

H10895

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

Type of Survey ..... Hydrographic  
Field No. .... N/A  
Registry No. .... H-10895

### LOCALITY

State ..... California  
General Locality .. San Francisco Bay  
Sublocality ..... 3.5 nautical miles SSE of  
Yerba Buena Island

1999

CHIEF OF PARTY  
Jonathan L. Dasler, P.E., P.L.S.

### LIBRARY & ARCHIVES

DATE ..... DEC 5 2000

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTER NO.
<b>HYDROGRAPHIC TITLE SHEET</b>		<b>H-10895</b>
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. <b>N/A</b>
State <u>California</u>		
General Locality <u>San Francisco Bay</u>		
Sublocality <u>3.5 Nautical Miles SSE of Yerba Buena Island</u>		
Scale <u>1:10,000</u>	Date of Survey <u>July 3-August 3, 1999</u>	
Instructions Date <u>October 1, 1998</u>	Project No. <u>OPR-L304-KR-98</u>	
<u>Change #1, June 4, 1999</u>		
Vessel <u>R/V Zephyr (Registry #929931)</u>		
Chief of Party <u>Jonathan L. Dasler, P.E., P.L.S.</u>		
Surveyed by <u>J. Dasler, H. Orlinsky, J. Hawkins, J. Creech, J. Lazar, S. Lemke, R. Nadeau, S Cross</u>		
Soundings taken by <u>echo sounder</u> , hand lead, pole <u>Reson 8101</u>		
Graphic record scaled by <u>N/A</u>		
Graphic record checked by <u>N/A</u>		
Evaluation by <u>I. Almacen</u>	Automated plot by <u>HP Design Jet 750c</u>	
Verification by <u>G. Nelson, B. Mihailov, I. Almacen</u>		
Soundings in <u>Feet</u> at <u>MLLW</u>		
REMARKS: <u>Time in UTC. Revisions and marginal notes in black were generated at the Pacific Hydrographic Branch during review of the survey.</u>		
<u>Aweis / SURF 121.00 mdr</u>		
Contractor Name: <u>David Evans and Associates, Inc.</u>		
<u>2828 SW Corbett Avenue</u>		
<u>Portland, Oregon 97201</u>		
<u>503-223-6663</u>		



## Descriptive Report to Accompany Hydrographic Survey H-10895

Field Number OPR-L304-KR-98

Scale 1:10,000

July 1999

David Evans and Associates, Inc.

Project Manager Jon Dasler

### A. PROJECT ✓

The navigable area survey was conducted in accordance with Hydrographic Project instructions OPR-L304-KR-98, for San Francisco Bay, California, dated October 1, 1998, and Change Number 1, dated June 4, 1999.

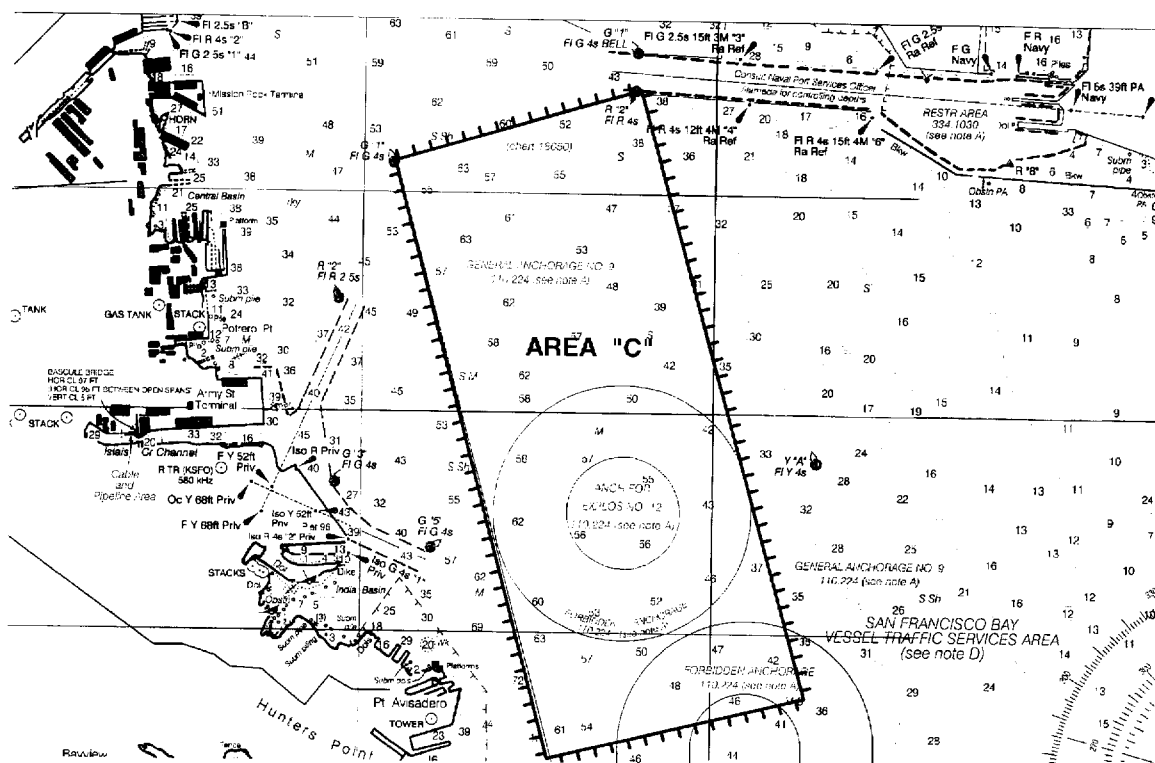
The area has been designated sheet "C" as specified in the Project Instructions Registry Number H-10895.

The purpose of the survey was to provide a hydrographic survey using multibeam sonar to update nautical charts, as requested by NOAA.

### B. AREA SURVEYED (*See EVAL RPT, Sec. B*)

The area surveyed for H-10895 covered a portion of central San Francisco Bay, California, in the vicinity of General Anchorage Number 9. Hydrographic limits extended from the entrance buoy R"2" of the Alameda Naval Station westward to buoy G "1". The northern limit was at latitude 37° 46' 27" N. The southern limit was at 37° 43' 25"N.

The chartlet on the following page shows the approximate survey limits.



STUDY AREA FOR SHEET C, SAN FRANCISCO BAY (NOAA CHART No. 18650, 48<sup>TH</sup> ED., AUG. 29, 1998)

Data acquisition was conducted from July 3, 1999, (Day Number 184), through August 3, 1999 (Day Number 215).

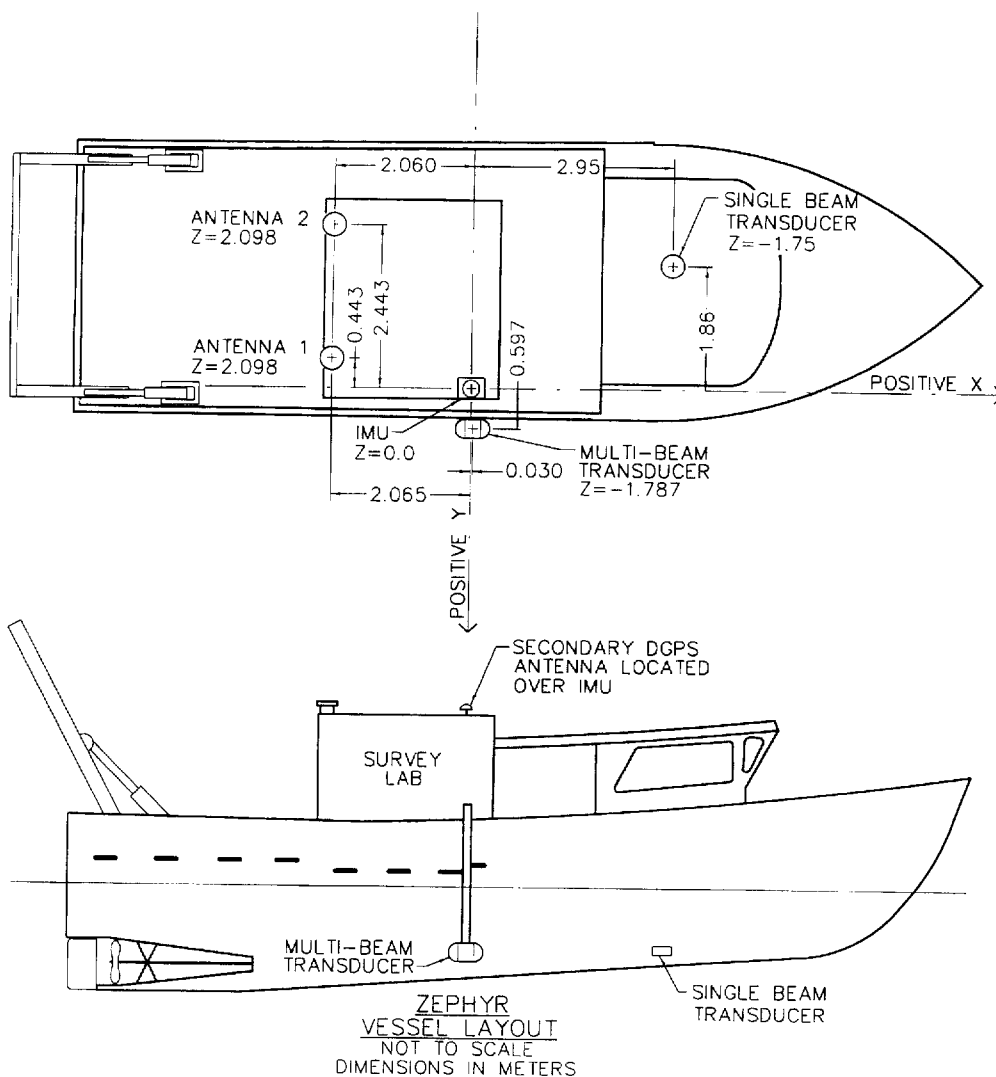
### C. SURVEY VESSELS ✓

For this project, only one vessel was used to perform all requirements as specified in the Statement of Work (SOW).

VESSEL	OPERATION
Zephyr	Multibeam data acquisition, sound velocity casts, DGPS position checks ✓

The Zephyr, registry #929931, is a 44-foot, 34 gross ton aluminum vessel with a 13-foot beam and a draft of five feet. The Zephyr was equipped with an over-the-side mount designed specifically for the multibeam transducer and with an onboard data acquisition and processing lab for all survey work. No unusual sensor set-up configurations were required.

All sensor offsets had been measured from the inertial motion unit (IMU) located inside the acquisition lab on the starboard side, close to the multibeam sensor. Offsets were applied to the data during acquisition, and no changes occurred throughout the survey period. A schematic of the vessel and sensor set-up is shown below.



LAYOUT OF EQUIPMENT ON THE R/V ZEPHYR

**D. AUTOMATED DATA ACQUISITION AND PROCESSING** ✓

DEA developed and implemented a state-of-the-art data acquisition and preliminary processing system aboard the R/V Zephyr in accordance with NOAA standards and modern remote sensing techniques. Data was collected with predicted tides and calibration offsets applied real-time. Initial processing was performed aboard the Zephyr, while final processing and review was performed at the DEA office in Portland. A detailed description of the data acquisition and processing platform can be found in Appendix G. \*

*\* Filed with the hydrographic data.*

During review of the data, an error of the heave lever arm was discovered. As heave was applied to the GSF data in real-time, a correction to the lever arm for remote heave was performed during post-processing. A routine written by Universal Systems Ltd., "Deacorrect.exe", was applied to every file to compute heave at the multibeam sonar head. The "Deacorrect.exe" program used original pitch and roll data to determine the DC component of heave to be added to each sonar ping. Applying this factor eliminated errors associated with an incorrect lever arm offset.

#### E. SONAR EQUIPMENT ✓

No sidescan operations were required for this project. *Concur.*

#### F. SOUNDING EQUIPMENT ✓

A Reson 8101 multibeam sonar was used for the entire survey. The 8101 series, serial number 17024, operates at 240 kHz, producing a 150° swath of 101 uniform beams of 1.5° x 1.5°. To meet IHO standards, only 108° of the sonar swath is used for coverage and sounding selection.



DATA ACQUISITION LAB ABOARD THE ZEPHYR

The Reson sonar head was installed on the Zephyr on June 29, 1999 (DN 180) alongside the Embarcadero Cove Marina in Alameda, California. The original installation of the sonar head and processor, motion sensor, and all ancillary sensors had been done on June 1-3, 1999 (DN 152-154) in Portland, Oregon, for initial testing and system check-out. The sonar head was removed for the transit to California and reinstalled just prior to the start of the survey. Once installation was complete, the vessel underwent system calibration and tests, including settlement and squat, alignment, and static vessel measurements.

