

Errata 28 Oct 63 ✓  
p. 217

UNIVERSITY OF CALIFORNIA | SCRIPPS INSTITUTION OF OCEANOGRAPHY

## data report

PHYSICAL AND CHEMICAL DATA

CCOFI Cruise 5908  
13-31 August 1959

and

CCOFI Cruise 5909  
9 September - 1 October 1959

SIO Reference 61-19  
12 September 1961

UNIVERSITY OF CALIFORNIA  
SCRIPPS INSTITUTION OF OCEANOGRAPHY

PHYSICAL AND CHEMICAL DATA

CCOFI CRUISE 5908  
13-31 August 1959

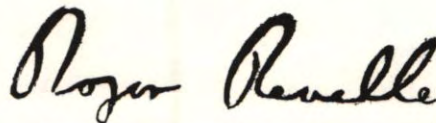
and

CCOFI CRUISE 5909  
9 September - 1 October 1959

Sponsored by  
Marine Research Committee

SIO Reference 61-19  
12 September 1961

Approved for distribution:

A handwritten signature in dark ink, reading "Roger Revelle". The signature is fluid and cursive, with the first name "Roger" and last name "Revelle" clearly distinguishable.

Roger Revelle, Director

## CONTENTS

|                        |     |
|------------------------|-----|
| INTRODUCTION . . . . . | iii |
|------------------------|-----|

### CRUISE 5908

|                           |     |
|---------------------------|-----|
| List of Figures . . . . . | ix  |
| Personnel . . . . .       | xi  |
| Tabulated Data . . . . .  | 304 |

### CRUISE 5909

|                           |      |
|---------------------------|------|
| List of Figures . . . . . | xii  |
| Personnel . . . . .       | xiii |
| Tabulated Data . . . . .  | 368  |

|                             |     |
|-----------------------------|-----|
| DISTRIBUTION LIST . . . . . | 385 |
|-----------------------------|-----|

## INTRODUCTION

The data presented in this report were collected on the one hundred and twenty-third and the one hundred and twenty-fourth consecutive cruises of the California Cooperative Oceanic Fisheries Investigations program. The Scripps Institution's Tuna Oceanography Research (STOR) program conducted a cruise called TO-59-2 from 13 August through 22 September 1959, using the R/V Hugh M. Smith. The cruise extended far to the south of the area of the CCOFI surveys, but the first part of it, from 13 August through 29 August, was devoted to occupying regular CCOFI stations (lines 130-153, in part) off the Pacific coast of Baja California. The observations made at these stations consisted of those regularly made in the CCOFI investigations together with other biological, chemical (silicate, nitrite, nitrate, acidity and alkalinity) and physical observations particularly required by the STOR program. Continuity with the oceanography of the region north of line 130 was provided by R/V Black Douglas, of the U. S. Bureau of Commercial Fisheries, and the R/V Orca, of the Scripps Institution, which occupied stations on lines 77-100 and lines 103-127, respectively, at the same period. For CCOFI purposes, all of the data collected by the three ships along regular CCOFI station lines have been included in Cruise 5908. All of the STOR observations, together with all observations made on the remaining part of TO-59-2 and on two other cruises, will be published by the U. S. Bureau of Commercial Fisheries which sponsored the STOR investigations. This publication will appear as a Special Scientific Report (Fisheries) of the U. S. Fish and Wildlife Service, entitled "Physical, chemical, and biological investigations in the eastern tropical Pacific Ocean: three cruises to the Gulf of Tehuantepec, 1958-1959." The R/V Black Douglas of the U. S. Bureau of Commercial Fisheries and the R/V Orca of the Scripps Institution participated in Cruise 5909.

The data are tabulated at observed depths; the interpolated and computed values are tabulated at standard depths and are accompanied by charts of horizontal distribution. The presentation of data in this report does not constitute publication; however, the data contained in this report have been carefully edited and no modifications should be necessary before final publication.

## STANDARD PROCEDURES

Processing of the data was carried out using the method described by Klein.<sup>1/</sup> Certain approximations have been introduced for the determination of the integrated pressure terms which may result in errors whose maximum values are less than 0.5 dynamic centimeter at 0 over 200 decibars, 1.0 dynamic centimeter

---

<sup>1/</sup> Klein, Hans T. A new technique for processing physical oceanographic data. MS.

at 0 over 500 decibars, and 2.0 dynamic centimeters at 0 over 1000 decibars. The 125-meter level was introduced into the integration to obtain greater accuracy in the determination of  $\Delta D$ . The interpolated values at 125 meters are not tabulated.

To indicate degree of accuracy, temperatures are recorded in tenths of a degree when obtained by bucket thermometer, thermograph, or bathythermograph, while temperatures from reversing thermometers are recorded in hundredths of a degree. Extrapolated values and values interpolated between remote observations are entered within parentheses. A hyphen is used to indicate a missing observed value. The time is the time of messenger release. When more than one cast was made on a station, messenger times and wire angles are given in the order of increasing depth. A line is left blank between the observed data of each cast.

#### FOOTNOTES

Laboratory personnel, before titrating the salinity samples, note any possible imperfections in the sealing of the bottles as follows:

Loose bottle cap:

The cap is definitely loose so that it could be moved with very little applied pressure. The salinity values obtained from these samples may be usable depending on time and/or conditions of storage.

Possible evaporation:

Either the cap was sealed with less than usual pressure, the bottle edge chipped, the rubber washer cracked, or the bale broke on opening, etc.

Use of the above values in interpolation depends upon consistency with other values of salinity and other properties, and these footnotes are supplemented with "falls on property curve" or "does not fall on property curve," depending upon whether the property curve was drawn through the value or not.

In addition to footnotes, three special notations are used without footnotes because their meaning is always the same.

To indicate a premature or a delayed reversal of the water-sampling device which results in certain depth and property errors, the following notation is used.

p: pretrip or posttrip.

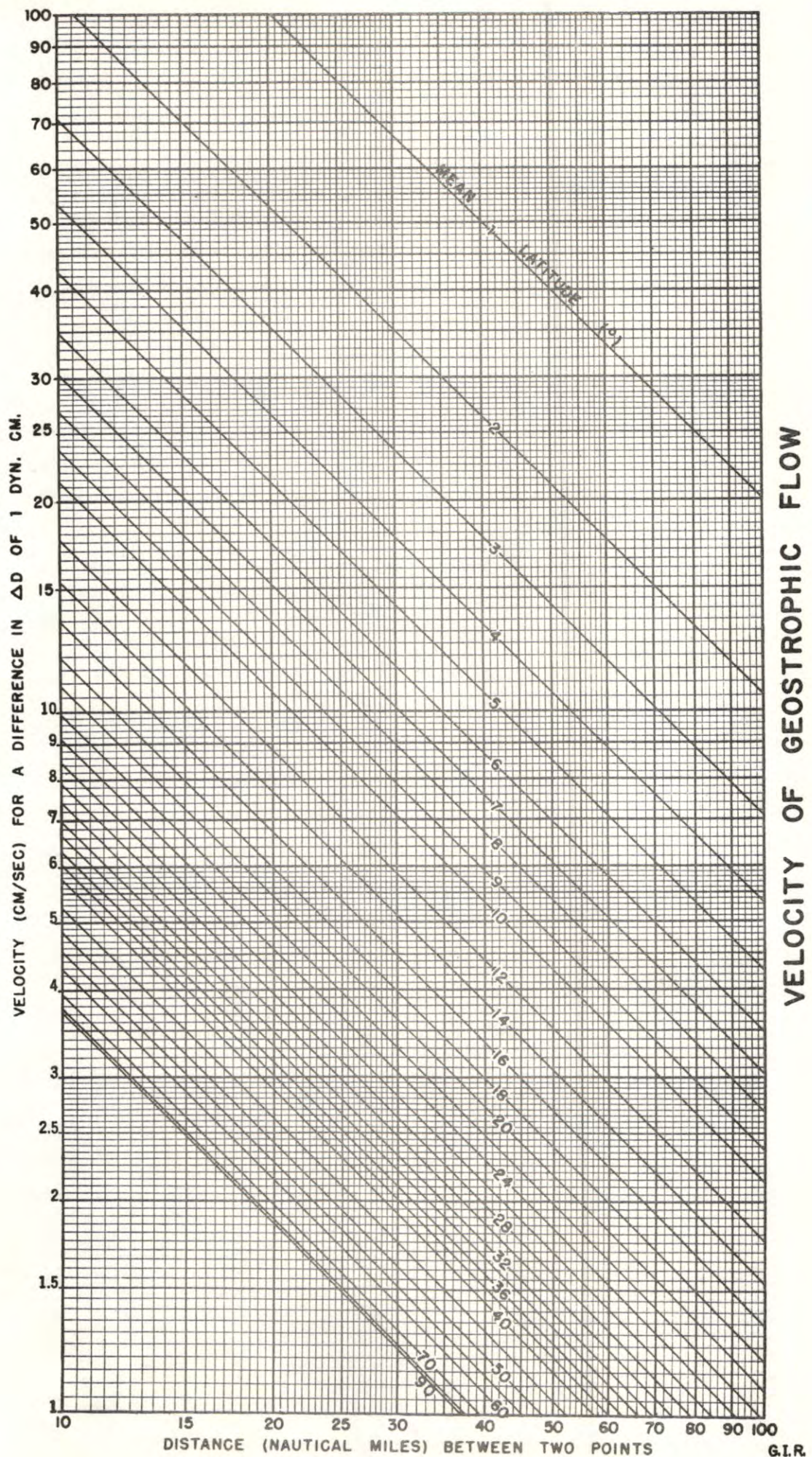
Values which are not drawn through because they seem to be in error without apparent reason are indicated by one of the following notations.

r: rejected value (value seems to be definitely wrong),

u: uncertain value (value may be correct; occasionally it can influence the drawing of the property curve).

#### FORMAT

These data are typed in the format of the University of California Press publication, Oceanic Observations of the Pacific. So that these pages can be used as copy for the 1959 volume, the first page of the Cruise 5908 data is numbered 304; Cruise 5909, 368.



## FIGURES

1. CCOFI Cruise 5909, station positions
2. Horizontal distribution of dynamic height anomaly (0 over 500 d-bar)
3. Horizontal distribution of temperature at 10 meters
4. Horizontal distribution of salinity at 10 meters
5. Horizontal distribution of temperature at 200 meters
6. Horizontal distribution of salinity at 200 meters

