

# 4215

Diag. Ch. No. 6002 - 2

# 4215

Form 504 DEPARTMENT OF COMMERCE U. S. COAST AND GEODETIC SURVEY
State: <i>Washington</i>
DESCRIPTIVE REPORT. Hyd. Sheet No. <i>4215</i>
LOCALITY: <i>Willapa Bay</i> <i>Willapa Bay</i> <i>and Bar</i>
<i>1922</i>
CHIEF OF PARTY: <i>F. L. Peacock</i>

ORIGINAL

Form 504

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

State: WASHINGTON

11-5613

DESCRIPTIVE REPORT.

HYDROGRAPHIC

BOAT Sheet No. 4215

LOCALITY:

WILLAPA BAY AND BAR

Pacific County

1922

CHIEF OF PARTY:

Fred. L. Peacock, H. & G. E.

( 1 )  
DESCRIPTIVE REPORT  
to  
ACCOMPANY HYDROGRAPHIC BOAT SHEET

WILLAPA BAY AND BAR

State of Washington

1922.

EXTENT:

The Hydrography covered by this report will be treated in four subdivisions, as follows, with respect to extent and results.

(a) The area outside a line joining the western extremity of Cape Shoalwater and the west shore of Leadbetter Peninsula bounded on the south by parallel  $46^{\circ} 37'$ , on the west by the 10 fathom curve and on the north by parallel  $46^{\circ} 45'$  and North Spit.

(b) Main Ship Channel from the entrance at Cape Shoalwater to the entrance to the improved waterway south of Hawks Point.

(c) The South Arm of Willapa Bay as far south as parallel  $46^{\circ} 36'$ .

(d) The marked channels east and south of Ellen Sands.

CONTROL:

The control is triangulation of secondary character. A large proportion of the principal hydrographic signals used were located over triangulation stations of this character. Most of the other signals were located by the intersection of theodolite cuts. Only a few and those of minor importance were located by planetable. ~~XXXX~~ The reason for the large proportion of signals located directly by triangulation was that it seemed the most economical method with respect to time and labor under existing circumstances.

EQUIPMENT:

A leased launch (DORA) 42 ft. long, of very seaworthy qualities and powered by a 30 H.P. Union Engine was used thruout the work. All soundings were obtained with the hand lead, the greatest depth encountered being nineteen fathoms. Sampson spot sashcord #8 and Silver Lake sashcord #8 were used for leadlines. 8 to 12# leads were used according to depth.

Scale of Beatsheet = 1: 20,000.

WEATHER:

Very little good weather was encountered until the last three weeks of the work. The progress made up to that time was possible only by taking advantage of all weather that permitted hydrography being attempted. Outside the entrance especially, heavy offshore weather kept the Bar so rough from the date of beginning hydrography to May 15th that little work there was possible. Tide rips and currents were unusually troublesome and interfered greatly with running straight lines and economical spacing of the same.

FIXES:

Fixes were by the usual simultaneous sextant angle method plotted with the three arm protractor.

TIDE GAUGES:

Automatic Tide Gauge No. 85 was in continuous operation at Take Point, (Pacific County Wharf) during the entire period of the hydrography. During work in the South Arm of the Bay and in the Channels east and south of Ellen Sands, a plain staff gauge was operated at H.E. Bechau's Wharf, Bay Center. The period during which this staff was in operation was 21 days. Readings were obtained every half hour from 8 A.M. to 5 P.M.

RESULTS:

(a) The Bar and area outside the entrance.

Unusually unfavorable weather and the necessity of closing field work not later than June 15, prevented the complete fulfillment of the original instructions for this area. On June 2, the Inspector of the Seattle Field Station was with the Officer in charge in the field of this area and a full consultation was had with respect to the work essential and desirable. Weather subsequently permitted all the recommendations of the Inspector to be fully carried to completion before closing field work.

The work accomplished includes a thorough development of both the South (buoyed) and North Channels to the 10 fathom curve; development of the south side of North Spit and also its western extremity; development of the east, north and south sides of the long North and South Spit west of the buoyed channel; development of the ten fathom curve from parallel  $46^{\circ} 37'$  to parallel  $46^{\circ} 43'$  except that part west of the North and South Spit, west of this Spit the depths from four to ten fathoms are sketchily outlined.