During data collection, the Reson sonar range scale was adjusted to obtain the best coverage in different depths of water. In general, this range was kept at four to six times the water depth. Sheet C had water depths from 29 feet (8.8 meters) to 67 feet (20.4 meters), resulting in a sonar range of 35 to 100 meters. The majority of the survey was done at the 75-meter range scale.

The vessel maintained an average speed of seven knots throughout the survey. The sonar system was operated at 10 Hz, providing complete coverage in the along-track direction. Sonar limitations decreased the update rate to 7.5 Hz when operating at the 100-meter range scale.

Using the criteria as specified in the SOW, the multibeam sonar was able to detect shoals that measure two meters by two meters horizontally and one meter vertically in depths of 40 meters or less. In addition, the speed of the vessel was adjusted to be certain that at least 3.2 beam footprints, center-to-center, fell within three meters in the along-track direction. Based on a sonar update rate of 10 Hz and a vessel speed of seven knots, the bottom coverage averaged 8.5 beam footprints every three meters. At slower speeds, the coverage increased significantly. When the sonar was operated on the 100-meter range scale, the bottom coverage averaged 6.4 beam footprints every three meters. Bottom insonification was 150% in a water depth of 20 meters.

Line planning for Sheet C ran parallel with the long axis of the survey area, minimizing turns and surveying approximately along the depth contours. Lines went from the southern sheet limit to the northern sheet limit, with a line spacing of 10 to 30 meters. Line spacing was determined to ensure complete coverage based on the criteria of using only +/- 54 degrees ( 2.75 times water depth), bottom topography, and maintaining at least five meters of overlap between successive lines. In areas with a steep slope, line spacing was reduced to ensure coverage on the upslope side.

The ISS-2000 provided real-time coverage of multibeam sonar data and a color-coded depth display. The sonar coverage used a dynamic 54-degree cut-off angle for swath limits and depths were color-coded based upon all applied offsets and predicted tides. The coverage plot was used to provide initial quality assurance checks of depth and to assure coverage throughout the area.

An Odom Echotrak DF 3200 MKII sonar was used for a daily single beam comparison against the multibeam depths. The sonar, serial number 9414, is a 200 kHz sonar with a beam width of three degrees. During daily system checks, a lead line comparison was made to the sonar, followed by a comparison to the multibeam. The multibeam check required using an off-nadir beam of 1.9 meters to account for the differences of the sonar heads. A complete log of daily checks is included in Appendix E.\* In general, a difference of less than 10 centimeters was observed daily.

*\* Filed with the hydrographic data.*

## G. CORRECTIONS TO SOUNDINGS

### Tide and Water Levels ✓

In accordance with Attachment #7, dated October 1, 1998, of the Project Instructions, the existing primary tide station at Alameda, California (510-941-4750), was used for the survey.

Station Number	Station Name	Latitude	Longitude
941-4750	Alameda, CA	37° 46.3' N	122° 17.9' W

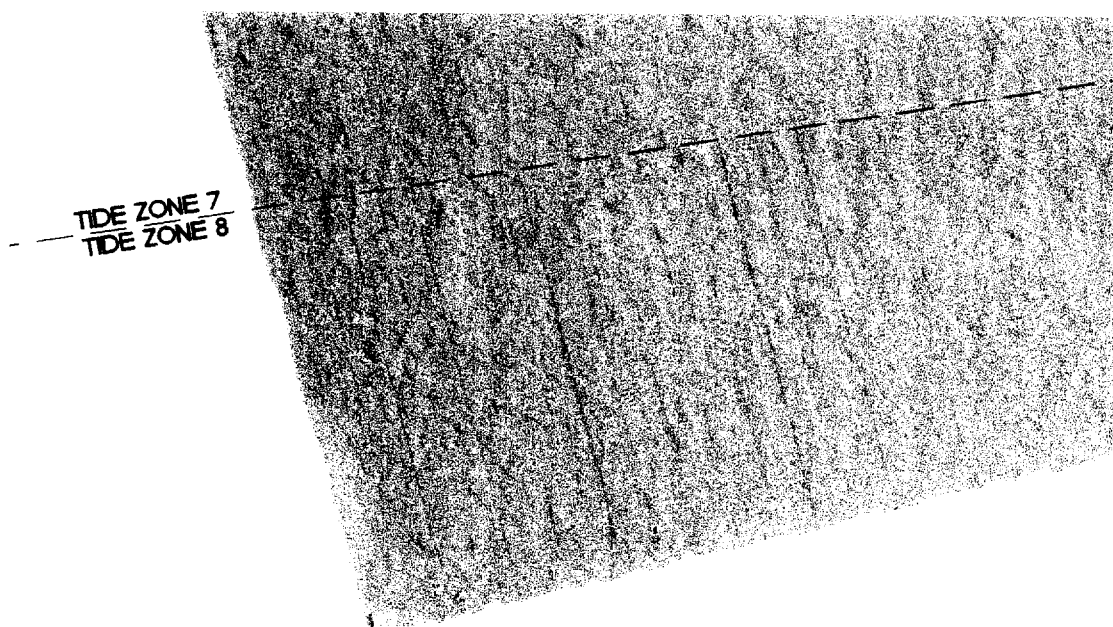
Three tide zones were established on Sheet C as specified by Section 1.2.1 of the project instructions.

Tidal Zone	Time Corrector	Height Corrector Ratio
SF 6	-6 min	0.94
SF 7	0 min	1.00
SF 8	+18 min	1.10



The real-time unverified tide data from the Alameda gauge was downloaded from the Ocean and Lake Levels Division of the NOS web page and used during initial processing of data with the ISS-2000 Geoswath data cleaning. When verified tide data was available, it was downloaded and applied for final processing and production of smooth sheets. Using tidal zone information from the SOW, Caris was used to calculate tidal correctors to be applied in the data.

In a review of a sun-illuminated plot and a contour plot, artifacts in the data were seen at the transition between Tidal Zones SF7 and SF8. Depth differences of one to two feet appeared between adjacent lines. The difference was more noticeable when adjacent lines had been run on different ends of the tide cycle. Further analysis confirmed that the zone information for SF8 was not adequate in correcting the survey data for tides on Sheet C.



SUN-ILLUMINATED PLOT OF SOUNDING DATA

New tidal zoning areas were determined by re-applying the tide data and changing the time and height correctors over the survey area. After each modification, the data was reviewed to determine the best fit for the correctors. Soundings were compared on adjacent lines and the data was examined visually with a sun-illuminated plot. No adjustments were needed on Zone



SF6 and Zone SF7, and those correctors remained the same as stated in the SOW. The following tide zone corrections had the best fit and were applied to the data set. Zone SF8 was renamed to Zone SF8r to identify the change in correctors.

Tidal Zone	Time Corrector	Height Corrector Ratio
SF 6	-6 min	0.94
SF 7	0 min	1.00
SF 8r	0 min	1.00

✓

The Alameda tide station experienced no down time during periods of hydrographic survey. All data was successfully retrieved and is included on tape 1 with the processed data.

### Velocity of Sound ✓

Corrections for the speed of sound through the water column were computed from the data obtained with a Seabird conductivity, temperature and depth (CTD) recorder. Two probes were deployed simultaneously, allowing for a confidence check on every sound velocity reading. The SeaCat SBE model 19-03, S/N 1919847-2691 (primary unit) and 1921127-2793 (secondary unit), were the two sensors used throughout the project. Each sensor had been calibrated prior to the start of the fieldwork. Factory calibration results are included in Appendix E. \*

The downcast data was retrieved using the Seabird Term19 program and data was processed using the Seabird Datchv program. The velocity tables were then loaded into the Reson 6042 software to be applied real time. Casts were taken frequently throughout the day, generally within two hours of the previous cast. Each cast was graphically displayed in the acquisition software and compared to the previous one to verify that there were no significant changes in the water column. Throughout the survey, no change of greater than two meters/second was seen between casts. A closing cast was taken at the end of each day to verify that the sound velocity had not changed by more than two meters/second. ✓

A total of 36 casts were taken, recording 72 sound velocity profiles. Casts were taken in the deepest sections of the survey area. Casts were extended by straight-line interpolation in the event a sounding was taken deeper than the cast. No cast was extrapolated more than 5% in any event. Below is a list of sound velocity casts taken throughout the survey. Cast file names were designated by "yyddd\_nu" where "yy" is year, "ddd" is Julian day number, "n" is daily cast number, and "u" is sensor unit (P for primary and S for secondary).

*\* Filed with the hydrographic data.*

### Sound Velocity Casts

Day	Cast File Number	Start Cast Time	Depth Meters	Applied Cast	North Latitude	West Longitude
184	99184_1P,1S	1740	15	1P	37 46 19	122 21 14
184	99184_2P,2S	2034	20	2P	37 44 51	122 20 24
184	99184_3P,3S	2355	18	3S	37 46 09	122 21 47
186	99186_1P,1S	1545	15	1P	37 46 20	122 20 53
186	99186_2P,2S	1630	13	NA	37 43 40	122 19 34
186	99186_3P,3S	1757	12	3P	37 46 32	122 20 34
186	99186_4P,4S	2005	16	4P	37 46 18	122 20 47
186	99186_5P,5S	2212	16	5P	37 46 14	122 20 43
187	99187_1P,1S	0035	17	1P	37 46 15	122 20 45
187	99187_2P,2S	1448	16	2P	37 46 33	122 20 46
187	99187_3P,3S	1650	16	3P	37 46 22	122 20 13
187	99187_4P,4S	1840	16	4P	37 46 17	122 21 11
187	99187_5P,5S	2045	16	5P	37 46 18	122 21 09
187	99187_6P,6S	2256	17	6P	37 46 17	122 21 11
188	99188_1P,1S	0005	16	NA	37 46 30	122 20 45
188	99188_2P,2S	1506	21	2P	37 45 51	122 21 20
188	99188_3P,3S	1644	20	3P	37 45 56	122 21 19
188	99188_4P,4S	1840	20	4P	37 46 12	122 21 47
188	99188_5P,5S	2039	20	5P	37 46 07	122 21 13
188	99188_6P,6S	2154	18	NA	37 46 17	122 21 10
189	99189_1P,1S	1435	18	1P	37 46 18	122 21 09
189	99189_2P,2S	1631	18	2P	37 46 19	122 21 10
189	99189_3P,3S	1830	18	3P	37 46 11	122 21 13
189	99189_4P,4S	2022	17	4P	37 46 24	122 21 33
189	99189_5P,5S	2220	18	5P	37 46 10	122 21 15
190	99190_6p,6s	0010	19	6P	37 46 11	122 21 11
190	99190_2P,2S	1435	17	2P	37 46 28	122 20 41
190	99190_3P,3S	1620	13	NA	37 43 17	122 20 04
190	99190_4P,4S	1820	18	NA	37 46 09	122 21 10
192	99192_1P,1S	1518	18	1P	37 46 07	122 21 35
192	99192_2P,2S	1639	19	2P	37 45 39	122 21 15
192	99192_3P,3S	1900	19	3P	37 44 50	122 21 04
192	99192_4P,4S	2155	19	4P	37 45 44	122 21 33
193	99193_1P,1S	0030	18	NA	37 45 31	122 21 11
215	99215_1P,1S	1529	21	1P	37 45 55	122 21 20
215	99215_2P,2S	1854	17	NA	37 45 35	122 21 08

### Static Draft ✓

With the vessel out of the water, markings were placed on the aft quarters and the forward section of the hull which provided measurements for vessel draft. These measurements were recorded daily at the start of each survey day. Changes to vessel loads were kept at a minimum during the survey so that only small changes to vessel and transducer drafts resulted. The multibeam mount was marked to provide a visual reading of the static draft of the transducer below the water line. Using the TSS POS M/V to monitor vessel roll, draft readings were observed only when roll was less than 0.2 degrees. The draft of the Reson multibeam sonar ranged from 0.97 to 0.98 meters throughout the survey. Markings along the port side of the vessel in line with the Odom transducer indicated the draft of the single beam sensor. The transducer draft was recorded when the vessel was alongside the pier and the roll angle was less than 0.2 degrees. Its draft ranged from 0.65 to 0.67 meters throughout the survey.

