Pt Reyes were applied:

Time Correctors		Height Correctors
<u>Hi Water</u>	<u>Lo Water</u>	<u>Height Ratio</u>
-1.0 hr	-30 Min	0.98

These predicted tides were converted to GMT tide correctors with PDP8/E computer using Program AM 500, PREDICTED TIDE GENERATOR, version 10 November 1972.

It is recommended that this survey be reduced using smooth tidal data from Pt Reyes primary tide station, and no zoning be applied.

Levels were run to four (4) standard disks at Pt Reyes, California on 14 October 1976.



CORRECTIONS to ECHO SOUNDINGS

PACKAGE

CEANOGRAPHIC LOG SHEET-A  
STATION AND THERMOMETER DATA

TYPE OF BOTTOM	DIR. 320	WIND SPEED (Knots)	DIR. 12	WIND WET	AIR TEMP (°C)	SEA DIR.	AMT.	WATER COLOR (Fovis)	COMPUTED BY
BT OBSERVATION NO.	—	WIND FORCE (Beaufort)	—	WEATHER	—	DIR.	—	TRANSPARENCY	LTD 10/8/76
BUCKET TEMP.	—	BAROMETER (In MBS.)	30.05	%	—	DIR.	—	—	CHECKED BY
				CLOUDS	—	—	—	—	✓ THP / DDM
				AMT.	—	—	—	—	—

STATION	LEFT THERMOMETER				RIGHT THERMOMETER				THERMO-METRIC DEPTH (Z)	DIFF. (T <sub>u</sub> - T <sub>w</sub> ) (sec.)	AVERAGE T <sub>w</sub>	L-Z OR COSINE OBS. USED	AC. CEPTED DEPTH	REMARKS	
	AUX. (IN)	V <sub>0</sub>	I	C <sub>0</sub>	T <sub>M</sub>	THERM. NO.	MAIN (T or Z)	AUX. (I OR C)							V <sub>0</sub>
0	21.1	116	707	713	15.30	657-65	15.63	20.9	103	701	710	15.52	15.52	0.0	* K=6140
1	21.6	—	707	714	15.30	—	15.63	21.4	—	701	711	15.57	—	9.8	—
2	21.0	115	706	718	13.38	664-65	15.63	20.9	91	701	718	15.52	15.52	19.6	** K=6300
3	21.4	—	706	718	13.38	—	15.63	21.3	—	701	710	15.52	—	29.5	*** K=6098
4	21.4	—	706	718	13.38	—	15.63	21.3	—	706	712	15.10	15.10	30.7	(30.7) FTB
5	21.0	128	704	723	11.81	595-65	11.79	20.9	108	709	718	11.52	11.52	39.8	—
6	21.4	—	704	723	11.81	—	11.80	21.4	—	709	719	11.52	—	49.0	—
7	20.8	142	703	724	11.61	3401	11.36	21.2	106	703	719	11.14	11.14	53.5	—
8	21.2	—	703	725	11.60	—	11.37	21.7	—	709	720	11.14	—	73.9	—
9	20.9	125	701	723	11.15	219-68	10.59	21.1	98	700	719	10.40	10.40	72.9	—
10	21.3	—	701	724	11.14	—	10.59	21.6	—	700	720	10.39	—	98.5	FTB
11	21.0	125	706	724	9.73	16736	—	—	99	—	—	10.09	—	116.2	—
12	21.5	—	706	725	9.74	—	—	—	—	—	—	—	—	119.4	—
13	21.3	123	708	725	10.91	14542	9.94	21.4	109	701	722	9.71	9.69	121.2	—
14	21.7	—	708	726	10.92	—	9.94	21.8	—	701	723	9.70	—	—	—

HYTECH SALINOMETER LOG SHEET

CRUISE SP-PMC-4-RA-76 LATITUDE 18° 07.3' N DATE 10/18/76  
 STATION NO. VICINITY OF POINT REYES, CA. LONGITUDE 123° 18.1' W OPERATOR LTD  
 SHIP NOAA SHIP RAINIER, MSS-21 AIR TEMP. 21.8 SALINOMETER NO. 1011