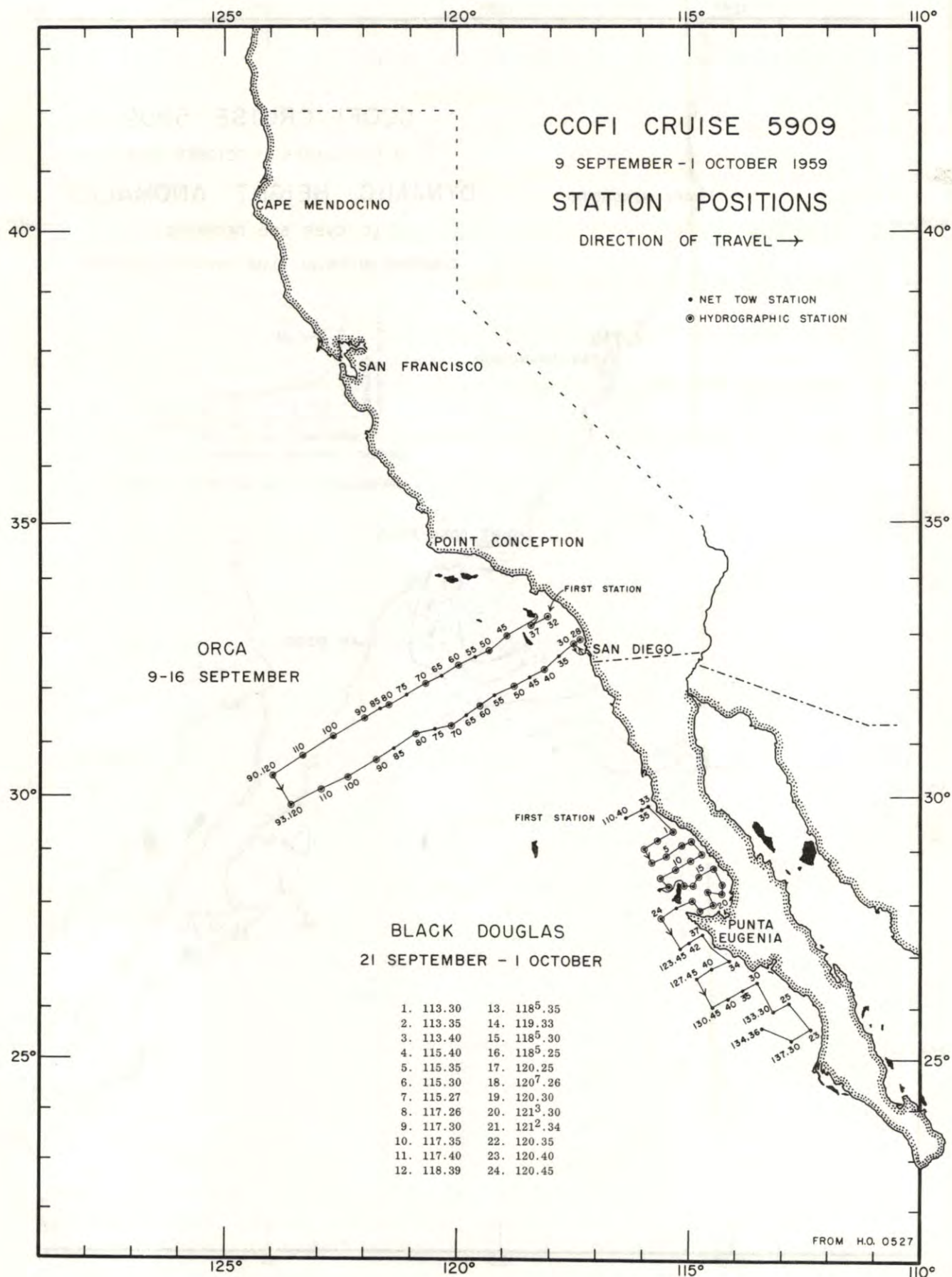


FIGURE 1

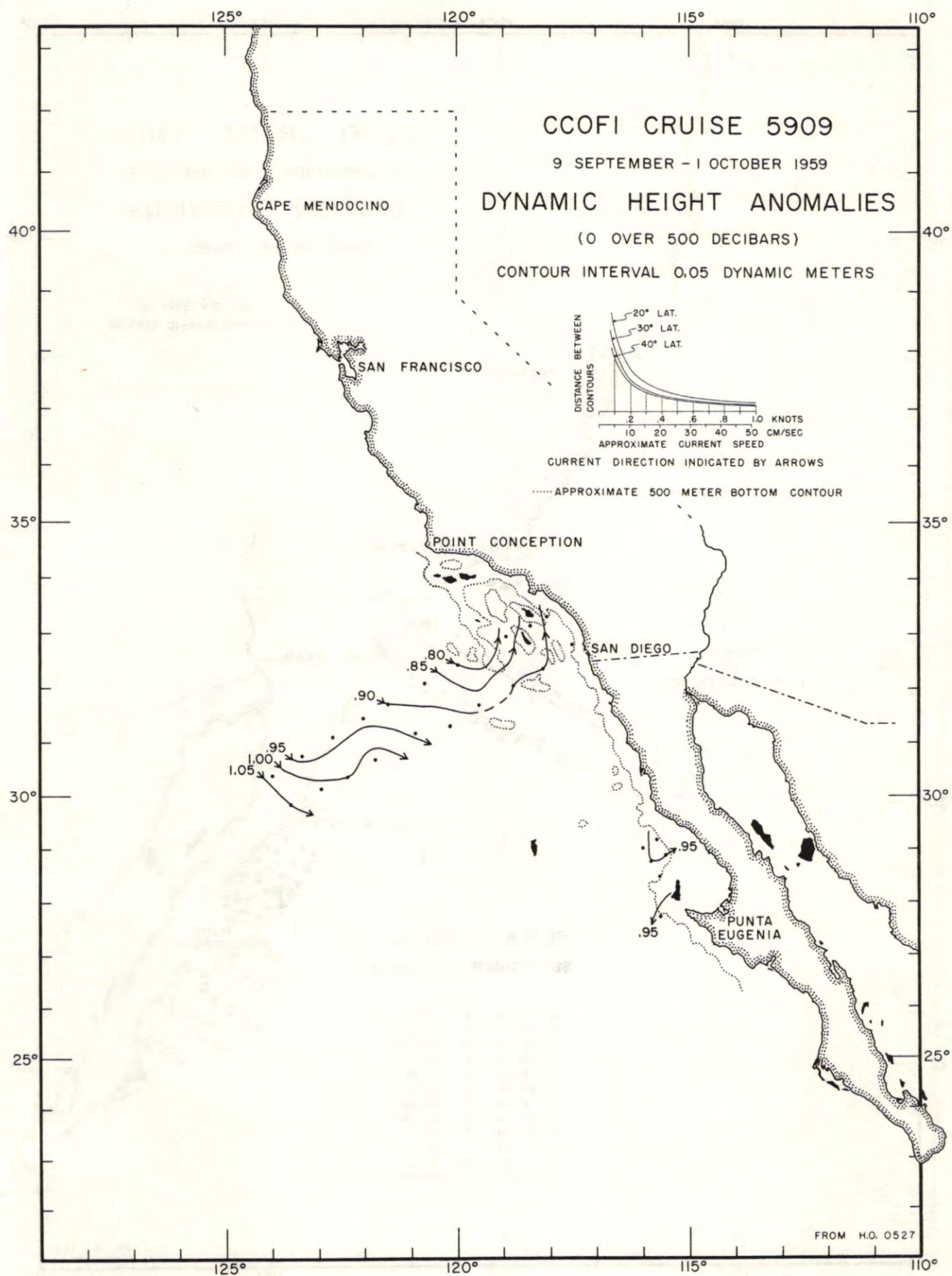


FIGURE 2

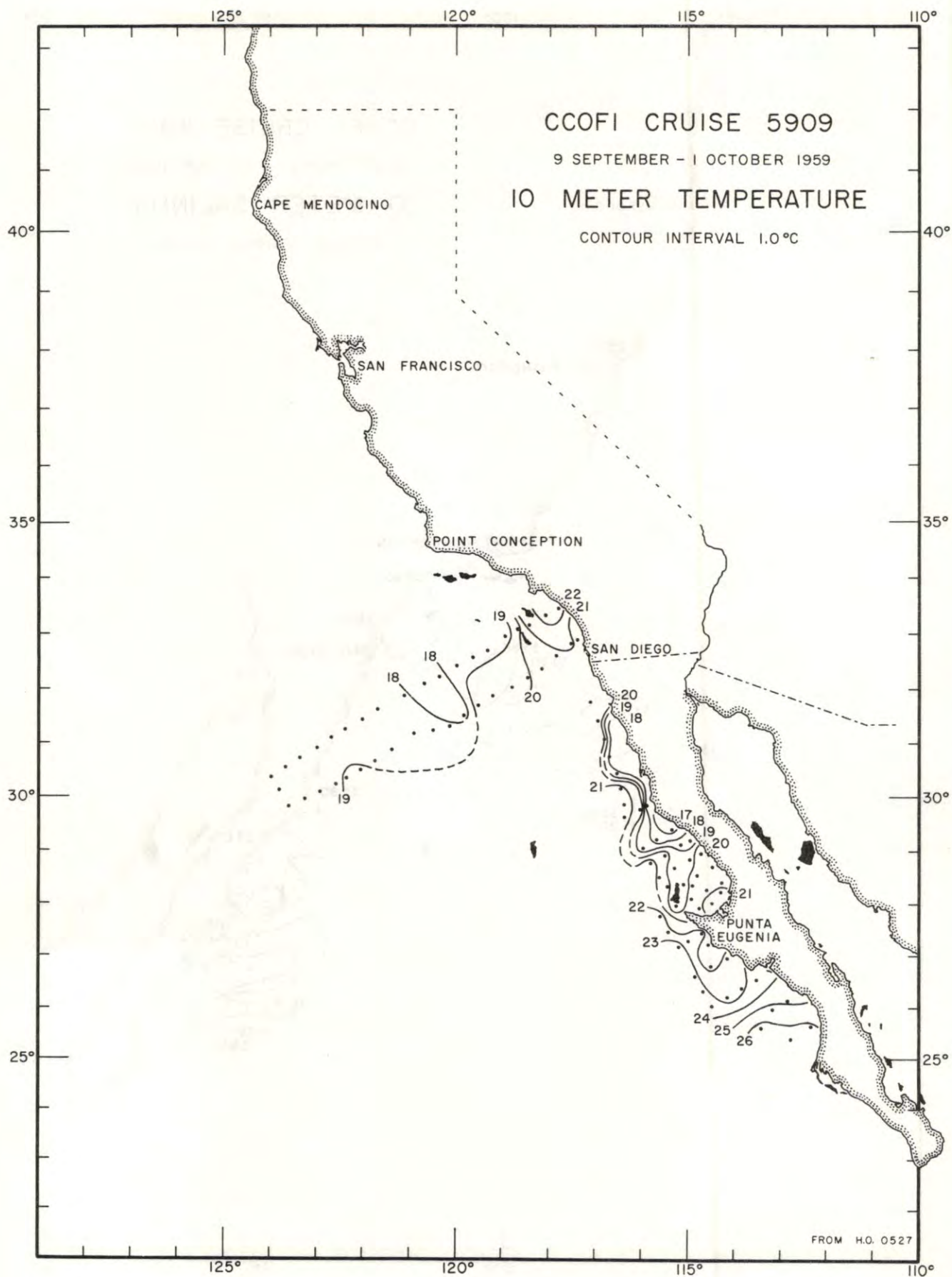


FIGURE 3

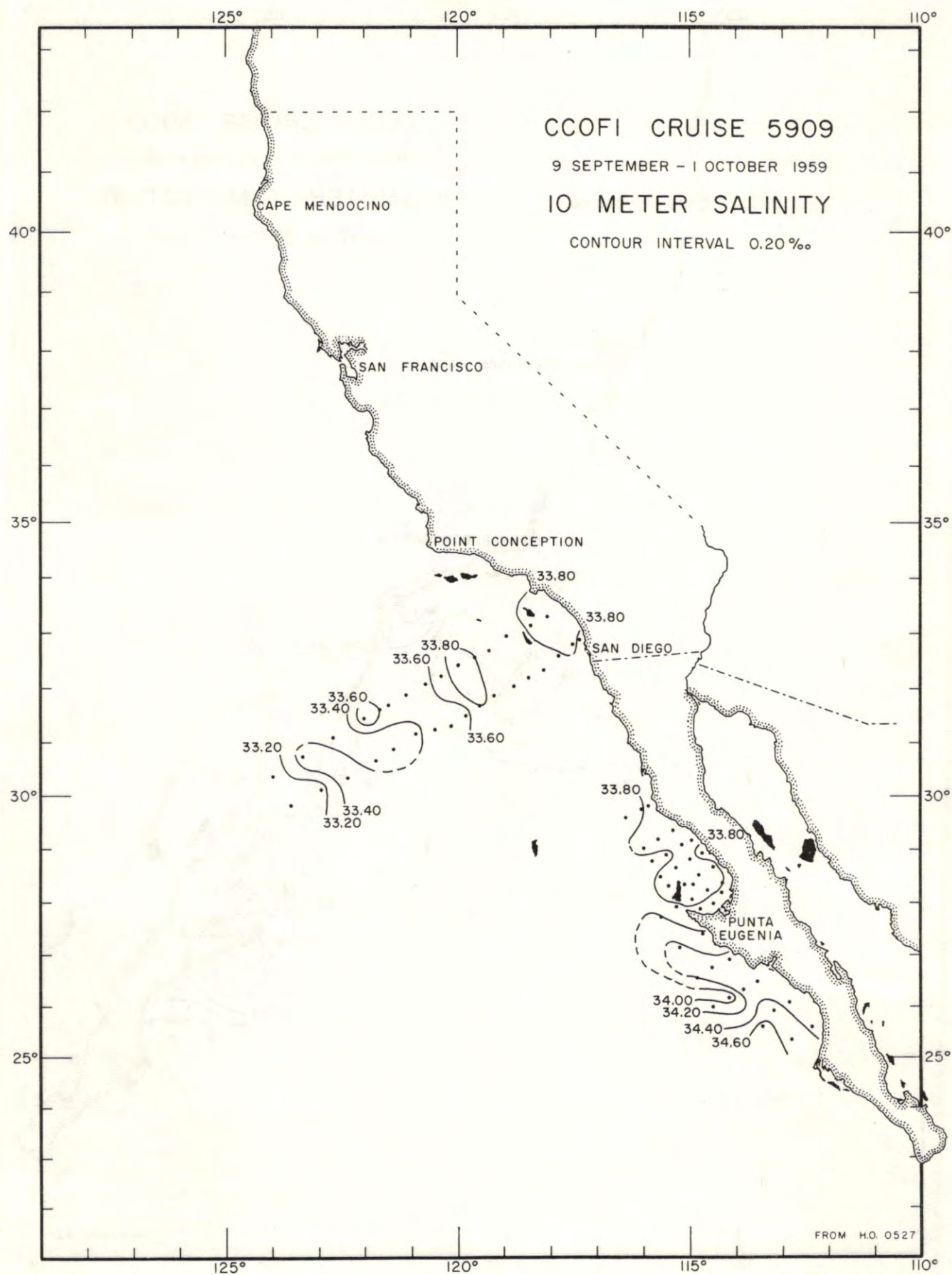


FIGURE 4

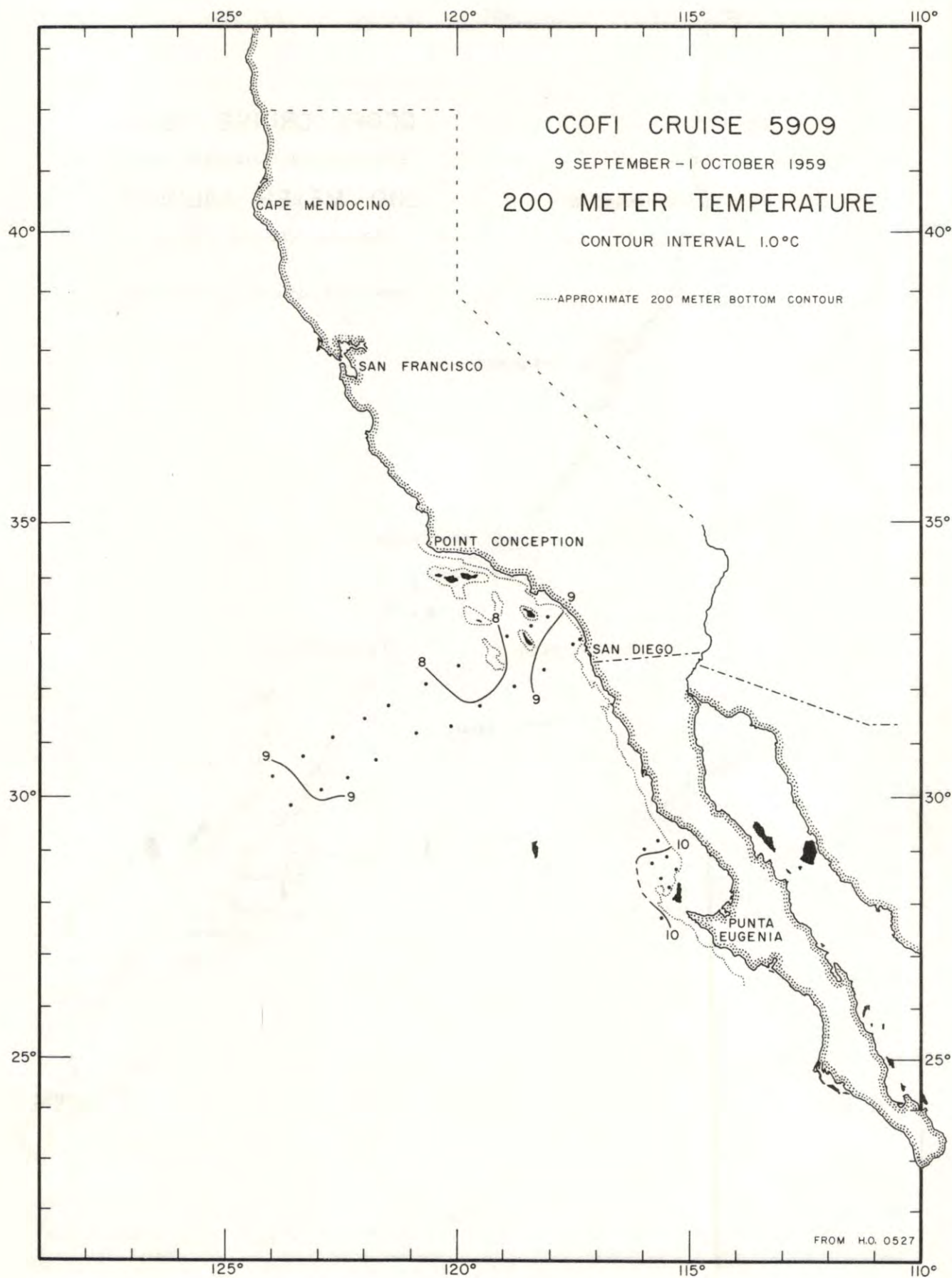


FIGURE 5

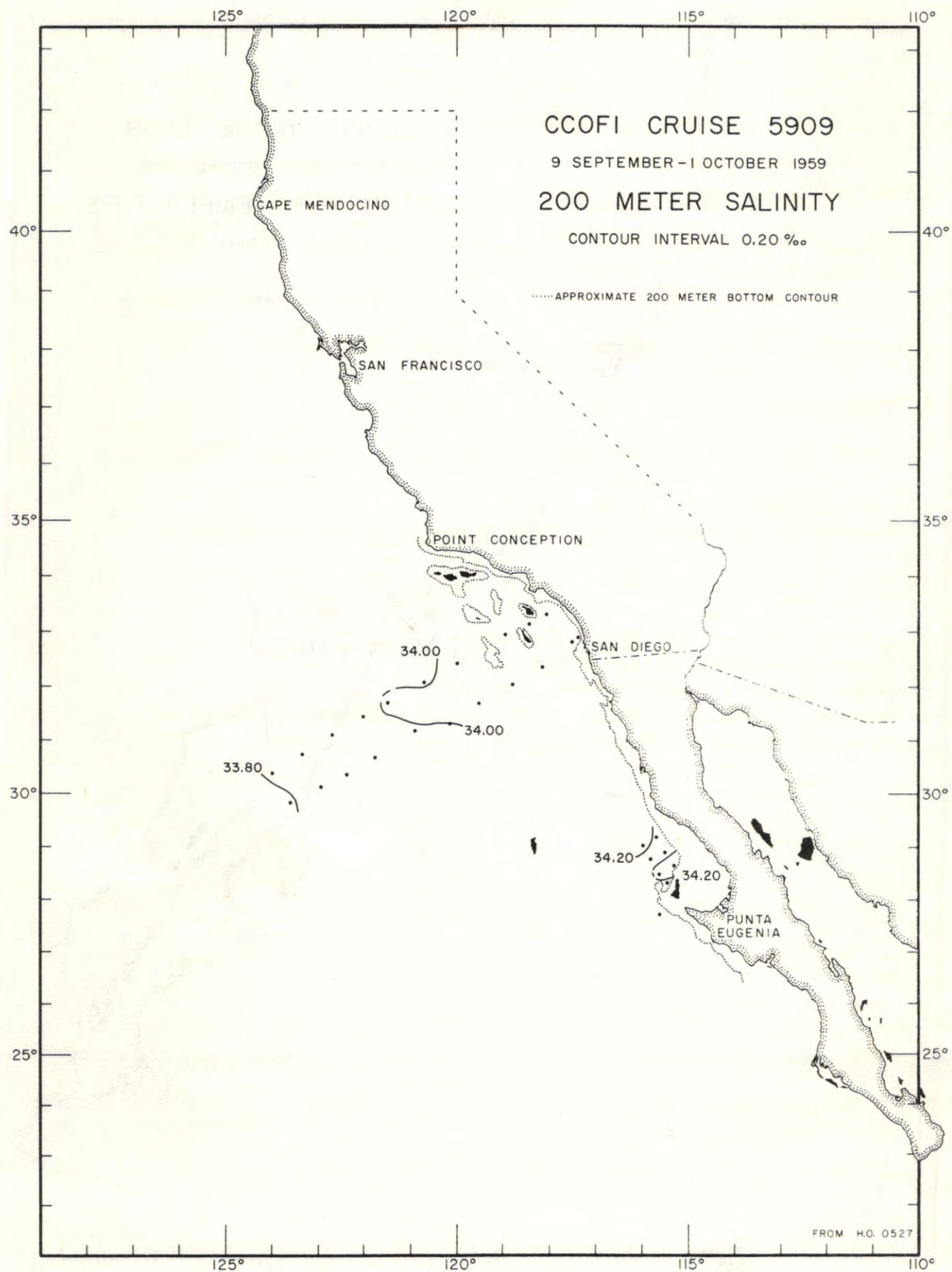


FIGURE 6

PERSONNEL  
Cruise 5909

SHIPS' CAPTAINS

Forster, Charles W., R/V Black Douglas  
Hopkins, Marvin H., R/V Orca

PERSONNEL PARTICIPATING IN THE COLLECTION OF DATA

R/V Black Douglas

Counts, Robert C., Fishery Research Biologist, U. S. Bureau of Commercial Fisheries  
Joyal, Norman F., Marine Technician  
Justice, David K., Fishery Aid, U. S. Bureau of Commercial Fisheries

R/V Orca

Lawson, Jan B., Senior Marine Technician  
Bottom, Kenneth S., Marine Technician  
Hester, Arthur W., Marine Technician  
Metoyer, Jack D., Fishery Aid, U. S. Bureau of Commercial Fisheries  
Pettengill, Donald A., Project Engineer, Ampex Corporation

SIO

CCOFI  
5909

| OBSERVED |    |   |                |              | INTERPOLATED |    |   |                | COMPUTED   |              |            |  |
|----------|----|---|----------------|--------------|--------------|----|---|----------------|------------|--------------|------------|--|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$ | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$ | $\Delta D$ |  |
| m        | °C | ‰ | ml/L           | 10 cm/g      | m            | °C | ‰ | ml/L           | g/L        | 10 cm/g      | dyn. m     |  |

90.32

ORCA; September 9, 1959; 0930 GCT; 33°20.5'N, 118°03'W; sounding, 400 fm; wind, direction missing, force 1; weather, clear; sea, slight; wire angle, 00°.

|     |       |       |      |     |     |         |         |        |         |       |        |  |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|--|
| 1   | 22.67 | 33.86 | 4.78 | 470 | 0   | (22.67) | (33.86) | (4.78) | (23.18) | (470) | (0.00) |  |
| 11  | 22.20 | 33.81 | 5.02 | 461 | 10  | 22.28   | 33.82   | 5.00   | 23.26   | 462   | 0.05   |  |
| 31  | 16.24 | 33.62 | 5.55 | 330 | 20  | 19.78   | 33.73   | 5.38   | 23.87   | 404   | 0.09   |  |
| 41  | 14.07 | 33.53 | 5.06 | 291 | 30  | 16.46   | 33.63   | 5.55   | 24.61   | 334   | 0.13   |  |
| 51  | 13.48 | 33.53 | 4.86 | 280 | 50  | 13.51   | 33.53   | 4.87   | 25.17   | 280   | 0.19   |  |
| 66  | 12.44 | 33.57 | 4.43 | 257 | 75  | 11.93   | 33.60   | 4.05   | 25.54   | 246   | 0.25   |  |
| 81  | 11.62 | 33.62 | 3.82 | 239 | 100 | 10.59   | 33.69   | 3.53   | 25.85   | 216   | 0.31   |  |
| 101 | 10.57 | 33.69 | 3.52 | 215 | 150 | 9.54    | 33.91   | 2.73   | 26.20   | 183   | 0.41   |  |
| 127 | 9.86  | 33.77 | 3.18 | 198 | 200 | 8.79    | 34.02   | 2.31   | 26.41   | 163   | 0.50   |  |
| 146 | 9.60  | 33.89 | 2.80 | 185 | 250 | 8.38    | 34.16   | 1.59   | 26.58   | 147   | 0.58   |  |
| 175 | 9.24  | 33.96 | 2.45 | 174 | 300 | 8.09    | 34.20   | 1.20   | 26.66   | 139   | 0.66   |  |
| 204 | 8.72  | 34.03 | 2.26 | 161 | 400 | 7.11    | 34.25   | 0.66   | 26.83   | 123   | 0.79   |  |
| 234 | 8.39  | 34.13 | 1.77 | 149 | 500 | 6.34    | 34.30   | 0.41   | 26.98   | 109   | 0.91   |  |
| 274 | 8.37  | 34.19 | 1.31 | 144 |     |         |         |        |         |       |        |  |
| 333 | 7.72  | 34.22 | 1.06 | 133 |     |         |         |        |         |       |        |  |
| 408 | 7.04  | 34.25 | 0.61 | 122 |     |         |         |        |         |       |        |  |
| 483 | 6.44  | 34.29 | 0.43 | 111 |     |         |         |        |         |       |        |  |
| 562 | 6.03  | 34.33 | 0.34 | 103 |     |         |         |        |         |       |        |  |

90.37

ORCA; September 9, 1959; 1236 GCT; 33°10.5'N, 118°23.5'W; sounding, 600 fm; wind, direction missing, force 1; weather, cloudy; sea, slight; wire angle, 00°.

|     |       |       |      |     |     |       |       |      |       |     |      |  |
|-----|-------|-------|------|-----|-----|-------|-------|------|-------|-----|------|--|
| 0   | 21.95 | 33.85 | 4.88 | 451 | 0   | 21.95 | 33.85 | 4.88 | 23.39 | 451 | 0.00 |  |
| 10  | 21.71 | 33.84 | 4.92 | 445 | 10  | 21.71 | 33.84 | 4.92 | 23.44 | 445 | 0.04 |  |
| 30  | 16.04 | 33.58 | 6.06 | 328 | 20  | 19.80 | 33.75 | 5.33 | 23.88 | 403 | 0.09 |  |
| 40  | 13.98 | 33.58 | 5.03 | 286 | 30  | 16.04 | 33.58 | 6.06 | 24.67 | 328 | 0.12 |  |
| 50  | 12.76 | 33.58 | 4.33 | 262 | 50  | 12.76 | 33.58 | 4.33 | 25.37 | 262 | 0.18 |  |
| 65  | 11.32 | 33.62 | 3.82 | 234 | 75  | 10.73 | 33.65 | 3.64 | 25.80 | 221 | 0.24 |  |
| 80  | 10.48 | 33.67 | 3.53 | 216 | 100 | 9.92  | 33.78 | 3.09 | 26.04 | 198 | 0.30 |  |
| 100 | 9.92  | 33.78 | 3.09 | 198 | 150 | 9.26  | 34.02 | 2.29 | 26.34 | 170 | 0.39 |  |
| 125 | 9.39  | 33.89 | 2.80 | 182 | 200 | 8.77  | 34.18 | 1.64 | 26.54 | 151 | 0.47 |  |
| 145 | 9.29  | 34.00 | 2.40 | 172 | 250 | 8.24  | 34.22 | 1.36 | 26.65 | 140 | 0.54 |  |
| 175 | 9.04  | 34.14 | 1.72 | 158 | 300 | 7.84  | 34.22 | 1.15 | 26.71 | 134 | 0.62 |  |
| 204 | 8.71  | 34.18 | 1.62 | 150 | 400 | 7.05  | 34.28 | 0.69 | 26.87 | 119 | 0.75 |  |
| 234 | 8.37  | 34.21 | 1.42 | 142 | 500 | 6.41  | 34.30 | 0.47 | 26.96 | 110 | 0.87 |  |
| 273 | 8.06  | 34.23 | 1.28 | 137 |     |       |       |      |       |     |      |  |
| 333 | 7.56  | 34.22 | 0.96 | 130 |     |       |       |      |       |     |      |  |
| 408 | 6.98  | 34.29 | 0.65 | 118 |     |       |       |      |       |     |      |  |
| 483 | 6.51  | 34.29 | 0.50 | 112 |     |       |       |      |       |     |      |  |
| 563 | 6.10  | 34.34 | 0.35 | 103 |     |       |       |      |       |     |      |  |

90.45

ORCA; September 10, 1959; 1918 GCT; 32°58'N, 118°56'W; sounding, 900+ fm; wind, 280°, force 4; weather, partly cloudy; sea, rough; wire angle, 18°.

|     |       |       |      |     |     |         |         |        |         |       |        |  |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|--|
| 1   | 19.31 | 33.84 | 4.97 | 384 | 0   | (19.31) | (33.84) | (4.97) | (24.08) | (384) | (0.00) |  |
| 10  | 18.14 | 33.78 | 5.11 | 361 | 10  | 18.14   | 33.78   | 5.11   | 24.32   | 361   | 0.04   |  |
| 29  | 12.67 | 33.55 | 4.37 | 262 | 20  | 15.40   | 33.66   | 4.80   | 24.87   | 309   | 0.07   |  |
| 39  | 11.40 | 33.64 | 3.93 | 233 | 30  | 12.62   | 33.55   | 4.36   | 25.38   | 261   | 0.10   |  |
| 48  | 11.14 | 33.65 | 3.83 | 228 | 50  | 11.07   | 33.65   | 3.82   | 25.73   | 227   | 0.15   |  |
| 62  | 10.64 | 33.68 | 3.56 | 217 | 75  | 10.30   | 33.71   | 3.38   | 25.91   | 210   | 0.20   |  |
| 76  | 10.28 | 33.71 | 3.37 | 209 | 100 | 9.72    | 33.80   | 3.11   | 26.09   | 193   | 0.25   |  |
| 95  | 9.82  | 33.78 | 3.17 | 197 | 150 | 8.75    | 33.99   | 2.52   | 26.39   | 165   | 0.34   |  |
| 118 | 9.30  | 33.87 | 2.87 | 182 | 200 | 8.10    | 34.12   | 1.86   | 26.59   | 146   | 0.42   |  |
| 137 | 8.87  | 33.96 | 2.62 | 168 | 250 | 7.66    | 34.15   | 1.56   | 26.68   | 137   | 0.49   |  |
| 165 | 8.60  | 34.02 | 2.37 | 160 | 300 | 7.79    | 34.30   | 1.11   | 26.78   | 128   | 0.56   |  |
| 192 | 8.19  | 34.11 | 1.91 | 148 | 400 | 7.00    | 34.32   | 0.57   | 26.90   | 116   | 0.69   |  |
| 219 | 7.92  | 34.13 | 1.77 | 142 | 500 | 6.43    | 34.33   | 0.35   | 26.99   | 108   | 0.81   |  |
| 255 | 7.64  | 34.16 | 1.50 | 136 |     |         |         |        |         |       |        |  |
| 310 | 7.80  | 34.32 | -    | 126 |     |         |         |        |         |       |        |  |
| 380 | 7.14  | 34.32 | 0.64 | 118 |     |         |         |        |         |       |        |  |
| 451 | 6.69  | 34.32 | 0.41 | 112 |     |         |         |        |         |       |        |  |
| 528 | 6.28  | 34.34 | 0.33 | 105 |     |         |         |        |         |       |        |  |

| OBSERVED |    |   |                |                   | INTERPOLATED |    |   |                | COMPUTED   |                   |            |
|----------|----|---|----------------|-------------------|--------------|----|---|----------------|------------|-------------------|------------|
| Z        | T  | S | O <sub>2</sub> | $\delta T_{-5}^3$ | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_{-5}^3$ | $\Delta D$ |
| m        | °C | ‰ | ml/L           | 10 cm/g           | m            | °C | ‰ | ml/L           | g/L        | 10 cm/g           | dyn. m     |

SIO

CCOFI  
5909

ORCA; September 10, 1959; 2327 GCT; <sup>a)</sup> 32°42.5'N, 119°18.5'W; sounding, 200 fm; wind, 320°, force 5; weather, partly cloudy; sea, very rough; wire angle, 08°.