### Dynamic Draft ✓

Settlement and squat measurements for the Zephyr were taken on June 29, 1999 (DN 180), in the Alameda ship channel. Data from these measurements are included in Appendix E. These values were obtained by visually recording the vessel height at different ship RPM's during transects along a pier. Using a Wild NA-2 level on a fixed pier, observations were taken to a metric rod held along the centerline of the vessel directly abeam of the sonar head and IMU location. During each transect, an initial value was recorded while the vessel was at rest, followed by ten readings at the designated speed, then a reading with the ship at rest. The ship squat value was based on averaging the ten readings, then subtracting out the average rest values of the line.



MULTIBEAM MOUNT WITH DRAFT MARKS

Ship speeds in increments of 100-200 RPM's were observed from 650 to 1600 RPM's. Results from the settlement and squat tests can be found in Appendix E. These data from the settlement and squat tests were applied to the sonar data during acquisition in the ISS-2000 software. Changes in ship RPM's were entered during acquisition to reflect new values for settlement and squat correctors. The average ship speed throughout the survey was 1300 RPM's, with a vessel settlement and squat correction of 7.8 cm.

## **Heave, Roll and Pitch Corrections ✓**

A TSS POS M/V 320 integrated Differential Global Positioning System (DGPS) and inertial reference system, serial number 040, was used for the motion sensor and primary navigation system for the Zephyr. The system comprised of an inertial motion unit (IMU), dual GPS antennas, and a data processor. The Reson 6042 software program recorded the ship heave, roll and pitch data at 25Hz through an Ethernet connection. A ComputerBoards, Inc., CIO-INT32 card, installed in the 6042 hardware configuration, was used to provide a one-millisecond clock for time stamping data.

The TSS POS M/V320 is a six-degree of freedom motion unit, with stated accuracies of 0.05m or 5% for heave, 0.02 degrees for roll, pitch and heading. Real-time displays of the vessel motion accuracy were monitored throughout the survey with the POS controller program. If any one of the vessel motion accuracies degraded to greater than 0.05 degrees, survey operations were suspended until the inertial unit was able to obtain the higher degree of accuracy. There were no periods during the survey that the unit experienced degraded accuracy or performance.

## **Initial System Calibration ✓**

To confirm alignment of the IMU sensor with the sonar transducer and to verify delay times applied to the time-tagged sensor data, a patch test was conducted. The patch test consisted of a series of lines run in a specific pattern which was used in pairs to analyze roll, pitch and heading alignment bias angles as well as latency (time delays) in the time tagging of the sensor data. The patch test lines were run according to NOAA standards in the following order: pitch, latency, roll, and heading. The tests were conducted on July 2-3, 1999 (DN 183-184).

Roll alignment had been determined by running reciprocal lines 500-1000 meters long over a flat bottom, in the deepest part of the survey area. This area is located on the northwestern section of Sheet C. Pitch and latency errors were determined by running reciprocal lines 500-1000 meters in length over a smooth slope perpendicular to the depth curves. The heading error was determined by running reciprocal lines made on each side of a submerged feature in shallow water. Lines had been run at 1000 RPM's to allow for cross track coverage and overlap.

To measure the alignment error in pitch, a selected pair of pitch lines were analyzed with the ISS-2000 software through a series of incremental changes in pitch angle over a specified range and the differences computed. Similarly, heading, roll and latency lines had been processed and corrections for each computed.

Two sets of lines were run and analyzed for pitch, latency, roll and heading. This duplication allowed for a complete analysis and to be certain that the bias obtained are correct.

The following biases were determined from the Patch Test using SAIC software.

Alignment	Bias
Roll	1.09
Pitch	0.0
Yaw	0.0
Latency	0.0

✓

To ensure no systematic errors were obtained, the entire data set was processed and analyzed with the Caris Patch Test routine. Slight differences were seen and verified on multiple lines, including a line with a known feature. These additional biases listed in the table below were applied to the entire data set. Data from the GSF files that had been converted to Caris for processing have the original bias applied. Thus any new corrector found is computed as an additional component and only that portion would be included in the Vessel Configuration File.

Alignment	SAIC Bias	Caris Bias	Total Vessel Bias
Roll	1.09	0.1	1.19
Pitch	0.0	-1.5	-1.5
Yaw	0.0	0.0	0.0
Latency	0.0	0.0	0.0

✓

### Lead line Comparison ✓

Lead line checks were performed against the multibeam and single beam echosounders at the start and end of each day while the ship was tied up alongside its berth in the marina. Lead line readings were taken on the port and starboard side directly abeam of the sonar transducer and on the port side abeam to the single beam transducer. Lead line readings were recorded and compared to the multibeam data recorded in the ISS-2000 software. Leadline data on the starboard side was compared to the Reson nadir beam, while the data recorded on the port side was checked against the off-nadir beam at -3.9 meters.

The Odom echosounder provided an analog output during lead lines checks, and a fix mark was recorded on the paper trace. All depths were recorded manually in the daily system check logs.

Differences of less than 10 cm were seen throughout the survey. Lead line logs are attached in Appendix E. \*

*\* Filed with the hydrographic data.*



## H. HYDROGRAPHIC POSITION CONTROL ✓

### Horizontal Datum ✓

The horizontal control datum for this project is North American Datum of 1983 (NAD83), Universal Transverse Mercator, Zone 10, projection was used with metric units when exporting to MicroStation.

### Positioning Equipment ✓

The primary positioning system for the survey was a TSS POS M/V 320 integrated Digital Geographic Positioning System (DGPS) inertial reference system. For quality control, position data from a secondary positioning system was simultaneously acquired. The secondary system consisted of a Trimble 4000SE GPS receiver. The ISS-2000 software, GPSmon, displayed in real-time the error between the two positioning systems. In general, differences of less than one meter were seen throughout the survey. Differential corrections for both systems were provided by a Trimble ProBeacon receiver acquiring corrections from the U.S. Coast Guard beacons located at Point Blunt or Pigeon Point.

The inertial component of the POS M/V ensures continuity of all data during GPS dropouts, enabling continued operation in high multipath environments and around significant obstructions. After power-up, the Inertial Measurement Unit (IMU) became the primary source of navigation data.

### Position Control ✓

Differential GPS provided hydrographic control throughout the survey. The following beacons were used during hydrographic operations:

Reference Station	Frequency (kHz)	Survey Operation (Day Number)
Pigeon Point (station ID 266)	287	183,184,187,190
Point Blunt (station ID 268)	310	188,189,190,192

On Day Number 190, Point Blunt went off the air for scheduled U.S. Coast Guard maintenance. Survey operations continued using the Pigeon Point beacon for the remainder of the day.

### DGPS Performance Checks ✓

A DGPS performance check point was established at the Alameda Marina with a Leica MX412 roving DGPS receiver. A confidence check was observed on NGS control station "Alameda" and a DGPS position was observed on "Quinns PK". A PK nail was set in the dock at Slip 52, Embarcadero Cove Marina, Alameda, California. The point was referenced as Quinns PK.

Station	Latitude	Longitude
Alameda	37 46 20.7152 N	122 17 17.2593 W
Quinns PK	37 46 51.354 N	122 14 38.778 W



Daily position confidence checks were conducted at this point by placing the Trimble DGPS antenna over the point and comparing the position obtained from the initial established position. The antenna was then moved to a point on the vessel directly above the IMU position and Trimble position was compared with the position derived from the TSS POS M/V system. Position differences of one meter or less were recorded throughout the survey. A complete log of daily position checks and a detached position record are included in appendix E \*

**I. SHORELINE** ✓

Not Applicable. Shoreline verification was not required. *Concur.*

**J. CROSSLINES** ✓

A total of 14.9 nautical miles of crosslines, or 6.5%, were run in the survey area. In general, the crosslines were in good agreement with the main scheme data. The statistical analysis of the data set was performed using the Universal Systems Ltd. (USL) makehist routine, version dated 12/10/98. A quality control report was created, listing statistics by beam number, and is attached in Appendix E. \*

A section representing 25.3 percent of the survey area was included in the analysis. The area covers the lower quarter of the survey area, with depths ranging from 35 feet to 62 feet, and is representative of the entire survey area. A 0.5-meter sort of all crosslines was compared to a 2-meter gridded DTM based upon a 0.5-meter sort of the section of mainscheme data.

The mean difference of the data set ranged from 10 cm at the near nadir beams to 31 cm at the outermost beams of the port side. The majority of the differences was less than 13 centimeters. One hundred percent of the data fell within five decimeters on all but three of the outermost beams. Beams 14-16 had agreement of 98 to 99 percent at the 5-decimeter level. Beams 21 through 92 showed greater than 90 percent agreement at the 3-decimeter level.

Overall, the good agreement of the crosslines, taken on separate days from the mainscheme show no systematic errors of the multibeam acquisition or processing routines. *Concur.*

**K. JUNCTIONS** ✓

Junctions were not required. *Concur.*

*\* Filed with the hydrographic data.*

**L. COMPARISON WITH PRIOR SURVEYS** (See EVAL RPT, Sec. M)

Comparison with prior surveys was not required under this contract. <sup>concur.</sup> See Section N for comparison to the nautical charts.

**M. ITEM INVESTIGATION REPORTS** ✓

No AWOIS items were assigned for the survey area. For the two features that were found, a Danger to Navigation letter was initiated and submitted to the Pacific Hydrographic Section, Seattle, Washington. A summary of these items is shown below. Copies of the Danger to Navigation letters are attached <sup>to this report.</sup> in Appendix A.

One feature, located in the anchorage area (area no.12), is an obstruction rising 5.5 feet off the seafloor and has a minimum depth of 48 feet. The charted depth in the area is 55 feet. Two charts, 18649 and 18650, are affected by this item, and it is recommended that the charts indicate this obstruction. The obstruction should be charted at latitude 37 44 42.61 N, longitude 122 20 17.97 W, with a depth of 48 feet. *Concur. chart obstruction as depicted on this present survey.*

A second feature is the shoaling area, extending nearly the entire length of the survey limits, was found on the eastern section of the sheet. Both the 30-foot and 36-foot contours have migrated westward. The 30-foot contour was seen to have shifted 460 meters to the west, and a 29-foot sounding was observed on the NW limit of the shoal. The charted depth in the area is 31 feet. The 36-foot contour has migrated 90 meters to the west, and a 35-foot sounding was observed on the NW limit of the shoal. The charted depth in that area is 39 feet. This feature affects two charts, 18649 and 18650, and it is recommended that new contours are drawn to reflect the migrating shoal. *Concur. Chart the area as shown on the present survey.*

**N. COMPARISON WITH THE CHART** (See EVAL RPT, Sec. O)

Three published charts are within the survey area. From the selected sounding plot, comparisons were made to the depths on each of the charts.

Chart	Scale	Edition	Date
18650	1:20,000	47	April 5, 1997
18649	1:40,000	59	April 26, 1997
18651	1:40,000	40	July 29, 1995

In general, soundings were in agreement with the charts in the area. A general shoaling on the eastern section resulted in depth differences of up to four feet from the charted depths. The 30- and 36-foot contour limits had migrated westward from their previous locations. This was most noticeable at the midsection of the eastern side, though the entire contour from the north to the south had a shift to the west. Depths of two feet deeper were seen on some sections of the survey area, primarily on the northwestern section. *Do not concur. The present soundings are about 1 to 2 feet shallower than the charted depths.*



**O. ADEQUACY OF SURVEY** (*See EVAL RPT, Sec. P*)

The survey is complete and should supercede all prior surveys. By utilizing multibeam sonar bottom coverage was complete and all features and possible obstructions were identified. *CONCUR.*

**P. AIDS TO NAVIGATION** (*See EVAL RPT, Sec. Q*)

Two navigational buoys were within the survey limits, G "1" and R "2", located on the northeastern and northwestern corners, respectively, of the survey area. The positions of the buoys were obtained by locating the buoy blocks with the multibeam data. Both the buoy blocks and anchor chains were observed while surveying lines adjacent to the navigational aids. Positions of the buoys were compared to both the charted positions and to the position listed in the Light List (Volume 6, 1999) and the differences are noted below.

**Buoy G "1" (FL G 4s)** (*LL # 4820*)

	Latitude	Longitude
Survey position	37°46'08.0" N	122°21'49.1" W
Charted position	37°46'07.0" N	122°21'50.2" W
Light List Position	37°46'06" N ✓	122°21'48" W ✓

Survey position is approximately 33 meters NW of the charted position and 68 meters SW of the position in the Light List.