The bottom in this area is uniformly a compact fine grey sand except a couple of gravel spots in the North Channel. The bottom lies in north and south ridges as a general rule and the lead could frequently be felt to drag up to the crest of a ridge or as it dragged down on the deepening side. Very uneven bottom was encountered in the vicinity of Black Can Buoy #1, (South Channel), and in the area between North Spit and the long North and South Spit (North Channel). The crest of these lumps felt extremely hard to the lead as if composed of concrete although the bottom brought up was invariably the same fine grey sand.

The best water in South Channel carries a least depth of about 26 ft. at M.L. L.W. although there is a 23 ft. spot close to the sailing line immediately south of Black Can Buoy #1 and a 21 ft. spot on the other side of the channel approximately  $1/3$  stat. mi., S.S.E.  $3/4$  E, true from Can Buoy #1. All the buoys are well placed with the exception of Red Nun Buoy #4 which in my opinion should be  $1/8$  of a mile to the west and south or more nearly on the extremity of the shoal to which it is an aid.

The North Channel is at present unbouyed. It carries a least depth of 22 ft. over the Bar. A row of shoal lumps with considerable depth between stretches across this channel from the southwestern extremity of North Spit in a southerly direction to the shoal water of the other Spit. The currents in this channel are very strong.

It is the judgement of the Officer in charge that the South Channel will gradually shoal and cut off in the area just west of Black Can Buoy #1-A and that the North Channel will presently swing to the southward and open through near the position of the buoyed channel of the 1911 survey. North Spit progressed to the southward a considerable distance during the progress of the work as indicated by the soundings of N-day, Mar. 25th, positions No. 79 to 83 as ~~examined~~ compared with development of this area in June AR and SS-days.

(b) Main Ship Channel to abreast Hawks Point.

The development was in accordance with the instructions except near the entrance where strong currents rendered the running of cross-channel lines extremely difficult. Enough of these were however run at slack water to thoroughly check the accuracy of the east and west lines. The shoal area north of Gas Buoy #10 was thoroughly developed and the depths were found to correspond closely with those now on the chart, the least depth found being 21 ft. at M.L., L.W. The anchorage area S.E. of Toke Point also received a thorough development.

(c) South Arm of Willapa Bay.

The development extends from the Main Ship Channel southward to parallel  $46^{\circ} 36'$  N. Marked differences from the depths shown on the present chart were found throughout this area and to perfect the chart, revision surveys will be needed further to the southward. Traffic requirements of this portion of the Bay do not appear to warrant any extreme expenditure of time and money for the purpose as no deepdraft vessels use this area.

(d) The Marked Channels East and South of Ellen Sands.

These channels are so narrow and the banks so shoal that development with a launch was impractical. Accordingly a 16 ft. dinghy was used for the greater part of the development. The channel east of Ellen Sands was found to be extremely shoal and narrow especially in the vicinity of Day Beacon Nos. 8 to 11 inclusive. A channel carrying slightly more water leaves this channel at Bn. #13 and opens to the Main Ship Channel at Red Nun Buoy #12. It is unmarked and is reported to shift frequently.

NOTE:

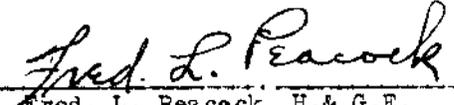
The channels into North Cove was also sketchily sounded during the dinghy work. This channel is shoaling constantly. The best water was not found on the sounding line as there is 2 ft. at M.L. L.W. throughout except over the Bar at the entrance which is slightly shoaler. The channel is very narrow and not marked. The location of the U.S. Coast Guard beathouse off North Cove is being abandoned on account of the shoaling of this area. It is reported that the proposed new location for this beathouse (floating) is the mouth of the Cedar River, north of Toke Point.

SHEET ( 4 ) .

The Shoal Area North of Leadbetter Point.

This area is extremely difficult to survey as it is very dangerous except in flat calm weather. It has no navigable importance although it is used to some extent by crab-fishermen as fishing grounds and at high water as a cutoff when running in from the south. The outer limits were defined as closely as possible during the hydrography but opportunity for making a detailed survey was entirely lacking.

Respectfully submitted

  
Fred. L. Peacock, H. & G. E.  
Chief of Party.

