8137

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-1354 *Office No.* H-8137

LOCALITY

State Washington

General locality Willapa Bay

Locality North End of South Arm

1954

CHIEF OF PARTY

C. A. George

LIBRARY & ARCHIVES

DATE January 8, 1957

8-1870-1 (1)

8137

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-8137

Field No. WCFP-1354

State Washington

General locality Willapa Bay

Locality South Arm - Willapa Bay

Scale 1:10,000 Date of survey 8 June 1954 to 22 Oct. 1954

Instructions dated 9 March 1954

Vessel WEST COAST FIELD PARTY

Chief of party C. A. George

Surveyed by G. E. Haraden and K. A. MacDonald

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

Fathograms scaled by W.H.N., ~~R.M.S., G.E.H. & K.A.M.~~

Fathograms checked by R.M.S., G.E.H. & K.A.M.

Protracted by H.C. Parsons

Soundings penciled by H.C. Parsons

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

REMARKS:

U. S. GOVERNMENT PRINTING OFFICE 693019

RKM

NOTES FOR DESCRIPTIVE REPORT TO ACCOMPANY HYDROGRAPHIC SURVEY

REGISTERY NO. H-8137 (1954) FIELD NO. WCFP-1354

NORTH END OF SOUTH ARM, WILLAPA BAY, WASHINGTON

PROJECT CS-372 SCALE 1:10,000

WEST COAST FIELD PARTY C. A. GEORGE, CHIEF OF PARTY

SURVEYED BY: G. E. HARADEN AND K. A. MACDONALD

A. PROJECT

The work was done in accordance with INSTRUCTIONS, 22/MEK, FP-West Coast, dated 9 March 1954, addressed to CDR. C. A. George, OinC., West Coast Field Party.

B. SURVEY LIMITS AND DATES

The area covered by this survey includes ~~that~~ the part of Willapa Bay north of Latitude 46° 36' and south of Latitude 46° 40'. Hydrography extended west to Longitude 124° 03.5'. On the east, the Palix River and the Center Cutoff Channel were surveyed. The southern part of Pine Island Channel is covered by this survey.

Field work began on 8 June 1954 and ended 22 October 1954.

C. VESSEL AND EQUIPMENT

USC&GS Launch CS-122, based at Bay Center, Washington was used for all fathometer sounding. The turning radius at sounding speed was approximately 12 meters. Skiff No. USC&GS 475 was used for pole and handlead sounding in the shallow areas in the Palix River and the Center Cutoff Channel.

Fathometer 808 J No. 152 SPX was used throughout the survey.

D. TIDE AND CURRENT STATIONS

Two tide stations were used for obtaining tide reducers for this survey, a portable gage was maintained at Bay Center and a standard gage at Toke Point.

↑ off sheet

D. TIDE AND CURRENT STATIONS Continuation

The dividing line between the two stations was as follows: From the north end of Leadbetter Point east along Latitude 46° 38.5' to Longitude 123° 59.0', thence north to Latitude 46° 40.6', thence east to the shoreline at Stony Point. The Bay Center gage was used to control the hydrography south and east of this line, and the Toke Point for the area north and west of the line.

No corrections to the observed readings were applied for differences in time and height.

It was noted that the difference in the tide reducers at the junction line amounted to as much as 0.8 foot in extreme cases, however, there is no displacement in the depth curves.

E. SMOOTH SHEET

The smooth sheet will be plotted by the Seattle Processing Office. When the smooth sheet projection is constructed, it should be made to conform with Boat Sheet 1354 B to include signal HINT at Latitude 46° 35.75', Longitude 124° 02.0' and station BRUCE 2, 1922, at Latitude 46° 40.70', Longitude 123° 54.87'

F. CONTROL STATIONS

The source of control was as follows:

1. Previous triangulation:

   (a) WILLAPA BAY (2nd Order) 1952 and 1953-G-10474 Pages 1 to 3.
   (b) OLYMPIC PENINSULA (1st Order) 1953-G-10362 Pages 1, 4, & 9.
   (c) STRAIT OF SAN JUAN DE FUCA, 1939 Pages 654 and 655.
   (d) COLUMBIA RIVER TO WILLAPA BAY 1939-G-5788 Pages 749 to 776.

2. Description of Recoverable Topographic Stations from Surveys T-9634, T-9635, T-9637, and T-9638. attached

3. Triangulation locations of temporary hydrographic stations in 1954. See 1954 G. P. List.

4. Form 567, Non-floating Aids dated 24 February 1954 from Baltimore Photogrammetric Office.

5. Photo-hydro signals located by field party on manuscripts T-9634 S, T-9634 N, T-9635 S, T-9635 N, T-9637 N and T-9638.

G. SHORELINE AND TOPOGRAPHY

Shoreline for the boat sheet was transferred from blue line prints of manuscripts nos. T-9638 N, T-9635 S, T-9634 S, and T-9637 N. The shoreline on the northerly part of Leadbetter Point is subject to frequent change.

H. SOUNDINGS

Soundings were taken with an 808 J type fathometer, calibrated at 800 fms/sec., and with sounding pole and handlead in some shoal areas. ✓

I. CONTROL OF HYDROGRAPHY

Hydrography was controlled by sextant fixes except in a few small areas. In the Bone River, positions 80"a", 81"a" and 82"a"(skiff) are fixed by estimated distances and times when abeam features plotted on the boat sheet. Positions 1"c" to 4"c"(skiff), in the Palix River at the US 101 highway bridge, were fixed by estimated distances from features plotted on the boat sheet. In the Niawakium River at the highway bridge, positions 2 thru 5 and 11 thru 15 on "db" day were fixed in the same manner. ✓

J. ADEQUACY OF SURVEY

The survey is considered complete and adequate to supersede prior surveys for charting. Review #5

Satisfactory junctions were made with U. S. Engineers surveys and with Survey H-8136 (1954) on the north. Review #4