**Buoy R "2" (FL R 4s)** (*LL # 4750*)

	Latitude	Longitude
Survey position	37°46'27.9" N	122°20'29.1" W
Charted position	37°46'27" N	122°20'27" W
Light List Position	37°46'30" N ✓	122°20'30" W ✓

Survey position is approximately 16 meters NE of the charted position and 66 meters NW of the position in the Light List

The light characteristics of the buoys are correct and no changes are required. *CONCUR.*

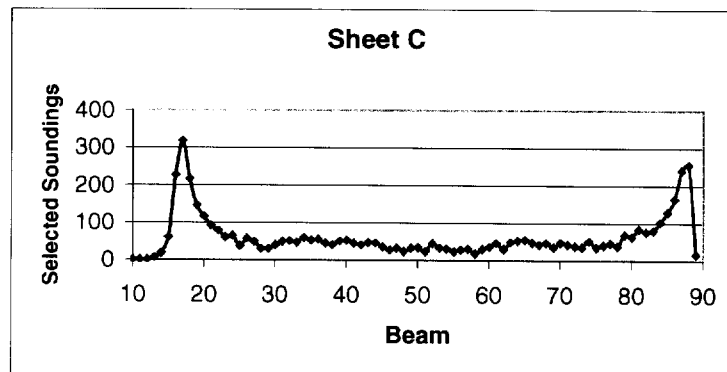
## Q. STATISTICS ✓

Description	Quantities
Days of Acquisition	9
Total Soundings	115,995,571
Total Soundings in 2m sort	2,890,000
Total Selected Soundings	4794
Total Mainscheme (nm)	234.59
Total Crosslines (nm)	14.88
Total Mainscheme (no. of lines )	88
Total Crosslines ( no. of lines )	13
Total Detached Positions	1
Total square nautical miles	3.3
Velocity casts	72
Tide Stations Installed	0

## R. MISCELLANEOUS ✓

### Selected Soundings ✓

A histogram of all selected soundings was made and is plotted below. The graph represents the number of times each beam was used as a selected sounding. The selected sounding process was a shoal-biased selection, based on a 10 meter bin selection and exported through a Caris overplot routine. This procedure examined the entire survey area and reduced the number of soundings to avoid text overwrites. A total of 4794 soundings was selected.



HISTOGRAM OF SELECTED SOUNDINGS

A high incidence of outer beams was observed in the sounding routine. This was investigated to determine if a systematic bias had been introduced into the data. No single source was found. It was concluded that the high selection of outer-beam data points could be attributed to a number of factors. The primary was that a multibeam system will result in outer beams with lower incident angles. This may result in shoaler depths when comparing outer beams to the near nadir beams. All the beams used in the survey and analysis were taken at a dynamic 54 degrees from nadir and have exceeded Class I IHO depth standards. Additionally, the entire survey had overlapping lines, in some cases as much as 40 percent, which increased the number of outer beams being grouped with more nadir beams during the binning process. The drop off in selection of dynamic outer beams can be attributed to periodic rejection of these beams based on exceeding the 54-degree swath limit. *Concur .*

The depths obtained in the survey have indicated a shoaling on the eastern side of the sheet limits. Noticeable shifts in the 30- and 36-foot contours were observed. In general, the contour has shifted by 300-400 meters westward. *Concur . This shoaling could be the results of continuous shifting of sediments towards the middle of the bay .*

No magnetic disturbances were observed.

#### S. RECOMMENDATIONS

It is recommended that the 30- and 36-foot curves along the eastern side<sup>of</sup> the sheet limits be developed further. *Concur .*

#### T. REFERRAL TO REPORTS (*See EVAL RPT, Sec. U*)

None

## APPROVAL SHEET

for

**H-10895**

Standard field surveying and processing procedures were followed in producing this survey in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; and the Field Procedures Manual, as updated for 1997. The data were reviewed daily during acquisition and processing.

The digital data and supporting records have been reviewed by me, are considered complete and adequate for charting purposes, and are approved. All records are forwarded for final review and processing to N/CS34, Pacific Hydrographic Branch.

Approved and forwarded,



Jonathan L. Dasler, P.E., P.L.S.  
Director of Hydrographic Services  
David Evans and Associates, Inc.



**DAVID EVANS AND ASSOCIATES, INC.**

TELECOPY TRANSMITTAL

*2828 SW Corbett Avenue*

TO: **Gary Nelson**

FAX NO: **206-526-4514**

*Portland, Oregon 97201*

Dennis Hill

PHONE NO: 206-526-6731

FIRM: NOAA

# OF PAGES: 4

*Tel: 503.223.6663*

FROM: Jon Dasler

PROJ. #: OPR-L304-KR-98

*Fax: 503.223.2701*

DATE:

REGARDING: Report of Danger to Navigation

COPIES: **Brian Greenawalt**

FAX NO: **301-713-4533**

ORIGINAL TO FOLLOW:  REGULAR MAIL  OVERNIGHT MAIL  COURIER  N/A

COMMENTS:

While conducting hydrographic survey operations in San Francisco Bay, David Evans and Associates, Inc. discovered two features that may pose a danger to navigation. Attached are the Danger to Navigation reports indicating the position of these items.

Differential GPS and multibeam sonar were used to determine the position and depths. These data are preliminary and subject to office review.

Danger to Navigation Report

7/14/99

ADVANCE  
INFORMATION

Hydrographic Survey Registry No.: H-10895

State: California

General Locality: San Francisco Bay

Sublocality: 3.5 NM SSE of Yerba Buena Island

Project Number: OPR-L304-KR-98

The following item was found during hydrographic survey operations:

Object discovered: Migrating Shoal

Description: A 200 meter long area of shoaling was found outside the charted 30 foot contour. The shoal area has migrated westward moving the charted 30 foot contour 460 meters west. A depth of 29 feet below MLLW was observed at the NW limit of the shoal using preliminary observed tides. The charted depth in the area is 31 feet.

A 600 meter long area of shoaling was found outside the charted 36 foot contour. The shoal area has migrated westward moving the charted 36 foot contour 90 meters west. A depth of 35 feet below MLLW was observed at the NW limit of the shoal using preliminary observed tides. The charted depth in the area is 39 feet.

Affected nautical charts:

Chart Number	Edition		Reported Depth	Charted Horiz. Datum	Geographic Position	
	No.	Date			Latitude	Longitude
18650	48	Aug. 29, 1998	29 Feet	NAD 83	37° 45' 35.99" N	122° 20' 10.18" W
18649	60	Sept. 19, 1998				
18650	48	Aug. 29, 1998	35 Feet	NAD 83	37° 45' 36.29" N	122° 20' 20.94" W
18649	60	Sept. 19, 1998				



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42 41 40 39 39 37 36 36

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39 38 37 37 35 32 31 30

37 38 37 38 35 35 32 30

36 37 38 38 35 35 32 32

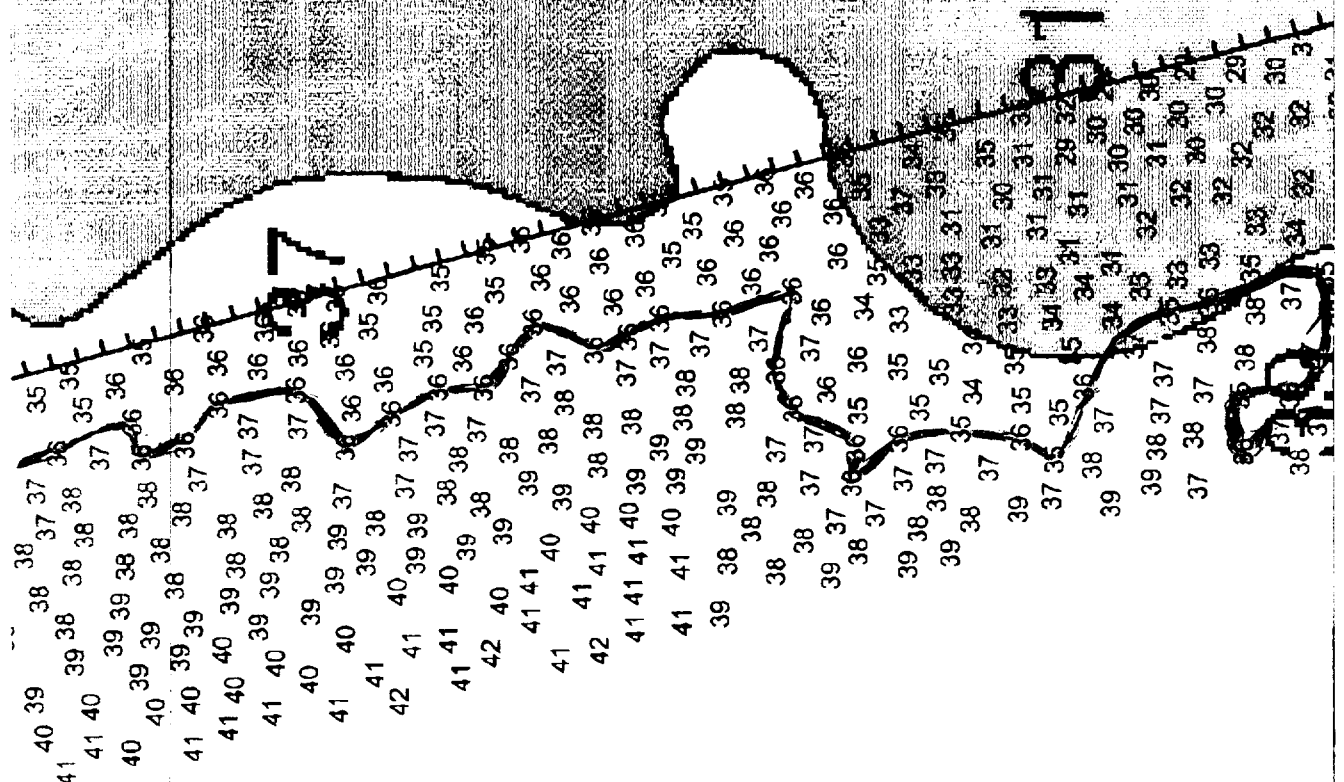
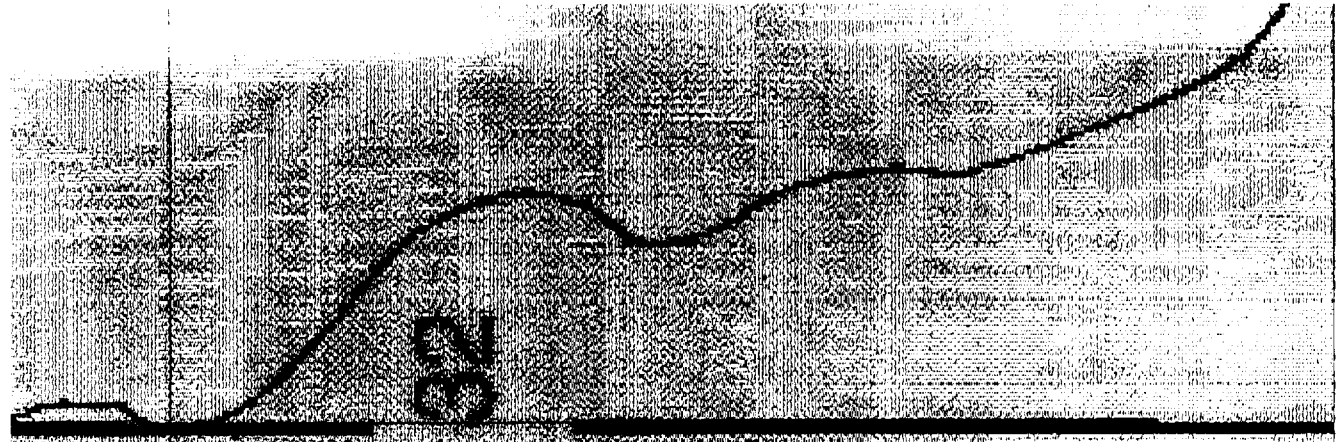
36 37 37 34 32 32 30 31