JUL 14 1922

HYDROGRAPHY STATISTICS

WILLAPA BAY AND BAR

SEASON 1922

Launch DORA

Date	Letter Day	Stat. Mi. of Soundings	No. of Soundings	No. of Positions	No. of angles
Feb. 14	a ✓	7.4	228	59	118
17	b ✓	7.1	321	47	94
27	c ✓	19.5	609	124	248
28	d ✓	14.4	357	96	192
March 1	e ✓	14.5	362	84	168
6	f ✓	6.2	181	38	76
7	g ✓	12.1	397	93	186
8	h ✓	20.8	633	142	284
16	i ✓	18.2	313	101	202
17	k ✓	0.2	7	2	4
23	l ✓	13.0	334	76	152
25	m ✓	13.3	412	85	170
27	n ✓	7.2	185	38	76
April 19	o ✓	10.3	230	55	109
21	p ✓	11.6	289	56	110
22	q ✓	3.5	152	37	73
24	r ✓	11.3	395	72	144
25	s ✓	24.1	823	173	346
26	t ✓	4.4	230	49	96
29	u ✓	10.5	294	77	154
May 1	v ✓	17.5	489	117	234
2	w ✓	10.6	376	75	150
4	x ✓	16.9	563	111	222
5	y ✓	16.8	515	127	254
8	z ✓	12.8	463	106	212
9	aa ✓	8.5	288	76	152
10	bb ✓	0.3	12	6	12
11	cc ✓	8.1	293	75	150
15	dd ✓	6.1	249	66	132
19	ee ✓	14.7	380	90	179
23	ff ✓	6.1	146	38	76
24	gg ✓	2.0	117	30	60
26	hh ✓	14.5	409	91	182
27	ii ✓	22.3	703	154	307
29	kk ✓	4.6	195	43	83
June 1	ll ✓	17.7	447	104	208
2	mm ✓	3.8	158	32	64
3	nn ✓	19.7	584	122	242
Totals .....		432.6	13,139	<del>5934</del> 2967	5923
(carried forward)					

HYDROGRAPHY STATISTICSWILLAPA BAY AND BARSEASON 1922

Date	Letter Day	Stat. Mi. of Soundings	No. of Soundings	No. of Positions	No. of angles
Bret forward ....		432.6	13,139	2967	5923
June 5	ee ✓	18.3	461	107	213
6	pp ✓	11.2	320	77	154
7	qq ✓	12.8	335	102	204
8	rr ✓	12.1	330	92	184
10	ss ✓	6.6	257	85	170
12	tt ✓	9.1	285	64	128
13	uu ✓	10.0	197	58	116
Totals for Launch DORA		512.7	15,324	3552	7092
Sixteen foot dinghy:					
May 10	a ✓	8.6	583	128	256
12	b ✓	6.6	449	109	218
15	c ✓	7.2	459	79	156
16	d ✓	1.5	139	31	62
24	e ✓	5.3	375	58	116
Totals for dinghy.....		29.2	2005	405	810
Totals for both beats..		541.9	17,329	3957	7902
Total area 42		square statute miles.			

U. S. SURVEY  
JUL 18 1922

- LIST OF HYDROGRAPHIC SIGNALS LOCATED BY TRIANGULATION
- LIST OF HYDROGRAPHIC SIGNALS LOCATED BY PLANETABLE
- LIST OF AIDS TO NAVIGATION LOCATED
- LIST OF DANGERS LOCATED
- LIST OF ECCENTRIC STATIONS AND TARGETS

W I L L A P A    B A Y  
S T A T E    O F    W A S H I N G T O N  
1 9 2 2

Original Copies

Fred. L. Peacock, H. & G. E.,  
Chief of Party

LIST OF ECCENTRIC OBJECTS OBSERVED

STATION	ECC. DIST. meters	DIRECTION (See page volume)	
BETTER	0.470	21	2
GOOSE (3)	0.105	31	2
LEAD (2)	2.240	32 & 33	3
CLAM	0.041	15	3
INSPECTOR	0.038	2 & 5	4
BRUCE (2)	0.043	39 & 42	2

NOTE: Observations on LEAD (2) prior to April 1st. were on an accurately centered target; subsequent observations were on the center-pole of hydrographic signal LEA, eccentric as above. The targets at the remainder of the above stations were eccentric for all observations thereon.

LIST OF ECCENTRIC STATIONS OCCUPIED

STATION	ECC. DIST. meters	DATE OCCUPIED	DIRECTION ( See page volume)	
<del>LEAD (2)</del> FISHER (2) ECC.	1.090	March 17 & 22	3 & 9	3
LEAD (2), ECC.(1)	0.670	April 12	36 & 37	3
LEAD (2), ECC. (2)	0.991	MAY 22	6 & 7	4
WILLAPA BAY L. H., ECC. (1)	1.430	April 5	22	3
WILLAPA BAY L. H., ECC. (2)	1.405	April 6	24	3
WILLAPA BAY L. H., ECC. (3)	1.390	April 8	26	3

AIDS TO NAVIGATION LOCATED.