TIME	SAMPLE		TEMP (C)	TEMP COMP	STAND ARDIZE	CONDUCTIVITY RATIO	Table IIb. Δ20	CORRECTED CONDUCTIVITY (R20)	SALINITY (ppt) Table IIa	DRIFT (ppt)	CORRECTIONS (ppt)		CORRECTED SALINITY (ppt)	REMARKS
	NUMBER	TEMP (C)									DRIFT	CALIB.		
1336	SSW	21.8	71	4964	1.00005	0	100005	195612	35.002	0	1.001	35.003	CL = 19.3755	
	31	21.8			195620	-4	195616	195616	33.283	1.006	0	33.289		
	33	21.4			195615	-3	195612	195612	33.288	0.012	0	33.294		
	35	21.4			195770	-3	195767	195767	33.342	0.018	0	33.360		
	37	21.5			195922	-3	195919	195919	33.402	1.024	0	33.426		
	39	21.0			196079	-2	196077	196077	33.463	1.030	0	33.493		
	41	21.2			196188	-2	196186	196186	33.508	1.036	0	33.541		
	43	21.5			196577	-2	196574	196574	33.658	1.042	0	33.706		
	45	21.3			196736	-2	196734	196734	33.720	1.048	0	33.768		
	47	21.3			196905	-2	196903	196903	33.786	1.054	0	33.840		
1420	SSW	22.4			199852	0	199852	199852	34.942	1.060	1.001	35.003	101776 Comp. by: LTD	

VELOCITY CORRECTION COMPUTATION  
SP-PMC-4-RA-76  
PT. REYES, CALIFORNIA

VESSEL = 2120

DATE = 10/8/76

TIME = 1200Z

LATITUDE = 038/07/18.00

LONGITUDE = 123/18/06.00

TYPE OF OBSERVATION = NANSEN CAST

CAST-DEPTH (SURFACE) (M)	TEMP (DEG C)	SALINITY (0/00)	SND VEL (M/SEC)
0000.0	15.52	33.29	1506.94
0009.8	15.52	33.29	1507.10
0019.7	15.10	33.36	1506.02
0029.5	12.99	33.43	1499.36
0039.4	11.52	33.49	1494.54
0049.2	11.15	33.54	1493.46
0073.9	10.40	33.70	1491.38
0118.2	09.69	33.84	1489.69

DEYERMINATION OF LAYERS

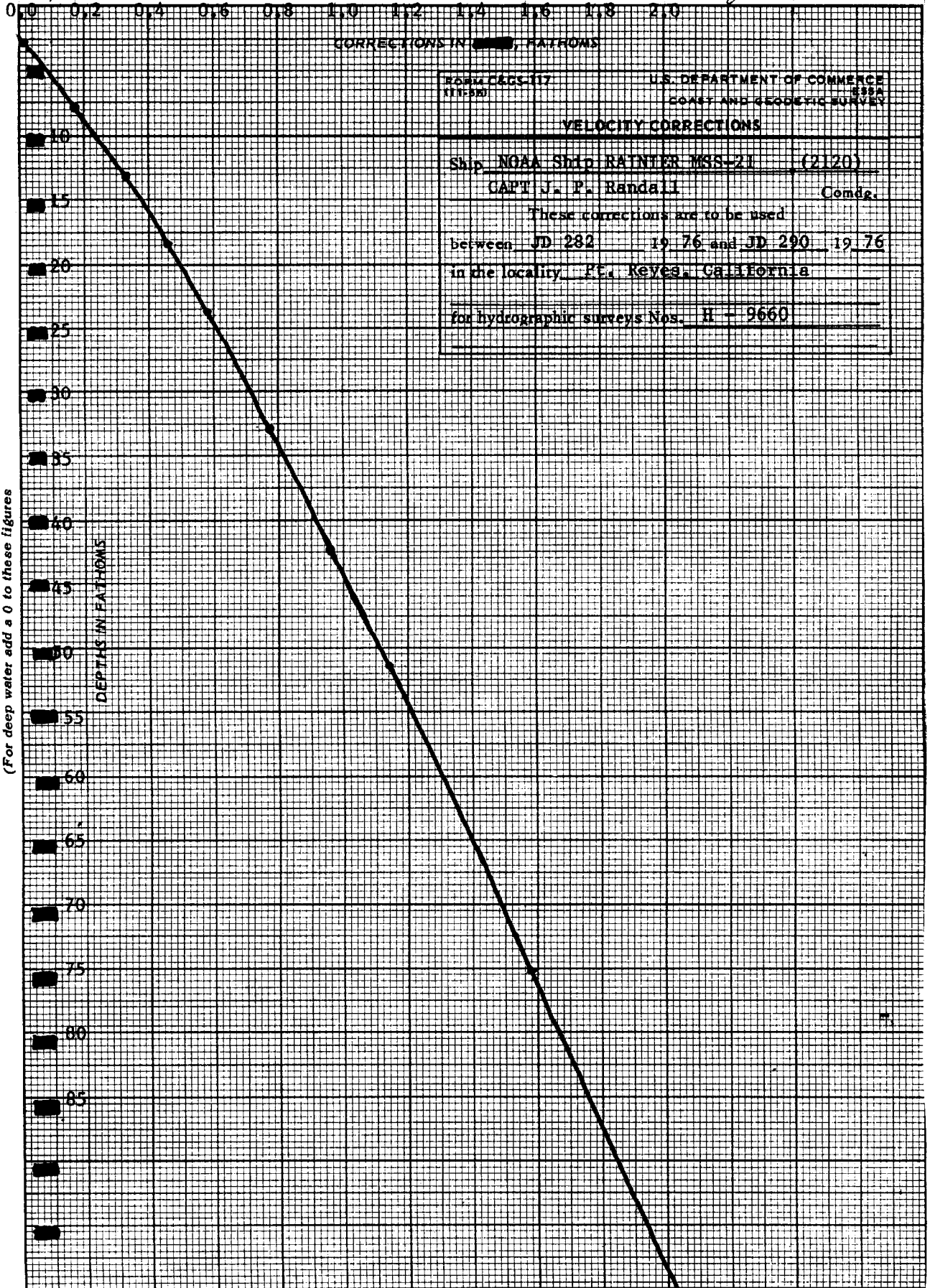
MID-DEPTH (M)	SND VEL (M/SEC)	LAYER THICKNESS (M)
0000.00	1506.94	0004.90
0009.80	1507.10	0009.85
0019.70	1506.02	0009.85
0029.50	1499.36	0009.85
0039.40	1494.54	0009.85
0049.20	1493.46	0017.25
0073.90	1491.38	0034.50
0118.20	1489.69	0044.30

