9811

Diagram No. 5530

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. DA-10-2-79

Office No. H-9811

LOCALITY

State California

General Locality San Francisco Bay

Locality Pt. Richmond to Pt. San Pablo

1979

CHIEF OF PARTY
CDR C.W. Hayes

LIBRARY & ARCHIVES

DATE March 11, 1981

☆U.S. GOV. PRINTING OFFICE: 1980—668-537

9811

AREAS
CHTS:
18649
18652 A, B & C inset 5
18654
} to sign off see Record of Application

NOAA FORM 77-28 (11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTER NO.

HYDROGRAPHIC TITLE SHEET

H-9811

INSTRUCTIONS - The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD NO.
DA-10-2-79

State California

General locality San Francisco Bay

Locality Pt. Richmond to Pt. San Pablo

Scale 1:10,000 Date of survey 15 March - 30 April 1979

Instructions dated January 15, 1979 Project No. OPR-L123-DA-79

Vessel Launches DA-1 (3131) and DA-2 (3132)

Chief of party CDR C. W. Hayes

Surveyed by LCDR A. Bodnar, LT. C. Lawrence, LTJG L. Haas, LTJG E. McDougal, ENS. T. Peasley

Soundings taken by echo sounder, hand lead, ~~pole~~ Ross Fineline, Model 5000

Graphic record scaled by Ross Digitizer

Graphic record checked by Ship's Personnel

Positions verified ~~Plotted~~ by Leonardo T. Deodato Automated plot by Xynetics Plotter (PMC)

Soundings verified ~~Verification~~ by Leonardo T. Deodato

Soundings in ~~fathoms~~ feet at ~~MLW~~ MLLW

REMARKS: Survey Completed.

Time meridian: GMT

STANDARDS CK'D 4-5-84
C.LOY

RWD

RWA 8/11/92

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537.

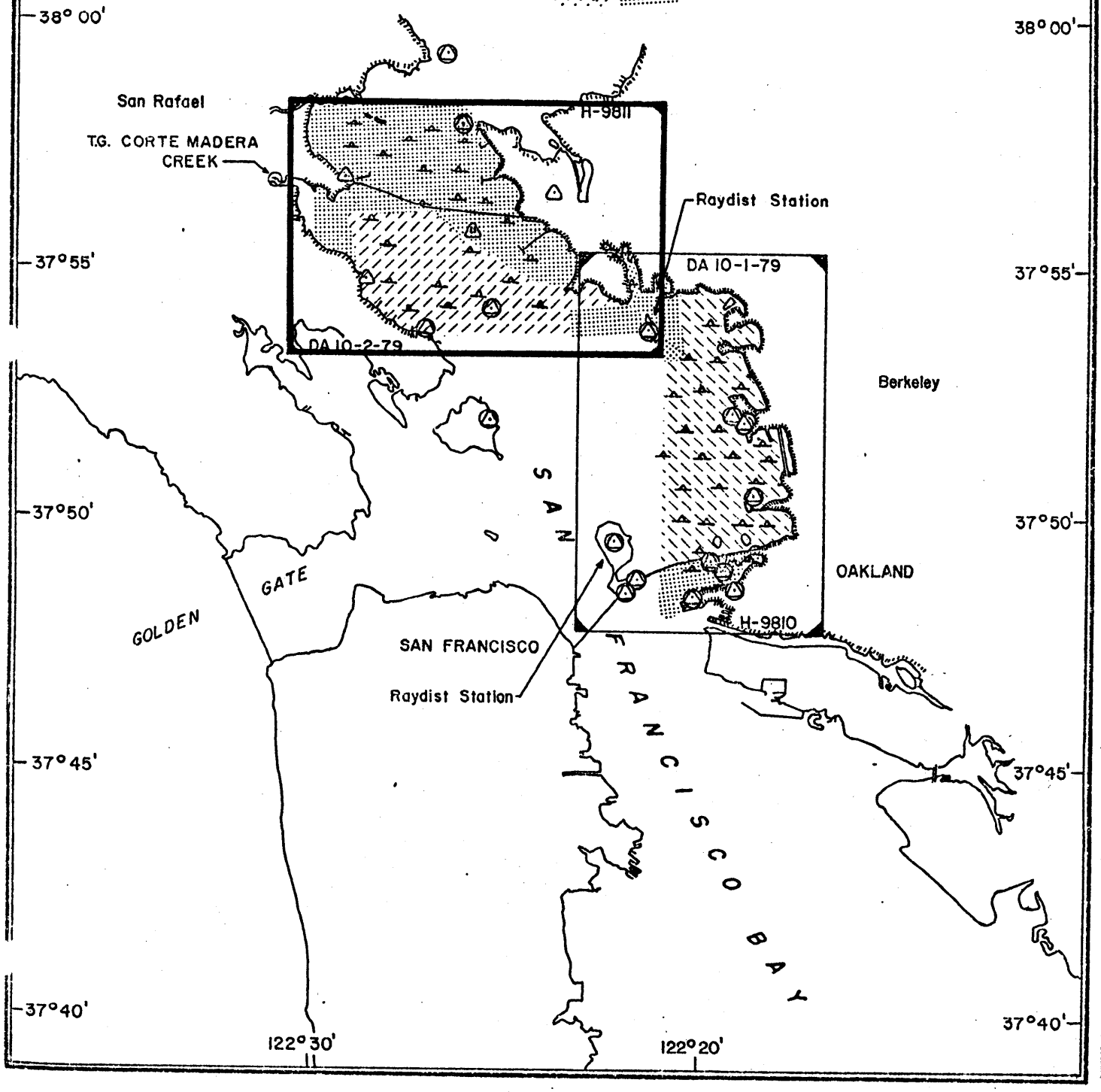
☆ U.S. GOVERNMENT PRINTING OFFICE: 1976—665-661/1222 REGION NO. 6

PROGRESS SKETCH
OPR-L123-DA-79
SAN FRANCISCO BAY, CALIFORNIA

SCALE: CHART 18680
1 : 210,668

NOAA SHIP DAVIDSON (S-331)
CDR. C. WILLIAM HAYES, Comdg.

MARCH	APRIL	STATISTICS :
452.9	337.95	L. N. M. SOUNDING LINE
20.5	13.15	SQ. N.M. SOUNDING
23	19	TRIANGULATION STA. RECOVERED
4	0	TRIANGULATION STA. ESTABLISHED
0	1	TIDE GAGES
25	28	BOTTOM SAMPLES
0/0	0/0	MARTEK / SALINITY CAST
3/0	5/0	BENCH MARKS RECOVERED / ESTAB.
12	11	L.N.M. PHOTO SHORELINE INSPECTION
4	1.2	L.N.M. WIRE DRAG
0.25	.14	SQ.N.M. WIRE DRAG



A. PROJECT

Basic hydrographic survey H-9811 (DA-10-2-79) was accomplished with the project instructions for OPR-L123-DA-79, San Francisco Bay, California, dated 15 January 1979; and Change No. 1 dated 1 February 1979; Change No. 2, dated 8 February 1979, and Change No. 3 dated 12 February 1979.

B. AREA SURVEYED

The area comprising the survey lies in the northern part of San Francisco Bay in the vicinity of the Richmond-San Rafael Bridge. The northern limit of the survey is Latitude 37°57'55"N and the southern limit is 37°53'10"N. On the west, the sheet extends to the shoreline and into the railroad bascule bridge over Corte Madera Creek (Longitude 122°30'45"W). The eastern limit is formed by the Bay shoreline and by Longitude 122°21'30"W, south of Point Richmond. It includes the Harbor Channel and Yacht Harbor as well as the entrance channel to Richmond Inner Harbor. Junctions were made to the south with H-9793 (RA-10-2-78) and H-9794 (RA-10-3-79) and to the southeast with H-9810 (DA-10-1-79).

Survey operations were begun on 15 March 1979 (JD 094) and were completed on 30 April 1979 (JD 120).

C. SOUNDING VESSELS

Two vessels were used as sounding platforms for this survey. They are listed below along with the corresponding colors used in data recording and preliminary computer plots:

VESSEL NO.	PLATFORM	COLOR
3131	DA-1	Red
3132	DA-2	Blue

The southern portion of the sheet (south of the bridge) was run mostly by DA-2 (3132) and the northern portion mostly by DA-1 (3131). Junctions between areas run by the different launches were in excellent agreement.

D. SOUNDING EQUIPMENT AND CORRECTORS

Both launches are equipped with Ross Fineline Model 5000 fathometers. These were used in depths of from approximately 2 to 140 feet. Serial numbers are as follows:

VESSEL NO.	RECORDER	DIGITIZER	TRANSCEIVER
3131	1048	1081	1036
3132 (thru JD 86)	1080	1077	1077
3132 (JD 87 on)	1077	1077	1077

Phase calibrations were made each morning from 0 to 200 feet at 10-foot intervals. The phase was usually adjusted so that the trace initial was aligned with the fathogram "zero". This occasionally resulted in a discrepancy at deeper depths due to variations in paper size, but never exceeding

0.5 foot. The analog recorder (S/N 1080) on DA-2 was replaced on JD 087 after a more sizable phase alignment discrepancy was found.

All fathograms were scanned daily for comparison with digitized depths. Corrections and additions of peaks or deeps were either edited into the master tape or included on a separate corrector tape.

The soundings plotted on the final field sheet are reduced for predicted tides. Correctors were computed based on the reference station at San Francisco, Golden Gate, as specified in the Project Instructions. Controlling gages at the Presidio and Alameda were operated by the California Tides Party during survey operations. In addition, three-day gages were installed by the Tide Party at Point Orient and Richmond Inner Harbor. One three-day gage at Corte Madera Creek was installed by DAVIDSON personnel. An additional gage (not required by Project Instructions but pertinent to the survey) was installed by the Tide Party at Angel Island during operations. (See the appended Field Tide Note.) The soundings have also been corrected for TRA but not for sound velocity. The TRA was determined from static draft measurements from daily bar checks and from settlement/squat tests made on 14 February 1979 at PMC. The static draft of each launch was +1.5 feet as determined by the mean of bar checks. The TRA corrector was changed with each change in launch speed to correct for settlement and squat. See VR To compute sound velocity correctors for the surveys, data collected by the NOAA Ship McARTHUR for their tide and current study of San Francisco Bay was used. Data from two Martek casts and one ODEC cast were used to correct the soundings on H-9811: Marteks on 2 March and 9 April, and an ODEC on 26 April. See the appended Correction to Echo Sounders Report.

E. HYDROGRAPHIC SHEETS

The field sheets for this survey were prepared aboard the DAVIDSON using the ship HYDROPLOT system. A PDP 8/e computer (S/N 10744) and a Complot DP3 plotter (S/N 5445-6) were used for computations and plotting. The survey has been plotted as two 1:10,000 scale field sheets with one inset and one 1:5000 scale blowup. The southern half of the sheet (south of the Richmond-San Rafael Bridge) is referred to as DA-10-2A-79 and the northern half as DA-10-2B-79. The inset on DA-10-2A of the Corte Madera Creek is referred to as DA-10-2C-79 in the field records but does not appear as a separate final field sheet. The one*blowup is a 1:5000 scale plot of the developments of Whiting and Invincible Rocks on DA-10-2B-79.

*plotted at 1:10,000 on smooth sheet

F. CONTROL STATIONS

Eleven existing first and third-order triangulation stations were recovered in the survey area to control hydrography. In addition, four third-order monumented stations and four third-order temporary points were established by DAVIDSON personnel. New stations were established by triangulation or (for the temporary points) by eccentric offsets from existing stations. The stations are as follows, listed by signal number from the master signal list:

(See next page)

001. Alley 1978, Raydist

002. Brooks Island 2, 1905-1916, Raydist (also #020 for Miniranger)

006. Southampton Shoal Channel Light 1

012. Simpton 1948 (RM2 used for control)

013. Paradise 1979

015. Red Rock 2 1979

016. San Francisco Bay North Channel Light 7

017. TPIB (Temp)

018. East Brother Island Lighthouse 1932

019. Pt. Chauncey Ecc. (Temp)

026. High Hill 4 1949

027. Richmond Harbor Channel Light 10

028. Madera (Temp)

029. Richmond Harbor Channel Light 5

030. Quentin 1979

031. San Francisco Bay North Channel Light 17

032. Sister 1941

033. Richard 1932 Ecc. (Temp)

Navigation lights were used as fixed calibration points for electronic control. All field computations were based on the North American 1927 Datum. See the ~~appended~~ Horizontal Control Report, filed with the Field records.

