8293

Diag. Cht. No. 6002-2.

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. WCFP-1656 *Office No.* H8293

LOCALITY

State Washington

General locality Grays Harbor

Locality Eastern Part

19 56

CHIEF OF PARTY

H. G. Conerly

LIBRARY & ARCHIVES

DATE January 28, 1959

8-1870 1 (1)

8293

Form 537
(Ed. June 1946)

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.

REGISTER No. H-8293

Field No. WCFP 1656

State Washington

General locality Grays Harbor

Locality Eastern Part

Scale 1:10,000 Date of survey 13 August - 25 September 1956

Instructions dated 18 February 1955 and 12 September 1956

Vessel Launch No. CS 160

Chief of party Horace G. Conerly

Surveyed by Kelly E. Taggart

Soundings taken by fathometer, ~~graphic recorder~~, hand lead, ~~wire~~

Fathograms scaled by A. W. Brain, R. G. Waterhouse

Fathograms checked by CDR. Horace G. Conerly, Ens. Kelly E. Taggart

Protracted by Ens. Kelly E. Taggart

Soundings penciled by Ens. James K. Richards

Soundings in ~~fathoms~~ feet at ~~MLLW~~ MLLW are true depths

REMARKS:

U. S. GOVERNMENT PRINTING OFFICE 16—66520-1

DESCRIPTIVE REPORT

TO ACCOMPANY HYDROGRAPHIC SURVEY

FIELD NO. WCFP 1656 - REGISTRY NO. H-8293

GRAYS HARBOR, WASHINGTON

PROJECT 13780 SCALE: 1:10,000

WEST COAST FIELD PARTY, HORACE G. CONERLY, CHIEF OF PARTY

SURVEYED BY: K. E. TAGGART

PURPOSE

The purpose of this survey is a new basic survey of Grays Harbor, Washington.

INSTRUCTIONS

The project number is 13780. Instructions are by The Director dated 18 February 1955, with supplemental instructions dated 12 September 1956.

SURVEY LIMITS AND DATES

The general locality of this survey is Grays Harbor. The western limit of the sheet is a junction with sheet WCFP 1255, Reg. No. H-8251. The northern and southern limits are the shoreline. The eastern limit is the old Chehalis River Highway Bridge at longitude 123° 48.2'. The survey included development of the Hoquiam River to latitude 46° 59.70' and of the Wishkah River to latitude 46° 59.90'.

Field work commenced, 13 August 1956 and continued intermittently until 25 September 1956.

VESSELS AND EQUIPMENT

For all soundings Launch CS 160 and a skiff were used, with numerous detached positions taken while walking logs. All fathometer soundings were taken aboard the launch with an 808 J type fathometer, no. 152 SPX, with a keel mounted accoustic unit. All soundings taken from the skiff and all other detached positions were either handlead or pole.

METHODS

Standard hydrographic methods were used throughout the survey, with exceptions in the Hoquiam and Wishkah Rivers. See Paragraph CONTROL OF HYDROGRAPHY in this report.

TIDES AND CURRENTS

For tidal reducers in the area of this survey, a tide gage was maintained at Aberdeen, Washington. See TIDAL NOTE in this report. An abstract of smooth tide reducers is ~~attached to this report.~~ filed with the "b" day fathograms.

No current stations were occupied.

SMOOTH SHEET

The projection was made by hand in the Seattle Processing Office. The projection was slightly distorted by the time the sheet arrived at the West Coast Field Party office in Wheeler, Oregon. ~~See paragraph three under SHORELINE AND TOPOGRAPHY.~~

CONTROL STATIONS

Most of the control was from previously established triangulation stations. A few signals were located by photo methods, and a few by sextant angles. See LIST OF SIGNALS for details.

Control in the Hoquiam and Wishkah Rivers was limited so far as triangulation methods were concerned, and other means were employed. See paragraph CONTROL OF HYDROGRAPHY in this report.

SHORELINE AND TOPOGRAPHY

The shoreline is from reviewed T-9519 N, T-9519 S, and T-9520, of 1957.

There are three discrepancies between the hydrographic and topographic location of piles: Positions 4a 81f and 83f. The hydrographic location of the north end of a row of piles (position 4a) was verified by position 3b, and the photogrammetric location is assumed incorrect. ϕ 46-55.77 λ 123-56.95 > T-9519 revised to agree.

Positions 81f and 83f locate the southern end of two rows of piles. Parts of both rows had been located by photogrammetric methods and placed on the manuscript, but the ends of both rows extend farther south into the water than the photo cuts indicate. When the hydrographic locations were plotted on the boat sheet in the field there was good agreement between the hydro and photo locations except the hydro location definitely located the extremity of the row. When the smooth sheet was plotted, however, these two hydro positions and the angles denoting the respective lines of directions of the rows show the hydro positions of the rows east of, but parallel to, the photo locations. This discrepancy is believed to result from a weak fix. The photo positions of the rows should be held. The hydro positions should be used only to determine the southern extent of the rows. ϕ 46-58 λ 123-56.6

The old highway bridge over the Chehalis River in Aberdeen has been removed. At the time of this survey the old pier foundations were being dredged out. The location of the new highway bridge should be taken from the Photogrammetry Field Edit Party from Portland, Oregon.

Numerous leadline soundings were taken along the faces of important docks in the Hoquiam and Aberdeen harbors. These soundings are recorded in volume 9, pages 3 - 25, and volume 11, pages 3 - 7.

