5611

Form 504
Rev. Dec. 1933
DEPARTMENT OF COMMERCE
U.S. COAST AND GEODETIC SURVEY
R. S. PATTON, DIRECTOR

DESCRIPTIVE REPORT

~~Topographic~~ / *Hydrographic* } *Sheet No.* (81) 5611

State California

LOCALITY

California Coast

Point San Luis to Cooper Point

1933

CHIEF OF PARTY

F. L. Peacock

U.S. GOVERNMENT PRINTING OFFICE: 1934

5611

✓ 18703 - applied

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REG. NO. 5611

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC TITLE SHEET

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. 81 5611

REGISTER NO.

State California

General locality California Coast

Locality Point San Luis to Cooper Point ~~Offshore~~ Large

Scale 1:80,000 Date of survey June 10 to Oct. 3, 1933

Vessel GUIDE

Chief of Party Fred. L. Peacock

Surveyed by Fred.L.Peacock, R.F.A.Studds, I.T.Sanders

~~Protracted~~ Plotted by N.R.Sparks, R.H.McCarthy, Jr.

Soundings penciled by R.H. McCarthy, Jr.

Soundings in fathoms ~~feet~~

Plane of reference M.L.L.W.

Subdivision of wire dragged areas by

Inked by Bowers

Verified by W.R.Jackson

Instructions dated March 2, 1933

Remarks: RAR Controlled hydrography. Fathometer soundings

U. S. GOVERNMENT PRINTING OFFICE: 1929

DESCRIPTIVE REPORT
to accompany
R.A.R. Field Sheet No. 81

INSTRUCTIONS:

This work was performed in accordance with the season's instructions dated March 23, 1933.
- 27,

CHARACTER OF WORK:

The hydrography on this sheet was done by Radio Acoustic Ranging.

The soundings were all obtained with the fathometer with the exception of 86 vertical casts. The depth range is approximately from 46 to 1339 fathoms for R.A.R. Field Sheet 81. However, the greater portion of the area represented by this sheet is deeper than 200 fathoms.

The east-west sounding line spacing is approximately one mile. Cross lines parallel to the shore are roughly four miles apart.

The position interval varies from ten to fifteen minutes between bombs in accordance with the usual practice, with supplemantal positions at changes of speed and course, with the exception of a few changes of speed and course between positions.

The scale of R.A.R. Field Sheet 81 is 1:80,000.

R.A.R. boat sheet field no. 81 includes nearly the entire area of this sheet with the exceptions of:

W day - pos. 77 to 87
X day - pos. 1 to 47
Y day - pos. 1 to 26
Q day - pos. 55 to 63
DD day - pos. 70 to 76
EE day - pos. 1 to 95
FF day - pos. 1 to 123
KK day - pos. 10 to 78
LL day - pos. 1 to 71
NN day - pos. 23 to 82

which were shown on boat sheet Field No. 181

The hydrography on this sheet covers an area of 2500 square statute miles extending from Pt. Buchon to Pfeiffer's Point and from the limits of visual fix hydrography approximately to the 1000 fathom curve. The adjoining inshore sheets are Field Sheets Nos. 121, 47, 41, 42, and 43 of Ship GUIDE and such off-shore visual hydrography accomplished by the Ship PIONEER between

latitudes 35° 18' and 35° 07' N. during the 1934 field season, in order from north to south.

The limits of R.A.R. Field Sheet No. 81 are the parallels of Latitude 36° 10' and 35° 07', and the visual fix hydrography inshore and a line extending from Latitude 36° 10' Longitude 122° 22' to Latitude 35° 07', Longitude 121° 39'.

CONTROL:

The control consisted of five hydrophone stations at the following points along the California Coast: Pt. Piedras Blancas, Pt. Buchon, Pfeiffer's Point, Pt. Arguello, and Pt. Sal.

The installing and later changes were on the following dates:

KVD at Piedras Blancas	- June 7, July 27, 1933.
KVH at Pt. Buchon	- May 25, July 12, 1933.
KVE at Pfeiffer's Pt.	- May 18, 1933.
KVK at Pt. Arguello	- May 1933.
KVJ at Pt. Sal	- August 29, 1933.

DATE OF SURVEY:

Work on this sheet began on June 10, 1933 and was concluded on October 3, 1933.

TIDAL REDUCERS:

The San Simeon Portable Automatic Tide Gage was used for all hydrography on this sheet.

No range or time correction was found to be necessary.

Tidal reducers were applied only to soundings of less than 100 fathoms.

APPARATUS CORRECTIONS:

The apparatus correction for the hydrography on this sheet consisted of a constant fathometer correction, a dial speed correction, and a velocity correction. These corrections were obtained from an analysis of the temperatures, densities, and depths sounded for the season's work. These fathometer corrections have been made the subject of a special report which was forwarded to the Director on February 14, 1934. More detailed information concerning these corrections can be found in this report. The constant fathometer correction was arrived at by the comparisons with vertical casts and whether the ship was unusually light or deep in the water. Also, variations occurred where a change of hydrophone or oscillator was made. This is taken up in the above mentioned report.

On bomb times a time correction of 0.04 second was

subtracted from all elapsed times to compensate for the sound build up and instrument lag. A more comprehensive statement can be found in the report on time delay and velocity tests which accompanied Descriptive Report R.A.R. Field Sheet No. 181, Season 1933.

SLOPE CORRECTIONS:

Because of the irregular bottom no slope corrections were made.

BOTTOM CHARACTERISTICS:

A total of 71 bottom characteristics were taken over the area. The majority, distributed over the entire area, showed gray, green, brown, and black mud and clay. There were a few samples of sand and gravel.

DANGERS:

There appear to be no dangers to navigation within the limits of this sheet.

COMPARISON WITH PREVIOUS WORK:

Previous work included in this area is small in extent. A small amount of work was done in 1924 in the north east portion of this sheet. (Reg. No. 4321 ~~or 4324~~). It is assumed that these soundings were tube or sonic soundings. In general, the soundings thruout this area check within reasonable limits. However, it should be noted that the wire soundings taken in this earlier survey check the work very closely.

JUNCTIONS:

Junctions with the inshore visual sheets are good.

It should be noted that when K day makes a junction with Field Sheet No. 41 - 1933 the soundings of the day are deep. This is consistent thruout, as noted before in this report. (Not for the whole day)

COMPUTATION OF VELOCITIES:

The methods of calculating the velocities used on this sheet were based on previous R.A.R. experience, and the results of the season's velocity tests. To arrive at the final velocity used on this sheet the following work was done:

Temperatures and salinities for the months worked on R.A.R. were carefully plotted and checked. From these theoretical velocities were computed and depth profiles were drawn for each velocity test only. Then mean assumed velocities were computed and compared with the actual measured velocities from the velocity tests. For further information the reader is referred to the Special Report on Sound Velocity Computations, a copy of which is attached to this report.

