

4992

122

Diag. Cht. No. 5502-2 & 5602-2

<p>Form 504 Ed. June, 1928</p> <p>DEPARTMENT OF COMMERCE U. S. COAST AND GEODETIC SURVEY</p> <p>R. S. Patton, Director.</p>	
<p>State: CALIFORNIA</p>	
<p>APR 16 1930</p>	
<p>DESCRIPTIVE REPORT</p>	
<p>Topographic Hydrographic</p>	<p>Sheet No. 122</p>
<p>4992</p>	
<p>LOCALITY</p> <p>Pt. Arena</p> <p>NORTHERN CALIFORNIA</p>	
<p>POINT GABRILLO to HAVENS ANCHORAGE</p>	
<p>to Navarro Head</p>	
<p>1929</p>	
<p>CHIEF OF PARTY</p>	
<p>E. B. T. Siems H. & C. Eng'r</p>	

U. S. GOVERNMENT PRINTING OFFICE: 1929

4992

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DESCRIPTIVE REPORT
TO ACCOMPANY HYDROGRAPHIC SHEET NO. 122

SCALE 1:120,000

COAST OF NORTHERN CALIFORNIA

POINT CABRILLO to HAVENS ANCHORAGE

U. S. C. & G. S. DISCOVERER.

F. B. T. Siems,
H. & G. Engr.,
Commanding.

Instructions dated March 25,
1929

LIMITS: The work on this sheet extends from a junction with inshore sheets numbers 42 and 43 - scale 1:40,000 - of the present field season in approximately $123^{\circ} 55'$ longitude westward to longitude $125^{\circ} 15'$, and from the southern limits of sheet 121, latitude $39^{\circ} 15'$ southward to about $38^{\circ} 33'$, the northern limits of sheet 123.

CONTROL: With the exception of the greater part of A and B days when visual fixes were used, all control was by the method of R A R. The adjacent coast is almost entirely devoid of mountain peaks suitable for offshore signals, and as a consequence the visual work is confined to within the 1000 fathom curve. However, after B day the visibility was extremely poor and attempts at visual fixes were abandoned. Of the two mountain peaks used, Cone was located by sextant cuts, plotted on sheet 42 and hence transferred by dm's and dp's to sheet 122. Ridge is Triangulation Station Sherwood Mountain, 1878-79.

The hydrophone at Caspar, lat. $39^{\circ} 21' 54.51''$ (1681 m.), long. $123^{\circ} 49' 47.63''$ (1140 m.), was supplemented by a magnetophone on June 30th whose position was 20 meters south by east of the hydrophone, a distance not appreciable on a sheet of this scale. The position of the hydrophone as

given was determined by plotting position angles on topographic sheet D - scale 1:10,000 - and checked by plotting on hydrographic sheet 22 - scale 1:20,000. The position of the magnetophone is a mean location of several sextant angle position lines plotted on topo sheet D. The magnetophone was used exclusively on this sheet except for A and B days. Its position is sensibly that of the hydrophone upon which the time circles of the sheet are based.

At Haven, hydrophone No. 1, laid July 1, 1930, was used during the entire time R A R was used to determine positions on the sheet. The hydrophone, located by sextant angles to triangulation stations, was found to be in latitude $38^{\circ} 47' 32.04''$ (986 m.), longitude $123^{\circ} 35' (41.15'')$ (455 m.)

In swinging the time circles that were used in lieu of distance circles, the following method was used: along the north-south and east-west lines and on one diagonal line radiating from each hydrophone, position computations were made for distances representing every ten seconds of time. After plotting these positions the circles were swung in through their respective three computed points with the hydrophone as an approximate center. The ten second points were then equally divided and the five second circles drawn in the same manner as before. A check on the distortion can readily be made by determining whether or not the computed positions fall in straight lines. With such a method distortion was practically eliminated.