G. ELECTRONIC POSITION CONTROL

Nine launch days of hydrography were run using a Hastings-RAYDIST DR-S medium range system operated in the range-range mode. The mean frequency of the system used is 3306.45 KHz with a lane width of 45.3 meters. All RAYDIST work on the survey was done by Launch DA-2 (3132) on JD's 74-75, 78-81, 85, and 94-95. The shore transmitters were located as follows:

Station:	Brooks Is. 2 1905-1916	Alley 1978
Color:	Green (left)	Red (right)
Transmitter:	S/N 015	S/N 234
Antenna Ht:	35 ft.	35 ft.

The on-board receiving equipment on DA-2 was as follows:

Transmitter:	S/N 171
Navigator:	S/N 26
Strip Chart:	S/N 14
Hazlow Interface:	S/N 33

All RAYDIST hydrography was run on the back side of the baseline with the green transmitter as the left station and the red on the right, since another area was being controlled at the same time in the normal configuration. The input from the navigator unit was reversed going into the Hazlow; the strip chart record is correct by color, but pattern one and pattern two are reversed.

Calibration of the RAYDIST system was done at least twice daily by fixed-point calibrations at Southampton Shoal Channel Light 1. The launch antenna was positioned close to the light and observed and known rates compared. During the initial calibration the rates were slewed to within one lane of the known rates. Correctors from morning and evening calibrations were meaned to give daily correctors for smooth plotting. If more than two calibrations were done in a day, successive pairs of correctors were meaned for the hydrography run between the corresponding calibrations.

On JD 088 after most of the RAYDIST hydrography had been run, a new third-order position for the calibration light was given to the DAVIDSON by R. Melby, Pacific Photo Party. The original photogrammetric position used for calibration was found to be in error by nearly 15 meters. All calibration correctors for JD's 074-085 were recomputed based on the new known rates for the light; each corrector shifted by -0.23 lane. The proper calibration correctors were used for the final field sheet plotting, but the preliminary plot used the original erroneous correctors. See the daily calibration sheets for corrections made.

Numerous lane jump problems and station problems were encountered during RAYDIST operations. The remote keying system used on board was triggered several times by CB radio traffic in the area; the remote switches were removed after this happened during hydrography on JD 078. The power supply to the red RAYDIST station, located on top of the bowling alley on Treasure Island, was disconnected several times overnight. In addition to these, lane jump problems were encountered while running hydrography near the Richmond-San Rafael Bridge and while running among the various tankers anchored in the General Anchorage Area No. 5, south of Red Rock. Some lane jumps were irretrievable, especially while running near the bridge; the signal became so erratic that lane jumps could not be positively identified. For a complete summary of lane jumps and daily pattern correctors see the appended Electronic Control Note.

The remaining hydrography on the survey was run using a Motorola MINIRANGER III System in both the range-range and range-azimuth modes. The serial numbers of the equipment used are as follows:

VESSEL	RANGE CONSOLE	R/T UNIT
3132 (DA-2)	710	719
3132 (DA-2)	707	721
3131 (DA-2)	716	709

TRANSPONDERS

Code	S/N
1	723
2	772
3	773
4	771

When used in the range-azimuth mode, a transponder and a Wild T-2 theodolite (S/N's 19302, 26423, or 67872) on the same station provided the position control.

Baseline calibrations of both launch units with the four transponders were performed on 16 February and 4 May 1979 at PMC, Seattle. The correctors determined from the 16 February calibration were used as daily correctors for preliminary plotting. Smooth plotting was done using mean correctors from the two calibrations. Daily calibration checks of the system (whether range-range or range-azimuth mode) were made at the beginning of each setup. These were usually done by fixed-point calibrations at navigation lights in the working area, located to third-order specifications. Comparisons were made between observed rates on the console and known rates for the light. The differences observed were always less than 5 meters as specified in the PMC OPORDER for a 1:10,000 scale survey.

There were several problems with the MINIRANGER System during survey operations. In the heavily-populated area of the Bay, reflective surfaces and radio interference resulted in erratic rates and null zones. Signal strengths were also erratic at times although usually strong enough to be reliable. Other transmissions on Codes 1, 3, and 4 at various times in some areas caused spurious rates. Bad rates were edited out of master range-azimuth tapes or "time and coursed" on range-range corrector tapes. In the northern areas of the survey, however, the interference was reduced and the system worked fairly well. The range-azimuth mode in particular worked well and was used in most MINIRANGER hydrography on the sheet.

For more information on the electronic control systems see the appended Electronic Control Note.

H. SHORELINE

The shoreline for this survey was derived from 1:20,000 scale manuscripts TP-00526 and TP-00527. Blowups of these manuscripts at a scale of 1:10,000 were provided from Photogrammetry Division, PMC for shoreline on the boat sheets. Both manuscripts were field edited during the survey operations. Rocks, pilings and other obstructions were located by three-point sextant fixes or by hydro dp's. All launch detached positions appear on the final field sheets.

New obstructions or field-edited features are compiled on the field edit manuscripts but not on the final field sheet. The shoreline on the final field sheet is from the 1:10,000 blowups of the Class III manuscripts only and is not to be used as the final* shoreline source. See the completed manuscripts and field edit reports for the two T-sheets concerned.

* Reviewed Class I manuscipts used on smooth sheet.

I. CROSSLINES

Crosslines comprise 18.4% of the hydrography for this survey. The crosslines are plotted in red on the final field sheet. In general the crosslines are in excellent agreement with the main scheme hydrography. The depth curves based on the main scheme correspond very closely to those based on the crosslines. ✓

J. JUNCTIONS

This survey junctions with two 1978 surveys by the NOAA Ship RAINIER (H-9793 and H-9794) to the south between Point Chauncey and the southwest side of Brooks Island, and with contemporary Survey H-9810 (DA-10-1-79) to the southeast between the north side of Brooks Island and Richmond Inner Harbor. Soundings from H-9793 and H-9794 appear on the preliminary plot in green and red respectively, but do not appear on the final field sheets. Soundings from H-9810 do not appear on either plot. The present survey (H-9811) junctions very well with all three adjoining surveys, showing less than two foot differences along the overlapping areas. ✓

K. COMPARISON WITH PRIOR SURVEYS

No numbered presurvey review items lie within the survey limits. Several information items will be discussed in Section L, COMPARISON WITH THE CHART.

Four prior surveys provide the most recent soundings for the survey area. Representative soundings from most of these prior surveys have been inked on the preliminary plot sheets but do not appear on the final field sheets. These are as follows:

SURVEY	YEAR	SCALE	COLOR
H-7620	1947	1:10,000	Orange
H-7623	1947	1:5,000	Brown
H-7867	1950	1:10,000	Blue
H-7897	1951	1:10,000	(Not plotted)

The comparison with the prior surveys shows significant changes in depths along the shores of the survey area. Comparing with H-7620 (1947), the present survey is somewhat shoaler in the near-shore areas by 3-5 feet, indicating some sediment accretion in these areas. The deeper channels in midbay are in good agreement but are still slightly shoaler in the present survey. Some of the shoaler areas in midbay (Southampton Shoal, the anchorage areas,* Whiting and Invincible Rocks) are now slightly deeper by 1-2 feet possibly due to erosion. Comparison with H-7867 (1950) shows a somewhat different set of changes. This survey overlaps the present one on the west side of sheet DA-10-2B, in San Rafael Bay. The soundings inshore on the present survey are now somewhat deeper on the mudflats than on the earlier survey. This may be due to sediment erosion from the currents running around Point San Pablo from San Pablo Bay. * prior shoaler depths have been carried forward. See OR

The other two surveys (H-7623 and H-7897) are of Richmond Harbor Channel and Corte Madera Creek respectively. These show some sediment accretion in the non-dredged areas of the present survey. Also, the dredged areas on each have been enlarged and deepened to accommodate larger boat traffic.

Man-made features of the area have caused considerable changes between the prior surveys and the present one. The construction of the Richmond-San Rafael Bridge from Point San Quentin to Castro Point has caused the formation of sediment ripples in the bottom. Areas between the bridge supports have been eroded by the current while sediment has been deposited north and south of each support. The dredged channel into Corte Madera Creek has been moved since 1947, now running out of the creek to the southeast instead of to the east. This channel is also deeper and wider than before to accommodate the ferry traffic into Corte Madera. The other dredged channels (Southampton Shoal, Richmond Harbor Entrance Channel, San Rafael Creek) are all maintained to deeper depths now, by 5-6 feet. The anchorage areas south of Red Rock and off Paradise Cay now have irregularities in the bottom mud from the frequent disturbances by tankers and freighters.

Sediment transport and erosion is the most likely reason for the changes seen from the prior surveys. With a tide range of only 6 feet, a variation in tide correctors will not significantly change either survey. Also, the position control from the prior surveys seems to coincide with that used for the present survey quite well. The shorelines are nearly identical (except for man-made changes) and the locations of off shore shoals and channels are the same on both. *See Q.C. Report, para 5.*

L. COMPARISON WITH THE CHART

Soundings from Chart 18649 (45th edition, 4 February 1978, Scale 1:40,000) *See I/R* have been transferred to the preliminary plot sheet in violet, but do not appear on the final field sheet. In general the present survey agrees well with the chart; the anchorage areas south of Red Rock and east of Paradise Cay are more irregular and slightly deeper than shown, but the deeper areas are generally as shown.

The irregular bottom of much of the survey area was delineated by running grid developments over the rough spots. The least depths in these areas were selected out for the final plot, and these show up to be slightly deeper than charted. These irregularities, generally 5-ft. ridges spaced 40-70 m. apart are most likely caused by disturbances by ship anchors in the bottom being enlarged by current action. The bottom is soft mud in these areas and presents no serious danger to navigation; no large obstructions were found in the area.

Whiting Rock and Invincible Rock, just east of the main channel by the Brothers Islands at the northern end of the sheet, were developed using a 25-meter grid with a survey launch. Diving determination of least depth turned out to be ineffective, due to poor visibility and high currents in the area. Drift soundings and leadline depths were used to take detached positions over the pinnacles. The charted depths of 13 feet and 7 feet respectively were not verified;* ~~leadline~~ depths of 15 and 9 feet were obtained. This discrepancy may be due to use of predicted tide reducers or possibly erosion of the rocks since the last surveys. *The prior shoaler depths have been carried forward.*

graphic recorder (corrected) *See Verifier's Report, para 6a.(6).*

The presurvey review information items listed in Change No. 3 to the Project Instructions were investigated during normal survey operations. The sunken wreck at Latitude 37°57'3½", Longitude 122°26'28" was not found or swept by wire drag. No sign of the wreck was found on the fathograms in the area.

See Verifier's Report, para. 7a.3(a)
No further investigation was deemed necessary, as it had previously been cleared to 50 feet by wire drag and presented no hazard to navigation. It is recommended that the wreck symbol be retained on the new chart edition.