Velocities used on this sheet are as follows:

Depth under ship	Mean Velocities
Under 200 fms	1485 m/sec
200 - 300 fms	1483.5 m/sec
300 - 400 fms	1482 m/sec
400 - 500 fms	1481 m/sec
Over 500 fms	1480.5 m/sec

PLOTTING OF SMOOTH SHEET:

The bombs were plotted in terms of distances from the respective hydrophone stations, which were computed from the elapsed times and the velocities obtained as noted above. Distance circles were drawn from each hydrophone station at intervals of 5,000 meters. A celluloid template subdivided to intervals of 100 meters was used to interpolate between the circles.

Since it was thought more practicable to draw circles from only one hydrophone position at each station, offset holes bearing the same relative position to the center hole as that used for the circles were punched in the template, and by orienting the template and marking thru the offset corresponding to the hydrophone location desired, arcs parallel to the distance circles were drawn, the intersection of which determined the bomb position.

The template used in plotting accompanies this report.

All preliminary work was done on tracing paper covering the smooth sheet. Approximate log factors were obtained between bombs at both ends of courses and the dead reckoning was plotted on a separate overlay and fitted in.

When a dead reckoning was obtained which appeared correct it was transferred to the smooth sheet and inked. Arcs not passing thru positions are shown one millimeter in length each side of their perpendicular thru the position.

Where question arose as to which of two bomb returns or of two groups of returns were probably more correct, those giving the highest milliammeter reading at the hydrophone were generally accepted, altho many instances occurred in which this rule could not be followed. Bombs with three or four intersections were given more consideration than those with two intersections.

Discrepancies between log readings and bomb positions were verified by checking the log against time, which in many cases showed the log reading to be in error and the bomb correct.

Bomb returns which were more than 400 meters in error were rejected.

There are a number of soundings not plotted due to

shoaler soundings at crossings or soundings too closely spaced to plot.

An abstract of dead reckoning is attached. It is the original copy, there being no second copy.

EXPLANATION OF DEAD RECKONING DIAGRAMS:

The complete report of this can be found in the Descriptive Report, R.A.R. Field Sheet 181, Season 1933.

DISCREPANCIES:

The number of discrepancies on this sheet is fairly small considering the extent of the work except in the two canyons in the vicinity of Latitude 36° 00', Longitude 121° 50' to 122° 15' where the bottom is very irregular. It is possible that were slope corrections used some of these discrepancies could be eliminated.

A few of the more important changes made while plotting this sheet are as follows:

7 E	c/c changed to pos. 8
1 G	c/c changed from 83 to 283
27 Q	H.R. changed to H.L.
3 S	Log changed from 25.25 to26.25 W.R.J.
28 T	H.L. changed to H.R.
4 X	Log rejected - plotted by time
35 X	Log rejected - plotted by time W.R.J.
57 Z	H.R. changed to H.L. W.R.J.
113 FF	Log rejected - plotted by time
6 &7 GG	Not plotted - insufficient data
1 - 8 HH	Log rejected - plotted by time and bombs W.R.J.
65 HH	c/c changed from 143 to 133
10 -17 JJ	Logs rejected - plotted by times and bombs
40 - 71 JJ	Logs rejected - plotted by times and bombs W.R.J.
64 - 72 PP	Pos. not plotted - insufficient data.

ABSTRACT OF CROSSINGS MORE THAN 3% IN ERROR:

				Diff	%	Location
15-16 A	20 F	570	553	17	3.1	35-35;121-50
26-27 B	3 - 4 F	600	620	20	3.2	35-40;121-50
26-27 B	30-31 P	600	625	25	4.0	35-40;121-50 (a)
57-58 D	30-31 N	632	603	29	4.8	35-50;121-50 (a)
53-54 D	18-19 L	580	561	19	3.3	35-45;121-45
~~57-58 D~~	~~30-31 N~~	~~632~~	~~603~~	~~29~~	~~4.8~~	~~35-50;121-50~~
57-58 D	55-56 U	605	656	51	7.8	" "
49-50 D	57-58 R	480	501	21	4.2	35-40;121-40 (c)
59-60 D	54-55 P	713	685	28	3.9	35-55;121-50 (a)
61-62 D	55-56 T	644	679	35	5.2	36-00;121-55 (a)
63-64 D	7 - 8 M	729	690	39	5.4	" "
67-68 D	8 - 9 J	640	662	22	3.3	36-05;122-00
4 - 5 E	118-119 FF	1180	1120	60	5.1	36-00;122-10 ?

(a) Irregular bottom

				Diff	%	Location
12-13 E	13-14 CC	867	839	32	3.7	35-55;122-05 ✓(a)
10-11 J	14-15 S	640	665	25	3.8	36-05;122-05 ✓(a)
3 - 4 K	63-64 P	799	838	39	4.5	36-00;122-05 ✓
6 - 7 K	65-66 R	615	654	39	6.0	36-00;121-55 ✓(a)
8 - 9 K	39-40 T	575	609	34	5.6	36-00;121-45 ✓
8 - 9 K	51-52 T	608	581	27	4.4	36-00;121-45 ✓
14-15 K	73-74 T	554	495	59	10.1	35-55;121-40 ✓(c)
~~26~~-29 K-30K	5 - 6 N	912	952	40	4.2	35-55;122-10 ✓
33-34 K	23-24 CC	702	735	33	4.5	35-55;121-55 ✓(c)
34-35 K	64-65 R	670	730	60	8.2	35-55;121-50 ✓(c)
51-52 K	8 - 9 GG	678	716	38	5.3	35-55;121-55 ✓
52-53 K	27-28 U	795	840	45	5.4	35-55;122-00 ✓
56-57 K	5 - 6 N	986	1019	33	3.2	35-55;122-10 ✓
5 - 6 M	56-57 Y	777	818	41	5.0	36-00;122-00 ✓
7 - 8 M	66-67 R	605	670	65	9.7	36-00;121-55 ✓
9 -10 M	6 - 7 Z	552	581	29	5.0	36-00;121-50 ✓
30-31 M	118-119 FF	1180	1120	60	5.1	36-00;122-10 ✓(a)
42-43 M	67-68 R	684	725	41	5.7	39-05;121-55 ✓
51-52 M	31-32 S	475	500	~~20~~ 25	5.0	36-05;121-50 ✓
62-63 M	120-121 FF	900	933	~~33~~ 35	3.5	36-05;122-15 ✓
5 - 6 N	69-70 Z	915	956	41	4.3	35-55;122-10 ✓
14-15 N	50-51 Z	652	675	23	3.4	35-55;121-50 ✓
29-30 N	61-62 R	560	602	42	7.0	35-50;121-45 ✓(a)
34-35 P	36-37 Z	584	628	44	7.0	35-45;121-50 ✓
49-50 P	~~8~~ - 7 U-8	672	649	23	3.4	35-55;121-50 ✓
49-50 P	35-36 U	617	655	38	5.8	" " ✓
49-50 P	55-56 U	584	624	40	6.4	35-50;121-50 ✓
52-53 P	64-65 R	740	780	40	5.1	35-55;121-50 ✓
54-55 P	64-65 R	730	668	38	4.9	35-55;121-50 ✓
55-56 P	6 - 7 U	702	673	29	4.1	35-55;121-55 ✓
55-56 P	19-20 CC	675	705	30	4.3	" " ✓
63-64 P	87-88 T	810	769	41	5.1	36-00;122-05 ✓
70-71 P	43-44 BB	744	815	71	8.7	36-05;122-10 ✓
70-71 P	60-61 BB	702	740	38	5.1	" " ✓
49-50 R	9 -11 H	450	475	25	5.3	35-30;121-30 ✓
62-63 R	57-58 CC	581	538	43	7.4	35-50;121-45 ✓
67-68 R	28-29 ~~MM~~AA	739	684	55	7.5	36-05;121-59 W.R.C.
Line	28-29 AA and 40-41 S		50-70	8.5 to 9.5		36-05;121-55 ✓(b)
82-83 S	56-57 Y	790	850	60	7.1	36-00;122-00 ✓
88-89 S	12-13 T	947	1090	143	13.1	36-00;122-10 ✓(c)
7 - 8 Z	~~64-68~~ 28-9K	587	609	22	3.6	36-00;121-50 ✓
71-72 BB	87-88 T	810	750	60	7.4	36-00;122-05 ✓(c)
26-27 U	16-17 CC	763	790	27	3.4	35-55;122-00 ✓(c)
37-38 ~~V~~ V	52 HH	374	358	16	4.3	35-40;121-30 ✓(c)
26-27 Y	28-29 KK	447	429	18	4.0	35-15;121-25 ✓(d)
50-51 Y	16 GG	754	726	28	3.8	35-50;121-55 ✓(c)
50-51 Y	37-38 GG	684	662	22	3.2	35-50;121-50 ✓(c)
61-62 Y	~~57-58 GG~~ 61 M	959	846	113	11.2	36-05;122-05 ✓(a)(c)
26-27 CC	30-31 CC	727	785	58	7.4	35-55;121-55 ✓(c)