SOUNDINGS

Soundings were taken with the 808 J type fathometer, handlead, and pole. The 808 accoustic units were mounted in the keel, and the initial was set at 3.0 feet during the soundings. A separate fathometer report has been forwarded to the Director. An abstract of corrections is attached to this report.

The handlead was calibrated at the beginning and end of the season and showed no appreciable error at either time.

CONTROL OF HYDROGRAPHY

For all hydrography in the harbor, the positions were fixed by sextant angles on previously located objects ashore.

In the Wishkah and Hoquiam Rivers it was impractical to spend a great amount of time building and locating signals for such a small area. The following method was used, therefore, in fixing the position of the launch while sounding: At the beginning of a line the position was fixed by either a 3-point fix or an accurate location of the position with respect to definite topographic features such as bridges, overhead cables, and buildings. While the launch was under way, the speed was kept constant, and a specific distance from the river bank was maintained and recorded. Beam bearings were obtained on identifiable objects to aid in spacing fixes. Using the continuity of the fathogram, beam bearings and distances to the river banks, the soundings were adjusted and spaced with sufficient accuracy for plotting. At some points along a line it was possible to obtain a 3-point fix, and at such times the spacing of fixes obtained by reference to topographic details was adjusted to the stronger fix. In all such cases the methods were in good agreement. There were some places in the rivers where a continuous line was impractical because of log booms extending into the channel, bridges in the path of the line, etc. At these times the use of ranges with a fix at each end of the line was employed.

ADEQUACY OF SURVEY

This survey is considered adequate for charting purposes, and should supercede all previous surveys.

A tracing of the western junction soundings will be sent to the Seattle Processing Office for comparison with Sheet WCFP 1255, H-8251.

CROSSLINES

Enough crosslines have been run to comply with the instructions. All crosslines appeared satisfactory.

COMPARISON WITH PRIOR SURVEYS

Comparison of this sheet with H-3228, 1:10,000, 1911 shows that the depths in the South Channel have generally not changed very much. The South Channel, however, is much narrower between longitude 123° 50.8' and longitude 123° 53.5' than the old survey indicates. The channel which ran northwesterly from the South Channel, between longitude 123° 52.0' and 123° 53.5', has now filled in and is blocked off from the South Channel.

The depth curves in the North Channel have maintained their same relative shape since survey H-6665, 1:10,000, 1940. The southern arm of the North Channel, between longitude 123° 55.0' and 123° 57.5' is now more shallow.

Sheet H-6647, 1:10,000, 1940 indicates that the depths in the Hoquiam River have not changed appreciably, except in the area south of the railroad bridge where it is now much shoaler than in 1940.

Many of the piles shown on the old charts are still intact. There is also a number of rows of piling, as well as numerous deadheads and stumps, that have appeared since the 1940 survey. A tracing of all piles and dolphins located by the hydrographic party will be forwarded to The Director.

See also review.

This survey is in fairly close agreement with the Corps of Engineers surveys (file nos. E-5-2-128, E-5-2-130, and E-5-2-131). Because of recent dredging, depths in the Cow Point Reach and the Aberdeen Reach are now slightly greater than those of the Corps of Engineers survey. Copies of the C.E. surveys mentioned above, plus a copy of C.E. soundings in the Port of Grays Harbor slips, will be forwarded with the smooth sheet.

COMPARISON WITH CHART

The Middle Channel, which is shown on chart 6195 (May, 1954) as a through channel connecting the North and South Channels, has filled in at its southern end. This area now bares at MLLW. ✓

The red light buoy number 60 is not shown on the chart. See AIDS TO NAVIGATION for the position of this buoy.

not an light L.t 1959

DANGERS AND SHOALS

All foul areas and obstructions are shown on the smooth sheet. Because of the many stub piles and deadheads in the South Channel, small boats using this channel should proceed with caution. ✓

All obstructions bare at MLLW except the stump at latitude 46° 57.52', longitude 123° 50.63'.

COAST PILOT INFORMATION

There are several changes to be applied to the Pacific Coast Coast Pilot, seventh edition.

Page 379 line 12 should read, "clearance of 125 feet and a vertical clearance of 8 feet. The swing bridge part of the Wests bridge is now destroyed, and the rest of the bridge is being destroyed. A new bascule highway bridge with a horizontal clearance of 178 feet and a vertical clearance of 54 feet at MLLW has been constructed approximately 100 yards east of the railroad bridge."

Page 379 line 46 should read, "Second Street swing bridge has been destroyed, but the old fender remains in the channel. A fixed concrete bridge has been constructed." Vertical and horizontal clearances were not obtained by the hydrographic party.

Page 380 line 46 should read, "Pilot charges are $2.00 per foot of draft and 2-1/2 cents per net ton each way, in or out. Minimum pilotage charge, in or out, is $150.00. The inward charge is to the first birth of the ship; shifting charge is $35.00, plus tug hire if required.

Page 381 line 39 should read, "one of which is maintained at a depth of 30 feet by dredging."

Page 382 line 2 should read, "Repairs. - There are two marine railways, one of which is capable of handling vessels with a maximum draft of 9 feet, a maximum of 100 feet long, and a weight of 250 tons; also machine shops and foundries capable of making ordinary repairs.