At the junction with Survey H-8138 (1954), on the west, there was a difference which could not be resolved on the boat sheet. Soundings between positions 6"b" and 7"b", Survey H-8138, plot between shoaler soundings on two lines of this survey. The positions and fathograms were verified with no changes. Weather conditions prevented further field work in this vicinity. It is recommended that the shoaler soundings on lines 57"na" - 58"na" and 72"ua" - 73"ua" be retained. The junction with H-8138 was satisfactory except for the above. Conflicts in depths resolved during smooth-plotting

At Latitude 46° 39.75' and Longitude 124° 02.00', the crossings between sounding lines on "n" day and "ua" day do not agree, although overlapping lines on the same days do agree (See overlay attached to Vol. 12, page 13 of the sounding volumes). Also, at Latitude 46° 39.95' and Longitude 124° 02.8', the soundings from positions 10"ab" to 12"ab" do not agree with the soundings previously taken on "r" and "u" days. The sounding lines were run several weeks apart, and the depths apparently changed due to storm conditions. These discrepancies are in Leadbetter Channel, an area subject to frequent changes. Conflicts in crossings resolved by Processing Office and verified in W.O.

The depth curves can be adequately drawn at the junctions. ✓

K. CROSSLINES

A total of approximately 8% crosslines were run with good agreement on the boat sheet. ✓

L. COMPARISON WITH PRIOR SURVEYS

The entire area has changed so radically since 1939 that a detailed comparison with H-6517 (1939) is impracticable. PS Review

Soundings from Engineers Surveys File No. E-4-7-23, scale 1:24,000, July 1954 and File No. E-4-9-13, scale 1:12,000, July 1953 are in agreement with those of this survey, at the junctions. PS Review

M. COMPARISON WITH CHART

The following objects charted on Chart 6185, 37th Edition, March 1954 were disproved and should be deleted from the chart:

Objects	Latitude	Longitude
2 Piles	46° 40.16'	123° 55.30'
2 Piles	46° 39.79'	123° 56.00'
Pile	46° 38.90'	123° 57.05'
Pile	46° 38.06'	123° 56.96'
2 Piles	46° 37.65'	123° 56.62'
Pile	46° 37.70'	123° 56.91'
Pile	46° 38.45'	123° 56.85'

All charted daybeacons within the limits of the survey were verified by sextant cuts. PSB Review

The zero-curve along the south side of the Bay Center Channel was found to extend approximately 200 meters north of its charted position at Latitude 46° 38.4', Longitude 123° 59.0'. H-8137 applied to chart 8165 dated 11-25-57.

The 24-foot curve from Latitude 46° 36.0', Longitude 123° 58.0' north to Latitude 46° 38.0', Longitude 123° 59.0' is now one to three hundred meters west of its charted position.

The shoal area with a least depth of one foot charted between Latitude 46° 37.0', Longitude 124° 00.0' and Latitude 46° 38.0, Longitude 124° 01.0' was found to have a least depth of ~~eleven~~ 3 feet.

The present depth over the 17-foot sounding and 24 foot curve charted at Latitude 46° 37.9', Longitude 123° 59.9' is 32 feet.

The charted depth of 15 feet at Latitude 46° 38.7', Longitude 124° 00.5' has shoaled to 1 foot.

The chart sections furnished by the Division of Photogrammetry as "Notes for the Hydrographer" are being forwarded to the Processing Office with appropriate notes.

N. DANGERS AND SHOALS

Newly found shoals are as follows:

At Latitude 46° 38.7', Longitude 124° 00.5' a shoal with least depth of one foot was found where the present charted depth is 15 feet. TP5 Review

The entrance to the Bay Center Channel has shoaled to the north. The zero-curve has moved about 200 meters north and the 6-foot curve now extends approximately 400 meters northwesterly from its charted position.

Shoaling in the Bay Center Channel at Latitude 46° 38.6', Longitude 123° 58.0' has reduced the channel width between 6-foot curves to approximately 130 meters. TP6C Review

The shoaling in Bay Center Channel was reported to the Washington Office with a print of conditions as of 1 October 1954.

Numberous deadheads were located and are indexed in Volume 1 of the sounding records.

O. COAST PILOT INFORMATION

Coast Pilot information was furnished The Director by letter of 13 December 1954.

P. AIDS TO NAVIGATION

No fixed aids to navigation were located. The positions of the day-beacons in Pine Island Channel were verified by sextant fixes taken by the hydrographic party. Several pile markers in Pine Island Channel and Center Cutoff Channel, maintained by the Port of Willapa Harbor, were located by the hydrographic party. The day markers marking the channel into Bay Center harbor were also located by the hydrographic party.

A list of the floating aids located by the hydrographic party follows:

Buoy	Date Located	Pos.No.	Depth ft.	Lat.			Long.		
LEADBETTER CHANNEL				o	'	m.	o	'	m.
Buoy 2	27 July 1954	39-40"j"	18	46	39	1182	124	03	250
Buoy 6	27 July 1954	99-100"j"	24	46	39	420	124	01	1032
Buoy 7	5 Aug. 1954	29"p"	13	46	38	503	124	00	1164
Elk Spit Eighted Buoy 1	15 July 1954	41"b"	24	46	38	301	123	59	620
Sandy Point Buoy 2	18 Oct. 1954	99"cb"	58	46	38	449	123	58	1138

P. AIDS TO NAVIGATION Continuation

Buoy	Date Located	Pos.No.	Depth ft.	Lat. o ' m.	Long. o ' m.
BAY CENTER CHANNEL					
Entrance Buoy	14 July 1954	18"a"	27	46 38 1552	123 59 517
Buoy 1	14 July 1954	14"a"	10	46 38 1152	123 58 921
Buoy 2	14 July 1954	15"a"	9	46 38 993	123 58 1260
Buoy 4	14 July 1954	13"a"	9	46 38 799	123 58 530
Buoy 6	14 July 1954	12"a"	11	46 38 959	123 57 975
Buoy 8	14 July 1954	11"a"	12	46 38 1117	123 57 611
Buoy 10	14 July 1954	10"a"	12	46 38 1283	123 57 256

The following bridge clearances were measured: Palix River bridge at US 101, clearance 16.6 feet above mean high water (See Vol. 40, Page 47 of sounding volumes). ~~Niawakium~~ River bridge at US 101, clearance 12.3 feet above mean high water (See Vol. 38, Page 9 of sounding volumes).