* See Q.C. Report, para. 5a.(5) H-7620 (1947) (See V.R. para. 7.a.3.(b)

The other two items, some submerged ruins and PA dolphins along the east shore north of the bridge, were investigated during field edit operations. ~~For information and disposal of items refer to the completed manuscript of TP-00526 and its accompanying report, appended.~~

* 37°57'N 122°25'30"W (approx)

M. ADEQUACY

This survey is considered basically complete, and adequate to supersede all prior surveys in the area. The few "holidays" were generally caused by barges, boats, and other obstructions alongside piers and bulkheads. No major additional field work is deemed necessary. See Q.C. Report, para 7

N. AIDS TO NAVIGATION

All charted aids to navigation within the sheet limits were located during survey operations. Fixed aids were located photogrammetrically or by third-order triangulation. Those located by third-order methods were done either by DAVIDSON personnel or by PMC Photo Party (R. Melby, Chief) during their spring operations in the Bay Area. For positions of the fixed aids, see the 76-40 forms for the field edit report of manuscript TP-00526, or the compiled field GP's in the ~~attached~~ Horizontal Control Report, filed with field records. See VR

All floating aids on the field sheets were located by hydrographic detached positions. These are all plotted on the final smooth ~~field~~ sheet. No new floating aids were found that do not already appear on Chart 18649. See VR. para 7.c.(5).

The aero obstruction lights located on the top of each main suspension support of the Richmond-San Rafael Bridge appear on the chart but are not in the Coast Guard LIGHT LIST. These were located as third-order intersection stations. It is recommended they be retained on the chart as they are useful aids.

O. STATISTICS

Number of Positions	4187
Nautical Miles Sounding Lines (Total)	454.2
Nautical Miles Crosslines	83.6
Square Nautical Miles	18.44
Bottom Samples	3
Tide Gages	1

P. MISCELLANEOUS

The high currents and shallow, silty bottom of the Bay will most likely cause continued sedimentation of the Bay, especially in the narrow dredged channels. As mentioned before the currents have shaped the bottom into irregular areas of mud ripples. The currents are especially fierce around each of the bridge support piers, and just south of the Brothers Islands. The locations of Whiting and Invincible Rocks are easily seen at maximum current as the water is very turbulent over them.

Winds on the Bay make small boat navigation hazardous. The winds usually funnel along the Bay, north or south in the area of the survey, and make the

shallow Bay water quite choppy. The prevailing westerly winds coming through the Golden Gate compound the problem in the central part of the Bay.

Q. RECOMMENDATIONS

Several areas of the survey were undergoing dredge or construction work during survey operations. Paradise Cay, on the west shore of the Bay south of Pt. San Quentin, was being dredged for new small boat moorage space. No soundings were taken in the Cay as work was to continue past survey operations. Plans for the new facility were still not available by the end of the project. It is recommended that the California Hydrographic Field Party obtain plans and/or soundings in the marinas when construction is complete.

In addition, dredging and construction was being done in the vicinity of Point Richmond in the southeast part of the survey. A* new marina was being installed north of the channel at Latitude 37°54'30"N, Longitude 122°22'45"W. Soundings were taken in the area prior to construction and DP's taken on the support pilings. It is recommended leadline depths in the area and locations of the new piers be obtained upon completion.

* Brickyard Cove Harbor

No other survey work should be necessary to complete this survey.

See Q.C. Report, para 7

R. AUTOMATED DATA PROCESSING

The following programs were used on the PDP 8/e HYDROPLOT system for data collection and processing:

PROGRAM #	NAME	VERSION
RK-111	Range-Range Real Time HYDROPLOT	1/30/78
FA-181	Range-Azimuth Logger	2/23/78
RK-201	Grid, Signal, Lattice Plot	4/18/75
RK-211	Range-Range Non Real Time Plot	1/15/76
RK-212	Visual Station Table Load	4/01/74
RK-216	Range-Azimuth Non-Real Time Plot	2/05/76
RK-230	Utility Computations	2/05/76
RK-330	Reformat and Data Check	5/04/76
RK-407	Geodetic Direct/Inverse	10/23/75
RK-409	Geodetic Utility Package	9/15/73
RK-410	Geodetic 3-Point Fix	8/23/73
AM-500	Predicted Tide Generator	11/10/72
RK-530	Layer Corrections for Velocity	5/10/76
AM-602	Elinore	5/20/75

S. REFERENCES TO REPORTS

- Horizontal Control Report
  Field Tide Report
  Correction to Echo Sounders Report
  Electronic Control Report
- Field Edit Reports TP-00526, TP-00527
  Coast Pilot Report

• Filed with Field records

Submitted by:

Linda F. Haas

Linda F. Haas
LT(JG), NOAA

Approved and forwarded by:

C. William Hayes

C. William Hayes
CDR, NOAA
Commanding Officer

SURVEY APPROVAL SHEET

DA 10-2-79(H-9811)

A. Amount and degree of personal supervision of field work and frequency of record and sheet inspection:

Direct/Daily

B. State whether the survey is complete and adequate or if additional field work is recommended:

See Descriptive Report for additional survey work in areas being dredged or where construction is planned, otherwise the survey is considered complete and adequate.

See Q.C. Report, para 7

C. Cite additional information or references that may be of assistance for verifying and reviewing the survey:

None

D. Signed statement of approval of the field sheet and all accompanying records:

DATE: 18 June 1979

Approved and forwarded by:

C. William Hayes
CDR, NOAA
Commanding Officer

CONTROL FOR: C09811 DATE OF LISTING: 10-02-80 GEOGRAPHIC POSITIONS IN DEGREES, MINUTES, AND SECONDS

RECORD NUMBER	YR	STA NUM	CARTO CODE	LABEL ANGLE	VECTOR DISP.	PLOT CODE	NAME	STATION HEIGHT	FREQUENCY (KHZ)	LATITUDE -(S)	LONGITUDE -(E)
1	79	1	250	340.30	.52	0	ALLEY 1978	12.0	3306.45	37 49 30.968	122 22 1.346
2	79	2	250	340.30	.52	0	BROOKS ISLAND 2 1905-16	48.0	3306.45	37 53 47.366	122 21 16.177
3	79	6	139	278.30	14.05	0	SOUTHAMPTON SHOAL CHANNEL	0.0	0.00	37 54 16.297	122 25 18.507
4	79	6	139	303.50	16.70	0	LIGHT 1 1979	0.0	0.00	37 54 16.297	122 25 18.507
5	79	12	254	186.55	1.78	0	SIMPTON 1948 RM 2	0.0	149835.00	37 52 9.556	122 25 19.766
6	79	13	250	181.40	9.20	0	PARADISE 1979	2.0	149835.00	37 54 55.057	122 28 25.116
7	79	15	250	24.40	21.20	0	RED ROCK 2 1979	53.0	149835.00	37 55 44.708	122 25 47.308
8	79	16	250	340.00	6.62	0	SAN FRANCISCO BAY NORTH CHANNEL	8.0	149835.00	37 53 39.593	122 26 54.648
9	79	16	250	351.50	15.40	0	LIGHT 7 1979	8.0	149835.00	37 53 39.593	122 26 54.648
10	79	17	254	24.50	31.00	0	TP-18	5.0	149835.00	37 56 8.218	122 26 43.456
11	79	18	250	357.50	5.80	0	EAST BROTHER ISLAND	10.0	149835.00	37 57 47.812	122 25 56.707
12	79	18	250	358.90	11.80	0	LIGHTHOUSE 1932	10.0	149835.00	37 57 47.812	122 25 56.707
13	79	19	254	200.00	6.40	0	PT CHAUNCEY	3.0	149835.00	37 53 39.680	122 26 54.604
14	79	20	250	340.30	.52	0	BROOKS ISLAND 2 1905-16	48.0	149835.00	37 53 47.366	122 21 16.177
15	79	25	254	119.86	.35	0	MATSON	0.0	149835.00	37 54 28.022	122 21 2.330
16	79	26	250	340.30	.52	0	HIGH HILL 4 1979	149.0	149835.00	37 56 32.428	122 24 4.652
17	79	27	139	293.50	13.25	0	RICHMOND HARBOR CHANNEL	0.0	0.00	37 54 13.315	122 22 30.328
18	79	27	139	315.30	17.30	0	LIGHT 10 1979	0.0	0.00	37 54 13.315	122 22 30.328
19	79	28	254	340.30	.52	0	MADERA	18.0	149835.00	37 56 26.480	122 29 44.396
20	79	29	139	31.00	17.30	0	RICHMOND HARBOR CHANNEL	0.0	0.00	37 54 29.674	122 23 54.361
21	79	29	139	22.20	23.52	0	LIGHT 5 1979	0.0	0.00	37 54 29.674	122 23 54.361
22	79	30	250	182.00	4.50	0	QUENTIN 1979	3.0	149835.00	37 56 42.339	122 28 48.272
23	79	31	139	88.00	11.65	0	SAN FRANCISCO BAY NORTH CHANNEL	0.0	0.00	37 57 26.103	122 27 21.590
24	79	31	139	51.00	15.00	0	LIGHT 17 1979	0.0	0.00	37 57 26.103	122 27 21.590
25	79	32	250	119.86	.35	0	SISTER 1941	0.0	149835.00	37 59 17.835	122 26 25.887
26	79	33	254	340.30	.52	0	RICHARD 1932 (ECC)	112.0	149835.00	37 55 14.167	122 22 51.771
27	79	35	139	283.70	13.30	0	SOUTHAMPTON SHOAL CHANNEL	0.0	0.00	37 54 18.741	122 25 9.419
28	79	35	139	309.40	16.73	0	LIGHT 2 1979	0.0	0.00	37 54 18.741	122 25 9.419
29	79	36	139	44.00	31.30	0	SOUTHAMPTON SHOAL CHANNEL	0.0	0.00	37 54 45.751	122 25 11.392
30	79	36	139	35.80	37.10	0	LIGHT 2A 1979	0.0	0.00	37 54 45.751	122 25 11.392
31	79	37	139	42.20	23.20	0	RICHMOND HARBOR CHANNEL	0.0	0.00	37 55 10.880	122 25 8.720
32	79	37	139	32.90	28.76	0	LIGHT 2 1979	0.0	0.00	37 55 10.880	122 25 8.720
33	79	38	139	48.00	23.30	0	RICHMOND HARBOR CHANNEL	0.0	0.00	37 54 55.503	122 24 27.845
34	79	38	139	37.50	28.40	0	LIGHT 3 1979	0.0	0.00	37 54 55.503	122 24 27.845
35	79	39	139	37.00	24.50	0	SOUTHAMPTON SHOAL CHANNEL	0.0	0.00	37 55 18.771	122 25 33.381
36	79	39	139	28.40	30.90	0	LIGHT 5 1979	0.0	0.00	37 55 18.771	122 25 33.381
37	79	40	139	31.60	19.05	0	RICHMOND HARBOR CHANNEL	0.0	0.00	37 54 22.498	122 23 59.517
38	79	40	139	23.20	25.23	0	LIGHT 4 1979	0.0	0.00	37 54 22.498	122 23 59.517
39	79	41	139	285.00	9.41	0	RICHMOND HARBOR APPROACH	0.0	0.00	37 54 2.958	122 23 25.608
40	79	41	139	316.60	13.30	0	RANGE FRONT LIGHT 1979	0.0	0.00	37 54 2.958	122 23 25.608
41	79	42	139	285.20	5.80	0	RICHMOND HARBOR APPROACH	0.0	0.00	37 53 55.817	122 23 15.694
42	79	42	139	327.50	10.42	0	RANGE REAR LIGHT 1979	0.0	0.00	37 53 55.817	122 23 15.694
43	79	43	139	53.50	14.12	0	RICHMOND HARBOR JETTY	0.0	0.00	37 54 13.720	122 23 27.578
44	79	43	139	37.50	18.73	0	DAYBEACON 1979	0.0	0.00	37 54 13.720	122 23 27.578
45	79	44	139	343.00	.45	0	GREEN BRAE RED BRICK STACK 1951	0.0	0.00	37 56 41.440	122 30 16.200
46	79	45	139	148.00	10.40	0	SAN QUENTIN TOWER NO 3 1962	0.0	0.00	37 56 13.814	122 29 17.203
47	79	46	139	161.00	9.50	0	SAN QUENTIN ARSENAL TOWER 1962	0.0	0.00	37 56 24.061	122 29 9.321
48	79	47	139	183.50	40.10	0	CORTE MADERA CHANNEL LIGHT 2 1979	0.0	0.00	37 55 42.029	122 28 2.053
49	79	48	139	34.00	44.00	0	RICHMOND-SAN RAFAEL BRIDGE AERO	0.0	0.00	37 56 7.090	122 26 43.584
50	79	48	139	28.40	51.70	0	OBSTRUCTION WEST SPAN W LT 1979	0.0	0.00	37 56 7.090	122 26 43.584