90.50

|    |       |       |      |     |    |         |         |        |         |       |        |
|----|-------|-------|------|-----|----|---------|---------|--------|---------|-------|--------|
| 2  | 18.36 | 33.78 | 5.41 | 366 | 0  | (18.36) | (33.78) | (5.41) | (24.27) | (366) | (0.00) |
| 5  | 18.34 | 33.78 | 5.36 | 365 | 10 | 18.33   | 33.77   | 5.36   | 24.28   | 365   | 0.04   |
| 8  | 18.34 | 33.78 | 5.35 | 365 | 20 | 17.53   | 33.69   | 5.39   | 24.41   | 353   | 0.07   |
| 11 | 18.33 | 33.77 | 5.36 | 366 | 30 | 14.45   | 33.44   | 5.40   | 24.91   | 305   | 0.11   |
| 14 | 18.25 | 33.75 | 5.39 | 366 | 50 | 13.00   | 33.41   | 4.92   | 25.18   | 279   | 0.16   |
| 17 | 17.74 | 33.70 | 5.42 | 358 | 75 | 10.48   | 33.62   | 3.61   | 25.81   | 220   | 0.23   |
| 20 | 17.53 | 33.69 | 5.39 | 353 |    |         |         |        |         |       |        |
| 23 | 17.38 | 33.66 | 5.40 | 352 |    |         |         |        |         |       |        |
| 26 | 16.32 | 33.58 | 5.36 | 334 |    |         |         |        |         |       |        |
| 29 | 14.46 | 33.44 | 5.43 | 305 |    |         |         |        |         |       |        |
| 32 | 14.41 | 33.42 | 5.32 | 306 |    |         |         |        |         |       |        |
| 35 | 14.32 | 33.42 | 5.31 | 304 |    |         |         |        |         |       |        |
| 38 | 14.32 | 33.39 | 5.20 | 304 |    |         |         |        |         |       |        |
| 41 | 14.18 | 33.40 | 5.11 | 298 |    |         |         |        |         |       |        |
| 47 | 13.96 | 33.39 | 5.08 | 292 |    |         |         |        |         |       |        |
| 56 | 13.56 | 33.44 | 4.77 | 270 |    |         |         |        |         |       |        |
| 66 | 12.62 | 33.58 | 4.05 | 235 |    |         |         |        |         |       |        |
| 76 | 10.46 | 33.62 | 3.60 | 219 |    |         |         |        |         |       |        |

ORCA; September 11, 1959; 0525 GCT; 32°24.5'N, 119°57.5'W; sounding, 485 fm; wind, 320°, force 2; weather, partly cloudy; sea, very rough; wire angle, 28°.

90.60

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 2   | 18.88 | 33.86 | 5.13 | 373 | 0   | (18.88) | (33.86) | (5.13) | (24.20) | (373) | (0.00) |
| 10  | 18.87 | 33.88 | 5.24 | 371 | 10  | 18.87   | 33.88   | 5.24   | 24.22   | 371   | 0.04   |
| 28  | 18.46 | 33.84 | 5.11 | 364 | 20  | 18.84   | 33.88   | 5.23   | 24.22   | 371   | 0.07   |
| 37  | 16.80 | 33.80 | 4.87 | 329 | 30  | 18.31   | 33.83   | 5.07   | 24.32   | 361   | 0.11   |
| 50  | 12.66 | 33.67 | 4.09 | 254 | 50  | 12.66   | 33.67   | 4.09   | 25.45   | 254   | 0.17   |
| 63  | 10.74 | 33.75 | 3.14 | 214 | 75  | 9.93    | 33.80   | 2.81   | 26.06   | 196   | 0.23   |
| 85  | 9.46  | 33.84 | 2.63 | 186 | 100 | 9.03    | 33.90   | 2.54   | 26.27   | 176   | 0.28   |
| 103 | 8.94  | 33.91 | 2.50 | 174 | 150 | 8.35    | 34.04   | 1.92   | 26.49   | 155   | 0.36   |
| 120 | 8.64  | 33.96 | 2.22 | 166 | 200 | 7.69    | 34.11   | 1.53   | 26.65   | 140   | 0.43   |
| 138 | 8.52  | 34.01 | 2.02 | 160 | 250 | 7.34    | 34.18   | 1.19   | 26.75   | 130   | 0.50   |
| 164 | 8.11  | 34.07 | 1.78 | 150 | 300 | 7.02    | 34.20   | 0.98   | 26.82   | 124   | 0.57   |
| 195 | 7.75  | 34.11 | 1.58 | 142 | 400 | 6.34    | 34.31   | 0.42   | 26.98   | 108   | 0.69   |
| 221 | 7.50  | 34.13 | 1.40 | 137 | 500 | 5.85    | 34.35   | 0.36   | 27.08   | 99    | 0.80   |
| 265 | 7.26  | 34.22 | 1.07 | 127 |     |         |         |        |         |       |        |
| 314 | 6.92  | 34.20 | 0.94 | 123 |     |         |         |        |         |       |        |
| 391 | 6.39  | 34.30 | 0.43 | 109 |     |         |         |        |         |       |        |
| 471 | 6.00  | 34.34 | 0.38 | 102 |     |         |         |        |         |       |        |
| 553 | 5.56  | 34.36 | 0.30 | 94  |     |         |         |        |         |       |        |

ORCA; September 11, 1959; 1134 GCT; 32°03.5'N, 120°40'W; sounding, 2000+ fm; wind, 320°, force 5; weather, partly cloudy; sea, very rough; wire angle, 20°.

90.70

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 2   | 17.52 | 33.48 | 5.37 | 368 | 0   | (17.52) | (33.48) | (5.37) | (24.25) | (368) | (0.00) |
| 11  | 17.52 | 33.50 | 5.36 | 367 | 10  | 17.52   | 33.50   | 5.36   | 24.26   | 367   | 0.04   |
| 30  | 17.47 | 33.48 | 5.35 | 367 | 20  | 17.51   | 33.49   | 5.36   | 24.26   | 367   | 0.07   |
| 39  | 17.12 | 33.50 | 5.44 | 358 | 30  | 17.47   | 33.48   | 5.35   | 24.26   | 367   | 0.11   |
| 53  | 14.38 | 33.48 | 5.64 | 301 | 50  | 14.47   | 33.48   | 5.64   | 24.94   | 303   | 0.18   |
| 67  | 13.50 | 33.48 | 4.71 | 284 | 75  | 12.85   | 33.49   | 4.56   | 25.28   | 270   | 0.25   |
| 91  | 11.58 | 33.55 | 4.38 | 243 | 100 | 10.95   | 33.57   | 4.30   | 25.70   | 230   | 0.31   |
| 110 | 10.32 | 33.61 | 4.20 | 217 | 150 | 9.05    | 33.83   | 3.24   | 26.22   | 181   | 0.42   |
| 129 | 9.41  | 33.77 | 3.38 | 191 | 200 | 8.25    | 33.98   | 2.93   | 26.46   | 158   | 0.50   |
| 147 | 9.08  | 33.82 | 3.25 | 182 | 250 | 7.56    | 34.03   | 1.96   | 26.60   | 145   | 0.58   |
| 176 | 8.66  | 33.91 | 3.06 | 169 | 300 | 7.06    | 34.09   | 1.45   | 26.71   | 134   | 0.65   |
| 209 | 8.08  | 34.00 | 2.84 | 154 | 400 | 6.40    | 34.22   | 0.74   | 26.91   | 116   | 0.78   |
| 238 | 7.71  | 34.02 | 2.15 | 148 | 500 | 5.74    | 34.29   | 0.40   | 27.04   | 103   | 0.89   |
| 286 | 7.19  | 34.07 | 1.57 | 137 | 600 | (5.22)  | (34.32) | (0.28) | (27.14) | (94)  | (1.00) |
| 423 | 6.26  | 34.25 | 0.60 | 111 |     |         |         |        |         |       |        |
| 507 | 5.70  | 34.29 | 0.38 | 102 |     |         |         |        |         |       |        |
| 591 | 5.27  | 34.32 | 0.28 | 95  |     |         |         |        |         |       |        |

a) Special cast.

SIO

CCOFI  
5909

| OBSERVED |    |   |                |                | INTERPOLATED |    |   |                | COMPUTED   |                |            |  |
|----------|----|---|----------------|----------------|--------------|----|---|----------------|------------|----------------|------------|--|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$   | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$   | $\Delta D$ |  |
| m        | °C | ‰ | ml/L           | $10^{-5}$ cm/g | m            | °C | ‰ | ml/L           | g/L        | $10^{-5}$ cm/g | dyn. m     |  |

90.80

ORCA; September 11, 1959; 1819 GCT; 31°41'N, 121°27.5'W; sounding, 2000+ fm; wind, 320°, force 5;  
weather, cloudy; sea, very rough; wire angle, 19°.

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 2   | 18.48 | 33.60 | 5.34 | 382 | 0   | (18.48) | (33.60) | (5.34) | (24.10) | (382) | (0.00) |
| 11  | 18.4  | 33.57 | 5.30 | 382 | 10  | 18.40   | 33.57   | 5.30   | 24.10   | 382   | 0.04   |
| 30  | 18.36 | 33.58 | 5.38 | 380 | 20  | 18.40   | 33.57   | 5.30   | 24.10   | 382   | 0.08   |
| 59  | 14.44 | 33.55 | 5.79 | 297 | 30  | 18.36   | 33.58   | 5.38   | 24.12   | 380   | 0.11   |
| 67  | 13.34 | 33.55 | 5.56 | 275 | 50  | 17.60   | 33.57   | 5.46   | 24.29   | 364   | 0.19   |
| 81  | 12.20 | 33.57 | 4.60 | 253 | 75  | 12.65   | 33.56   | 4.98   | 25.37   | 262   | 0.27   |
| 96  | 11.01 | 33.58 | 4.25 | 231 | 100 | 10.86   | 33.59   | 4.26   | 25.72   | 228   | 0.33   |
| 109 | 10.50 | 33.61 | 4.29 | 220 | 150 | 9.12    | 33.79   | 3.53   | 26.18   | 185   | 0.43   |
| 132 | 9.43  | 33.72 | 3.46 | 195 | 200 | 8.23    | 34.01   | 2.29   | 26.49   | 155   | 0.52   |
| 150 | 9.12  | 33.79 | 3.53 | 185 | 250 | 7.66    | 34.10   | 1.80   | 26.64   | 141   | 0.60   |
| 177 | 8.76  | 33.92 | 2.77 | 170 | 300 | 7.19    | 34.15   | 1.20   | 26.75   | 130   | 0.67   |
| 204 | 8.14  | 34.02 | 2.23 | 154 | 400 | 6.36    | 34.24   | 0.77   | 26.93   | 114   | 0.79   |
| 231 | 7.88  | 34.07 | 2.00 | 146 | 500 | 5.80    | 34.34   | 0.38   | 27.08   | 99    | 0.90   |
| 277 | 7.36  | 34.13 | 1.46 | 135 |     |         |         |        |         |       |        |
| 328 | 6.98  | 34.18 | 0.95 | 126 |     |         |         |        |         |       |        |
| 406 | 6.32  | 34.24 | 0.76 | 113 |     |         |         |        |         |       |        |
| 487 | 5.85  | 34.34 | 0.40 | 100 |     |         |         |        |         |       |        |
| 570 | 5.68  | 34.34 | 0.31 | 98  |     |         |         |        |         |       |        |

90.90

ORCA; September 11, 1959; 2339 GCT; 31°25'N, 122°00'W; sounding, 2000+ fm; wind, 320°, force 5;  
weather, partly cloudy; sea, rough; wire angle, 25°.

|     |       |       |        |     |     |         |         |        |         |       |        |
|-----|-------|-------|--------|-----|-----|---------|---------|--------|---------|-------|--------|
| 1   | 18.64 | 33.60 | 5.27   | 386 | 0   | (18.64) | (33.60) | (5.27) | (24.06) | (386) | (0.00) |
| 9   | 18.64 | 33.61 | 5.22   | 385 | 10  | 18.64   | 33.61   | 5.22   | 24.07   | 385   | 0.04   |
| 28  | 18.48 | 33.58 | 5.19   | 384 | 20  | 18.57   | 33.60   | 5.21   | 24.08   | 384   | 0.08   |
| 36  | 18.15 | 33.58 | 5.33   | 376 | 30  | 18.45   | 33.58   | 5.20   | 24.09   | 383   | 0.12   |
| 50  | 14.41 | 33.15 | 5.99a) | 326 | 50  | 14.41   | 33.15   | 5.99   | 24.69   | 326   | 0.19   |
| 63  | 13.96 | 33.21 | 5.90   | 312 | 75  | 13.61   | 33.34   | 5.50   | 25.01   | 296   | 0.26   |
| 85  | 13.30 | 33.44 | 5.14   | 282 | 100 | 12.20   | 33.40   | 4.94   | 25.34   | 265   | 0.34   |
| 103 | 11.93 | 33.40 | 4.88   | 260 | 150 | 9.63    | 33.71   | 3.87   | 26.03   | 199   | 0.45   |
| 120 | 10.74 | 33.51 | 4.45   | 232 | 200 | 8.50    | 33.97   | 3.14   | 26.42   | 162   | 0.54   |
| 138 | 9.94  | 33.65 | 3.89   | 208 | 250 | 7.72    | 34.03   | 2.65   | 26.58   | 147   | 0.62   |
| 163 | 9.28  | 33.78 | 3.85   | 189 | 300 | 7.19    | 34.12   | 1.46   | 26.72   | 133   | 0.70   |
| 192 | 8.64  | 33.96 | 3.01   | 166 | 400 | 6.06    | 34.16   | 0.85   | 26.90   | 116   | 0.82   |
| 218 | 8.20  | 33.98 | 3.39   | 158 | 500 | 5.54    | 34.24   | 0.43   | 27.04   | 103   | 0.94   |
| 260 | 7.59  | 34.04 | 2.46   | 144 |     |         |         |        |         |       |        |
| 309 | 7.08  | 34.13 | 1.35   | 131 |     |         |         |        |         |       |        |
| 383 | 6.22  | 34.15 | 0.95   | 119 |     |         |         |        |         |       |        |
| 461 | 5.70  | 34.22 | 0.49   | 107 |     |         |         |        |         |       |        |
| 541 | 5.40  | 34.27 | 0.38   | 100 |     |         |         |        |         |       |        |

90.100

ORCA; September 12, 1959; 0456 GCT; 31°05'N, 122°39.5'W; sounding, 2000+ fm; wind, 310°, force 4;  
weather, cloudy; sea, rough; wire angle, 15°.

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 1   | 18.56 | 33.35 | 5.34 | 402 | 0   | (18.56) | (33.35) | (5.34) | (23.90) | (402) | (0.00) |
| 11  | 18.56 | 33.35 | 5.37 | 402 | 10  | 18.56   | 33.35   | 5.37   | 23.90   | 402   | 0.04   |
| 30  | 18.44 | 33.37 | 5.38 | 398 | 20  | 18.53   | 33.36   | 5.38   | 23.92   | 400   | 0.08   |
| 39  | 16.40 | 33.24 | 5.97 | 361 | 30  | 18.44   | 33.37   | 5.38   | 23.94   | 398   | 0.12   |
| 54  | 14.32 | 33.17 | 6.04 | 322 | 50  | 14.58   | 33.17   | 6.04   | 24.67   | 328   | 0.19   |
| 69  | 13.50 | 33.27 | 5.63 | 299 | 75  | 13.13   | 33.32   | 5.45   | 25.08   | 289   | 0.27   |
| 92  | 12.04 | 33.40 | 5.04 | 262 | 100 | 11.52   | 33.44   | 4.86   | 25.49   | 250   | 0.34   |
| 111 | 10.87 | 33.51 | 4.62 | 234 | 150 | 9.18    | 33.78   | 4.08   | 26.16   | 187   | 0.45   |
| 131 | 9.78  | 33.61 | 4.28 | 209 | 200 | 8.39    | 33.95   | 3.22   | 26.42   | 162   | 0.54   |
| 151 | 9.16  | 33.78 | 4.07 | 186 | 250 | 7.71    | 34.05   | 2.52   | 26.59   | 146   | 0.62   |
| 179 | 8.68  | 33.89 | 3.60 | 171 | 300 | 7.13    | 34.06   | 2.04   | 26.68   | 137   | 0.69   |
| 212 | 8.24  | 33.99 | 3.02 | 157 | 400 | 6.11    | 34.18   | 0.95   | 26.91   | 115   | 0.82   |
| 241 | 7.83  | 34.04 | 2.59 | 148 | 500 | 5.38    | 34.26   | 0.52   | 27.07   | 100   | 0.93   |
| 289 | 7.22  | 34.05 | 2.18 | 139 | 600 | (5.02)  | (34.33) | (0.30) | (27.16) | (91)  | (1.04) |
| 343 | 6.86  | 34.16 | 1.22 | 126 |     |         |         |        |         |       |        |
| 426 | 5.78  | 34.18 | 0.88 | 111 |     |         |         |        |         |       |        |
| 509 | 5.36  | 34.27 | 0.47 | 99  |     |         |         |        |         |       |        |
| 594 | 5.04  | 34.33 | 0.30 | 92  |     |         |         |        |         |       |        |

| OBSERVED |    |   |                |              | INTERPOLATED |    |   |                | COMPUTED   |              |            |
|----------|----|---|----------------|--------------|--------------|----|---|----------------|------------|--------------|------------|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$ | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$ | $\Delta D$ |
| m        | °C | ‰ | ml/L           | 10 cm/g      | m            | °C | ‰ | ml/L           | g/L        | 10 cm/g      | dyn. m     |

SIO  
CCOFI  
5909

ORCA; September 12, 1959; 1000 GCT; 30°43'N, 123°19'W; sounding, 2000+ fm; wind, 310°, force 4; weather, partly cloudy; sea, rough; wire angle, 16°.

90.110

|     |       |       |      |     |     |       |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|-------|---------|--------|---------|-------|--------|
| 7   | 18.41 | 33.44 | 5.37 | 392 | 0   | 18.4  | (33.44) | (5.37) | (24.00) | (392) | (0.00) |
| 26  | 18.22 | 33.46 | 5.38 | 386 | 10  | 18.39 | 33.45   | 5.37   | 24.01   | 391   | 0.04   |
| 35  | 18.00 | 33.40 | 5.31 | 386 | 20  | 18.29 | 33.47   | 5.38   | 24.04   | 388   | 0.08   |
| 50  | 14.34 | 33.04 | 6.16 | 332 | 30  | 18.14 | 33.44   | 5.37   | 24.06   | 386   | 0.12   |
| 65  | 13.25 | 33.08 | 5.88 | 308 | 50  | 14.34 | 33.04   | 6.16   | 24.63   | 332   | 0.19   |
| 88  | 12.46 | 33.30 | 5.35 | 277 | 75  | 12.81 | 33.18   | 5.58   | 25.05   | 292   | 0.27   |
| 107 | 11.02 | 33.38 | 4.97 | 246 | 100 | 11.65 | 33.35   | 5.14   | 25.40   | 259   | 0.34   |
| 126 | 10.50 | 33.56 | 4.37 | 224 | 150 | 9.35  | 33.76   | 4.04   | 26.11   | 191   | 0.45   |
| 145 | 9.48  | 33.73 | 4.10 | 195 | 200 | 8.44  | 33.96   | 3.57   | 26.41   | 163   | 0.54   |
| 173 | 8.92  | 33.89 | 3.77 | 174 | 250 | 7.73  | 34.06   | 2.40   | 26.61   | 144   | 0.62   |
| 205 | 8.36  | 33.97 | 3.52 | 160 | 300 | 6.92  | 34.09   | 1.84   | 26.73   | 132   | 0.69   |
| 234 | 7.98  | 34.05 | 2.66 | 149 | 400 | 6.02  | 34.18   | 0.94   | 26.92   | 114   | 0.82   |
| 281 | 7.20  | 34.08 | 2.07 | 136 | 500 | 5.55  | 34.22   | 0.51   | 27.02   | 105   | 0.93   |
| 335 | 6.61  | 34.10 | 1.56 | 127 |     |       |         |        |         |       |        |
| 416 | 5.92  | 34.20 | 0.83 | 111 |     |       |         |        |         |       |        |
| 498 | 5.56  | 34.22 | 0.52 | 105 |     |       |         |        |         |       |        |
| 566 | 5.22  | 34.33 | 0.34 | 93  |     |       |         |        |         |       |        |
| 576 | 5.20  | 34.31 | 0.35 | 94  |     |       |         |        |         |       |        |

ORCA; September 12, 1959; 1513 GCT; 30°22.5'N, 123°57'W; sounding, 2000+ fm; wind, 330°, force 3; weather, partly cloudy; sea, rough; wire angle, 16°.