47

53

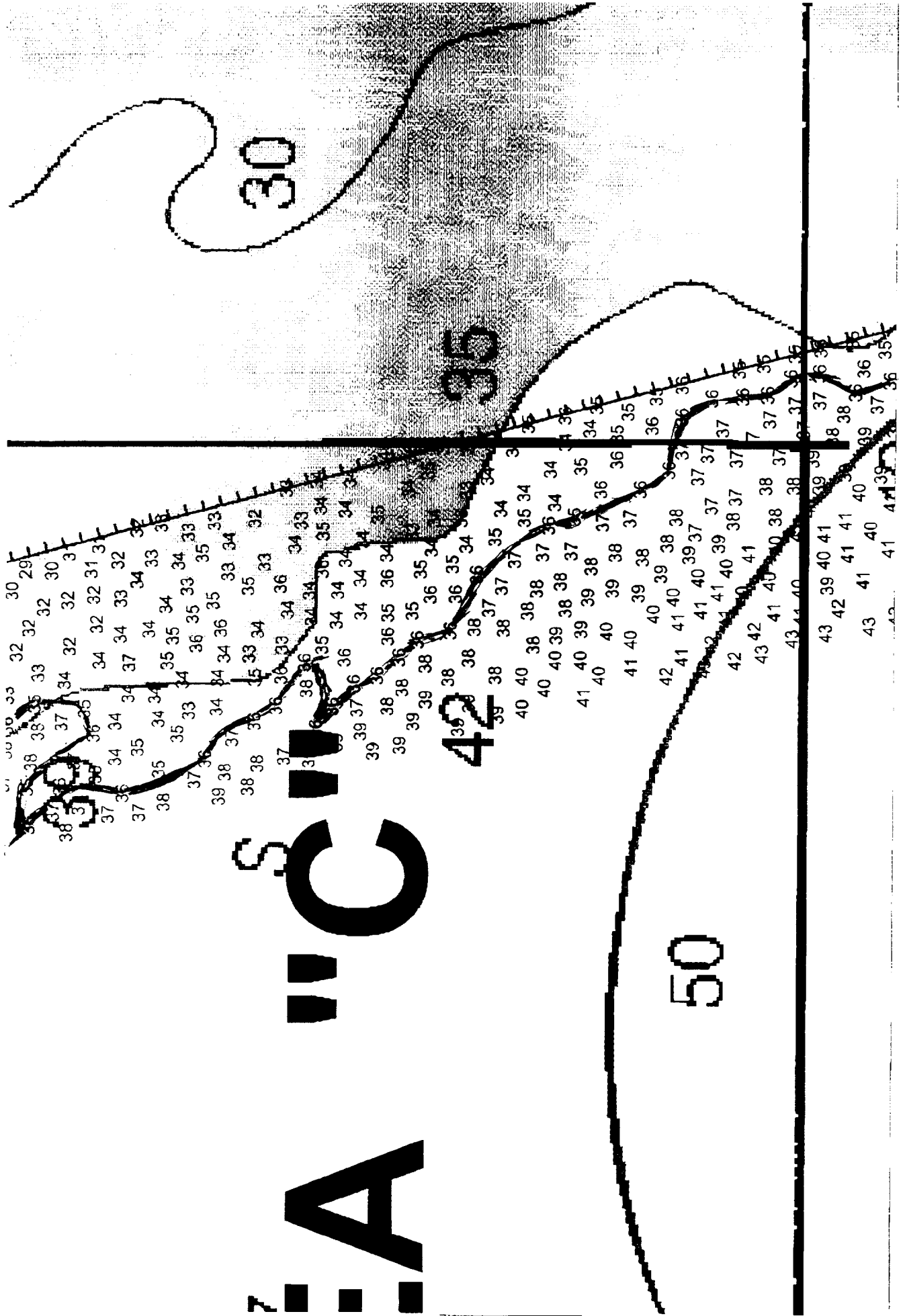
PAGE NO. 9

note A) 48



A dense grid of small numbers, likely representing data points or a coordinate system, covering the lower half of the page. The numbers are arranged in a somewhat regular pattern, with some variations in spacing and alignment.













**DAVID EVANS AND ASSOCIATES, INC.**

TELECOPY TRANSMITTAL

2828 SW Corbett Avenue

TO: **Gary Nelson**  
Dennis Hill

FAX NO: **206-526-4514**

Portland, Oregon 97201

PHONE NO: 206-526-6731

FIRM: NOAA

# OF PAGES: 4

Tel: 503.223.6663

FROM: Jon Dasler

PROJ. #: OPR-L304-KR-98

Fax: 503.223.2701

DATE: 7/14/99

REGARDING: Report of Danger to Navigation

COPIES: **Brian Greenawalt**

FAX NO: **301-713-4533**

ORIGINAL TO FOLLOW:  REGULAR MAIL  OVERNIGHT MAIL  COURIER  N/A

COMMENTS:

While conducting hydrographic survey operations in San Francisco Bay, David Evans and Associates, Inc. discovered two features that may pose a danger to navigation. Attached are the Danger to Navigation reports indicating the position of these items.

Differential GPS and multibeam sonar were used to determine the position and depths. These data are preliminary and subject to office review.

Danger to Navigation Report

7/14/99

ADVANCE  
INFORMATION

corrected depth  
danger - 9/22  
anchor zone 45'

Hydrographic Survey Registry No.: H-10895

State: California

General Locality: San Francisco Bay

Sublocality: 3.5 NM SSE of Yerba Buena Island

Project Number: OPR-L304-KR-98

14.72 m  
48.3 feet.

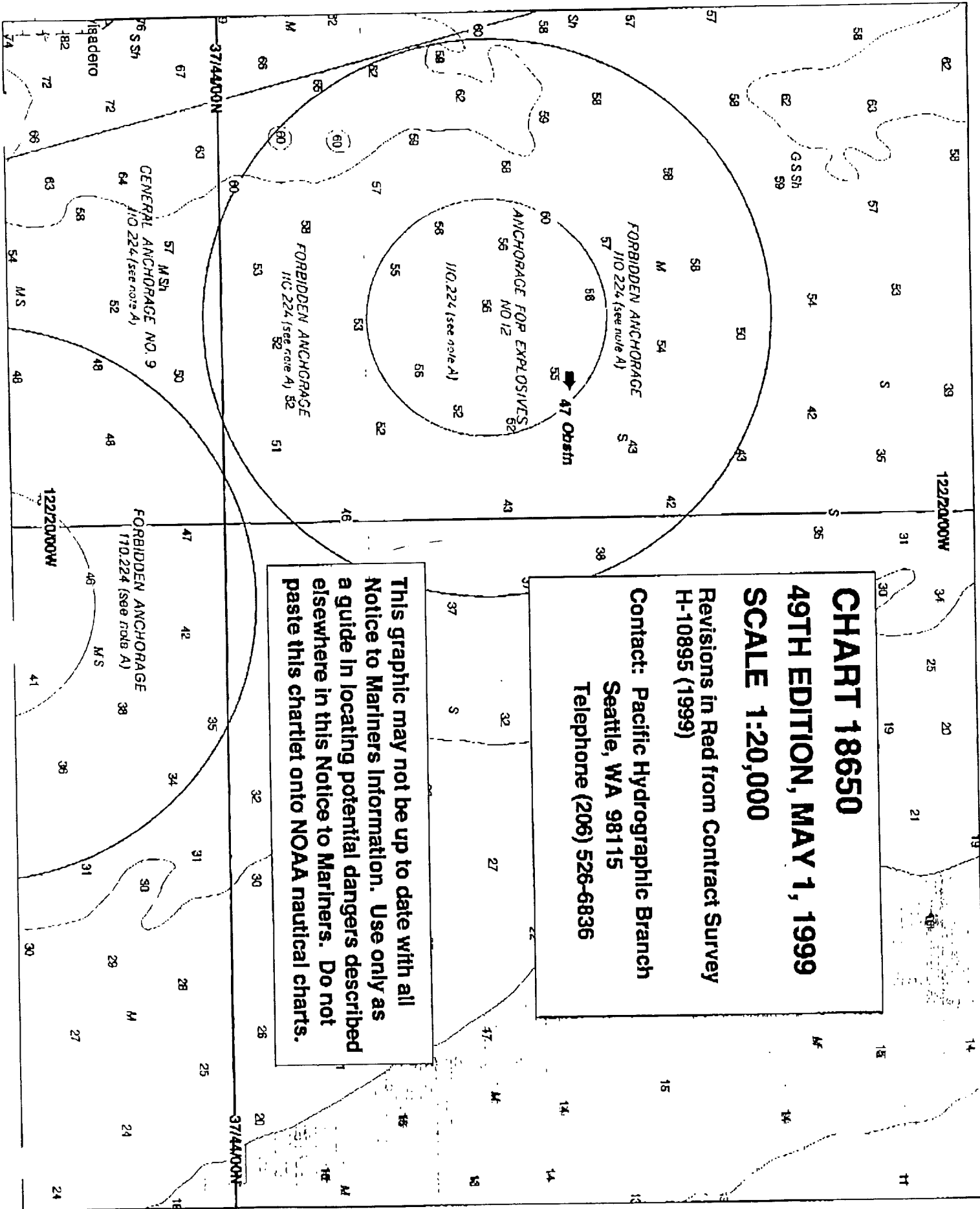
The following item was found during hydrographic survey operations:

Object discovered: Obstruction

Description: An object was found to be 5.5 feet above the surrounding seafloor.  
Using preliminary observed tides, a depth of 47 feet below MLLW was computed from  
multibeam data. The charted depth in this area is 55 feet.

Affected nautical charts:

Chart Number	Edition		Reported Depth	Charted Horiz. Datum	Geographic Position	
	No.	Date			Latitude	Longitude
18650	48	Aug. 29, 1998	47 Feet	NAD 83	37° 44' 42.61" N	122° 20' 17.97" W
18649	60	Sept. 19, 1998				



This graphic may not be up to date with all Notice to Mariners Information. Use only as a guide in locating potential dangers described elsewhere in this Notice to Mariners. Do not paste this chartlet onto NOAA nautical charts.

**CHART 18650**  
**49TH EDITION, MAY 1, 1999**  
**SCALE 1:20,000**  
 Revisions in Red from Contract Survey  
 H-10895 (1999)  
 Contact: Pacific Hydrographic Branch  
 Seattle, WA 98115  
 Telephone (206) 526-6836



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL OCEAN SERVICE  
OFFICE OF COAST SURVEY  
Pacific Hydrographic Branch  
Seattle, Washington 98115-0070

July 12, 1999

Commander (OAN)  
Eleventh Coast Guard District  
Coast Guard Island  
Building 50-6  
Alameda, CA 94501-5100

Dear Sir:

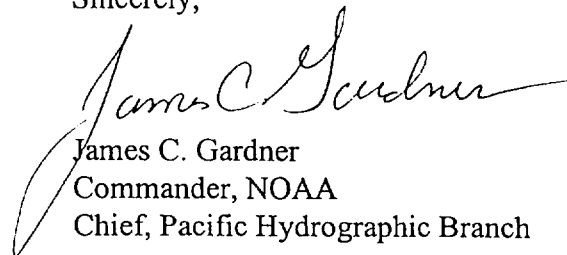
While conducting survey operations in San Francisco Bay, NOAA contractor, David Evans and Associates, Inc., discovered one submerged obstruction considered to be a potential danger to navigation affecting the following charts:

<u>Chart</u>	<u>Edition/Date</u>	<u>Datum</u>
18649	60 <sup>th</sup> , 9/19/98	NAD 83
18650	49 <sup>th</sup> , 5/01/99	NAD 83

It is recommended that the enclosed Report of Dangers to Navigation be included in the Local Notice to Mariners.

Questions concerning this report should be directed to the Pacific Hydrographic Branch at (206) 526-6836.

Sincerely,

  
James C. Gardner  
Commander, NOAA  
Chief, Pacific Hydrographic Branch

Enclosures

cc: NIMA  
NCS/261





REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10895

Survey Title:           State:           CALIFORNIA  
                          Locality:        SAN FRANCISCO BAY  
                          Sublocality:    3.5 NM SSE OF YERBA BUENA ISLAND

Project Number: OPR-L304-KR-99

Survey Date:           July 3, 1999 - July 12, 1999

Features are reduced to Mean Lower Low Water using predicted tides and are positioned on NAD 83.