VELOCITIES: A base velocity of 1481 meters per second was used on sheet 122, and as the actual velocities as determined from tests varied according to depth, it was necessary to compute a table of corrections to be applied to the assumed distances. The actual velocity varied from 1479 to 1483 meters per second as follows:

DEPTH Fathoms	VELOCITY Meters per Second
0 - 300	1483
300 - 700	1482
700 - 1100	1481
1100 - 1500	1480
1500 - 2100	1479

The table of corrections, a copy of which is included with this report, is in hundredths of seconds. The arguments are seconds of time and final velocity. The correction is applied additive or subtractive to the elapsed time according to whether the final velocity is greater or less than the base velocity of 1481 meters per second. In the bomb records the column heading "distances in meters" has been changed to read "distances in 1481 meter units". In other words the unit for bomb distances on sheet 122 is 1481 meters rather than 1 meter. In the sub-heading "assumed" appears the distance corresponding to the elapsed time and the correction corresponding to the difference in assumed and final velocities in hundredths of seconds. In the "final" column is the distance in 1481 meter units, the base unit of the sheet.

For further information concerning these velocities the reader is respectfully referred to the special report on velocities.

METHOD: Soundings were obtained by fathometer red light to as great a depth as possible, usually around 370 fathoms, but occasionally to 450 fathoms, and by white light beyond that depth. The disc speed was kept constant by adjusting the rheostat to keep the middle reed of the tachometer vibrating. Such adjustment was seldom necessary except when stopping for vertical casts where varying steam pressure caused generator voltage to vary. No corrections to depth were made in the records for varying disc speeds as repeated tests in the field failed to disclose any appreciable change in the sounding due to even abnormal variations in disc speed.

Whenever the personnel was available, the white light soundings were obtained by two officers, and both readings entered in the record. Otherwise the recorder checked the reading of the officer on watch. At vertical casts all officers aboard read the fathometer independently of one another and before the vertical cast depth was announced. All such readings were recorded, and have since been tabulated and personnel equations obtained.

Vertical casts were taken at suitable spacing over the area to obtain comparison with fathometer, surface and bottom temperatures, bottom samples and water samples for salinity determinations. All of the latter samples were shipped to the Scripps Institute for analysis. The mean salinity for the sheet was 33.52.

On vertical casts the Commanding Officer always handled the ship and great care was taken to keep the wire vertical. In the few cases when this was impossible, the estimated slant was entered in the record and the sounding corrected accordingly.

The sheaves were tested before and after the season and the results entered on page 3 of volume 1, this sheet. Altho the corrections in each case are less than the 1% allowed in the Hydrographic Manual, the actual corrections in the greater depths were as much as 10 fathoms. As the fathometer can ordinarily be read to within this limit, it was considered good practice to apply the sheave corrections to the vertical cast depths.

VELOCITY CORRECTIONS: A constant correction for the fathometer red light was applied in addition to the temperature correction. It was arrived at by tabulating comparative readings, applying the temperature corrections to the fathometer sounding and taking a mean of the differences. This correction was determined as -0.6 fathom. A list of corrections to red light soundings is included with this report. A table of velocity corrections to white light soundings is also included with the report.

SLOPE CORRECTIONS: Slope corrections were computed in a manner similar to that developed upon the GUIDE in 1927, except that corrections were determined from distances between depth curves rather than soundings. The curves were drawn as accurately as possible on the boat sheet and the corrections computed with the aid of a celluloid scale. In some cases it was necessary to smooth out the curves to avoid obtaining what were considered abnormally large corrections. Slope corrections of less than 1% were neglected.

See
note
in
Review
a.l.s.

FATHOMETER: The fathometer was read at 30 second intervals on the red light and at two and five minute intervals below and above 500 fathoms respectively. ✓

Soundings obtained with one echo only or when water noises caused by high seas made the reading uncertain were in all cases marked "one echo" or "uncertain".

On E, F and H days great difficulty was experienced in obtaining fathometer white light soundings, and many inaccurate ones were recorded. This is clearly shown by a comparison of fathometer and vertical cast soundings, of which many were taken during those days. On H day investigation showed the port oscillator had inadvertently been cut in rather than the starboard, and that the port was much the weaker of the two altho up to that time both oscillators were thought to emit signals of equal strength. Further investigation disclosed there was no electrical connection between the tuned hydrophone, in a tank adjacent to the magazine, and the fathometer. What was thought to have been the tuned hydrophone was a Submarine Signal Corporation "rat". With a tuned hydrophone and the starboard oscillator no further difficulty was experienced, and soundings could be obtained with ease in any depth and on any slope encountered.

The erroneous soundings have been rejected by the Chief of Party. ✓

LOG: Difficulty was experienced with the patent logs in that successive readings would often fail to correspond to the elapsed time by a wide margin. In plotting the dead reckoning time was always favored rather than the log. All the logs have since been returned to the office for overhaul.