51	79	49	139	35.10	40.60	0	RICHMOND-SAN RAFAEL BRIDGE AERO	0.0	0.00	37	56	6.198	122	26	30.172	
52	79	49	139	28.90	48.25	0	OBSTRUCTION WEST SPAN E LT 1979	0.0	0.00	37	56	6.198	122	26	30.172	
53	79	50	139	47.50	31.05	0	RICHMOND-SAN RAFAEL BRIDGE AERO	0.0	0.00	37	56	2.859	122	25	40.154	
54	79	50	139	37.20	37.80	0	OBSTRUCTION EAST SPAN W LT 1979	0.0	0.00	37	56	2.859	122	25	40.154	
55	79	51	139	50.06	27.90	0	RICHMOND-SAN RAFAEL BRIDGE AERO	0.0	0.00	37	56	1.962	122	25	26.742	
56	79	51	139	38.50	34.40	0	OBSTRUCTION EAST SPAN E LT 1979	0.0	0.00	37	56	1.962	122	25	26.742	
57	79	52	87	175.70	11.90	1	SAN RAFAEL CREEK LIGHT 5	0.0	0.00	37	57	59.420	122	28	59.440	
58	79	53	87	175.70	11.90	1	SAN RAFAEL CREEK LIGHT 1	0.0	0.00	37	57	41.870	122	28	8.560	
59	79	54	87	200.30	31.10	1	CORTE MADERA CHANNEL LIGHT 4	0.0	0.00	37	55	47.030	122	28	15.720	
60	79	55	87	201.50	30.20	1	CORTE MADERA CHANNEL LIGHT 5	0.0	0.00	37	55	52.970	122	28	39.680	
61	79	56	87	200.50	31.00	1	CORTE MADERA CHANNEL LIGHT 6	0.0	0.00	37	55	55.690	122	28	38.040	
62	79	57	87	196.70	26.40	1	CORTE MADERA CHANNEL LIGHT 7	0.0	0.00	37	56	1.390	122	29	2.210	
63	79	58	87	196.10	26.70	1	CORTE MADERA CHANNEL LIGHT 8	0.0	0.00	37	56	4.120	122	29	.700	
64	79	59	87	102.00	7.20	1	CORTE MADERA CHANNEL LIGHT 9	0.0	0.00	37	56	10.020	122	29	24.650	
65	79	60	87	100.07	5.70	1	CORTE MADERA CHANNEL LIGHT 10	0.0	0.00	37	56	12.710	122	29	23.100	
66	79	61	87	74.20	6.40	1	CORTE MADERA CHANNEL LIGHT 11	0.0	0.00	37	56	18.780	122	29	47.540	
67	79	62	87	58.40	5.10	1	CORTE MADERA CHANNEL LIGHT 12	0.0	0.00	37	56	21.310	122	29	45.620	
68	79	63	87	79.70	6.10	1	CORTE MADERA CHANNEL LIGHT 13	0.0	0.00	37	56	25.660	122	30	0.000	
69	79	64	87	65.80	4.70	1	CORTE MADERA CHANNEL LIGHT 14	0.0	0.00	37	56	28.060	122	29	57.830	
70	79	65	87	80.00	6.10	1	CORTE MADERA CHANNEL LIGHT 15	0.0	0.00	37	56	32.430	122	30	12.160	
71	79	66	87	68.50	4.60	1	CORTE MADERA CHANNEL LIGHT 16	0.0	0.00	37	56	34.930	122	30	9.950	
72	79	67	87	85.90	6.80	1	CORTE MADERA CHANNEL LIGHT 17	0.0	0.00	37	56	32.790	122	30	17.240	
73	79	68	87	101.50	8.50	1	CORTE MADERA CHANNEL LIGHT 19	0.0	0.00	37	56	34.410	122	30	20.970	
74	79	69	87	94.00	6.10	1	CORTE MADERA CHANNEL LIGHT 20	0.0	0.00	37	56	38.500	122	30	20.440	
75	79	70	87	87.80	24.20	1	POINT RICHMOND FOG SIGNAL	0.0	0.00	37	54	29.260	122	23	29.760	
76	79	71	87	87.70	26.15	1	RICHMOND HARBOR CHANNEL LIGHT 6	0.0	0.00	37	54	19.~~460~~98	122	23	25.580	
77	79	72	87	97.00	26.30	1	RICHMOND HARBOR CHANNEL LIGHT 8	0.0	0.00	37	54	~~16.870~~	122	23	1.270	17.09
78	79	73	87	98.00	29.70	1	RICHMOND HARBOR CHANNEL LIGHT 12	0.0	0.00	37	54	5.890	122	21	57.600	
79	79	74	87	102.10	28.85	1	RICHMOND HARBOR CHANNEL LIGHT 14	0.0	0.00	37	54	13.040	122	21	35.030	
~~80~~	~~79~~	~~75~~	~~87~~	~~184.00~~	~~1.70~~	~~0~~	~~TOWER~~ Rejected	~~0.0~~	~~0.00~~	~~37~~	~~56~~	~~23.740~~	~~122~~	~~29~~	~~9.340~~	
81	79	76	87	100.20	21.60	1	BRICKYARD COVE HARBOR LIGHT 1	0.0	0.00	37	54	25.820	122	22	54.580	
82	79	77	87	99.00	20.80	1	BRICKYARD COVE HARBOR LIGHT 2	0.0	0.00	37	54	24.980	122	22	53.620	
83	79	78	87	113.00	26.40	1	RICHMOND HARBOR CHANNEL LIGHT 9	0.0	0.00	37	54	19.150	122	22	27.920	
84	79	79	87	65.00	19.60	1	STANDARD OIL WHARF FOG SIGNAL	0.0	0.00	37	55	21.630	122	24	32.350	
85	79	80	87	66.50	14.80	1	STANDARD OIL WHARF INNER	0.0	0.00	37	55	30.~~580~~	122	24	16.~~870~~	
86	79	80	87	45.80	18.90	1	FOG SIGNAL	0.0	0.00	37	55	30.~~580~~.73	122	24	16.~~870~~.50	
87	79	81	87	43.60	6.10	1	POINT ORIENT WHARF NORTH LIGHTS	0.0	0.00	37	57	24.480	122	25	~~37.930~~	~~38.22~~
88	79	82	87	42.40	6.90	1	POINT ORIENT WHARF SOUTH LIGHTS	0.0	0.00	37	57	19.~~720.53~~	122	25	37.~~890~~.64	
89	79	83	87	19.00	9.20	1	MOLATE POINT WHARF NORTH END LT	0.0	0.00	37	56	~~50.730~~	122	25	~~34.040~~	33.62
90	79	84	87	25.40	9.40	1	MOLATE POINT WHARF SOUTH END LT	0.0	0.00	37	56	42.720	122	25	33.210	47.94
91	79	85	87	349.00	.52	0	TANK	0.0	0.00	37	55	9.090	122	22	56.570	
92	79	85	139	340.30	.52	0	POINT RICHMOND P G AND E	0.0	0.00	37	54	44.193	122	22	37.471	
93	79	86	139	317.40	1.60	0	GAS TANK 1951	0.0	0.00	37	54	44.193	122	22	37.471	
94	79	87	139	340.30	.52	0	RICHMOND AMER R AND S S	0.0	0.00	37	56	56.530	122	21	55.990	
95	79	87	139	317.40	1.60	0	CORP TANK 1947	0.0	0.00	37	56	56.530	122	21	55.990	
96	79	88	139	181.20	7.30	0	NARROW BLACK TANK 1921	0.0	0.00	37	57	14.760	122	21	26.980	
97	79	89	87	90.00	1.20	0	STACK	0.0	0.00	37	54	34.500	122	21	24.160	

FIELD TIDE NOTE
OPER-L123-DA-79

SAN FRANCISCO BAY, CALIFORNIA

INTRODUCTION

The operating primary tide gages at the Presidio, San Francisco (941-4290) and Alameda (941-4750) provided tide control for the survey area. Predicted tides used for hydrography were based on predicted tides for San Francisco and were interpolated by a PDP-8/e computer using Program AM-500, PREDICTED TIDES GENERATOR (VER 11/10/72)

Of the four subordinate stations required by Project Instructions dated 15 January 1979 to control the survey area, only the Corte Madera Creek Station (941-4874) was occupied and monitored by DAVIDSON personnel. Point Orient (941-4881) and Richmond Inner Harbor (941-4849) were installed and maintained by the California Tide Party. Pier 22½ (941-4317) was installed by the NOAA Ship McARTHUR S-330. Close communication was maintained with both the California Tides Party and McARTHUR personnel to assure continuous operation of gages at Pier 22½, Richmond Inner Harbor, Pt. Orient, and the two primary gages. Predicted tide and actual tides recorded by the Corte Madera Creek gage are referenced to Greenwich Mean Time to correspond with hydrography.

CORTE MADERA CREEK (941-4874)

A Fischer-Porter ADR Gage (S/N 7304 A 1380 M18) was installed at a historic site in Corte Madera Creek and operated for the duration of tide dependent work in that area. The gage was installed at 1730Z on 05 April 1979 and operated continuously, with one exception, until it was removed at 1624Z on 27 April. The gage was found 3 minutes slow on 10 April, 5 minutes slow on 20 April, and 3 minutes slow on 25 April. The gage was not reset on any of these occasions. Malfunctions of the gage occurred on 16 April, when it was found to have stopped 10 minutes before the arrival of the observer, and on 23 April, when it was found to have jumped 24 minutes ahead. Time was corrected and the gage properly restarted on both of these occasions. Data loss totaled less than 1 hour.

On the basis of seven gage/staff comparisons, the staff was found to read 0.12 ft. higher than the gage.

LEVELS AT CORTE MADERA CREEK

Levels from the staff to four of the five historic bench marks recovered were run upon installation and removal of the gage at Corte Madera Creek. Elevation differences were insignificant, as shown by the abstract below.

	Differences in Elevation (M)	
	5 April	27 April
(a) ⟶ 4874A	0.906	0.908
4874A ⟶ 4874C	0.832	0.832
4874C ⟶ 4874D	0.072	0.074
4874D ⟶ HUB, 1961	-0.950	-0.952

RECOMMENDED ZONING

Based on available data and project instruction requirements, it is recommended that Corte Madera Creek tides information be used to control hydrography in Corte Madera Creek and its dredged entrance channel.

COMMENTS

In addition to the four gages required by Project Instructions for the survey area, two other gages, installed and operated by the California Tide Party, were located within or significantly near to the project area. One was located at the Coast Guard Pier on the southeast side of Angel Island. The other was installed on a small private pier south of the Berkeley Yacht Harbor. Further information on these gages can be obtained through CTP.

Submitted by:

Ellen McDougal
LT(jg), NOAA
NOAA Ship DAVIDSON

Approved and Forwarded by:

C. William Hayes
CDR, NOAA
Commanding Officer
NOAA Ship DAVIDSON

U.S. DEPARTMENT OF COMMERCE
September 17, 1979 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

TIDE NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Pacific Marine Center:

Hourly heights are approved for 941-4881 Point Orient, CA
941-4874 Corte Madera Creek, CA

Tide Station Used (NOAA Form 77-12):

Period: March 15 - April 30, 1979

HYDROGRAPHIC SHEET: H-9811

OPR: L123

Locality: San Francisco Bay, California

Plane of reference (mean lower low water): 7.12 ft. - Pt. Orient
9.11 ft. - Corte Madera Creek

Height of Mean High Water above Plane of Reference is
5.2 ft. - Pt. Orient; 5.1 ft. - Corte Madera Creek

REMARKS: Recommended zoning:

(1). In Corte Madera Creek zone on Corte Madera Creek.
(2). North of 37°55'zone direct on Point Orient.
(3). South of 37°55' zone on Point Orient applying -15 minute time correction and range ratio x0.96.