Charts affected:       18649 60<sup>th</sup> Edition/Sept.19, 1998, scale 1:40,000, NAD 83  
                          18650 49<sup>th</sup> Edition/May 01, 1999, scale 1:20,000, NAD 83

<u>DANGER TO NAVIGATION</u>	<u>LATITUDE(N)</u>	<u>LONGITUDE(W)</u>
A.) Obstruction, subm 47 feet	37/44/42.6	122/20/18.0

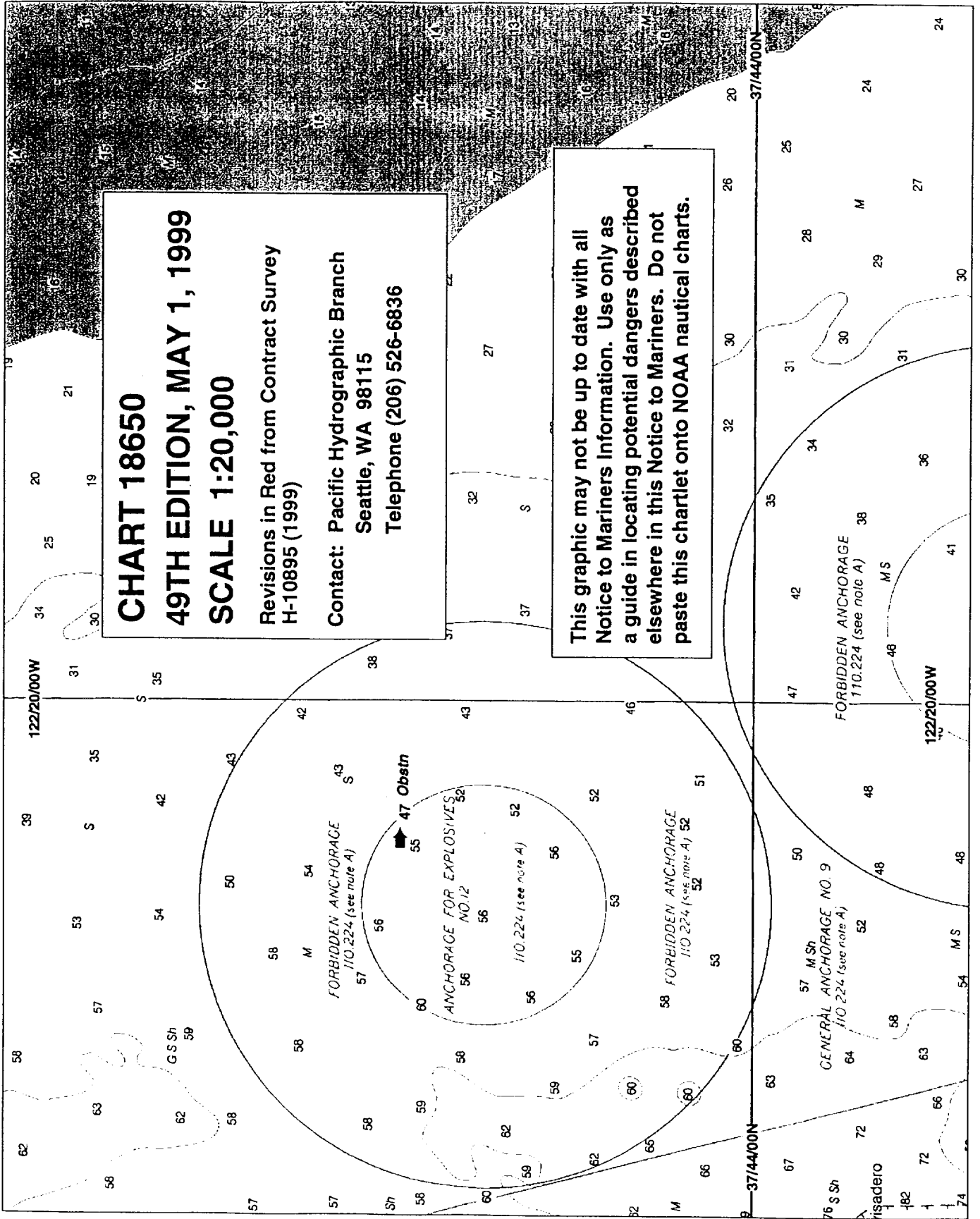
Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206) 526-6836.

**CHART 18650**  
**49TH EDITION, MAY 1, 1999**  
**SCALE 1:20,000**

Revisions in Red from Contract Survey  
H-10895 (1999)

Contact: Pacific Hydrographic Branch  
Seattle, WA 98115  
Telephone (206) 526-6836

This graphic may not be up to date with all  
Notice to Mariners Information. Use only as  
a guide in locating potential dangers described  
elsewhere in this Notice to Mariners. Do not  
paste this chartlet onto NOAA nautical charts.



July 30, 1999

Commander (O-7(N))  
Eleventh Coast Guard District  
Coast Guard Island  
Building 50-6  
Alameda, CA 94501-5100

Dear Sir:

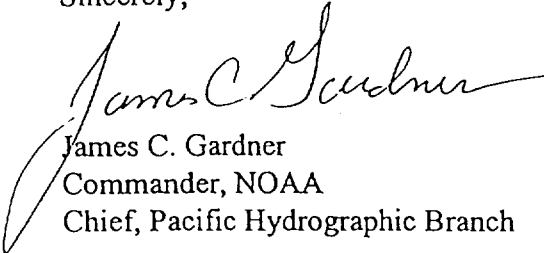
While conducting survey operations in San Francisco Bay, NOAA contractor, David Evans and Associates, Inc., discovered significant shoaling considered to be a potential danger to navigation affecting the following charts:

<u>Chart</u>	<u>Edition/Date</u>	<u>Datum</u>
18649	60 <sup>th</sup> , 9/19/98	NAD 83
18650	49 <sup>th</sup> , 5/01/99	NAD 83

It is recommended that the enclosed Report of Dangers to Navigation be included in the Local Notice to Mariners.

Questions concerning this report should be directed to the Pacific Hydrographic Branch at (206) 526-6836.

Sincerely,

  
James C. Gardner  
Commander, NOAA  
Chief, Pacific Hydrographic Branch

Enclosures

cc: NIMA  
NCS/261



REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10895

Survey Title:                    State:            CALIFORNIA  
                                      Locality:        SAN FRANCISCO BAY  
                                      Sublocality:    3.5 NM SSE OF YERBA BUENA ISLAND

Project Number:            OPR-L304-KR-99

Survey Date:                July 3, 1999 - July 12, 1999

Features are reduced to Mean Lower Low Water using predicted tides and are positioned on NAD 83.

Charts affected:            18649 60<sup>th</sup> Edition/Sept. 19, 1998, scale 1:40,000, NAD 83  
                                      18650 49<sup>th</sup> Edition/May 01, 1999, scale 1:20,000, NAD 83

DANGER TO NAVIGATION

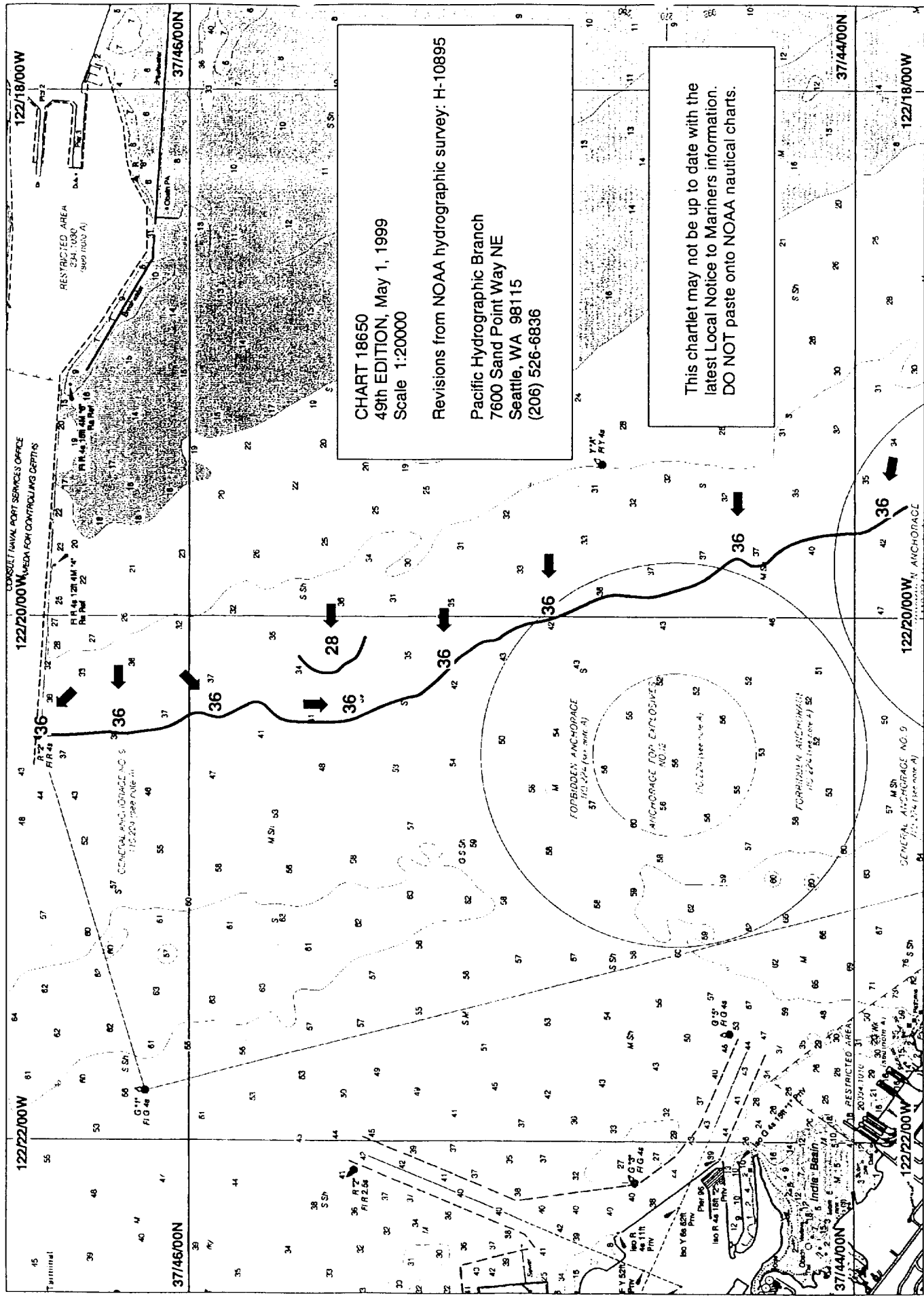
Shoaling was found in an area bounded by:   LATITUDE(N)                    LONGITUDE(W)

	37/46/28	122/20/26
	37/46/23	122/20/43
	37/43/42	122/19/28
	37/43/40	122/19/43

As a result, both the 36-foot contour and the 30-foot contour have shifted to the west between .08 nm and .25 nm. Significant soundings defining these contours are as follows:

<u>DEPTH</u>	<u>LATITUDE(N)</u>	<u>LONGITUDE(W)</u>
36	37/46/27	122/20/25
36	37/46/13	122/20/24
36	37/45/58	122/20/19
36	37/45/31	122/20/20
36	37/45/14	122/20/10
36	37/44/55	122/19/57
36	37/44/21	122/19/43
36	37/43/55	122/19/35
28	37/45/32	122/20/07

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206) 526-6836.



CONSULT NAVAL PORT SERVICES OFFICE  
122/20/00W, AREA FOR CONTROLLING DEPTHS

RESTRICTED AREA  
234,7030  
(see note A)

GENERAL ANCHORAGE NO. 5  
(1:10,000 scale only)

FORBIDDEN ANCHORAGE  
(1:10,000 scale only)

ANCHORAGE FOR EXPOSIVES  
(1:10,000 scale only)

FORBIDDEN ANCHORAGE  
(1:10,000 scale only)

GENERAL ANCHORAGE NO. 9  
(1:10,000 scale only)