Niawiakum

Q. LANDMARKS FOR CHARTS

No additional landmarks are recommended within the limits of this survey.

U. VELOCITY CORRECTIONS

Velocity corrections were determined from bar checks taken during the hydrographic operations. Copies of the abstract of velocity and phase corrections to be applied to the soundings on this survey is included in this report.

Z. TABULATION OF APPLICABLE DATA

Applicable Data	Forwarded to	Date
TIDAL DATA		
Level Records, Toke Point and Bay Center	The Director	3 August 1954
Level Records, Palix River	The Director	28 Sept. 1954
Tide Marigrams, Bay Center and Palix River	The Director	28 Sept. 1954
Tide Rolls, Toke Point	The Director	8 Oct. 1954
Hourly Heights, Tide Curves and Reducers	Seattle Processing Office	Jan. 1955

Z. TABULATION OF APPLICABLE DATA Continuation

PHOTOGRAMMETRIC DATA

Field Photographs	Baltimore Photo Office	8 Oct. 1954 27 Oct. 1954
Office Photographs	Portland Photo Office	3 Nov. 1954
Manuscripts T-9634 S, T-9634 N, T-9635 S, T-9635 N, T-9637 N, and T-9638	Seattle Processing Office	3 Nov. 1954

HYDROGRAPHIC DATA

Boat Sheets, Fathograms, Velocity Correction Report, Control Data	Seattle Processing Office	Jan. 1955

Submitted,

Kenneth A. MacDonald
for Gerard E. Haraden
Ensign, USC&GS

Approved and Forwarded,

C. A. George
C. A. George
CDR., USC&GS
OinC, West Coast Field Party

STATISTICS FOR HYDROGRAPHIC SURVEY

Field No. WCFP 1354 (1954)

SHEET NO. H-8137

West Coast Field Party CS-372

Vol. No.	Day Letter	Date	HL Sdgs.	No. Pos.	Stat. Miles Sdg.	
1	a	14 July		27	3.6	Launch
1	b	15 July		113	28.5	
2	c	16 July		102	17.9	
3	d	19 July		124	20.7	
4 & 5	e	21 July		168	28.2	
5 & 6	f	22 July		150	28.6	
7	g	23 July		115	21.2	
6	h	26 July		92	17.7	
8	j	27 July		124	24.0	
9	k	28 July		77	13.9	
10	l	29 July		130	20.2	
11	m	30 July		45	8.6	
12	n	4 Aug.		36	6.2	
12	p	5 Aug.		48	7.6	
13	q	6 Aug.		51	12.8	
14	r	9 Aug.		28	5.2	
15	s	10 Aug.		20	3.2	
15	t	11 Aug.		34	4.5	
15 & 16	u	12 Aug.		131	20.8	
16 & 17	v	13 Aug.		159	17.1	
17 & 18	w	16 Aug.		218	23.3	
19	x	17 Aug.		156	13.4	
20	y	19 Aug.		106	11.4	
20	z	24 Aug.		10	1.1	
20 & 21	aa	25 Aug.		117	16.3	
22	ba	26 Aug.		175	16.8	
23	ca	27 Aug.		128	14.4	
24	da	30 Aug.		112	14.9	
25	ea	31 Aug.		189	20.7	
26	fa	1 Sept.		39	4.5	
26	ga	2 Sept.		8	0.9	
26	ha	7 Sept.		24	4.4	
27	ja	8 Sept.		151	16.4	
28	ka	9 Sept.		12	1.5	
28	la	13 Sept.		141	15.2	
29	ma	14 Sept.		98	11.1	
29	na	15 Sept.		98	10.7	
30	pa	16 Sept.		56	6.1	
30	qa	17 Sept.		21	2.1	
31	ra	27 Sept.		77	9.8	
32	sa	28 Sept.		36	3.7	

STATISTICS

(Continuation)

Vol. No.	Day Letter	Date	HL Sdgs.	No. Pos.	Stat. Miles Sdg.	
32	ta	30 Sept.		18	2.4	Launch
32	ua	1 Oct.		49	4.3	
32 & 33	va	5 Oct.	9	95	9.4	
33	wa	6 Oct.		5	0.7	
33 & 34	xa	8 Oct.	2	155	19.2	
34	ya	11 Oct.	1	111	11.6	
34	za	13 Oct.	12	63	7.4	
35	ab	14 Oct.		131	18.9	
36	bb	15 Oct.	120	120	10.0	
37	cb	18 Oct.	25	113	8.5	
38	db	19 Oct.		17	1.3	
		TOTAL	54	4,620	622.9	
39	a	23 Sept.	581	119	13.0	
40	b	24 Sept.	570	139	10.2	
40	c	19 Oct.	13	4	0.2	
40	d	22 Oct.		11		
		GRAND TOTAL	1,218	4,893	646.3	

Total area 13.3 square statute miles

TIDE NOTE TO ACCOMPANY DESCRIPTIVE REPORT

OF SURVEY H-8137 (1954) WCFP-1354

Two tide stations were used for obtaining tide reducers for Survey H-8137.

A portable tide gage was located at Bay Center at Latitude 46° 37.75' and Longitude 123° 57.12' and a standard tide gage was located at Toke Point at Latitude 46° 42.47' and Longitude 123° 57.93'. (Toke Pt. T.G on H-8136)

The dividing line between the two stations was as follows: From the north end of Leadbetter Point east along Latitude 46° 38.50' to Longitude 123° 59.00', thence north to Latitude 46° 40.60', thence east to the shoreline at Stony Point. The Bay Center gage was used to control the hydrography south and east of this line, and the Toke Point gage was used for the area north and west of the line. The authority for this zoning was contained in the Director's letter, 36-rjb, dated 30 June 1954.