ORIGINAL

AIDS

HOW LOCATED

MAIN SHIP CHANNEL

COLAPA BAY CHANNEL BUOY

NOTES WHEN PASSING ON SOUNDING LINE

BUOY #01A

" " " " " "

" #01

" " " " " "

" #N2

" " (PLANE TABLE & TRIANGULATION ~~OF~~ CUTS

" #N4

" " " "

" #N6

" " " "

" #N8

" " " "

" #03

" " " "

FLASHING BUOY #10

TRIANGULATION CUTS.

BUOY #N12

" "

TOKE POINT LIGHT

" "

BUOY #05

PLANETABLE CUTS

" #07

" "

RUSSELL CHANNEL LIGHT

TRIANGULATION CUTS

FRONT RANGE DREDGED OUT (LIGHTED)

PLANETABLE & TRIANGULATION CUTS.

NORTH RIVER.

TWO DAY BEACONS

PLANETABLE & TRIANGULATION CUTS.

RUSSELL ~~EMTGER~~ CUTOFF CHANNEL  
(CHANNEL EAST OF ELLEN SANDS)

PILE WEST SIDE OF ENTRANCE

TRIANGULATION CUTS.

DAY BEACON #2

" "

" " #4

" "

" " #6

" "

" " #8

" "

" " #1

" "

" " #3

" "

" " #5

" "

AIDS

DAY BEACON #7  
 " " #9  
 " " #11  
 " " #13  
 " " #10  
 " " #12  
 " " #14  
 " " #16

HOW LOCATED.

TRIANGULATION CUTS.  
 " "  
 " "  
 " "  
 " "  
 " "  
 " "  
 " "

PALIX RIVER JUNCTION LIGHT

TRIANGULATION & PLANETABLE CUTS.

PALIX RIVER & BAY CENTER CHANNEL.

DAY BEACON #3

TRIANGULATION & PLANETABLE CUTS.

" " #5  
 " " #1  
 BUOY #1 (FLASHING)  
 " #83  
 " #82  
 DAY BEACON #4  
 " " #6

" " "  
 " " "  
 " " "  
 " " "  
 " " "  
 " " "

SOUTH BAY

BUOY #83  
 " #82

NOTES WHILE PASSING ON SOUNDING LINES.

" " " " " "

DANGERS TO NAVIGATION.

<u>OBJECT</u>	<u>LOCALITY</u>	<u>HOW LOCATED</u>
STERN PORTION OF WRECK OF THE S.S. CANADIAN EXPORTER WITH UPRIGHT SPAR.	3.9 STAT. MI. S.W. OF WILLAPA BAY LIGHTHOUSE.	INTERSECTIONS OF TRIANGULATION CUTS.
BOW PORTION OF WRECK OF THE S.S. CANADIAN EXPORTER <del>WITH</del> AWASH AT 3/4 TIDE.	2.5 STAT. MI. N.W. OF THE EXTREMITY OF CAPE SHOALWATER.	NOTES WHEN PASSING ON SOUNDING LINES AND ONE CUTS FROM TRIANGU- LATION STATION.



## LIST OF HYDROGRAPHIC SIGNALS

NAME	CHARACTER	LAT.	LONG.	DMS	DPS
O Gate	White gate or sign	123-56	46-37	54.3	403.5
O Red	E. gable of red cannery	123-56	46-37	1077.1	1051.3
✓ O Cen	North gable (flagpole) Olesen's gen'l store	✓ 123-57	✓ 46-37	✓ 1727.6	✓ 32.7
O Bay	North gable (flagpole) wharfhouse	123-56	46-38	42.6	922.7
O Bum	3-pile dolphin	124-00	46-41	1730.5	151.7
O Bø	3-pile dolphin	123-54	46-42	206.3	723.9
O White	Day Bn. 6 (White target on single pile)	123-57	46-38	1304.4	229.1
O Tre or Trey	Day Bn. 3 (Black target on dolphin)	✓ 123-56	✓ 46-38	✓ 1251.6	✓ 997.8
O Sin	Day Bn. 5 (Black target on dolphin)	123-56	46-38	718.8	805.2
O Buoy #2	Red nun buoy #2	124-05	46-40	1189.2	1131.5
O Buoy #4	Red nun buoy #4	124-05	46-41	1192.2	781.3
O Buoy #6	Red nun buoy #6	124-04	46-41	1779.2	774.9
O Buoy #8	Red nun buoy #8	124-03	46-41	1779.1	404.4
O Buoy #1	Black can buoy #1				
O Buoy #1A	Black can buoy #1A				