90.120

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 1   | 18.34 | 33.13 | 5.42 | 413 | 0   | (18.34) | (33.13) | (5.42) | (23.78) | (413) | (0.00) |
| 11  | 18.34 | 33.12 | 5.18 | 414 | 10  | 18.34   | 33.12   | 5.19   | 23.77   | 414   | 0.04   |
| 29  | 18.12 | 33.10 | 5.36 | 410 | 20  | 18.31   | 33.11   | 5.19   | 23.78   | 413   | 0.08   |
| 39  | 18.01 | 33.12 | 5.37 | 406 | 30  | 18.05   | 33.10   | 5.37   | 23.83   | 408   | 0.12   |
| 54  | 17.63 | 33.68 | 5.73 | 357 | 50  | 18.19   | 33.51   | 5.51   | 24.10   | 382   | 0.20   |
| 68  | 16.58 | 33.68 | 5.82 | 333 | 75  | 16.19   | 33.68   | 5.80   | 24.71   | 324   | 0.29   |
| 92  | 15.48 | 33.69 | 5.76 | 308 | 100 | 15.18   | 33.72   | 5.72   | 24.97   | 300   | 0.37   |
| 111 | 14.78 | 33.79 | 5.63 | 286 | 150 | 11.80   | 33.68   | 5.03   | 25.62   | 237   | 0.51   |
| 130 | 13.82 | 33.86 | 5.14 | 262 | 200 | 9.21    | 33.82   | 4.18   | 26.18   | 184   | 0.61   |
| 149 | 11.94 | 33.69 | 5.04 | 239 | 250 | 8.34    | 33.98   | 2.88   | 26.44   | 160   | 0.70   |
| 177 | 10.00 | 33.68 | 4.50 | 207 | 300 | 7.64    | 34.04   | 2.13   | 26.60   | 145   | 0.78   |
| 210 | 8.93  | 33.87 | 4.06 | 176 | 400 | 6.59    | 34.18   | 1.01   | 26.85   | 121   | 0.92   |
| 238 | 8.49  | 33.95 | 3.20 | 164 | 500 | 5.80    | 34.23   | 0.53   | 26.99   | 108   | 1.04   |
| 285 | 7.90  | 34.03 | 2.28 | 149 | 600 | (5.29)  | (34.35) |        | (27.15) | (93)  | (1.15) |
| 336 | 7.00  | 34.06 | 1.86 | 135 |     |         |         |        |         |       |        |
| 417 | 6.48  | 34.20 | 0.83 | 118 |     |         |         |        |         |       |        |
| 499 | 5.81  | 34.23 | 0.54 | 108 |     |         |         |        |         |       |        |
| 583 | 5.34  | 34.32 | 0.40 | 96  |     |         |         |        |         |       |        |

ORCA; September 9, 1959; 0207 GCT; <sup>a)</sup> 32°55'N, 117°21.5'W; sounding, 300 fm; wind, 320°, force 1; weather, partly cloudy; sea, slight; wire angle, 03°.

93.28

|     |      |       |      |     |
|-----|------|-------|------|-----|
| 286 | 8.64 | 34.22 | 1.22 | 146 |
| 289 | 8.58 | 34.22 | 1.22 | 145 |
| 292 | 8.54 | 34.22 | 1.01 | 144 |
| 316 | 8.32 | 34.23 | 0.99 | 140 |
| 319 | 8.28 | 34.24 | 0.96 | 139 |
| 322 | 8.29 | 34.22 | 0.98 | 141 |
| 346 | 8.06 | 34.23 | 0.86 | 137 |
| 349 | 8.08 | 34.26 | 0.86 | 135 |
| 352 | 8.02 | 34.25 | 0.83 | 135 |
| 376 | 7.68 | 34.29 | 0.59 | 127 |
| 379 | 7.62 | 34.25 | 0.71 | 130 |
| 382 | 7.58 | 34.22 | 0.68 | 131 |
| 407 | 7.33 | -     | -    | -   |
| 409 | 7.32 | 34.29 | 0.58 | 122 |
| 413 | 7.28 | 34.29 | 0.59 | 122 |
| 437 | 7.12 | 34.28 | 0.58 | 120 |
| 440 | 7.12 | 34.30 | 0.58 | 119 |
| 442 | 7.11 | 34.25 | 0.60 | 122 |

a) Special cast.

SIO

CCOFI  
5909

| OBSERVED |    |   |                |                                 | INTERPOLATED |    |   |                | COMPUTED   |                                 |            |
|----------|----|---|----------------|---------------------------------|--------------|----|---|----------------|------------|---------------------------------|------------|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$                    | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$                    | $\Delta D$ |
| m        | °C | ‰ | ml/L           | $10^{-5} \text{ cm}^3/\text{g}$ | m            | °C | ‰ | ml/L           | g/L        | $10^{-5} \text{ cm}^3/\text{g}$ | dyn. m     |

93.28

ORCA; September 16, 1959; 2040 GCT; 32° 54'N, 117° 22'W; sounding, 150 fm; wind, 310°, force 2; weather cloudy; sea, moderate; wire angle, 26°.

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 1   | 20.74 | 33.73 | 5.23 | 428 | 0   | (20.74) | (33.73) | (5.23) | (23.62) | (428) | (0.00) |
| 9   | 20.51 | 33.73 | 5.39 | 422 | 10  | 20.49   | 33.73   | 5.39   | 23.68   | 422   | 0.04   |
| 28  | 16.46 | 33.58 | 5.47 | 338 | 20  | 17.54   | 33.59   | 5.47   | 24.32   | 361   | 0.08   |
| 45  | 14.96 | 33.57 | 5.20 | 306 | 30  | 16.21   | 33.58   | 5.45   | 24.63   | 332   | 0.12   |
| 67  | 13.52 | 33.55 | 4.48 | 279 | 50  | 14.62   | 33.56   | 5.08   | 24.97   | 300   | 0.18   |
| 88  | 12.42 | 33.58 | 3.98 | 256 | 75  | 13.03   | 33.56   | 4.24   | 25.29   | 269   | 0.25   |
| 107 | 11.94 | 33.62 | 3.83 | 244 | 100 | 12.08   | 33.61   | 3.87   | 25.51   | 248   | 0.32   |
| 140 | 10.50 | 33.81 | 3.06 | 206 | 150 | 10.28   | 33.85   | 2.93   | 26.03   | 199   | 0.43   |
| 172 | 9.94  | 33.97 | 2.62 | 184 | 200 | 9.61    | 34.05   | 2.31   | 26.29   | 174   | 0.52   |
| 214 | 9.46  | 34.08 | 2.17 | 169 |     |         |         |        |         |       |        |

93.30

ORCA; September 16, 1959; 1900 GCT; 32° 50'N, 117° 30'W; sounding, 585 fm; wind, 310°, force 3; weather, cloudy; sea, moderate; wire angle, 15°.

|     |       |       |      |     |     |       |       |      |       |     |      |
|-----|-------|-------|------|-----|-----|-------|-------|------|-------|-----|------|
| 0   | 21.82 | 33.81 | 5.08 | 451 | 0   | 21.82 | 33.81 | 5.08 | 23.38 | 451 | 0.00 |
| 10  | 21.78 | 33.83 | 5.11 | 448 | 10  | 21.78 | 33.83 | 5.11 | 23.41 | 448 | 0.04 |
| 29  | 16.38 | 33.57 | 5.64 | 336 | 20  | 19.95 | 33.74 | 5.35 | 23.84 | 407 | 0.09 |
| 38  | 14.88 | 33.51 | 5.64 | 309 | 30  | 16.26 | 33.56 | 5.64 | 24.61 | 334 | 0.12 |
| 48  | 14.02 | 33.54 | 5.29 | 290 | 50  | 13.90 | 33.54 | 5.20 | 25.10 | 287 | 0.19 |
| 62  | 12.78 | 33.55 | 4.54 | 265 | 75  | 11.98 | 33.63 | 3.87 | 25.55 | 244 | 0.25 |
| 76  | 11.96 | 33.64 | 3.84 | 243 | 100 | 10.87 | 33.70 | 3.76 | 25.81 | 220 | 0.31 |
| 95  | 11.02 | 33.69 | 3.83 | 223 | 150 | 10.11 | 33.83 | 3.06 | 26.04 | 198 | 0.42 |
| 119 | 10.42 | 33.77 | 3.48 | 207 | 200 | 9.59  | 34.08 | 2.24 | 26.32 | 171 | 0.51 |
| 138 | 10.23 | 33.79 | 3.16 | 203 | 250 | 8.89  | 34.17 | 1.93 | 26.51 | 153 | 0.59 |
| 166 | 9.92  | 33.89 | 2.93 | 190 | 300 | 8.23  | 34.19 | 1.46 | 26.63 | 142 | 0.67 |
| 195 | 9.66  | 34.05 | 2.30 | 174 | 400 | 7.35  | 34.29 | 0.77 | 26.83 | 123 | 0.81 |
| 223 | 9.25  | 34.20 | 2.07 | 157 | 500 | 6.36  | 34.34 | 0.43 | 27.01 | 106 | 0.93 |
| 261 | 8.76  | 34.16 | 1.87 | 152 |     |       |       |      |       |     |      |
| 319 | 8.00  | 34.22 | 1.28 | 137 |     |       |       |      |       |     |      |
| 395 | 7.38  | 34.29 | 0.79 | 123 |     |       |       |      |       |     |      |
| 463 | 6.74  | 34.31 | 0.54 | 113 |     |       |       |      |       |     |      |
| 541 | 5.96  | 34.38 | 0.35 | 98  |     |       |       |      |       |     |      |

93.40

ORCA; September 14, 1959; 2056 GCT; 32° 21'N, 118° 07'W; sounding, 400 fm; wind, 340°, force 5; weather, cloudy; sea, very rough; wire angle, 28°.

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 2   | 20.20 | 33.75 | 5.06 | 413 | 0   | (20.20) | (33.75) | (5.06) | (23.78) | (413) | (0.00) |
| 11  | 20.20 | 33.73 | 5.05 | 415 | 10  | 20.20   | 33.73   | 5.05   | 23.76   | 415   | 0.04   |
| 30  | 14.56 | 33.49 | 5.64 | 304 | 20  | 17.90   | 33.62   | 5.30   | 24.26   | 367   | 0.08   |
| 37  | 14.31 | 33.52 | 5.52 | 296 | 30  | 14.56   | 33.49   | 5.64   | 24.92   | 304   | 0.11   |
| 50  | 12.96 | 33.55 | 4.53 | 268 | 50  | 12.96   | 33.55   | 4.53   | 25.30   | 268   | 0.17   |
| 62  | 11.17 | 33.61 | 3.93 | 231 | 75  | 10.74   | 33.68   | 3.47   | 25.82   | 219   | 0.23   |
| 84  | 10.56 | 33.77 | 3.10 | 209 | 100 | 10.26   | 33.83   | 2.93   | 26.02   | 200   | 0.28   |
| 100 | 10.26 | 33.83 | 2.93 | 200 | 150 | 9.73    | 33.97   | 2.57   | 26.22   | 181   | 0.38   |
| 116 | 10.19 | 33.86 | 2.77 | 197 | 200 | 9.56    | 34.12   | 1.82   | 26.36   | 167   | 0.47   |
| 132 | 9.98  | 33.88 | 2.77 | 192 | 250 | 9.43    | 34.28   | 1.27   | 26.50   | 154   | 0.55   |
| 156 | 9.66  | 34.01 | 2.48 | 177 | 300 | 8.92    | 34.29   | 1.08   | 26.59   | 145   | 0.63   |
| 184 | 9.56  | 34.07 | 2.11 | 171 | 400 | 7.58    | 34.27   | 0.82   | 26.78   | 127   | 0.77   |
| 209 | 9.55  | 34.16 | 1.61 | 164 | 500 | 6.64    | 34.29   | 0.43   | 26.94   | 113   | 0.90   |
| 250 | 9.43  | 34.28 | 1.27 | 154 |     |         |         |        |         |       |        |
| 298 | 8.96  | 34.29 | 1.10 | 146 |     |         |         |        |         |       |        |
| 372 | 7.90  | 34.27 | 0.94 | 132 |     |         |         |        |         |       |        |
| 449 | 7.10  | 34.27 | 0.57 | 121 |     |         |         |        |         |       |        |
| 529 | 6.42  | 34.31 | 0.38 | 109 |     |         |         |        |         |       |        |

| OBSERVED |    |   |                |              | INTERPOLATED |    |   |                | COMPUTED   |              |            |  |
|----------|----|---|----------------|--------------|--------------|----|---|----------------|------------|--------------|------------|--|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$ | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$ | $\Delta D$ |  |
| m        | °C | ‰ | ml/L           | 10 cm/g      | m            | °C | ‰ | ml/L           | g/L        | 10 cm/g      | dyn. m     |  |

SIO  
CCOFI  
5909

ORCA; September 14, 1959; 1535 GCT; 32°03'N, 118°46'W; sounding, 700 fm; wind, 320°, force 5; weather, partly cloudy; sea, high; wire angle, 16°.

93.50

|     |        |       |        |     |     |         |         |        |         |       |        |  |
|-----|--------|-------|--------|-----|-----|---------|---------|--------|---------|-------|--------|--|
| 2   | 19.44  | 33.72 | 5.13   | 397 | 0   | (19.44) | (33.72) | (5.13) | (23.95) | (397) | (0.00) |  |
| 11  | 19.45  | 33.68 | 5.12   | 400 | 10  | 19.45   | 33.68   | 5.12   | 23.92   | 400   | 0.04   |  |
| 35  | 16.42  | 33.51 | 5.71a) | 342 | 20  | 19.45   | 33.68   | 5.14   | 23.92   | 400   | 0.08   |  |
| 45  | 14.98  | 33.46 | 5.77   | 315 | 30  | 18.14   | 33.60   | 5.41   | 24.18   | 374   | 0.12   |  |
| 60  | 14.09  | 33.43 | 5.41   | 299 | 50  | 14.70   | 33.45   | 5.68   | 24.86   | 310   | 0.19   |  |
| 74  | 13.05  | 33.45 | 5.11   | 277 | 75  | 13.02   | 33.45   | 5.10   | 25.20   | 277   | 0.26   |  |
| 98  | 11.28  | 33.55 | 4.48   | 238 | 100 | 11.19   | 33.56   | 4.43   | 25.64   | 236   | 0.33   |  |
| 117 | 10.38  | 33.66 | 4.01   | 215 | 150 | 9.22    | 33.88   | 2.85   | 26.23   | 180   | 0.43   |  |
| 137 | 9.42   | 33.78 | 3.25   | 190 | 200 | 8.39    | 34.15   | 2.10   | 26.56   | 148   | 0.51   |  |
| 166 | 9.03b) | 33.98 | 2.51   | 170 | 250 | 7.85    | 34.13   | 1.57   | 26.64   | 141   | 0.59   |  |
| 195 | 8.47   | 34.15 | 2.33   | 149 | 300 | 7.49    | 34.21   | 1.17   | 26.75   | 130   | 0.66   |  |
| 234 | 8.00   | 34.10 | 1.74   | 146 | 400 | 6.82    | 34.30   | 0.70   | 26.91   | 115   | 0.78   |  |
| 264 | 7.75   | 34.16 | 1.44   | 138 | 500 | 6.10    | 34.35   | 0.35   | 27.05   | 102   | 0.90   |  |
| 313 | 7.42   | 34.23 | 1.09   | 128 | 600 | 5.60    | 34.38   | 0.32   | 27.13   | 94    | 1.00   |  |
| 376 | 7.00   | 34.29 | 0.82   | 118 |     |         |         |        |         |       |        |  |
| 475 | 6.26   | 34.34 | 0.41   | 105 |     |         |         |        |         |       |        |  |
| 564 | 5.78   | 34.37 | 0.32   | 97  |     |         |         |        |         |       |        |  |
| 638 | 5.40   | 34.39 | 0.31   | 91  |     |         |         |        |         |       |        |  |

ORCA; September 14, 1959; 0923 GCT; 31°41'N, 119°30'W; sounding, 2000+ fm; wind, 340°, force 4; weather, clear; sea, very rough; wire angle, 15°.

93.60

|     |       |       |      |     |     |         |         |        |         |       |        |  |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|--|
| 1   | 19.08 | 33.78 | 5.23 | 383 | 0   | (19.08) | (33.78) | (5.23) | (24.09) | (383) | (0.00) |  |
| 10  | 19.08 | 33.80 | 5.21 | 382 | 10  | 19.08   | 33.80   | 5.21   | 24.11   | 382   | 0.04   |  |
| 34  | 16.22 | 33.50 | 5.57 | 338 | 20  | 19.01   | 33.80   | 5.21   | 24.12   | 381   | 0.08   |  |
| 44  | 13.80 | 33.33 | 5.61 | 300 | 30  | 17.90   | 33.67   | 5.31   | 24.31   | 363   | 0.11   |  |
| 58  | 12.72 | 33.42 | 5.03 | 273 | 50  | 13.30   | 33.37   | 5.40   | 25.09   | 288   | 0.18   |  |
| 73  | 11.94 | 33.48 | 4.67 | 255 | 75  | 11.82   | 33.49   | 4.62   | 25.47   | 252   | 0.25   |  |
| 97  | 10.24 | 33.60 | 4.03 | 217 | 100 | 10.10   | 33.61   | 3.98   | 25.87   | 214   | 0.30   |  |
| 116 | 9.54  | 33.65 | 3.77 | 202 | 150 | 8.96    | 33.83   | 3.12   | 26.23   | 180   | 0.40   |  |
| 135 | 9.17  | 33.75 | 3.50 | 189 | 200 | 8.12    | 34.09   | 2.08   | 26.56   | 149   | 0.49   |  |
| 164 | 8.74  | 33.91 | 2.73 | 171 | 250 | 7.78    | 34.16   | 1.55   | 26.67   | 138   | 0.56   |  |
| 192 | 8.23  | 34.06 | 2.19 | 152 | 300 | 7.59    | 34.24   | 1.10   | 26.76   | 129   | 0.63   |  |
| 231 | 7.88  | 34.13 | 1.81 | 142 | 400 | 6.59    | 34.29   | 0.54   | 26.94   | 112   | 0.76   |  |
| 260 | 7.74  | 34.17 | 1.46 | 137 | 500 | 6.02    | 34.38   | 0.35   | 27.08   | 99    | 0.87   |  |
| 308 | 7.55  | 34.25 | 1.06 | 128 | 600 | 5.49    | 34.46   | 0.27   | 27.21   | 87    | 0.96   |  |
| 370 | 6.80  | 34.27 | 0.67 | 117 |     |         |         |        |         |       |        |  |
| 467 | 6.22  | 34.35 | 0.40 | 104 |     |         |         |        |         |       |        |  |
| 554 | 5.74  | 34.42 | 0.29 | 93  |     |         |         |        |         |       |        |  |
| 629 | 5.32  | 34.48 | 0.25 | 83  |     |         |         |        |         |       |        |  |

ORCA; September 14, 1959; 0327 GCT; 31°18'N, 120°07'W; sounding, 2000+ fm; wind, 340°, force 4; weather, cloudy; sea, very rough; wire angle, 29°.

93.70

|     |       |       |      |     |     |         |         |        |         |       |        |  |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|--|
| 3   | 18.26 | 33.55 | 5.37 | 380 | 0   | (18.26) | (33.55) | (5.37) | (24.12) | (380) | (0.00) |  |
| 11  | 18.25 | 33.55 | 5.41 | 380 | 10  | 18.25   | 33.55   | 5.40   | 24.12   | 380   | 0.04   |  |
| 33  | 18.19 | 33.55 | 5.36 | 380 | 20  | 18.23   | 33.55   | 5.38   | 24.12   | 380   | 0.08   |  |
| 41  | 16.24 | 33.36 | 5.94 | 348 | 30  | 18.21   | 33.55   | 5.37   | 24.13   | 380   | 0.11   |  |
| 54  | 15.06 | 33.35 | 5.97 | 325 | 50  | 15.15   | 33.35   | 5.97   | 24.68   | 327   | 0.18   |  |
| 67  | 14.53 | 33.46 | 5.86 | 306 | 75  | 14.02   | 33.48   | 5.66   | 25.03   | 294   | 0.26   |  |
| 88  | 13.20 | 33.52 | 5.04 | 275 | 100 | 12.22   | 33.51   | 4.60   | 25.41   | 258   | 0.33   |  |
| 104 | 11.98 | 33.51 | 4.53 | 253 | 150 | 9.80    | 33.67   | 3.62   | 25.96   | 205   | 0.45   |  |
| 121 | 11.28 | 33.55 | 4.34 | 238 | 200 | 8.60    | 34.00   | 2.48   | 26.42   | 162   | 0.54   |  |
| 144 | 10.09 | 33.62 | 3.80 | 213 | 250 | 8.01    | 34.18   | 1.62   | 26.65   | 140   | 0.62   |  |
| 167 | 9.08  | 33.84 | 3.23 | 181 | 300 | 7.58    | 34.24   | 1.11   | 26.76   | 130   | 0.69   |  |
| 200 | 8.60  | 34.00 | 2.48 | 162 | 400 | 6.73    | 34.28   | 0.57   | 26.92   | 115   | 0.82   |  |
| 223 | 8.46  | 34.11 | 1.91 | 152 | 500 | 6.08    | 34.29   | 0.36   | 27.01   | 106   | 0.93   |  |
| 263 | 7.86  | 34.20 | 1.51 | 137 |     |         |         |        |         |       |        |  |
| 316 | 7.44  | 34.25 | 0.98 | 127 |     |         |         |        |         |       |        |  |
| 402 | 6.72  | 34.28 | 0.56 | 115 |     |         |         |        |         |       |        |  |
| 481 | 6.20  | 34.29 | 0.37 | 108 |     |         |         |        |         |       |        |  |
| 550 | 5.74  | 34.31 | 0.36 | 101 |     |         |         |        |         |       |        |  |

a) Alternate value, 5.59 ml/L, not used in interpolation.

b) Alternate value, 9.15°C, not used in interpolation.

373

SIO

CCOFI  
5909

| OBSERVED |    |   |                |              | INTERPOLATED |    |   |                | COMPUTED   |              |            |
|----------|----|---|----------------|--------------|--------------|----|---|----------------|------------|--------------|------------|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$ | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$ | $\Delta D$ |
| m        | °C | ‰ | ml/L           | 10 cm/g      | m            | °C | ‰ | ml/L           | g/L        | 10 cm/g      | dyn. m     |

93.80 ORCA; September 13, 1959; 2140 GCT; 31°10.5'N, 120°52.5'W; sounding, 2000+ fm; wind, 340°, force 4; weather, cloudy; sea, rough; wire angle, 28°.