Mean lower low water on the staff at Bay Center corresponds to a reading of 2.8 feet, and mean lower low water on the staff at Toke Point corresponds to a reading of 3.7 feet. (Re: Acting Director's letter, 36-rjb, dated 11 August 1954. Mn Range — {Toke Pt = 8.1 ft / Bay Center = 8.4 ft

See attached tide note.

No correction to the observed readings were applied for differences in time and height.

ABSTRACT OF VELOCITY CORRECTIONS
FOR HYDROGRAPHIC SURVEY
PROJECT OS-372
Willapa Bay, Washington

Corrections		Dates	To Be Applied Sheet	Day Letter
A Scale		**(PERIOD 1)**		
0.0 to 44.0	0.0	14 July thru 10 Aug. and 2 Sept. thru 19 Oct.	WCFP-1354 H-8137	"a" thru "s" "ga" thru "db"
44.5 to 52.0	+0.2			
52.5 to 55.0	+0.4			
B Scale(& C Scale)				
35.0 to 47.0	+0.2		WCFP-15154 H-8138	"a" thru "e" "j" thru "n"
47.5 to 52.5	+0.4			
53.0 to 56.0	+0.6			
56.5 to 58.5	+0.8			
59.0 to 61.5	+1.0			
62.0 to 64.0	+1.2		WCFP-1254 H-8136	"b" thru "p"
64.5 to 67.5	+1.4			
68.0 to 71.5	+1.6		WCFP-1454	"a" day only
72.0 to 75.5	+1.8			
76.0 to 110.0	+2.0			
A Scale		**(PERIOD 2)**		
0.0 to 55.0	0.0	11 Aug. thru 18 Aug.	WCFP-1354 H-8137	"t" thru "x"
B Scale (& C Scale)				
35.0 to 38.0	+1.4		WCFP-15154 H-8138	"f" thru "g"
38.5 to 42.0	+1.6			
42.5 to 47.5	+1.8			
48.0 to 56.5	+2.0			
57.0 to 71.5	+2.2			
72.0 to 110.0	+2.4			
A Scale		**(PERIOD 3)**		
0.0 to 30.0	0.0	19 Aug. thru 2 Sept.	WCFP-1354 H-8137	"y" thru "fa"
30.5 to 38.0	+0.2			
38.5 to 42.5	+0.4		WCFP-15154 H-8138	"h" day only
43.0 to 46.5	+0.6			
47.0 to 50.0	+0.8			
50.5 to 53.0	+1.0		WCFP-1254 H-8136	"a" day only
53.5 to 56.0	+1.2			
B Scale(& C Scale)				
35.0 to 42.0	+1.2			
42.5 to 54.5	+1.4			
55.0 to 63.0	+1.6			
63.5 to 70.0	+1.8			
70.5 to 79.0	+2.0			
79.5 to 89.0	+2.2			
89.5 to 105.0	+2.4			

ABSTRACT OF PHASE CORRECTIONS
Field No. WCFP-1354 (1954)

Sheet No. H-8137

West Coast Field Party CS-372

From Pos. No.	To Pos. No. (inclusive)	Phase Corr.
84 d	86 d +8	+1.0
95 d +3	99 d	+1.0
116 d +5	121 d	+1.0
75 f +1	78 f +7	+1.0
113 g +2	114 g +7	+1.0
9 u +6	11 u +2	−1.0
57 u	57 u +1	−1.0
72 aa	72 aa +3	−1.0
81 aa +5	82 aa	−1.0
26 ba +3	29 ba	−0.6
35 ba +1	36 ba +2	−0.6
37 ba +1	38 ba +2	−0.6
46 ba	47 ba	−0.6
66 ba +3	69 ba	−0.6
85 ba +6	86 ba	−0.6
143 ja	-	+1.0
128 xa +4	130 xa +5	+1.0

LIST OF STATIONS ON H-8137 (1954)

Field No. WCFP-1354

Name Used In Hydro Survey	Origin Of Station
ABE	Manuscript T-9635S
APA	South Willapa Bay, Sandy Point Light, 1953
BAN	Manuscript T-9635 S
BONE	Manuscript T-9635 S
BARN	Manuscript T-9638 *
BAY	BAY, 1939
BRUCE	BRUCE 2, 1922
BLO	Manuscript T-9637 N
CHA	Bay Center Channel Light, 1953
CON	Pine Island Channel Daybeacon No. 12, 1953 (*)
DRY	G. P. List WCFP-1954
EAST	T-9638 *
ELF	T-9638
ELL	G. P. List WCFP-1954
FORE	T-9637, 1953 *
GOO	G. P. List WCFP-1954
HIN	T-9638
HINT	T-9637, 1953 *
HUG	T-9635 *
INT	G. P. List WCFP-1954
JOE	Manuscript T-9635 S
LEAD	LEAD 4, 1939
LEV	Manuscript T-9638
LIG	Bay Center Channel Direction Light 1953

LIST OF STATIONS

(CONTD)

Name Used In Hydro Survey	Origin Of Station
LIME	Bay Center, Lime Factory, East Cable, 1939
LIX	G. P. List, WCFP-1954
LOG	G. P. List, WCFP-1954
MIK	Manuscript T-9638
MIS	Vol. 1, Page 72
MUT	MISSION AZIMUTH MARK 1953
NAT	Manuscript T-9637 M
NOG	T-9638 *
NIA	Manuscript T-9635 S
OYE	Manuscript T-9638
PAL	Manuscript T-9635 S
PAT	Manuscript T-9638 (Also, see Vol. 1, Page 72)
PHI	Manuscript T-9638
PILE	~~Vol. 1, Page 1~~ Not a signal
PIN	Pine Island Channel Daybeacon No. 10, 1953 (*)
POI	G. P. List WCFP-1954
ROE	Vol. 1, Page 72
ROK (ROC)	Manuscript T-9635 S
ROSE	T-9638 *
SAM	Manuscript T-9638 (Also See Vol, 1 Page 71)
SAN	Manuscript T-9634 S Theodolite cuts in Geodesy
SEC	Section Corner 33,34,4,3 T-9635 *
SHE	SHELL (USE), 1939
SOW	T-9635 *
SUE	Manuscript T-9635 S