CROSSINGS: In 62 crossings on the sheet between 300 and 1800 fathoms on the fathometer white light the average discrepancy is 17 fathoms, with a maximum of 85 fathoms.

In 39 crossings on the sheet between 90 and 400 fathoms on the fathometer red light, the average discrepancy is 3 fathoms, with a maximum of 20 fathoms.

SHOALS: There are no shoals or banks on the area covered by this sheet. A small submarine valley extends from the 1000 fathom to the 300 fathom curves in latitude $39^{\circ} 05'$, and there is evidence of another a few miles south of the first.

ANCHORAGES: No anchorages are on the area covered by this sheet.

LANDMARKS: No landmarks or aids of mariners are on the area covered by this sheet.

JUNCTIONS AND COMPARISONS WITH PREVIOUS SURVEYS: There were no previous surveys in this area.

DISCREPANCIES BETWEEN SMOOTH AND BOAT SHEETS: Slight discrepancies in the bomb positions between the smooth and boat sheets are generally due to difference in the value of the velocity used; station lag of 0.17 sec. afterwards applied to Haven (see following paragraph) and difference in position of the time circles. The latter is due to more accurate location of the hydrophones and placings of the circles on the smooth sheet.

In all cases where the elapsed time as computed by the initial signal differed materially from that obtained from the mean of the lags the

time that best satisfied the dead reckoning was used in plotting the position. It is generally true that the lesser time is the more correct.

In several instances the relay was reported as hand tripped when it was evidently bomb tripped first. Such cases are generally easily distinguishable after plotting the dead reckoning. Throughout the season, particularly on days when the bomb signals were not coming through with sufficient strength to trip the relay, tests were made to determine the personal equation of the shore station operators. Such individual lags were applied to those bomb distances marked hand tripped.

Differences in soundings on the two sheets are due to the approximate reduction factors used on the boat sheet, and to the fact that no slope corrections were used.

STATION LAG AT HAVEN: On Sept. 21st, while making velocity tests on sheet 43 - scale 1:40,000, it was observed that the bomb distances from Haven failed to check the visual fixes by an amount too large to be assigned to the ordinary cases of such discrepancies. It was at first thought the hydrophone had dragged to a new position. On H day, September 23rd (sheet 43), fourteen tests were made in the immediate vicinity of the hydrophone to verify its position. From the visual positions, arcs corresponding to bomb distances were swung using a velocity of 1490 meters per second, a figure afterwards found to be correct. As the distances were all less than 1500 meters, any probable velocity within rather wide limits could be used without changing the result. The arcs were found to circumscribe the hydrophone at a mean distance of 253 meters or 0.17 seconds of time. This conclusively proved (1) the hydrophone was in its initial position, and (2) that an instrumental lag existed in the shore station apparatus.

On October 14th the instrumental lag was removed; the following

message from the operator giving the details:

"Made adjustment on relay magnet by bringing them closer to armature thereby increasing pulling force. Made adjustment of tension spring so it would release armature at six mills increasing potentiometer resistance one half making total resistance approximately 220 ohms. Relay armature was acting sluggish so investigated and found bearings slightly dusty and too tight so released tension on them to speed up action. Made tests with spare hydrophone and stop watch to check speed and since change has been made, find it working o. k."

(signed) DARTON

On October 18th further velocity tests taken in the same manner as before indicated the entire removal of the lag.

It is assumed the lag of 0.17 seconds was present from the time the station was established until October 14th, and the records have been corrected accordingly.

PLOTTING: Distinctive colors of ink were used in differentiating between bomb, visual and dead reckoning positions as follows:

Bomb positions	Blue position numbers
Visual positions	Red position numbers
Dead reckoning	Green position numbers

When bomb distances from both stations were obtained and used, a single blue dot marks the position rather than intersecting arcs prescribed in the hydrographic manual. When one bomb distance only was used, a 4 m.m. arc of the same color as its corresponding time circles was drawn through the selected position. When one angle supplemented the bomb position, its arc was shown in red.

Robert W. Knox
R. W. Knox,
Jr. H. & G. Engr.