(a) Irregular bottom (b) Rejected (c) Corrected by reporting (d) Fathometer working poorly.

In the above it can be seen that the majority of the discrepancies occur from K to P days inclusively, and that the fathometer conditions were the same for these days.

K and P days were rerun, as it was known that the soundings at times were rather questionable.

These days were corrected and plotted in the same manner as was consistent for this work. In the sounding volumes, in other columns, a new fathometer correction has been entered and the soundings also reduced with this correction.

The original corrected soundings are the ones plotted on this sheet. The soundings corrected additionally are in many cases in better agreement with other days, but the fathometer appears to be spotty thruout each of these two days.

It is felt that this additional ~~additional~~ fathometer correction is correct for a good portion of these days when the fathometer was apparently erratic, reading too deep.

The additional fathometer corrections is attached. It was arrived at by using the comparisons for these days separately.

The additional fathometer correction was used for all of K day. On P day, the original correction was used from pos. 11P to pos. 19 P and from pos. 19P to pos. 71P the additional fathometer correction was applied. A study of the cross lines showed that these corrections gave the best results.

R.L.J.

Respectfully submitted,

L. W. Swanson
Jr. H. & G. E., C. & G. Survey.

R. H. McCarthy, jr.
Civil Engineering Hand
C. & G. Survey.

Respectfully forwarded,
Approved,

F. H. Hardy
Chief of Party, C. & G. Survey
Commanding Ship GUIDE.

Reper all of K day
" 19 To 71 P "

R.A.R.
Field Sheet No. 81
Project 140

BOMBS

Vol No.	½Pt.	Ret.	Pt.	Ret.	Qt.	Ret.	2Qt.	Ret.	C.I.	Ret.
1			128	315						
2	14	44	49	218	21	49				
3			24	55	70	175	18	45		
4	21	66	14	45	62	150	11	35	1	3
5	3	8	24	73	82	222			6	20
6	37	107	28	91	46	149			2	7
7	14	45	50	154	29	64	9	19	10	30
8			24	80	51	115	8	22	29	99
9			115	365						
10	10	31	76	205	30	92				
11	22	70	85	231	5	13				
12	73	163	33	79	5	9				
13	6	12	8	16						
Tot.	200	546	658	1837	401	1038	46	121	48	159
Ave [illegible].		2.7		2.79		2.59		2.63		3.31

* [illegible]. equals returns per bomb.

R.A.R.

Field Sheet No. 81

Project 140

Bomb Returns

Vol. No.	½ pint		Pint		Quart		2 Quart		Cast Iron	
	Pos.	Used	Pos.	Used	Pos.	Used	Pos.	Used	Pos.	Used.
1	-	-	324	286	-	-	-	-	-	-
2	42	42	225	192	69	49	-	-	-	-
3	-	-	72	53	219	167	54	38	-	-
4	84	65	56	43	192	143	36	27	3	3
5	12	7	104	64	328	201	-	-	24	19
6	148	98	112	88	184	134	-	-	8	4
7	56	38	216	149	120	57	36	17	40	30
8	-	-	96	66	208	81	32	19	116	86
9	-	-	460	327	-	-	-	-	-	-
10	40	21	300	186	120	76	-	-	-	-
11	91	67	314	212	20	13	-	-	-	-
12	292	153	124	59	20	9	-	-	-	-
13	24	12	34	16	-	-	-	-	-	-
Sums	789	503	2437	1741	1480	930	158	101	191	142
Percent	63.8		71.5		62.8		63.8		74.3	

Pos. indicates the number of possible returns.
Used " " " " returns used.
Percent " " percent of usable returns.