VELOCITY TABLE

TRA = 2.4 FATHOMS

ACTUAL DEPTH (SURFACE) MINUS VELOCITY CORRECTION (FM)	VELOCITY CORRECTION (FM)
0002.67	0000.01
0007.89	0000.17
0013.12	0000.33
0018.38	0000.46
0023.65	0000.58
0032.88	0000.77
0051.38	0001.14
0075.16	0001.58

(Let 1 inch equal 4 fathoms for deep water and 1 inch equal 0.4 fathom for shoal.)



FORM C&CS-117 11/1/50	U.S. DEPARTMENT OF COMMERCE COAST AND GEODETIC SURVEY
<b>VELOCITY CORRECTIONS</b>	
Ship <u>NOAA Ship RAINIER MSB-21</u>	(2120)
CAPT <u>J. P. Randall</u>	Comd.
These corrections are to be used	
between <u>JD 282</u>	<u>19 76</u> and <u>JD 290</u>
in the locality <u>Pt. Reyes, California</u>	
for hydrographic surveys Nos. <u>H - 9660</u>	

(For deep water add a 0 to these figures)

VELOCITY CORRECTOR TAPE PRINTOUT  
RA-20-4-76(H-9660)

TABLE - 1  
SCALE - FATHOM

000104	0	0002	0001	001	212000	009660
000140	0	0003				
000179	0	0004				
000225	0	0005				
000269	0	0006				
000320	0	0007				
000367	0	0008				
000418	0	0009				
000469	0	0010				
000517	0	0011				
000571	0	0012				
000624	0	0013				
000677	0	0014				
999999	0	0015				



Leadline Comparisons

NOAA Ship RAINIER, MSS-21

(2120)

16 October 1976

	<u>Port</u>	<u>Starboard</u>
Leadline Depth	12.6 fms	12.6 fms
Fathometer Depth	<u>10.2 fms</u>	<u>10.2 fms</u>
TRA	2.4 fms	2.4 fms