James R Hubbard
Chief, Datums and Information Branch

NOAA FORM 76-155
(11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

GEOGRAPHIC NAMES

SURVEY NUMBER

H-9811

Name on Survey	A ON CHART NO.	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	KT-Sheet	
BIRD ISLAND									TP-00527	1
BRICKYARD COVE BROOKS ISLAND	18649								00527	2
CASTRO PT.	18649								00526	3
CASTRO ROCKS	18649								00526	4
CORTE MADERA									00526	5
CORTE MADERA CREEK CYPRESS PT. ✓									00526 00526	6
EAST MARIN ISLAND									00526	7
EL CAMPO									00526	8
GREEN BRAE	18649								00526	9
INVINCIBLE ROCK	18649									10
LAURITZEN CANAL	18649								00527	11
MEADOWSWEET	18649									12
POINT RICHMOND (locality) ~~PARADISE~~									00526	13
PARADISE CAY	18649								00526	14
PARADISE COVE									00526	15
PT. CHAUNCEY	18649								00526	16
~~PT.~~ MOLATE PT.									00526	17
PT. ORIENT	18649								00526	18
PT. POTRERO	18649								00527	19
PT. RICHMOND (2 places)	18649								00526	20
PT. SAN PABLO	18649								00526	21
PT. SAN QUENTIN	18649								00526	22
RED ROCK	18649								00526	23
RICHMOND	18649								00526	24
~~RICHMOND INNER HARBOR~~	18649								00527	25

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 76-155
(11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

GEOGRAPHIC NAMES

SURVEY NUMBER

H-9811

Name on Survey	A ON CHART NO.	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	KT-Sheet	
RICHMOND-SAN RAFAEL BRIDGE	18649	✓							00526	1
RICHMOND YACHT HARBOR SAN CLEMENTE CREEK	18649	✓							00527 00526	2
SAN FRANCISCO BAY	18649	✓							00526	3
SAN PABLO STRAIT ~~SAN PABLO~~		✓							00526	4
SAN QUENTIN	18649	✓								5
SAN RAFAEL BAY	18649	✓							00526	6
SANTA FE CHANNEL	18649	✓								7
~~STANDARD OIL DOCK~~ THE BROTHERS	18649 18649	✓							00526	8
WEST MARIN ISLAND		✓							00526	9
WHITING ROCK	18649	✓								10
SOUTHAMPTON SHOAL		✓								11
SOUTHHAMPTON SHOAL CHANNEL		✓								12
STANDARD OIL LONG WHARF		✓								13
SAN RAFAEL CREEK		✓								14
PARR CANAL		✓								15
HARBOR CHANNEL		✓								16
CORTE MADERA CHANNEL										17
										18
										19
					Approved:					20
										21
					Chas. E. Harrington					22
					Chief Geographer - C3x5					23
					26 April 1982					24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

APPROVAL SHEET

FOR

SURVEY H-9811

A. All revisions and additions made on the smooth sheet during verification have been entered in the magnetic tape records for this survey. A new final position print-out has been made. A new final sounding print-out has been made.

B. The verified smooth sheet has been inspected, is complete, and meets the requirements of the Hydrographic Manual. Exceptions are listed in the verifier's report.

Date: 1/8/81

Signed:

Title: Chief, Verification Branch

NOAA FORM 77-27 (5-77) | U. S. DEPARTMENT OF COMMERCE NOAA | HYDROGRAPHIC SURVEY NUMBER

HYDROGRAPHIC SURVEY STATISTICS

H-9811

RECORDS ACCOMPANYING SURVEY: To be completed when survey is registered.

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	BOAT SHEETS & PRELIMINARY OVERLAYS	5
DESCRIPTIVE REPORT	1	SMOOTH OVERLAYS: POS. ARC, EXCESS	6

DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/ SOURCE DOCUMENTS
ENVELOPES						
CAHIERS	2					
VOLUMES						
BOXES						

T-SHEET PRINTS (List) TP-00526, TP-00527

SPECIAL REPORTS (List)

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS: PRE-VERIFICATION	AMOUNTS: VERIFICATION	AMOUNTS: TOTALS
POSITIONS ON SHEET			3966
POSITIONS CHECKED		3966	
POSITIONS REVISED		1162	
SOUNDINGS REVISED		1712	
SOUNDINGS ERRONEOUSLY SPACED		82	
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED			
	TIME – HOURS		
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)	10		
VERIFICATION OF CONTROL		28	
VERIFICATION OF POSITIONS		140	
VERIFICATION OF SOUNDINGS		405	
COMPILATION OF SMOOTH SHEET		122	
APPLICATION OF TOPOGRAPHY		104	
APPLICATION OF PHOTOBATHYMETRY			
JUNCTIONS		12	
COMPARISON WITH PRIOR SURVEYS & CHARTS		13	
VERIFIER'S REPORT		36	
OTHER			
TOTALS	10	860	870

Pre-Verification by J. S. Green	*Beginning Date* 7/16/79	*Ending Date* 7/16/79
Verification by L. T. Deodato	*Beginning Date* 1/7/80	*Ending Date* 12/12/80
Verification Check by J. S. Green and S. Otsubo	*Time (Hours)* 90	*Date* 12/10/80
Marine Center Inspection by HIT	*Time (Hours)* 24	*Date* 2/10/81
Quality Control Inspection by Robert W. Derkazarian	*Time (Hours)* 644	*Date* 3/30/82
Requirements Evaluation by Robert W. Derkazarian	*Time (Hours)* 4	*Date* 2/28/84

D Myers 12/20/82 127 hrs.

REGISTRY NO. 9811

The magnetic tape containing the data for this survey has not been corrected to reflect the changes made during evaluation and review.

When the magnetic tape has been updated to reflect the final results of the survey, the following shall be completed:

MAGNETIC TAPE CORRECTED

DATE_____ TIME REQUIRED_____ INITIALS_____

REMARKS:

PACIFIC MARINE CENTER
VERIFIER'S REPORT

REGISTRY NO. H-9811 FIELD NO. DA-10-2-79

California, San Francisco Bay, Pt. Richmond to Pt. San Pablo

SURVEYED: March 15 - April 30, 1979

SCALE: 1:10,000 PROJECT NO. OPR-L123-DA-79

SOUNDINGS: Ross Fineline CONTROL: Range/Range Raydist and Mini-Ranger, Range Azimuth Mini-Ranger

Chief of Party.....CDR C. W. Hayes

Surveyed by.....LCDR A. Bodnar, LT C. Lawrence, LTJG L. Haas, LTJG E. McDougal, ENS. T. Peasley

Automated plot by.....Xynetics Plotter (PMC)
Verified by.....Leonardo T. Deodato
December 12, 1980

1. INTRODUCTION

a. This is ~~a basic~~ an adequate hydrographic survey of San Francisco Bay, California, covering the area defined by the shoreline on the east and west and from Latitude 37°53.75'N to Latitude 37°57.95'N.

b. The following were unusual problems encountered and corrected during verification:

(1) The TRA was based only on static draft and the effect of settlement and squat. The combined effect of draft and instrument errors was neglected.

(2) The field TC/TI tape did not cover the work done by vessel 3131 on JD-117.

(3) Scaling of time for peaks and deeps is not in accordance with Table 4-14 of the Hydrographic Manual.

(4) Velocity table No. 3 was rejected due to the following reasons:

(a) The surface salinity was not determined by the use of a salinometer or hydrometer. Instead it was then taken directly from the graph provided with the Martek Instrument.

(b) The bar check abstract from JD-074 to JD-086 when

plotted against the velocity correction graph does not follow the trend of the graph. The same abstract was plotted on the velocity correction graph of velocity table No. 4 and they match.

c. No non-standard procedure was used.

d. The following were revised during verification:

(1) Field projection parameters have been revised to meet PMC software requirements.

(2) The field signal list was revised to include only signals used to control hydrography and fixed aids to navigation.

(3) TRA was revised from 1.5 ft. to 1.8 ft. plus the effect of settlement and squat.

(4) Part of the electronic corrector abstract was revised to conform to the calibrations.

(5) Predicted tide reductions were based on San Francisco. Approved tides from Point Orient and Corte Madera Creek tide gages were utilized for soundings on the smooth sheet.

2. CONTROL AND SHORELINE

a. The source of control is adequately described in Section F of the Descriptive Report.

b. The blow-up copies at a scale of 1:10,000 of the following unreviewed* Class I manuscripts with their respective dates of photography and field edit were used in this survey. See HIT Report, para 1. and Q.C. Report, Introduction

TP-00526	1977	1978,79
TP-00527	1977	1979

* Reviewed manuscripts were applied during quality evaluation.

(1) The low water line in the vicinity of Latitude 37°56.0'N, Longitude 122°29.7'W was modified to be consistent with the hydrographic data. ~~Correct other revisions were made elsewhere on the~~ smooth sheet during quality evaluation

(2) The Richmond-San Rafael bridge is not shown on the smooth sheet.

3. HYDROGRAPHY

a. Crossline soundings agree within 0-3 ft. at appropriate ~~all~~ depths. Some consideration is given to the strong currents and other sea conditions described in the D.R. para. P.

b. Standard depth curves could be adequately drawn with the exception of depth curves close to the shore. The charted 36 foot supplemental curve is shown on the smooth sheet. A supplemental 3 ft. depth curve is shown in lat. 37°54'47"N, long. 122°23'24"W, (approx) to delineate a channel.

c. Except as noted in Section L, paragraph 3, and M of the Descriptive Report, the development of the bottom configuration and the determination of least depths are adequate. See Q.C. Report, para 1.a

d. Some soundings were displaced to improve legibility at Point Orient Wharf, Molate Pt. Wharf, Standard Oil Wharf and Pt. Richmond pier.

4. CONDITION OF SURVEY — See Q.C. Report, para. 1, 2, and 3.

With the exception of the following items, the smooth sheet and accompanying overlays, hydrographic records, and reports are adequate and conform to the requirements of the Hydrographic Manual.

a. On JD-085, vessel 3132, the morning calibration where the lane count starts was not included in the Raydist strip chart.

b. The electronic corrector abstract for Mini-Ranger Range Azimuth was not included in the inserts of the Descriptive Report.

c. The fathogram on JD-113, vessel 3132, was not rescanned for peaks and deeps.

5. JUNCTIONS

a.	H-9793	(1978)	1:10,000 to the southwest
	H-9794	(1978)	1:10,000 to the southeast
	H-9810	(1979)	1:10,000 to the east

With the ~~exception~~ addition of the 29 ft. and 16 ft. soundings that were transferred from H-9810 at the edge of the channel about 280 meters and 350 meters respectively south of Richmond Harbor Channel Daybeacon 16, the junction with the above surveys is satisfactory. Junction notes and depth curves have been inked. The adequacy of junctions H-9793 and H-9810 will be considered at the time of their appropriate evaluations.

b. There is no contemporary survey on the northern side of the survey. Surveys are scheduled for this area in FY83. See Q.C. Report, para 4.