R.A.R. Field Sheet No. 81
Additional Fathometer Corrections
for K and P days

Index K day
July 26, 1933 : -15.6 fms
Index P day
Aug. 1, 1933 :
1. -22.9 Av. -27.2 fms
2. -31.5

Depth	(-) Corr Speed + Veloc	K day -16fm Index + Corr.	Reducer (-)	P day -27fm Index + Corr.	Reducer (-)
405					
	5.6	21.6		32.6	
415					
	5.7	21.7		32.7	
421					
	5.8	21.8		32.8	
426			22		33
	5.9	21.9		32.9	
436					
	6.0	22.0		33.0	
437					
	6.1	22.1		33.1	
449					
	6.2	22.2		33.2	
450					
	8.9	24.9		35.9	
452					
	9.0	25.0		36.0	
467			25		36
	9.1	25.1		36.1	
468					
	10.1	26.1		37.1	
482			26		37
	10.2	26.2		37.2	
497					
	10.3	26.3		37.3	
513					
	10.4	26.4		37.4	
528			27		38
	10.5	26.5		37.5	
541					
	11.5	27.5		38.5	
544					
	11.6	27.6		38.6	
559					
	11.7	27.7		38.7	
575			28		39
	11.8	27.8		38.8	
590					
	11.9	27.9		38.9	
605					
	12.0	28.0		39.0	
615					

Depth	(-) Corr Speed + Veloc	K day -16fm Index + Corr	Reducer (-)	P day -27fm Index + Corr.	Reducer (-)
615					
	13.0	29.0		40.0	
621			29		40
	13.1	29.1		40.1	
636					
	13.2	29.2		40.2	
651					
	13.3	29.3		40.3	
666					
	13.4	29.4		40.4	
682					
	13.5	29.5		40.5	
698			30		41
	13.6	29.6		40.6	
713					
	13.7	29.7		40.7	
715					
	14.7	30.7		41.7	
728					
	14.8	30.8		41.8	
744			31		42
	14.9	30.9		41.9	
759					
	15.0	31.0		42.0	
775					
	15.5	31.5	32	42.5	43
793					
	16.5	32.5		43.5	
851			33		44
	17.0	33.0		44.0	
929					
	17.5	33.5	34	44.5	45
934					
	18.5	34.5		45.5	
1003			35		46
	19.0	35.0		46.0	
1082					
	19.5	35.5	36	46.5	47
1108					

COMBINED FATHOMETER
CORRECTION TABLE
RED LIGHT X 6

Small Sept.29,30 Depth	Corr.(-)
97	
	2
133-	
	3
205	
	4
266	
	5
324	
	6
382	
	7
437	
	8
450	
	10
468	
	11
541	
	12
559	
	13
615	
	14
713	
	15
715	
	16
793	
	17
851	
	18
934	
	19
1003	
	20
1108	
	21
1160	
	22
1198	
	23
1250	

Prepared by G.E.L.
Verified by N.R.S.

COMBINED FATHOMERER
CORRECTION TABLES
RED LIGHT DIRECT
Sheet 81

Small June 10-13 inclusive		Large June 20-24 inclusive		Large July 25,28, 29,30		Large Aug.15,17		Large Aug.24,25		Large Aug.26-30 inclusive	
Depth	Corr. (-)	Depth	Corr. (-)	Depth	Corr. (-)	Depth	Corr. (-)	Depth	Corr. (-)	Depth	Corr. (-)
0		0		0		0		0		0	
	0		½		½		1		1		½
39		25		44		65		45		45	
	½		1		1		2		2		1
75		65		89		167		147		103	
	1		2		2		3		3		2
111		143		183		241		224		198	
	2		3		3		4		4		3
199		222		258		300		292		261	
	3		4		4		5		5		4
260		280		320		378		359		322	
	4		5		5		6		6		5
320		323		383		403		403		398	
	5				6						
323		Small June 23		456				Small			
		0			7			0			
			0	476					0		
		39						45			
			½						½		
		75						103			
			1						1		
		111						147			
			2					2	2		
		199						2 84			
			3						3		
		260						292			
			4						4		
		320						359			
			5						5		
		323						403			

Prepared by G.E.L.
Verified by N.R.S.

COMBINED FATHOMETER
CORRECTION TABLE, RED LIGHT X 6

Small June 20-24 inclusive Depth	Corr. (-)	Small Aug.24,25 Depth	Corr. (-)	Large 2:33 p.m. Sep.12 Depth	Corr. (-)	Large Sep.26-29 inclusive Depth	Corr. (-)	Small Sep.12-20 inclusive Depth	Corr. (-)	Large & Small Oct.1-3 inclusive Depth	Corr. (-)
	1		15								
137		793		450		97		97		97	
	2		16		8		2		½		2
205		851		468		143		112		138	
	3		17		9		3		1		3
260		934		482		212		146		208	
	4		18		10		4		2		4
313		1003		541		270		220		267	
	5		19		11		5		3		5
374		1108		615		328		279		328	
	6				12		6		4		6
424				636		390		333		385	
	7				13		7		5		7
450				715		446		391		449	
	9				14		8		6		8
468				775		450		450		450	
	10				15		19		9		10
541				793		468		468		468	
	11				16		11		10		11
590				929		541		541		541	
	12						12		11		12
615						575		590		559	
	13						13		12		13
715						615		615		615	
	14						14		13		14
744						715		715		713	
							15		14		15
						728		744		715	
							16		15		16
						793		793		793	
							17		16		17
						851		851		851	
							18		17		18
						934		934		934	
							19		18		19
						1003		1003		1003	
							20		19		20
						1108		1108		1108	
							21		20		21
						1160		1160		1160	
							22				22
						1198				1198	
							23				23
						1250				1250	

Prepared by G.E.L.
Verified by N. R.S.

COMBINED OPERATIONS
CORRECTION TABLES
RED LIGHT DIRECT
Sheet 81

Large Sep.12-19 inclusive Depth	Corr. (-)	Large Sep.26-29 inclusive Depth	Corr. (-)	Small Sep.29-30 inclusive Depth	Corr. (-)	Large & Small Oct.1-3 inclusive Depth	Corr. (-)
0		0		0		0	
	½		½		½		½
45		27		25		17	
	1		1		1		1
84		80		66		65	
	2		2		2		2
163		158		146		152	
	3		3		3		3
241		231		222		226	
	4		4		4		4
300		296		288		295	
	5		5		5		5
363		359		353		356	
	6		6		6		6
410		410		410		405	

*Small	
0	
	0
45	
	½
84	
	1
124	
	2
204	
	3
270	
	4
333	
	5
398	
	6
410	

* Large oscillator used end of Sept. 12. Use this table.

Prepared by G.E.L.
Verified by N.R.S.

REPORT ON TIME DELAY TESTS AND VELOCITY TESTS

1933 SEASON

DESCRIPTION OF SHORE STATIONS: During the 1933 R.A.R. season five shore stations were operated at intervals. Two of these were established by the party of the GUIDE, and three were placed by the PIONEER.

Stations established by the GUIDE were as follows; KVE (Pfeiffer's Point) was placed in operation on May 18, 1933, and the location of the hydrophone remained constant for the entire season. KVD (Point Piedras Blancas) was placed twice during the season, first on June 7, 1933, and for a second time on July 27, 1933.

The rest of the shore R.A.R. stations were established by the party of the PIONEER as follows; Station KVH (Point Buchon) installed twice, first on May 25, 1933, and a second location on July 12, 1933. The station was operated jointly, both the GUIDE and the PIONEER maintaining operators at the station. KVX (Point Arguello) was located once and remained unchanged throughout the season. KVJ (Point Sal) was located three times by the PIONEER, but this station was used by the GUIDE only upon August 29, 1933.

See the appendix for an abstract of the hydrophone locations as used on the field sheets.