LIST OF STATIONS

(CONTD)

Name Used In Hydro Survey	Origin Of Station
STACK	T-9637 *
STO	STONY POINT, 1939
TOM	Manuscript T-9635 S
TOR	Palix River, Bridge, Power Pole, Center Insulator, 1939
WAT	G. P. List WCFR-1954
YEL	T-9638 *

* Positions from Description of Recoverable Topo. Station (Form 524)

(*) Positions from List of Non-Floating Aids (24 February 1954)(Form 567)

APPROVAL SHEET

SURVEY H-8137 (FIELD NO. WCFP-1354)

The survey is considered complete and adequate. No additional field work is recommended.

The boat sheet was examined daily as the field work progressed.

The field records and boat sheet are to be forwarded to the Seattle Processing Office for smooth plotting in accordance with the Director's letter, 22/MEK, dated 11 October 1954.

All corrections to the soundings have been entered and checked. The soundings have been reduced, but not checked.

C. A. George

C. A. George
CDR., USC&GS
OinC, West Coast
Field Party

E. Smooth Sheet

The smooth sheet constructed by hand in the Seattle Processing Office.

J. Adequacy of Survey

The discrepancies mentioned in the field report under this heading were reconciled by the following methods.

At Lat. 46° 39'.1; Long. 124° 03'.95

The sounding line of 5-9 (H-8138) was correctly plotted according to course changes. This reconciled the junction between H-8138 and H-8137.

At Lat. 46° 39'.75 and Long. 124° 02' to 124° 04'

The discrepancies between "n" and "~~ua~~ va" day were minimized by the following procedure. Whenever there was a disagreement of sounding lines, the fixes controling the lines were questioned. The angles taken by one or both of the officers responsible for this survey were held and the others rejected whenever necessary. The lines on "n" and "~~ua~~ va" day were therefore plotted on left angle, time and course when ever a disagreement was evident. The remaining discrepancies were attributed to storm change.

Sand ridges of 2-4 feet occur generally all over the area, expecially where there is a break in grade (banks of a channel or sand bar). Depth curves could not be realistically drawn in these areas of sand ridges.

Depth curves adequately drawn

Most of the notes of distances to beach lines could not be used because they were taken at high tide and probably changed during the survey.

M. Comparison with Chart Chart No. 6185 38th Ed.

The charted sounding of 7 feet at Lat. 46° 39'.0, Long. 124° 00'.2 does not agree with the smooth sheet, which shows approximately 45 feet, or with the condition survey by the U. S. Engineers, dated July 1956, File No. E-4-7-25. The source of the 7 foot sounding is the U.S.E. condition survey of October 1955, as listed in paragraph 5484b N to M No. 48 for 1955.

Except for the above mentioned sounding, the agreement between the smooth sheet and Chart 6185, 38th Edition, is very good. The chart revision was made from the boat sheet.

HP 6 Review

P. Aids to Navigation

See #6-B3 Review

One day beacon #14, not charted, was placed by the Port of Willapa Harbor at Lat. 46° 39'.95, Long. 123° 56'.85 on 14 October 1954 and located by the hydrographer on 15 October 1954. The day beacon appears to have been placed on an existing charted pile. (See Vol. 36 page 5).

#6 Review

All other aids to navigation agree with charted positions reasonably well except for numbers 1, 2, and 10 in Bay Center Channel. The smooth sheet position of buoy #1 is approximately 240 meters ESE of the charted position, #2 is approximately 220 meters SE of the charted position and #10 is approximately 150 meters SW of the charted position. Buoys frequently moved due to rapidly and constantly-changing bottom. (Note pos. 69, "J" day, vol. 8, p. 37).

Respectfully submitted,

Harvey C Parsons

Harvey C. Parsons
Cartographer, C&GS

Examined and Approved:

William M. Martin

William M. Martin
Cartographer-in-charge, S.P.O.

Approved and Forwarded:

Frank G. Johnson

Frank G. Johnson, Capt., C&GS
Seattle District Officer

GEOGRAPHIC NAMES USED ON H-8137

BAY CENTER

BAY CENTER CHANNEL

BONE RIVER

BAY CENTER CUTOFF CHANNEL

ELLEN SANDS

GOOSE POINT

LEADBETTER CHANNEL

LEADBETTER Point

NIAWIAKUM RIVER

PACIFIC OCEAN

PALIX RIVER

PINE ISLAND

PINE ISLAND CHANNEL

SANDY POINT

SNAG ISLANDS

SOUTH ARM OF WILLAPA BAY

STONY POINT

WILSON POINT

RHC

Form 712
(11-30-55)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

TIDE NOTE FOR HYDROGRAPHIC SHEET

Chart Division: R. H. Carstens

25 February 1957

Plane of reference approved in
40 volumes of sounding records for

HYDROGRAPHIC SHEET 8137

Locality Willapa Bay, Washington

Chief of Party: C. A. George in 1954

Plane of reference is mean lower low water, reading

2.8ft. on tide staff at Bay Center

13.9ft. below B.M. 8 (1944)

3.7 ft. on tide staff at Toke Point

13.8 ft. below B.M. 4 (1922)

Height of mean high water above plane of reference is.

Bay Center	8.4 ft.
Toke Point	8.1 ft.