Revised & approved:

F. B. T. Siems
F. B. T. Siems,
H. & G. Engr, Commanding.

TIDAL NOTE - - - - SHEET 122

Auto-portable tide gauge number 133 at Mendocino Bay, California, in latitude $39^{\circ} 18'$, longitude $123^{\circ} 43'$, and standard automatic gauge number 211, Arena Cove, California, in latitude $38^{\circ} 55'$, Longitude $123^{\circ} 43'$, were used in reducing the soundings on this sheet. The Director's letter of January 3rd, 1930 permits either to be used without correction. The tabulation for highest and lowest tides observed have not been made.

APPROVAL OF CHIEF OF PARTY

Sheet number 122 and accompanying records have been inspected and approved by me. The field and office work was done under my immediate supervision at all times. No additional work is considered necessary.

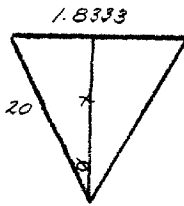


F. B. T. Siems,
H. & G. Eng'r,
Commanding.

OSCILLATOR AND HYDROPHONE LOCATION

The distance between the location of the oscillator and hydrophone, which was used in obtaining red light soundings, was 22 feet. The altitude of the isoscles triangle produced by the sound traveling from the oscillator to the bottom and hence to the hydrophone would be the correct depth while the fathometer reading would be equal to the sides of the triangle. In the solution for the altitude of the triangle for various depths obtained by the fathometer, it was determined that the difference between the altitude (correct depth) and the fathometer reading was so small that no correction need be applied to the soundings.

With the white light method the distance between the location of the oscillator and hydrophone was 6 feet. In considering the correction to soundings due to the ships run, it was determined that for the maximum depth obtained that no correction was necessary. The ships run in this instance is used as a base of the isoscles triangle and the computation would be the same as mentioned above.



22 ft, distance between hydrophone and oscillator
(redlight)

$$\sin \theta = \frac{1.8333}{20} = .09166$$

$$\theta = 5^{\circ}-15'.37 \quad \text{or } 22'$$

$$\tan \theta = .0920 = \frac{1.8333}{x}$$

$$x = \frac{1.8333}{.0920} = 19.92$$

WHITE LIGHT (Tuned)

6 ft. = distance hydrophone and oscillator -- no correction for such distance.

For ships run -- 10 knots or 14.6' / seconds. Maximum depth during season 2130 fathoms 800 fms./ sec./ fath, calibrated.

$$2130 \times 2 = 4260 \text{ fms. sound travels thru.}$$

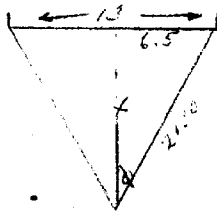
$$\frac{4260}{800} = 5.325 \text{ sec. of time}$$

$$14.6 \times 5.325 = 77.7 \text{ ft. ship runs. } 13 \text{ fms. approx.}$$

$$\sin \theta = \frac{6.5}{2130} = .00305$$

$$\theta = 15' \text{ approx.}$$

$$\tan \theta = \text{same.}$$



CORRECTIONS TO RED LIGHT SOUNDINGS

SHEET 122

Depth fms	Temp. Corr. for Max. Depth fms	Initial Correction fms	Total Correction fms	Correction used fms
0 - 15	- 0.3	- 0.6	- 0.3	- $\frac{1}{2}$
16 - 45	0.8	0.6	- 0.2	0
46 - 75	1.3	0.6	0.7	+ $\frac{1}{2}$
76 - 125	2.0	0.6	1.4	1
126 - 250	3.2	0.6	2.6	2
251 - 375	4.2	0.6	3.7	3
376 - 450	4.5	0.6	3.9	4

CORRECTIONS TO WHITE LIGHT SOUNDINGS

SHEET 122

Depth fms	Correc- tion fms	Depth fms	Correc- tion fms	Depth fms	Correc- tion fms	Depth fms	Correc- tion fms
100	+2	1000	+12	1490	+22	1840	+32
200	3	1060	13	1530	23	1870	33
340	4	1120	14	1575	24	1895	34
440	5	1160	15	1620	25	1920	35
560	6	1220	16	1650	26	1950	36
660	7	1280	17	1690	27	1975	37
740	8	1300	18	1720	28	2000	38
820	9	1350	19	1750	29	2030	39
880	10	1400	20	1780	30	2050	40
940	11	1450	21	1810	31	2075	41
1000		1490		1840		2090	