AIDS TO NAVIGATION

No fixed aids to navigation on this sheet were located by the hydrographic party.

The Grays Harbor, North Channel Range 8 Front Daybeacon marker is gone, but the pile on which it was located is still standing.

All floating aids to navigation in the area were located by the hydrographic party, and are listed below:

Buoy	Lat. and Long.	Depth at Buoy (ft.)	Pos.No.	Date of Location
N "20"	lat. 46° 55.70' long. 123° 57.50'	8.4	6 k	5 September 1956
N "24"	lat. 46° 55.89' long 123° 56.17'	9.6	7 k	5 September 1956
N "30"	lat. 46° 56.65' long 123° 53.15'	7.3	19 k	5 September 1956

AIDS TO NAVIGATION, CONTINUATION

Buoy	Lat. and Long.	Depth at Buoy (ft)	Pos.No.	Date of Location
N "34"	lat. 46° 57.00' long 123° 51.83'	5.6	204 j	4 September 1956
N "36"	lat. 46° 57.27' long. 123° 50.97'	8.1	205 j	4 September 1956
N "38"	lat. 46° 57.76' long. 123° 57.39'	24	29 - 33 d	24 August 1956
N "40"	lat. 46° 57.85' long. 123° 56.95'	30.0	87 f	28 August 1956
"41" Fl.G.	lat. 46° 57.93' long. 123° 56.92'	27.9	86.f	28 August 1956
N "42"	lat. 46° 57.99' long. 123° 56.17'	30.5	5 k	5 September 1956
N "44"	lat. 46° 58.08' long. 123° 55.68'	17.3	4 k	5 September 1956
N "48"	lat. 46° 58.13' long. 123° 54.97'	25.0	3 k	5 September 1956
N "50"	lat. 46° 58.10' long. 123° 54.39'	26.1	2 k	5 September 1956
N "52"	lat. 46° 58.02' long. 123° 53.92'	22.9	1 k	5 September 1956
N "54"	lat. 46° 57.98' long. 123° 51.94'	24.2	157 w	20 September 1956
R"56" Fl.W	lat. 46° 57.57' long. 123° 50.65'	13.7	156 w	20 September 1956
R"58" Fl.R	lat. 46° 57.57' long. 123° 50.30'	13.2	155 w	20 September 1956
R"60" Fl.W	lat. 46° 57.67' long.123° 49.66'	18.0	154 w	20 September 1956

All bridge and cable information was taken from the manuscripts. The only changes are those mentioned under COAST PILOT INFORMATION.

TABULATION OF APPLICABLE DATA

1. Tidal levels, marigrams, etc. forwarded to The Director 16 October 1956. Abstract of tide reducers ~~attached to this report.~~ filed with fathograms.

2. Field and office photographs transferred to the Portland Photogrammetric Office, 24 August 1956.

3. Photo manuscripts forwarded to Seattle Processing Office, 29 November 1956.

4. Blueline prints forwarded to Seattle Processing Office, 28 November 1956.

5. Special fathometer report forwarded to The Director, 17 October 1956. Abstract of corrections attached to this report.

6. Cahier computation of triangulation station BOWERMAN FIELD AERO BEACON sent to The Director, 8 November 1956.

7. Fathograms to be forwarded to The Director.

8. Sounding volumes to be forwarded to The Director.

9. Boat sheet to be forwarded to The Director.

10. Tracing of western junction soundings for comparison to sheet WCFP 1255, H-8251 to be forwarded to Seattle Processing Office.

11. The tracing of the hydrographic location of piles and dolphins, Corps of Engineers surveys,and old surveys to be forwarded to The Director.

Respectfully Submitted

James K. Richards

James K. Richards
Ensign, C&GS

Approved and Forwarded

Arthur L. Wardwell

Arthur L. Wardwell
Commander, C&GS
OinC., West Coast Field Party

STATISTICS FOR HYDROGRAPHIC SURVEY

FIELD NO. WCFP 1656 - REGISTRY NO. H-8293

LANUCH CS 160 - PROJECT 13780

Vol.No.	Day Letter	Date	No.Pos.	H.L.& Pole Sigs.	Stat.Miles	D.P.'s	Method
2	a	13 August	37	5		37	*
1	b	20 "	3			3	*
1	c	22 "	127	9	16.1	1	*
1 & 2	d	24 "	183	27	26.8	16	*
2 & 3	e	27 "	259	83	37.4	4	*
4	f	28 "	198	108	25.1	14	*
3,4 & 5	g	30 "	216	86	24.0	65	* & #
6	h	31 "	184	122	23.1	50	* & #
6 & 7	j	4 Sept.	229	72	22.4	46	* & #
5	k	5 "	38		4.5	8	*
5	l	6 "	168	43	18.9	43	* & #
8	m	7 "	190	101	21.6	59	* & #
9 & 8	n	10 "	149	149		149	** & #
10	p	11 "	105	~~109~~	3.8	99	## & #
10	q	12 "	60	58	0.9	60	## & #
10	r	13 "	101	101	2.0	101	#
10	s	14 "	102	99	2.1	101	## & #
8 & 10	t	17 "	125	30	12.8	25	** & #
10 & 9	u	18 "	130	16	10.2	17	## & *
9 & 11	v	19 "	164	71	11.1	64	## & *
11	w	20 "	166	22	18.4	24	* & #
11	x	21 "	10	10		10	##
11	y	25 "	7	7		7	Detached Positions
9	pp	11 "	129	129		129	**
			3,080 2976	1,457	281.3	1032	

Total area, square statute miles 16.9

* Launch
** H.L. off Docks
\# Skiff
Log Walking

TIDAL NOTE FOR HYDROGRAPHIC SURVEY

FIELD NO. WCFP 1656 - REGISTRY NO. H-8293

For tide reducers for the entire area of the sheet, a tide gage was maintained at Aberdeen, latitude 46° 58.02', longitude 123° 51.17'. The MLLW reading on the tide staff was 4.6 feet.