Condition of records satisfactory except as noted below:

Signature

Chief, Tides Branch

Comm-DC 34330

GEOGRAPHIC NAMES

Survey No. H-8137

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		
Washington		(for title)							BGN	1
Pacific Ocean										2
Willapa Bay		(for title)							BGN	3
South Arm of Willapa Bay										4
Bay Center		(one tide station								5
Goose Point										6
Elk Spit Lighted Buoy										7
Sandy Point										8
Palix River									BGN	9
Niawiakum River									"	10
Wilson Point										11
Bay Center Channel										12
Bay Center Cutoff Channel										13
Bone River									BGN	14
Stony Point										15
Pine Island										16
Pine Island Channel										17
Snag Islands										18
Ellen Sands										19
Leadbetter Point										20
Leadbetter Channel										21
										22
				Names approved 2-13-57 L. Heck						23
										24
Toke Point			(one tide station, off sheet)							25
										26
										27

M 234

Hydrographic Surveys (Chart Division)

HYDROGRAPHIC SURVEY NO. ..8137..

Records accompanying survey:

Boat sheets ..3..; sounding vols. ..40..; wire drag vols. .....;

bomb vols. .....; graphic recorder rolls 26-Envelopes

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

1-Velocity Correction Report filed in Chart with H-8335.....

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

Number of positions on sheet		4,893
Number of positions checked		43
Number of positions revised		1 80-81"h"
Number of soundings revised (refers to depth only)		0
Number of soundings erroneously spaced		0
Number of signals erroneously plotted or transferred		0
Topographic details	Time	9. hrs.
Junctions	Time	13. "
Verification of soundings from graphic record	Time	39. "

Verification by Stephen Rose Total time 272 hrs. Date 10-31-57

Reviewed by L. M. Zeskind Time 80 Date 1-17-58

M-2232-1

DIVISION OF CHARTS

REVIEW SECTION - NAUTICAL CHART BRANCH

REVIEW OF HYDROGRAPHIC SURVEY

REGISTRY NO. H-8137 FIELD NO. WCFP-1354

Washington, Willapa Bay, North End of South Arm

Surveyed: June-Oct. 1954 Scale 1:10,000

Project No. CS 372

Soundings:

Pole

Leadline

808 Fathometer

Control:

Sextant fixes on shore signals.

Chief of Party - C. A. George
Surveyed by - C. E. Harden and K. A. MacDonald
Protracted by - H. C. Parsons
Soundings plotted by - H. C. Parsons
Verified and inked by - S. Rose
Reviewed by - I M. Zeskind Date: 1/15/58
Inspected by - R. H. Carstens

1. Shoreline and Control

The shoreline originates with unreviewed air-photographic surveys T-9634 S (1950-51-53), T-9635 S (1950-51-53), T-9637 N(1950-51-53), and T-9638 N (1950-51-55).

The source of the control is given in the Descriptive Report.

2. Sounding Line Crossings

Considering the irregularity of the bottom, the crossings are in adequate agreement.

3. Depth Curves and Bottom Configuration.

The usual depth curves are adequately delineated. The 3-ft., 24-ft., and 36-ft. curves were drawn to better delineate the bottom configuration.

The bottom is very irregular. Submarine features such as natural channels, mud and sand flats, sand bars, deeps, shoals and ridges contribute to the bottom configuration.

4. Junctions with Contemporary Surveys

Adequate junctions were effected with H-8138 (1954) on the northwest, with H-8136 (1954) on the north, and with H-8335 (1954) on the southeast in Palix River. The survey extends to the Project limits on the south and makes adequate junction with the charted hydrography.

5. Comparison with Prior Surveys

H-335 (1852), 1-20,000	H-2103 (1891), 1-20,000
H-498 (1855), 1-20,000	H-2104 (1891), 1-20,000
H-1799(1887), 1-20,000	H-3297 (1911), 1-20,000
H-2045(1890), 1-20,000	H-4215 (1922), 1-20,000
H-2046(1890), 1-20,000	H-6518 (1939), 1-10,000
	H-6519 (1939), 1-10,000

These prior surveys cover the area of the present survey. A comparison between the prior and present surveys reveals radical changes in bottom configuration and shoreline. These changes are attributed to the action of the current on the bottom and the depositing of sediment. The greatest changes are noted in the vicinity of Leadbetter Point where the shoreline has both eroded and accreted, and where the bottom configuration has been in a state of constant change. The north end of Leadbetter Point has eroded as much as 600 meters, whereas the eastern side has accreted as much as 0.9 mile since 1887. An island formerly located in the vicinity of lat. 46°38.2', long. 124°01.4', now is part of the eastern side of Leadbetter Point. The entrance channel to Willapa Bay has been in a state of flux throughout the years. Present depths here are as much as 20 ft. deeper than prior depths. Many changes in bottom configuration in Willapa Bay are also noted. A shoal which formerly extended in a southeasterly direction from approximately lat. 46°38.6', long. 124°00.5', to approximately lat. 46°37.3', long.123°59.1', and whose depths ranged from 0-5 ft. is covered by present depths of as much as 46 ft. A shoal which extended about 1 mile from the 2 islands located in the vicinity of lat. 46°40.2', long. 124°01.8', and which now uncovers as much as 4 ft. at M.L.L.W.,

was formerly covered by depths of as much as 51 ft. In Palix River, only minor changes in depths are noted. The controlling depth of the natural channel here has remained practically the same throughout the years, i. e., 7 ft.

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

6. <u>Comparison with Chart 6185 (Latest print date 11-25-57)</u>

A. <u>Hydrography</u>

The charted hydrography originates with the previously discussed prior surveys, which need no further consideration, with the boat sheets of the present survey, and with the U. S. Corps of Engineers' surveys of 1953 (Bp.50445), 1955 (Bp. 52955), 1956 (Bp. 54184), and 1957 (Bps. 55518 and 55591). Portions of the area of the present survey are superseded by the Engineers' surveys of later date. In other areas differences of 2-4 ft. with charted depths are of minor importance considering the changing bottom. Depths charted in the natural channels leading to the Palix River are in adequate agreement with the present survey depths.