TABLE OF CORRECTIONS TO BE APPLIED TO ELAPSED TIMES
BASE VELOCITY, 1481 METERS PER SECOND
SHEET 122

Elapsed Time	Correction for Final Velocity of	Elapsed Time	Correction for Final Velocity of
	-1480		-1479
	+1482		+1483
sec	sec	sec	sec
0	0.00	0	0.00
8	.01	5	.01
22	.02	11	.02
37	.03	18	.03
52	.04	25	.04
66	.05	33	.05
82	.06	40	.06
100		48	.07
		55	.08
		62	.09
		70	.10
		77	.11
		85	.12
		92	.13
		99	.14
		106	

STATISTICS, SHEET NO. 122

Date 1929	Letter	Vol	Positions		Soundings			Miles (statute)			Vessel	
			Bomb	Vis'l	Fath R L	Fath W L	V C	Bomb	Vis'l	Total		
July 13	A	1	17	83	147	201			21.7	89.8	111.5	Ship
14	B	1	34	36	180	234			55.5	24.8	80.3	
August 7	C	1	43		162	79	3		85.7		85.7	
8	D	1&2	45		219	74	7		76.6		76.6	
9	E	2	34		131	50	6		63.8		63.8	
10	F	2	35		108	139	4		103.2		103.2	
15	H	2	15		64	48	2		39.0		39.0	
16	J	2	37		317	161	1		104.8		104.8	
28	K	3	34		5	136			132.6		132.6	
29	L	3	28			165	1		143.3		143.3	
30	M	3	29			197			177.7		177.7	
31	N	3	13			106			80.2		80.2	
Sept 1	P	3	27			177			165.0		165.0	
8	Q	3	31			167	3		132.4		132.4	
Total			422	119	1333	1934	27		1381.5	114.6	1496.1	

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(FOR FILES OF FIELD REPORTS SECTION)

April 25, 1930

Division of Hydrography and Topography:

✓ Division of Charts:

Tide Reducers are approved in
3 volumes of sounding records for

HYDROGRAPHIC SHEET 4992

Locality: California (Mendocino to Havens Anchorage)

Chief of Party: F.B.T. Siema, in 1929
Plane of reference is mean lower low water, reading
1.6 ft. on tide staff at Mendocino City
ft. below B. M.

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.


 Chief, Division of Tides and Currents.

Section of Field Records.
Report on Hydrographic Sheet No. H-4992.
Havens Anchorage to Navarro Head, California.
Surveyed in 1929.
Instructions dated March 25, 1929 (Discoverer).

FATHOMETER SOUNDINGS - R.A.R. FINDING

Chief of Party - F.B.T.Siems, F. G. Engle.
Surveyed by - F.B.T. Siems, F. G. Engle.
Protracted by - R. W. Knox
Soundings plotted by R. W. Knox
Verified and inked by - John G. Ladd.

1. The records conform to the requirements of the Hydrographic Manual with the exception that the time intervals to the various stations should have been entered in the sounding records. This would facilitate the verification work. The use of time arcs based on an assumed base velocity instead of the prescribed distance arcs is a departure that it is understood has been fully authorized.
2. The work is in accord with the Specific Instructions with the exception that there should have been more development in the vicinity of the 1000 fathom curve in lat. 38° - 44'.
3. The sounding line crossings were not always satisfactory. In most cases, the difference I believe, was within the probable error of the method of sounding (white light), and nothing was done to eliminate these differences. The recommendation by the field party that the mean of the soundings at the crossings be used was not deemed advisable since it is believed that by indicating these differences on the sheet a measure is obtained of the probable errors of the method. By eliminating these differences a degree of perfection is attached to the work which is not justified by the known results. From the standpoint of the charts, the office treatment will give the navigator the same amount of information.

There were two days work on the sheet that were considered quite carefully. The soundings on the first day (J day) was found to be at variance with lines that it crossed where red light soundings were taken. The soundings on J day having been taken by the white light method, the difference was attributed to that, and wherever a conflict occurred the soundings on J Day were omitted. On the other day's work (L day) a different problem arose. Here the soundings were white light crossing numerous east and west lines surveyed by the same method. The L day line was found to be, with only one exception, shoaler than the lines which it crossed. The question of variation in temperature was considered, but it appears that it would take a most abnormal variation in temperature to account for the average difference of 35 fathoms. The only other explanation that presents itself

is that the speed of the dial on this day was materially different from what it was on other days, although this is somewhat negatived by the fact that no increase in the discrepancy is noticed when passing into deep water. In this connection, it should be noted that the Chief of Party notes in his report (pg. 3) that "no corrections to depth were made in the records for varying disc speeds as repeated tests in the field failed to disclose any appreciable change in the sounding due to even abnormal variations in disc speed". This is a rather broad statement and should be amplified.

On account of the above difference, the line 23 L to 28 L has been rejected and also the soundings between 1 and 2 L. This will not produce a gap in the work as the area is adequately covered by east and west lines. The balance of L day has been retained rather than have a holiday in the work. Furthermore the depths are mostly around 2000 fathoms and the percentage error is comparatively small.

A tabulation of the soundings at the crossings for L day and the cross lines is herewith given:

Position No.	Depth at Crossing (L)	Crossing line (C)	Depth	Diff. L - C
27-28L	707	59-60A	725	-18
27-28L	732	13-14A	783	-51
27-29L	706	65-66A	750	-44
27L	848	9-10B	892	-44
26-27L	665	13-14B	715	-50
26-27L	661	24-25B	672	-11
25-26L	760 (Int.)	28B	799	-39
1-2L	1052	64B	1113	-61
24-25L	1038	64B	1110	-72
2-3L	1020	61B	1052	-32
4-5L	1804	9-10Q	1832	-28
6-7L	1925	20-21Q	1931	-6
8-9L	1936	4-5P	1884	+52
18-19L	1948	4-5P	1996	-48
20-21L	1913	20-21Q	1918	-5
22-23L	1840	24-25Q	1851	-11
22-23L	1804	25Q	1856	-52
22-23L	1784	25-26Q	1846	-62
22-23L	1773	25-26Q	1843	-70
22-23L	1773	8-9Q	1825	-52

4. The junctions with the offshore sheets H-4991 and H-4993 will be considered when those sheets are reviewed.

The junctions with H-4987 and H-4990 are satisfactory. Certain adjustments had to be made on H-4992 to smooth out some of the differences with H-4990.

5. Note to Compiler.

No authority could be found for the charted soundings in the vicinity of lat. 39° long. 124°. They are probably from Fish Commission sources. The 127 fathom sounding in this position must clearly be in error as it falls in depths of 400 fathoms on the new survey.

It is recommended that within its limits the new survey supersede all previous work.

6. Other matters pertaining to various phases of the work covered by this series of sheets (H-4991, H-4992, H-4993) will be taken up in detail when the final sheet H-4993 is reviewed.
7. Attention is called to the fact that difficulty was experienced in receiving the bomb return when inside the 1000 fathom curve from Haven when at the northern end of the sheet and from Caspar when at the southern end. No study has been made of the probable causes of this difficulty. An overlay tracing should be prepared similar to one being prepared for H-4993 and a detailed study made of the whole area.

8. Slope Corrections.

Slope corrections have been applied in accordance with the rules prescribed in Special Pub. 165. Where the field party had applied corrections based on other principles, these soundings were corrected in the records to conform to the principles of the above publication.

9. Reviewed by A. L. Shalowitz, February 1931.

Y/p.
A. M. Sopheralski

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC TITLE SHEET

REG. NO. 4992

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. 122

REGISTER NO. **4992**

State CALIFORNIA

General locality ~~OFFSHORE; NORTHERN PORTION~~ Pt. Arena

Locality ~~Point Gabrille to Havens Anchorage to Navarro Head~~

Scale 1:120,000 Date of survey July 13 - Sept 6, 19~~30~~²⁹

Vessel U.S. C. & G. S. S. Discoverer

Chief of Party F. B. T. Siems, H. & G. Eng'r

Surveyed by F. G. Engle and F. B. T. Siems.

Protracted by R. W. Knox

Soundings penciled by R. W. Knox

Soundings in fathoms ~~meters~~

Plane of reference Mean lower low water

Subdivision of wire dragged areas by _____

Inked by Jahn G. Ladd

Verified by J.G.L.

Instructions dated March 25, 19 30

Remarks: _____

Field Records Section (Charts)

HYDROGRAPHIC SHEET No. 4992.

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

Number of positions on sheet	..541.
Number of positions checked	...160
Number of positions revised	...None.
Number of soundings recorded	..329.4
Number of soundings revised	...6.5
Number of signals erroneously plotted or transferred	...None

Date:.....Jan.....17., 1931.....
Cartographer:.....John G. Ladd.....

Partially applied to Chart 5021 - S. R. 3/4/47.