No corrections for time or height for distance from the gage was applied to the observed tides.

LIST OF SIGNALS USED

FIELD NO. WCFP 1656 - REGISTRY NO. H-8293

Name Used In Hydro.	Origin of Signal
AND	ABERDEEN, ANDERSON MILL WATERTANK, 1940.
ANN	GRAYS HARBOR, NORTH CHANNEL RANGE 6, FRONT LIGHT, 1952.
ARB	GRAYS HARBOR USE, 1940.
BACK	See G.P. computation, this descriptive report.
BOR	GRAYS HARBOR, NORTH CHANNEL RANGE 7, REAR DAYBEACON 1952.
BOW	T-9519 H.
BRICK	HOQUIAM, GRAYS HARBOR LUMBER CO., BRICK STACK, 1940.
CHAN	NORTH CHANNEL LIGHT 36, 1951.
CHAR	CHARLES CREEK DIKE LIGHT 38, 1952.
CON	GRAYS HARBOR, NORTH CHANNEL RANGE 9, FRONT DAYBEACON 1952.
CROSS	HOQUIAM SAXON LUTH. CHURCH, CROSS ON STEEPLE, 1940.
DALE	3 pt. fix, "w" day vol. 11, page 2.
DAY	GRAYS HARBOR N. CHANNEL RANGE 9 REAR DAYBEACON, 1952.
DOLF	DOLF, 1951.
DON	ABERDEEN, DONAVON LUMBER CO. RED BRICK STACK, 1940.
EAR	GRAYS HARBOR RANGE 3, REAR LIGHT, 1951.
EL	EL, 1952.
FIN	HOQUIAM, FIRST CHURCH OF CHRIST SCIENTIST FINIAL, 1940.
GRAY	See G.P. computation, this descriptive report.
GUS	GUS, 1952.
HAR	GRAYS HARBOR, NORTH CHANNEL RANGE 7 AND RANGE 10 FRONT DAYBEACON 1952.
ICK	3 pt. fix "w" day vol. 11, page 10.
IRON	SOUTH ABERDEEN, LUMBER MILL IRON STACK, 1940.
LAD	T-9519 H.

LIST OF SIGNALS USED

(CONTINUATION)

Name Used In Hydro.	Origin of Signal
SAG ✓	ABERDEEN, SAGINAW SHINGLE CO. STACK, 1940.
SOUTH ✓	ABERDEEN, STATION KXRO SOUTH RADIO MAST, 1952.
STACK ✓	STACK, 1952
STAT ✓	ABERDEEN, STATION KXRO NORTH RADIO MAST, 1952.
SUE ✓	See G.P. computation, this descriptive report.
TANK ✓	ABERDEEN MUNICIPAL TANK, 1952.
TIDE ✓	USE, 1951.
TOWER ✓	TOWER, 1952.
WAT ✓	SOUTH ABERDEEN LUMBER MILL WATER TANK (WAT) 1940.
WIN ✓	T-9519 H.
WOOD ✓	ABERDEEN, AMERICAN PLYWOOD CO., STACK (CONCRETE) 1940.

NOTE: Signal TRI (Latitude 46° 59.05', Longitude 123° 56.56') was located by photo methods. It was not located on the Smooth Sheet by the plotter. The signal, however, was only used once, locating Nun Buoy No. 36. The smooth sheet location of TRI was taken from the boat sheet, and is sufficiently accurate for locating the buoy.

TRI PLOTTED BY VERIFIER + INKed

GRAYS HARBOR N. CHANNEL RANGE 8 FRONT DAYBEACON, 1952.
HAS C SYMBOL BUT WAS NOT USED.

COMBINED CORRECTIONS FOR 808 FATHOMETER 152 SPX

AS USED IN LAUNCH CS 160

PROJECT 13780 - SUMMER 1956

"A" Scale		"B" Scale	
Fathometer	Corr'n	Fathometer	Corr'n
3.6	- 0.6		
5.0	- 0.5		
7.8	- 0.4		
15.0	- 0.3		
24.0	- 0.2		
33.0	- 0.1	32.4	≠ 0.5
42.0	0.0	41.4	≠ 0.6
51.0	≠ 0.1	50.4	≠ 0.7
60.0	≠ 0.2	59.4	≠ 0.8
		68.4	≠ 0.9
		76.4	≠ 1.0
		85.4	≠ 1.1
		90.0	≠ 1.2

LIST OF SIGNALS USED

(CONTINUATION)

Name Used In Hydro.	Origin of Signal
LEA	~~See G.P. computation, this descriptive report.~~ T-9519 S See Vol. 1, Page 2
LIG	GRAYS HARBOR RANGE 3 FRONT LIGHT, 1951.
LT 59	GRAYS HARBOR, NORTH CHANNEL, LIGHT 59, 1952.
LT 57	GRAYS HARBOR, NORTH CHANNEL, LIGHT 57, 1952.
LT 46	NORTH CHANNEL LIGHT 46, 1951.
LT 51	GRAYS HARBOR NORTH CHANNEL LT 51, 1952.
LT 27	SOUTH CHANNEL LIGHT 27, 1951.
LOG	T-9520.
MAST	ABERDEEN, STATION KBKW RADIO MAST, 1952
MILL	ABERDEEN, HULBERT MILL WATER TANK FINIAL, 1940.
MOON	GRAYS HARBOR, RANGE 5 REAR LIGHT, 1951.
NEL	GRAYS HARBOR, NORTH CHANNEL RANGE 10 REAR DAYBEACON, 1952.
NOR	GRAYS HARBOR, NORTH CHANNEL RANGE 6 REAR LIGHT, 1952
PAL	See G.P. computation, this descriptive report.
PIL	ABERDEEN, CHURCH OF PILGRIMS, CROSS ON STEEPLE, 1940.
PIP	3 pt. fix "s" day vol. 10, page 41.
PLY	EAST HOQUIAM, WEST COAST PLYWOOD CO., TALL IRON STACK (PLY) 1940.
POLE	HOQUIAM RADIO POLE (NORTH RADIO) 1940.
POLKA	POLKA, 1940, r. 1952.
RAD	HOQUIAM RADIO POLE (SOUTH RADIO) 1940
RAN	GRAYS HARBOR, RANGE 5 FRONT LIGHT, 1951.
RAP	3 pt. fix "s" day vol. 10, page 42.
RAY	EAST HOQUIAM, RAYONIER PULP MILL STEEL WATER TANK, HIGHER OF TWO (RAY) 1940.
RAYON	EAST HOQUIAM, RAYONIER PULP MILL TALL CONCRETE STACK (RAYON) 1940.
REAR	GRAYS HARBOR, NORTH CHANNEL RANGE 8 REAR DAYBEACON, 1952.

APPROVAL SHEET

HYDROGRAPHIC SURVEY

FIELD NO. WCFP 1656 - REGISTRY NO. H-8293

This survey is believed to be complete and adequate for use in charting the area. I believe that the former Chief of Party kept close personal supervision of the field work.

Arthur L. Wardwell

Arthur L. Wardwell
Commander, C&GS
OinC., West Coast
Field Party

See Sketch Vol. 1. Sheet WCFP 1656

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April 1945

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2 WALTZ	to 3 NED	140	44	00
2d ∠		&	+		
α	2 WALTZ	to 1 GRAY	140	44	00
Δα					
			180	00	00.0
α′	1	to 2			

			°	′	″
α	3 Stearns 3	to 2 Brack	175	06	43
3d ∠		&	− 35	17	10
α	3 Stearns 3	to 1 Sue	139	49	33
Δα					
			180	00	00.0
α′	1	to 3			

First Angle of Triangle

	°	′	″			°	′	″
φ	46	55	28.326	2 WALTZ	λ	123	56	50.578
Δφ		+	.281	11.2 m.	Δλ	+	00	.335
φ′	46	55	28.607	1 GRAY	λ′	123	56	50.913

	°	′	″			°	′	″
φ	46	55	22.600	3 Stearns 3	λ	123	58	54.206
Δφ	+	00	.286	11.58 m.	Δλ	+	00	00.353
φ′	46	55	22.886	1 SUE	λ′	123	58	54.559

	Logarithms	Values in seconds
s	1.049218	883.4
Cos α	9.888858	
B	8.510319	(969.4)
h	9.448395	1st term +0.2808
s^2	2.098436	
$\sin^2\alpha$	9.602712	
C	1.43300	
	3.134148	2d term +
h^2	8.896790	
D	2.3917	
	1.288490	3d term +
		−Δφ +0.2808

½(φ+φ′)	°	′	″	Logarithms	Values in seconds
s				1.049218	1077.2
Sin α				+ 9.801356	+ 442.5
A′				8.508940	(192.2)
Sec φ′				0.165605	
Δλ				9.525119	+ 0.33506
Sin ½(φ+φ′)					
−Δα					

	Logarithms	Values in seconds
s	1.063708	(1146.1)
Cos α	9.883143	
B	8.510319	706.7
h	9.457170	1st term +0.28653
s^2	2.127416	
$\sin^2\alpha$	9.619272	
C	1.43298	
	3.179668	2d term +
h^2	8.914338	
D	2.3917	
	1.306038	3d term +
		−Δφ +0.28653

½(φ+φ′)	°	′	″	Logarithms	Values in seconds
s				1.063708	
Sin α				9.809636	+ (115.1)
A′				8.508940	
Sec φ′				0.165592	1154.4
Δλ				9.547876	+ 0.35308
Sin ½(φ+φ′)					
−Δα					

GRAY 46° 55′ 883.4m. (43.0) GRAY 123° 56′ 442.5m. (192.5) SUE 46° 55′ 706.7m. (219.7) SUE 123° 58′ 519.6m. (115.2)

16—44238-1 U. S. GOVERNMENT PRINTING OFFICE

Sheet 1CFP1656

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April 1945

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2 Yel	to 3 Neds Rock	118	45	
2d ∠		&	+180	00	
α	2 Yel	to 1 Back	298	45	
Δα					
			180	00	00.0
α′		to 2			

			°	′	″
α	3	to 2			
3d ∠		&	−		
α	3 Brack 1910	to 1 Pal	180	45	19.7
Δα					
			180	00	00.0
α′	1	to 3			

First Angle of Triangle

	°	′	meters		λ	°	′	meters
ϕ	46	56	605	2 Yel	λ	123	53	489
Δϕ	−	00	8	16.9 m.	Δλ	−	00	15
ϕ′	46°	56′	597m	1 Back	λ′	123°	53	474m

	°	′	″		λ	°	′	″
ϕ	46	58	52.299	3 Brack 1910	λ	123	59	20.409
Δϕ	+	00	00.112		Δλ	−	00	00.002
ϕ′	46	58	52.411	1 Pal.	λ′	123	59	20.407

	Logarithms	Values in seconds
s	1.227 887	
Cos α	9.682 135	
B		meters
h	0.910 022	1st term + 5.129
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^2		
D		
		3d term +
		−Δϕ

°	′	″		Logarithms	Values in seconds
½(ϕ+ϕ′)					
			s	1.227 887	
			Sin α	9.942 864	
			A′		
			Sec ϕ′		meters
			Δλ	1.170 751	14.82
			$\sin\frac{1}{2}(\phi+\phi')$		
			−Δα		

	Logarithms	Values in seconds
s	0.537 819	
Cos α	9.999 962	
B	8.510 315	
h	9.048 096	1st term − 0.″1117
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^2		
D		
		3d term +
		−Δϕ

°	′	″		Logarithms	Values in seconds
½(ϕ+ϕ′)					
			s	0.537 819	
			Sin α	8.120 083	
			A′	8.510 315	
			Sec ϕ′	0.166 064	
			Δλ	7.334 281	0.″0022
			$\sin\frac{1}{2}(\phi+\phi')$		
			−Δα		

Back 46° 56′ 597m.(329.4) Back 123° 53′ 474m.(160.6) Pal. 46° 58′ 692.1m.(234.3) Pal. 123° 59′ 431.3m.(202.8)

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GEOGRAPHIC NAMES

Survey No. H-8293

Name on Survey	On Chart No. A	On previous survey No. B	On U. S. quadrangle Maps C	From local information D	On local Maps E	P. O. Guide or Map F	Rand McNally Atlas G	U. S. Light List H	K	
Washington									BGN	1
Grays Harbor										2
North Channel										3
Middle Channel										4
South Channel										5
Moon Island										6
Hoquiam										7
Hoquiam River									BGN	8
Rennie Island										9
Cow Point										10
Aberdeen		(tide station)								11
Wishkah River										12
Chehalis River										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
										24
										25
										26
										27

Names approved 2-13-57
L Heck

M 234

Hydrographic Surveys (Chart Division)

HYDROGRAPHIC SURVEY NO. 8293

Records accompanying survey:

Boat sheets 1; sounding vols. 11; wire drag vols. .....;

bomb vols. .....; graphic recorder rolls 7-Envelopes

special reports, etc. 1-Smooth sheet and 1-Descriptive report.

.....

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

Number of positions on sheet		3072
Number of positions checked		350
Number of positions revised		.....
Number of soundings revised (refers to depth only)		114
Number of soundings erroneously spaced		—
Number of signals erroneously plotted or transferred		3
Topographic details	Time	26 hrs.
Junctions	Time	—
Verification of soundings from graphic record	Time	11 hrs.

Verification by W. E. Loig ... Total time 180 hrs. Date 6/3/59.

Reviewed by ..... Time 65 Date 10/6/59

M-2232-1

DIVISION OF CHARTS

REVIEW SECTION -- NAUTICAL CHART BRANCH

REVIEW OF HYDROGRAPHIC SURVEY

REGISTRY NO. H-8293 FIELD NO. WCFP-1656

Washington, Grays Harbor, Eastern Part

Surveyed: Aug. - Sept. 1956 Scale 1:10,000

Project No. 13780

Soundings: 808 depth recorder
Handlead
Pole

Control: Sextant angles on shore sig nals; reference to shore line in the narrow rivers.

Chief of Party---------- H. G. Conerly
Surveydd by---------- K. E. Taggart
Protracted by---------- K. E. Taggart
Soundings plotted by---------- J. K. Richards
Verified and inked by---------- W. E. Roig
Reviewed by---------- L. V. Evans III DATE: 10/6/59
Inspected by---------- R. H. Carstens

1. Shoreline and Control

The sources of shoreline and control are given in the Descriptive Report.

2. Sounding Line Crossings

Depths are in good agreement at crossings.

3. Depth Curves and Bottom Configuration

The depth curves are adequately defined. Below the mouth of the Chehalis River there are two main channels through the extensive tidal flats which cover much of Grays Harbor in this area.

4. Junctions with Contemporary Surveys

The only adjoining, contemporary survey is H-8251 (1955-56) to the west, that junction will be considered in the review of H-8251.

In the Hoquiam, Wishkah and Chehalis Rivers the present survey extends to the project limits. Depths at those limits are in harmony with charted hydrography.

5. Comparison with Prior Surveys

H-1589b	(1883)	1:20,000	H-6647	(1940)	1:10,000
H-2085	(1891)	1:20,000	H-6665	(1940-41)	1:10,000
H-3228	(1911)	1:10,000			

A comparison between the present and prior surveys reveals the main channels to be relatively stable in location. However, the South Channel is subject to both shoaling and natural deepening. The North Channel depths are maintained by periodic dredging (Federal project).

The widespread tidal flats are generally becoming shoaler and more extensive. For example, Middle Channel, which formerly cut across the tidal flats southwest of Rennie Island, is now completely blocked from South Channel by unbroken flats with depths of 1 - 3 feet.

The following comparisons illustrate the nature of the general shoaling and limited deepening that have taken place:

Prior Depth		Lat.	Long.	Present Depth
15 ft.	(H-6665)	46°57.9'	123°54.8'	7 ft.
10 ft.	(H-6665)	46°57.75'	123°56.0'	6 "
7 ft.	(H-3228)	46°57.28'	123°52.35'	-3 "
15 ft.	(H-3228)	46°57.2'	123°53.35'	1 "
8 ft.	(H-3228)	46°57'	123°52'	11 "
0 ft.	(H-6665)	46°56.28'	123°55'	2-3 "
29-33 ft.	(H-6647)	46°58.2'	123°52.6'	15-23 "

Snags charted in lat. 46°56.74', long. 123°52.73' and lat. 46°57.28', long. 123°50.93' from H-3228 should be disregarded.

The present survey is adequate to supersede the prior survey within the common area.

6. Comparison with Chart 6195 (print of 2/23/59)

A. Hydrography

The charted hydrography originates largely with the previously discussed prior surveys supplemented by advance data from the present survey. Charted hydrography in the Chehalis and Wishkah Rivers originates with Corps of Engineers surveys.

There are many piles, dolphins, lines of piling, etc., charted from prior topographic and hydrographic surveys and from Corps of Engineers surveys. Such piling as were not confirmed by the present survey were located in areas very close to or above the mean lower low water line, where remnants below high water should have been

visible to the hydrographer at low-water stages. In addition, such areas are well guarded by the existing piling as shown by the survey. Therefore the present survey is considered adequate for charting piling information and it is recommended that the chart be revised accordingly.

The present survey is adequate to supersede the charted hydrography within the common area.

B. Controlling Depths

The controlling depths charted for the improved channels are from Corps of Engineers surveys subsequent to the time of field work of the present survey.

C. Aids to Navigation

The survey positions of eight navigational buoys differed from their charted positions by 60 to 250 meters. It is assumed that the buoys have been restored to their official positions subsequent to the date of the survey.

South Channel Buoy 20 and North Channel Lighted Buoy 60 have been discontinued (N. to M. 24 and 27, 1957) since their location on the present survey. South Channel Light 20, North Channel Light 61 and Aberdeen Harbor Light 1 have been established since the date of the present survey (N. to M. 24, 1957 and 18, 1958).

The privately maintained markers which formerly marked a range into Hoquiam River, charted in the vicinity of lat. 46°57.9', long. 123°53', no longer exist, as noted on p. 18 of the Descriptive Report for T-9519.

The rest of the aids are charted in substantial agreement with their survey positions. The charted positions of all aids appear adequate for the intended purposes.

7. Condition of Survey

A. The field records are complete and comprehensive.

B. The smooth plotting was well done except for the omission of soundings alongside piers and wharves. The verifier plotted such soundings on inserts.

C. Extensive revisions were made in the high-water line because of changes made during review of the photogrammetric surveys. Many of the dolphins had not been transferred to the smooth sheet by the smooth plotter.

8. Compliance with Project Instructions

This survey adequately complies with the project instructions.

9. Additional Field Work Recommended

This is a basic survey of this unstable area. No additional field work is recommended.

Examined and approved:

Max G. Ricketts
Chief, Nautical Chart Branch

Ernest B. Lewey
Chief, Division of Charts

Lorin F. Woodcock
Chief, Hydrography Branch

Samuel B. Grenell
Chief, Division of Coastal Surveys

RHC

Form 712
DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
Rev. June 1937

TIDE NOTE FOR HYDROGRAPHIC SHEET

[redacted] 14 Feb. 1957

Division of Charts: R. H. Carstens

Plane of reference approved in
11 volumes of sounding records for

HYDROGRAPHIC SHEET 8293

Locality Grays Harbor, Washington

Chief of Party: H. G. Conerly in 1956
Plane of reference is mean lower low water, reading
4.6 ft. on tide staff at Aberdeen
18.2 ft. below B. M. K 12 (1920)

Height of mean high water above plane of reference is 9.2 feet.

Condition of records satisfactory except as noted below:

William Shafer

Chief, [redacted] Tides [redacted] Branch

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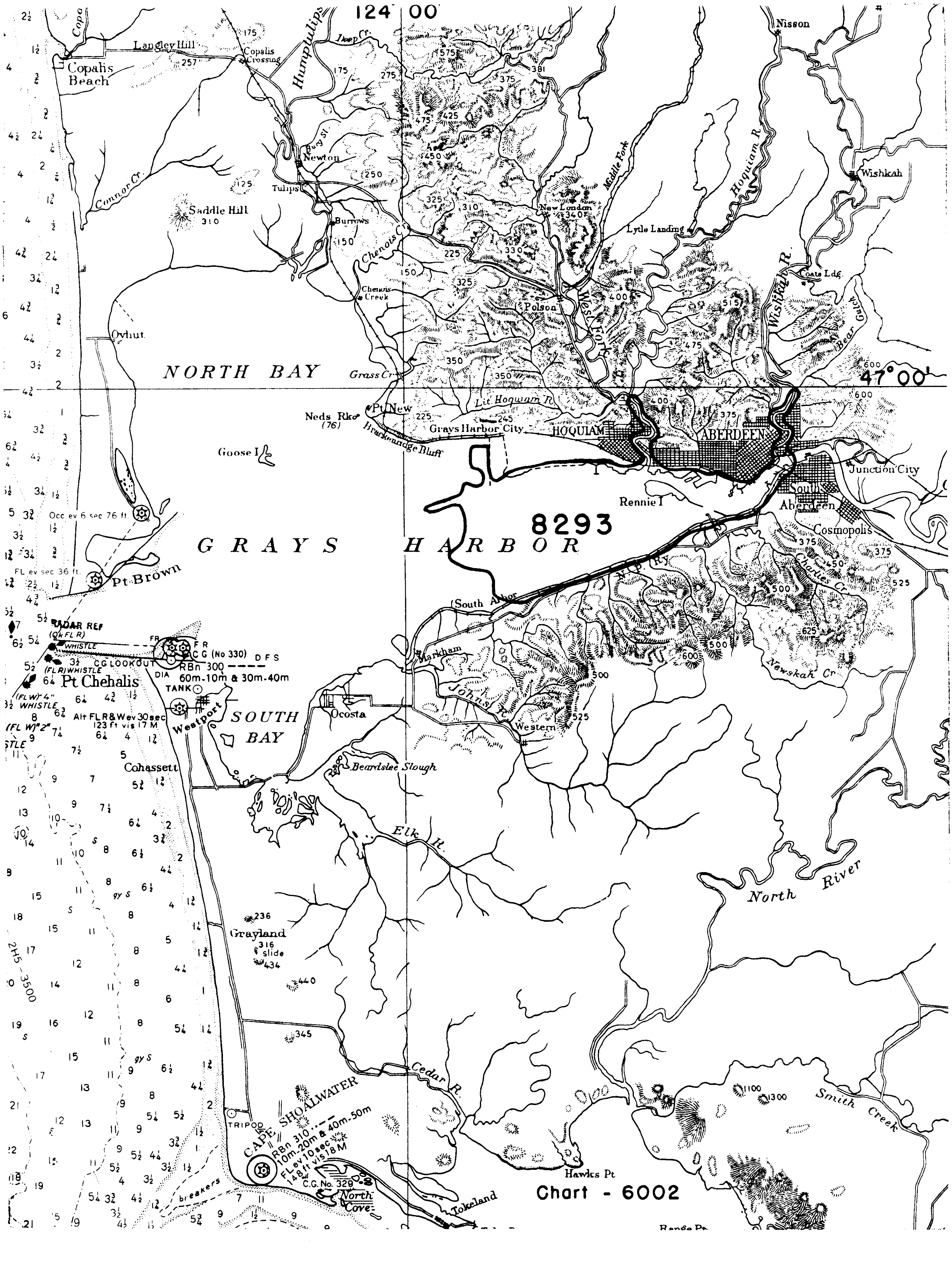
124°00'
47°00'
Copalis Beach
Langley Hill
Copalis Crossing
Humptulips
Newton
Tulips
Burrows
Saddle Hill
Connor Cr.
Chenois Cr.
Chenois Creek
Oyhut
NORTH BAY
Grass Cr.
Pt New
Neds Rk (76)
Brackenridge Bluff
Grays Harbor City
Goose I
Lit. Hoquiam R.
Polson
New London
Middle Fork
West Fork
Hoquiam R.
Lytle Landing
Nisson
Wishkah
Wishkah R.
Coats Ldg.
Bear Gulch
HOQUIAM
ABERDEEN
Junction City
Rennie I
South Aberdeen
Cosmopolis
8293
GRAYS HARBOR
Occ ev 6 sec 76 ft
FL ev sec 36 ft
Pt Brown
N.P. Ry
Charlies Cr.
South Arbor
Markham
Newskah Cr.
RADAR REF (Qk FL R)
WHISTLE
(FL R) WHISTLE
CG LOOKOUT
C G (No 330)
RBn 300
DFS
60m-10m & 30m-40m
DIA
TANK
Pt Chehalis
(FL W) 4" WHISTLE
(FL W) 2"
Alt FL R & W ev 30 sec 123 ft vis 17 M
Westport
SOUTH BAY
Ocosta
Johns R.
Western
Beardslee Slough
Cohassett
Elk R.
North River
Grayland
316 slide
2H5-3500
Cedar R.
CAPE SHOALWATER
RBn 310
10m-20m & 40m-50m
FL ev 10 sec 148 ft vis 18 M
TRIPOD
breakers
C.G. No. 329
North Cove
Tokeland
Hawks Pt
Smith Creek
Range Pt
Chart - 6002

NAUTICAL CHARTS BRANCH

SURVEY NO. H-8293

Record of Application to Charts

DATE	CHART	CARTOGRAPHER	REMARKS
3/15/57	6195	L.G. McGann	Before ~~After~~ Verification and Review
			Partially applied. (added shoal edge only.)
2/17/60	6195	E.E. Thomas	~~Before~~ After Verification and Review
			Considered Completely Applied. 2nd
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review

M-2168-1

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.