LAG TESTS: Lag tests were made at station KVD on October 13, 1933, at station KVH on October 17, 1933, and at station KVE on October 31, 1933.

FIELD PROCEDURE: Field procedure of lag tests was as follows; A detonating cap was dropped from the wing of the bridge as the ship was drifting with engines stopped. A sextant fix was taken at the instant of dropping the cap. The observers stood at the wing of the bridge for the fix, and the position of fire of the cap in the water was noted and measured as a distance from which the position was taken. The return from the shore station was received on the chronograph and entered in accordance with the usual R.A.R. methods. Original data was recorded as follows:

1. Field sheet and position number.
2. Date
3. Time
4. Fix
5. Initial interval from chronograph tapes.
6. Elapsed time from chronograph tapes.
7. Fuse time of bomb.
8. Position of fire.
9. Depth of water.
10. Kick (received from shore station operator)
11. Type of bomb.
12. Remarks.

The ship was in all cases not more than two miles away from the hydrophone, thus assuring that an assumed velocity would not materially affect the accuracy of the tests over so short a scaled distance.

It should be further noted that the "initial" return on the tape was used in all cases, as the metronome returns on this type of test have too much mechanical delay apart from the desired data on actual sound build up. This is in accordance with the instructions in the Coast and Geodetic Survey special publication on R.A.R. work.

In verifying and checking tapes the "run" in this case being the time interval based on the distance from where the cap explodes to the ship's hydrophone. This time interval was figured from the formula;

$$\sqrt{\frac{(x+a)^2+b^2}{1500 \text{ meters/sec}}}$$ See diagram of ship.

From this formula it was found that the value of the "run" varied from .01 seconds to .03 seconds for all lag tests.

The assumed velocities were taken as the mean between the average depth of the hydrophone and the depth at the position of the ship, the velocities themselves based on temperatures and salinities taken in the field. The limiting range of the assumed velocity can be as high as five meters per second either way and not affect either the lag location of the hydrophone or the build up interval of the sound wave.

RESULTS OF LAG TESTS: Office procedure was carried out in the following manner: All tapes were checked, all copying of original results and computations were completely verified before the lag tests were plotted. Each lag test position was then plotted and its distance from the fix position of the hydrophone was scaled in meters on a separate projection made to include the vicinity of the hydrophone and such signals as were used for positions.

On each individual test there was a computed distance in meters based on an assumed velocity and a scaled distance in meters taken directly from the plotted sheet. In each case the computed distance was longer by a nearly constant value than the corresponding scaled distance. This of course represents a factor of time which indicates the sound build up lag. The average of all tests at the three stations gives this interval of build up a value of .04 seconds.

During the previous season's office work on lag tests a method of accurately locating the hydrophone was developed which was used this season. This was done as follows:

	(-) Corr	K day -16fm		P day -27fm	
Depth	Speed + Veloc	Index + Corr	Reducer (-)	Index + Corr.	Reducer (-)
1108					
	20.5	36.5		47.5	
1160			37		48
	21.0	37.0		48.0	
1198					
	22.0	38.0	38	49.0	49
1237					
	22.5	38.5	39	49.5	50
1250					
	21.5	37.5		48.5	
1312			38		49
	22.0	38.0		49.0	
1390					
	22.5	38.5		49.5	
1468			39		50
	23.0	39.0		50.0	
1544					
	23.5	39.5		50.5	
1621			40		51
	24.0	40.0		51.0	
1650					

COMBINED FATHOMETER
CORRECTION TABLE, RED LIGHT X 6
Sheet 81.

Small June 10-13 Depth	Corr. (-)	Large Port June 20-24 Depth	Corr. (-)	Large July 25,26 28,29,30. Depth	Corr. (-)	Large Aug.15,17 Depth	Corr. (-)	Large Aug.24,25 Depth	Corr (-)	Large Aug.26-30 Depth	Corr. (-)	Large Sep.12-20 Depth	Corr. (-)
97			2		4	97		97		97		97	
	½	128		297			2		2		½		2
99			3		5	147		128		159		146	
	1	199		359			3		3		1		3
137			4		6	220		207		198		220	
	2	252		421			4		4		2		4
205			5		7	282		267		257		279	
	3	311		450			5		5		3		5
260			6		10	344		3⅛		313		333	
	4	366		468			6		6		4		6
313			7		11	405		392		381		391	
	5	421		541			7		7		5		7
374			8		12	450		450		437		450	
	6	450		575			10		10		6		10
424			10		13	468		468		450		468	
	7	468		615			11		11		8		11
450			11		14	541		513		468		541	
	9	541		715			12		12		9		12
468			12		15	544		541		482		590	
	10	575		728			13		13		10		13
541			13		16	615		615		541		615	
	11	615		793			14		14		11		14
590			14		17	698		666		615		715	
	12	715		851			15		15		12		16
615			15		18	715		715		636		744	
	13	728		9¾4			16		16		13		16
715			16		19	793		775		715		793	
	14	793		1003			17		17		14		17
744			17		20	851		793		775		851	
	15	851		1108			18		18		15		18
793			18		21	934		929		793		934	
	16	934		1160			19		19		16		19
851			19		22	1003		934		929		1003	
	17	1003		1198			20		20		17		20
929			20		23	1108		1082		934		1108	
	18	1108		1250					21		18		21
1003			21		(22)			1108		1082		1160	
		1160		1312					22		19		22
Prepared			22		23			1198		1108		1237	
by G.E.L.		1198		1390					23		20		23
Verified			23		23			1237		1198		1250	
by N.R.S.		1250		1468					24				22
			22					1250				1312	
		1312							23				23
								1390				1468	
													24
												1544	

The distance from each position to the hydrophone was computed from an assumed velocity and the scaled elapsed times. Arcs were swung with these distances as radii and the corresponding positions as centers. These arcs did not intersect at a common point. Each radius is too long by about the same amount. A small circle was drawn so that it was tangent to as many arcs as possible by adjusting its radius and center. The distance from the center of this small circle and each position was scaled. Each scaled distance was subtracted from the corresponding computed distance. This difference was found to be practically constant. An average was taken of these differences and subtracted from the computed distances. New arcs were drawn using these distances as radii and the corresponding positions as centers. It was found that these arcs intersected at the center of the above mentioned small circle. Therefore the center of this small circle is the position of the hydrophone. The radius of this circle was equal to the difference of scaled distance and computed distance. This distance (the radius of the small circle) divided by the velocity represents the time lag of the sound build up.

There are some good arguments for this type of location, especially where the original hydrophone fix is poor, or where the hydrophone has not remained in the same spot during the season. In the first place, instead of the one original fix there are as many control points as there are individual tests, and that no matter if the assumed velocity is five meters per second either way the tendency is only to increase or decrease the radius of the small circle without changing the actual center of the circle which is the location of the hydrophone. Then all that is needed to get a good location of the hydrophone is an assumed velocity and the actual elapsed time from the chronograph tapes for each position, from which the distances can be computed and the arcs scaled. It should be noted, however, that the tests should be run on a circle of 180 degrees so as to cover the greatest possible arc around the hydrophone. Further, it can be said, that the lag locations of the hydrophones give much better velocities than the fix locations, and as such were used on the velocity tests.

CONCLUSIONS: In these lag tests the lag or time delay is the difference in time between the exact point at which the sound wave strikes the hydrophone and the instant the return is marked on the chronograph tape. This time delay may result from two main sources; (1) mechanical lag in the relay at the shore station or (2) "sound build up", or a combination of both.

The radio operators of the CURB have experimented with the relays and have found the mechanical lag is of the order of 1/1000 or 2/1000 of a second. This was found to be so by passing a 500 cycle/sec. current through the relay and noting whether the relay opened and closed at that 500 cycle/sec. frequency. The results indicated that this was the case.

Then we must consider the sound wave itself. The first wave of sound that reaches the hydrophone is weak, and is below the noise level of the water. Following the first sound waves are reflections or echoes from the surface and bottom which build up the sound pressure at the hydrophone with the final result that the sum of these waves raises the sound pressure enough to trip the relay. The amount of time it takes the sound wave to build up is actually the greatest factor of the time delay. It will vary several hundredths of a second depending on the type of bomb, the distance between the bomb and hydrophone, and whether the echoes build up or diminish the first sound wave. From this it can be seen that the term lag tests is somewhat misleading and that perhaps a more suitable name of time delay tests would be more appropriate.

VELOCITY TESTS

1926

Velocity tests were taken during the R.A.R. season as follows:

Date	Hydrophone Station	Number of Tests	Field Sheet.
May 19	KVE	8	41
September 26	KVE	8	41
	KVD	5	
	KVH	1	
October 17, 18 and 19.	KVD	49	41, 42 and 43
October 17 and 18	KVH	19	43
October 31	KVE	16	41 and 42

All the above tests exclude all rejected positions.

OBJECT OF TESTS: The object of these tests was to get an actual comparison between measured velocities between each position of the ship and the location of the hydrophone, and the assumed velocities used in the actual field R.A.R. work, in order to verify the accuracy of the latter, and possibly to improve the accuracy of computing them.

FIELD PROCEDURE: The field work on these tests was carried out in the following manner:

The position of the ship was located by means of a visual fix at the instant of dropping a bomb over the side of the ship with the elapsed time measured in accordance with the usual R.A.R. methods. All field data from the original records and all subsequent results has been abstracted on a separate section of this report in order to facilitate office computations. This will be found in the appendix of this report.

OFFICE PROCEDURE: The order of procedure in the office work was as follows:

The data for the simultaneous days of work between KVD and KVH was plotted on a 1:60,000 sheet. All other data was plotted to the same scale on an aluminum sheet reserved for these velocity tests. The lag and fix location of each hydrophone was carefully verified and placed on the sheets, and the distances between the ship positions and these locations were scaled and test velocities computed from these distances and elapsed times. As a correction to the elapsed times the "run" was computed to get the elapsed time from the bomb explosion point to the hydrophone on the ship.

The following functions were used:

D is the distance in meters from where the bomb is thrown over to the ship's hydrophone. S is the speed of the ship in knots. V is the sinking velocity in meter/sec. of the bomb according to type. These values are as follows:

Cast iron bombs sink 5.1 meters/sec.
Pints and quarts sink 1.8 meters/sec.
Detonating caps were found to sink about 3 meters before exploding.

These values are for bombs used on the GUIDE during the past season.

t is the fuse interval in seconds

Therefore "Tmn" equals $\frac{\sqrt{D^2 + .515\ St + V^2 t^2}}{1480}$

As a further correction to the elapsed time the lag or sound delay interval of .04 seconds was subtracted from the elapsed time interval used. Also, as the bomb was invariably thrown over four meters from the observers, this value was subtracted from the scaled distances, before the test velocities were computed. At NYD two types of apparatus were used for bomb returns, namely a thyratron and a standard relay. After investigation of these two instruments it was concluded that the sound build up effect was essentially the same, and that the .04 second correction should consequently be applied to all returns irrespective of their being made by a relay or a thyratron.

ASSUMED MEAN VELOCITIES: In computing the assumed velocities two general assumptions have been made; first that the velocity of sound in sea water is a function of temperature, salinity, and depth, as taken from the British Admiralty tables (H. D. 282), and that for the locality worked a constant velocity outside the two hundred fathom curve for each station and another constant velocity for all feyths less than 200 fathoms for all stations could be used for the entire season's work. In addition, a further assumption was made that the path of the sound from the bomb to the hydrophone follows the profile of the bottom, except that main sound wave does not go below the 400 fathom curve, and that it jumps across narrow valleys or depressions on the bottom. This assumption is based wholly upon the R.A.R. work of the 1938 season. Experimental evidence of this fact is not available to support such a theory, except in a very fragmentary manner.

The theoretical velocities used in the actual tests were computed from the average temperatures and salinities for the days worked and at the depths encountered. The depth profiles used were constructed from the boat sheets and were plotted from the hydrophone position to the bomb position in units of depth against time in seconds of an assumed velocity of 1480 meters/sec.

Sound paths in straight lines were drawn over these profiles, according to the theory previously noted. Breaks in the bottom profile were used as points and the average velocity between each two successive points was taken as the weighted average of all the velocities previously computed for all the depths falling between the two points.

The assumed mean velocity over the entire distance was then obtained as an average of the average velocities mentioned above and weighted as to the distance from the hydrophone in seconds.

COMPARISON OF RESULTS: A comparison of the results with their averages will be found in the appendix.

VELOCITIES USED: 1480.5 meters/second for all stations and outside the 200 fathom curve.

1485 meters/second for all stations inside the 200 fathom curve.

A diagram showing the general area and velocity division is shown in the appendix.