RESTRICTED AREA

RESTRICTED AREA

RESTRICTED AREA

RESTRICTED AREA

RESTRICTED AREA

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RESTRICTED AREA

Terminal

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FIG. 46

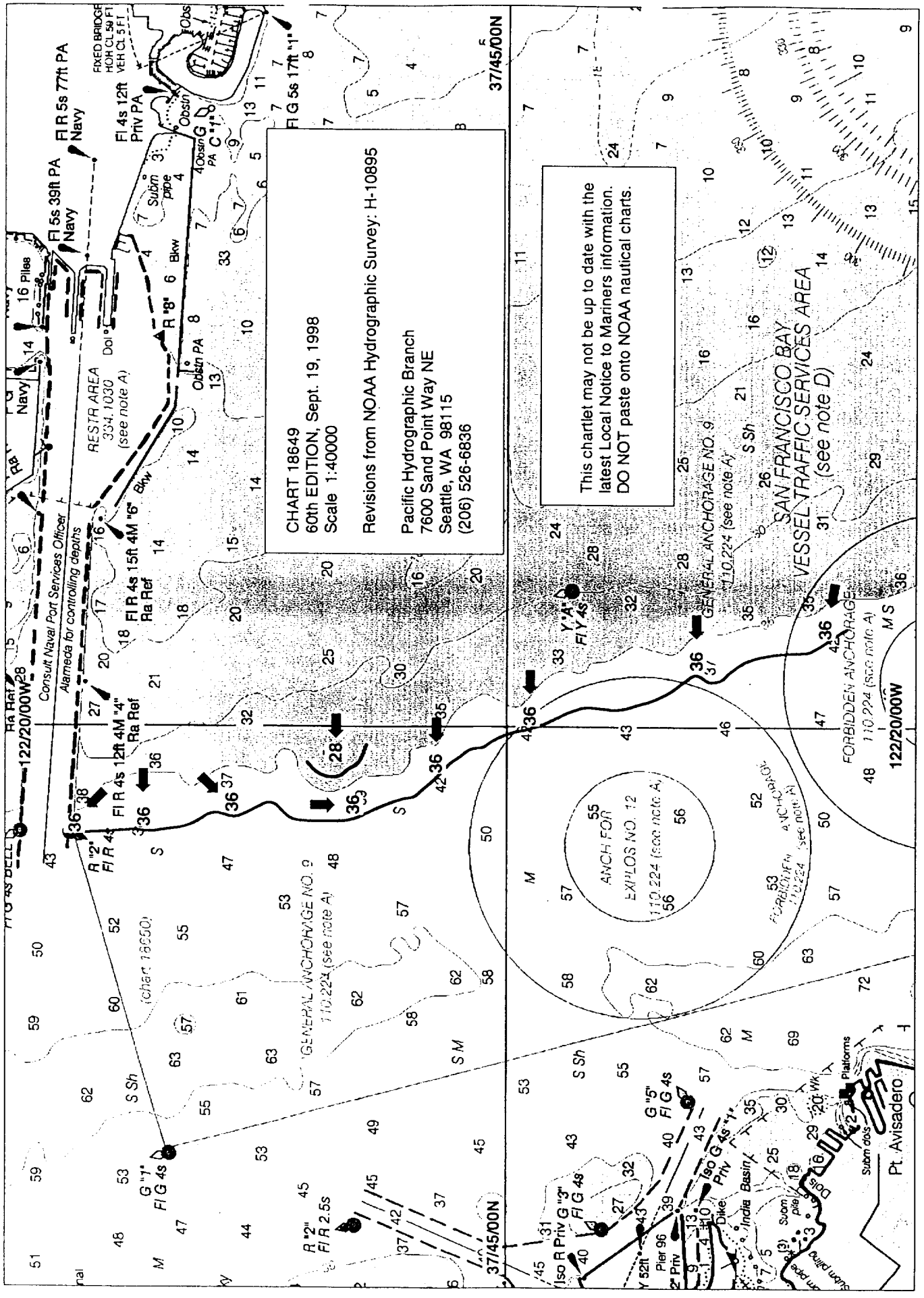


CHART 18649  
 60th EDITION, Sept. 19, 1998  
 Scale 1:40000  
 Revisions from NOAA Hydrographic Survey: H-10895  
 Pacific Hydrographic Branch  
 7600 Sand Point Way NE  
 Seattle, WA 98115  
 (206) 526-6836

This chartlet may not be up to date with the latest Local Notice to Mariners information. DO NOT paste onto NOAA nautical charts.

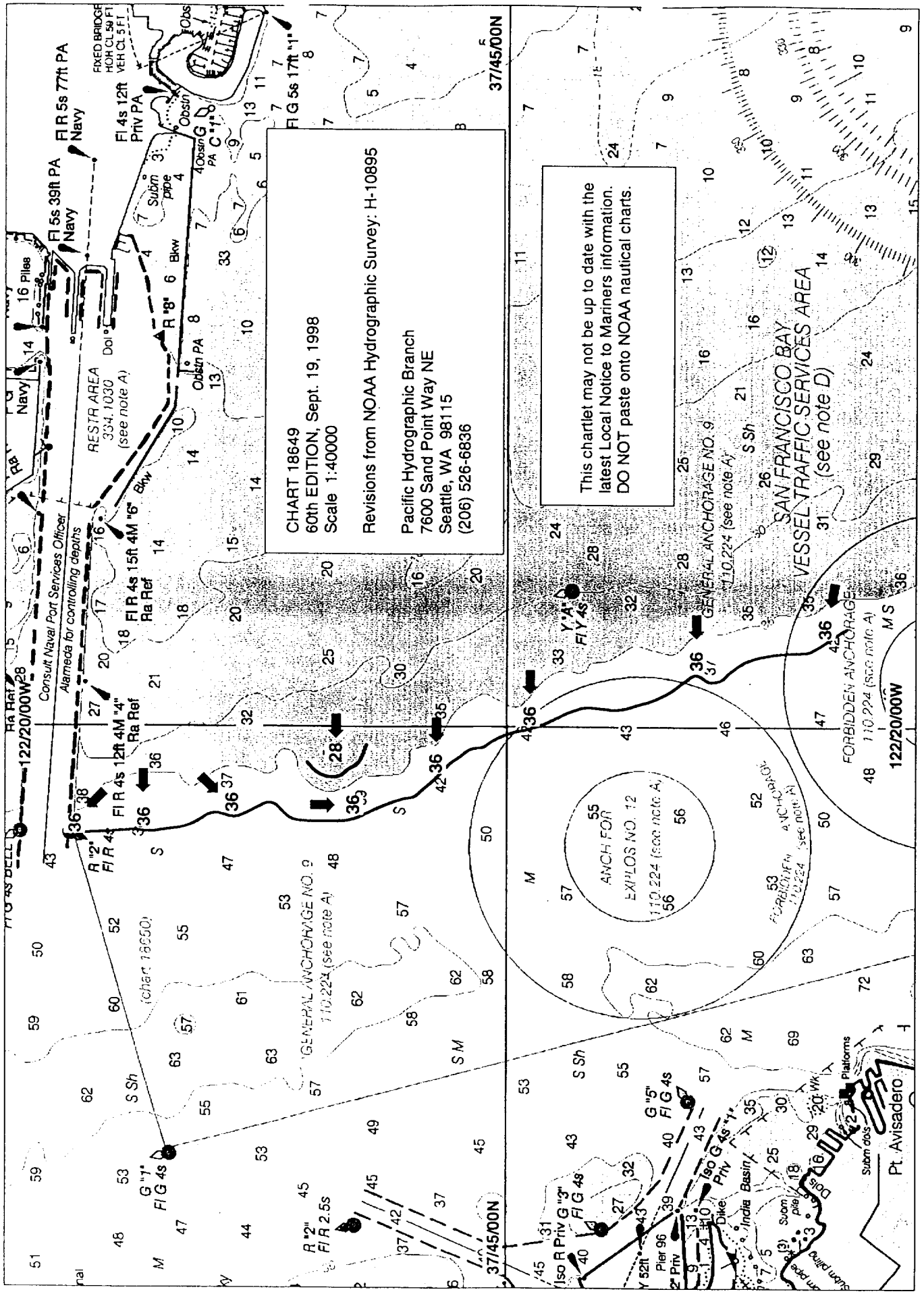
SAN FRANCISCO BAY  
 VESSEL TRAFFIC SERVICES AREA  
 (see note D)

ANCH FOR  
 EXPLOS NO. 12  
 110.224 (see note A)  
 56

ANCHORAGE  
 110.224 (see note A)  
 53

GENERAL ANCHORAGE NO. 9  
 110.224 (see note A)  
 36

FORBIDDEN ANCHORAGE  
 110.224 (see note A)  
 48



August 23, 1999

Commander (OAN)  
Eleventh Coast Guard District  
Coast Guard Island  
Building 50-6  
Alameda, CA 94501-5100

Dear Sir:

During office review an error was found in the Danger to Navigation Report dated July 30, 1999 affecting the following charts:

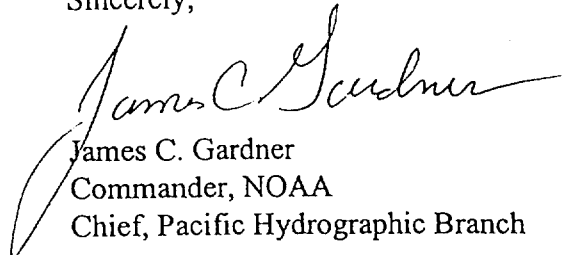
<u>Chart</u>	<u>Edition/Date</u>	<u>Datum</u>
18649	60 <sup>th</sup> , 9/19/98	NAD 83
18650	49 <sup>th</sup> , 5/01/99	NAD 83

A shoal sounding of 28 feet listed at 37/45/14N, 122/20/41W should be 28 feet at 37/45/32N, 122/20/07W. Attached is a corrected Danger to Navigation Report.

It is recommended that a correction be included in the Local Notice to Mariners.

Questions concerning this report should be directed to the Pacific Hydrographic Branch at (206) 526-6836.

Sincerely,

  
James C. Gardner  
Commander, NOAA  
Chief, Pacific Hydrographic Branch

Enclosures

cc: NIMA  
NCS/261



## REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10895

Survey Title:           State:           CALIFORNIA  
                          Locality:       SAN FRANCISCO BAY  
                          Sublocality:   3.5 NM SSE OF YERBA BUENA ISLAND

Project Number:       OPR-L304-KR-99

Survey Date:           July 3, 1999 - July 12, 1999

Features are reduced to Mean Lower Low Water using predicted tides and are positioned on NAD 83.

Charts affected:       18649 60<sup>th</sup> Edition/Sept.19, 1998, scale 1:40,000, NAD 83  
                          18650 49<sup>th</sup> Edition/May 01, 1999, scale 1:20,000, NAD 83

### DANGER TO NAVIGATION

Shoaling was found in an area bounded by:   LATITUDE(N)           LONGITUDE(W)

	37/46/28	122/20/26
	37/46/23	122/20/43
	37/43/42	122/19/28
	37/43/40	122/19/43

As a result, both the 36-foot contour and the 30-foot contour have shifted to the west between .08 nm and .25 nm. Significant soundings defining these contours are as follows:

<u>DEPTH</u>	<u>LATITUDE(N)</u>	<u>LONGITUDE(W)</u>
36	37/46/27	122/20/25
36	37/46/13	122/20/24
36	37/45/58	122/20/19
36	37/45/31	122/20/20
36	37/45/14	122/20/10
36	37/44/55	122/19/57
36	37/44/21	122/19/43
36	37/43/55	122/19/35
28	37/45/32	122/20/07

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206) 526-6836.



NOAA FORM 77-27(H) (9-83)		U.S. DEPARTMENT OF COMMERCE		REGISTRY NUMBER	
HYDROGRAPHIC SURVEY STATISTICS				H-10895	
RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed.					
RECORD DESCRIPTION		AMOUNT		RECORD DESCRIPTION	
SMOOTH SHEET		1		SMOOTH OVERLAYS: POS., ARC, EXCESS	
DESCRIPTIVE REPORT		1		FIELD SHEETS AND OTHER OVERLAYS	
DESCRIP- TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR- GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS
ACCORDION FILES					
ENVELOPES					
VOLUMES					
CAHIERS					
Digital Boxes Tapes	1				
SHORELINE DATA					
SHORELINE MAPS (List): N/A					
PHOTOBATHYMETRIC MAPS (List): N/A					
NOTES TO THE HYDROGRAPHER (List): None					
SPECIAL REPORTS (List): None					
NAUTICAL CHARTS (List): 18650, 49th Edition, May 1, 1999					
OFFICE PROCESSING ACTIVITIES <i>The following statistics will be submitted with the cartographer's report on the survey</i>					
PROCESSING ACTIVITY			AMOUNTS		
			VERIFICATION	EVALUATION	TOTALS
POSITIONS ON SHEET					
POSITIONS REVISED					
SOUNDINGS REVISED					
CONTROL STATIONS REVISED					
			TIME-HOURS		
			VERIFICATION	EVALUATION	TOTALS
PRE-PROCESSING EXAMINATION					
VERIFICATION OF CONTROL					
VERIFICATION OF POSITIONS					
VERIFICATION OF SOUNDINGS			73.5		73.5
VERIFICATION OF JUNCTIONS					
APPLICATION OF PHOTOBATHYMETRY					
SHORELINE APPLICATION-VERIFICATION					
COMPILATION OF SMOOTH SHEET			15.0		15.0
COMPARISON WITH PRIOR SURVEYS AND CHARTS					
EVALUATION OF SIDE SCAN SONAR RECORDS					
EVALUATION OF WIRE DRAGS AND SWEEPS					
EVALUATION REPORT				22.0	22.0
GEOGRAPHIC NAMES					
OTHER: (Chart Compilation)				20.0	20.0
USE OTHER SIDE OF FORM FOR REMARKS					
TOTALS			88.5	42.0	130.5
Pre-processing Examination by G. Nelson, D. Hill			Beginning Date 12/17/99	Ending Date 12/20/99	
Verification of Field Data by G. Nelson, B. Mihailov, I. Almacen			Time (Hours) 88.5	Ending Date 6/7/00	
Verification Check by L. Deodato			Time (Hours) 4.0	Ending Date 10/25/00	
Evaluation and Analysis by I. Almacen			Time (Hours) 22.0	Ending Date 6/8/00	
Inspection by L. Deodato			Time (Hours) 2.0	Ending Date 10/25/00	

## EVALUATION REPORT H-10895

### **A. PROJECT**

Survey H-10895 was conducted under contract number 50-DGNC-9-90011 awarded on June 15, 1999. A Statement of Work (SOW), dated October 1, 1998 contains specific requirements. The purpose of this contract is to provide NOAA with modern, accurate hydrographic survey data with which to update the existing nautical charts of the area.