HORIZONTAL CONTROL

PACKAGE

-27-  
 MASTER STATION LIST POINT REYES CALIFORNIA  
 /SP-PMC-4-RA-76 H-9660

```

=====
101 4 37 59 44450 123 01 19363 139 0091 000000 VISUAL SIGNAL
/POINT REYES LIGHTHOUSE 1870 371231(1004)

102 4 37 59 47284 123 00 49596 139 0186 000000
/POINT REYES HEAD 3 1960 371231(1003)

103 1 37 59 47324 123 00 53354 250 0166 000000 MINI RANGER
/POINT REYES USCG WATER TANK 1968 371231(1010) CODE 4

104 4 38 08 12440 122 54 22119 139 0163 000000
/FOSTER 1857 381223(1077)

105 4 38 07 52880 122 56 46325 250 0039 000000 MINI RANGER
/ADAMS 1929 381223(1052) CODE 1

106 4 38 05 53786 122 57 25203 139 0055 000000
/DRIFT 1930 381223(1068)

107 4 38 02 58801 122 57 58027 139 0112 000000
/DRAKE 1962 381223(1067)

108 4 37 59 47187 123 00 49449 139 0187 000000
/FENCH MARK 612 VA USGS 1930 371231(1003)

109 4 38 02 58858 122 58 30551 250 0072 000000 MINI RANGER
/FRANCIS 1962 381223(1050) CODE 3

110 4 37 59 46232 122 59 43807 139 0168 000000
/CABESA 1930 371224(1005)

111 4 37 59 25740 122 57 52906 139 0056 000000
/POINT REYES EAST 2 1930 371224(1018)

113 4 38 01 58529 122 59 31780 139 0000 000000 VISUAL SIGNAL
/ROB (USN) 1968 381223(1199)

114 4 38 00 46631 123 00 15482 139 0000 000000 VISUAL SIGNAL
/GEORGE (USN) 1968 381232(1053)

115 4 38 04 40115 122 58 24286 139 0000 000000
/PT REYES NORTH BEACH HOUSE W GABLE 1968 381223(1198)

116 4 38 02 10451 122 59 32803 139 0000 000000 VISUAL SIGNAL
/PT REYES RADIO COMPASS STATION 1968 381223(1051)
=====

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NOTE: ELEVATIONS OF MINI RANGER STATIONS ARE CORRECTED  
 FOR HEIGHT OF SHIPS TRANSPONDER ABOVE WATER.

ASCII SIGNAL TAPE      POINT REYES  
SP-PMC-4-RA-76        H-9660  
RA-20-4-76

101	4	37	59	44450	123	01	19363	139	0091	000000
102	4	37	59	47284	123	00	49596	139	0186	000000
103	1	37	59	47324	123	00	53354	250	0166	000000
104	4	38	08	12440	122	54	22119	139	0163	000000
105	4	38	07	52880	122	56	46325	250	0039	000000
106	4	38	05	53786	122	57	25203	139	0055	000000
107	4	38	02	58801	122	57	58027	139	0112	000000
108	4	37	59	47187	123	00	49449	139	0187	000000
109	4	38	02	58858	122	58	30551	250	0072	000000
110	4	37	59	46232	122	59	43807	139	0168	000000
111	4	37	59	25740	122	57	52906	139	0056	000000
113	4	38	01	58529	122	59	31780	139	0000	000000
114	4	38	00	46631	123	00	15482	139	0000	000000
115	4	38	04	40115	122	58	24286	139	0000	000000
116	4	38	02	10451	122	59	32803	139	0000	000000

PT. REYES

ELEVATIONS of M-R STATIONS

ADAMS	CODE 1	Elev. of station	59.4M
		+ HT of M/R over station	<u>3.7</u>
		Elev. of M/R	63.1
		- Elev. of ship's transponder	<u>24.4M</u>
		Elev. (actual diff)	38.7M
FRANCIS	CODE 3	Elev. of station	93.3M
		+ HT of M/R above station	<u>3.1</u>
		Elev. of M/R	96.4M
		- Elev. of ship's transponder	<u>24.4</u>
		Elev. (actual diff.)	72.0M
USCG WATER TANK		Elev. at base of tank	183.7M
		+ HT of tank	5.2
		+ HT of M/R above tank top	<u>1.0</u>
		Elev. of M/R	189.9
		- Elev. of ship's transponder	<u>24.4</u>
		Elev. (actual diff.)	165.5M

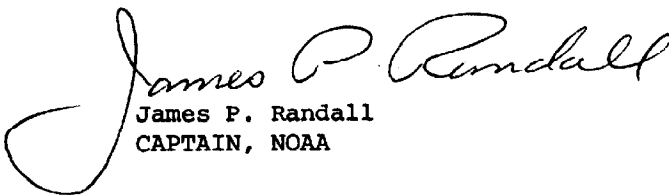
APPROVAL SHEET  
DESCRIPTIVE REPORT TO ACCOMPANY  
HYDROGRAPHIC SURVEY

H-9660  
SP-PMC-4-RA-76

OPR-411-RA-76

In producing this sheet, standard procedures were observed in accordance with the Provisional Hydrographic Manual, PMC OPORDER, and the Instruction Manual for Automated Hydrographic Surveys. The data was examined daily during the execution of the survey.

The boatsheet and the accompanying records have been examined and are complete and adequate for charting purposes and are approved.

  
James P. Randall  
CAPTAIN, NOAA

2/28/77

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Pacific Marine Center:

Hourly heights are approved for

Tide Station Used (NOAA Form 77-12): Point Reyes

Period: October 8-16, 1976

HYDROGRAPHIC SHEET: H-9660

~~XXXX~~  
~~XXXX~~ SP-PMC-4-RA-76

Locality: Off Point Reyes, California

Plane of reference (mean lower low water): 3.68ft.

Height of Mean High Water above Plane of Reference is  
5.0 ft.

Remarks: Zone direct

*James R. Hubbard*  
\_\_\_\_\_  
for Chief, Tides Branch







HYDROGRAPHIC SURVEY STATISTICS  
HYDROGRAPHIC SURVEY NO. H-9660

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT	
SMOOTH SHEET with smooth PNO & excess overlay		1	BOAT SHEETS (2 parts, mylar)		1	
DESCRIPTIVE REPORT		1	OVERLAYS (preliminary)		3	
DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/SOURCE DOCUMENTS
ENVELOPES						
CAHIERS			2			
VOLUMES						
BOXES	5					
T-SHEET PRINTS (List)						
N/A						
SPECIAL REPORTS (List)						
N/A						

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS			
	PRE-VERIFICATION	VERIFICATION	REVIEW	TOTALS
POSITIONS ON SHEET				2121
POSITIONS CHECKED		2121		
POSITIONS REVISED		0		
DEPTH SOUNDINGS REVISED		84		
DEPTH SOUNDINGS ERRONEOUSLY SPACED		0		
SIGNALS ERRONEOUSLY PLOTTED OR TRANSFERRED		0		
	TIME (MANHOURS)			
Verification of Control		2		
Verification of Positions		41		
Verification of Soundings		30		
Smooth Sheet Compilation		10		
ALL OTHER WORK	3	17		
TOTALS	3	100		
PRE-VERIFICATION BY	BEGINNING DATE		ENDING DATE	
James S. Green	2/11/77		2/11/77	
VERIFICATION BY	BEGINNING DATE		ENDING DATE	
Thelma O. Jones <i>Thelma O. Jones</i>	3/14/77		4/27/77	
REVIEW BY QUALITY CONTROL BY	BEGINNING DATE		ENDING DATE	
<i>K. W. Wellman</i>			6-15-77	

*R.R. Engle*  
*R.D. Swuschi* 2 hrs. 4/22/77

Reg. No. \_\_\_\_\_

The Computer and Excess Sounding Cards for this survey have not been corrected to reflect the changes made to the Computer Card and Excess Card Printouts at this time of the review.

When the cards have been updated to reflect the final results of the survey the following shall be completed:

CARDS CORRECTED

DATE \_\_\_\_\_ TIME REQ'D \_\_\_\_\_ INITIALS \_\_\_\_\_

REMARKS:

Reg. No. H-9660

The magnetic tape containing the data for this survey has not been corrected to reflect the changes made during evaluation and review.

When the magnetic tape has been updated to reflect the final results of the survey, the following shall be completed:

MAGNETIC TAPE CORRECTED

DATE \_\_\_\_\_ TIME REQ'D \_\_\_\_\_ INITIALS \_\_\_\_\_

REMARKS:

H-9660

Information for Future Presurvey Reviews

None

<u>Position</u>	<u>Index</u>	<u>Bottom Change</u>	<u>Use</u>	<u>Resurvey</u>
<u>Lat.</u>	<u>Long.</u>	<u>Index</u>	<u>Index</u>	<u>Cycle</u>
380	1232	0	0	50 years
380	1231	1	2	50 years

PACIFIC MARINE CENTER  
VERIFIER'S REPORT

REGISTRY NO. H-9660

FIELD NO. RA-20-4-76

California, Northern Coast, Offshore Point Reyes

SURVEYED: October 8 - 16, 1976

SCALE: 1:20,000

PROJECT NO. SP-PMC-4-RA-76

SOUNDINGS: EDO Model 248 Transceiver,  
Raytheon Universal Graphic  
Recorder UGR 1968-13, EDO  
Model 261c- Digitizer

CONTROL: MINI-RANGER

Chief of Party.....CAPT James P. Randall  
Surveyed by.....ENS J. Peterson (team leader),  
LT F. Kleinschmidt, LTJG J. Osborn,  
ENS J. Davis, ENS K. Lerch,  
ENS M. Molchan  
Automated Plot by.....Kynetics Plotter (PMC)  
Verified by.....Thelma O. Jones  
27 April 1976

I. INTRODUCTION

This Special Project Survey was accomplished for the Defense Mapping Agency by NOAA Ship RAINIER in accordance with Project Instructions dated 22 June 1976. The area surveyed is roughly rectangular, covering 41 square miles off shore from Point Reyes, California,