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 2   | 18.58 | 33.31 | 5.17 | 406 | 0   | (18.58) | (33.31) | (5.17) | (23.85) | (406) | (0.00) |
| 11  | 18.59 | 33.31 | 5.18 | 406 | 10  | 18.59   | 33.31   | 5.18   | 23.86   | 406   | 0.04   |
| 28  | 18.52 | 33.31 | 5.15 | 404 | 20  | 18.57   | 33.31   | 5.16   | 23.86   | 405   | 0.08   |
| 37  | 18.32 | 33.33 | 5.17 | 397 | 30  | 18.49   | 33.31   | 5.15   | 23.88   | 403   | 0.12   |
| 50  | 16.04 | 33.40 | 5.61 | 342 | 50  | 16.04   | 33.40   | 5.61   | 24.53   | 342   | 0.20   |
| 63  | 14.70 | 33.31 | 5.70 | 320 | 75  | 13.89   | 33.30   | 5.57   | 24.92   | 304   | 0.28   |
| 84  | 13.24 | 33.30 | 5.39 | 292 | 100 | 12.32   | 33.46   | 4.98   | 25.36   | 263   | 0.35   |
| 101 | 12.22 | 33.46 | 4.96 | 261 | 150 | 9.38    | 33.74   | 3.82   | 26.09   | 193   | 0.46   |
| 118 | 10.74 | 33.51 | 4.42 | 232 | 200 | 8.37    | 33.98   | 3.00   | 26.45   | 159   | 0.55   |
| 135 | 9.83  | 33.66 | 4.04 | 206 | 250 | 7.69    | 34.08   | 2.07   | 26.62   | 143   | 0.63   |
| 159 | 9.16  | 33.78 | 3.70 | 187 | 300 | 7.04    | 34.10   | 1.47   | 26.73   | 133   | 0.70   |
| 188 | 8.62  | 33.95 | 3.09 | 166 | 400 | 6.12    | 34.19   | 0.70   | 26.92   | 114   | 0.83   |
| 214 | 8.09  | 34.01 | 2.95 | 154 | 500 | 5.52    | 34.28   | 0.41   | 27.07   | 100   | 0.94   |
| 256 | 7.63  | 34.09 | 1.91 | 142 |     |         |         |        |         |       |        |
| 304 | 6.99  | 34.10 | 1.45 | 132 |     |         |         |        |         |       |        |
| 378 | 6.28  | 34.17 | 0.86 | 118 |     |         |         |        |         |       |        |
| 455 | 5.74  | 34.23 | 0.52 | 107 |     |         |         |        |         |       |        |
| 535 | 5.38  | 34.33 | 0.35 | 95  |     |         |         |        |         |       |        |

93.90 ORCA; September 13, 1959; 1436 GCT; 30°39'N, 121°44'W; sounding, 2000+ fm; wind, 360°, force 5; weather, overcast; sea, rough; wire angle, 10°.

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 2   | 18.79 | 33.35 | 5.18 | 408 | 0   | (18.79) | (33.35) | (5.18) | (23.83) | (408) | (0.00) |
| 12  | 18.79 | 33.35 | 5.17 | 408 | 10  | 18.79   | 33.35   | 5.17   | 23.83   | 408   | 0.04   |
| 32  | 18.80 | 33.35 | 5.11 | 408 | 20  | 18.79   | 33.35   | 5.15   | 23.83   | 408   | 0.08   |
| 41  | 18.65 | 33.40 | 5.21 | 401 | 30  | 18.80   | 33.35   | 5.12   | 23.83   | 408   | 0.12   |
| 55  | 17.23 | 33.56 | 5.52 | 356 | 50  | 17.60   | 33.55   | 5.49   | 24.28   | 366   | 0.20   |
| 70  | 16.31 | 33.53 | 5.41 | 338 | 75  | 16.01   | 33.50   | 5.40   | 24.62   | 333   | 0.29   |
| 94  | 14.72 | 33.46 | 5.38 | 309 | 100 | 14.70   | 33.49   | 5.37   | 24.90   | 306   | 0.37   |
| 114 | 13.29 | 33.52 | 5.17 | 277 | 150 | 11.02   | 33.64   | 4.46   | 25.73   | 227   | 0.50   |
| 133 | 12.29 | 33.60 | 4.97 | 252 | 200 | 8.95    | 33.89   | 3.92   | 26.28   | 175   | 0.60   |
| 152 | 10.81 | 33.65 | 4.38 | 223 | 250 | 8.01    | 34.01   | 3.02   | 26.51   | 153   | 0.69   |
| 182 | 9.39  | 33.78 | 4.11 | 190 | 300 | 7.25    | 34.05   | 2.35   | 26.66   | 139   | 0.77   |
| 215 | 8.63  | 33.95 | 3.68 | 166 | 400 | 6.40    | 34.17   | 1.13   | 26.87   | 119   | 0.90   |
| 245 | 8.10  | 34.00 | 3.10 | 154 | 500 | 5.71    | 34.26   | 0.47   | 27.03   | 104   | 1.02   |
| 293 | 7.34  | 34.04 | 2.43 | 141 | 600 | (5.30)  | (34.34) | (0.37) | (27.14) | (93)  | (1.12) |
| 348 | 6.74  | 34.07 | 1.81 | 131 |     |         |         |        |         |       |        |
| 431 | 6.22  | 34.21 | 0.75 | 114 |     |         |         |        |         |       |        |
| 514 | 5.63  | 34.27 | 0.44 | 102 |     |         |         |        |         |       |        |
| 599 | 5.31  | 34.34 | 0.37 | 94  |     |         |         |        |         |       |        |

93.100 ORCA; September 13, 1959; 0857 GCT; 30°21'N, 122°20'W; sounding, 2000+ fm; wind, 350°, force 5; weather, cloudy; sea, very rough; wire angle, 09°.

|     |       |         |      |     |     |         |         |        |         |       |        |
|-----|-------|---------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 1   | 19.10 | 33.48a) | 5.26 | 406 | 0   | (19.10) | (33.48) | (5.26) | (23.86) | (406) | (0.00) |
| 10  | 19.10 | 33.47   | 5.20 | 406 | 10  | 19.10   | 33.47   | 5.20   | 23.85   | 406   | 0.04   |
| 30  | 18.94 | 33.48   | 5.25 | 401 | 20  | 19.06   | 33.47   | 5.21   | 23.86   | 405   | 0.08   |
| 40  | 17.87 | 33.46   | 5.46 | 378 | 30  | 18.94   | 33.48   | 5.25   | 23.90   | 401   | 0.12   |
| 54  | 16.68 | 33.51   | 5.69 | 347 | 50  | 17.20   | 33.50   | 5.62   | 24.33   | 360   | 0.20   |
| 69  | 15.70 | 33.55   | 5.75 | 323 | 75  | 15.85   | 33.62   | 5.76   | 24.75   | 321   | 0.28   |
| 94  | 14.72 | 33.68   | 5.52 | 293 | 100 | 14.51   | 33.69   | 5.46   | 25.09   | 288   | 0.36   |
| 114 | 14.06 | 33.75   | 5.33 | 275 | 150 | 11.03   | 33.69   | 4.78   | 25.77   | 224   | 0.49   |
| 134 | 12.56 | 33.68   | 5.02 | 251 | 200 | 8.99    | 33.87   | 4.04   | 26.26   | 177   | 0.59   |
| 153 | 10.82 | 33.69   | 4.74 | 220 | 250 | 8.09    | 34.05   | 3.20   | 26.54   | 151   | 0.68   |
| 183 | 9.44  | 33.78   | 4.27 | 191 | 300 | 7.29    | 34.08   | 1.99   | 26.67   | 138   | 0.75   |
| 217 | 8.64  | 33.96   | 3.81 | 165 | 400 | 6.39    | 34.19   | 1.00   | 26.89   | 117   | 0.89   |
| 246 | 8.16  | 34.04   | 3.29 | 152 | 500 | 5.74    | 34.28   | 0.51   | 27.04   | 103   | 1.00   |
| 295 | 7.35  | 34.07   | 2.05 | 139 | 600 | 5.28    | 34.38   | 0.35   | 27.17   | 91    | 1.11   |
| 350 | 6.81  | 34.14   | 1.35 | 127 |     |         |         |        |         |       |        |
| 435 | 6.12  | 34.22   | 0.78 | 112 |     |         |         |        |         |       |        |
| 519 | 5.65  | 34.30   | 0.44 | 100 |     |         |         |        |         |       |        |
| 605 | 5.26  | 34.38   | 0.35 | 90  |     |         |         |        |         |       |        |

374

a) Salinity bottle numbers were not recorded on the data sheet. Since standard handling and titrating procedures were used, these salinity values are assumed to be in the order listed.

| OBSERVED |    |   |                |                       | INTERPOLATED |    |   |                | COMPUTED   |                       |            |
|----------|----|---|----------------|-----------------------|--------------|----|---|----------------|------------|-----------------------|------------|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$          | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$          | $\Delta D$ |
| m        | °C | ‰ | ml/L           | 10 <sup>-5</sup> cm/g | m            | °C | ‰ | ml/L           | g/L        | 10 <sup>-5</sup> cm/g | dyn. m     |

SIO  
CCOFI  
5909

ORCA; September 13, 1959; 0235 GCT; 30°06.5'N, 122°53.5'W; sounding, 2000+ fm; wind, 045°, force 4; weather, cloudy; sea, very rough; wire angle, 24°.

93.110

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 1   | 18.26 | 33.17 | 5.37 | 408 | 0   | (18.26) | (33.17) | (5.37) | (23.83) | (408) | (0.00) |
| 10  | 18.26 | 33.16 | 5.40 | 409 | 10  | 18.26   | 33.16   | 5.40   | 23.82   | 409   | 0.04   |
| 29  | 18.20 | 33.15 | 5.31 | 408 | 20  | 18.24   | 33.16   | 5.34   | 23.82   | 409   | 0.08   |
| 37  | 18.04 | 33.13 | 5.37 | 406 | 30  | 18.19   | 33.15   | 5.31   | 23.83   | 408   | 0.12   |
| 51  | 17.58 | 33.52 | 5.62 | 367 | 50  | 17.60   | 33.47   | 5.59   | 24.22   | 371   | 0.20   |
| 65  | 15.50 | 33.38 | 5.94 | 331 | 75  | 15.50   | 33.52   | 5.85   | 24.75   | 321   | 0.29   |
| 87  | 15.18 | 33.55 | 5.74 | 312 | 100 | 14.78   | 33.62   | 5.61   | 24.98   | 299   | 0.37   |
| 105 | 14.62 | 33.66 | 5.54 | 292 | 150 | 10.71   | 33.54   | 4.60   | 25.71   | 229   | 0.50   |
| 122 | 13.58 | 33.68 | 5.40 | 270 | 200 | 8.88    | 33.83   | 3.93   | 26.24   | 179   | 0.60   |
| 141 | 11.34 | 33.51 | 4.81 | 242 | 250 | 7.98    | 34.00   | 3.36   | 26.51   | 153   | 0.69   |
| 168 | 9.70  | 33.64 | 4.30 | 205 | 300 | 7.22    | 34.04   | 2.30   | 26.66   | 139   | 0.76   |
| 199 | 8.92  | 33.83 | 3.94 | 179 | 400 | 6.22    | 34.15   | 0.95   | 26.88   | 119   | 0.90   |
| 227 | 8.33  | 33.95 | 3.70 | 162 | 500 | 5.78    | 34.29   | 0.51   | 27.04   | 103   | 1.02   |
| 271 | 7.67  | 34.02 | 3.00 | 147 |     |         |         |        |         |       |        |
| 322 | 6.92  | 34.05 | 1.83 | 135 |     |         |         |        |         |       |        |
| 401 | 6.22  | 34.15 | 0.94 | 118 |     |         |         |        |         |       |        |
| 480 | 5.88  | 34.27 | 0.55 | 106 |     |         |         |        |         |       |        |
| 562 | 5.46  | 34.33 | 0.37 | 96  |     |         |         |        |         |       |        |

ORCA; September 13, 1959; 0344 GCT;<sup>a)</sup> 30°06.5'N, 122°53.5'W; sounding, 2000+ fm; wind, 045°, force 4; weather, cloudy; sea, very rough; wire angle, 12°.

93.110

|     |         |       |      |     |  |  |  |  |  |  |  |
|-----|---------|-------|------|-----|--|--|--|--|--|--|--|
| 34  | 18.12   | 33.23 | 5.40 | 400 |  |  |  |  |  |  |  |
| 43  | 18.09   | 33.39 | 5.45 | 388 |  |  |  |  |  |  |  |
| 50  | 16.48   | 33.28 | 5.83 | 360 |  |  |  |  |  |  |  |
| 58  | 15.78   | 33.36 | 5.82 | 339 |  |  |  |  |  |  |  |
| 61  | 15.44   | 33.38 | 5.90 | 330 |  |  |  |  |  |  |  |
| 64  | 15.07   | 33.34 | 5.92 | 325 |  |  |  |  |  |  |  |
| 67  | 15.29   | 33.49 | 5.88 | 319 |  |  |  |  |  |  |  |
| 70  | 15.45   | 33.55 | 5.83 | 318 |  |  |  |  |  |  |  |
| 73  | 15.48   | 33.57 | 5.83 | 317 |  |  |  |  |  |  |  |
| 76  | 15.60   | 33.62 | 5.70 | 316 |  |  |  |  |  |  |  |
| 89  | 15.32b) | 33.64 | 5.72 | 308 |  |  |  |  |  |  |  |
| 92  | 15.18   | 33.64 | 5.72 | 306 |  |  |  |  |  |  |  |
| 95  | 15.18   | 33.67 | 5.67 | 304 |  |  |  |  |  |  |  |
| 98  | 15.18   | 33.68 | 5.65 | 303 |  |  |  |  |  |  |  |
| 101 | 14.92   | 33.66 | 5.60 | 299 |  |  |  |  |  |  |  |
| 104 | 14.83   | 33.69 | 5.53 | 295 |  |  |  |  |  |  |  |
| 107 | 14.58   | 33.71 | 5.55 | 288 |  |  |  |  |  |  |  |
| 137 | 11.82   | 33.48 | 5.00 | 252 |  |  |  |  |  |  |  |

ORCA; September 12, 1959; 2044 GCT; 29°49.5'N, 123°34'W; sounding, 2000+ fm; wind, 360°, force 4; weather, cloudy; sea, rough; wire angle, 18°.

93.120

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 1   | 18.72 | 33.16 | 5.23 | 420 | 0   | (18.72) | (33.16) | (5.23) | (23.71) | (420) | (0.00) |
| 10  | 18.69 | 33.19 | 5.24 | 417 | 10  | 18.69   | 33.19   | 5.24   | 23.74   | 417   | 0.04   |
| 29  | 18.58 | 33.17 | 5.19 | 416 | 20  | 18.64   | 33.18   | 5.23   | 23.74   | 417   | 0.08   |
| 39  | 18.51 | 33.23 | 5.11 | 410 | 30  | 18.58   | 33.17   | 5.18   | 23.75   | 416   | 0.12   |
| 53  | 17.94 | 33.60 | 5.49 | 370 | 50  | 18.20   | 33.53   | 5.40   | 24.12   | 381   | 0.20   |
| 67  | 16.67 | 33.75 | 5.59 | 330 | 75  | 16.40   | 33.77   | 5.56   | 24.74   | 322   | 0.29   |
| 91  | 16.00 | 33.78 | 5.47 | 312 | 100 | 15.70   | 33.79   | 5.45   | 24.90   | 306   | 0.37   |
| 110 | 15.24 | 33.80 | 5.43 | 295 | 150 | 11.39   | 33.62   | 4.70   | 24.65   | 235   | 0.51   |
| 128 | 13.98 | 33.78 | 5.10 | 271 | 200 | 9.32    | 33.79   | 4.16   | 26.14   | 188   | 0.62   |
| 146 | 11.73 | 33.62 | 4.75 | 240 | 250 | 8.37    | 33.89   | 3.03   | 26.36   | 167   | 0.71   |
| 170 | 9.84  | 33.66 | 4.45 | 206 | 300 | 7.58    | 34.03   | 2.40   | 26.59   | 146   | 0.79   |
| 204 | 9.26  | 33.80 | 4.13 | 187 | 400 | 6.37    | 34.12   | 1.14   | 26.84   | 122   | 0.93   |
| 232 | 8.70  | 33.84 | 3.30 | 175 | 500 | 5.82    | 34.20   | 0.57   | 26.97   | 110   | 1.05   |
| 277 | 7.94  | 33.96 | 2.84 | 154 |     |         |         |        |         |       |        |
| 327 | 7.14  | 34.04 | 1.92 | 138 |     |         |         |        |         |       |        |
| 407 | 6.32  | 34.13 | 1.09 | 121 |     |         |         |        |         |       |        |
| 488 | 5.88  | 34.20 | 0.62 | 111 |     |         |         |        |         |       |        |
| 571 | 5.47  | 34.25 | 0.36 | 102 |     |         |         |        |         |       |        |

a) Special cast.  
b) Alternate value, 15.52°C, not used in interpolation.

SIO

CCOFI  
5909

| OBSERVED |    |   |                |                   | INTERPOLATED |    |   |                | COMPUTED   |                   |            |
|----------|----|---|----------------|-------------------|--------------|----|---|----------------|------------|-------------------|------------|
| Z        | T  | S | O <sub>2</sub> | $\delta T_{-5}^3$ | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_{-5}^3$ | $\Delta D$ |
| m        | °C | ‰ | ml/L           | 10 cm/g           | m            | °C | ‰ | ml/L           | g/L        | 10 cm/g           | dyn. m     |

97.32

BLACK DOUGLAS; September 21, 1959; 2316 GCT;<sup>a)</sup> 32°11'N, 117°17'W; sounding, 700 fm; wind, 270°, force 3; weather, cloudy; sea, moderate; wire angle, 19°.

|     |      |       |      |     |
|-----|------|-------|------|-----|
| 423 | 6.80 | 34.35 | 0.39 | 111 |
| 425 | 6.81 | 34.34 | 0.35 | 112 |
| 428 | 6.76 | 34.33 | 0.36 | 112 |
| 452 | 6.59 | 34.33 | 0.26 | 110 |
| 455 | 6.60 | 34.34 | 0.25 | 109 |
| 458 | 6.56 | 34.34 | 0.25 | 108 |
| 482 | 6.40 | 34.34 | 0.27 | 106 |
| 485 | 6.40 | 34.35 | 0.24 | 106 |
| 488 | 6.39 | 34.37 | 0.27 | 104 |
| 512 | 6.18 | 34.39 | 0.25 | 100 |
| 515 | 6.16 | 34.36 | 0.27 | 102 |
| 517 | 6.16 | 34.36 | 0.30 | 102 |
| 542 | 6.00 | -     | -    | -   |
| 545 | 5.98 | 34.34 | 0.31 | 102 |
| 547 | 5.94 | 34.36 | 0.35 | 99  |
| 572 | 5.84 | 34.36 | 0.25 | 98  |
| 574 | 5.83 | 34.38 | 0.30 | 96  |
| 577 | 5.82 | 34.42 | 0.29 | 94  |

113.30

BLACK DOUGLAS; September 23, 1959; 0036 GCT; 29°22'N, 115°18'W; sounding, 30 fm; wind, 260°, force 3; weather, cloudy; sea, moderate; wire angle, 05°.

|    |       |       |      |     |    |         |         |        |         |       |        |
|----|-------|-------|------|-----|----|---------|---------|--------|---------|-------|--------|
| 0  | 18.49 | 33.70 | 5.64 | 375 | 0  | 18.49   | 33.70   | 5.64   | 24.18   | 375   | 0.00   |
| 9  | 16.56 | 33.62 | 5.64 | 336 | 10 | 16.40   | 33.62   | 5.63   | 24.62   | 333   | 0.04   |
| 28 | 14.90 | 33.64 | 5.29 | 300 | 20 | 15.38   | 33.63   | 5.44   | 24.86   | 310   | 0.07   |
| 48 | 13.57 | 33.61 | 4.50 | 275 | 30 | 14.85   | 33.64   | 5.27   | 24.98   | 299   | 0.10   |
|    |       |       |      |     | 50 | (13.40) | (33.61) | (4.40) | (25.26) | (272) | (0.16) |

113.35

BLACK DOUGLAS; September 23, 1959; 0405 GCT; 29°11.5'N, 115°38'W; sounding, 740 fm; wind, 270°, force 4; weather, partly cloudy; sea, moderate; wire angle, 10°.

|     |       |       |      |     |     |        |         |        |         |      |        |
|-----|-------|-------|------|-----|-----|--------|---------|--------|---------|------|--------|
| 0   | 17.94 | 33.66 | 5.25 | 365 | 0   | 17.94  | 33.66   | 5.25   | 24.28   | 365  | 0.00   |
| 9   | 17.86 | 33.64 | 5.47 | 364 | 10  | 17.85  | 33.63   | 5.48   | 24.29   | 364  | 0.04   |
| 28  | 15.83 | 33.59 | 5.27 | 324 | 20  | 17.45  | 33.61   | 5.48   | 24.36   | 357  | 0.07   |
| 38  | 15.39 | 33.64 | 5.11 | 310 | 30  | 15.75  | 33.60   | 5.22   | 24.76   | 320  | 0.11   |
| 54  | 13.85 | 33.66 | 4.61 | 278 | 50  | 14.87  | 33.66   | 4.96   | 24.98   | 298  | 0.17   |
| 69  | 13.33 | 33.64 | 4.35 | 269 | 75  | 13.10  | 33.67   | 4.28   | 25.37   | 262  | 0.24   |
| 93  | 11.79 | 33.74 | 4.13 | 233 | 100 | 11.29  | 33.74   | 3.97   | 25.76   | 224  | 0.30   |
| 111 | 10.83 | 33.79 | 3.69 | 213 | 150 | 10.35  | 34.03   | 2.29   | 26.16   | 187  | 0.40   |
| 132 | 10.68 | 33.92 | 2.73 | 200 | 200 | 9.72   | 34.22   | 1.42   | 26.41   | 163  | 0.49   |
| 152 | 10.32 | 34.04 | 2.25 | 186 | 250 | 9.93   | 34.38   | 0.68   | 26.51   | 153  | 0.57   |
| 181 | 9.79  | 34.18 | 1.64 | 166 | 300 | 9.36   | 34.40   | 0.66   | 26.61   | 144  | 0.65   |
| 216 | 9.73  | 34.25 | 1.22 | 160 | 400 | 7.91   | 34.30   | 0.67   | 26.76   | 130  | 0.79   |
| 245 | 9.96  | 34.38 | 0.70 | 154 | 500 | 6.80   | 34.34   | 0.37   | 26.95   | 112  | 0.92   |
| 294 | 9.40  | 34.40 | 0.67 | 144 | 600 | (5.85) | (34.38) | (0.22) | (27.10) | (97) | (1.03) |
| 349 | 9.09  | 34.43 | 0.56 | 137 |     |        |         |        |         |      |        |
| 433 | 7.24  | 34.25 | 0.72 | 124 |     |        |         |        |         |      |        |
| 516 | 6.68  | 34.36 | 0.31 | 108 |     |        |         |        |         |      |        |
| 595 | 5.90  | 34.38 | 0.22 | 97  |     |        |         |        |         |      |        |

a) Special cast.

| OBSERVED |    |   |                |              | INTERPOLATED |    |   |                | COMPUTED   |              |            |  |
|----------|----|---|----------------|--------------|--------------|----|---|----------------|------------|--------------|------------|--|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$ | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$ | $\Delta D$ |  |
| m        | °C | ‰ | ml/L           | 10 cm/g      | m            | °C | ‰ | ml/L           | g/L        | 10 cm/g      | dyn. m     |  |

S10  
CCOFI  
5909

BLACK DOUGLAS; September 23, 1959; 0705 GCT; 29°02'N, 115°57'W; sounding, 600 fm; wind, 260°, force 4; weather, cloudy; sea, moderate; wire angle, 24°.