<u>The pile</u> charted in lat. 46°40.01', long. 123°56.8', originates with air-photographic survey T-9635 S (1950-51-53). This pile which was subsequently erased from the air-photographic survey, was noted on the boat sheet as being nonexistent. The pile should be deleted from the chart.

Attention is directed to discrepancies between the charted and smooth sheet clearances of the following fixed bridges:

a. <u>Niawiakum River</u>

<u>Smooth Sheet</u>	<u>Chart</u>
Lat. 46°37.85'	Long. 123°55.25'
Hor. Cl. 59 ft.	Hor. Cl. 57 ft.
Vert. Cl. 12.3 ft.	Vert. Cl. 9 ft.

b. <u>Palix River</u>

<u>Smooth Sheet</u>	<u>Chart</u>
Lat. 46°36.9'	Long. 123°54.75'
Hor. Cl. 57 ft.	Hor. Cl. 57 ft.
Vert. Cl. 16.6 ft.	Vert. Cl. 12 ft.

Discrepancy ABE

Checked by Capt. Nelson with C of E 1-2-26(57) ABE

The present survey is adequate to supersede the charted information originating with surveys accomplished prior to the present survey.

B. Aids to Navigation

The present position of aids to navigation are in substantial agreement with the charted positions, and adequately mark the features intended, except as follows:

1. Buoy N "2" charted in lat. 46°38.68', long. 123° 59.28', is located about 430 meters southeastward on the present survey. This buoy was moved to its charted position subsequent to the present survey (HON to M 21, 1956).

2. Buoy C "1" charted in lat. 46°38.68', long. 123° 58.88', is located about 250 meters southeastward on the present survey. The buoy was moved to its charted position subsequent to the present survey (HON to M 7, 1955).

3. Red Beacon "14" located on the present survey in lat. 46° 39.95', long. 123°56.85', has not been charted. The beacon appears to be placed on the pile charted in the aforementioned location from H-6915 (1939).

C. Dredged Channels (not in 1958 4.4)

The charted controlling depths of the dredged channel leading into Bay Center originate with the U. S. Corps of Engineers' survey of 1957 (Bp. 55518, Chart letter 641,1957).

7. Condition of Survey

a. The sounding records and Descriptive Report are complete and comprehensive.

b. The smooth plotting was accurately done.

8. Compliance with Project Instructions

The survey adequately complies with the Project Instructions.

9. Additional Field Work Recommended.

The survey is considered basic and no additional field work is recommended. Because of the radical changes constantly occuring, the U. S. Corps of Engineers make periodic surveys of much of the area.

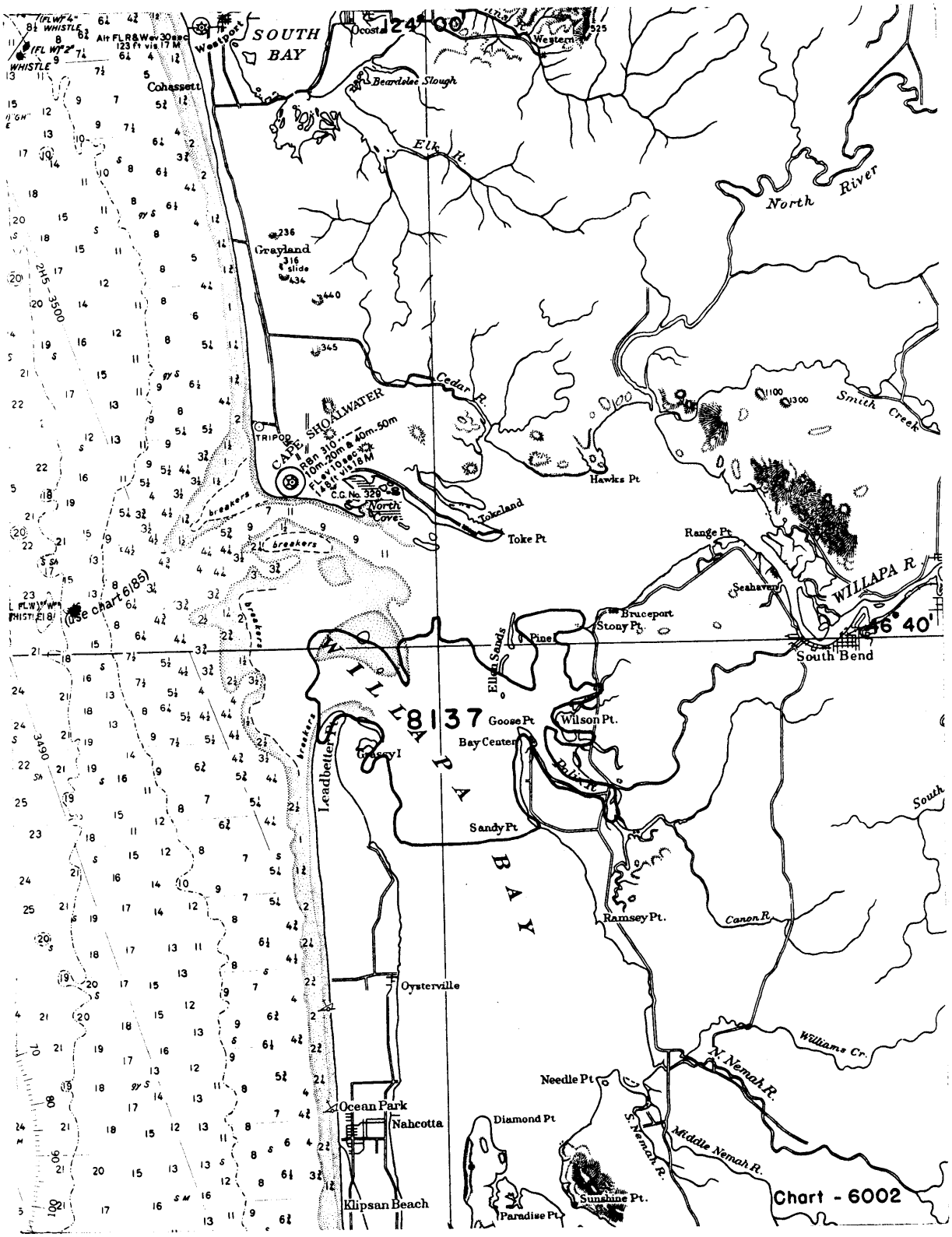
Examined and approved:

Max G. Ricketts
Chief, Nautical Chart Branch

Charles A. Schanck
Chief, Division of Charts

Karl B. Jeffers
Chief, Hydrography Branch

Samuel B. Grenell
Chief, Division of Coastal Surveys


SOUTH BAY
Westport
Cohasset
Ocosta
Western
Beardslee Slough
Elk R.
North River
Grayland
Cedar R.
CAPE SHOALWATER
TRIPOD
Rbn 30...
10m-20m & 40m-50m
FL.W.10sec
14M vis
C.G. No. 329
North Cove
Tokeland
Toke Pt
Hawks Pt
Smith Creek
Range Pt
Seaharvest
WILLAPA R.
Bruceport
Stony Pt.
Pine
South Bend
Ellen Sands
WILLAPA BAY
Goose Pt
Wilson Pt.
Bay Center
Graveyl
Leadbetter
Palix R.
Sandy Pt
Ramsey Pt.
Canon R.
South
Oysterville
Williams Cr.
N. Nemah R.
Needle Pt
Ocean Park
Nahcotta
Diamond Pt
S. Nemah R.
Middle Nemah R.
Sunshine Pt.
Klipsan Beach
Paradise Pt.
(use chart 6185)
8137
46° 40'
124° 00'
Chart - 6002

Note: The geographic positions of TEMPORARY HYDROGRAPHIC SIGNALS listed hereon are from field computations. This is the final listing since it is not considered necessary that further computing be done by the Washington Office.

DEPARTMENT OF COMMERCE
S. COAST AND GEODETIC SURVEY
Form 28 B
Ed. April 1940

(WCFP 1954)

H-8137

GEOGRAPHIC POSITIONS
FIELD COMPUTATIONS

Accession No. of Computation: _____

Locality Willapa Bay — North American 1927 Datum Fourth — order Triangulation. State Washington

16—15634-1 U. S. GOVERNMENT PRINTING OFFICE

STATION	LATITUDE AND LONGITUDE	SECONDS IN METERS	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
						LOGARITHM (METERS)	METERS	FEET
Int (temporary hydro signal)	46 38 12.438	(1468.6) 384.1	28 18 44.7	208 18 34.2	GRASSY 1939	2.811 436		
nd. nm	124 02 08.497	(1095.5) 180.7	114 33 36.6	294 32 58.4	LEAD 4 1939	3.088 269		
Poi (temporary hydro signal)	46 37 55.489	(139.3) 1713.4	86 41 27.1	266 40 59.4	GRASSY 1939	2.909 671		
nd. nm.	124 01 44.822	(322.9) 953.4	136 06 18.2	316 06 01.0	Int (temporary hydro signal)	2.861 123		
Log (temporary hydro signal)	46 40 08.712	(1583.7) 269.0	273 15 52.5	93 18 32.0	ELLEN 3 1939	3.669 134		
nd. nm.	124 01 20.180	(846.4) 429.0	34 48 41.6	214 47 28.5	LEAD 4 1939	3.574 301		
Dry (temporary hydro signal)	46 40 09.703	(1553.1) 299.6	272 48 34.7	92 52 00.4	ELLEN 3 1939	3.779 802		
nd nm.	124 02 23.928	(766.8) 508.6	14 10 54.8	194 10 27.9	LEAD 4 1939	3.506 440		
Ell (temporary hydro signal)	46 39 57.593	(74.3) 1778.4	204 44 40.9	24 44 42.1	ELLEN 3 1939	1.920 973	83.363	273.5
nd. nm.	123 57 42.592	(370.1) 905.4						
Goo (temporary hydro signal)	46 38 11.975	(1482.9) 369.8	261 18 31.8	81 18 32.0	GOOSE 4 1939	0.785 330	6.1	
nd. nm.	123 57 32.535	(584.2) 692.0						
Lix (temporary hydro signal)	46 38 31.960	(865.8) 986.9	54 28 38	234 28 38	PALIX 1939	0.737 034	5.458	
(Δ PALIX RM No.2 1939)	123 56 17.566	(902.5) 373.6						
nd. nm.								
Hod (Δ RHODES RM No.2 1939)	46 36 42.880	(528.6) 1324.1	102 03 09.3	282 03 08.5	RHODES 1939	1.394 014	24.775	
nd nm	123 57 23.997	(766.1) 510.7						
Wat (temporary hydro signal)	46 37 58.451	(47.8) 1804.8	35 18 21.9	215 18 21.8	QUE 1939	0.814 25	6.520	
(Δ QUE R.M. No.1 1939) nd nm	123 56 04.354	(1183.6) 92.6						
Run (temorary hydro signal)	46 34 58.936	(32.8) 1819.9	60 43 47.2	240 43 46.7	MESS 1939	1.222 014	16.673	
(signal cloth in tree) nd. nm.	124 01 22.523	(797.9) 479.5						

[1] No check on this position.

Abbreviations used: d.=described; m.=marked; n.=not; r.=recovered; l.=lost; p.=probably. (Examples: n. d.=not described; p. l.=probably lost.)

kam

(INITIALS) ON ORIGINAL DOCUMENT

RMS

NAUTICAL CHARTS BRANCH

SURVEY NO. H-8137

Record of Application to Charts

DATE	CHART	CARTOGRAPHER	REMARKS
9-10-57	6185	R.K. DeLauder	Part appd during ~~Before~~ ~~After~~ Verification and Review 3MA
9/10/58	6185	Dam	~~Before~~ After Verification and Review Partially Forward file (Prim. & Channel) as per review
8/4/61	6185	J.H. Ector	Comp appd. ~~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.