The station list in the Descriptive Report was amended to include only the stations used for control and calibrations.

Field sheet soundings were reduced from predicted tides for Fort Point, Presidio Primary Tide Station (Golden Gate), San Francisco, California. Smooth sheet soundings were reduced using smooth tidal data from Pt. Reyes Primary Tide Station.

This is an excellent basic survey, adequate to supersede common areas of prior surveys and charted hydrography.

## II. CONTROL AND SHORELINE

There is no shoreline within the project limits. No field edit was accomplished on this survey.

Horizontal control is adequately described in paragraphs F and G of the Descriptive Report.

## III. HYDROGRAPHY

The basic hydrography incorporated in this survey is adequate to delineate bottom configuration and least depths except as noted in paragraphs VI and VII. There were no major difficulties in the verification of main scheme soundings. Crossline agreement is excellent with maximum discrepancy of 1 fathom in 39 fathom depths. (See Q. C. Report-item 1)

Bottom samples were not required by the Project Instructions. However, 5 bottom samples were transferred to the smooth sheet from prior survey H-5169, 1:40,000 (1931-32).

## IV. CONDITION OF SURVEY

The hydrographic records, overlays, smooth sheet, and reports are adequate and conform to the requirements of the Provisional Hydrographic Manual.

## V. JUNCTIONS

There are no junctions with any contemporary surveys. (See Q. C. Report-item 2)

## VI. COMPARISON WITH PRIOR SURVEYS

### A.

H-5169, 1:40,000 (1931-32)

H-5164, 1:20,000 (1931)

H-5169, 1:40,000 (1931-32)

Soundings are in excellent agreement, within a fathom deeper in 35 and 45 fathoms. The only exception is a shoal in the vicinity of latitude  $38^{\circ}03'20''$ , longitude  $123^{\circ}02'45''$ . H-5169 shows a least depth of 27 fathoms compared to the least depth of 24 fathoms on this survey. This discrepancy is probably due to the 45 meter spaced development on the current survey compared to the 100 meter spacing on H-5169. It is recommended that the 24 fathom sounding supersede the 27 fathom sounding of the prior survey.

This survey is adequate to supersede H-5169 in areas of common hydrography.

H-5164, 1:20,000 (1931)

With two exceptions, the soundings were in excellent agreement, within a fathom in 21 fathom depths. The shoal area in the vicinity of latitude  $38^{\circ}00'00''$ , longitude  $123^{\circ}02'00''$  has shifted slightly, <sup>to the southwest.</sup> In this area the present survey shows a least depth of 11.8 fathoms, compared to a  $10\frac{3}{4}$  fathom on the prior survey. In the same area, the present survey depicts a 16.3 fathom sounding compared to a 15 fathom sounding on the prior survey. This discrepancy is due to the fact that the shoaler soundings were added to the prior survey from a wire drag survey, H-6249 (1937). These shoaler soundings have been carried forward to the present survey. With the addition of the shoaler soundings, H-9660 is adequate to supersede H-5164, in areas of common hydrography.

B (See Q.C. Report - item 4)

There are no pre-survey review items for this survey.

#### VII. COMPARISON WITH CHART 18645 (C&GS 5072), 12th Edition, 3 January 1976

All hydrography on Chart 18645, <sup>within the area of the present survey,</sup> originated <sup>with</sup> from prior surveys H-5169, 1:40,000 (1931-32) and H-5164 1:20,000 (1931).

With the exceptions of the discrepancies mentioned in the previous paragraph, soundings were in good agreement, within 1 to 2 fathoms, throughout the survey.