6. COMPARISON WITH PRIOR SURVEYS — See Q.C. Report, para 5

a.	H-7620	(1947)	1:10,000
	H-7867	(1950)	1:10,000

(1) All major shoreline changes were man made especially in the vicinity of:

Latitude 37°54.8'N, Longitude 122°28.5'W - Marina at Paradise Cay
Latitude 37°56.3'N, Longitude 122°29.5'W
Latitude 37°56.6'N, Longitude 122°28.7'W
Latitude 37°57.5'N, Longitude 122°29.5'W - Approx. 650 meters claimed

(2) There's a significant change in the size and shape of the following islands which could be due to natural changes and to less accurate method used to delineate the shoreline:

West Marin Island
The Brothers Islands - (not significant)
Red Rock

Western tip of Brooks Island
partial
(3) A change in size and shape is also noted on the following possibly due to modifications or reconstructions:

~~See Q.C. Report para~~

Point Orient Wharf
Molate Point Wharf
Piers at Castro Point
Standard Oil Wharf
Piers at Pt. Richmond
See Q.C. Report, para 6.b.1.

have been revised during the application of the reviewed shoreline manuscripts

* channel in the vicinity of Lighted Bell Buoy 8, following the natural to the vicinity of lat. 37°55.6'N, long. 122°26.6' at Lighted Buoy 12,

(4) The present survey as compared to H-7620 is mostly shoaler by 3-6 ft. except in the vicinity of Standard Oil Wharf and ~~at~~ from Latitude 37°54.5'N, Longitude 122°26.5'W, where it is deeper by 4-7 ft. ~~On~~ In comparison with H-7867 the present survey is deeper by 1-3 ft. in depths less than 7 ft. and 0 to ~~plus or minus~~ 7 ft. shoaler at greater depths. The San Rafael Creek Channel is presently shoaler by 0 to 5 ft. on the western portion of the survey. Depths in the vicinity of The Brothers and Invincible Rock vary ± 6 ft between the two surveys.

(5) The ruins of a wharf in the vicinity of Latitude 37°57.04'N, Longitude 122°25.3'W which is also an unnumbered PSR item was transferred to the smooth sheet, for a hydro D.P. (Fix #6880) was taken on a stake that marks its position. See Q.C. Report, para 5a.(5)

(6) A 7 ft. and 13 ft. sounding on Invincible Rock and Whiting Rock respectively which originates from H-3929 (1931) Add. Wk. that were transferred to H-7620 (1947) were also transferred to the smooth sheet. Refer to paragraph 3, Section L of the Descriptive Report.

(7) Some soundings and features not superseded by the present survey were transferred to the smooth sheet.

b. H-7623 (1947) 1:5,000 See Q.C. Report, para 5.b.

(1) A manmade harbor now exists in the vicinity of Latitude 37°54.5'N, Longitude 122°22.7'W.

(2) ~~An islet now exists at Latitude 37°54.54'N, Longitude 122°23.33'W.~~ Superseded; deleted during the review of shoreline manuscript

(3) The structures (drydocks) in the vicinity of Latitude 37°55.12'N, Longitude 122°21.8'W no longer exist, they have been reclaimed and presently are bordered with riprap.

(4) The present survey is deeper by 5-11 ft. in the channel from Pt. Richmond to Santa Fe Channel.

c. H-7897 (1951) 1:10,000 and 1:5,000 (inset) See Q.C. Report, para. 5.c.

(1) Most of the shoreline changes were man made.

(2) The entrance channel to Corte Madera Creek was relocated. Because of this, a good comparison cannot be made. In the undredged area the soundings are deeper by 1-2 ft. in the present survey. In the ~~rest of the~~ newer dredged channel the present survey is deeper by 6-11 ft.

d. With the transferances of some prior survey features and soundings to the smooth sheet, the present survey is adequate to supersede the above prior surveys in the common area.

7. COMPARISON WITH CHARTS See Q.C. Report, para 6

Comparison was made with Chart #18649 (45th edition, Feb. 4, 1978)

a. Hydrography

~~(1)~~ Charted soundings that originate from the previously discussed prior surveys were disposed of in Section 6 of this report, also see enclosed chartlet. Disregard see Q.C.

~~(2)~~ Charted soundings from the 1976 Chart Adequacy Survey and from unknown sources are shoaler by 1 to 5 ft. than the present survey. Disregard see Q.C.

(3) Two (2) unnumbered PSR items:

(a) The charted wreck that is cleared by wire drag by 50 ft. at Latitude 37°57'32"N, Longitude 122°26'28"W which originates from CL 346/53 was not properly developed by hydrography and no wire drag survey was used to verify it. This should be continued to be charted from its original source. See Descriptive Report, para L. (NM 15/53; COE swept area; PA)

(b) The charted dolphins PA at approximate Latitude 37°56'29"N, Longitude 122°24'46"W that originates from CL 1039/73 was no longer shown on the unreviewed Class I manuscript of TP-00526. Its disposal is being referred to by the hydrographer to the report of the said manuscript. Coastal Mapping advises that ~~it~~ they no longer exist$ and should not be charted. A lone pile was located at lat 37°56'28"N, long 122°24'53"W

(4) With the exceptions noted above and in the Quality Control Report para 6 ~~of what is stated in paragraph 7a(3)(a), the data on~~ the present survey is sufficient to supersede ~~all~~ the charted ~~data~~ hydrography in the common area.

b. Controlling Depths

Para. (3) thru (10) are to be disregarded, see Quality Control Report, para 6b.

Present controlling depths of the following:

(1) The entrance channel to San Rafael Creek is 6 ft. compared to the charted note of ~~4~~7 ft. The 7ft. depth was indicated on chart 18649, 46th Ed. Jan 78. of Feb. 78 data the extent of the present survey in

(2) The entrance channel to Corte Madera Creek is 10 ft. compared to the charted depth of 11 ft. Depths of 6-8ft. were located by the present survey along portions of the channel sides. See Chart letter 967(1976), Item 13 for reference data.

~~(3)~~ Southampton Shoal Channel is now 38 ft. compared to the charted tabulated depth of 35 ft. The project depth is 35 ft. The 37 foot controlling depth is only appropriate in the center two quarters of the channel. Disregard

~~(4)~~ Richmond Harbor Entrance Channel is 36 ft. compared to the project charted ~~tabulated~~ depth of 35 ft. Disregard

(5) Turning Basin at Pt. Richmond is 35 ft. which agrees to the charted tabulated depth of 35 ft. Disregard

(6) Port Potrero reach is 36 ft. compared to the charted tabulated depth of 35 ft. "

(7) Pt. Potrero turn is 36 to 33 ft compared to the charted tabulated depth of 35 to 30 ft. "

(8) Harbor Channel is 35 ft. which agrees to the charted tabulated depth of 35 ft. "

(9) Santa Fe Channel is 33 to 27 ft. compared to the charted tabulated depth of 35 to 30 ft. "

(10) Turning basin is 30 ft. which agrees to the charted tabulated depth of 30 ft. "

c. Aids to Navigation See Q.C. Report, para. 6.c.

(1) The position of some fixed aids to navigation were verified by the conventional ground survey method and should be charted as shown. All the rest whose office photogrammetric position were not verified should be charted with the best position photogrammetry can still provide. The office*position of San Rafael Creek Lt. 5 is off by 1 minute in Longitude to where it was plotted on the manuscript. This was corrected in order to let it agree to its plotted position. All of the above were also shown on the smooth sheet.

* Corrected on Form 76-40; new forms were submitted with the reviewed shoreline manuscripts

(2) The following lights were not in position at the time of field edit. Refer to NOAA Form 76-40.

Paradise Cay Light - Destroyed
Corte Madera Light 3 (Was replaced by a white spherical buoy; however buoy was not on station at time of present survey.
San Rafael Creek Light 3
Richmond Harbor Channel Light 7 (This light ~~is being~~ was replaced by a black bouy, ~~&~~ lighted, however the light was not observed at the time of the survey.

(3) The charted buoy N "EX" was not located during hydrography. Perhaps this buoy was not in place during the survey nor was it mentioned in the Descriptive Report.

(4) With the exception of the above, all charted buoys were located and shown on the smooth sheet. ~~See QC Report, para.~~

(5) A new spherical speed buoy was located at the end of Corte Madera Creek and is shown on the smooth sheet, in lat. 37°56'33.06 N, long. 122°30'21.64"W. (pos. 7197)

8. COMPLIANCE WITH INSTRUCTIONS

Except where noted, this survey adequately complies with the Project Instructions dated January 15, 1979 and Change Nos. 1 thru 3 dated February 1, 8 and 12, 1979 respectively.

9. ADDITIONAL FIELD WORK

This is a ~~good basic~~ adequate hydrographic survey and no major additional field work is recommended except as stated in Section Q of the Descriptive Report.

Superseded, See Q.C. Report para. 7.

Submitted by,

Leonardo T. Deodato

Leonardo T. Deodato
Cartographic Technician
December 12, 1980

Examined and approved,

James S. Green
Chief, Verification Branch

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Pacific Marine Center
1801 Fairview Avenue East
Seattle, Washington 98102

February 12, 1980[1] OA/CPM3/JWC

TO: OA/CPM - Charles K. Townsend

FROM: OA/CPM3 - John W. Carpenter

SUBJECT: PMC Hydrographic Inspection Team Report for Survey H-9811

This survey is a basic hydrographic survey of Point Richmond to Point San Pablo, San Francisco Bay, California. This survey was conducted by NOAA Ship DAVIDSON in 1979 in accordance with Project Instructions OPR-L123-DA-79 dated January 15, 1979; Change No. 1, dated February 1, 1979; Change No. 2, dated February 8, 1979, and Change No. 3, dated February 12, 1979.

The following items were noted:

1. The necessity of having shoreline photogrammetric manuscripts compiled at the same scale of the hydrographic survey in order to fulfill the requirements of the Hydrographic Manual (Section 6.3.5 and 7.3.4) is apparent in this survey. A 1:20,000 manuscript in a congested area such as San Francisco is not adequate in detail for the hydrographic requirements of a 1:10,000 smooth sheet. Concur, the survey (present) does not meet the "General Standards" set forth by the H.M. Chapter 1. Part A. Sect 1.2

2. The 18 foot soundings on Chart 18649 in the area of this survey (~~see Verifier's Report chart attachment~~) that originated from a Chart Adequacy Survey by the NOAA Ship DAVIDSON in 1976 and 77 was not addressed as a prior survey since it is not a registered survey. Thus, these soundings need to be addressed by the chart compiler since the survey data did not support these soundings. See Q.C. Report para 6.a.(1).

3. The need to fully coordinate field edit and hydrographic activities in a fully coordinated operation is clearly illustrated by deficiency in locating Castro Rocks. Identifying the rocks was accomplished by the field editor but their location was not transferred to the field sheet as required (Hydrographic Manual, Section 4.2.7) The need to utilize prior surveys and existing charts in conjunction with photo manuscripts to furnish critical information on rocks, etc. to the hydrographer is a must. This deficiency has been addressed to the Photogrammetry Division, C34 in the past. I strongly endorse this suggestion.

4. The Hydrographic Manual requirement that all aids to navigation in the project area shall be accurately located (Section 4.5.13) was not fully complied with by the DAVIDSON. It is recommended that the PMC OPORDER emphasize the need to fulfill this requirement.

The inspection team finds H-9811 to be a ~~basic~~ survey adequate to supersede common areas of prior surveys and charted hydrography. Administrative approval is recommended.

John W. Carpenter

James W. Wintermyre

James W. Steensland

James L. Stringham

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
CHARTING AND GEODETIC SERVICES
Rockville, Md. 20852

N/CG241:RWD

December 20, 1983

TO: Roy K. Matsushige
Chief, Hydrographic Surveys Branch

THRU: Chief, Standards Section

FROM: R. W. DerKazarian
Quality Evaluator

SUBJECT: Quality Control Report for H-9811 (1979), California, San Francisco Bay, Point Richmond to Point San Pablo

A quality control inspection of H-9811 was accomplished to monitor the survey for adequacy with respect to data acquisition, delineation of the bottom, determination of least depths, navigational hazards, junctions, sounding line crossings, smooth plotting, shoreline transfer, decisions made and actions taken by the verifier, and the cartographic presentation of data. A comparison between the present survey and reviewed Class I maps revealed many problems that were resolved during quality control. These conflicts were reconciled by an examination of prior and present hydrographic and topographic data. In many cases, additional text, included herein, was deemed necessary to authenticate and clearly describe the adequacy of these data. In general, the survey was found to conform to the National Ocean Survey's standards and requirements except as stated in the Verifier's Report, the HIT Report, and as follows:

1. The completeness and adequacy of the present survey was compromised by the following deficiencies:

a. A number of significant features, bare at MHW, on the prior surveys and chart were not verified or disproved on the present survey. Many of these items fall in areas alongshore where limited hydrographic work precluded a determination of their existence. Numerous hours were spent during quality evaluation examining the present raw data listings, graphic depth records, field edit reports, the field edit ozalid, and compilation and reconnaissance photographs to determine the present existence of significant charted features, many of which originate with National Ocean Service source documents. The Hydrographic Manual, section 1.4.3, states that "A basic hydrographic survey is not complete and adequate until there is reasonable assurance that all obstructions, shoals, and other dangers to navigation in the survey area have been found and the least depths over them determined." The manual further

states in section 1.6.2 that "Questionable features below the water surface such as reef limits, rocks, pilings, and similar objects must be investigated thoroughly by the hydrographer. . . . Each isolated bare rock, rock awash, or other hazard seaward of the shoreline must be located by hydrographic or photogrammetric methods. Each such feature shall be described definitively on the field sheet." (See sections 3.2.4, 4.1.1.(7), 4.1.3, 4.2.7, 4.2.8, 4.5.8, and 4.5.15 of the Hydrographic Manual.)

b. The raw data listings, field sheet, and graphic records should have contained descriptive notes which would have contributed to the verification of several charted features. (See sections 4.2.1 and 4.8.4 of the Hydrographic Manual.)

2. The contemporary shoreline maps of the San Francisco Bay area were in various stages of processing during the verification of the present survey. Many conflicts between topographic and hydrographic compilations encountered during verification and quality control could have been eliminated if maps in common with the hydrographic survey had been reviewed prior to verification.

3. Notes in field reports, such as Field Edit, Season's Report, and Horizontal Control Report, specifically referenced in the Descriptive Report and Verifier's Report that contain information necessary to verify the final disposition of features should accompany the hydrographic records. All referenced data for this survey were not furnished to headquarters.

4. The following supplements paragraph 5.b of the Verifier's Report:

With the exception of the 7- to 8-foot depths directly east of East Marin Island on the present survey and the 18-foot curve at approximate latitude 37°58'N, longitude 122°27'W, the present survey is in harmony with charted depths.

5. The following statements either supplement, are in addition to, or supersede various portions of the Verifier's Report, paragraph 6:

a. H-7620 (1947) 1:10,000

(1) Differences are noted throughout the entire area in common with the present and prior surveys. Significant bottom changes have occurred along the eastern inshore slopes between the 6- and 36-foot depth curves near offshore islands and where piers, wharfs, and bulkheads exist. In one instance, approximately 125 meters northeast of Molate Point Wharf South End Light, present depths of 6 feet exist in prior depths of 29 to 39 feet.

Significant changes are noted from Point Chauncey to the entrance of Corte Madera Channel where differences of 10 feet are evident; one area, approximately 800 meters north-northwest of Point Chauncey, has changed from prior depths of 83 feet to present depths of 51 feet.

Due to drastic bottom changes resulting from natural and cultural causes in the area, no realistic comparison can be made in many cases with the prior survey. However, some items have been carried forward from H-7620 (1947).

(2) A dolphin and a pile from an old pier (adjacent to Molate Point Wharf) in latitude 37°56'50"N, longitude 122°25'22"W were not verified or disproved by the present survey. Normally these items should be carried forward; however, they appear not to have been charted in the past. No action was taken during quality evaluation to carry them forward.

(3) Two charted piles in latitude 37°56'29"N, longitude 122°24'37"W were not addressed by the hydrographer on the present survey. These were shown as visible ruins of seven piles on the prior survey. The existence of these piles is doubtful; however, two piles have been carried forward as uncovering at mean lower low water on the present survey

(4) Five dolphins charted in proximity to the Standard Oil Long Wharf, in latitude 37°55'30"N, longitude 122°24'35"W, were not verified or disproved by the present survey. The quality evaluator was informed in a telephone conversation with Mr. Arthur Sommers, Regulatory Functions Branch--Permit Enforcement, U.S. Army Corps of Engineers, San Francisco District, that Standard Oil Company personnel reported these dolphins to be abandoned as ruins some 15 to 20 years ago and that merchant marine personnel regard the features as nonexistent. The existence of the charted dolphins is doubtful; however, they have been carried forward to the present survey as submerged until an adequate investigation disproves them.

(5) Inasmuch as the field edit for TP-00526 identifies the two stakes addressed in section 6.a(5) of the Verifier's Report (unnumbered presurvey review item) at detached position 6880 (latitude 37°57'03"N, longitude 122°25'27"W) as pipes which pose a significant danger to navigation, the smooth sheet description was revised accordingly during quality control. Also, the height of these features from present survey information was added to the verified smooth sheet. The charted pier ruins shown as a pier on H-7620 (1947) have been carried forward to the present survey as submerged ruins and should be charted. These ruins are marked by the pipes.

(6) A rock charted (near Red Rock) in latitude 37°55.85'N, longitude 122°25.86'W was located by an estimated distance from a sounding line, as described in the Descriptive Report of H-7620. The prior position should be disregarded in lieu of the present rock located approximately 30 meters west. (The position of the rock on H-5807 (1934) is in good agreement with the present survey.)

(7) An islet east of Red Rock in latitude 37°55.74'N, longitude 122°25.73'W was not addressed by the hydrographer. It appears that the shoreline of Red Rock and the delineation of adjacent rocks have undergone significant changes over the years; the shoreline has receded up to 20-40 meters in some areas; the islet was not considered disproved and has been carried forward as a rock awash.

With the addition of items carried forward, the present survey is adequate to supersede the prior survey within the common area.

b. H-7623 (1947) 1:5,000 N/C see FE-242

(1) The pier (ferry slip) charted at Point Richmond, latitude 37°54'30"N, longitude 122°23'30"W, is approximately 75 meters shorter than shown on the prior survey. The prior Y-shaped character of the pier's offshore end does not appear on the present shoreline manuscript, neither are its remains disproved by the present survey. The existing portion of the single line pier as shown on the present survey is in considerable disagreement with the prior data which indicate the pier to be approximately 20 meters wide. Mr. Jerry Hancock of the Photogrammetric Review Group, N/MOA221x1, indicated that the pier actually measures about 8 meters in width. Mr. Sommers of the U.S. Army Corps of Engineers indicated that a fire occurred 7 to 8 years ago demolishing the pier and that the remaining hundreds of piles are to be dismantled in the future. Submerged ruins have been carried forward until an investigation can verify that no debris remain which would pose a hazard to navigation. The pier ruin terminus is at the limit of a maintained channel. (See paragraph 7.c.)

(2) The charted ruins (piles) in latitude 37°54'34"N, longitude 122°23'22"W were not found during field edit of the shoreline manuscript; these ruins should be deleted from the chart.

(3) The charted pier and dolphin (the dolphin is in the position of a prior fixed aid) in latitude 37°54'25"N, longitude 122°23'05"W have been removed per information received from Mr. Sommers. (See Chart Letter 1125 of 1981.) It is recommended that the charted information be revised accordingly.

(4) Pier ruins in latitude 37°54'09"N, longitude 122°21'45"W have been disproved by a 1976 Chart Adequacy Survey. (See Chart Letter 967 of 1976, item 4B.)

(5) The piles in latitude 37°54'37"N, longitude 122°22'43"W (charted as a single pile) and a cluster of dolphins or piles in latitude 37°54'38"N, longitude 122°21'36"W and latitude 37°54'54"N, longitude 122°21'51"W have apparently been removed through cultural improvements, although mention of their nonexistence was not addressed by the hydrographer. It is recommended that these features be deleted from the chart. New piles have been added in the vicinity of latitude 37°54'54"N, longitude 122°21'51"W.

(6) The present existence of a log charted in latitude 37°54'05"N, longitude 122°21'59"W, in present depths of ½ foot, is considered unlikely. The log should be deleted from the chart. This feature was not mentioned by the hydrographer or the field editor.

With the addition of the items carried forward to the smooth sheet, the present survey is adequate to supersede the prior survey within the common area.

c. H-7897 (1951) 1:10,000 and inset 1:5,000

(1) The mean lower low waterline in the vicinity of Corte Madera has accreted as much as 1,700 meters. No evidence of two old approach channels exists near Corte Madera Channel on the present survey. The changes can

probably be attributed to the deposit of spoil and/or sedimentation in these channels. Also, fill has possibly been used to reclaim approximately 650 meters of San Rafael Bay to the north.

(2) Piles, stakes, and duck blinds in the vicinity of latitude 37°55'30"N, longitude 122°29'00"W and three dolphins in the vicinity of latitude 37°56'30"N, longitude 122°28'35"W were not disproved or verified by the hydrographer. Although no specific investigation was conducted, no indication of these items was noted on the graphic depth records. The present existence of these features is considered doubtful. The piles in the vicinity of latitude 37°55'17"N, longitude 122°29'10"W and the three dolphins noted above are charted. These features have been carried forward to the present survey.

With the addition of the items carried forward, the present survey is adequate to supersede the prior survey within the common area.

d. H-7705 (1948) 1:10,000

Generally, present depths are from 1 to 2 feet deeper than prior depths in the area. A charted pile has been carried forward to the present survey in latitude 37°53'51"N, longitude 122°21'43"W. With this addition, the present survey is adequate to supersede the prior survey within the common area.

e. H-5807 (1934) 1:10,000

A small wire-drag investigation in the vicinity of Invincible Rock and Whiting Rock is plotted on the basic survey of H-5807 (1934). There are no conflicts between the present survey depths and effective wire-drag depths. Statements in the Descriptive Report of H-5807 recommend that the 7-foot depth determined over Invincible Rock by H-3929 (1931) Ad. Wk. be retained because the area is rocky and very irregular with many pinnacles. A least depth determined by the wire drag was 8 feet; the present survey determined 9 feet.

f. T-6301 (1934) 1:10,000

A cluster of dolphins, three piles, and a pier were located by this prior planetable survey in the vicinity of latitude 37°54'36"N, longitude 122°23'25"W (Point Richmond). Subsequent hydrographic work of 1947 on surveys H-7620 and H-7623 determined elevations and verified that two of the piles were no longer in existence (H-7623, Descriptive Report, page 4, paragraph 4). There is a slight disagreement in the positions of these features between the hydrographic surveys and T-6301.

Per telephone conversation with Mr. Sommers of the U.S. Army Corps of Engineers, his personal inspection of the area at an extreme low tide provided no evidence of these items. Inasmuch as the present survey did not verify or disprove them, they have been carried forward as submerged at their planetable-survey positions and should remain as charted until adequately disproved.

With the addition of the items carried forward to the smooth sheet, the present survey is adequate to supersede the prior survey within the common area.

6. The following statements either supplement, are in addition to, or supersede various portions of the Verifier's Report, paragraph 7.

a. Hydrography

The charted hydrography originates with the previously discussed prior surveys which require no further consideration, supplemented with various chart letters, blueprints, and U.S. Army Corps of Engineers drawings. Attention is directed to the following:

(1) Inasmuch as the Chart Adequacy Surveys of 1976 and 1977 (Chart Letter 967 of 1976, Blueprints 95430-34; and Chart Letter 2112 of 1977, Blueprint 102616) covering the survey area were available during quality evaluation, a comparison was made with the present survey. In general, soundings on the present survey appear to be 1 to 2 feet deeper in the area of common coverage. This difference may possibly be attributed to the lack of actual tides being applied to the 1977 work. However, some local shifting of sediments is indicated as, for example, a prior 34 falls in depths of 40 feet on the present survey. The charted 18- and 19-foot soundings in the vicinity of latitude 37°55'08"N, longitude 122°25'48"W and the 27-foot depth in latitude 37°55'06'N, longitude 122°26'24"W were not disproved by the present survey and should be retained on the chart. Two 31-foot depths (from BP-102616) in the vicinity of latitude 37°55'18'N, longitude 122°26'57"W (not charted) have not been disproved by the present survey.