HYDROPHONE LOCATIONS

1935 SEASON

KVE (Pfeiffer's Point) All Season			1:80,000			1:60,000	
36-35	1734.2	36-30	907.7	(826.1)	36-30	403.8	(625.9)
121-49	72.0	121-45	786.5	(178.3)	121-40	755.2	(79.3)
KVD (Point Piedras Blancas)							
No. 1 June 7 - July 27							
35-39	761	35-35	1019.8	(156.0)	35-30	966.8	(60.5)
121-17	330	121-15	416.6	(534.8)	121-10	606.4	(253.2)
No. 2 July 27 to end. (plotted)							
35-39	713.3	35-35	1015.7	(142.0)	35-30	964.2	(63.1)
121-17	308.1	121-15	415.9	(527.5)	121-10	604.1	(254.9)
KVH (Point Buchon)							
No. 1 May 25 to July 12							
35-15	498	35-15	62.2	(1095.2)	35-10	541.5	(486.0)
120-54	1109	120-50	897.0	(51.0)	120-50	598.7	(444.0)
No. 2 July 12 to end. (plotted)							
35-15	466.8	35-15	56.5	(1097.5)	35-10	539.5	(487.7)
120-54	1089.5	120.50	892.1	(55.9)	120-50	596.5	(446.2)
KVK (Point Arguello)							
All Season							
34-34	52.7	34-30	951.0	(228.5)	34-30	413.9	(613.5)
120-39	1052.6	120-35	896.2	(59.7)	120-30	825.3	(26.6)
KVJ (Point Sal)							
No. 3 Used August 29 only.							
34-35	570	34-30	759.6	(416.0)	34-30	328.7	(696.5)
120-39	1571	120-35	955.2	(19.1)	120-30	838.0	(8.5)

TIME CORRECTION FOR SPEED OF SHIP AND FUSE TIME OF BOMB

Fuse Time Seconds	Speed of Ship in Knots 1	2	3	4	5	6	7	8	9	10	11	12	13
8	.0028	.0056	.0084	.0110	.0139	.0166	.0194	.0224	.025	.028	.031	.033	.036
9	.0031	.0062	.0094	.0124	.016	.019	.022	.025	.028	.031	.034	.037	.041
10	.0035	.0069	.010	.014	.017	.021	.024	.028	.031	.035	.038	.042	.045
11	.0038	.0076	.011	.015	.019	.023	.027	.031	.034	.038	.042	.046	.050
12	.0042	.0083	.012	.017	.021	.025	.029	.033	.037	.042	.046	.050	.054
13	.0045	.0090	.014	.018	.023	.027	.032	.036	.041	.045	.050	.054	.059
14	.0049	.0097	.015	.019	.024	.029	.034	.039	.044	.049	.053	.058	.063
15	.0052	.010	.016	.021	.026	.031	.036	.042	.047	.052	.057	.062	.067
16	.0056	.011	.017	.022	.028	..033	.039	.044	.050	.056	.061	.067	.072
17	.0059	.012	.018	.024	.029	.035	.041	.047	.053	.059	.065	.071	.077
18	.0062	.013	.019	.025	.031	.037	.044	.050	.056	.062	.069	.075	.081
19	.0066	.013	.020	.026	.033	.040	.046	.053	.059	.066	.073	.079	.086
20	.0069	.014	.021	.028	.035	.042	.049	.056	.062	.069	.076	.083	.090
21	.0073	.015	.022	.029	.036	.044	.051	.058	.065	.073	.080	.088	.095

$$\text{Correction} = \frac{.525 \text{ meters per second} \times \text{Fuse time in seconds} \times \text{knots}}{1480 \text{ meters per second}}$$

Constant correction to be applied for distance from hydrophone on the ship to place Cap was thrown overboard. $= \frac{37.5 \text{ meters}}{1480 \text{ meters/sec.}} = .0253$ sec.

STATEMENT
to accompany

R.A.R. SHEET FIELD NO. 81

Coast of California
U.S.C. & G.S.S. GUIDE
1933

The smooth plotting of this sheet has been done by Mr. N. R. Sparks and Mr. R. H. McCarthy, jr., civil engineering hands and the pencilling of the soundings thereon has been done by Mr. R. H. McCarthy, jr., civil engineering hand, under the general supervision of Lieutenant (jg) L. W. Swanson.

Lieutenant (jg) Swanson has drawn the depth curves. The completed smooth sheet has been inspected and is approved.

F. H. Hardy
Chief of Party, C. & G. S.
Commanding Ship GUIDE

Oakland, California
December 28, 1934.

STATISTICS
to accompany
HYDROGRAPHIC SHEET FIELD NO. 81
Project No. 140

1933 Date	Day	No. of Soundings RL	RL x 6	V.C.	No. of Positions RL	Rl x 6	V.C.	Stat. Miles Sdg.Lines.	Bottom Character-istics	Water Samples
6-10	A	4	231		1	37		73.6		
6-11	B		218			40		69.1		
6-12	C	9	262		2	51		77.5		
6-13	D		356	2		72	2	115.1		2
6-20	E		82			16		34.5		
6-21	F		187			53		89.0		
6-23	G	8	230		1	44		71.5		
6-24	H		113			30		38.9		
7-25	J		84			18		28.6		
7-26	K		315	1		59	1	128.6		2
7-28	L	16	260	1	3	64	1	110.0		2
7-29	M		319	1WL 1		66	1	121.7		2
7-30	N		197			37		76.9		
8-1	P		305	6WL 2		71	2	86.8		4
8-15	Q	3	221	2	1	63	2	92.0		4
8-17	R		412	2		71	2	139.4		2
8-24	S	8	444	2WL 4	2	93	4	103.1		6
8-25	T		637	4		92	4	110.0		2
8-26	U		520	3		72	3	104.5		
8-27	V	1	520	5		82	5	101.7		2
8-28	W	28	464	3	3	84	3	96.3		2
8-29	X	32	398	3	3	44	3	81.1		2
8-30	Y	26	486	5	7	57	5	11.7		2
9-12	Z		467	4		81	4	97.0		2
9-13	AA		185	1WL 2		38	2	38.9		2
9-14	BB		565	2		101	2	120.0		2
9-15	CC		455	4		76	4	84.0		2
9-16	DD	49	372	3	6	70	3	90.0		2
9-18	EE		566	6		95	6	125.65		2
9-19	FF	54	866	3	8	115	3	170.4		2
9-26	GG		361	4		58	4	75.6		2
9-27	HH		551	4		82	4	106.4		2
9-28	JJ		587	4		94	4	119.4		2
9-29	KK		541	6		78	6	94.3		6
9-30	LL		396	4		71	4	68.1		2
10-1	MM		163			38		30.8		
10-1	NN	39	470	2	7	75	2	84.4		2
10-3	PP	9	370		1	71		56.0		
TOTAL		280	14,176	86	45	2439	86	3422.6		64

Area: 2,500 square statute miles.

Field Records Section (Charts)

HYDROGRAPHIC SHEET NO. 5611

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

Number of positions on sheet	2570
Number of positions checked	224
Number of positions revised	119
Number of soundings recorded	14542
Number of soundings revised	983
Number of signals erroneously plotted or transferred	.....

Date: Aug. 3, 1935.

Verification by W. R. Jackson — Time: 209 Hrs.
Inked by Bowers — Time: 47 "
Review by H. T. Welsh — Time: 23½ hrs

Critical Report of H-5611

1. The records conform to the requirements of the General Instructions.
2. The usual depth curves have been drawn, except (1) the 100 fm. curve at Lat. 35°-37' Long. 121°-20'. It is suggested that the portion of the line "1A" to "3A" be rejected as this area is covered by surveys H-5566 and H-5567 which are in agreement with each other but not in agreement with H-5611.
3. The field plotting was completed as prescribed.
4. No drafting was done over.
5. The junctions with contemporary adjacent sheet are satisfactory.
6. Places where major changes were made in the plotting are noted in the Descriptive Report.

The Descriptive Report contains a paragraph that reads, "K and P days were rerun, as it was known that the soundings at times were rather questionable". Carefull investigation of the records reveals no rerunning of any lines. The sounding records do show, however, a new fathometer correction for these days which would help the crossing not in agreement. It seems that this new correction was made without any regard for the many more crossings that are in good agreement. Were this new correction applied for the entire days, "K" and "P", the discrepancies would be far greater in number, although improving the ones noted in the Descriptive Report.

Respectfully submitted,

W. R. Jackson

To: H.M. Stromg
From C.F.M.

Survey No. H 5611

GEOGRAPHIC NAMES
CALIFORNIA

Date. Feb.1, 1935

Chart No. 5302

Names underlined in red approved April 1, 1935
Harlow Bacon

Diagram No. 5302

*, Approved by the Division of Geographic Names, Department of Interior.

¢, Not Approved by the Division of Geographic Names, Department of Interior.

R, Referred to the Division of Geographic Names, Department of Interior.

Status	Name on Survey	Name on Chart	New Names in local use	Names assigned by Field	Location
	---------	Point San Luis			
	---------	Cooper Point			
		Pacific Ocean			
		- 1321			

(M 100)

LCC

March 27, 1935.

RAR

Division of Hydrography and Topography: Fleming

Division of Charts: Attention Mr. E. P. Ellis

Tide Reducers are approved in
9 volumes of sounding records for

HYDROGRAPHIC SHEET 5611

Locality Point San Luis to Cooper Point, California Coast

Chief of Party: F. L. Peacock in 1933
Plane of reference is mean lower low water, reading
1.3 ft. on tide staff at San Simeon
20.0 ft. below B.M. 1

On account of the large depths very few tide reducers were needed.

Height of mean higher high water above plane of reference is 5.2 ft.

Condition of records satisfactory except as noted below:

Harrison

Acting Chief, Division of Tides and Currents.

Section of Field Records

REVIEW OF HYDROGRAPHIC SURVEY NO. 5611 (1933) FIELD NO. 81

Point San Luis to Cooper Pt., California Coast
Surveyed in June - Oct. 1933
Instructions dated March 27, 1933 (GUIDE)

Fathometer Soundings. RAR control.

Chief of Party - F. L. Peacock.
Surveyed by - F. L. Peacock.
Protracted by - N. R. Sparks, R. H. McCarthy, Jr.
Soundings penciled by - R. H. McCarthy, Jr.
Verified and inked by - Bowers and W. R. Jackson.

1. Condition of Records.

The records are neat and legible and conform to the requirements of the Hydrographic Manual except as follows:

Position numbers and day letters were not entered on the covers and title pages in the color used in the records. This was accomplished in the office.

The Descriptive Report is clear and comprehensive, and adequately covers all matters of importance.

2. Compliance with Instructions for the Project.

The plan, extent, and development of the survey comply with the instructions for the project.

3. Shoreline and Signals.

This is an offshore sheet and no shoreline is shown. The control is R. A. R.

4. Sounding Line Crossings.

Over the area of comparatively regular bottom the crossings are very good. The northern portion of the survey includes two deep and narrow submarine valleys, and a number of discrepancies occur. With the exception of "K" day and "P" day when a considerable number of discrepancies occur, apparently due to incorrect fathometer reading, and noted by the field party, most of the apparent discrepancies can be accounted for by irregularities in the bottom. The crossings on these two days were improved by using the additional fathometer correction, furnished by the field party, on all of "K" day and from position 19P to position 71P on "P" day.

5. Depth Curves.

All of the usual depth curves may be satisfactorily drawn.

6. Junction with Contemporary Surveys.

The junctions with H-5472 (1932) on the north, H-5313 (1932-33), H-5477 (1933), H-5567 (1933), H-5566 (1933), H-5774 (1934), inshore, H-5777 (1933) on the south, and H-5500 (1933) on the west are very satisfactory.

7. Comparison with Prior Surveys.

a. H-1550 (1883).

This survey, on a 1:10,000 scale, includes a few soundings within the area of the present survey at latitude 36° 10' to 15', longitude 121° 52' approximate, and these are in fair agreement.

b. H-2076 (1890-91).

This survey, on a 1:20,000 scale, includes a single sounding within the area of the present survey. This is in fair agreement.

c. H-3099 (1910) H-3100 (1910).

These surveys include a few soundings at the extreme southeast end of the present survey. These are in good agreement with the present survey.

d. H-4321 (1924).

This survey, on a 1:80,000 scale, is a development of the area between latitude 35° 58' and 36° 09', and longitude 121° 44' to 59', investigating shoal soundings reported by the U. S. S. PENNSYLVANIA in 1923. No shoaling was found. The depths are in general agreement with the present survey except for the soundings between 44A and 46A, which are approximately 100 fathoms shoaler than the present depths. These soundings of 550 fathoms (charted), 551 fathoms, (uncharted), and 554 fathoms (charted), at latitude 36° 04' longitude 121° 58' were obtained with the sonic depth finder and appear to be erroneous. These soundings should be disregarded in future charting.

8. Comparison with Chart 5302.

Except for several deep sea soundings which appear on the first edition of the chart, and the source of which could not be ascertained, the chart within the area of the present survey is

based on surveys discussed in the foregoing paragraphs and contains no other information that needs consideration in this review.

The above mentioned soundings are in general agreement with the present survey except a 490 fathom sounding at latitude 36° 30', longitude 121° 45', which is 100 fathoms too shoal. This is evidently an error in reading or is greatly out of position as the bottom is quite regular in this area. These soundings should be discontinued in future charting.

9. Field Plotting.

The field protracting and plotting are excellent and conforms to the requirements of the Hydrographic Manual.

10. Additional Field Work Recommended.

This survey is complete and no additional field work is required.

11. Superseding Old Surveys.

Within the area covered the present survey supersedes the following surveys for charting purposes:

H-1550	(1883)	in part
H-2076	(1890-91)	" "
H-3099	(1910)	" "
H-3100	(1910)	" "
H-4321	(1924)	" "

12. Reviewed by - Harry T. Kelsh, August 23, 1935.

Inspected by - A. L. Shalowitz.

Examined and approved:

C. K. Green, C. K. Green
Chief, Section of Field Records.

L. O. Colbert
Chief, Division of Charts.

J. S. Borden
Chief, Section of Field Work.

G. T. Rude
Chief, Division of H. & T.

Applied to drawing of Chart 5302 - Jan. 24, 1936 - J.T.W.

25 Jan 10, 1936
Ltd.

H-5611 Applied to CHART EXTENSION (18703) 8-12-80
35°09' To 35°05' G Diamond
8-28-80 ROS