The verifier does not concur with the recommendation of ship personnel about the disposition of the shoal sounding of 10 fathoms, 5 ft. at  $38^{\circ}00.3'$ ;  $123^{\circ}02.2'$ . The hydrographers did not have data available to determine the origin of the charted sounding. The verifier recommends that the 10 fathom, 5 ft. sounding remain as charted.

H-9660 is adequate to supersede charted hydrography of the area of common coverage.

There are no aids to navigation within the survey area. However, it should be noted that the light on Point Reyes Lighthouse is no longer in operation and has been replaced with an automatic light, which is 50 feet north and about 20 feet lower. No geographic positions were given for location of the new light. See Ship's Report, Recovery Note, Triangulation Station.

#### VIII. COMPLIANCE WITH PROJECT INSTRUCTIONS

This survey adequately complies with Project Instructions, dated 22 June 1976.

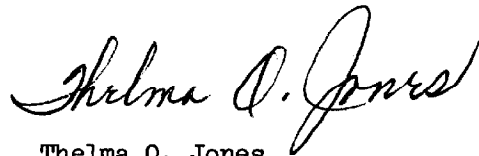
#### IX. ADDITIONAL FIELD WORK

This is an excellent basic survey. No additional field work is recommended.

X. NOTES TO COMPILER

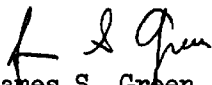
The soundings transferred from prior surveys were converted from fractional fathoms to tenths of fathoms.

Respectfully submitted,



Thelma O. Jones  
Cartographic Technician  
April 27, 1977

Examined and approved,



James S. Green  
Chief, Verification Branch



APPROVAL SHEET  
FOR  
SURVEY H- 9660

- A. All revisions and additions made on the smooth sheet during verification have been entered in the magnetic tape records for this survey. A new final position print-out has been made. A new final sounding print-out has been made.
- B. The verified smooth sheet has been inspected, is complete, and meets the requirements of the Hydrographic Manual. Exceptions are listed in the verifier's report.

Date: 5/21/77

Signed: 

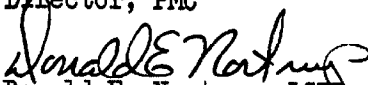
Title: Chief, Verification Branch



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL OCEAN SURVEY, Pacific Marine Center  
1801 Fairview Ave. E., Seattle, WA 98102

Date: 11 May 1977

To: Eugene A. Taylor, RADM  
Director, PMC

From:   
Donald E. Nortrup, LCDR  
Chief, Processing Division


Subject: PMC Hydrographic Survey Inspection Team Report, H-9660

This survey is a basic hydrographic survey offshore of Point Reyes, CA. The survey was conducted by NOAA Ship RAINIER in October 1976 in accordance with Project Instruction SP-PMC-RA-76 dated 22 June 1976.

This is a well executed survey. Only one problem of any magnitude was encountered during the inspection procedure. During the ship's determination of the TRA corrector, by lead line comparison, the effect of sound velocity corrector was not considered. The resultant TRA value was in error by 0.3 fathoms. This error was corrected and the smooth sheet has been replotted using the corrected TRA value.

The inspection team finds survey H-9660 to be an excellent basic survey, adequate for charting and to supersede common areas of prior surveys. Administrative approval is recommended.

  
Donald E. Nortrup, LCDR

  
Stanley H. Otsubo

  
Dean R. Seidel, LCDR

  
David B. MacFarland, Jr., LCDR



ADMINISTRATIVE APPROVAL  
H-9660

The smooth sheet and reports of this survey have been examined and the survey is adequate for charting and to supersede common areas of prior surveys.



\_\_\_\_\_  
Eugene A. Taylor, RADM  
Director  
Pacific Marine Center

5/18/77  
\_\_\_\_\_  
Date



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL OCEAN SURVEY  
Rockville, Md. 20852

C352

June 15, 1977

*a J Patrick*  
TO: A. J. Patrick  
Chief, Marine Surveys Division

THRU: Chief, Quality Control Branch

FROM: K. W. Wellman *K. W. Wellman*  
Quality Evaluator

SUBJECT: Quality Control Report for H-9660 (1976), California, Northern Coast, Offshore Point Reyes

A quality control inspection of H-9660 has been accomplished to evaluate the accuracy and adequacy of the survey with respect to data acquisition, delineation of the bottom, determination of least depths and navigation hazards, decisions and actions by the verifier, and cartographic presentation of data.

In general, the present survey was found to conform to National Ocean Survey standards and requirements except as follows:

1. Section III of the Verifier's Report (Hydrography) is lacking any reference to the adequacy of the depth curves (see provisional manual--section 6.6(8)).

Section III of the Verifier's Report is supplemented by the following:

The usual depth curves are adequately delineated. Brown depth curves were added to emphasize isolated shoaler soundings.

2. Section V of the Verifier's Report is supplemented by the following:

Present depths, however, are in general harmony with charted depths along the perimeter of the present survey area.

3. The 10.8-fathom sounding, carried forward during verification from H-6249 (1937) WD, was displaced approximately 50 meters from its source document position. The position was revised and appropriately annotated during quality control inspection (see provisional manual--section 6.3.7.3).



4. During verification, no formal comparison was made between the present survey and two prior wire-drag surveys falling within the area of the present survey (see provisional manual--section 6.6(11)). Such comparisons were made during quality control inspection.

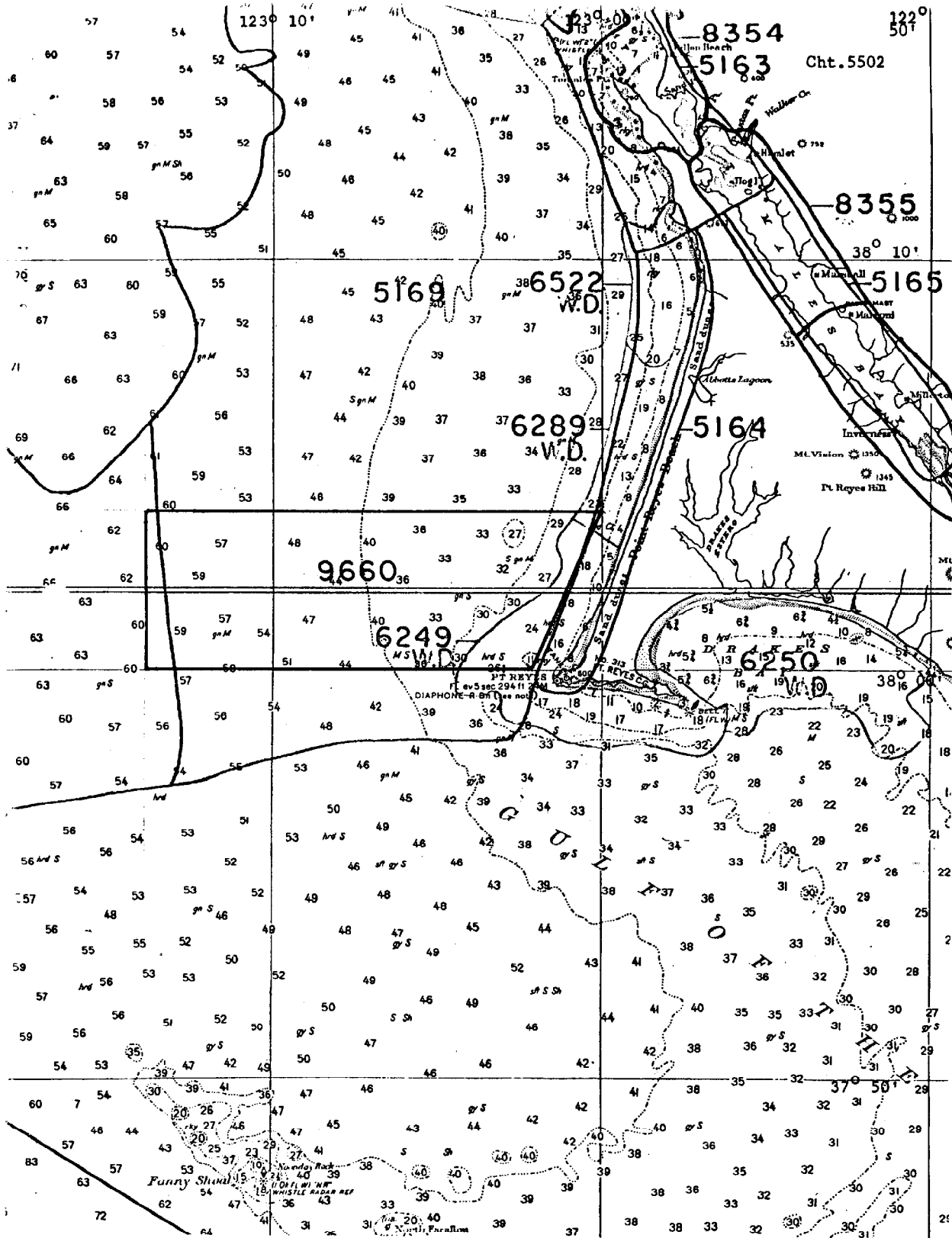
Section VI of the Verifier's Report is supplemented by the following:

b. H-6249 (1937) WD 1:20,000  
H-6289 (1937) WD 1:10,000

There are no conflicts between present depths and effective depths on the prior wire-drag surveys. A depth of 10.8 fathoms in latitude  $38^{\circ}00.25'$ , longitude  $123^{\circ}02.20'$  was carried forward from H-6249 to supplement the present survey.

5. The formal tide approval note was not included in the Descriptive Report during verification. A copy was obtained from the Tides Branch and inserted into the Descriptive Report during quality control inspection.

cc:  
C351



RECORD OF APPLICATION TO CHARTS

18648 (20)

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9660

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
18643 5602	1978	25 <i>Cartto</i> <sup>1</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 16
18647 5599	1978	2 <i>Cartto</i> <sup>1</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 15
18645 5072	1978	4 <i>Cartto</i> <sup>1</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 15
18640 5502	1978	<i>Cartto</i> <sup>1</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 24
18680 5402	1978	2 <i>Cartto</i> <sup>1</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 19 Ed.
18010 5021	1978	2 <i>Cartto</i> <sup>1</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 19
18022 5020	1978	<i>Cartto</i> <sup>1</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 39
18007 5052	1978	<i>Cartto</i> <sup>1</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 29
18020 5002	1978	<i>Cartto</i> <sup>1</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 31
18648 5601	1978	9 <i>Cartto</i> <sup>5</sup> / <sub>WW</sub>	Full <del>Part Before</del> After Verification Review Inspection Signed Via Drawing No. 3 Ed.
18648	1884	J Abraham	Full to Reconstruction