(2) A pile charted in latitude 37°55'17"N, longitude 122°28'52"W from a miscellaneous source was not verified or disproved by the present survey. This feature should be retained on the chart.

(3) (See Verifier's Report.)

(4) A pile charted in latitude 37°55'40"N, longitude 122°25'45"W is the remains of the Red Rock Fog Signal (Bell) which was discontinued as stated in Notice to Mariners 6/61. The bell as described in a previous U.S. Coast Guard Light List (1961) was built on a white iron stand. The prior survey additionally shows this to be located on an islet. The islet still exists on the present survey. It is recommended that the pile be deleted from the chart and the islet charted in its place.

(5) The 31- and 32-foot depths charted in the approach to the Richmond Harbor Entrance Channel (vicinity of the maneuvering area, latitude 37°55'12"N, longitude 122°25'00"W) were not disproved by the present survey. The 31-foot depth originates with the Chart Adequacy Survey of 1976 and should be retained. The 32-foot depth is from a miscellaneous source, probably a U.S. Army Corps of Engineers survey. A subsequent U.S. Army Corps of Engineers survey of March-April 1981 (Blueprint 113918) indicates a 33-foot depth in this area. A depth of 32.7 feet was also shown on the blueprint in the vicinity of latitude 37°54'54"N, longitude 122°24'39"W.

(6) A bulkhead-like structure charted in latitude 37°56'25"N, longitude 122°29'05"W from Blueprint 60175 (an air photo revision via a U.S. Geological Survey quadrangle map) was not addressed by the present survey. Mr. Jerry Hancock (N/MOA221x1) indicated that the area is too irregular to be a bulkhead. The present shoreline manuscript (TP-00526) indicates the area to have riprap with a rocky base; chart accordingly.

(7) The low waterline charted in latitude 37°57'30"N, longitude 122°27'40"W was applied in 1966 from a miscellaneous source, probably an air photo revision, Blueprint 98391. This charted feature was not developed on the present survey; however, the general area has deepened 2 to 3 feet to present depths of 7 to 8 feet. It is recommended that present survey depths be charted. Refer to Chart Letter 710 of 1979, item 5 (Chart Inspection Report).

b. Controlling Depths

Present depths were compared in the Verifier's Report with tabulated project depths based on U.S. Army Corps of Engineers data, rather than actual controlling depths. Also, several depths stated in paragraphs 7.b(3)-(10) of the Verifier's Report are not accurate and should be disregarded. Shoaler depths of 1 to 5 feet are shown on the smooth sheet in the maintained channels when compared to project depths.

This comparison was performed during quality evaluation inasmuch as three groups of subsequent U.S. Army Corps of Engineers surveys have been conducted almost entirely in the common area during 1979, 1980, and 1981. The most recent miscellaneous data should be used for charting, where appropriate.

c. Aids to Navigation

In most cases, charted fixed and floating aids adequately mark the intended features. However, Richmond Harbor Channel Light "12" charted in latitude 37°54'06"N, longitude 122°21'57"W does not mark the intended feature. Richmond Harbor Channel Light "4" is located approximately 45 meters east of its charted position. The present survey location of the light better defines the channel limit. Corte Madera Creek Lights "13," "15," and "17" are slightly out of position as compared to the chart. The present survey positions adequately mark the feature intended. The charted positions of lights "15" and "17" fall approximately 40 to 70 meters, respectively, south of the present survey positions. If continued as charted, light "17" would fall approximately 40 meters within the marsh line as shown on the present survey. Charted Molate Point Wharf North and South End Lights are 80 and 40 meters out of position, respectively, as compared with the present survey. The charted Horn, privately maintained (lighted when fog signal is in operation), at Point Richmond is approximately 50 meters out of position as determined from the present survey. The present survey position marks the visible portion of the ferry pier while the charted position marks the terminus of the pier before the fire, as discussed in paragraph 5.b(1) of this report. San Francisco Bay North Channel Lighted Buoys "B" and "C" and Lighted Bell Buoy "8" were located on the present survey approximately 60 to 80 meters from their charted positions; however, they still adequately mark the intended features. Lights were not observed on Buoys "B" and "C." The direction of the Richmond Harbor approach range

computed from field data agrees with a corresponding value published in the 1979 U.S. Coast Guard Light List. However, due to insufficient field data, the San Rafael Range Rear Light location could not be determined and consequently the San Rafael range was not ascertained. The position of the San Rafael Range Rear Light has been rejected.

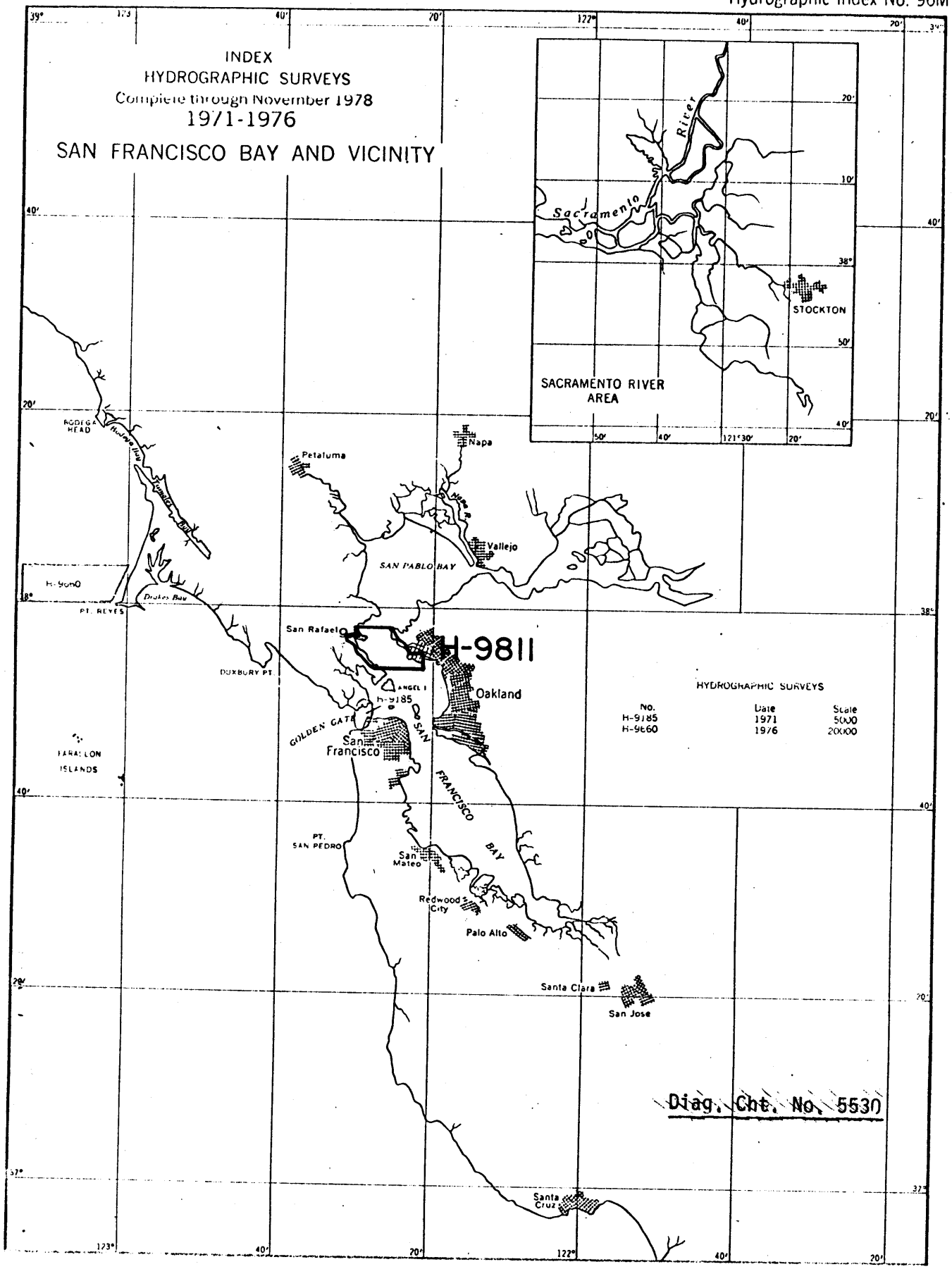
7. The comment in paragraph 9 of the Verifier's Report that says H-9811 is a good basic survey which needs no major additional field work in the area is somewhat misleading. (See section 6.6 of the Hydrographic Manual.)

The present survey is considered adequate by quality control standards. Some charted dolphins originating with prior surveys were carried forward as submerged objects in order to supplement the present survey. N/CG241 has been informed of items that should be fully investigated to prove or disprove their existence. Also, it is recommended that soundings be obtained alongside and at the ends of piers and in docks at an opportune time.

cc:
N/CG241

DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Survey
Rockville, Maryland

Hydrographic Index No. 96M



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
CHARTING AND GEODETIC SERVICES
Rockville, Md. 20852

N/CG241:RWD

MAR 5 1984

TO: N/MOP - Charles K. Townsend

FROM: for N/CG2 - C. William Hayes Signed R. Peters

SUBJECT: Report of Compliance for Survey H-9811

The smooth sheet and Descriptive Report for survey H-9811 (1979), California, San Francisco Bay, Point Richmond to Point San Pablo, have been reviewed. This survey, except as noted in the Quality Control Report, dated December 20, 1983 (copy attached), and the Hydrographic Survey Inspection Team Report, dated February 12, 1981, is complete and adequate for the purposes intended and is in compliance with Project Instructions OPR-L123-DA-79, dated January 15, 1979. Subsequent work clarifying several deficiencies on the present survey are addressed on FE-242 (1983). Processing of FE-242 (1983) is not complete as of the date of this compliance report.

Attachment

cc:
N/CG242 w/o att.

ADMINISTRATIVE APPROVAL
H-9811

The smooth sheet and reports of this survey have been examined and the survey is adequate for charting and to supersede common areas of prior surveys.

Charles K. Townsend, RADM

2/13/64
Date

FORM C&GS-8352
(3-25-63)

NAUTICAL CHART DIVISION

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9811

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.
1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
18649	5-25-84	Tom Fuller JS	Full ~~Part Before~~ After Verification Review Inspection ~~Signed~~ * Signature Via
			Drawing No. 65
18654	5-25-84	Tom Fuller	Full ~~Part Before~~ After Verification Review Inspection ~~Signed~~ Signature Via
			Drawing No. 47
18652	8/5/85	W.J. Bozanski	~~Full~~ Part ~~Before~~ After Verification Review Inspection Signed Via
			Drawing No. * Exam'd for critical corr's only
18653	9/23/86	D.R. Thyen	Full ~~Part Before~~ After Verification Review Inspection Signed Via
			Drawing No. #1 new chart.
~~18652~~	~~9/16/86~~	~~Corrdts~~	
18652	9/16/86	Corrdts WW	Full ~~Part Before~~ After Verification Review Inspection Signed Via
Reapply			Drawing No. 28 applied thru 18649
18649	7-27-87	S. Hill WW	
			Full ~~Part Before~~ After Verification Review Inspection Signed Via
			Drawing No. 67 Reapply H-sheet for addition soup
Reapply			
18654	7-27-87	S. Hill WW	Full ~~Part Before~~ After Verification Review Inspection Signed Via
			Drawing No. 48
Reapply			
18652	8-4-87	S. Hill WW	Full ~~Part Before~~ After Verification Review Inspection Signed Via
			Drawing No. 28
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.

FORM C&GS-8352 SUPERSEDES ALL EDITIONS OF FORM C&GS-975.

USCOMM-DC 8558-P63