This survey was conducted by David Evans & Associates, Inc. of Portland, Oregon, which hereafter mentioned as the hydrographer. Specific information pertaining to this contractor may be obtained from NOS Hydrographic Survey Division (N/CS3)

### **B. AREA SURVEYED**

The survey area is adequately discussed in the hydrographer's report

A page-size plot of the charted area depicting the specific limits of supersession accompanies this report as Attachment 1.

Bottom sampling was not required for this contract. Depths range from 0 to 124 fathoms.

### **C. SURVEY VESSELS**

The hydrographer's report contains adequate information relating to the vessel used during this survey.

### **D. AUTOMATED DATA ACQUISITION AND PROCESSING**

Shallow water multibeam data were acquired using Reson SEABAT 8101 systems. Data acquisition and processing procedures employed in the field have been adequately documented in the hydrographer's report, section D.

Office review of survey data and the preliminary smooth sheet was accomplished at the Pacific Hydrographic Branch. The final smooth sheet was compiled with MicroStation 95.

The smooth sheet drawing is filed in the MicroStation format, i.e., dgn extension. Copy of this file will be forwarded to the Hydrographic Surveys Division and a backup copy retained at PHB.

The drawing files necessarily contain information that is not part of the field data set such as geographic names text, line-type data, and minor symbolization. Cartographic codes used to describe the digital data are those authorized by the NOS Hydrographic Surveys Specifications and Deliverables.

The data are plotted using a Universal Transverse Mercator (UTM) projection and are depicted on a single sheet.

### **E. SONAR EQUIPMENT**

Towed side scan sonar was not utilized during this survey.

### **F. SOUNDING EQUIPMENT**

Sounding equipment has been adequately discussed in the hydrographer's report.

### **G. CORRECTIONS TO SOUNDINGS**

Soundings have been reduced to Mean Lower Low Water (MLLW), with verified tide data obtained from the Ocean Products and Services Division (OPSD) Home Page "Hydro Hot List". The approved tide correctors are zoned from Alameda, California, gage 941-4750. Further information concerning tides can be found in section G of the hydrographer's report.

Other sounding reducers include corrections for static draft, dynamic draft, sound velocity, heave, roll and pitch. These reducers have been reviewed and are consistent with NOS specification.

**H. CONTROL STATIONS**

The positions of horizontal control stations used during hydrographic operations are published values based on NAD 83.

The smooth sheet is annotated with an NAD27 adjustment tick based on values determined with the NGS program NADCON. Geographic positions based on NAD27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections.

Latitude: -0.252 seconds (-7.783 meters)  
Longitude: 3.893 seconds (95.296 meters)

**I. HYDROGRAPHIC POSITION CONTROL**

Hydrographic position control has been adequately discussed in the hydrographer's report.

**J. SHORELINE**

Investigation of shoreline was not required under this contract.

**K. CROSSLINES**

Crosslines are adequately discussed in the hydrographer's report.

**L. JUNCTIONS**

Junction comparisons were not required on this survey.

**M. COMPARISON WITH PRIOR SURVEYS**

Comparison with prior surveys was not required under this contract. However, comparison with the following prior survey was accomplished as part of the standard office processing procedure.

<u>Survey</u>	<u>Year</u>	<u>Scale</u>
H-10494	1993	1:10,000

Survey H-10494 covers the entire area of the present survey. This prior survey was previously compiled in meters. There is a good sounding agreement between the two surveys, except that their respective depth curves delineate two different units of depths and therefore not in coincidence. The soundings from this present survey generally agree to within one to two feet of the prior with the exception of the shoaling noted along the eastern section of the bay and the 48-foot obstruction reported as dangers to navigation.

Survey H-10895 is adequate to supersede the above prior survey within the area of common coverage.

**N. ITEM INVESTIGATION:**

No AWOIS items were assigned for this survey.

**O. COMPARISON WITH CHART**

Survey H-10895 was compared with the following chart.

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>	<u>Datum</u>
18650	49th	May 1, 1999	1:20,000	NAD 83
18649	61st	Jan. 22, 2000	1:40,000	NAD 83
18651	40th	July 29, 1995	1:40,000	NAD 83

a. Hydrography

Charted hydrography originates primarily with the previously discussed prior survey and from miscellaneous sources. The prior survey has been adequately addressed in the preceding section and require no further discussion.

Survey H-10895 is adequate to supersede charted hydrography within the common area of coverage.

b. Dangers to navigation

Five (5) Dangers to Navigation (DTON) reports for this survey were transmitted to the USCG, NIMA, N/CS261 and N/CS3 on July 12, 1999, July 14, 1999, July 30, 1999 and August 23, 1999. A copy of the reports is attached. No additional dangers were found during office processing.

**P. ADEQUACY OF SURVEY**

The hydrography contained on survey H-10895 is adequate to:

- a. delineate the bottom configuration, determine least depths, and draw the required depth curves;
- b. reveal there are no significant discrepancies or anomalies requiring further investigation; and
- c. show the survey was properly controlled and soundings are correctly plotted.

With the exception of the following, the hydrographic records and reports received for processing are adequate and conform to the requirements of the NOS Hydrographic Surveys Specifications and Deliverables dated April 1999 and the Statement of Work dated October 1, 1998.

The descriptive report format does not follow the section labeling scheme specified in the Specs and Deliverables, section 8.1.3. This includes the identification of appendices.

**Q. AIDS TO NAVIGATION**

There are two (2) floating aids to navigation within the survey area. The locations of these aids were verified using the DGPS positioning system. They were found in good condition and adequately serve their intended purpose.

**R. STATISTICS**

Statistics are adequately itemized in the hydrographer's report.

**S. MISCELLANEOUS**


Miscellaneous information is adequately discussed in the hydrographer's report.

**T. RECOMMENDATIONS**

Survey H-10870 is a good hydrographic survey. No additional work is recommended.

**U. REFERRAL TO REPORTS**

The hydrographer's report contains no reference to additional survey information in section T, Referral to Reports. However, several appendices included in the original descriptive report have been detached and filed with the rest of the hydrographic field records. These documents contain important information concerning the type of vessel used, system characteristics, system checks, instrument calibrations and data processing procedures.

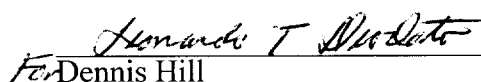


Isagani A. Almacen  
Cartographer

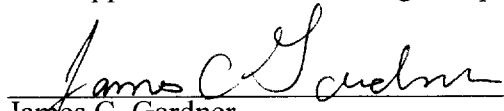
APPROVAL SHEET  
H-10895

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, comparison with prior surveys and verification or disproval of charted data. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

  
\_\_\_\_\_  
Dennis Hill  
Supervisory Cartographer  
Pacific Hydrographic Branch  
Date: 10/26/00

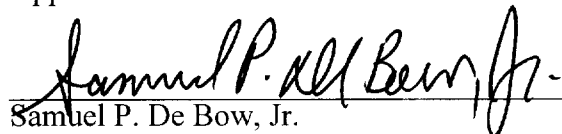
I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

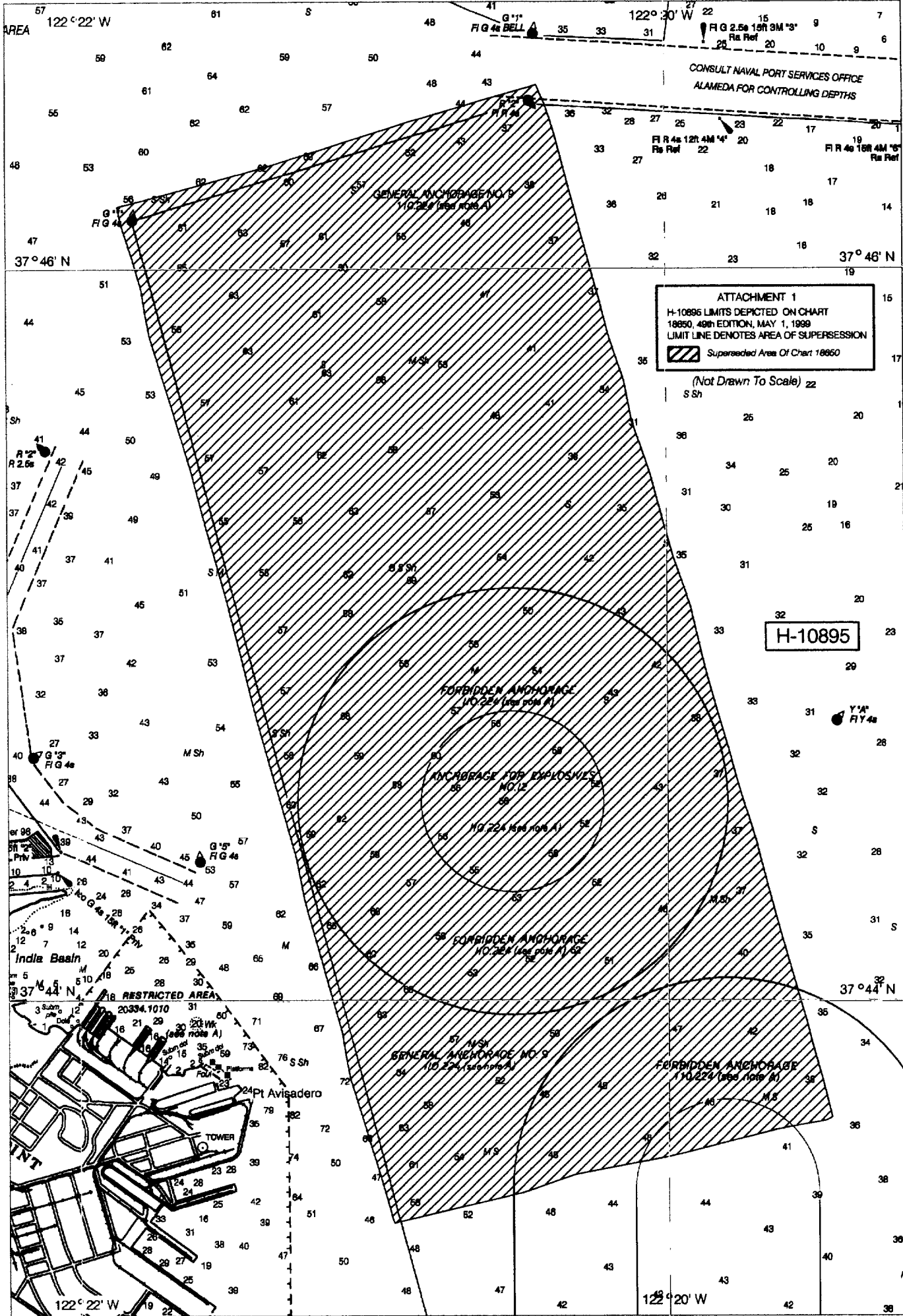
  
\_\_\_\_\_  
James C. Gardner  
Commander, NOAA  
Chief, Pacific Hydrographic Branch  
Date: 11-29-00

\*\*\*\*\*

Final Approval

Approved:

  
\_\_\_\_\_  
Samuel P. De Bow, Jr.  
Captain, NOAA  
Chief, Hydrographic Surveys Division  
Date: 12/5/00



ATTACHMENT 1  
 H-10896 LIMITS DEPICTED ON CHART  
 18660, 49th EDITION, MAY 1, 1999  
 LIMIT LINE DENOTES AREA OF SUPERSESSION  
 [Hatched Box] Superseded Area Of Chart 18660

H-10895

AREA 122° 22' W

122° 30' W

37° 46' N

37° 46' N

37° 44' N

37° 44' N

122° 22' W

122° 20' W