ORIGINAL

LOCATED BY PLANE TABLE

GENERAL LOCATION	HOW LOCATED
Over roadway South of Bay Center	Plane table cuts only
On Wharf South of Bay Center County Wharf	do
Bay Center	do
Pacific County Wharf, Bay Center	do
Off Tokeland Beach	do
North side main ship channel near entrance to dredged cut	Plane table cuts and one or more theod. cut
Palix-River-Bay Center channel	do
do	do
do	do
Main ship channel, outside	do*
Main ship channel	do*
do	do*
do	do*
Main ship channel outside *	
do*	

\*Also notes in sounding volumes when passing

Copied by A.W.S.

Copy checked by

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY  
WASHINGTON

January 6, 1923.

Verification of Hydrographic Sheet No. 4215. <sup>1</sup>

By A. L. Shalowitz, Cartographer.

The following remarks relative to the verification of this sheet are made with full knowledge of the unusually difficult conditions the Chief of Party had to contend with. It is not intended to be construed as a criticism of the work itself, but rather as a statement of fact and analysis of the reasons for the apparent discrepancies.

Perhaps the most difficult part of the verification was the failure of some of the cross lines to check by differences ranging from 3 to 9 feet. This can be attributed to any one or all of four causes:

First, shifting bottom, especially after a heavy storm. This was true of the area southwest of Cape Shoalwater. Soundings between 79 and 82 m were rejected by the Chief of Party as this same area was surveyed two months later and the spit was found to have shifted to the southward. I quote the Chief of Party's note on page 25, volume 5, of the sounding records: "North spit was found to have made to southward and these soundings no longer indicate correct depths."

Second, strong currents. This would explain the discrepancies in sounding lines run at short intervals apart and even on the same day. In areas that have excessive currents it is almost futile to attempt to run lines across the current and expect accurate crossings. The tendency is for the current to bow the line out and hence a deeper sounding results. This was found in general to be the case here. The line run across the current was usually the deeper one. Of course in very shallow depths there should be no difference.

Third, steep and abrupt slopes where only a few feet <sup>horizontally</sup> would make a difference in the sounding of many feet.

Fourth, poor leadsmen. This is by no means a small factor. Experienced and reliable leadsmen in waters of this nature are almost imperative. The allowance for swell, the bowing of line, the rapidity with which slack can be taken in in rapidly changing bottom, etc., are things which only experience can perfect.

Following are a few of the places where discrepancies occur: Soundings between 40 a and 41 a differ by 7 to 9 feet with soundings between 5 aa and 6 aa and 23 to 24 dd.

~~From~~ From 57 rr to 65 rr the line appears to shoal. Soundings do not check with cross lines of pp, hh and ii days by 3 to 7 feet.

A 54-foot sounding between 22 and 23 l crosses a 59-foot sounding between 18 and 19 hh.

The line between 52 and 53 uu coincides with 7-8 uu yet soundings on the two lines differ from 3 to 6 feet.

On line 46-47 uu soundings differ by 5 feet with cross lines 58-59 pp.

On line 11-12 uu soundings differ by 4 feet with cross line 37-38 pp.

At 84 m a sounding of 33 feet is crossed by a 28-foot sounding between 24 and 25 pp.

A 26-foot sounding between 74 and 75 pp crosses a 31-foot sounding between 49 and 50 uu.

A 33-foot sounding on 9-10 tt crosses a 29-foot sounding on 91-92 rr.

A 35-foot sounding on 25 kk crosses a 30-foot sounding on 2-3oo.

A 35-foot sounding on 24-25 kk crosses a 31-foot sounding on 5-6 oo.

A 32-foot sounding on 7-8 p crosses a 28-29-foot sounding on 7-8 oo.

A 30-foot sounding between 18-19 oo crosses a 33-35-foot sounding on 27-28 kk.

30 tt and 99 oo are exactly the same spot yet in one case 27 feet was obtained and in the other 32 feet.

The development seems adequate, all indications of shoals having been developed. In the north channel on ss day (volume 11, page 61) an <sup>22-foot</sup> sounding was obtained. This sounding is questioned in the record. It also happens to be the shoalest sounding in the vicinity. Subsequent development showed not less than 26 feet. Hence at the recommendation of the Chief of Party the 22-foot sounding was omitted. The records were good, and contained plenty of explanatory notes. The recording of A. W. Skilling was unusually good.