11340

|     |       |       |      |     |     |       |         |        |         |       |        |  |
|-----|-------|-------|------|-----|-----|-------|---------|--------|---------|-------|--------|--|
| 5   | 19.15 | 33.84 | 4.77 | 381 | 0   | 19.3  | (33.84) | (4.77) | (24.07) | (385) | (0.00) |  |
| 13  | 18.89 | 33.70 | 4.86 | 385 | 10  | 18.99 | 33.73   | 4.85   | 24.08   | 384   | 0.04   |  |
| 31  | 17.86 | 33.80 | 4.81 | 353 | 20  | 18.72 | 33.70   | 4.86   | 24.11   | 381   | 0.08   |  |
| 41  | 17.68 | 33.84 | 4.48 | 346 | 30  | 17.89 | 33.79   | 4.82   | 24.39   | 354   | 0.11   |  |
| 55  | 15.74 | 33.64 | 4.93 | 318 | 50  | 17.53 | 33.72   | 4.82   | 24.66   | 329   | 0.18   |  |
| 69  | 14.47 | 33.67 | 4.34 | 289 | 75  | 14.00 | 33.67   | 4.03   | 25.18   | 280   | 0.26   |  |
| 92  | 12.44 | 33.66 | 2.83 | 251 | 100 | 12.16 | 33.68   | 2.62   | 25.56   | 244   | 0.32   |  |
| 110 | 11.96 | 33.71 | 2.51 | 238 | 150 | 11.09 | 33.82   | 2.06   | 25.86   | 215   | 0.44   |  |
| 128 | 11.60 | 33.76 | 2.05 | 228 | 200 | 9.87  | 34.08   | 2.05   | 26.28   | 176   | 0.54   |  |
| 147 | 11.18 | 33.81 | 2.03 | 217 | 250 | 9.33  | 34.21   | 1.45   | 26.47   | 157   | 0.62   |  |
| 175 | 10.38 | 33.93 | 2.36 | 194 | 300 | 8.82  | 34.34   | 0.98   | 26.66   | 140   | 0.70   |  |
| 207 | 9.74  | 34.10 | 1.93 | 172 | 400 | 7.46  | 34.33   | 0.60   | 26.84   | 122   | 0.84   |  |
| 234 | 9.44  | 34.16 | 1.66 | 163 | 500 | 6.58  | 34.33   | 0.47   | 26.97   | 110   | 0.96   |  |
| 280 | 9.10  | 34.33 | 1.09 | 145 |     |       |         |        |         |       |        |  |
| 332 | 8.28  | 34.33 | 0.85 | 133 |     |       |         |        |         |       |        |  |
| 410 | 7.36  | 34.32 | 0.60 | 120 |     |       |         |        |         |       |        |  |
| 490 | 6.64  | 34.33 | 0.48 | 110 |     |       |         |        |         |       |        |  |
| 573 | 6.02  | 34.35 | 0.31 | 102 |     |       |         |        |         |       |        |  |

3

BLACK DOUGLAS; September 23, 1959; 1848 GCT; 29°11'N, 114°55'W; sounding, 40 fm; wind, 270°, force 1; weather, overcast; sea, moderate; wire angle, 00°.

115.27

|    |       |       |      |     |    |         |         |        |         |       |        |  |
|----|-------|-------|------|-----|----|---------|---------|--------|---------|-------|--------|--|
| 0  | 19.18 | 33.69 | 5.51 | 392 | 0  | 19.18   | 33.69   | 5.51   | 24.00   | 392   | 0.00   |  |
| 9  | 18.60 | 33.68 | 5.59 | 379 | 10 | 18.58   | 33.68   | 5.59   | 24.14   | 378   | 0.04   |  |
| 29 | 15.64 | 33.59 | 5.35 | 319 | 20 | 16.85   | 33.62   | 5.50   | 24.51   | 343   | 0.07   |  |
| 49 | 13.72 | 33.57 | 4.65 | 281 | 30 | 15.54   | 33.59   | 5.32   | 24.79   | 317   | 0.11   |  |
|    |       |       |      |     | 50 | (13.60) | (33.57) | (4.61) | (25.18) | (279) | (0.17) |  |

7

BLACK DOUGLAS; September 23, 1959; 1645 GCT; 29°05'N, 115°08'W; sounding, 50 fm; wind, 260°, force 3; weather, overcast; sea, moderate; wire angle, 00°.

115.30

|    |       |       |      |     |    |       |       |      |       |     |      |  |
|----|-------|-------|------|-----|----|-------|-------|------|-------|-----|------|--|
| 0  | 18.72 | 33.66 | 4.75 | 384 | 0  | 18.72 | 33.66 | 4.75 | 24.08 | 384 | 0.00 |  |
| 10 | 18.73 | 33.69 | 4.81 | 382 | 10 | 18.73 | 33.69 | 4.81 | 24.10 | 382 | 0.04 |  |
| 30 | 14.94 | 33.61 | 4.36 | 301 | 20 | 17.94 | 33.68 | 4.80 | 24.30 | 364 | 0.08 |  |
| 50 | 12.94 | 33.62 | 4.11 | 263 | 30 | 14.94 | 33.61 | 4.36 | 24.96 | 301 | 0.11 |  |
| 75 | 11.62 | 33.78 | 2.32 | 227 | 50 | 12.94 | 33.62 | 4.11 | 25.36 | 263 | 0.16 |  |
|    |       |       |      |     | 75 | 11.62 | 33.78 | 2.32 | 25.73 | 227 | 0.23 |  |

5

BLACK DOUGLAS; September 23, 1959; 1349 GCT; 28°53'N, 115°28'W; sounding, 500 fm; wind, 320°, force 4; weather, drizzle; sea, rough; wire angle, 06°.

115.35

|     |       |       |      |     |     |       |       |      |       |     |      |  |
|-----|-------|-------|------|-----|-----|-------|-------|------|-------|-----|------|--|
| 0   | 20.37 | 33.83 | 4.82 | 411 | 0   | 20.37 | 33.83 | 4.82 | 23.80 | 411 | 0.00 |  |
| 10  | 20.43 | 33.81 | 4.96 | 415 | 10  | 20.43 | 33.81 | 4.96 | 23.76 | 415 | 0.04 |  |
| 30  | 17.66 | 33.73 | 5.41 | 354 | 20  | 18.92 | 33.77 | 5.23 | 24.12 | 380 | 0.08 |  |
| 39  | 16.31 | 33.67 | 5.50 | 328 | 30  | 17.66 | 33.73 | 5.41 | 24.40 | 354 | 0.12 |  |
| 54  | 15.30 | 33.66 | 5.35 | 307 | 50  | 15.52 | 33.66 | 5.41 | 24.85 | 311 | 0.18 |  |
| 70  | 13.70 | 33.70 | 4.44 | 272 | 75  | 14.00 | 33.83 | 4.29 | 25.30 | 268 | 0.26 |  |
| 96  | 12.54 | 33.75 | 3.16 | 246 | 100 | 12.80 | 33.86 | 2.91 | 25.57 | 242 | 0.32 |  |
| 116 | 12.82 | 34.10 | 1.79 | 226 | 150 | 10.95 | 34.01 | 2.47 | 26.04 | 198 | 0.43 |  |
| 136 | 11.56 | 34.05 | 2.20 | 206 | 200 | 10.36 | 34.22 | 1.55 | 26.30 | 173 | 0.53 |  |
| 156 | 10.78 | 34.01 | 2.51 | 196 | 250 | 9.43  | 34.22 | 1.65 | 26.46 | 158 | 0.61 |  |
| 185 | 10.36 | 34.14 | 1.81 | 178 | 300 | 8.69  | 34.29 | 1.26 | 26.63 | 142 | 0.69 |  |
| 222 | 10.37 | 34.29 | 1.43 | 168 | 400 | 7.72  | 34.34 | 0.62 | 26.82 | 124 | 0.83 |  |
| 252 | 9.38  | 34.22 | 1.67 | 157 | 500 | 6.56  | 34.37 | 0.32 | 27.01 | 106 | 0.95 |  |
| 301 | 8.68  | 34.29 | 1.25 | 142 | 600 | 5.99  | 34.39 | 0.22 | 27.10 | 98  | 1.06 |  |
| 356 | 8.29  | 34.34 | 0.76 | 132 |     |       |       |      |       |     |      |  |
| 442 | 7.16  | 34.36 | 0.50 | 115 |     |       |       |      |       |     |      |  |
| 526 | 6.37  | 34.38 | 0.26 | 103 |     |       |       |      |       |     |      |  |
| 611 | 5.96  | 34.39 | 0.22 | 97  |     |       |       |      |       |     |      |  |

5

SIO

CCOFI  
5909

| OBSERVED |    |   |                |                       | INTERPOLATED |    |   |                | COMPUTED   |                       |            |  |
|----------|----|---|----------------|-----------------------|--------------|----|---|----------------|------------|-----------------------|------------|--|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$          | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$          | $\Delta D$ |  |
| m        | °C | ‰ | ml/L           | 10 <sup>-5</sup> cm/g | m            | °C | ‰ | ml/L           | g/L        | 10 <sup>-5</sup> cm/g | dyn. m     |  |

115.40

BLACK DOUGLAS; September 23, 1959; 1050 GCT; 28°45'N, 115°47'W; sounding, 475 fm; wind, 300°, force 3; weather, cloudy; sea, moderate; wire angle, 14°.

|     |         |       |      |     |     |       |       |      |       |     |        |
|-----|---------|-------|------|-----|-----|-------|-------|------|-------|-----|--------|
| 0   | 21.12   | 33.86 | -    | 429 | 0   | 21.12 | 33.86 |      | 23.61 | 429 | 0.00   |
| 8   | 21.13   | 33.86 | 5.67 | 429 | 10  | 21.11 | 33.86 | 5.67 | 23.61 | 429 | 0.04   |
| 28  | 16.94   | 33.75 | 5.46 | 336 | 20  | 18.81 | 33.77 | 5.54 | 24.40 | 354 | 0.08   |
| 37  | 15.92   | 33.73 | 5.20 | 315 | 30  | 16.93 | 33.75 | 5.45 | 24.60 | 335 | 0.12   |
| 52  | 14.48   | 33.64 | 5.37 | 292 | 50  | 14.90 | 33.66 | 5.34 | 24.98 | 298 | 0.18   |
| 67  | 13.89   | 33.70 | 4.89 | 275 | 75  | 13.08 | 33.78 | 3.60 | 25.45 | 254 | 0.25   |
| 91  | 13.06a) | 34.04 | 2.40 | 234 | 100 | 12.78 | 34.06 | 2.06 | 25.73 | 227 | 0.31   |
| 112 | 12.51a) | 34.11 | 1.73 | 219 | 150 | 11.77 | 34.14 | 1.49 | 25.98 | 203 | 0.42   |
| 131 | 11.97a) | 34.10 | 1.68 | 209 | 200 | 10.89 | 34.26 | 1.47 | 26.24 | 179 | 0.52   |
| 151 | 11.78   | 34.14 | 1.48 | 203 | 250 | 10.47 | 34.43 | 0.88 | 26.45 | 159 | 0.60   |
| 181 | 11.25   | 34.20 | 1.59 | 190 | 300 | 9.65  | 34.40 | 0.90 | 26.56 | 148 | 0.68   |
| 216 | 10.66   | 34.34 | 1.25 | 169 | 400 | 8.00  | 34.36 | 0.70 | 26.79 | 127 | 0.82   |
| 249 | 10.48   | 34.43 | 0.89 | 160 | 500 | 6.59  | 34.32 | 0.57 | 26.96 | 111 | 0.95   |
| 298 | 9.68    | 34.40 | 0.92 | 149 | 600 | 5.93  | 34.39 | 0.29 | 27.10 | 97  | (1.06) |
| 353 | 9.01    | 34.41 | 0.70 | 138 |     |       |       |      |       |     |        |
| 438 | 7.24    | 34.33 | 0.69 | 119 |     |       |       |      |       |     |        |
| 524 | 6.42    | 34.33 | 0.50 | 108 |     |       |       |      |       |     |        |
| 609 | 5.87    | 34.40 | 0.27 | 96  |     |       |       |      |       |     |        |

117.26

BLACK DOUGLAS; September 23, 1959; 2110 GCT; 28°56'N, 114°41.5'W; sounding, 41 fm; wind, 300°, force 3; weather, cloudy; sea, moderate; wire angle, 00°.

|    |       |       |      |     |    |         |         |        |         |       |        |
|----|-------|-------|------|-----|----|---------|---------|--------|---------|-------|--------|
| 0  | 20.28 | 33.83 | 5.21 | 409 | 0  | 20.28   | 33.83   | 5.21   | 23.82   | 409   | 0.00   |
| 9  | 20.27 | 33.86 | 5.28 | 407 | 10 | 20.26   | 33.86   | 5.29   | 23.85   | 406   | 0.04   |
| 29 | 13.88 | 33.56 | 4.31 | 285 | 20 | 16.00   | 33.64   | 4.74   | 24.73   | 323   | 0.08   |
| 49 | 12.44 | 33.62 | 2.93 | 254 | 30 | 13.76   | 33.56   | 4.25   | 25.15   | 283   | 0.11   |
|    |       |       |      |     | 50 | (12.40) | (33.62) | (2.86) | (25.46) | (253) | (0.16) |

117.30

BLACK DOUGLAS; September 24, 1959; 0235 GCT; 28°48'N, 114°56.5'W; sounding, 55 fm; wind, 320°, force 3; weather, partly cloudy; sea, moderate; wire angle, 06°.

|    |       |       |      |     |    |         |         |        |         |       |        |
|----|-------|-------|------|-----|----|---------|---------|--------|---------|-------|--------|
| 0  | 20.02 | 33.75 | 5.20 | 408 | 0  | 20.02   | 33.75   | 5.20   | 23.82   | 408   | 0.00   |
| 10 | 19.37 | 33.64 | 5.23 | 400 | 10 | 19.37   | 33.64   | 5.23   | 23.92   | 400   | 0.04   |
| 30 | 15.34 | 33.57 | 4.75 | 314 | 20 | 18.50   | 33.61   | 5.19   | 24.10   | 382   | 0.08   |
| 50 | 13.12 | 33.62 | 4.66 | 266 | 30 | 15.34   | 33.57   | 4.75   | 24.82   | 314   | 0.11   |
| 74 | 11.72 | 33.77 | 2.63 | 230 | 50 | 13.12   | 33.62   | 4.66   | 25.32   | 266   | 0.17   |
|    |       |       |      |     | 75 | (11.70) | (33.78) | (2.52) | (25.72) | (228) | (0.23) |

117.35

BLACK DOUGLAS; September 24, 1959; 0510 GCT; 28°38'N, 115°16'W; sounding, 130 fm; wind, 320°, force 4; weather, missing; sea, moderate; wire angle, 14°.

|     |       |       |      |     |     |         |         |        |         |       |        |
|-----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 0   | 19.53 | 33.73 | 5.39 | 398 | 0   | 19.53   | 33.73   | 5.39   | 23.94   | 398   | 0.00   |
| 8   | 19.48 | 33.72 | 5.13 | 398 | 10  | 19.46   | 33.72   | 5.12   | 23.95   | 397   | 0.04   |
| 27  | 19.14 | 33.71 | 5.19 | 390 | 20  | 19.32   | 33.72   | 5.14   | 23.98   | 394   | 0.08   |
| 46  | 16.06 | 33.64 | 5.40 | 324 | 30  | 19.01   | 33.71   | 5.23   | 24.06   | 386   | 0.12   |
| 70  | 15.34 | 34.03 | 3.16 | 280 | 50  | 15.90   | 33.78   | 4.83   | 24.86   | 310   | 0.19   |
| 93  | 13.93 | 33.94 | 3.03 | 258 | 75  | 14.97   | 34.00   | 3.10   | 25.24   | 274   | 0.26   |
| 116 | 12.68 | 33.91 | 2.65 | 237 | 100 | 13.30   | 33.90   | 2.88   | 25.50   | 249   | 0.33   |
| 153 | 10.76 | 33.86 | 2.26 | 206 | 150 | 10.84   | 33.85   | 2.28   | 25.93   | 208   | 0.44   |
| 190 | 10.30 | 34.03 | 2.17 | 186 | 200 | (10.21) | (34.06) | (2.15) | (26.20) | (183) | (0.54) |

a) A strong temperature inversion was indicated by the bathythermograph observation taken one hour before the hydrographic cast.

| OBSERVED |    |   |                |                       | INTERPOLATED |    |   |                | COMPUTED   |                       |            |  |
|----------|----|---|----------------|-----------------------|--------------|----|---|----------------|------------|-----------------------|------------|--|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$          | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$          | $\Delta D$ |  |
| m        | °C | ‰ | ml/L           | 10 <sup>-5</sup> cm/g | m            | °C | ‰ | ml/L           | g/L        | 10 <sup>-5</sup> cm/g | dyn. m     |  |

SIO  
CCOFI  
5909

BLACK DOUGLAS; September 24, 1959; 0810 GCT; 28°28'N, 115°35.5'W; sounding, 450 fm; wind, 280°, force 4; weather, cloudy; sea, moderate; wire angle, 05°.

11740

|     |       |       |      |     |     |       |       |      |       |     |      |
|-----|-------|-------|------|-----|-----|-------|-------|------|-------|-----|------|
| 0   | 20.84 | 33.82 | 5.40 | 424 | 0   | 20.84 | 33.82 | 5.40 | 23.66 | 424 | 0.00 |
| 9   | 20.88 | 33.78 | 5.45 | 429 | 10  | 20.88 | 33.78 | 5.46 | 23.61 | 429 | 0.04 |
| 29  | 20.30 | 33.76 | 5.58 | 415 | 20  | 20.86 | 33.77 | 5.47 | 23.62 | 428 | 0.08 |
| 39  | 18.32 | 33.73 | 6.08 | 369 | 30  | 20.20 | 33.76 | 5.61 | 23.78 | 412 | 0.13 |
| 53  | 16.80 | 33.69 | 6.34 | 337 | 50  | 16.94 | 33.70 | 6.32 | 24.54 | 340 | 0.20 |
| 68  | 14.54 | 33.68 | 5.50 | 290 | 75  | 14.09 | 33.70 | 5.20 | 25.18 | 279 | 0.28 |
| 93  | 12.49 | -     | 3.91 | -   | 100 | 12.09 | 33.83 | 3.73 | 25.68 | 232 | 0.35 |
| 114 | 11.98 | 33.84 | 3.66 | 229 | 150 | 10.96 | 33.92 | 2.67 | 25.96 | 205 | 0.46 |
| 134 | 11.24 | 33.84 | 2.68 | 216 | 200 | 10.57 | 34.18 | 1.97 | 26.24 | 179 | 0.56 |
| 154 | 10.91 | 33.94 | 2.66 | 203 | 250 | 10.11 | 34.29 | 1.41 | 26.40 | 164 | 0.64 |
| 184 | 10.72 | 34.11 | 2.26 | 187 | 300 | 8.72  | 34.24 | 1.71 | 26.59 | 146 | 0.72 |
| 220 | 10.37 | 34.25 | 1.57 | 170 | 400 | 7.82  | 34.33 | 0.96 | 26.80 | 126 | 0.86 |
| 250 | 10.11 | 34.29 | 1.41 | 164 | 500 | 6.65  | 34.32 | 0.56 | 26.96 | 111 | 0.99 |
| 300 | 8.72  | 34.24 | 1.71 | 146 | 600 | 5.99  | 34.38 | 0.35 | 27.08 | 98  | 1.10 |
| 355 | 8.46  | 34.33 | 1.13 | 136 |     |       |       |      |       |     |      |
| 440 | 7.30  | 34.33 | 0.78 | 119 |     |       |       |      |       |     |      |
| 525 | 6.42  | 34.33 | 0.48 | 108 |     |       |       |      |       |     |      |
| 609 | 5.95  | 34.39 | 0.34 | 97  |     |       |       |      |       |     |      |

BLACK DOUGLAS; September 24, 1959; 1026 GCT; 28°18.5'N, 115°23.5'W; sounding, 140 fm; wind, 320°, force 3; weather, cloudy; sea, moderate; wire angle, 05°.

11839

|     |       |       |      |     |     |       |       |      |       |     |      |
|-----|-------|-------|------|-----|-----|-------|-------|------|-------|-----|------|
| 0   | 20.15 | 33.74 | 5.13 | 412 | 0   | 20.15 | 33.74 | 5.13 | 23.78 | 412 | 0.00 |
| 10  | 20.09 | 33.74 | 5.16 | 411 | 10  | 20.09 | 33.74 | 5.16 | 23.80 | 411 | 0.04 |
| 29  | 18.60 | 33.67 | 4.99 | 380 | 20  | 18.99 | 33.68 | 5.04 | 24.03 | 389 | 0.08 |
| 49  | 15.36 | 33.64 | 4.66 | 309 | 30  | 18.46 | 33.67 | 4.96 | 24.15 | 377 | 0.12 |
| 74  | 13.10 | 33.63 | 3.99 | 265 | 50  | 15.24 | 33.64 | 4.64 | 24.89 | 307 | 0.19 |
| 99  | 11.36 | 33.75 | 3.00 | 224 | 75  | 13.00 | 33.63 | 3.96 | 25.36 | 263 | 0.26 |
| 123 | 11.27 | 33.87 | 2.47 | 214 | 100 | 11.33 | 33.76 | 2.96 | 25.77 | 224 | 0.32 |
| 162 | 10.81 | 34.05 | 1.95 | 193 | 150 | 10.96 | 34.00 | 2.12 | 26.03 | 199 | 0.43 |
| 201 | 10.32 | 34.21 | 1.36 | 173 | 200 | 10.33 | 34.21 | 1.37 | 26.30 | 174 | 0.52 |

BLACK DOUGLAS; September 25, 1959; 0349 GCT; 28°40.5'N, 114°25.5'W; sounding, 42 fm; wind, 320°, force 4; weather, cloudy; sea, moderate; wire angle, 06°.

1185.25

|    |       |       |      |     |    |         |         |        |         |       |        |
|----|-------|-------|------|-----|----|---------|---------|--------|---------|-------|--------|
| 0  | 20.26 | 33.77 | 5.54 | 414 | 0  | 20.26   | 33.77   | 5.54   | 23.77   | 414   | 0.00   |
| 10 | 20.28 | 33.78 | 5.36 | 414 | 10 | 20.28   | 33.78   | 5.36   | 23.77   | 414   | 0.04   |
| 30 | 16.22 | 33.76 | 5.35 | 319 | 20 | 17.01   | 33.76   | 5.35   | 24.58   | 336   | 0.08   |
| 49 | 15.04 | 33.66 | 5.27 | 302 | 30 | 16.22   | 33.76   | 5.35   | 24.76   | 319   | 0.11   |
| 74 | 12.57 | 33.67 | 3.27 | 252 | 50 | 15.03   | 33.66   | 5.26   | 24.95   | 302   | 0.17   |
|    |       |       |      |     | 75 | (12.51) | (33.67) | (3.25) | (25.48) | (251) | (0.24) |

BLACK DOUGLAS; September 25, 1959; 0122 GCT; 28°30.5'N, 114°45.5'W; sounding, 60 fm; wind, 330°, force 5; weather, cloudy; sea, moderate; wire angle, 04°.

1185.30

|    |       |       |      |     |     |         |         |        |         |       |        |
|----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 0  | 20.64 | 33.78 | 5.02 | 422 | 0   | 20.64   | 33.78   | 5.02   | 23.68   | 422   | 0.00   |
| 10 | 20.66 | 33.78 | 5.11 | 422 | 10  | 20.66   | 33.78   | 5.11   | 23.68   | 422   | 0.04   |
| 29 | 17.90 | 33.62 | 4.88 | 367 | 20  | 19.38   | 33.68   | 5.02   | 23.94   | 398   | 0.08   |
| 49 | 13.31 | 33.62 | 3.97 | 270 | 30  | 16.50   | 33.62   | 4.66   | 24.59   | 336   | 0.12   |
| 73 | 12.15 | 33.90 | 2.71 | 228 | 50  | 13.25   | 33.62   | 3.95   | 25.29   | 269   | 0.18   |
| 98 | 11.32 | 33.91 | 2.15 | 212 | 75  | 12.17   | 33.92   | 2.66   | 25.74   | 226   | 0.24   |
|    |       |       |      |     | 100 | (11.27) | (33.91) | (2.14) | (25.90) | (211) | (0.30) |

BLACK DOUGLAS; September 24, 1959; 2137 GCT; 28°20.5'N, 115°05'W; sounding, 65 fm; wind, 330°, force 4; weather, cloudy; sea, moderate; wire angle, 03°.

1185.35

|    |       |       |      |     |     |         |         |        |         |       |        |
|----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 0  | 19.30 | 33.62 | 5.88 | 400 | 0   | 19.30   | 33.62   | 5.88   | 23.91   | 400   | 0.00   |
| 9  | 19.26 | 33.68 | 5.81 | 395 | 10  | 19.25   | 33.68   | 5.80   | 23.97   | 395   | 0.04   |
| 29 | 18.94 | 33.77 | 5.57 | 380 | 20  | 19.16   | 33.74   | 5.69   | 24.04   | 388   | 0.08   |
| 49 | 14.78 | 33.62 | 5.21 | 299 | 30  | 18.92   | 33.77   | 5.56   | 24.13   | 380   | 0.12   |
| 74 | 12.64 | 33.62 | 4.09 | 258 | 50  | 14.70   | 33.62   | 5.20   | 24.99   | 298   | 0.18   |
| 99 | 11.74 | 33.72 | 3.20 | 234 | 75  | 12.61   | 33.62   | 4.07   | 25.42   | 257   | 0.25   |
|    |       |       |      |     | 100 | (11.73) | (33.72) | (3.17) | (25.67) | (233) | (0.32) |

SIO  
CCOFI  
5909

| OBSERVED |    |   |                |              | INTERPOLATED |    |   |                | COMPUTED   |              |            |
|----------|----|---|----------------|--------------|--------------|----|---|----------------|------------|--------------|------------|
| Z        | T  | S | O <sub>2</sub> | $\delta T_3$ | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_3$ | $\Delta D$ |
| m        | °C | ‰ | ml/L           | 10 cm/g      | m            | °C | ‰ | ml/L           | g/L        | 10 cm/g      | dyn. m     |

119.33 BLACK DOUGLAS; September 24, 1959; 2320 GCT; 28°19'N, 114°53'W; sounding, 60 fm; wind, 330°, force 4; weather, cloudy; sea, moderate; wire angle, 10°.

|    |       |       |      |     |     |         |         |        |         |       |        |
|----|-------|-------|------|-----|-----|---------|---------|--------|---------|-------|--------|
| 0  | 20.69 | 33.74 | 6.20 | 426 | 0   | 20.69   | 33.74   | 6.20   | 23.64   | 426   | 0.00   |
| 9  | 20.68 | 33.73 | 6.22 | 426 | 10  | 20.68   | 33.73   | 6.22   | 23.64   | 426   | 0.04   |
| 28 | 20.10 | 33.88 | 5.89 | 402 | 20  | 20.64   | 33.74   | 6.20   | 23.66   | 425   | 0.08   |
| 48 | 16.90 | 33.62 | 6.26 | 344 | 30  | 19.73   | 33.86   | 5.92   | 23.98   | 394   | 0.13   |
| 73 | 12.82 | 33.78 | 4.19 | 249 | 50  | 16.54   | 33.63   | 6.14   | 24.59   | 336   | 0.20   |
| 97 | 11.60 | 33.93 | 2.83 | 216 | 75  | 12.68   | 33.79   | 4.08   | 25.54   | 246   | 0.27   |
|    |       |       |      |     | 100 | (11.59) | (33.96) | (2.75) | (25.88) | (213) | (0.33) |

120.25 BLACK DOUGLAS; September 25, 1959; 0616 GCT; 28°22.5'N, 114°15'W; sounding, 30 fm; wind, 300°, force 4; weather, cloudy; sea, rough; wire angle, 08°.

|    |       |       |      |     |    |         |         |        |         |       |        |
|----|-------|-------|------|-----|----|---------|---------|--------|---------|-------|--------|
| 0  | 20.16 | 33.77 | 5.49 | 410 | 0  | 20.16   | 33.77   | 5.49   | 23.81   | 410   | 0.00   |
| 10 | 20.18 | 33.80 | 5.46 | 409 | 10 | 20.18   | 33.80   | 5.46   | 23.82   | 409   | 0.04   |
| 30 | 16.98 | 33.63 | 5.45 | 344 | 20 | 17.72   | 33.65   | 5.45   | 24.32   | 361   | 0.08   |
| 49 | 15.82 | 33.68 | 5.36 | 316 | 30 | 16.98   | 33.63   | 5.45   | 24.50   | 344   | 0.11   |
|    |       |       |      |     | 50 | (15.78) | (33.68) | (5.35) | (24.81) | (315) | (0.18) |

120.30 BLACK DOUGLAS, September 25, 1959; 0926 GCT; 28°13'N, 114°34'W; sounding, 51 fm; wind, 300°, force 5; weather, overcast; sea, rough; wire angle, 00°.

|    |       |       |      |     |    |       |       |      |       |     |      |
|----|-------|-------|------|-----|----|-------|-------|------|-------|-----|------|
| 0  | 20.50 | 33.73 | 5.21 | 422 | 0  | 20.50 | 33.73 | 5.21 | 23.68 | 422 | 0.00 |
| 10 | 20.52 | 33.75 | 5.22 | 421 | 10 | 20.52 | 33.75 | 5.22 | 23.69 | 421 | 0.04 |
| 30 | 20.50 | 33.75 | 5.27 | 421 | 20 | 20.51 | 33.75 | 5.25 | 23.69 | 421 | 0.08 |
| 50 | 16.68 | 33.65 | 5.25 | 337 | 30 | 20.50 | 33.75 | 5.27 | 23.69 | 421 | 0.13 |
| 75 | 13.10 | 33.68 | 4.09 | 261 | 50 | 16.68 | 33.65 | 5.25 | 24.58 | 337 | 0.20 |
|    |       |       |      |     | 75 | 13.10 | 33.68 | 4.09 | 25.38 | 261 | 0.28 |

120.35 BLACK DOUGLAS; September 25, 1959; 1503 GCT; 28°03'N, 114°54'W; sounding, 47 fm; wind, 340°, force 4; weather, cloudy; sea, rough; wire angle, 00°.

|    |       |       |      |     |    |       |       |      |       |     |      |
|----|-------|-------|------|-----|----|-------|-------|------|-------|-----|------|
| 0  | 20.64 | 33.74 | 5.21 | 425 | 0  | 20.64 | 33.74 | 5.21 | 23.65 | 425 | 0.00 |
| 10 | 20.66 | 33.74 | 5.27 | 426 | 10 | 20.66 | 33.74 | 5.27 | 23.65 | 426 | 0.04 |
| 30 | 20.64 | 33.73 | 5.33 | 426 | 20 | 20.65 | 33.74 | 5.30 | 23.65 | 426 | 0.08 |
| 50 | 18.56 | 33.68 | 5.01 | 378 | 30 | 20.64 | 33.73 | 5.33 | 23.65 | 426 | 0.13 |
| 75 | 13.92 | 33.64 | 3.78 | 280 | 50 | 18.56 | 33.68 | 5.01 | 24.14 | 378 | 0.21 |
|    |       |       |      |     | 75 | 13.92 | 33.64 | 3.78 | 25.17 | 280 | 0.29 |

120.45 BLACK DOUGLAS; September 25, 1959; 2010 GCT; 27°43'N, 115°33'W; sounding, 1106 fm; wind, 320°, force 5; weather, partly cloudy; sea, very rough; wire angle, 07°.

|     |       |       |      |     |     |       |       |      |       |     |      |
|-----|-------|-------|------|-----|-----|-------|-------|------|-------|-----|------|
| 0   | 22.48 | 34.02 | 4.66 | 453 | 0   | 22.48 | 34.02 | 4.66 | 23.36 | 453 | 0.00 |
| 10  | 22.47 | 34.00 | 4.65 | 454 | 10  | 22.47 | 34.00 | 4.65 | 23.35 | 454 | 0.04 |
| 30  | 22.41 | 34.00 | 4.64 | 453 | 20  | 22.44 | 34.00 | 4.64 | 23.36 | 454 | 0.09 |
| 40  | 18.14 | 33.75 | 5.25 | 363 | 30  | 22.41 | 34.00 | 4.64 | 23.36 | 453 | 0.14 |
| 55  | 15.76 | 33.66 | 5.21 | 316 | 50  | 16.38 | 33.67 | 5.23 | 24.66 | 329 | 0.21 |
| 70  | 13.78 | 33.74 | 4.15 | 270 | 75  | 13.16 | 33.76 | 3.74 | 25.42 | 257 | 0.29 |
| 95  | 11.47 | 33.79 | 2.90 | 224 | 100 | 11.21 | 33.80 | 2.87 | 25.82 | 218 | 0.35 |
| 115 | 10.80 | 33.89 | 2.75 | 205 | 150 | 10.63 | 34.18 | 1.52 | 26.22 | 181 | 0.45 |
| 135 | 10.68 | 34.04 | 1.89 | 192 | 200 | 9.91  | 34.33 | 1.12 | 26.47 | 157 | 0.54 |
| 155 | 10.61 | 34.20 | 1.48 | 179 | 250 | 9.67  | 34.44 | 0.76 | 26.58 | 146 | 0.61 |
| 185 | 10.00 | 34.29 | 1.27 | 162 | 300 | 9.25  | 34.47 | 0.55 | 26.68 | 137 | 0.69 |
| 220 | 9.86  | 34.37 | 0.98 | 154 | 400 | 7.78  | 34.41 | 0.47 | 26.86 | 120 | 0.82 |
| 251 | 9.66  | 34.44 | 0.75 | 146 | 500 | 6.77  | 34.41 | 0.30 | 27.01 | 106 | 0.94 |
| 301 | 9.24  | 34.47 | 0.54 | 137 | 600 | 5.98  | 34.43 | 0.22 | 27.12 | 95  | 1.04 |
| 356 | 8.40  | 34.45 | 0.50 | 126 |     |       |       |      |       |     |      |
| 442 | 7.26  | 34.39 | 0.43 | 114 |     |       |       |      |       |     |      |
| 526 | 6.59  | 34.42 | 0.26 | 103 |     |       |       |      |       |     |      |
| 611 | 5.88  | 34.43 | 0.21 | 93  |     |       |       |      |       |     |      |

| OBSERVED |    |   |                |                       | INTERPOLATED |    |   |                | COMPUTED   |                       |            |  |
|----------|----|---|----------------|-----------------------|--------------|----|---|----------------|------------|-----------------------|------------|--|
| Z        | T  | S | O <sub>2</sub> | $\delta T_{-5}^3$     | Z            | T  | S | O <sub>2</sub> | $\sigma_t$ | $\delta T_{-5}^3$     | $\Delta D$ |  |
| m        | °C | ‰ | ml/L           | 10 <sup>-5</sup> cm/g | m            | °C | ‰ | ml/L           | g/L        | 10 <sup>-5</sup> cm/g | dyn. m     |  |

SIO  
CCOFI  
5909

BLACK DOUGLAS; September 25, 1959; 0715 GCT; 28°12.5'N, 114°15.5'W; sounding, 21 fm; wind, 320°, force 4; weather, cloudy; sea, rough; wire angle, 00°.

1207.26

|    |       |       |      |     |    |       |       |      |       |     |      |
|----|-------|-------|------|-----|----|-------|-------|------|-------|-----|------|
| 0  | 21.34 | 33.84 | 4.80 | 436 | 0  | 21.34 | 33.84 | 4.80 | 23.54 | 436 | 0.00 |
| 10 | 21.40 | 33.84 | 4.87 | 438 | 10 | 21.40 | 33.84 | 4.87 | 23.52 | 438 | 0.04 |
| 30 | 16.54 | 33.62 | 4.89 | 336 | 20 | 18.50 | 33.70 | 4.88 | 24.18 | 375 | 0.08 |
|    |       |       |      |     | 30 | 16.54 | 33.62 | 4.89 | 24.59 | 336 | 0.12 |

18

BLACK DOUGLAS; September 25, 1959; 1310 GCT; 27°53'N, 114°43'W; sounding, 22 fm; wind, 320°, force 4; weather, cloudy; sea, rough; wire angle, 00°.

1212.34

|    |       |       |      |     |    |       |       |      |       |     |      |
|----|-------|-------|------|-----|----|-------|-------|------|-------|-----|------|
| 0  | 22.00 | 33.90 | 4.52 | 449 | 0  | 22.00 | 33.90 | 4.52 | 23.40 | 449 | 0.00 |
| 10 | 20.99 | 33.86 | 4.90 | 425 | 10 | 20.99 | 33.86 | 4.90 | 23.65 | 425 | 0.04 |
| 30 | 17.46 | 33.65 | 4.96 | 355 | 20 | 20.01 | 33.80 | 4.94 | 23.87 | 404 | 0.08 |
|    |       |       |      |     | 30 | 17.46 | 33.65 | 4.96 | 24.39 | 355 | 0.12 |

21

BLACK DOUGLAS; September 25, 1959; 1116 GCT; 27°58.5'N, 114°26.5'W; sounding, 21 fm; wind, 320°, force 4; weather, overcast; sea, rough; wire angle, 00°.

1213.30

|    |       |       |      |     |    |       |       |      |       |     |      |
|----|-------|-------|------|-----|----|-------|-------|------|-------|-----|------|
| 0  | 21.74 | 33.95 | 4.95 | 438 | 0  | 21.74 | 33.95 | 4.95 | 23.51 | 438 | 0.00 |
| 10 | 21.75 | 33.94 | 5.02 | 439 | 10 | 21.75 | 33.94 | 5.02 | 23.50 | 439 | 0.04 |
| 25 | 17.66 | 33.66 | 5.25 | 358 | 20 | 20.03 | 33.82 | 5.12 | 23.87 | 404 | 0.09 |

20

## TEMPERATURE AND SALINITY AT 10 METERS (NET-TOW STATIONS)

| Station  | Date  | Time<br>GCT | Latitude<br>North | Longitude<br>West | Sounding<br>(fm) | Wind<br>Dir | Force | Weather       | Sea        | 10 Meters<br>T | S     |
|----------|-------|-------------|-------------------|-------------------|------------------|-------------|-------|---------------|------------|----------------|-------|
| 90.55-O  | IX-11 | 0210        | 32°33.5'          | 119°37.0'         | 500              | 320°        | 4     | partly cloudy | very rough | 18.50          | 33.80 |
| 90.65-O  | 11    | 0820        | 32°13.0'          | 120°19.5'         | 2050             | 320°        | 5     | partly cloudy | very rough | 17.80          | 33.78 |
| 90.75-O  | 11    | 1505        | 31°52.0'          | 121°05.0'         | 2000+            | 320°        | 5     | cloudy        | very rough | 18.22          | 33.55 |
| 90.85-O  | 11    | 2030        | 31°36.5'          | 121°40.0'         | 2000+            | 320°        | 5     | partly cloudy | very rough | 18.56          | 33.60 |
| 93.35-O  | 15    | 0052        | 32°36.5'          | 117°49.0'         | 450              | 300°        | 4     | partly cloudy | rough      | 20.18          | 33.72 |
| 93.45-O  | 14    | 1820        | 32°13.0'          | 118°26.0'         | 600              | 320°        | 5     | cloudy        | rough      | 19.98          | 33.69 |
| 93.55-O  | 14    | 1215        | 31°52.0'          | 119°12.0'         | 2000+            | 320°        | 5     | partly cloudy | very rough | 19.84          | 33.78 |
| 93.65-O  | 14    | 0630        | 31°30.0'          | 119°48.0'         | 2000+            | 340°        | 4     | clear         | very rough | 17.86          | 33.53 |
| 93.75-O  | 14    | 0032        | 31°14.5'          | 120°28.5'         | 2000+            | 340°        | 4     | cloudy        | very rough | 18.58          | 33.51 |
| 93.85-O  | 13    | 1758        | 30°53.0'          | 121°21.0'         | 2000+            | 340°        | 4     | cloudy        | rough      | 18.68          | 33.30 |
| 110.33-B | 22    | 1950        | 29°50.0'          | 115°52.0'         | 50               | 320°        | 4     | partly cloudy | moderate   | 17.75          | 33.66 |
| 110.35-B | 22    | 1830        | 29°46.0'          | 116°00.0'         | 740              | 270°        | 4     | cloudy        | moderate   | 20.70          | 33.97 |
| 110.40-B | 22    | 1540        | 29°36.5'          | 116°19.5'         | -                | 270°        | 3     | cloudy        | moderate   | 21.44          | 33.95 |
| 120.40-B | 25    | 1715        | 27°56.5'          | 115°14.0'         | 20               | 320°        | 3     | cloudy        | moderate   | 19.63          | 33.91 |
| 123.37-B | 26    | 0445        | 27°24.0'          | 114°40.0'         | 38               | 270°        | 3     | clear         | moderate   | 22.06          | 34.02 |
| 123.42-B | 26    | 0205        | 27°14.0'          | 114°59.0'         | 950              | 340°        | 5     | partly cloudy | rough      | 22.32          | -     |
| 123.45-B | 26    | 0023        | 27°08.0'          | 115°10.5'         | 2200             | 340°        | 5     | partly cloudy | rough      | 23.31          | 34.22 |
| 127.34-B | 26    | 0925        | 26°55.0'          | 114°06.5'         | 41               | 260°        | 4     | clear         | moderate   | 22.56          | 34.28 |
| 127.40-B | 26    | 1220        | 26°43.5'          | 114°29.0'         | 1700             | 320°        | 4     | partly cloudy | rough      | 21.78          | 34.23 |

| Station  | Date  | Time<br>GCT | Latitude<br>North | Longitude<br>West | Sounding<br>(fm) | Wind |       | Weather       | Sea      | 10 Meters |       |
|----------|-------|-------------|-------------------|-------------------|------------------|------|-------|---------------|----------|-----------|-------|
|          |       |             |                   |                   |                  | Dir  | Force |               |          | T         | S     |
| 127.45-B | IX-26 | 1445        | 26°33.0'          | 114°48.5'         | 1750             | 340° | 3     | partly cloudy | moderate | 23.62     | 34.20 |
| 130.30-B | 27    | 0225        | 26°29.0'          | 113°29.0'         | 43               | 300° | 3     | clear         | moderate | 23.37     | 34.26 |
| 130.35-B | 27    | 0010        | 26°19.0'          | 113°48.0'         | 160              | 290° | 4     | clear         | rough    | 22.98     | 34.22 |
| 130.40-B | 26    | 2152        | 26°09.0'          | 114°07.0'         | 1100             | 320° | 3     | partly cloudy | moderate | 22.98     | 33.94 |
| 130.45-B | 26    | 1900        | 25°58.5'          | 114°26.5'         | 1840             | 320° | 3     | partly cloudy | moderate | 23.24     | 34.18 |
| 133.25-B | 27    | 0923        | 26°04.5'          | 112°48.0'         | 45               | 300° | 2     | clear         | moderate | 24.62     | 34.34 |
| 133.30-B | 27    | 0700        | 25°54.5'          | 113°07.5'         | 108              | 280° | 2     | clear         | moderate | 25.13     | 34.45 |
| 134.36-B | 27    | 2355        | 25°36.0'          | 113°22.5'         | 88               | 320° | 4     | missing       | missing  | -         | 34.64 |
| 137.23-B | 27    | 1338        | 25°34.0'          | 112°19.0'         | 41               | 280° | 3     | partly cloudy | moderate | 26.04     | 34.28 |
| 137.30-B | 27    | 1640        | 25°20.0'          | 112°45.0'         | 140              | 300° | 4     | partly cloudy | moderate | 26.10     | 34.56 |

TEMPERATURE AND SALINITY AT 10 METERS (NET-TOW STATIONS)

SIO  
CCOFI  
5909

## DISTRIBUTION LIST

Inter-American Tropical Tuna Commission  
(c/o Scripps Institution of Oceanography)

Mr. Edward B. Bennett  
Mr. T. J. Chow  
Dr. M. B. Schaefer

U. S. Bureau of Commercial Fisheries  
(c/o Scripps Institution of Oceanography)

Dr. E. H. Ahlstrom  
Mr. Frederick H. Berry  
Mr. Gerald V. Howard

Scripps Institution of Oceanography

Mrs. A. Alvariño de Leira  
Dr. Leo D. Berner  
Dr. Maurice Blackburn  
Dr. Edward Brinton  
Dr. Abraham Fleminger  
Mr. Jeffery D. Frautschy  
Mr. John D. Isaacs  
Dr. Martin W. Johnson  
Mr. Hans T. Klein  
Mr. Garth I. Murphy  
Dr. C. B. Murty  
Mr. Joseph L. Reid, Jr.  
Dr. Roger Revelle  
Mrs. Margaret K. Riedel  
Mrs. Margaret K. Robinson  
Mr. Gunnar I. Roden  
Dr. Richard H. Rosenblatt  
Mr. Richard A. Schwartzlose  
Mr. Charles G. Worrall (20)  
Library (4)  
Library, SFA

MR. D.L. ALVERSON  
CHIEF, NO. PAC. FISHERIES EXPLORATIO  
& GEAR RESEARCH  
2725 MONTLAKE BLVD.  
SEATTLE 2, WASH.

DR. ERNEST R. ANDERSON  
CODE 2233  
U. S. NAVY ELECTRONICS LABORATORY  
SAN DIEGO 52, CALIFORNIA

MR. WILLIAM ANDERSON  
BUREAU OF COMMERCIAL FISHERIES  
BIOLOGICAL LABORATORY  
BRUNSWICK, GEORGIA

MR. THOMAS S. AUSTIN  
BUREAU OF COMMERCIAL FISHERIES  
BIOLOGICAL LABORATORY  
% NATIONAL OCEANOGRAPHIC DATA CENTER  
WASHINGTON 25, D. C.

MR. WILLIAM E. BATZLER  
CODE 2232  
U. S. NAVY ELECTRONICS LABORATORY  
SAN DIEGO 52, CALIFORNIA

MR. W. R. BETER  
DIRECTOR OF PURCHASING  
FLORIDA STATE UNIVERSITY  
TALLAHASSEE, FLORIDA

DR. ROLF BOLIN  
HOPKINS MARINE STATION  
PACIFIC GROVE, CALIFORNIA

BRITISH JOINT SERVICES  
(NAVY STAFF)  
1910 K ST. N. W.  
WASHINGTON, D. C.

CAPT. E. B. BROWN  
U. S. COAST AND GEODETIC SURVEY  
417 S. HILL ST. ROOM 535  
LOS ANGELES 13, CALIFORNIA

LABORATORY DIRECTOR  
BUREAU OF COMMERCIAL FISHERIES  
BIOLOGICAL LABORATORY  
U. S. FISH AND WILDLIFE SERVICE  
WASHINGTON 25, D. C.

LIBRARIAN  
BUREAU OF COMMERCIAL FISHERIES  
BIOLOGICAL LABORATORY  
P. O. BOX 3830  
HONOLULU 12, HAWAII

LABORATORY DIRECTOR  
BUREAU OF COMMERCIAL FISHERIES  
ICHTHYOLOGICAL LABORATORY  
U. S. NATIONAL MUSEUM  
WASHINGTON 25, D.C.

MR. J. G. BURNETTE, CHAIRMAN  
MARINE RESEARCH COMMITTEE  
P. O. BOX 807  
LOS ALTOS, CALIFORNIA

DR. WAYNE V. BURT  
ASSOC. PROF. OF OCEANOGRAPHY  
SCHOOL OF SCIENCE  
OREGON STATE COLLEGE  
CORVALLIS, OREGON

LIBRARIAN 4  
DEPARTMENT OF FISH AND GAME  
CALIFORNIA STATE FISHERIES LAB.  
TERMINAL ISLAND, CALIFORNIA

CAPITAN DE NAVIO  
LUIS R. A. CAPURRO  
SERVICIO DE HIDROGRAFIA NAVAL  
AVENIDA MONTES DE OCA 2124  
BUENOS AIRES, ARGENTINA

LIBRARY  
OCEANOGRAPHIC GROUP  
CENTRAL FISHERIES EXPERIMENT STATION  
PUSAN, KOREA

MR. HAROLD B. CLEMENS, JR.  
MARINE RESOURCES OPERATIONS  
CALIFORNIA STATE FISHERIES LAB.  
TERMINAL ISLAND, CALIFORNIA

CHIEF, DIVISION OF FISHERIES  
COMMONWEALTH SCIENTIFIC &  
INDUST. RESEARCH ORG.  
P. O. BOX 21  
CRUNULLA, NSW, AUSTRALIA

DR. G. M. CRESSWELL  
DEPARTMENT OF EARTH SCIENCES  
STANFORD RESEARCH INSTITUTE  
MENLO PARK, CALIFORNIA

MR. R. S. CROKER, DIRECTOR  
CALIF. DEPT. OF FISH AND GAME  
MARINE FISHERIES LABORATORY BRANCH  
772 CAPITOL AVENUE  
SACRAMENTO 14, CALIFORNIA

HERRN PROF. DR. A. DEFANT  
STERNWARTSTRASSE 38  
INNBRUCK  
AUSTRIA

DEUTSCHE AKADEMIE DER  
WISSENSCHAFTEN ZU BERLIN  
INSTITUT FUR MEERESKUNDE  
WARNEMUNDE, SEESTR. 15  
BERLIN, GERMANY

DEUTSCHES HYDROGRAPHISCHES INSTITUT  
BERNHARD-NOCHT-STR. 78  
HAMBURG 4, GERMANY

DIRECCION GENERAL DE PESCA E  
INDUSTRIAS CONEXAS  
ESTACION DE BIOLOGIA MARINA  
CASA DEL MARINA  
MAZATLAN, SINALOA, MEXICO

CHIEF  
DIVISION OF BIOLOGICAL RESEARCH  
BUREAU OF COMMERCIAL FISHERIES  
U. S. DEPARTMENT OF THE INTERIOR  
WASHINGTON 25, D. C.

MR. ROBERT L. EBERHARDT  
TECHNOLOGY - ASW & OCEAN SYSTEMS  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

DR. S. A. EL WARDANI  
SCIENCES  
SAN JOSE STATE COLLEGE  
SAN JOSE, CALIFORNIA

DIRECTOR OF RESEARCH  
FISH COMMISSION OF OREGON  
ROUTE 1, BOX 31A  
CLACKAMAS, OREGON

DR. RICHARD H. FLEMING  
UNIVERSITY OF WASHINGTON  
OCEANOGRAPHIC LABORATORIES  
SEATTLE 5, WASHINGTON

DR. PAUL M. FYE  
WOODS HOLE OCEANOGRAPHIC INST.  
WOODS HOLE, MASSACHUSETTS

PROF. JAMES A. GAST  
DIVISION OF NATURAL RESOURCES  
HUMBOLDT STATE COLLEGE  
ARCATA, CALIFORNIA

DR. ROBERT H. GIBBS, JR.  
DEPT. OF BIOLOGY  
BOSTON UNIVERSITY  
BOSTON 15, MASS.

MR. RAFAEL SOTO GIL  
SECRETARIO GENERAL  
UNIVERSIDAD DE BAJA CALIFORNIA  
MEXICALI, B. C.  
MEXICO

MR. C. G. GUNNERSON  
DEPARTMENT OF WATER RESOURCES  
DIVISION OF RESOURCES PLANNING  
P. O. BOX 388  
SACRAMENTO 2, CALIFORNIA

HANCOCK LIBRARY OF BIOLOGY & OCEANOGRAPHY  
ALLAN HANCOCK FOUNDATION  
UNIVERSITY OF SO. CALIF.  
LOS ANGELES 7, CALIF.

DR. WILLIAM J. HARGIS, JR., DIRECTOR  
VIRGINIA INSTITUTE OF MARINE  
SCIENCES  
GLOUCESTER POINT, VIRGINIA

MR. JOHN HAWK  
% SEAFARERS' INTERNATIONAL UNION OF  
NORTH AMERICA  
450 HARRISON STREET  
SAN FRANCISCO 5, CALIFORNIA

DR. ROBERT W. HIATT  
UNIVERSITY OF HAWAII  
HONOLULU 12, HAWAII

MR. T. HIRANO  
TOKAI REGIONAL FISHERIES  
RESEARCH LABORATORY  
TSUKUSHIMA  
TOKYO, JAPAN

DIRECTOR 2  
IGY, WDC-A, OCEANOGRAPHY  
TEXAS A. AND M. COLLEGE  
COLLEGE STATION, TEXAS

DIR.. INST. DE GEOFISICA  
TORRE DE CIENCIAS, 3ER PISO  
UNIVERSIDAD NACIONAL AUTONOMA  
DE MEXICO  
VILLA OBREGON, D. F., MEXICO

DR. W. C. JACOBS, DIRECTOR  
NATIONAL OCEANOGRAPHIC DATA CENTER  
WASHINGTON 25, D. C.

JAPAN METEOROLOGICAL AGENCY  
OCEANOGRAPHICAL SECTION  
TOKYO, JAPAN

MR. ALPHONSE KEMMERICH, EXEC. DIR.  
PACIFIC MARINE FISHERIES COMMISSION  
741 STATE OFFICE BUILDING  
1400 S. W. FIFTH AVENUE  
PORTLAND 1, OREGON

DR. H. KITAMURA  
OCEANOGRAPHIC SECTION  
KOBE MARINE OBSERVATORY  
KOBE, JAPAN

DR. E. KOTO  
INSTITUTE OF FISHERIES  
HOKKAIDO UNIVERSITY  
HAKODATE, JAPAN

DR. E. C. LA FOND  
CODE 2250  
U. S. NAVY ELECTRONICS LABORATORY  
SAN DIEGO 52, CALIFORNIA

DR. JOHN LYMAN  
NATIONAL SCIENCE FOUNDATION  
WASHINGTON 25, D.C.

MR. JOSEPH M. WARDESICH  
1513 WEST FIFTEENTH STREET  
SAN PEDRO, CALIFORNIA

MR. JOHN C. MARR, REGIONAL DIRECTOR  
BUREAU OF COMMERCIAL FISHERIES  
P. O. BOX 3830  
HONOLULU 12, HAWAII

MR. JOTARO MASUZUWA  
OCEANOGRAPHICAL SECTION  
JAPAN METEOROLOGICAL AGENCY  
TOKYO, JAPAN

DR. HUGH J. McLELLAN  
DEPARTMENT OF OCEANOGRAPHY  
TEXAS A. AND M. COLLEGE  
COLLEGE STATION, TEXAS

MR. ARTHUR H. WENDONCA  
% R. E. BOOTH COMPANY, INC.  
280 BATTERY STREET  
SAN FRANCISCO 11, CALIFORNIA

DR. R. C. MILLER, DIRECTOR  
CALIFORNIA ACADEMY OF SCIENCE  
GOLDEN GATE PARK  
SAN FRANCISCO 18, CALIFORNIA

LIBRARIAN  
MINISTRY OF AGRICULTURE, FISHERIES  
AND FOOD  
FISHERIES LABORATORY  
LOWESTOFT, SUFFOLK, ENGLAND

MR. JOHN V. MORRIS  
FRENCH SARDINE COMPANY  
582 TUNA STREET  
TERMINAL ISLAND, CALIFORNIA

NATIONAL MARINE CONSULTANTS, INC.  
1500 CHAPALA STREET  
SANTA BARBARA, CALIFORNIA

CHIEF OF NAVAL RESEARCH  
OFFICE OF NAVAL RESEARCH  
GEOPHYSICS BRANCH  
WASHINGTON 25, D. C.

MR. A. W. H. NEEDLER, DIRECTOR  
PACIFIC BIOLOGICAL STATION  
NANAIHO, B. C.  
CANADA

DR. KENNETH S. NORRIS  
UNIVERSITY OF CALIFORNIA  
DEPT. OF ZOOLOGY  
LOS ANGELES 24, CALIF.

MR. ROBERT M. NORRIS  
DEPT. OF PHYSICAL SCIENCES  
UNI. OF CALIF.  
SANTA BARBARA CAMPUS  
GOLETA, CALIF.

DIRECTOR  
NORWEGIAN POLAR INSTITUTE  
OBSERVATORIEGT 1  
OSLO, NORWAY

SR. RAUL E. OCAMPO T.  
INSTITUTO DE GEOFISICA  
CIUDAD UNIVERSITARIA  
MEXICO 20, D.F., MEXICO

DR. YNØVE H. OLSEN  
JOURNAL OF MARINE RESEARCH  
YALE UNIVERSITY  
NEW HAVEN, CONN.

ING. GILBERTO HARO OSIO  
CALLE F Y MADERO  
EDIFICIO NUEVA DELHI NO. 3  
MEXICALI, B.C.  
MEXICO

DR. ROBERT G. PAQUETTE  
GENERAL MOTORS CORPORATION  
DEFENSE SYSTEMS DIVISION  
BOX T  
SANTA BARBARA, CALIFORNIA

DR. G. L. PICKARD  
INST. OF OCEANOGRAPHY  
UNIVERSITY OF BRITISH COLUMBIA  
VANCOUVER, B. C.  
CANADA

DR. G. POGADE, LIBRARIAN  
DEUTSCHER WETTERDIENST SEEWETTERAMT  
HAMBURG, GERMANY

DR. D. W. PRITCHARD, DIRECTOR  
CHESAPEAKE BAY INSTITUTE  
THE JOHNS HOPKINS UNIVERSITY  
121 MARLAND HALL  
BALTIMORE 18, MARYLAND

MR. D. W. PRIVETT, LIBRARIAN  
NATL. INST. OF OCEANOGRAPHY  
WORMLEY  
NEAR GODALMING  
SURREY, ENGLAND

PUBLICATIONS OFFICE  
101 UNIVERSITY HALL  
THE UNIVERSITY OF CALIFORNIA  
2200 UNIVERSITY AVE.  
BERKELEY 4, CALIF.

PUSAN FISHERIES COLLEGE  
PUSAN  
KOREA

MR. JOHN RADOVICH  
CALIF. DEPT. OF FISH AND GAME  
CALIFORNIA STATE FISHERIES LAB.  
TERMINAL ISLAND, CALIFORNIA

DR. G. A. RILEY  
BRINGHAM OCEANOGRAPHIC FOUNDATION  
YALE UNIVERSITY  
NEW HAVEN, CONN.

DIRECTOR PEDRO MERCADO SANCHEZ  
ESCUELA SUPERIOR CIENCIAS MARINAS  
UNIVERSIDAD AUTONOMA DE BAJA CALIF.  
APARTADO DE CORREOS 453  
ENSENADA, B. C., MEXICO

MR. DON T. SAXBY  
CALIFORNIA DIVISION  
CALIFORNIA PACKING CORPORATION  
2600 SEVENTH STREET  
BERKELEY 10, CALIFORNIA

DR. O. E. SETTE, CHIEF  
BUREAU OF COMMERCIAL FISHERIES  
BIOLOGICAL LABORATORY  
450-B JORDAN HALL  
STANFORD, CALIFORNIA

MR. W. T. SHANNON  
CALIF. DEPT. OF FISH AND GAME  
926 J STREET  
SACRAMENTO 14, CALIFORNIA

MR. D. SHOJI  
JAPANESE HYDROGRAPHIC OFFICE  
TSUKIJI  
TOKYO, JAPAN

DR. REIMER SIMONSEN  
INSTITUT FÜR MEERESKUNDE  
HOHENBERGSTRASSE 2  
KIEL, GERMANY

MR. W. E. STEWART  
% CALIF. STATE CHAMBER OF COMMERCE  
350 BUSH STREET  
SAN FRANCISCO 4, CALIFORNIA

PROF. HENRY M. STOMMEL  
HARVARD UNIVERSITY  
PIERCE HALL  
CAMBRIDGE 38, MASSACHUSETTS

MISS MARGARET STORY, LIBRARIAN  
NATURAL HISTORY MUSEUM  
STANFORD, CALIF.

MR. Y. TAKENOUTI  
OCEANOGRAPHICAL SECTION  
JAPAN METEOROLOGICAL AGENCY  
CHUO-KU  
TOKYO, JAPAN

MR. NORMAN TEBBLE  
ANNELIDA SECTION  
BRITISH MUSEUM, NATURAL HISTORY  
CROMWELL ROAD  
LONDON SW 7, ENGLAND

DEPARTMENT OF OCEANOGRAPHY  
TEXAS A. AND M. COLLEGE  
COLLEGE STATION, TEXAS

MR. A. J. THOMSON  
OFFICIAL SECRETARY  
NEW SOUTH WALES GOVERNMENT OFFICES  
56, STRAND  
LONDON, W. C. 2, ENGLAND

DR. R. B. TIBBY  
HANCOCK FOUNDATION  
U. OF SOUTHERN CALIFORNIA  
UNIVERSITY PARK  
LOS ANGELES 7, CALIFORNIA

MR. M. UDA  
TOKYO U. OF FISHERIES  
MINATO-KU  
TOKYO, JAPAN

LIBRARIAN  
U. S. COAST AND GEODETIC SURVEY  
WASHINGTON 25, D. C.

U. S. FISH AND WILDLIFE SERVICE  
TIBURON MARINE LABORATORY  
P. O. BOX 98  
TIBURON, CALIFORNIA

U. S. HYDROGRAPHIC OFFICE 2  
NAVY DEPARTMENT  
WASHINGTON 25, D. C.  
ATTN- DR. BOYD E. OLSEN  
DIVISION OF OCEANOGRAPHY

LIBRARIAN  
U. S. NAVAL CIVIL ENGINEERING LAB.  
PORT HUENEME, CALIFORNIA

U. S. NAVY ELECTRONICS LABORATORY  
SAN DIEGO 52, CALIF.  
ATTN. CODE 2420, LIBRARY 2

UNIVERSITY OF CALIFORNIA  
DEPARTMENT OF ZOOLOGY  
BERKELEY 4, CALIF.

UNIVERSITY OF CALIFORNIA 2  
SERIALS DEPARTMENT  
GENERAL LIBRARY  
BERKELEY 4, CALIFORNIA

DIRECTOR  
UNIVERSITY OF MIAMI  
MARINE LABORATORY  
CORAL GABLES, FLORIDA

LIBRARIAN  
UNIVERSITY OF WASHINGTON  
OCEANOGRAPHIC LABORATORIES  
FRIDAY HARBOR, WASH.

LIBRARIAN  
UNIVERSITY OF WASHINGTON  
OCEANOGRAPHIC LABORATORIES  
SEATTLE 5, WASH. 2

DIRECTOR  
UNIVERSITY OF WASHINGTON  
SCHOOL OF FISHERIES  
SEATTLE 4, WASH.

MR. GILBERT C. VAN CAMP, SR.  
772 TUNA STREET  
TERMINAL ISLAND, CALIFORNIA

MR. RICHARD C. VETTER  
SEC'Y. TO COMM. ON OCE.  
NATIONAL ACADEMY OF SCIENCE  
2101 CONSTITUTION AVENUE  
WASHINGTON 25, D.C.

DR. B. W. WALKER  
UNIVERSITY OF CALIFORNIA  
DEPARTMENT OF ZOOLOGY  
LOS ANGELES 24, CALIF.

DR. M. PAT WENNEKENS  
OCEANIC RESEARCH DIV. - CODE 508  
NAVAL ORDNANCE TEST STATION  
CHINA LAKE, CALIFORNIA

DR. KOZO YOSHIDA  
GEOPHYSICAL INST.  
TOKYO UNIVERSITY  
TOKYO, JAPAN