The protracting was good and the plotting of the soundings was very good, time interval being strictly adhered to.

The position of the buoys as shown on the sheet are a mean between the hydrographic and topographic locations.

The low water line was transferred from the topographic and boat sheets where soundings were not obtained. This was approved by the Chief of Party. All notes on the sheet were made with the approval of the officer in charge.

In conclusion it might be said that on the whole, the survey probably represents the best that could have been obtained under similar conditions and with similar equipment.

It seems to the writer that if systematic surveys are to be made in this or in similar localities, many of the things mentioned above should be given consideration before attempting any work at all.

*A. L. Shalowitz*

A. L. Shalowitz,  
Cartographer.

Approved:

*A. L. Giacomini*

Chief, Section of Field Records

*J. Sturdy*  
Chief Section Field work.

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY  
WASHINGTON  
SECTION OF FIELD RECORDS.

Report on Hydrographic Sheet No. 4215.

Surveyed in 1922.

Date of instructions, Jan. 5, 1922.

Chief of Party, F. L. Peacock.

Surveyed by F. L. Peacock.

Protracted and soundings plotted by J. D. Torrey.

Verified and inked by A. L. Shalowitz.

1. The records conform to the requirements of the General Instructions.
2. The plan and character of development fulfill the requirements of the General Instructions.
3. The plan and extent of development satisfy the specific instructions, such departures from the instructions as occur in the location of sounding lines being due to strong currents or heavy swells.
4. The sounding line crossings are, in general, adequate. Some crossings which fail to attain the usual standard are noted in the report of Mr. Shalowitz. In addition to the causes given by him it is quite probable that the distance of the tide gauge from the lower part of the south entrance channel resulted in defective tide reducers.
5. The information is sufficient for drawing the usual depth curves.
6. Owing to the field party having been ordered to another locality as soon as the survey was completed, the sheet was entirely plotted in the office.
7. The junction of this survey with the old work in the south arm of the bay indicates the need of a re-survey to the southward. The middle ground near spar buoy No. 2 has disappeared, but how far southward this elimination has extended is unknown.

8. This survey is complete and may be considered as a correct representation of the conditions that existed when it was made. In view, however, of the excessive changes that constantly take place the locality must be frequently surveyed if the chart is to possess even a fair degree of accuracy.
9. Mr. Peacock states that he had great difficulty in obtaining accurate soundings when running normal to the axes of strong currents. The same trouble was experienced on H. 4035 and H. 4211 of Knik Arm. As this is no doubt characteristic of all surveying in swift water, it would appear advisable to run all sounding lines along the axes of strong currents when the depths are greater than about four fathoms.
10. Reviewed by E. P. Ellis, January, 1923.

Approved:

*A. J. Giacomini*

Chief, Section of Field Records

*Just steady  
chief Section field work.*

COPY TO FIELD RECORDS

Aug. 30, 1922.

Division of Hydrography and Topography:

Division of Charts:

Tidal <sup>reductions</sup> ~~are~~ approved in  
14 volumes of sounding records for

HYDROGRAPHIC SHEET 4215

Locality: Willapa Bay and Bar, Washington.

Chief of Party: F. L. Penscock in 1922

Plane of reference is

4.7 ft. on tide staff at Pacific Company Wharf, Toke Point.



For reduction of soundings.

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 each 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.

*H. Hammer*

Acting Chief, Division of Tides and Currents.

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC TITLE SHEET

Boat sheet

The finished Hydrographic Sheet is to be accompanied by the following title sheet, filled in as completely as possible, when the sheet is forwarded to the Office.

U. S. Coast and Geodetic Survey.

Register No. 4215

State Washington

General locality Willapa Bay

Locality Willapa Bay and Bar

Chief of party Fred. L. Peacock

Surveyed by Fred. L. Peacock

Date of survey January - June 1922

Scale 1:20,000

Soundings in Feet

Plane of reference Mean lower low water

Protracted by J. D. J. Soundings in pencil by J. D. J.

Inked by A. L. Shalowitz Verified by A. L. Shalowitz

Records accompanying sheet (check those forwarded):

Des. report,  Tide books,  Marigrams,  Boat sheets,

14 Sounding books,  Wire-drag books,  Photographs.

Data from other sources affecting sheet

Remarks: