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TECHNICAL REPORT

ASWEPS REPORT NO. 3

TONGUE OF THE OCEAN RESEARCH EXPERIMENT

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A B S T R A C T

A research experiment, conducted aboard the USS SAN PABLO for the purpose of studying temperature structure in the waters of the Tongue of the Ocean from 4 to 20 March 1960, is described. The data have been tabulated and listed as Appendixes to the report. Analysis of the data has not been completed; however, a preliminary examination shows that internal waves play a large part in the fluctuation of thermal structure in this area.

FOREWORD

In 1958, the Hydrographic Office was assigned the responsibility for the development of an Antisubmarine Warfare Environmental Prediction System (ASWEPS). This system is a five-year program designed to provide the Fleet with continuing environmental information and predictions in support of antisubmarine warfare operations.

Of paramount importance in the prosecution of this program is the availability of an oceanographic research vessel instrumented especially for ASWEPS requirements. This report deals with a research experiment conducted aboard the USS SAN PABLO (AGS-30) in the Tongue of the Ocean from 4 March to 20 March 1960. It is narrative in nature, containing a tabulation of the data, as well as generalizations resulting from a cursory examination of the data.

It is believed that analysis of the data obtained from this experiment will contribute significantly toward the development of a prediction technique for the thermal structure of the ocean.

E. C. STEPHAN
Rear Admiral U. S. Navy
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SCIENTIFIC PERSONNEL

The following civilian scientists participated in the ASWEPS field research program in the Tongue of the Ocean:

Wayne Magnitzky-----	Chief Scientist
Robert Farland-----	Electronic Engineer
Howard French-----	Oceanographer
William Gladfelter-----	Oceanographer
Edward Johnson-----	Oceanographer
Griffith Knoop-----	Oceanographer
Edward Lessmann-----	Physical Science Technician
Gordon MacDowell-----	Oceanographer
Paul Mazeika-----	Oceanographer
Robert Pickett-----	Oceanographer
Kemper Reece-----	Electronic Development Technician
Douglas Smith-----	Oceanographer
Frank Taylor-----	Electronic Development Technician

I. INTRODUCTION

A research experiment was designed and implemented to study the interaction of the ocean and atmosphere and to relate these effects to the problems involved in the ASWEPS program. An oceanographic research team, consisting of nine Oceanographers, one Physical Science Technician, one Electronic Engineer, and two Electronic Development Technicians, was assigned to the USS SAN PABLO (AGS-30) to conduct the field work. The Tongue of the Ocean (TOTO) was selected as the most appropriate site for the experiment because it is a unique feature in the ocean with its rather steep slope and extremely flat and deep bottom and because of the availability of a 3-point mooring system installed at 24° 35' N, 77° 34' W. In addition, environmental results obtained aboard the USNS GIBBS during a preliminary survey of the TOTO in December 1959 and the work of the Woods Hole Oceanographic Institute and the University of Miami indicated that the TOTO would serve as an excellent field laboratory for the study of internal waves. Eighteen oceanographic stations were occupied, including a 5-day anchor station at the 3-point mooring system southeast of High Cay and a 2-day anchor station just east of Big Wood Cay. Figure 1 shows the approximate locations of the stations occupied in the TOTO.

II. RESEARCH EXPERIMENT

The experiment was conducted to determine the distribution in time and space of the horizontal and vertical temperature field; the energy exchange between the sea and the atmosphere was studied, particularly with respect to changes in the vertical temperature structure; data were obtained for use to evaluate the advective term in the distribution equation; studies of the density structure were accomplished by means of temperature and salinity measurements; and associated meteorological data were obtained to supplement the above. Since density is a governing factor in the behavior of internal waves, oceanographic casts were made to measure this variable. From the system of anchored buoys (thermal array) recording concurrently, it is believed that wave length and speed of propagation of the internal waves can be derived. Appendix I outlines a plan and proposed method of analysis for the study of internal waves. Time series data produced by the thermal array will be subjected to power spectrum analysis and the results will be used as a basis for the development of a prediction technique for thermal structure.

A. THERMAL ARRAY

Temperature measuring devices were assembled in an array. This was accomplished by using the anchoring cables of the permanent mooring bridle system, to which were attached 19 wire resistance thermometers at selected depths; an 11-point thermistor chain streamed from the USS SAN PABLO, and by lowering BT's. A schematic diagram of this installation is shown in Figure 2. Results of previous surveys in the TOTO indicated the depth of the thermocline at approximately 400 feet. Accordingly, the electrical cable and sensing elements were fabricated for this depth.

Because the layer depth extended to 650-700 feet during this period, all probe depths were modified aboard ship to cope with this unexpected phenomenon.

The array was designed in the form of three triangles with the apex of each at buoy A. The large triangle was formed by buoys A, B, and C, the length of the sides being 1500 feet. The medium triangle was formed by buoy A and two dan buoys D and E hung from polypropylene rope, 150 feet from the apex A. The small triangle was formed by buoy A and two dan buoys F and G hung from polypropylene rope, 50 feet from the apex A. Sponges floats were used to give the electrical cable the necessary buoyancy. The data from the resistance thermometers were printed out on chart paper by two Brown recorders, twenty seconds being required to scan all nineteen probes. Figure 3 shows part of the array streamed from the USS SAN PABLO to one of the mooring buoys and Figure 4 shows a close-up of one of the mooring buoys.

Another component of the thermal array consisted of a thermistor chain streamed from the USS SAN PABLO. This equipment was fabricated at the Hydrographic Office, using 14-conductor Vector cable and eleven thermistor probes plus a pressure element. The chain was constructed so that the pressure element and the last thermistor probe could be lowered to at least 1200 feet. Each probe consisted of a previously calibrated bridge circuit and provided a precise voltage to a DYMAC voltage - to - frequency connector, which in turn was counted and then digitally presented on paper tape at the rate of twelve data points every 65 seconds. Five of the thermistor probes malfunctioned so that data were collected at depths of 580, 650, 670, 690, 730, 750 and 770 feet, respectively.

Mechanical 900-foot BT's and paired reversing thermometers on the Nansen bottles were used to supplement the temperature data from the thermal array.

B. OTHER PARAMETERS

In order to arrive at a satisfactory technique to obtain solar irradiation measurements at sea, the SAN PABLO was instrumented with pyrheliometers, incident sensing from the stem and deckhouse, and reflected sensing from the stem and port/starboard booms. Flat-plate radiometers were also utilized at the stem location to record long-wave incoming/reflected values. For this investigation, Daystrom-Weston Corporation recording instruments, with specially furnished ranges, were installed. The instruments were found to perform well within field requirements and with the flexibility of ranges available, many erratic patterns previously doubtful are now believed to be fully documented. Figure 5 shows the radiation instrument action used.

The Roberts Current Meter was used to obtain profiles of water movement. The meters presented no problems and a good set of current

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The Roberts Current Meter was used to obtain profiles of water movement. The meters presented no problems and a good set of current

data was obtained while on anchor station.

Wave data were obtained using the "Splashnik", developed by the David Taylor Model Basin, as the basic sensing element. The system consists of a buoy assembly containing a transducer and transmitter, a wide band FM receiver, an electronic low pass filter, and a recorder. The transmitter emits a signal that varies in frequency proportional to the acceleration imparted to the buoy assembly by wave action. This signal is received by the antenna mounted on the ship and is fed into a receiver. In the receiver, the frequency changes are converted to a varying dc voltage which is proportional to the acceleration. The dc voltage is placed on the input of an adjustable low pass filter which cuts off the signals produced by the surface chop of the sea, but passes unaltered the lower frequency signals produced by the larger and longer waves. The output of the filter unit is then recorded on magnetic tape. Figure 6 shows the float assembly, or "Splashnik", of the wave height telemetering buoy system.

Oceanographic casts, using the Nansen bottle and paired reversing thermometers, were made for obtaining water samples in order to compute density.

Meteorological data were obtained using standard equipment, as well as time-lapse photographs of cloud cover. Wind measurements were made at three levels.

III. INSTRUMENTATION TEST AND EVALUATION

A. ELECTRIC CABLE REELS

Installed aboard the survey vessel were two models of newly-manufactured electric cable reels of 12,000 and 2,000 foot capacity, respectively. Figure 7 shows the smaller cable reel and winch. These units, designed to operate with electrically conductive cable (six conductors), offer infinite speed control in both powered lowering and hoisting positions and have the advantageous feature of rapid interchangeability of the reels. Approximately 30 lowerings were made with the smaller unit, utilizing two models of electronic bathythermographs. Operation was found to be smooth and trouble free. In addition, since there was no universal connector for both BT's, drums were changed daily. This operation was performed in about 10 minutes with insignificant delays in data acquisition.

B. ELECTRONIC BATHYTHERMOGRAPHS

Two models of an electronic bathythermograph, the WHOI Subaqueous Temperature Probe and the HYDRO Linear Thermistor System were tested during this period with excellent results. Briefly, both consist of a dc pick-off and self balancing resistance bridge circuit with a thermistor sensor as the variable leg. This was the first deepwater test of these instruments, both of which have a 600 psi (1350 foot) depth limitation.

Figures 8 and 9 show a comparison of the traces obtained by the electronic BT's with the corresponding standard Nansen cast and 900 foot mechanical BT. A statistical analysis of the electronic BT data collected on this cruise will be made as compared to other methods of temperature-depth measurements. Data collected from future tests will likewise be analyzed, and from these results a final design will be selected. Figure 10 shows the WHOI electronic BT and Figure 11 shows the HYDRO linear electronic BT.

IV. OCEANOGRAPHIC AND METEOROLOGICAL OBSERVATIONS

This section is a resume of the kind and quantity of data obtained. These data are tabulated in the Appendixes as indicated below.

A. TEMPERATURE DATA

The following methods were used to obtain temperature with depth data. In general, when two or more instruments were used simultaneously, the data agreed well.

1. Mechanical 900' BT's - 801 BT's were obtained to an average depth of 840 feet. The data, 24360 data points, are presented in Appendix II.

2. Hydro electronic linear BT - 14 traces down and 14 traces up were plotted by the X-Y recorder.

3. WHOI electronic BT - 19 traces down and 19 traces up were plotted by the X-Y recorder.

4. Thermistor Chain - Approximately 24 hours, or 15,440 data points, of continuous data were recorded. The data have not been completely reduced at this time.

5. Reversing thermometer - 645 data points were obtained and are presented in Appendix III.

6. Thermal array - Approximately 26 hours of continuous data were recorded on two 12-point Brown recorders. However, only 17 hours of the data are considered useful and the data taken at the 700' depth are presented in Appendix IV. Data from all sensors total 61,200 data points.

B. SEA AND SWELL

Visual observations were made every 15 minutes. Approximately 1/2 hour of Splashnik data was recorded on magnetic tape.

C. CURRENTS

Eighty-seven current profiles at seven depths were obtained, representing 616 data points. The data are presented in Appendix V.

D. OCEANOGRAPHIC CASTS

Forty-three Nansen casts were made, including five deep casts and representing 645 data points each of temperature, salinity, and computed sigma - t and sound velocity. The data are presented in Appendix III.

E. METEOROLOGICAL DATA

These data were obtained with standard meteorological instrumentation.

1. Air temperatures - 216 hours of wet and dry bulb data were obtained.

2. Winds - Wind speed and direction were measured at the mast and bow. The bow-height sensor measured wind speed on a continuous basis.

3. Radiation - Continuous recordings were made using five pyrhemometers and one flat-plate radiometer. 28,800 data points were obtained with the pyrhemometers and are presented in Appendix VI.

V. SHIPBOARD DATA REDUCTION

Data reduction and processing were successfully completed aboard a Navy oceanographic vessel for the first time. Six hour watches were maintained continuously in the data center established aboard the USS SAN PABLO. Meteorological data, mechanical BT's, ocean casts, and thermistor chain data were encoded and key punched onto IBM cards. The data were checked and verified aboard ship and publication listings obtained upon return to HYDRO.

VI. PRELIMINARY EXAMINATION OF OCEANOGRAPHIC DATA

The Tongue of the Ocean is widely recognized for its unique features, particularly with respect to size, shape, and depth. To what extent the geometry of the Basin completely influences the physical properties is not known. However, the distribution of these physical properties is apparently influenced by changing climatic conditions, prevailing meteorological situations, and the oceanographic circulation patterns east of the Bahamas. Local changes, particularly internal water movements, appeared to be related directly to the configuration of the ocean basin.

A. CURRENTS

To determine the circulation pattern in the Tongue of the Ocean, density currents were computed relative to the 300-meter level. Comparison of these currents with actual hourly observations taken during the period 9 to 13 March at the moor show excellent agreement. Analyses of dynamic current data indicate a circulation pattern in which water

courses southward through the eastern portion, gradually curves westerly, and then sets northward through the western portion. Further analyses of these data suggest the possibility of two major eddies, one located between the northern and central transect and the other located between the central and southern transect.

Previous investigations have shown the currents in this area to be weak and subject to influence by prevailing winds. A review of the currents while in the mooring bridle substantiates this latter fact, but also shows current speeds as great as 1 knot. The most striking example of wind-driven currents can be seen when comparing data for 11 and 12 March. During this period, water movement in the upper layer changed almost 180° under the influence of strong northerly winds; maximum speeds were obtained coincident with maximum winds. The following statements are relevant to the 87 observations made during the period 9 to 13 March:

1. Current gradient 10 to 100 meters:
Average, 0.2 knot; range, 0.0 to 0.8 knot
2. Current speed at 10 meters:
Average, 0.5 knot; range, 0.0 to 1.0 knot
3. Prevailing current direction 10 to 100 meters : northeasterly
4. Current direction variation 10 to 100 meters :
Average, 40° ; range, 0° to 160° (Difference decreases the longer a wind persists from one direction)
5. The strongest current (1.0 knot) was observed setting southeast during a northeasterly wind whose speed increased from 16 to 24 knots in 4 hours.
6. Below 100 meters, the current speed averaged about 0.3 knot with a range from <0.2 to 0.5 knot the first day on station. The direction varied from northerly to east-northeasterly. The remainder of the time the current speed averaged about 0.5 knot with a range from <0.2 to 0.7 knot. The direction varied from north-northeasterly to southeasterly.

B. TEMPERATURE

1. Surface

The oceanographic observations collected during the Tongue of the Ocean survey clearly demonstrate the homogeneity of the water masses. Sea surface temperatures varied from a minimum of 23.76°C to a maximum of 24.10°C , or a difference of 0.34°C (0.61°F). From Tinker Rocks to Green Cay, temperatures showed an increase from 23.76°C to 23.99°C , the latter temperature being measured in the vicinity of Green Cay. Similarly,

the distribution of sea surface temperature over the northern portion, from near Mastic Point to Goulding Cay, showed a corresponding increase in temperature, with values ranging from 23.84°C in the western sector to 23.94°C in the eastern sector. On the other hand, the variation of temperature along the central transect, extending from station 10 to station 12 showed a decrease in sea surface temperature with values ranging from 24.00°C in the western sector to 23.87°C in the eastern sector. The general trend of sea surface temperature along a longitudinal axis extending from station 1 to station 17 showed that highest temperatures were observed in the northern one-third of the survey area.

2. Vertical Cross Sections

a. The oceanographic stations which were taken on a line extending from Tinker Rocks to Green Cay, stations 3 through 6, show the same general properties at each location (Fig. 12). The vertical distribution of water temperature showed an increase between the surface and intermediate depths with values ranging from 0.16° to 0.24°C between stations 3 and 4. Although less marked, a similar positive temperature gradient existed between stations 5 and 6 with temperature increases ranging from 0.20° to 0.04°C . The depth of maximum temperature was deepest at station 4, 135 meters, and shallowest at station 3, 70 meters. The main thermocline began at a depth of approximately 140 meters at station 3 and sloped downward toward the east to a depth of approximately 150 meters.

b. The transect in the central portion of the survey area, namely stations 10 through 12 (Fig. 13), also shows temperature increases at depth; however, the magnitude of these temperature increases is not as great as in the southern transect. Specifically, at station 10 the surface layer is characterized by a decrease in temperature of approximately $.5^{\circ}\text{C}$ to a depth of 20 meters and then a very slight increase of $.2^{\circ}\text{C}$ to 35 meters. A gradual decrease in temperature was observed from this depth to the main thermocline, which began at approximately 180 meters. On the other hand, the intrusion of warm water can be noted at stations 11 and 12 at depths of approximately 80 and 140 meters at station 11 and at depths of 10 and 100 meters at station 12. The main thermocline along this transect appeared roughly horizontal at the 185-meter level between stations 10 and 11 and then depths generally decreased, the thermocline sloping gradually upward to depths of 150 meters.

c. The transect for the northern portion, stations 15 to 18, Figure 14, demonstrated characteristics similar to those observed in the central and southern portions. At all stations, positive temperature gradients were noted at depth, the strongest of these being found at stations 16 and 17 where temperature increases on the order of $.12^{\circ}\text{C}$ were found. One striking feature not in evidence at the southern transect was a core of colder water at approximately 100 meters between stations 16 and 17. Apparently, this tongue of colder water was trapped by intrusion of warmer water at the 150 meter level. The main thermocline

generally sloped downward from west to east from approximately 135 meters at station 15 to 170 meters at station 18.

3. Longitudinal Cross Section - The longitudinal cross section, extending from south to north (Fig. 15), shows the same general features described in the latitudinal cross sections. The main thermocline slopes downward from south to north, from a mean depth of 150 meters at station 4 to a maximum depth of 190 meters at station 13. The factors producing such a change can be attributed to either piling up of water under wind pressure or tidal influence. The direct cause cannot be determined precisely inasmuch as the survey was conducted in approximately 4 days.

4. Anchor Station Data - Surface temperature of the TOTO water at $24^{\circ}35'N$, $77^{\circ}34'W$ ranged from $23.61^{\circ}C$ to $23.99^{\circ}C$, or a range of $0.28^{\circ}C$, during the six days SAN PABLO was tied in the mooring bridle system. During this same period of time, layer depth fluctuated from 525 feet to 695 feet, or a range of 170 feet. Daily fluctuations of layer depth were as follows:

<u>Day</u> <u>March</u>	<u>Layer Depth</u> <u>Feet</u>	<u>Range of Layer Depth</u> <u>Feet</u>
7	580-650	70
8	595-640	45
9	605-685	80
10	650-695	45
11	605-685	80
12	610-655	45
13	530-655	125
14	525-575	50

C. SALINITY

1. Surface - The horizontal distribution of surface salinity shows a gradual increase from the entrance of the Tongue of the Ocean southward. At the southernmost transect, salinity values ranged from 36.60/00 on the western side to 36.75/00 on the eastern side. At the northernmost transect, values were nearly the same, displaying properties typical of open ocean conditions. The transect extending across the central portion, on the other hand, showed higher salinity values on the western side than on the eastern side. Under normal conditions, higher salinity values would be expected on the eastern side, principally due to shoalness of the water area and its ability to produce high saline water. Salinity values along the central transect varied from 36.70/00 to 36.52/00.

2. Vertical Cross Sections

a. Stations 3 through 6 - Approximately 4 hours were required to occupy stations 3 through 6; therefore, the data obtained on this

cross section are nearly synoptic in nature. Analysis of all salinity profiles for this period show an intrusion of higher saline water at depths ranging from 140 meters at station 3 to 70 meters at station 6 (Fig. 16). Probably, this intrusion of high saline water originates from the shoal water area surrounding the Tongue. The magnitude of the salinity increase ranges from .39/00 at station 3 to .08/00 at station 6. A marked halocline exists below the depth of maximum salinity, with gradual decreasing salinity values to depths of 600 meters. For the most part, the halocline slopes generally upward from west to east.

b. Stations 10, 11 and 12 - As in the southern transect, these stations were occupied during a three to four hour period; and hence, are nearly synoptic. Similar properties can be found in this transect as were found in the southern transect. First, the increase in salinity with depth can be found at each station. This salinity increase varies from .26/00 at the western station to .40/00 at station 11 to .35/00 at the easternmost station (Fig. 17). The depth of maximum salinity ranges from 160 meters at station 10 to 180 meters at station 11 to 150 meters at station 12. The halocline that exists below these depths is quite marked, with salinity values decreasing gradually.

c. Stations 15 through 18 - Although the horizontal distribution of sea surface salinity shows little change between stations 14 and 18 (Fig. 18), the vertical distribution shows a radical change at each station. As in the previous transects, the intrusion of high saline water can be found at approximately the same depths. For example, at station 15, the increase in salinity from the surface to 190 meters is .28/00. Similar increases can be found at the other stations, with gradients ranging from .31/00 at station 16 to .37/00 at station 18. The depth of maximum salinity along this transect is nearly horizontal, ranging from 190 meters at station 15 to 185 meters at station 16, 170 at station 17 to 180 at station 18. The salinity decrease below this level is less marked than at the southern transects, and in all observations, salinity values are above 36.00/00.

3. Longitudinal Cross Section - Figure 19 has been prepared to show the longitudinal distribution of horizontal and vertical salinity variations in the Tongue of the Ocean. This figure clearly illustrates the general increase in surface salinity values, with highest readings being obtained in the southern portion and lowest values being obtained in the northern portion. It also clearly illustrates the intrusion of high saline water throughout the entire Tongue of the Ocean. Figure 19 illustrates that the depth of maximum salinity slopes downward from a least depth of 100 meters at station 1 to a maximum depth of 180 meters at station 11. Variation in salinity below these depths appears generally constant. On the other hand, the distribution of salinity above this level varied considerably from north to south. The Tongue of the Ocean appears to be divided into two cells, one being typical of the region between station 1 and station 7 and the other being typical of the area between stations 7 and 18. The isohalines between station 7

and 18 slope gradually downward, and the surface values of $36.77^0/00$ at station 7 can be found at a depth of 140 meters at station 18.

D. DENSITY

1. Surface - The horizontal distribution of surface density shows highest values in the southern portion of the Tongue. Density values (expressed as sigma - t) increase from 24.78 along the northern transect to 25.09 at the southernmost station. In general, the highest density values are found along the western portion of the basin and minimum density values are found along the eastern portion of the basin. An example of this horizontal change can be found by comparing the values along the midtransect. In this example, density values range from 24.95 at station 10 to 24.85 at station 12. A similar change can be noted at the northern transect, although the magnitude is less marked than over the central portion.

2. Vertical Cross Sections

a. The vertical distribution of density along the southern transect demonstrates that the waters in this region are nearly isopycnal (Fig. 20). At station 3, isopycnal conditions can be found to depths of about 40 meters, whereas, at station 4 they can be found to depths of 20 meters. This condition also exists at station 5. At station 6, unstable conditions, probably arising from the intrusion of high saline water off the shoal banks, creates a density inversion in which density values increase from 24.87 to 25.00. The pycnocline commences at approximately 150 meters at stations 3 through 5 and approximately 170 meters at station 6. For the most part, isopycnals along this transect are nearly horizontal, except between stations 5 and 6 where a horizontal gradient exists causing the isopycnals to slope gradually downward.

b. Stations 10 through 12 - No evidence of density inversions can be found along this transect (Fig. 21). Nearly isopycnal conditions prevail from the surface to depths of approximately 50 meters, with a gradual increase below this depth. The pycnocline begins at depths of approximately 160 meters and the isopycnals are nearly horizontal across the entire transect.

c. Along the northern transect, isopycnal conditions prevail from the surface to 90 meters at station 15, decreasing eastward to approximately 40 meters at station 18 (Fig. 22). As in the central transect, a gradual increase in density can be found between this level and the main pycnocline which can be found at approximately 150 meters at all stations.

3. Longitudinal Cross Section - The longitudinal variation in density is shown in Figure 23. The most striking feature of this figure is the orientation of the main pycnocline, which for the most part is nearly horizontal below depths of 150 meters. Above this level, the density

change is relatively slight, and the circulation structure described under paragraph A, above, is clearly evident.

VII. CONCLUSIONS

A preliminary examination of the data shows that internal waves play a large part in the fluctuation of thermal structure in this area. The data will be carefully analyzed to determine whether the modes of oscillation of the internal waves are simple. If they are, the prediction of thermal structure with reasonable accuracy can be simplified.

A research vessel, instrumented especially for ASWEPS requirements, would allow for the continuation of experiments of this nature.

FIGURE 2. SCHEMATIC OF THERMAL ARRAY AND ANCHOR ASSEMBLY

FIGURE 3 PART OF THERMAL ARRAY FROM USS SAN PABLO TO
APEX BUOY SHOWING SPONGEX FLOATS

FIGURE 4 MOORING BUOY USED IN THERMAL ARRAY

EPPLEY PYRHELIOMETER

BOW-MOUNTED
SENSOR UNIT

FLAT-PLATE
RADIOMETER

RECORDER (MULTIPOINT)

EPPLEY PYRHELIOMETER

RANGE AND SPAN
CONTROLS

FLAT-PLATE
RADIOMETER

FIGURE 5 RADIATION INSTRUMENTATION

FIGURE 6 SPLASHNIK - OVER-THE-SIDE WAVE SENSOR

FIGURE 8-COMPARISON OF DATA FROM WOODS HOLE ELECTRONIC BT, MECHANICAL BT, AND NANSEN CAST.

FIGURE 9-COMPARISON OF DATA FROM HYDRO LINEAR ELECTRONIC BT, MECHANICAL BT, AND NANSEN CAST.

OVER-THE-SIDE
SENSOR

CONTROL CONSOLE

FIGURE 10 WHOI ELECTRONIC BT

FIGURE 11 HYDRO LINEAR ELECTRONIC BT

FIGURE 12 TEMPERATURE (°C) CROSS SECTION STATIONS 3-6
16 MARCH 1960

FIGURE 13 TEMPERATURE (°C) CROSS SECTION STATIONS 10-12
18 MARCH 1960

FIGURE 14 TEMPERATURE (°C) CROSS SECTION STATIONS 15-18
19 MARCH 1960

FIGURE 15 TEMPERATURE (°C) CROSS SECTION STATIONS 1-18

FIGURE 16 SALINITY (‰) CROSS SECTION STATIONS 3-6
16 MARCH 1960

FIGURE 17 SALINITY (‰) CROSS SECTION STATIONS 10-12
18 MARCH 1960

FIGURE 18 SALINITY (%) CROSS SECTION STATIONS 15-18
19 MARCH 1960

FIGURE 19 SALINITY (%) CROSS SECTION STATIONS 1-18

FIGURE 20 DENSITY (σ_t) CROSS SECTION STATIONS 3-6
16 MARCH 1960

FIGURE 21 DENSITY (σ_t) CROSS SECTION STATIONS 10-12
18 MARCH 1960

FIGURE 22 DENSITY(σ_t) CROSS SECTION STATIONS 15-18
19 MARCH 1960

FIGURE 23 DENSITY(σ_t) CROSS SECTION STATIONS 1-18

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APPENDIX I

SIMULTANEOUS TEMPERATURE OBSERVATIONS
AT MEAN DEPTH OF THERMOCLINE TO
STUDY INTERNAL WAVES

APPENDIX I
SIMULTANEOUS TEMPERATURE OBSERVATIONS
AT MEAN DEPTH OF THERMOCLINE TO
STUDY INTERNAL WAVES

In planning a survey of temperatures to observe the effect of internal wave movement, some assumption about the speed of propagation must be made. Three sources of value are available:

1. E. C. LaFond of USNEL has attributed the movement of surface sea slicks to the passage of internal waves with resulting water convergence at the surface just behind the crest of the internal wave. In shallow water (approximately 50 feet) off the California coast these slicks have been observed to travel at 30 feet per minute.

2. Preliminary inspection of the 3-buoy temperature records made at Texas Tower No. 4 indicates a speed of internal wave propagation of approximately 100 feet per minute.

3. Assuming these waves are gravity waves at the interface between two different homogeneous water layers, speed has been calculated from the formula (Lamb, 1945):

$$c = \sqrt{\frac{(\rho - \rho') g / k}{\rho' \coth kh' + \rho \coth kh}}$$

where ρ = density of water in lower layer

ρ' = density of water in upper layer

h = thickness of lower layer

h' = thickness of upper layer

$k = \frac{2\pi}{\lambda}$ where λ = wave length

In TOTO, 29°C and 36.7°/oo were used for the upper layer, $\rho' = 1.02336$.

The mixed layer is said to fluctuate between 175 and 300 feet; h' was taken

as 300 feet and h as 3600 feet. The speed of propagation increases with increasing wave length according to the formula; values range from 9 feet per minute for 4.5-foot waves (the smallest which can just be observed with a 15 sec/cycle time on our recorder) to a maximum of 190 feet per minute for 3000-foot (or greater) waves.

OBSERVATIONAL NETWORK:

As the internal waves, which will be measured, will vary from one lunar day (24.84 hours) to approximately one minute, wave lengths will range from 50 miles to approximately 20 feet. To determine the vector, K (whose direction is the direction of propagation and whose magnitude is "wave number") as great a spacing of observations as possible is desirable. However, this spacing can be no greater than $\frac{\lambda}{2}$ Therefore, 3 different triangular spacings of the temperature sensors used are suggested:

SPACING (FEET)	VELOCITY CALCULATED FROM GRAVITY WAVE EQUATION ft/min	SHORTEST WAVE PERIOD (MINUTES) WHICH WILL BE DETECTED ASSUMING:	
		30 ft/min	100 ft/min
10	1	3/4	< 1/2
200	5	13	4
1730	25	120	35

The duration of the continuous observation period should be at least a week or more to pick up the tidal cycles.

The depth of the thermal sensors should be at the mean depth of the

thermocline as determined by several BT obs over at least a 2-hour period.

METHOD OF ANALYSIS:

The method will be by Fourier analysis as follows, in addition to single station power spectrum analysis. Four assumptions are made:

1. The three resistance thermometers are located at the same depth near the average mid-depth of the thermocline and are sufficiently restrained from swinging as a pendulum to maintain a fixed position despite horizontal currents.

2. The vertical movement of the thermocline is never great enough to cause the sensors to be in either the mixed surface layer or in the bottom layer of small vertical temperature gradient.

3. The vertical temperature gradient within the thermocline is constant.

4. Progressive internal wave components in the area have infinite crests of constant amplitude but each component moves independently.

Under these assumptions, the temperature measured by each thermometer during an interval of record "T" can be approximated by a Fourier Series plus a constant term:

$$T(x, y, t) = \bar{T} + \sum_{n=1}^{\infty} C_n \cos(K_{1n}x + K_{2n}y - \frac{2\pi nt}{T} - \delta_n)$$

where: $K_{1n}^2 + K_{2n}^2 = K_n^2 = (\frac{2\pi}{\lambda_n})^2$ = square of wave number of nth component

λ_n = wave length of nth component

$$K_{1n} = K_n \cos \theta_n$$

$$K_{2n} = K_n \sin \theta_n$$

θ_n = direction of normal to nth infinite crested wave component

$$C_n^2 = a_n^2 + b_n^2 = \text{square of amplitude of nth component}$$

$$\delta_n = \tan^{-1} b_n/a_n = \text{phase of nth component}$$

Expanding twice:

$$\begin{aligned} T(x, y, t) &= \bar{T} + \sum_{n=1}^{\infty} C_n \cos(K_{1n}x + K_{2n}y) \cos\left(\frac{2\pi nt}{T} + \delta_n\right) + C_n \sin(K_{1n}x + K_{2n}y) \sin\left(\frac{2\pi nt}{T} + \delta_n\right) \\ &= \bar{T} + \sum_{n=1}^{\infty} \cos(K_{1n}x + K_{2n}y) C_n \left[\cos\frac{2\pi nt}{T} \cos\delta_n - \sin\frac{2\pi nt}{T} \sin\delta_n \right] + \sin(K_{1n}x + K_{2n}y) C_n \\ &\quad \left[\sin\frac{2\pi nt}{T} \cos\delta_n + \cos\frac{2\pi nt}{T} \sin\delta_n \right] \end{aligned}$$

Substituting $a_n = C_n \cos\delta_n$ $b_n = C_n \sin\delta_n$

$$T(x, y, t) = \bar{T} + \sum_{n=1}^{\infty} \cos(K_{1n}x + K_{2n}y) \left[a_n \cos\frac{2\pi nt}{T} - b_n \sin\frac{2\pi nt}{T} \right] + \sin(K_{1n}x + K_{2n}y) \left[a_n \sin\frac{2\pi nt}{T} + b_n \cos\frac{2\pi nt}{T} \right]$$

Example: 3 thermometers in right triangle

Let $L = \frac{1}{2}$ shortest wave length to be measured

$$T(0,0,t) = \text{TIME SERIES OF TEMPERATURE AT ORIGIN} = \bar{T} + \sum_{n=1}^{\infty} a_n \cos\frac{2\pi nt}{T} - b_n \sin\frac{2\pi nt}{T}$$

Solving for a specific value a_{ℓ} of a_n by multiplying both sides by $\cos\frac{2\pi \ell t}{T}$ and integrating from $t=0$ to $t=T$ the term with $\bar{T}$ is zero at both limits of integration since ℓ is a specific integer, the integrand from the right hand portion of the summation becomes $-b_n \sin\frac{2\pi nt}{T} \cos\frac{2\pi \ell t}{T}$ which can also be expressed as $-\frac{b_n}{2} \sin\frac{2\pi nt + 2\pi \ell t}{T} - \frac{b_n}{2} \sin\frac{2\pi nt - 2\pi \ell t}{T}$ which when integrated with limits of $t=0$ and $t=T$ becomes zero for every value of n , and the integrand of the left hand term in the summation gives the only contribution and at that only for $n=\ell$:

$$\begin{aligned} \int_0^T T(0,0,t) \cos\frac{2\pi \ell t}{T} dt &= \sum_{n=1}^{\infty} \int_0^T a_n \cos\frac{2\pi nt}{T} \cos\frac{2\pi \ell t}{T} dt \\ &= \sum_{n=1}^{\infty} \int_0^T \frac{a_n}{2} \left[\cos\frac{2\pi}{T}(n+\ell)t + \cos\frac{2\pi}{T}(n-\ell)t \right] dt \end{aligned}$$

All integrals of this summation are zero except for $n=\ell$:

$$= \frac{a_{\ell}}{2} \int_0^T \left[\cos\frac{4\pi \ell t}{T} + \cos 0 \right] dt = \frac{a_{\ell}}{2} T$$

$$a_{\ell} = \frac{2}{T} \int_0^T T(0,0,t) \cos\frac{2\pi \ell t}{T} dt$$

Similarly solving for b_{ℓ} by multiplying both sides by $\sin\frac{2\pi \ell t}{T}$ and integrating from $t=0$ to $t=T$:

$$b_{\ell} = -\frac{2}{T} \int_0^T T(0,0,t) \sin\frac{2\pi \ell t}{T} dt$$

$$\text{Use } T(L, 0, t) = \begin{matrix} \text{TIME SERIES} \\ \text{OF TEMPERATURES} \\ \text{AT POINT (L, 0)} \end{matrix} = \bar{T} + \sum_{n=1}^{\infty} \left[a_n \cos K_{1n} L + b_n \sin K_{1n} L \right] \cos \frac{2\pi n t}{T} + \left[a_n \sin K_{1n} L - b_n \cos K_{1n} L \right] \sin \frac{2\pi n t}{T}$$

Solving for Fourier coefficients for a specific value l of n in a similar manner to preceding:

$$a_l \cos K_{1l} L + b_l \sin K_{1l} L = \frac{2}{T} \int_0^T T(L, 0, t) \cos \frac{2\pi l t}{T} dt$$

$$a_l \sin K_{1l} L - b_l \cos K_{1l} L = \frac{2}{T} \int_0^T T(L, 0, t) \sin \frac{2\pi l t}{T} dt$$

Knowing a_l and b_l solve these simultaneous equations for $\sin K_{1l}$ and $\cos K_{1l}$ and thereby evaluate K_{1l}

$$\text{Use } T(0, L, t) = \begin{matrix} \text{TIME SERIES} \\ \text{OF TEMPERATURES} \\ \text{AT POINT (0, L)} \end{matrix} = \bar{T} + \sum_{n=1}^{\infty} \left[a_n \cos K_{2n} L + b_n \sin K_{2n} L \right] \cos \frac{2\pi n t}{T} + \left[a_n \sin K_{2n} L - b_n \cos K_{2n} L \right] \sin \frac{2\pi n t}{T}$$

Again solving for Fourier coefficients for a specific value l of n :

$$a_l \cos K_{2l} L + b_l \sin K_{2l} L = \frac{2}{T} \int_0^T T(0, L, t) \cos \frac{2\pi l t}{T} dt$$

$$a_l \sin K_{2l} L - b_l \cos K_{2l} L = \frac{2}{T} \int_0^T T(0, L, t) \sin \frac{2\pi l t}{T} dt$$

Solve for $\sin K_{2l}$ and $\cos K_{2l}$ and thereby evaluate K_{2l}

Using $K_{1l}^2 + K_{2l}^2 = K_l^2$ solve for K_l

$$\begin{aligned} \text{Solve for } \theta_l &= \cos^{-1} \frac{K_{1l}}{K_l} \\ &= \sin^{-1} \frac{K_{2l}}{K_l} \end{aligned}$$

APPENDIX II

BATHYTHERMOGRAPH OBSERVATIONS

Depths in feet - temperatures (0.1°F)

AY	DAY	COUNTRY	WIND	WIND DIRECTION	WIND SPEED	WIND TEMP	CLOUDS		SEA	SEA STATE	SEA TEMP	TEMPERATURE (°C)												LAT	LONG															
							SKY	SEA				1000	850	700	550	400	250	100	000	100	250	400	550			700	850	1000												
6	1900	2435	7734	737	06	07	770	654	84	25	00	02	748	748	747	747	747	747	748	748	750	753	753	753	753	753	755	755	755	752	737	706	674	667						
6	1925	2435	7734	737	06	07	770	654	84	25	00	02	748	748	747	744	743	744	744	744	744	744	744	744	744	744	744	745	746	746	745	743	740	727	711	678	661	658		
6	2010	2435	7734	744	06	07	755	620	85	26	00	02	750	750	749	749	749	749	749	749	749	749	749	749	749	749	749	749	749	749	749	746	733	725	689	665	650	657		
6	2045	2435	7734	744	06	07	718	630	86	27	00	02	746	746	745	744	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	744	744	743	725	702	673	660	656	652
6	2125	2435	7734	740	05	08	718	630	86	27	00	02	747	747	747	744	743	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	739	724	704	675	659	656	652	
6	2200	2435	7734	735	03	09	685	608	86	28	00	02	748	748	748	744	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	742	737	723	705	679	660	657	654
6	2230	2435	7734	740	03	09	685	608	86	28	00	02	745	745	745	744	743	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	738	723	706	670	658	656	652	
6	2300	2435	7734	740	05	08	680	617	86	27	00	03	747	747	747	746	745	744	743	743	743	743	743	743	743	743	743	743	743	743	743	741	738	727	707	669	658	656	653	
6	2330	2435	7734	735	05	08	680	617	86	27	00	03	746	746	746	746	744	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	741	733	727	707	669	658	656	654
7	0000	2435	7734	735	05	08	670	600	86	27	00	03	746	746	746	744	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	741	733	727	710	678	661	658	656
7	0030	2435	7734	735	05	08	670	600	86	27	00	03	746	746	746	744	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	741	733	727	710	678	661	658	656
7	0100	2435	7734	737	05	10	678	607	84	25	00	03	746	746	746	745	744	743	743	743	743	743	743	743	743	743	743	743	743	743	743	740	735	725	712	679	662	658	65	

DAY	TIME	POSITION	SUN RISE SET	MOON RISE SET	WIND DIR SPEED	SEA STATE	CLOUDS	TEMPERATURES AT DEPTH																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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8	0645	2435 7734	746	11	10	710	645	83	24	00	02	746	746	746	746	746	746	746	745	745	745	745	746	746	746	746	746	746	746	746	746	746	746	746	746	746	746	723	692	674	668	659																																																																																																																																																																																																																																																																																																																																																																																																																					
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8	0715	2435 7734	746	11	10	710	645	83	24	00	02	747	747	747	747	747	747	746	746	745	745	745	745	746	746	746	746	746	746	746	746	746	746	746	746	746	746	730	690	674	668	660																																																																																																																																																																																																																																																																																																																																																																																																																					
8	0730	2435 7734	747	11	10	710	645	83	24	00	02	747	747	747	747	747	747	746	746	745	745	745	745	746	746	746	746	746	746	746	746	746	746	746	746	746	746	730	690	674	668	660																																																																																																																																																																																																																																																																																																																																																																																																																					
8	0745	2435 7734	746	12	10	708	648	83	24	00	02	747	747	747	747	747	746	746	745	745	745	745	746	746	746	746	746	746	746	746	746	746	746	746	746	746	746	732	689	674	668	658																																																																																																																																																																																																																																																																																																																																																																																																																					
8	0800	2435 7734	746	12	10	708	648	83	24	00	02	746	746	746	746	746	746	746	745	745	745	745	746	746	746	746	746	746	746	746	746	746	746	746	746	746	746	746	732	689	674	668	658																																																																																																																																																																																																																																																																																																																																																																																																																				
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8	0830	2435 7734	748	12	10	708	648	83	24	00	03	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748

BATHYTHERMOGRAPH DATA
BATHYTHERMOGRAPH DATA
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[illegible]

RELATIVETHERMOGRAPH DATA
AT THERMOGRAPH DATA
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MARCH 1960

STATION	TIME	POSITION	WIND		AIR TEMPERATURE		CLOUDS	SEA	TEMPERATURES AT DEPTH																
			WIND	WAVE	WIND	AIR			015'	040'	060'	100'	120'	140'	160'	180'	200'	240'	280'	300'	400'	450'	500'	600'	700'
AT	UT	LONG	WAVE	WAVE	WIND	AIR	015'	040'	060'	100'	120'	140'	160'	180'	200'	240'	280'	300'	400'	450'	500'	600'	700'	800'	900'
9 1000	2435	7734	743	07	18	630	81	21	00	04	02	743	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1015	2435	7734	743	07	18	630	81	21	00	04	02	743	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1030	2435	7734	743	07	18	630	81	21	00	04	02	743	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1045	2435	7734	743	06	18	630	826	84	25	00	03	02	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1100	2435	7734	744	06	18	630	826	84	25	00	03	02	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1115	2435	7734	744	06	18	630	826	84	25	00	03	02	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1130	2435	7734	744	06	18	630	826	84	25	00	03	02	742	742	742	742	742	742	742	742	742	742	742	742	742
9 1145	2435	7734	744	07	16	593	638	85	26	00	04	03	742	742	742	742	742	742	742	742	742	742	742	742	742
9 1200	2435	7734	744	07	16	593	638	85	26	00	04	03	742	742	742	742	742	742	742	742	742	742	742	742	742
9 1215	2435	7734	744	07	16	593	638	85	26	00	04	03	742	742	742	742	742	742	742	742	742	742	742	742	742
9 1230	2435	7734	744	07	16	593	638	85	26	00	04	03	742	742	742	742	742	742	742	742	742	742	742	742	742
9 1245	2435	7734	744	07	16	593	638	85	26	00	04	03	742	742	742	742	742	742	742	742	742	742	742	742	742
9 1300	2435	7734	745	07	17	636	633	85	26	00	04	03	742	742	742	742	742	742	742	742	742	742	742	742	742
9 1315	2435	7734	745	07	17	636	633	85	26	00	04	03	742	742	742	742	742	742	742	742	742	742	742	742	742
9 1330	2435	7734	745	07	17	636	633	85	26	00	04	03	742	742	742	742	742	742	742	742	742	742	742	742	742
9 1345	2435	7734	745	07	17	636	633	85	26	00	04	03	740	740	740	740	740	740	740	740	740	740	740	740	740
9 1400	2435	7734	745	07	15	701	640	85	26	00	04	03	740	740	740	740	740	740	740	740	740	740	740	740	740
9 1415	2435	7734	745	07	15	701	640	85	26	00	04	03	740	740	740	740	740	740	740	740	740	740	740	740	740
9 1430	2435	7734	745	07	15	701	640	85	26	00	04	03	740	740	740	740	740	740	740	740	740	740	740	740	740
9 1445	2435	7734	745	07	15	701	640	85	26	00	04	03	740	740	740	740	740	740	740	740	740	740	740	740	740
9 1500	2435	7734	745	07	14	710	640	83	24	00	04	03	740	740	750	740	740	740	740	740	740	740	740	740	740
9 1515	2435	7734	745	07	14	710	640	83	24	00	04	03	745	741	741	741	741	741	741	741	741	741	741	741	741
9 1530	2435	7734	745	07	14	710	640	83	24	00	04	03	745	741	741	741	741	741	741	741	741	741	741	741	741
9 1545	2435	7734	745	07	15	710	640	83	24	00	04	03	744	741	741	741	741	741	741	741	741	741	741	741	741
9 1600	2435	7734	745	07	15	710	640	83	24	00	04	03	745	741	741	741	741	741	741	741	741	741	741	741	741
9 1615	2435	7734	744	07	15	710	640	83	24	00	04	03	744	742	742	742	742	742	742	742	742	742	742	742	742
9 1630	2435	7734	744	07	15	710	640	83	24	00	04	03	745	742	742	742	742	742	742	742	742	742	742	742	742
9 1645	2435	7734	744	07	12	651	631	83	24	00	04	03	744	743	743	743	743	743	743	743	743	743	743	743	743
9 1700	2435	7734	747	07	12	651	631	83	24	00	04	03	747	741	741	739	739	740	740	740	741	741	741	741	741
9 1715	2435	7734	745	07	12	651	631	83	24	00	04	03	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1730	2435	7734	746	07	12	651	631	83	24	00	04	03	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1745	2435	7734	746	10	13	721	651	87	28	00	04	03	746	746	746	745	745	745	745	745	745	745	745	745	745
9 1800	2435	7734	746	10	13	721	651	87	28	00	04	03	741	741	741	741	740	741	741	741	741	741	741	741	741
9 1815	2435	7734	745	10	13	721	651	87	28	00	04	03	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1830	2435	7734	745	10	13	721	651	87	28	00	04	03	743	743	743	743	743	743	743	743	743	743	743	743	743
9 1845	2435	7734	745	10	13	721	651	87	28	00	04	03	744	743	743	742	742	743	743	743	743	743	743	743	743
9 1900	2435	7734	745	10	11	742	662	86	27	00	04	03	747	746	746	746	744	745	745	745	745	745	745	745	745
9 1915	2435	7734	746	10	11	742	662	86	27	00	04	03	748	747	746	745	744	744	744	745	745	745	745	745	745
9 1930	2435	7734	746	10	11	742	662	86	27	00	04	03	747	746	745	744	744	744	744	745	745	745	745	745	745
10 05	2435	7734	746	10	11	742	662	86	27	00	04	03	745	745	745	744	744	744	744	744	744	744	744	744	744
10 15	2435	7734	746	10	11	742	662	86	27	00	04	03	745	745	745	744	744	744	744	744	744	744	744	744	744

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DAY	TIME	POSITION	WATER	WIND	SEA TEMPERATURE	CLOUDS		SEA	TEMPERATURES AT DEPTH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
						0000'	0005'		0010'	0015'	0020'	0025'	0030'	0035'	0040'	0045'	0050'	0055'																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
10	0615	2435	7734	744	14	10	723	678	82	23	00	03	02745	745	745	745	745	745	746	747	747	747	747	748	749	750	750	750	749	727	698	670																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
10	0630	2435	7734	744	14	10	723	678	82	23	00	03	02739	739	739	739	739	740	740	740	740	740	740	740	740	740	741	741	741	742	742	739	709	690	663																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
10	0645	2435	7734	744	14	10	723	678	82	23	00	03	02740	740	740	740	740	740	740	740	741	742	742	742	742	742	742	742	743	745	745	745	740	712	685	666																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
10	0700	2435	7734	744	14	09	720	674	82	23	00	03	02740	740	740	740	740	740	740	740	741	741	742	742	742	742	742	742	744	745	745	745	740	719	680	665																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
10	0715	2435	7734	744	14	09	720	674	82	23	00	03	02740	740	740	740	740	740	740	740	741	741	742	742	742	742	742	742	743	743	745	745	738	711	686	663																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
10	0730	2435	7734	744	14	09	720	674	82	23	00	03	02743	740	740	740	740	740	740	741	741	741	741	742	742	742	742	743	744	745	745	745	736	715	675	666																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
10	0745	2435	7734	743	14	10	720	676	82	22	00	02	02743	741	741	741	741	741	741	741	741	741	742	742	742	742	743	743	744	744	745	745	734	710	687	662																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
10	0800	2435	7734	744	14	10	720	676	82	22	00	02	02744	742	742	742	742	742	742	742	743	743	743	744	745	745	745	745	745	746	746	747	736	718	685	669																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
10	0815	2435	7734	744	14	10	720	676	82	22	00	02	02744	743	743	743	743	743	743	744	744	744	744	745	745	745	745	745	745	745	746	747	747	748	737	719	676	667																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
10	0830	2435	7734	744	14	10	720	676	82	22	00	02	02744	745	745	745	745	745	745	745	745	745	745	745	745	745	745	745	745	746	747	747	748	748	738	722	688	660																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
10	0845	2435	7734	744	14	11	719	675	82	22	00	02	02744	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	739	719	687	667																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
10	0900	2435	7734	744	14	11	719	675	82	22	00	02	02744	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	742	740	709	676	668																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
10	0915	2435	7734	744	14	11	719	675	82	22	00	02	02744	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	740	709	676	669																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
10	0930	2435	7734	743	14	11	719	675	82	22	00	02	02743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	740	710	675	669																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
10	0945	2435	7734	743	14	10	713	673	82	22	00	02	02743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	74

BATHYTHERMOGRAPH DATA

TONGUE OF THE OCEAN

ANCHER TANK

DAY	TIME	POSITION	LAT	LONG	WIND	SEA	TEMPERATURES AT DEPTH												400'	300'	200'	100'	00'	800'																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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		SURFACE	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'	160'	170'	180'	190'	200'	210'	220'	230'	240'	250'	260'	270'	280'	290'	300'	310'	320'	330'	340'	350'	360'	370'	380'	390'	400'	410'	420'	430'	440'	450'	460'	470'	480'	490'	500'	510'	520'	530'	540'	550'	560'	570'	580'	590'	600'	610'	620'	630'	640'	650'	660'	670'	680'	690'	700'	710'	720'	730'	740'	750'	760'	770'	780'	790'	800'	810'	820'	830'	840'	850'	860'	870'	880'	890'	900'	910'	920'	930'	940'	950'	960'	970'	980'	990'	1000'	1010'	1020'	1030'	1040'	1050'	1060'	1070'	1080'	1090'	1100'	1110'	1120'	1130'	1140'	1150'	1160'	1170'	1180'	1190'	1200'	1210'	1220'	1230'	1240'	1250'	1260'	1270'	1280'	1290'	1300'	1310'	1320'	1330'	1340'	1350'	1360'	1370'	1380'	1390'	1400'	1410'	1420'	1430'	1440'	1450'	1460'	1470'	1480'	1490'	1500'	1510'	1520'	1530'	1540'	1550'	1560'	1570'	1580'	1590'	1600'	1610'	1620'	1630'	1640'	1650'	1660'	1670'	1680'	1690'	1700'	1710'	1720'	1730'	1740'	1750'	1760'	1770'	1780'	1790'	1800'	1810'	1820'	1830'	1840'	1850'	1860'	1870'	1880'	1890'	1900'	1910'	1920'	1930'	1940'	1950'	1960'	1970'	1980'	1990'	2000'	2010'	2020'	2030'	2040'	2050'	2060'	2070'	2080'	2090'	2100'	2110'	2120'	2130'	2140'	2150'	2160'	2170'	2180'	2190'	2200'	2210'	2220'	2230'	2240'	2250'	2260'	2270'	2280'	2290'	2300'	2310'	2320'	2330'	2340'	2350'	2360'	2370'	2380'	2390'	2400'	2410'	2420'	2430'	2440'	2450'	2460'	2470'	2480'	2490'	2500'	2510'	2520'	2530'	2540'	2550'	2560'	2570'	2580'	2590'	2600'	2610'	2620'	2630'	2640'	2650'	2660'	2670'	2680'	2690'	2700'	2710'	2720'	2730'	2740'	2750'	2760'	2770'	2780'	2790'	2800'	2810'	2820'	2830'	2840'	2850'	2860'	2870'	2880'	2890'	2900'	2910'	2920'	2930'	2940'	2950'	2960'	2970'	2980'	2990'	3000'	3010'	3020'	3030'	3040'	3050'	3060'	3070'	3080'	3090'	3100'	3110'	3120'	3130'	3140'	3150'	3160'	3170'	3180'	3190'	3200'	3210'	3220'	3230'	3240'	3250'	3260'	3270'	3280'	3290'	3300'	3310'	3320'	3330'	3340'	3350'	3360'	3370'	3380'	3390'	3400'	3410'	3420'	3430'	3440'	3450'	3460'	3470'	3480'	3490'	3500'	3510'	3520'	3530'	3540'	3550'	3560'	3570'	3580'	3590'	3600'	3610'	3620'	3630'	3640'	3650'	3660'	3670'	3680'	3690'	3700'	3710'	3720'	3730'	3740'	3750'	3760'	3770'	3780'	3790'	3800'	3810'	3820'	3830'	3840'	3850'	3860'	3870'	3880'	3890'	3900'	3910'	3920'	3930'	3940'	3950'	3960'	3970'	3980'	3990'	4000'	4010'	4020'	4030'	4040'	4050'	4060'	4070'	4080'	4090'	4100'	4110'	4120'	4130'	4140'	4150'	4160'	4170'	4180'	4190'	4200'	4210'	4220'	4230'	4240'	4250'	4260'	4270'	4280'	4290'	4300'	4310'	4320'	4330'	4340'	4350'	4360'	4370'	4380'	4390'	4400'	4410'	4420'	4430'	4440'	4450'	4460'	4470'	4480'	4490'	4500'	4510'	4520'	4530'	4540'	4550'	4560'	4570'	4580'	4590'	4600'	4610'	4620'	4630'	4640'	4650'	4660'	4670'	4680'	4690'	4700'	4710'	4720'	4730'	4740'	4750'	4760'	4770'	4780'	4790'	4800'	4810'	4820'	4830'	4840'	4850'	4860'	4870'	4880'	4890'	4900'	4910'	4920'	4930'	4940'	4950'	4960'	4970'	4980'	4990'	5000'	5010'	5020'	5030'	5040'	5050'	5060'	5070'	5080'	5090'	5100'	5110'	5120'	5130'	5140'	5150'	5160'	5170'	5180'	5190'	5200'	5210'	5220'	5230'	5240'	5250'	5260'	5270'	5280'	5290'	5300'	5310'	5320'	5330'	5340'	5350'	5360'	5370'	5380'	5390'	5400'	5410'	5420'	5430'	5440'	5450'	5460'	5470'	5480'	5490'	5500'	5510'	5520'	5530'	5540'	5550'	5560'	5570'	5580'	5590'	5600'	5610'	5620'	5630'	5640'	5650'	5660'	5670'	5680'	5690'	5700'	5710'	5720'	5730'	5740'	5750'	5760'	5770'	5780'	5790'	5800'	5810'	5820'	5830'	5840'	5850'	5860'	5870'	5880'	5890'	5900'	5910'	5920'	5930'	5940'	5950'	5960'	5970'	5980'	5990'	6000'	6010'	6020'	6030'	6040'	6050'	6060'	6070'	6080'	6090'	6100'	6110'	6120'	6130'	6140'	6150'	6160'	6170'	6180'	6190'	6200'	6210'	6220'	6230'	6240'	6250'	6260'	6270'	6280'	6290'	6300'	6310'	6320'	6330'	6340'	6350'	6360'	6370'	6380'	6390'	6400'	6410'	6420'	6430'	6440'	6450'	6460'	6470'	6480'	6490'	6500'	6510'	6520'	6530'	6540'	6550'	6560'	6570'	6580'	6590'	6600'	6610'	6620'	6630'	6640'	6650'	6660'	6670'	6680'	6690'	6700'	6710'	6720'	6730'	6740'	6750'	6760'	6770'	6780'	6790'	6800'	6810'	6820'	6830'	6840'	6850'	6860'	6870'	6880'	6890'	6900'	6910'	6920'	6930'	6940'	6950'	6960'	6970'	6980'	6990'	7000'	7010'	7020'	7030'	7040'	7050'	7060'	7070'	7080'	7090'	7100'	7110'	7120'	7130'	7140'	7150'	7160'	7170'	7180'	7190'	7200'	7210'	7220'	7230'	7240'	7250'	7260'	7270'	7280'	7290'	7300'	7310'	7320'	7330'	7340'	7350'	7360'	7370'	7380'	7390'	7400'	7410'	7420'	7430'	7440'	7450'	7460'	7470'	7480'	7490'	7500'	7510'	7520'	7530'	7540'	7550'	7560'	7570'	7580'	7590'	7600'	7610'	7620'	7630'	7640'	7650'	7660'	7670'	7680'	7690'	7700'	7710'	7720'	7730'	7740'	7750'	7760'	7770'	7780'	7790'	7800'	7810'	7820'	7830'	7840'	7850'	7860'	7870'	7880'	7890'	7900'	7910'	7920'	7930'	7940'	7950'	7960'	7970'	7980'	7990'	8000'	8010'	8020'	8030'	8040'	8050'	8060'	8070'	8080'	8090'	8100'	8110'	8120'	8130'	8140'	8150'	8160'	8170'	8180'	8190'	8200'	8210'	8220'	8230'	8240'	8250'	8260'	8270'	8280'	8290'	8300'	8310'	8320'	8330'	8340'	8350'	8360'	8370'	8380'	8390'	8400'	8410'	8420'	8430'	8440'	8450'	8460'	8470'	8480'	8490'	8500'	8510'	8520'	8530'	8540'	8550'	8560'	8570'	8580'	8590'	8600'	8610'	8620'	8630'	8640'	8650'	8660'	8670'	8680'	8690'	8700'	8710'	8720'	8730'	8740'	8750'	8760'	8770'	8780'	8790'	8800'	8810'	8820'	8830'	8840'	8850'	8860'	8870'	8880'	8890'	8900'	8910'	8920'	8930'	8940'	8950'	8960'	8970'	8980'	8990'	9000'	9010'	9020'	9030'	9040'	9050'	9060'	9070'	9080'	9090'	9100'	9110'	9120'	9130'	9140'	9150'	9160'	9170'	9180'	9190'	9200'	9210'	9220'	9230'	9240'	9250'	9260'	9270'	9280'	9290'	9300'	9310'	9320'	9330'	9340'	9350'	9360'	9370'	9380'	9390'	9400'	9410'	9420'	9430'	9440'	9450'	9460'	9470'	9480'	9490'	9500'	9510'	9520'	9530'	9540'	9550'	9560'	9570'	9580'	9590'	9600'	9610'	9620'	9630'	9640'	9650'	9660'	9670'	9680'	9690'	9700'	9710'	9720'	9730'	9740'	9750'	9760'	9770'	9780'	9790'	9800'	9810'	9820'	9830'	9840'	9850'	9860'	9870'	9880'	9890'	9900'	9910'	9920'	9930'	9940'	9950'	9960'	9970'	9980'	9990'	10000'

DAY	TIME	SUNRISE	SUNSET	MOON	SEA	TEMPERATURES AT DEPTH												400'	500'	600'
						10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'			
11	1215	2435	7734	743	12	07	730	681	82	23	00	02	01	750	750	750	750	750	750	750
11	1230	2435	7734	742	12	07	730	681	82	23	00	02	01	746	746	746	746	746	746	746
11	1245	2435	7734	744	13	07	755	700	82	23	00	02	01	746	746	746	746	746	746	746
11	1300	2435	7734	744	13	07	755	700	82	23	00	02	01	746	746	746	746	746	746	746
11	1315	2435	7734	745	13	07	755	700	82	23	00	02	01	746	746	746	746	746	746	746
11	1330	2435	7734	744	13	07	755	700	82	23	00	02	01	745	747	747	747	747	747	747
11	1345	2435	7734	744	14	08	780	717	85	26	00	02	02	744	744	744	744	744	744	744
11	1400	2435	7734	744	14	08	780	717	85	26	00	02	02	744	744	744	744	744	744	744
11	1415	2435	7734	745	14	08	780	717	85	26	00	02	02	744	744	744	744	744	744	744
11	1430	2435	7734	747	16	10	789	703	84	25	00	02	02	744	744	744	744	744	744	744
11	1445	2435	7734	748	16	10	789	703	84	25	00	02	02	744	744	744	744	744	744	744
11	1500	2435	7734	748	16	10	789	703	84	25	00	02	02	744	744	744	744	744	744	744
11	1515	2435	7734	748	16	10	789	703	84	25	00	02	02	744	744	744	744	744	744	744
11	1530	2435	7734	748	16	10	789	703	84	25	00	02	02	744	744	744	744	744	744	744
11	1545	2435	7734	748	16	10	791	716	83	24	00	02	02	745	745	745	745	745	745	745
11	1600	2435	7734	748	16	10	791	716	83	24	00	02	02	745	745	745	745	745	745	745
11	1615	2435	7734	749	16	10	791	716	83	24	00	02	02	745	745	745	745	745	745	745
11	1630	2435	7734	750	16	10	793	712	83	24	00	02	02	745	745	745	745	745	745	745
11	1645	2435	7734	752	18	10	793	712	82	24	00	02	02	744	744	744	744	744	744	744
11	1700	2435	7734	754	18	10	793	712	82	24	00	02	02	744	744	744	744	744	744	744
11	1715	2435	7734	754	18	10	793	712	82	24	00	02	02	744	744	744	744	744	744	744
11	1730	2435	7734	755	18	11	799	721	83	24	00	02	02	745	745	745	745	745	745	745
11	1745	2435	7734	755	18	11	799	721	83	24	00	02	02	745	745	745	745	745	745	745
11	1800	2435	7734	755	18	11	799	721	83	24	00	02	02	745	745	745	745	745	745	745
11	1815	2435	7734	755	18	11	799	721	83	24	00	02	02	745	745	745	745	745	745	745
11	1830	2435	7734	754	18	11	799	721	83	24	00	02	02	745	745	745	745	745	745	745
11	1845	2435	7734	754	18	11	799	721	83	24	00	02	02	745	745	745	745	745	745	745
11	1900	2435	7734	756	14	11	801	721	83	24	00	02	02	750	749	748	747	746	745	744
11	1915	2435	7734	756	14	11	801	721	83	24	00	02	02	750	749	748	747	746	745	744
11	1930	2435	7734	758	14	11	801	721	83	24	00	02	02	748	746	744	743	743	743	743
11	1945	2435	7734	758	14	11	801	721	83	24	00	02	02	750	749	748	747	746	745	744
11	2000	2435	7734	757	14	12	807	723	82	22	00	02	02	750	749	748	747	746	745	744
11	2015	2435	7734	757	14	12	807	723	82	22	00	02	02	750	749	748	747	746	745	744
11	2030	2435	7734	756	14	12	807	723	82	22	00	02	02	750	749	748	747	746	745	744
11	2045	2435	7734	754	14	13	805	724	82	22	00	02	02	750	749	748	747	746	745	744
11	2100	2435	7734	751	14	13	805	724	82	22	00	02	02	748	748	748	748	748	748	748
11	2115	2435	7734	752	14	13	805	724	82	22	00	02	02	748	748	748	748	748	748	748
11	2130	2435	7734	750	14	13	805	724	82	22	00	02	02	750	750	749	748	747	746	745
11	2200	2435	7734	750	14	11	793	715	82	22	00	02	02	749	748	748	747	746	745	744
11	2215	2435	7734	750	14	11	793	715	82	22	00	02	02	750	750	749	748	747	746	745
11	2230	2435	7734	747	14	11	793	715	82	22	00	02	02	749	748	748	747	746	745	744
11	2245	2435	7734	747	15	11	781	713	82	22	00	02	02	748	748	748	747	746	745	744

STATION INFORMATION
BATHYTHERMOGRAPH DATA
TONGUE OF THE OCEAN
MARCH 1966

DAY	TIME	LATITUDE	LONGITUDE	SURF TEMP	WIND	SEA TEMPERATURE	CLOUDS										TEMPERATURES AT DEPTH												800'	
					dir	speed	dir	speed	dir	speed	dir	speed	dir	speed	dir	speed	100'	200'	300'	400'	500'	600'	700'	800'	900'	1000'	1100'	1200'		
11	2300	2435	7734	747	15	11	781	713	82	22	00	02	02	02	02	02	747	747	748	748	748	746	745	745	745	744	744	745	745	800'
11	2315	2435	7734	742	15	11	781	713	82	22	00	02	02	02	02	02	747	747	748	748	747	748	746	745	744	744	744	744	744	800'
11	2330	2435	7734	742	15	11	781	713	82	22	00	02	02	02	02	02	749	749	749	749	747	746	746	746	744	744	744	744	744	800'
11	2345	2435	7734	742	16	09	763	721	02	21	31	00	02	01	01	01	750	750	750	749	749	748	748	746	746	746	746	746	746	800'
12	0000	2435	7734	741	16	09	763	721	02	21	31	00	02	01	01	01	748	748	749	749	747	746	746	745	745	745	745	745	745	800'
12	0015	2435	7734	741	16	09	763	721	02	21	31	00	02	01	01	01	750	750	750	749	749	747	747	747	747	747	747	747	747	800'
12	0030	2435	7734	741	16	09	763	721	02	21	31	00	02	01	01	01	750	750	750	749	749	746	746	746	746	746	746	746	746	800'
12	0045	2435	7734	741	16	09	763	721	02	21	31	00	02	01	01	01	750	750	750	749	749	748	748	748	748	748	748	748	748	800'
12	0100	2435	7734	741	16	08	750	700	82	23	00	02	01	01	01	01	750	750	750	749	748	748	748	748	748	748	748	748	748	800'
12	0115	2435	7734	736	16	08	750	700	82	23	00	02	01	01	01	01	750	750	750	749	748	748	748	748	748	748	748	748	748	800'
12	0130	2435	7734	732	16	08	750	700	82	23	00	02	01	01	01	01	750	750	750	749	748	748	748	748	748	748	748	748	748	800'
12	0145	2435	7734	734	16	08	750	700	82	23	00	02	01	01	01	01	747	747	748	748	749	748	748	748	748	748	748	748	748	800'
12	0200	2435	7734	734	18	10	750	702	71	31	00	02	01	01	01	01	748	748	749	749	748	748	748	748	748	748	748	748	748	800'
12	0215	2435	7734	734	18	10	750	702	71	31	00	02	01	01	01	01	748	748	749	749	748	748	748	748	748	748	748	748	748	800'
12	0230	2435	7734	734	18	10	750	702	71	31	00	02	01	01	01	01	748	748	749	749	748	748	748	748	748	748	748	748	748	800'
12	0245	2435	7734	733	18	05	750	703	71	51	00	02	01	01	01	01	748	748	746	746	749	748	747	747	747	747	747	747	747	800'
12	0300	2435	7734	731	18	05	750	703	71	51	00	02	01	01	01	01	749	748	748	749	749	748	747	747	747	747	747	747	747	800'
12	0315	2435	7734	730	18	05	750	703	71	51	00	02	01	01	01	01	747	748	748	749	749	748	748	748	748	748	748	748	748	800'
12	0330	2435	7734	730	18	05	750	703	71	51	00	02	01	01	01	01	750	750	751	751	750	750	750	750	750	750	750	750	750	800'
12	0345	2435	7734	730	18	07	738	698	71	51	00	01	01	01	01	01	748	748	748	748	750	750	749	748	747	747	747	747	747	800'
12	0400	2435	7734	734	18	07	738	698	71	51	00	01	01	01	01	01	748	748	748	748	748	748	748	748	748	748	748	748	748	800'
12	0415	2435	7734	732	18	07	738	698	71	51	00	01	01	01	01	01	748	748	748	748	749	748	747	747	747	747	747	747	747	800'
12	0430	2435	7734	734	18	07	738	698	71	51	00	01	01	01	01	01	747	748	748	749	748	747	747	747	747	747	747	747	747	800'
12	0445	2435	7734	734	18	07	738	698	71	51	00	01	01	01	01	01	747	748	748	749	748	747	747	747	747	747	747	747	747	800'
12	0500	2435	7734	740	18	07	738	698	71	51	00	02	01	01	01	01	750	750	750	750	749	749	749	749	749	749	749	749	749	800'
12	0515	2435	7734	745	25	09	740	705	84	25	00	02	02	02	02	02	749	749	749	749	748	748	748	748	748	748	748	748	748	800'
12	0530	2435	7734	745	25	09	740	705	84	25	00	02	02	02	02	02	750	750	750	750	749	748	748	748	748	748	748	748	748	800'
12	0545	2435	7734	740	25	09	740	705	84	25	00	02	02	02	02	02	750	750	750	750	749	748	748	748	748	748	748	748	748	800'
12	0600	2435	7734	740	25	09	740	705	84	25	00	02	02	02	02	02	750	750	750	750	749	748	748	748	748	748	748	748	748	800'
12	0615	2435	7734	740	25	09	740	705	84	25	00	02	02	02	02	02	750	750	750	750	749	748	748	748	748	748	748	748	748	800'
12	0630	2435	7734	740	25	09	740	705	84	25	00	02	02	02	02	02	750	750	750	750	749	749	749	749	749	749	749	749	749	800'
12	0645	2435	7734	742	25	09	740	705	84	25	00	03	02	02	02	02	749	749	749	749	749	749	749	749	749	749	749	749	749	800'
12	0700	2435	7734	741	25	12	742	703	85	26	00	03	02	02	02	02	750	750	750	750	749	749	749	749	749	749	749	749	749	800'
12	0715	2435	7734	740	25	12	742	703	85	26	00	03	02	02	02	02	744	744	744	744	745	745	745	745	744	744	744	744	744	800'
12	0730	2435	7734	740	25	12	742	703	85	26	00	03	02	02	02	02	749	749	749	749	749	749	749	749	749	749	749	749	749	800'
12	0745	2435	7734	740	25	12	742	703	85	26	00	03	02	02	02	02	745	745	745	745	745	745	745	745	745	745	745	745	745	800'
12	0800	2435	7734	740	22	13	735	704	82	22	00	03	02	02	02	02	749	749	749	749	749	749	749	749	749	749	749	749	749	800'
12	0815	2435	7734	740	22	13	735	704	82	22	00	03	02	02	02	02	745	746	746	746	746	746	746	746	746	746	746	746	746	800'
12	0830	2435	7734	739	22	13	735	704	82	22	00	03	02	02	02	02	744	744	744	744	744	744	744	744	744	744	744	744	744	800'
12	0845	2435	7734	740	22	13	735	704	82	22	00	03	02	02	02	02	744	745	745	745	745	745	745	745	744	744	744	744	744	800'
12	0900	2435	7734	741	23	13	730	702	89	24	00	03	02	02	02	02	743	743	743	743	743	743	743	743	743	743	743	743	743	800'
12	0915	2435	7734	740	23	13	730	702	83	24	00	03	02	02	02	02	743	743	743	743	743	743	743	743	743	743	743	743	743	800'

ATHY THERMOGRAPH DATA
TONGUE OF THE OCEAN
MARCH 1960

[illegible]

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TONGUE OF THE OCEAN
MARCH 1960

[illegible]

BRATHYTHERMOGRAPH DATA

BATHYTHERMOGRAPH DATA
TONGUE OF THE OCEAN
MARCH 1960

[illegible]

APPENDIX III

OCEANOGRAPHIC STATION DATA

SURFACE OBSERVATIONS											
H. O. REF. NO.	STATION	DATE				POSITION				SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MD.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE			
00659	MOOR	03	06	960	22	24	35N	077°	34W	1756	17

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		CDL.	TRANS.
04	06	23		24	0	18	4		8	5	05	1	05	1		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ Δ D ↓	O ₂ ml/l ↓	V _t ↓
0000	23 83	36 51	24 85	0 000		5021 4
0000	23 83	36 51	24 85			5021 4
0010	23 83	36 50	24 85	0 031		5021 9
0010	23 83	36 50	24 85			5021 9
0020	23 76	36 52	24 88	0 062		5022 0
0020	23 76	36 52	24 88			5022 0
0030	23 71	36 57	24 94	0 093		5022 4
0030	23 71	36 57	24 94			5022 4
0050	23 71	36 58	24 94	0 154		5023 6
0050	23 71	36 58	24 94			5023 6
0075	23 73	36 63	24 97	0 229		5025 4
0075	23 73	36 63	24 97			5025 4
0100	23 78	36 68	25 00	0 305		5027 5
0100	23 78	36 68	25 00			5027 5
0150	23 76	36 79	25 09	0 454		5030 7
0150	23 76	36 79	25 09			5030 7
0190	22 75	36 78	25 37			5024 7
0200	21 83	36 73	25 60	0 589		5017 2
0250	18 71	36 53	26 28	0 697		4991 2
0250	18 71	36 53	26 28			4991 2
0300	18 04	36 46	26 40	0 786		4987 5
0300	18 04	36 46	26 40			4987 5
0400	16 80	36 25	26 54	0 955		4980 5
0500	14 87	35 97	26 77	1 109		4965 7
0500	14 87	35 97	26 77			4965 7
0600	12 26	35 61	27 03	1 241		4941 9
0600	12 26	35 61	27 03			4941 9
0800	08 09	35 20	27 44	1 440		4902 7
0800	08 09	35 20	27 44			4902 7
1000	05 35	35 03	27 68	1 575		4878 4
1000	05 35	35 03	27 68			4878 4
1200	04 60	35 01	27 75	1 679		4880 1
1200	04 60	35 01	27 75			4880 1
1500	04 18	35 00	27 79	1 822		4892 1
1500	04 18	35 00	27 79			4892 1
1750	03 74	34 98	27 82			4900 8

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	OATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	MOOR	03	07	960	13	24° 35'N	077° 34'W		1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
04	10	23		21	16	9		7	2	07	1	07	1			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ ml/l ↓	V _t ↓
0000	23 78	36 52	24 88	0 000		5021 0
0000	23 78	36 52	24 88			5021 0
0010	23 78	36 51	24 87	0 031		5021 5
0010	23 78	36 51	24 87			5021 5
0020	23 74	36 51	24 88	0 062		5021 8
0020	23 74	36 51	24 88			5021 8
0030	23 75	36 51	24 88	0 093		5022 5
0030	23 75	36 51	24 88			5022 5
0050	23 79	36 51	24 87	0 155		5024 0
0050	23 79	36 51	24 87			5024 0
0075	23 74	36 59	24 94	0 232		5025 4
0075	23 74	36 59	24 94			5025 4
0100	23 62	36 65	25 02	0 307		5026 1
0100	23 62	36 65	25 02			5026 1
0150	23 71	36 78	25 09	0 455		5030 3
0150	23 71	36 78	25 09			5030 3
0190	23 47	36 80	25 18			5030 8
0200	22 41	36 74	25 44	0 595		5022 2
0250	18 85	36 55	26 26	0 707		4992 6
0250	18 85	36 55	26 26			4992 6
0300	18 22	36 49	26 38	0 797		4989 4
0300	18 22	36 49	26 38			4989 4
0350	17 70	36 42	26 45			4987 1

SURFACE OBSERVATIONS											
H. O. REF. NO.	STATION	DATE				POSITION				SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE			
00659	MOOR	03	07	960	20	24	35N	077°	34W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ↓	WET ↓			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
05	10	23		22	21	17	3		8	2						

SUBSURFACE OBSERVATIONS							
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ m l/l ↓	V _t ↓	
0000	23 99	36 53	24 82	0 000		5022 7	
0000	23 99	36 53	24 82			5022 7	
0010	23 86	36 53	24 86	0 031		5022 3	
0010	23 86	36 53	24 86			5022 3	
0020	23 82	36 54	24 88	0 062		5022 6	
0020	23 82	36 54	24 88			5022 6	
0030	23 82	36 53	24 87	0 093		5023 1	
0030	23 82	36 53	24 87			5023 1	
0050	23 84	36 54	24 87	0 155		5024 5	
0050	23 84	36 54	24 87			5024 5	
0075	23 69	36 59	24 96	0 232		5025 0	
0075	23 69	36 59	24 96			5025 0	
0100	23 65	36 66	25 02	0 307		5026 4	
0100	23 65	36 66	25 02			5026 4	
0150	23 75	36 79	25 09	0 456		5030 7	
0150	23 75	36 79	25 09			5030 7	
0190	23 16	36 80	25 27			5028 2	
0200	22 15	36 74	25 52	0 593		5020 0	
0250	18 76	36 54	26 28	0 703		4991 7	
0250	18 76	36 54	26 28			4991 7	
0300	18 11	36 47	26 39	0 793		4988 2	
0300	18 11	36 47	26 39			4988 2	
0350	17 60	36 41	26 47			4986 0	

SURFACE OBSERVATIONS											
H. O. REF. NO.	STATION	DATE				POSITION				SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE			
00659	MOOR	03	08	960	02	24	35N	077°	34W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
07	11	23		21	9	18	3		8	7	10	2	11	3		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ_t ↓	$\Sigma \Delta \sigma$ ↓	O ₂ ml/l ↓	V _t ↓
0000	23 83	36 53	24 87	0 000		5021 4
0000	23 83	36 53	24 87			5021 4
0010	23 88	36 53	24 85	0 031		5022 4
0010	23 88	36 53	24 85			5022 4
0020	23 83	36 53	24 87	0 062		5022 6
0020	23 83	36 53	24 87			5022 6
0030	23 84	36 53	24 87	0 093		5023 3
0030	23 84	36 53	24 87			5023 3
0050	23 81	36 53	24 88	0 155		5024 2
0050	23 81	36 53	24 88			5024 2
0075	23 76	36 59	24 94	0 232		5025 6
0075	23 76	36 59	24 94			5025 6
0100	23 67	36 61	24 98	0 308		5026 4
0100	23 67	36 61	24 98			5026 4
0150	23 90	36 86	25 10	0 457		5032 1
0150	23 90	36 86	25 10			5032 1
0190	23 45	36 84	25 22			5030 7
0200	22 38	36 76	25 47	0 596		5022 1
0250	18 82	36 52	26 25	0 708		4992 2
0250	18 82	36 52	26 25			4992 2
0300	18 22	36 54	26 41	0 798		4989 6
0300	18 22	36 54	26 41			4989 6
0350	17 54	36 56	26 60			4986 0

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH	
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE			
00659	MOOR	03	08	960	08	24° 35'N	077° 34'W	1756	03	

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
05	11	23		21.7	18.1			8	3	10	1	10	1			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ _t ↓	Σ Δ D ↓	O ₂ ml/l ↓	V _f ↓
0000	23.82	36.53	24.87	0.000		5021.3
0000	23.82	36.53	24.87			5021.3
0010	23.79	36.52	24.87	0.031		5021.7
0010	23.79	36.52	24.87			5021.7
0020	23.80	36.53	24.88	0.062		5022.4
0020	23.80	36.53	24.88			5022.4
0030	23.81	36.53	24.88	0.093		5023.1
0030	23.81	36.53	24.88			5023.1
0050	23.82	36.52	24.86	0.155		5024.3
0050	23.82	36.52	24.86			5024.3
0075	23.76	36.56	24.93	0.232		5025.5
0075	23.76	36.58	24.93			5025.5
0100	23.67	36.65	25.01	0.306		5026.5
0100	23.67	36.65	25.01			5026.5
0150	23.79	36.78	25.07	0.457		5030.9
0150	23.79	36.78	25.07			5030.9
0190	22.97	36.81	25.33			5026.6
0200	21.99	36.75	25.57	0.594		5018.7
0250	18.68	36.53	26.29	0.702		4990.9
0250	18.68	36.53	26.29			4990.9
0300	18.04	36.46	26.40	0.791		4987.5
0300	18.04	36.46	26.40			4987.5
0350	17.41	36.37	26.48			4984.0

SURFACE OBSERVATIONS									
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	MOOR	03	08	960	13	24° 35'N	077° 34'W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
05	34	23		21.0	17.8			8	2	27	2	29	2			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ m l/l ↓	V _t ↓
0000	23.77	36.54	24.89	0.000		5021.0
0000	23.77	36.54	24.89			5021.0
0010	23.78	36.53	24.88	0.031		5021.6
0010	23.78	36.53	24.88			5021.6
0020	23.75	36.54	24.90	0.061		5022.0
0020	23.75	36.54	24.90			5022.0
0030	23.75	36.54	24.90	0.092		5022.6
0030	23.75	36.54	24.90			5022.6
0050	23.79	36.54	24.89	0.154		5024.1
0050	23.79	36.54	24.89			5024.1
0075	23.77	36.58	24.93	0.231		5025.6
0075	23.77	36.58	24.93			5025.6
0100	23.85	36.74	25.02	0.307		5028.3
0100	23.85	36.74	25.02			5028.3
0150	23.98	36.88	25.09	0.455		5032.9
0150	23.98	36.88	25.09			5032.9
0190	22.86	36.82	25.37			5025.7
0200	21.91	36.76	25.60	0.590		5018.0
0250	18.71	36.54	26.29	0.698		4991.3
0250	18.71	36.54	26.29			4991.3
0300	18.04	36.46	26.40	0.787		4987.5
0300	18.04	36.46	26.40			4987.5
0350	17.32	36.36	26.50			4983.1

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	MOOR	03	08	960	19	24	35N	077° 34W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
06	05	23		20	7	17	9		2	2	10	2	20	3		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	D _{zm} l/l ↓	V _t ↓
0000	23 92	36 54	24 85	0 000		5022 2
0000	23 92	36 54	24 85			5022 2
0010	23 81	36 53	24 88	0 031		5021 9
0010	23 81	36 53	24 88			5021 9
0020	23 75	36 54	24 90	0 062		5022 0
0020	23 75	36 54	24 90			5022 0
0030	23 75	36 53	24 89	0 093		5022 6
0030	23 75	36 53	24 89			5022 6
0050	23 77	36 54	24 89	0 154		5024 0
0050	23 77	36 54	24 89			5024 0
0075	23 79	36 67	24 99	0 230		5026 1
0075	23 79	36 67	24 99			5026 1
0100	23 77	36 71	25 02	0 305		5027 6
0100	23 77	36 71	25 02			5027 6
0150	23 93	36 86	25 09	0 454		5032 4
0150	23 93	36 86	25 09			5032 4
0190	22 71	36 81	25 41			5024 4
0200	21 83	36 75	25 61	0 589		5017 3
0250	18 79	36 54	26 27	0 696		4992 0
0250	18 79	36 54	26 27			4992 0
0300	18 02	36 46	26 40	0 786		4987 3
0300	18 02	36 46	26 40			4987 3
0350	17 32	36 36	26 50			4983 1

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH	
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE			
00659	MOOR	03	09	960	02	24° 35'N	077° 34'W	1710	03	

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
05	06	23		21	2	17	3		8	5	05	1	05	1		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ▼	S‰ ▼	σ _t ▼	Σ ΔD ▼	O ₂ m l/l ▼	V _t ▼
0000	23 77	36 53	24 89	0 000		5020 9
0000	23 77	36 53	24 89			5020 9
0010	23 78	36 54	24 89	0 031		5021 6
0020	23 78	36 54	24 89	0 061		5022 2
0020	23 78	36 54	24 89			5022 2
0030	23 76	36 55	24 91	0 092		5022 7
0050	23 74	36 57	24 93	0 153		5023 8
0050	23 74	36 57	24 93			5023 8
0075	23 78	36 65	24 98	0 229		5025 9
0100	23 84	36 73	25 02	0 305		5028 2
0100	23 84	36 73	25 02			5028 2
0150	24 02	36 90	25 09	0 453		5033 3
0150	24 02	36 90	25 09			5033 3
0180	23 96	36 90	25 11			5034 6
0190	23 76	36 89	25 16			5033 5
0200	20 90	36 67	25 81	0 583		5008 8
0205	20 03	36 61	26 00			5001 1
0215	19 42	36 58	26 14			4996 0
0225	19 23	36 56	26 17			4994 7
0250	18 69	36 53	26 29	0 686		4991 0
0250	18 69	36 53	26 29			4991 0
0300	17 88	36 44	26 42	0 774		4985 9
0300	17 88	36 44	26 42			4985 9
0350	17 23	36 35	26 51			4982 2

SURFACE OBSERVATIONS									
H. O. REF. NO.	STATION	DATE				POSITION			
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE	
00659	MOOR	03	09	960	08	24°	35'N	077°	34'W
								1710	04

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
09	07	23		20.7	17.3			8	4	05	2	07	2			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ m l/l ↓	V _t ↓
0000	23.73	36.55	24.91	0.000		5020.7
0000	23.73	36.55	24.91			5020.7
0010	23.72	36.54	24.91	0.031		5021.2
0020	23.72	36.54	24.91	0.061		5021.8
0020	23.72	36.54	24.91			5021.8
0030	23.73	36.55	24.91	0.092		5022.5
0050	23.75	36.58	24.93	0.153		5023.9
0050	23.75	36.58	24.93			5023.9
0075	23.80	36.68	24.99	0.229		5026.2
0100	23.84	36.76	25.04	0.303		5028.3
0100	23.84	36.76	25.04			5028.3
0150	23.89	36.85	25.09	0.451		5032.0
0150	23.89	36.85	25.09			5032.0
0180	23.80	36.85	25.12			5033.1
0190	23.78	36.88	25.15			5033.6
0200	21.52	36.71	25.67	0.585		5014.5
0205	20.72	36.65	25.84			5007.5
0215	19.80	36.60	26.05			4999.5
0225	19.27	36.58	26.18			4995.2
0250	18.74	36.53	26.27	0.691		4991.5
0250	18.74	36.53	26.27			4991.5
0300	17.99	36.46	26.41	0.780		4987.1
0300	17.99	36.46	26.41			4987.1
0350	17.27	36.36	26.51			4982.6

SURFACE OBSERVATIONS										
H. D. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	MOOR	03	09	960	13	24	35N	077° 34W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ↓	WET ↓			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
08	07	23		20	9	17	4		8	5	07	2	06	3		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	D ₂₀ M/I ↓	V _t ↓
0000	23 68	36 56	24 94	0 000		5020 3
0000	23 68	36 56	24 94			5020 3
0010	23 69	36 57	24 94	0 030		5021 0
0020	23 69	36 57	24 94	0 061		5021 6
0020	23 69	36 57	24 94			5021 6
0030	23 74	36 61	24 96	0 091		5022 8
0050	23 81	36 68	24 99	0 151		5024 8
0050	23 81	36 68	24 99			5024 8
0075	23 83	36 76	25 04	0 225		5026 7
0100	23 85	36 81	25 08	0 299		5028 6
0100	23 85	36 81	25 08			5028 6
0150	23 89	36 85	25 09	0 446		5032 0
0150	23 89	36 85	25 09			5032 0
0180	23 88	36 86	25 10			5033 8
0190	23 65	36 87	25 18			5032 5
0200	21 58	36 72	25 66	0 580		5015 0
0205	20 75	36 66	25 84			5007 8
0215	19 48	36 59	26 13			4996 6
0225	19 22	36 57	26 18			4994 7
0250	18 85	36 54	26 25	0 687		4992 6
0250	18 85	36 54	26 25			4992 6
0300	18 00	36 56	26 48	0 775		4987 5
0300	18 00	36 56	26 48			4987 5
0350	17 17	36 34	26 52			4981 6

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH	
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE			
00659	MOOR	03	09	960	19	24° 35' N	077° 34' W	1708	17	

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
06	09	23		23.4	19.0			8	6	09	1	09	1			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ Δσ ↓	O ₂ ml/l ↓	V _t ↓
0000	23.77	36.57	24.92	0.000		5021.1
0000	23.77	36.57	24.92			5021.1
0010	23.74	36.57	24.93	0.030		5021.4
0020	23.72	36.57	24.93	0.061		5021.9
0020	23.72	36.57	24.93			5021.9
0030	23.71	36.59	24.95	0.091		5022.4
0050	23.71	36.63	24.98	0.151		5023.8
0050	23.71	36.63	24.98			5023.8
0075	23.76	36.69	25.01	0.226		5025.9
0100	23.81	36.75	25.04	0.301		5028.0
0100	23.81	36.75	25.04			5028.0
0150	23.91	36.85	25.09	0.449		5032.2
0150	23.91	36.85	25.09			5032.2
0180	23.89	36.87	25.11			5033.9
0190	23.83	36.90	25.15			5034.1
0200	23.10	36.86	25.33	0.590		5028.5
0205	22.69	36.83	25.43			5025.2
0215	21.78	36.75	25.63			5017.8
0225	19.96	36.62	26.03			5001.7
0250	19.02	36.56	26.23	0.706		4994.2
0250	19.02	36.56	26.23			4994.2
0300	18.06	36.47	26.40	0.797		4987.8
0300	18.06	36.47	26.40			4987.8
0350	17.41	36.38	26.49			4984.1
0400	16.80	36.29	26.57	0.964		4980.7
0400	16.80	36.29	26.57			4980.7
0500	14.40	35.92	26.83	1.113		4960.5
0500	14.40	35.92	26.83			4960.5
0600	12.51	35.65	27.01	1.243		4944.8
0600	12.51	35.65	27.01			4944.8
0800	08.35	35.20	27.40	1.448		4905.9
0800	08.35	35.20	27.40			4905.9
1000	05.45	35.06	27.69	1.586		4879.9
1000	05.45	35.06	27.69			4879.9
1200	04.65	35.02	27.75	1.689		4880.8
1200	04.65	35.02	27.75			4880.8
1500	04.20	35.00	27.79	1.833		4892.4
1500	04.20	35.00	27.79			4892.4
1700	03.99	35.05	27.85			4901.6

SURFACE OBSERVATIONS									
H. O. REF. NO.	STATION	DATE				POSITION		SDNIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	MOOR	03	10	960	01	24° 35' N	077° 34' W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
03	15	23		24	5	21	2			8	1	15	1	15	1	

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	Q _{2m} l/l ↓	V _t ↓
0000	23 71	36 57	24 94	0 000		5020 6
0000	23 71	36 57	24 94			5020 6
0010	23 72	36 58	24 94	0 030		5021 3
0020	23 73	36 58	24 94	0 061		5022 0
0020	23 73	36 58	24 94			5022 0
0030	23 70	36 60	24 96	0 091		5022 4
0050	23 69	36 65	25 00	0 151		5023 7
0050	23 69	36 65	25 00			5023 7
0075	23 81	36 77	25 06	0 225		5026 6
0100	23 89	36 84	25 09	0 298		5029 0
0100	23 89	36 84	25 09			5029 0
0150	23 93	36 87	25 10	0 445		5032 4
0150	23 93	36 87	25 10			5032 4
0180	23 91	36 88	25 11			5034 1
0190	23 92	36 89	25 12			5034 8
0200	23 51	36 87	25 22	0 589		5032 0
0205	23 05	36 87	25 36			5028 4
0215	21 61	36 89	25 78			5016 8
0225	19 68	36 60	26 08			4999 0
0250	19 01	36 55	26 22	0 707		4994 1
0250	19 01	36 55	26 22			4994 1
0300	18 08	36 47	26 39	0 798		4988 0
0300	18 08	36 47	26 39			4988 0
0350	17 39	36 37	26 49			4983 8

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	MOOR	03	10	960	08	24	35N	077° 34W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
05	14	23		22	2	19	7		8	3	12	2	11	2		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ ml/l ↓	V _t ↓
0000	23 64	36 59	24 97	0 000		5020 1
0000	23 64	36 59	24 97			5020 1
0010	23 65	36 59	24 97	0 030		5020 8
0020	23 67	36 59	24 96	0 060		5021 5
0020	23 67	36 59	24 96			5021 5
0030	23 69	36 63	24 99	0 090		5022 4
0050	23 72	36 70	25 03	0 150		5024 1
0050	23 72	36 70	25 03			5024 1
0075	23 78	36 76	25 06	0 223		5026 3
0100	23 83	36 80	25 07	0 297		5028 4
0100	23 83	36 80	25 07			5028 4
0150	23 92	36 86	25 09	0 444		5032 3
0150	23 92	36 86	25 09			5032 3
0180	23 88	36 86	25 10			5033 8
0190	23 88	36 87	25 11			5034 4
0200	23 60	36 87	25 20	0 589		5032 7
0205	23 36	36 87	25 27			5031 0
0215	22 67	36 81	25 42			5025 6
0225	21 02	36 68	25 79			5011 4
0250	19 07	36 56	26 21	0 708		4994 7
0250	19 07	36 56	26 21			4994 7
0300	18 14	36 48	26 39	0 799		4988 6
0300	18 14	36 48	26 39			4988 6
0350	17 50	36 39	26 48			4985 0

SURFACE OBSERVATIONS									
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	MOOR	03	10	960	14	24° 35'N	077° 34'W	1710	03

WIND		ANEMO. HOT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
03	14	23		23 4	20 4			8	1	14	1	14	1			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ m l/l ↓	V _t ↓
0000	23 68	36 62	24 98	0 000		5020 5
0000	23 68	36 62	24 98			5020 5
0010	23 65	36 63	25 00	0 030		5020 9
0020	23 64	36 63	25 00	0 060		5021 4
0020	23 64	36 63	25 00			5021 4
0030	23 68	36 67	25 02	0 089		5022 5
0050	23 76	36 74	25 05	0 148		5024 6
0050	23 76	36 74	25 05			5024 6
0075	23 85	36 79	25 06	0 222		5027 0
0100	23 90	36 82	25 07	0 295		5029 0
0100	23 90	36 82	25 07			5029 0
0150	23 91	36 86	25 10	0 442		5032 2
0150	23 91	36 86	25 10			5032 2
0180	23 87	36 87	25 12			5033 7
0190	23 90	36 90	25 13			5034 7
0200	23 04	36 86	25 35	0 583		5028 0
0205	22 66	36 83	25 44			5025 0
0215	22 02	36 77	25 58			5019 9
0225	20 82	36 67	25 83			5009 6
0250	15 22	36 57	27 15	0 676		4956 8
0250	15 22	36 57	27 15			4956 8
0300	18 31	36 51	26 37	0 746		4990 3
0300	18 31	36 51	26 37			4990 3
0350	17 65	36 42	26 46			4986 6

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH	
		MD.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE			
00659	MOOR	03	10	960	19	24 35N	077° 34W	1710	03	

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
03	17	23		24.7	20.3			8	1	18	1	18	1			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ_t ↓	$\Sigma \Delta D$ ↓	O_2 m l/l ↓	V_f ↓
0000		36.65				
0000		36.65				
0010		36.66				
0020	23.66	36.66	25.02			5021.7
0020	23.66	36.66	25.02			5021.7
0030	23.70	36.71	25.04			5022.8
0050	23.77	36.79	25.08			5024.8
0050	23.77	36.79	25.08			5024.8
0075	23.79	36.80	25.09			5026.5
0100	23.80	36.80	25.08			5028.1
0100	23.80	36.80	25.08			5028.1
0150	23.92	36.86	25.09			5032.3
0150	23.92	36.86	25.09			5032.3
0180	23.87	36.86	25.11			5033.7
0190	23.81	36.85	25.12			5033.8
0200	23.73	36.88	25.16			5033.8
0205	23.47	36.89	25.25			5032.0
0215	22.53	36.82	25.47			5024.5
0225	20.88	36.66	25.81			5010.1
0250	19.17	36.57	26.19			4995.7
0250	19.17	36.57	26.19			4995.7
0300	18.33	36.51	26.36			4990.5
0300	18.33	36.51	26.36			4990.5
0350	17.67	36.43	26.47			4986.8

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	MOOR	03	11	960	01	24 35N		077° 34W	1710	04

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
05	36	23		23 1	14 2			8	2	34	2	34	2			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ M/L ↓	V _t ↓
0000		36 61				
0000		36 61				
0010		36 65				
0020	23 73	36 68	25 01			5022 3
0020	23 73	36 68	25 01			5022 3
0030	23 74	36 70	25 02			5023 1
0050	23 75	36 73	25 04			5024 5
0050	23 75	36 73	25 04			5024 5
0075	23 85	36 80	25 07			5027 0
0100	23 90	36 84	25 08			5029 1
0100	23 90	36 84	25 08			5029 1
0150	23 89	36 85	25 09			5032 0
0150	23 89	36 85	25 09			5032 0
0180	23 83	36 89	25 14			5033 5
0190	23 84	36 90	25 15			5034 2
0200	23 65	36 90	25 20			5033 2
0205	23 02	36 85	25 35			5028 1
0215	20 71	36 65	25 85			5008 0
0225	19 67	36 59	26 08			4998 9
0250	18 90	36 53	26 23			4993 0
0250	18 90	36 53	26 23			4993 0
0300	18 25	36 48	26 36			4989 6
0300	18 25	36 48	26 36			4989 6
0350	17 56	36 41	26 48			4985 7

SURFACE OBSERVATIONS									
H. D. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	MOOR	03	11	960	08	24° 35'N	077° 34'W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
04	36	23		22.8	19.3			0	0	01	1	01	1			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ▼	S‰ ▼	σ_t ▼	$\Sigma \Delta D$ ▼	O_2 ml/l ▼	V_f ▼
0000	23 61	36 61	25 00	0 000		5019 9
0000	23 61	36 61	25 00			5019 9
0010	23 64	36 62	24 99	0 030		5020 8
0020	23 66	36 62	24 99	0 060		5021 5
0020	23 66	36 62	24 99			5021 5
0030	23 66	36 63	25 00	0 089		5022 2
0050	23 67	36 65	25 01	0 149		5023 5
0050	23 67	36 65	25 01			5023 5
0075	23 79	36 72	25 03	0 223		5026 3
0100	23 87	36 78	25 05	0 298		5028 6
0100	23 87	36 78	25 05			5028 6
0150	23 94	36 85	25 08	0 446		5032 4
0150	23 94	36 85	25 08			5032 4
0180	23 80	36 83	25 11			5033 0
0200	23 49	36 82	25 19	0 591		5031 6
0205	22 63	36 82	25 44			5024 7
0215	19 97	36 62	26 02			5001 2
0225	19 59	36 59	26 10			4998 2
0250	19 18	36 56	26 18	0 711		4995 7
0250	19 18	36 56	26 18			4995 7
0300	18 21	36 49	26 38	0 803		4989 3
0300	18 21	36 49	26 38			4989 3
0350	17 55	36 40	26 47			4985 5

SURFACE OBSERVATIONS									
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	MOOR	03	11	1960	14	24° 35'N	077° 34'W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
04	01	23		24	21	1		8	2	09	1	10	1			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ m l/l ↓	V _t ↓
0000	23 66	36 62	24 99	0 000		5020 3
0000	23 66	36 62	24 99			5020 3
0010	23 66	36 62	24 99	0 030		5020 9
0020	23 66	36 62	24 99	0 060		5021 5
0020	23 66	36 62	24 99			5021 5
0030	23 67	36 62	24 99	0 090		5022 2
0050	23 68	36 63	24 99	0 149		5023 5
0050	23 68	36 63	24 99			5023 5
0075	23 73	36 72	25 04	0 224		5025 8
0100	23 79	36 79	25 08	0 297		5028 0
0100	23 79	36 79	25 08			5028 0
0150	23 91	36 85	25 09	0 444		5032 2
0150	23 91	36 85	25 09			5032 2
0180	23 84	36 93	25 17			5033 7
0190	22 80	36 84	25 41			5025 3
0200	22 04	36 77	25 57	0 581		5019 2
0205	21 41	36 72	25 71			5013 8
0215	19 66	36 60	26 09			4998 3
0225	19 40	36 58	26 14			4996 4
0250	18 88	36 55	26 25	0 690		4992 9
0250	18 88	36 55	26 25			4992 9
0300	18 31	36 50	26 36	0 781		4990 3
0300	18 31	36 50	26 36			4990 3
0350	17 43	36 38	26 49			4984 3

SURFACE OBSERVATIONS									
H. D. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	MOOR	03	11	960	19	24 35N	077° 34W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
06	14	23		27	1	22	4		8	2	15	1	15	2		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ▼	S ‰ ▼	σ _t ▼	Σ Δ D ▼	O ₂ m l/l ▼	V _t ▼
0000	24 02	36 60	24 87	0 000		5023 2
0000	24 02	36 60	24 87			5023 2
0010	23 85	36 61	24 92	0 031		5022 5
0020	23 73	36 62	24 97	0 061		5022 1
0020	23 73	36 62	24 97			5022 1
0030	23 73	36 64	24 98	0 091		5022 8
0050	23 74	36 69	25 02	0 151		5024 2
0050	23 74	36 69	25 02			5024 2
0075	23 78	36 75	25 05	0 225		5026 3
0100	23 82	36 79	25 07	0 298		5028 2
0100	23 82	36 79	25 07			5028 2
0150	23 88	36 84	25 09	0 445		5031 9
0150	23 88	36 84	25 09			5031 9
0180	23 90	36 87	25 11			5034 0
0190	23 82	36 93	25 18			5034 1
0200	22 43	36 83	25 50	0 583		5022 7
0205	21 83	36 78	25 64			5017 7
0215	20 84	36 67	25 83			5009 2
0225	19 74	36 61	26 08			4999 6
0250	19 19	36 57	26 19	0 695		4995 9
0250	19 19	36 57	26 19			4995 9
0300	18 29	36 50	26 37	0 788		4990 1
0300	18 29	36 50	26 37			4990 1
0350	17 40	36 38	26 49			4984 0

SURFACE OBSERVATIONS											
H. O. REF. NO.	STATION	DATE				POSITION				SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE			
00659	MOOR	03	12	960	02	24	35N	077°	34W	1710	03

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
04	16	23		23	9	21	1		8	2	15	1	15	1		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ_t ↓	$\Sigma \Delta D$ ↓	O_{sm}/l ↓	V_t ↓
0000	23 94	36 61	24 90	0 000		5022 6
0000	23 94	36 61	24 90			5022 6
0010	23 99	36 62	24 89	0 031		5023 6
0020	24 00	36 65	24 91	0 061		5024 4
0020	24 00	36 65	24 91			5024 4
0030	23 92	36 71	24 98	0 092		5024 6
0050	23 82	36 80	25 08	0 151		5025 3
0050	23 82	36 80	25 08			5025 3
0075	23 85	36 82	25 08	0 224		5027 1
0100	23 86	36 83	25 09	0 297		5028 7
0100	23 86	36 83	25 09			5028 7
0150	23 86	36 85	25 10	0 443		5031 8
0150	23 86	36 85	25 10			5031 8
0180	23 81	36 93	25 18			5033 4
0190	23 44	36 89	25 26			5030 8
0200	21 71	36 74	25 64	0 577		5016 2
0205	20 97	36 68	25 80			5009 8
0215	19 72	36 60	26 07			4998 8
0225	19 38	36 58	26 15			4996 2
0250	18 86	36 55	26 26	0 685		4992 7
0250	18 86	36 55	26 26			4992 7
0300	18 24	36 48	26 36	0 775		4989 5
0300	18 24	36 48	26 36			4989 5
0350	17 41	36 38	26 49			4984 1

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH	
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE			
00659	MOOR	03	12	960	08	24 35N	077° 34W	1710	03	

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
04	24	23		23 4	21 1			3	5	23	1	23	1			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ ml/l ↓	V _t ↓
0000		36 54				
0000		36 54				
0010		36 56				
0018						
0020		36 55				
0030		36 57				
0044	23 82	36 61	24 93			5024 3
0050	23 83	36 65	24 96			5024 8
0075	23 86	36 79	25 06			5027 1
0087	23 87	36 83	25 08			5028 0
0100	23 87	36 84	25 09			5028 8
0131	23 86	36 85	25 10			5030 6
0150	23 86	36 86	25 11			5031 8
0157	23 85	36 86	25 11			5032 2
0166	23 83	36 84	25 10			5032 4
0179	23 66	36 86	25 17			5031 9
0187	23 18	36 87	25 32			5028 4
0197	22 05	36 78	25 57			5019 1
0200	21 63	36 75	25 67			5015 6
0218	19 62	36 59	26 09			4998 0
0250	18 93	36 54	26 23			4993 3
0268	18 60	36 53	26 31			4991 2
0300	18 13	36 54	26 44			4988 7
0318	17 93	36 55	26 49			4987 9

SURFACE OBSERVATIONS									
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	T001	03	16	960	12	23 49N	077° 16W	0732	05

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
07	18	23		24 6	23 3			8	2	17	2	17	2			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ m l/l ↓	V _l ↓
0000	24 01	36 89	25 09	0 000		5024 2
0000	24 01	36 89	25 09			5024 2
0009	24 03	36 93	25 11			5025 0
0010	24 03	36 92	25 11	0 029		5025 0
0018	24 01	36 88	25 08			5025 2
0020	24 01	36 88	25 08	0 058		5025 3
0027	24 02	36 87	25 07			5025 8
0030	24 02	36 87	25 07	0 087		5026 0
0046	24 03	36 88	25 08			5027 0
0050	24 03	36 88	25 08	0 145		5027 3
0069	24 04	36 90	25 09			5028 6
0075	24 07	36 91	25 09	0 218		5029 2
0092	24 10	36 93	25 09			5030 5
0100	24 07	36 92	25 09	0 291		5030 7
0138	23 91	36 89	25 12			5031 6
0150	23 84	36 88	25 13	0 436		5031 7
0174	23 20	36 87	25 31			5027 8
0200	20 94	36 70	25 82	0 565		5009 3
0229	19 23	36 57	26 18			4995 0
0250	18 77	36 53	26 27	0 668		4991 8
0276	18 27	36 48	26 35			4988 4
0300	18 04	36 44	26 38	0 758		4987 5
0372	17 09	36 33	26 53			4982 0
0400	16 62					
0470	15 19					

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH	
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE			
00659	T002	03	16	960	14	23° 57'N	077° 19'W	1353	12	

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
08	16	23		24.6	22.8			8	1	15	2					

SUBSURFACE OBSERVATIONS							
SAMPLE DEPTH (M)	T °C ▼	S ‰ ▼	σ _t ▼	Σ Δ D ▼	O ₂ m l/l ▼	V _t ▼	
0000	23.79	36.71	25.02	0.000		5021.7	
0000	23.79	36.71	25.02			5021.7	
0009	23.83	36.73	25.02			5022.7	
0010	23.84	36.74	25.03	0.029		5022.8	
0018	23.88	36.78	25.04			5023.8	
0020	23.93	36.81	25.05	0.059		5024.4	
0027	24.06	36.89	25.07			5026.2	
0030	24.07	36.90	25.08	0.088		5026.5	
0046	24.12	36.93	25.09			5028.0	
0050	24.12	36.93	25.09	0.146		5028.2	
0069	24.12	36.93	25.09			5029.3	
0075	24.12	36.93	25.09	0.219		5029.7	
0092	24.11	36.93	25.09			5030.6	
0100	24.06	36.92	25.10	0.292		5030.7	
0137	23.85	36.85	25.11			5030.9	
0150	23.69	36.79	25.11	0.438		5030.2	
0174	22.96	36.86	25.37			5025.8	
0200	20.76	36.62	25.81	0.568		5007.4	
0229	19.15	36.56	26.19			4994.2	
0250	18.81	36.54	26.26	0.671		4992.2	
0275	18.41	36.51	26.34			4989.8	
0300	18.13	36.47	26.38	0.761		4988.4	
0367	17.09	36.32	26.52			4981.7	
0400	16.31	36.15	26.58	0.929		4975.2	
0463	14.85	35.95	26.75			4963.2	
0484	14.37	35.92	26.84			4959.2	
0500	14.04	35.87	26.87	1.075		4956.5	
0600	12.03	35.57	27.04	1.201		4939.1	
0659	10.89	35.43	27.15			4929.0	
0800	08.29	35.18	27.39	1.404		4905.1	
0837	07.70	35.14	27.45			4899.7	
1000	05.50	35.05	27.68	1.544		4880.5	
1020	05.32	35.05	27.70			4879.3	
1200	04.59	35.09	27.81	1.642		4880.3	
1205	04.59	35.09	27.81			4880.6	

SURFACE OBSERVATIONS									
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	T003	03	16	960	05	24 01'N	077° 25'W	1280	06

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
08	14	23		23	9	22	2		8	2	14	2	14	2		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ m l/l ↓	V _t ↓
0000	23 76	36 60	24 94	0 000		5021 1
0000	23 76	36 60	24 94			5021 1
0009	23 76	36 61	24 95			5021 7
0010	23 76	36 61	24 95	0 030		5021 7
0019	23 77	36 62	24 96			5022 4
0020	23 77	36 62	24 96	0 060		5022 4
0028	23 78	36 61	24 94			5023 0
0030	23 77	36 62	24 96	0 091		5023 0
0046	23 75	36 70	25 02			5024 1
0050	23 79	36 73	25 03	0 150		5024 8
0069	23 92	36 84	25 08			5027 4
0075	23 90	36 84	25 08	0 224		5027 6
0093	23 87	36 84	25 09			5028 4
0100	23 87	36 87	25 12	0 296		5028 9
0139	23 89	36 89	25 12			5031 5
0150	23 02	36 82	25 33	0 437		5024 7
0176	21 32	36 70	25 72			5011 2
0200	20 35	36 64	25 94	0 558		5003 8
0232	19 34	36 57	26 15			4996 2
0250	18 97	36 54	26 22	0 660		4993 7
0278	18 44	36 50	26 33			4990 2
0300	18 18	36 47	26 37	0 751		4988 9
0371	17 15	36 34	26 52			4982 6
0400	16 65	36 27	26 59	0 919		4979 1
0500	14 53	35 97	26 84	1 067		4962 1
0556	13 10	35 75	26 97			4949 1

SURFACE OBSERVATIONS										
H.O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH	
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE			
00659	T004	03	16	960	06	24° 00'N	077° 21'W	1372	06	

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
07	14	23		24	1	22	4		8	2	14	2	14	2		

SUBSURFACE OBSERVATIONS							
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ _t ↓	Σ ΔD ↓	Q: m l/l ↓	V _t ↓	
0000	23 76	36 64	24 97	0 000		5021	2
0000	23 76	36 64	24 97			5021	2
0009	23 77	36 64	24 97			5021	9
0010	23 77	36 64	24 97	0 030		5021	9
0018	23 77	36 65	24 98			5022	4
0020	23 76	36 66	24 99	0 060		5022	5
0027	23 74	36 70	25 02			5022	9
0030	23 74	36 70	25 02	0 090		5023	1
0045	23 75	36 72	25 04			5024	1
0050	23 79	36 76	25 06	0 148		5024	9
0067	23 90	36 84	25 08			5027	1
0075	23 92	36 85	25 09	0 222		5027	8
0090	23 96	36 87	25 09			5029	1
0100	23 97	36 91	25 12	0 294		5029	9
0135	24 00	36 94	25 13			5032	3
0150	23 03	36 90	25 38	0 433		5025	1
0171	21 83	36 83	25 67			5015	9
0200	20 53	36 70	25 93	0 554		5005	6
0225	19 63	36 60	26 10			4998	6
0250	18 96	36 52	26 21	0 655		4993	5
0271	18 48	36 47	26 29			4990	1
0300	18 17	36 45	26 36	0 747		4988	7
0363	17 32	36 36	26 50			4983	9
0400	16 71	36 28	26 58	0 916		4979	7
0500	14 63	35 98	26 83	1 065		4963	2
0550	13 36	35 78	26 94			4951	7

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	T005	03	16	960	07	24	01'N	077° 18'W	1366	11

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
07	18	23		23 9	22 3			8	2	17	2	17	2			

SUBSURFACE OBSERVATIONS							
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ _t ↓	Σ Δσ ↓	σ _ρ m/l ↓	V _t ↓	
0000	23 77	36 70	25 02	0 000		5021 5	
0000	23 77	36 70	25 02			5021 5	
0008	23 77	36 70	25 02			5022 0	
0010	23 78	36 70	25 01	0 030		5022 2	
0017	23 78	36 71	25 02			5022 7	
0020	23 76	36 71	25 03	0 059		5022 7	
0026	23 74	36 72	25 04			5022 9	
0030	23 75	36 73	25 04	0 089		5023 3	
0043	23 78	36 75	25 05			5024 4	
0050	23 87	36 81	25 07	0 147		5025 7	
0065	23 97	36 88	25 09			5027 7	
0075	23 94	36 87	25 09	0 220		5028 0	
0087	23 91	36 86	25 10			5028 5	
0100	23 88	36 86	25 10	0 293		5029 0	
0131	23 82	36 86	25 12			5030 3	
0150	23 50	36 86	25 22	0 436		5028 8	
0167	22 92	36 83	25 36			5024 9	
0200	20 42	36 65	25 93	0 560		5004 5	
0220	19 40	36 56	26 14			4996 1	
0250	18 71	36 52	26 27	0 661		4991 2	
0264	18 44	36 50	26 33			4989 4	
0300	18 20	36 47	26 36	0 751		4989 1	
0356	17 53	36 38	26 46			4985 6	
0400	16 59	36 22	26 57	0 920		4978 3	
0436	15 94	36 15	26 66			4973 6	
0450	15 72	36 14	26 71			4972 2	
0500	14 56	35 95	26 82	1 070		4962 3	
0600	12 42	35 64	27 02	1 200		4943 8	
0600	12 42	35 64	27 02			4943 8	
0777	09 24	35 27	27 31			4915 7	
0800	08 70	35 23	27 37	1 408		4910 4	
0947	06 11	35 08	27 62			4885 6	
1000	05 53	35 08	27 70	1 549		4881 1	
1128	04 89	35 08	27 77			4880 1	

SURFACE OBSERVATIONS									
H.O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	T006	03	16	960	09	24° 01'N	077° 15'W	1308	05

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
07	17	23		23.9	22.2			3	4	17	2	17	2			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ ml/l ↓	V _l ↓
0000	23.99	36.75	24.99	0.000		5023.5
0000	23.99	36.75	24.99			5023.5
0010	23.95	36.77	25.02	0.030		5023.9
0010	23.95	36.77	25.02			5023.9
0019	23.94	36.73	24.99			5024.2
0020	23.94	36.73	24.99	0.059		5024.2
0029	23.96	36.73	24.98			5024.9
0030	23.96	36.73	24.98	0.089		5025.0
0048	23.98	36.74	24.98			5026.3
0050	23.99	36.75	24.99	0.149		5026.5
0072	24.03	36.83	25.04			5028.4
0075	24.03	36.82	25.03	0.224		5028.6
0096	24.03	36.78	25.00			5029.7
0100	24.02	36.79	25.01	0.298		5029.9
0143	23.96	36.79	25.03			5032.0
0150	23.82	36.77	25.05	0.448		5031.2
0181	22.80	36.68	25.28			5024.2
0200	21.27	36.57	25.63	0.583		5011.8
0239	19.11	36.42	26.10			4993.9
0250	18.91	36.41	26.14	0.694		4992.7
0287	18.28	36.38	26.28			4988.8
0300	18.14	36.36	26.30	0.789		4988.1
0384	16.95	36.19	26.46			4980.8
0400	16.67	36.16	26.50	0.964		4978.9
0483	14.89	35.98	26.77			4964.9

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	T007	03	16	960	02	24	15N	077° 23W	1810	04

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
07	16	23		24	6	23	3			15	2	15	2			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ Δθ ↓	O ₂ m/l ↓	V _t ↓
0000	23 89	36 77	25 03	0 000		5022 8
0000	23 89	36 77	25 03			5022 8
0009	23 90	36 78	25 04			5023 4
0010	23 90	36 78	25 04	0 029		5023 5
0018	23 90	36 78	25 04			5024 0
0020	23 93	36 80	25 04	0 059		5024 4
0027	24 00	36 84	25 05			5025 5
0030	24 01	36 84	25 05	0 088		5025 8
0046	24 04	36 85	25 05			5027 0
0050	24 06	36 87	25 06	0 147		5027 5
0069	24 13	36 92	25 08			5029 4
0075	24 12	36 92	25 08	0 220		5029 7
0092	24 10	36 93	25 09			5030 5
0100	24 09	36 93	25 09	0 293		5030 9
0138	24 06	36 92	25 10			5032 9
0150	23 78	36 90	25 16	0 438		5031 3
0175	22 90	36 84	25 38			5025 3
0200	21 07	36 71	25 79	0 566		5010 5
0230	19 47	36 59	26 13			4997 4
0250	18 88	36 54	26 25	0 670		4992 9
0277	18 26	36 48	26 36			4988 4
0300	17 97	36 46	26 41	0 760		4986 9
0323	17 71	36 43	26 46			4985 6
0370	17 29	36 37	26 51			4984 0

SURFACE OBSERVATIONS											
H. O. REF. NO.	STATION	DATE				POSITION				SDNIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MD.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE			
00659	T008	03	15	960	22	24°	28'N	077°	29'W	1954	04

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ↓	WET ↓			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
09	17	23		23	9	21	7		8	2	17	3	17	1		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	Q ₂ m/l ↓	V _t ↓
0000	23 77	36 61	24 95	0 000		5021 2
0000	23 77	36 61	24 95			5021 2
0008	23 77	36 61	24 95			5021 7
0010	23 77	36 61	24 95	0 030		5021 8
0016	23 77	36 61	24 95			5022 2
0020	23 75	36 61	24 95	0 060		5022 3
0024	23 73	36 61	24 96			5022 3
0030	23 73	36 63	24 97	0 090		5022 8
0039	23 74	36 66	24 99			5023 5
0050	23 75	36 71	25 03	0 150		5024 4
0059	23 76	36 75	25 06			5025 2
0075	23 84	36 84	25 10	0 223		5027 1
0079	23 86	36 85	25 10			5027 5
0100	23 88	36 86	25 10	0 296		5029 0
0119	23 89	36 86	25 10			5030 2
0150	23 91	36 88	25 11	0 442		5032 3
0152	23 91	36 88	25 11			5032 4
0200	22 52	36 83	25 48	0 580		5023 5
0200	22 52	36 83	25 48			5023 5
0242	19 43	36 58	26 13			4997 7
0250	19 27	36 57	26 17	0 693		4996 6
0300	18 31	36 49	26 35	0 786		4990 2
0335	17 72	36 43	26 45			4986 4
0400	16 78	36 30	26 58	0 955		4980 5
0428	16 44	36 24	26 62			4978 5

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	T009	03	16	960	21	24	23N	077° 39W	1349	05

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
08	16	23		24	6	23	3		8	3	18	2				

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ Δ D ↓	O ₂ m l/l ↓	V _t ↓
0000	23 92	36 62	24 91	0 000		5022 5
0000	23 92	36 62	24 91			5022 5
0010	23 90	36 62	24 92	0 031		5022 9
0010	23 90	36 62	24 92			5022 9
0020	23 80	36 63	24 95	0 061		5022 7
0020	23 80	36 63	24 95			5022 7
0030	23 73	36 70	25 03	0 091		5023 0
0030	23 73	36 70	25 03			5023 0
0050	23 77	36 75	25 05	0 150		5024 7
0050	23 77	36 75	25 05			5024 7
0075	23 89	36 86	25 10	0 223		5027 6
0075	23 89	36 86	25 10			5027 6
0100	23 84	36 86	25 12	0 295		5028 7
0100	23 84	36 86	25 12			5028 7
0150	23 35	36 95	25 33	0 435		5027 9
0150	23 35	36 95	25 33			5027 9
0190	19 52	36 59	26 12			4995 5
0200	19 29	36 58	26 17	0 551		4993 9
0250	18 36	36 51	26 36	0 644		4987 8
0250	18 36	36 51	26 36			4987 8
0300	17 84	36 44	26 43	0 730		4985 5
0300	17 84	36 44	26 43			4985 5
0400	16 48	36 23	26 60	0 895		4977 3
0400	16 48	36 23	26 60			4977 3
0500	14 37	35 92	26 84	1 042		4960 2
0500	14 37	35 92	26 84			4960 2

SURFACE OBSERVATIONS											
H. O. REF. NO.	STATION	DATE				POSITION				SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE			
00659	T009	03	17	960	03	24	23N	077°	39W	1349	05

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
07	12	23		24 8	23 3					12	2	12	2			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ Δσ ↓	σ _{sm} l/l ↓	V _t ↓
0000	24 01	36 62	24 88	0 000		5023 2
0000	24 01	36 62	24 88			5023 2
0010	23 97	36 64	24 91	0 031		5023 6
0010	23 97	35 38	23 96			5019 1
0020	23 76	36 68	25 00	0 061		5022 6
0020	23 76	36 68	25 00			5022 6
0030	23 76	36 74	25 05	0 090		5023 4
0030	23 76	36 74	25 05			5023 4
0050	23 81	36 79	25 07	0 149		5025 2
0050	23 81	36 79	25 07			5025 2
0075	23 80	36 81	25 09	0 222		5026 7
0075	23 80	36 81	25 09			5026 7
0100	23 79	36 83	25 11	0 294		5028 1
0100	23 79	36 83	25 11			5028 1
0150	23 26	36 99	25 39	0 433		5027 3
0150	23 26	36 99	25 39			5027 3
0190	19 80	36 60	26 05			4998 1
0200	19 54	36 58	26 11	0 550		4996 2
0250	18 56	36 51	26 30	0 645		4989 7
0250	18 56	36 51	26 30			4989 7
0300	18 06	36 46	26 39	0 734		4987 7
0300	18 06	36 46	26 39			4987 7
0400	16 80	36 29	26 57	0 902		4980 7
0400	16 80	36 29	26 57			4980 7
0500	14 69	35 95	26 79	1 053		4963 7
0500	14 69	35 95	26 79			4963 7

SURFACE OBSERVATIONS											
H. O. REF. NO.	STATION	DATE				POSITION				SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HDUR	LATITUDE		LONGITUDE			
00659	T009	03	17	960	10	24	23N	077°	39W	1349	05

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
07	18	23		23	9	22	2		8	2	17	2	17	2		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ ml/l ↓	V _t ↓
0000	23 81	36 66	24 97	0 000		5021 7
0000	23 81	36 66	24 97			5021 7
0010	23 82	36 66	24 97	0 030		5022 4
0010	23 82	36 66	24 97			5022 4
0020	23 79	36 68	24 99	0 060		5022 8
0020	23 79	36 68	24 99			5022 8
0030	23 79	36 76	25 06	0 089		5023 7
0030	23 79	36 76	25 06			5023 7
0050	23 83	36 79	25 07	0 148		5025 3
0050	23 83	36 79	25 07			5025 3
0075	23 79	36 81	25 09	0 221		5026 6
0075	23 79	36 81	25 09			5026 6
0100	23 81	36 83	25 10	0 293		5028 3
0100	23 81	36 83	25 10			5028 3
0150	23 16	36 97	25 40	0 432		5026 4
0150	23 16	36 97	25 40			5026 4
0190	19 53	36 59	26 12			4995 5
0200	19 33	36 57	26 15	0 547		4994 2
0250	18 44	36 50	26 33	0 641		4988 5
0250	18 44	36 50	26 33			4988 5
0300	17 78	36 43	26 44	0 728		4984 9
0300	17 78	36 43	26 44			4984 9
0400	16 44	36 22	26 60	0 892		4976 8
0400	16 44	36 22	26 60			4976 8
0500	14 89	35 99	26 78	1 042		4965 9
0500	14 89	35 99	26 78			4965 9

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	T009	03	17	962	21	24	23N	077° 39W	1349	05

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
06	14	23		24	3	23	3		8	1	13	2				

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	O ₂ ml/l ↓	V _f ↓
0000	23 97	36 68	24 94	0 000		5023 1
0000	23 97	36 68	24 94			5023 1
0010	23 90	36 68	24 96	0 030		5023 1
0010	23 90	36 68	24 96			5023 1
0020	23 79	36 74	25 04	0 060		5023 0
0020	23 79	36 74	25 04			5023 0
0030	23 79	36 76	25 06	0 089		5023 7
0030	23 79	36 76	25 06			5023 7
0050	23 80	36 78	25 07	0 148		5025 1
0050	23 80	36 78	25 07			5025 1
0075	23 80	36 81	25 09	0 221		5026 7
0075	23 80	36 81	25 09			5026 7
0100	23 80	36 83	25 11	0 293		5028 2
0100	23 80	36 83	25 11			5028 2
0150	23 34	36 93	25 32	0 434		5027 8
0150	23 34	36 93	25 32			5027 8
0190	20 43	36 64	25 92			5003 9
0200	20 07	36 62	26 00	0 555		5001 2
0250	18 69	36 53	26 29	0 653		4991 0
0250	18 69	36 53	26 29			4991 0
0300	18 06	36 46	26 39	0 742		4987 7
0300	18 06	36 46	26 39			4987 7
0400	16 97	36 30	26 54	0 912		4982 4
0400	16 97	36 30	26 54			4982 4
0500	15 30	36 05	26 73	1 067		4970 4
0500	15 30	36 05	26 73			4970 4

SURFACE OBSERVATIONS									
H. D. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	T009	03	18	960	04	24 23N	077 39W	1349	05

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
10	14	23		24 4	23 6				0	13	2	13	1			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ▼	S‰ ▼	σ _t ▼	Σ ΔD ▼	Q: m l/l ▼	V _f ▼
0000	23 80	36 71	25 01	0 000		5021 8
0000	23 80	36 71	25 01			5021 8
0010	23 83	36 71	25 01	0 030		5022 7
0010	23 83	36 71	25 01			5022 7
0020	23 83	36 71	25 01	0 059		5023 3
0020	23 83	36 71	25 01			5023 3
0030	23 78	36 73	25 04	0 089		5023 5
0030	23 78	36 73	25 04			5023 5
0050	23 82	36 78	25 06	0 148		5025 2
0050	23 82	36 78	25 06			5025 2
0075	23 92	36 87	25 10	0 220		5027 9
0075	23 92	36 87	25 10			5027 9
0100	23 83	36 85	25 11	0 293		5028 5
0100	23 83	36 85	25 11			5028 5
0150	23 63	36 87	25 19	0 437		5030 0
0150	23 63	36 87	25 19			5030 0
0150	23 63	36 87	25 19			5030 0
0190	22 58	36 82	25 45			5023 4
0200	21 81	36 76	25 63	0 569		5017 2
0250	19 10	36 56	26 20	0 678		4995 0
0250	19 10	36 56	26 20			4995 0
0300	18 28	36 49	26 36	0 770		4989 9
0300	18 28	36 49	26 36			4989 9
0400	16 98	36 31	26 54	0 941		4982 5
0400	16 98	36 31	26 54			4982 5
0500	15 38	36 07	26 73	1 097		4971 3
0500	15 38	36 07	26 73			4971 3

SURFACE OBSERVATIONS										
H.O. REF. NO.	STATION	DATE				POSITION			SDNIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	TO10	03	18	960	16	24	33N	077° 38W	1554	05

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
14	24	23		26	24	6		8	6	22	3	18	3			

SUBSURFACE OBSERVATIONS							
SAMPLE DEPTH (M)	T °C ▼	S‰ ▼	σ _t ▼	Σ Δ D ▼	D ₂ m l/l ▼	V _t ▼	
0000	24 00	36 70	24 95	0 000		5023	4
0000	24 00	36 70	24 95			5023	4
0007	23 99	36 70	24 95			5023	7
0010	23 97	36 71	24 96	0 030		5023	8
0015	23 95	36 73	24 99			5024	0
0020	23 96	36 74	24 99	0 060		5024	4
0022	23 96	36 74	24 99			5024	5
0030	23 97	36 74	24 99	0 090		5025	1
0037	23 97	36 74	24 99			5025	5
0050	23 83	36 71	25 01	0 150		5025	1
0057	23 80	36 71	25 01			5025	2
0075	23 87	36 80	25 06	0 224		5027	2
0076	23 87	36 80	25 06			5027	3
0100	23 86	36 83	25 09	0 297		5028	7
0116	23 85	36 86	25 11			5029	7
0150	23 84	36 94	25 18	0 442		5031	9
0157	23 84	36 96	25 19			5032	4
0198	21 89	36 74	25 59			5017	7
0200	21 75	36 73	25 62	0 574		5016	5
0242	19 40	36 58	26 14			4997	4
0250	19 27	36 57	26 17	0 684		4996	6
0300	18 44	36 51	26 34	0 778		4991	5
0333	17 88	36 45	26 43			4987	9
0400	16 71	36 31	26 61	0 947		4979	9
0500	14 90	36 02	26 80	1 096		4966	2
0526	14 41	35 93	26 84			4962	2

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH	
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE			
00659	T011	03	18	960	15	24 36N	077° 31W	1705	06	

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
08	16	23		25	0	23	5		0	6	16	2	16	2		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ Δ D ↓	O ₂ m l/l ↓	V _l ↓
0000	23 93	36 55	24 86	0 000		5022 3
0000	23 93	36 55	24 86			5022 3
0009	23 91	36 54	24 85			5022 6
0010	23 90	36 54	24 86	0 031		5022 6
0018	23 87	36 54	24 87			5022 9
0020	23 87	36 54	24 87	0 062		5023 0
0027	23 87	36 54	24 87			5023 4
0030	23 83	36 55	24 88	0 093		5023 3
0045	23 70	36 60	24 96			5023 3
0050	23 75	36 65	24 98	0 154		5024 2
0068	23 83	36 77	25 05			5026 3
0075	23 80	36 77	25 06	0 228		5026 5
0090	23 76	36 78	25 08			5027 1
0100	23 79	36 80	25 09	0 302		5028 0
0136	23 83	36 87	25 13			5030 8
0150	23 78	36 94	25 19	0 446		5031 4
0181	23 68	36 95	25 23			5032 5
0200	21 78	36 78	25 65	0 577		5017 0
0226	19 88	36 61	26 04			5001 0
0250	19 05	36 55	26 21	0 686		4994 5
0271	18 47	36 51	26 33			4990 1
0300	18 24	36 48	26 36	0 778		4989 5
0365	17 46	36 38	26 48			4985 5
0400	16 89	36 30	26 56	0 948		4981 6
0500	14 67	35 98	26 82	1 098		4963 6
0561	12 89	35 71	26 98			4947 0

SURFACE OBSERVATIONS											
H. O. REF. NO.	STATION	DATE				POSITION				SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE			
00659	TO12	03	18	960	13	24	38N	077°	27W	1353	06

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
09	16	23		25	1	23	9		3	6	16	2	16	2		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ_t ↓	$\Sigma \Delta D$ ↓	O ₂ ml/l ↓	V _l ↓
0000	23 87	36 52	24 85	0 000		5021 7
0000	23 87	36 52	24 85			5021 7
0010	23 89	36 52	24 84	0 031		5022 5
0010	23 89	36 52	24 84			5022 5
0019	23 87	36 52	24 85			5022 8
0020	23 87	36 52	24 85	0 062		5022 9
0029	23 87	36 52	24 85			5023 4
0030	23 86	36 53	24 86	0 093		5023 5
0048	23 69	36 63	24 99			5023 5
0050	23 68	36 64	25 00	0 154		5023 6
0073	23 68	36 70	25 04			5025 2
0075	23 70	36 71	25 04	0 229		5025 5
0097	23 82	36 81	25 08			5028 1
0100	23 81	36 82	25 10	0 302		5028 3
0145	23 72	36 87	25 16			5030 4
0150	23 59	36 86	25 19	0 446		5029 6
0194	21 90	36 74	25 59			5017 5
0200	21 42	36 71	25 70	0 577		5013 6
0242	18 95	36 54	26 23			4993 0
0250	18 77	36 52	26 26	0 683		4991 7
0290	17 98	36 44	26 40			4986 3
0300	17 91	36 43	26 41	0 773		4986 2
0388	16 92	36 29	26 54			4981 2
0400	16 73	36 26	26 56	0 940		4979 9
0500	14 59	35 96	26 82	1 090		4962 7
0585	12 02	35 59	27 06			4938 2

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	T013	03	18	1960	18	24 45'N		077° 36'W	1856	06

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
14	24	23		27 8	24 3			8	3	22	2					

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ _t ↓	Σ Δ D ↓	O ₂ ml/l ↓	V _t ↓
0000	24 02	36 54	24 82	0 000		5023 0
0000	24 02	36 54	24 82			5023 0
0009	23 99	36 54	24 83			5023 3
0010	23 98	36 54	24 83	0 031		5023 3
0018	23 94	36 56	24 86			5023 5
0020	23 92	36 56	24 87	0 063		5023 5
0027	23 88	36 56	24 88			5023 6
0030	23 88	36 56	24 88	0 093		5023 7
0045	23 88	36 57	24 89			5024 7
0050	23 84	36 58	24 90	0 155		5024 7
0067	23 75	36 63	24 97			5025 1
0075	23 74	36 64	24 98	0 231		5025 6
0090	23 73	36 68	25 01			5026 5
0100	23 77	36 73	25 04	0 306		5027 6
0135	23 86	36 85	25 10			5030 9
0150	23 85	36 86	25 11	0 453		5031 7
0182	23 82	36 88	25 14			5033 5
0200	21 75	36 75	25 64	0 587		5016 6
0228	19 13	36 58	26 21			4994 0
0250	18 96	36 55	26 23	0 696		4993 6
0300	18 44	36 55	26 37	0 787		4991 7
0373	17 35	36 37	26 50			4984 8
0400	16 85	36 27	26 54	0 957		4981 1
0500	14 54	35 71	26 64	1 117		4961 2
0568	12 56	35 17	26 63			4941 6

SURFACE OBSERVATIONS									
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE		
00659	T014	03	18	960	23	24 55N	077° 40W	1975	15

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
08	23	23		27 2	24 4			7	5	20	2					

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ▼	S‰ ▼	σ _t ▼	Σ ΔD ▼	O ₂ m l/l ▼	V _t ▼
0000	24 12	36 47	24 74	0 000		5023 6
0000	24 12	36 47	24 74			5023 6
0010	24 12	36 47	24 74	0 032		5024 2
0010	24 12	36 47	24 74			5024 2
0020	23 99	36 47	24 78	0 064		5023 7
0020	23 99	36 47	24 78			5023 7
0030	23 97	36 48	24 79	0 096		5024 2
0030	23 97	36 48	24 79			5024 2
0050	23 73	36 53	24 90	0 159		5023 6
0050	23 73	36 53	24 90			5023 6
0074	23 64	36 55	24 94			5024 4
0075	23 64	36 56	24 95	0 235		5024 5
0099	23 67	36 68	25 03			5026 6
0100	23 69	36 68	25 02	0 311		5026 8
0149	23 79	36 82	25 10			5031 0
0150	23 76	36 82	25 11	0 458		5030 8
0198	21 85	36 74	25 60			5017 3
0200	21 70	36 73	25 63	0 592		5016 1
0248	19 03	36 56	26 22			4994 2
0250	18 99	36 56	26 23	0 701		4994 0
0297	18 17	36 48	26 38			4988 7
0300	18 14	36 48	26 39	0 791		4988 6
0397	16 76	36 27	26 56			4980 0
0400	16 69	36 26	26 57	0 959		4979 5
0496	14 45	35 93	26 83			4960 8
0500	14 34	35 91	26 83	1 108		4959 8
0582	12 20	35 59	27 03			4940 0
0600	11 86	35 54	27 05	1 235		4937 1
0777	08 71	35 19	27 33			4908 9
0800	08 24	35 17	27 39	1 436		4904 4
0971	05 67	35 08	27 68			4881 2
1000	05 50	35 07	27 69	1 575		4880 6
1165	04 74	35 03	27 75			4880 0
1200	04 62	35 02	27 76	1 677		4880 4
1456	04 21	35 00	27 79			4889 9

SURFACE OBSERVATIONS										
H. O. REF. NO.	STATION	DATE				POSITION		SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH	
		MO.	DAY	YEAR	HOUR	LATITUDE	LONGITUDE			
00659	TO15	03	19	960	03	25° 05'N	077° 52'W	1600	05	

WIND		ANEMO. HOT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
14	27	23		22	3	19	8		8	5	27	4	25	3		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ _t ↓	Σ Δ D ↓	D ₂ m l/l ↓	V _t ↓
0000	23 84	36 48	24 83	0 000		5021 3
0000	23 84	36 48	24 83			5021 3
0007	23 86	36 48	24 82			5021 9
0010	23 85	36 48	24 83	0 031		5022 0
0014	23 84	36 48	24 83			5022 2
0020	23 84	36 48	24 83	0 063		5022 5
0021	23 84	36 48	24 83			5022 6
0030	23 86	36 48	24 82	0 094		5023 3
0036	23 87	36 48	24 82			5023 7
0050	23 87	36 49	24 83	0 157		5024 6
0055	23 86	36 49	24 83			5024 8
0074	23 79	36 50	24 86			5025 4
0075	23 79	36 50	24 86	0 236		5025 5
0100	23 75	36 52	24 89	0 314		5026 7
0112	23 72	36 55	24 92			5027 3
0150	23 61	36 69	25 06	0 466		5029 1
0150	23 61	36 69	25 06			5029 1
0189	22 59	36 73	25 38			5023 1
0200	21 70	36 70	25 61	0 602		5016 0
0228	19 87	36 62	26 05			5001 0
0250	19 32	36 58	26 16	0 712		4997 1
0300	18 19	36 49	26 38	0 805		4989 1
0310	17 98	36 47	26 42			4987 6
0400	16 45	36 29	26 65	0 969		4977 2
0490	15 48	36 08	26 71			4971 8

SURFACE OBSERVATIONS										
H. D. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	T016	03	19	960	04	25	06N	077° 47W	2432	04

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		CDL.	TRANS.
13	27	23		25.8	24.5				8	8	27	2	27	2		

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S‰ ↓	σ _t ↓	Σ ΔD ↓	Q ± m l/l ↓	V _t ↓
0000	23.90	36.49	24.82	0.000		5021.9
0000	23.90	36.49	24.82			5021.9
0006	23.90	36.47	24.80			5022.1
0010	23.89	36.46	24.80	0.032		5022.3
0012	23.89	36.46	24.80			5022.4
0017	23.91	36.48	24.81			5022.9
0020	23.92	36.48	24.81	0.063		5023.2
0029	23.92	36.48	24.81			5023.7
0030	23.92	36.48	24.81	0.095		5023.8
0043	23.86	36.47	24.82			5024.0
0050	23.84	36.48	24.83	0.158		5024.3
0057	23.81	36.48	24.84			5024.5
0075	23.74	36.51	24.88	0.236		5025.1
0086	23.70	36.53	24.91			5025.5
0100	23.62	36.57	24.96	0.313		5025.8
0116	23.59	36.62	25.01			5026.7
0146	23.71	36.73	25.06			5029.9
0150	23.47	36.75	25.14	0.461		5028.2
0177		36.80				
0200	20.77	36.71	25.88	0.589		5007.8
0243	18.97	36.56	26.24			4993.4
0250	18.72	36.54	26.29	0.690		4991.3
0300	17.31	36.41	26.54	0.776		4980.3
0400	16.51	36.25	26.61	0.935		4977.6
0404	16.45	36.25	26.62			4977.3

SURFACE OBSERVATIONS											
H. O. REF. NO.	STATION	DATE				POSITION				SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE			
00659	T017	03	19	960	06	25°	04N	077°	44W	2578	04

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY °	WET °			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
14	32	23		26	3	23	9		8	8	32	2	32	3		

SUBSURFACE OBSERVATIONS							
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ_t ↓	$\Sigma \Delta D$ ↓	$O_{zm} I/I$ ↓	V_t ↓	
0000	23 94	36 46	24 78	0 000		5022	1
0000	23 94	36 46	24 78			5022	1
0006	23 95	36 47	24 79			5022	6
0010	24 07	36 48	24 76	0 032		5023	8
0012	24 08	36 48	24 76			5024	0
0018	23 95	36 48	24 80			5023	3
0020	23 95	36 48	24 80	0 064		5023	4
0030	23 94	36 47	24 79	0 095		5023	9
0030	23 94	36 47	24 79			5023	9
0047	23 76	36 51	24 88			5023	6
0050	23 74	36 53	24 90	0 158		5023	7
0061	23 68	36 58	24 95			5024	0
0075	23 62	36 58	24 97	0 234		5024	4
0092	23 60	36 59	24 98			5025	3
0100	23 67	36 63	24 99	0 310		5026	4
0125	23 77	36 74	25 05			5029	2
0150	23 72	36 80	25 11	0 458		5030	4
0157	23 64	36 81	25 14			5030	2
0191		36 76					
0200	21 22	36 73	25 77	0 589		5011	9
0250	18 98	36 56	26 24	0 694		4993	9
0263	18 50	36 52	26 33			4990	0
0300	17 37	36 42	26 53	0 782		4980	9
0400	16 60	36 25	26 59	0 942		4978	5
0433	16 14	36 22	26 67			4975	7

SURFACE OBSERVATIONS										
H. D. REF. NO.	STATION	DATE				POSITION			SONIC DEPTH UNCORRECTED	MAX. SAMPLE DEPTH
		MO.	DAY	YEAR	HOUR	LATITUDE		LONGITUDE		
00659	T018	03	19	960	07	25	03N	077° 40W	1957	05

WIND		ANEMO. HGT.	AIR PRESS	AIR TEMPERATURE		HUMID- ITY	WEATHER	CLOUD		SEA		SWELL		VIS.	WATER	
SPEED	DIR.			DRY ▼	WET ▼			TYPE	AMT.	DIR.	AMT.	DIR.	AMT.		COL.	TRANS.
13	32	23		21	1	18	8		8	32	3	32	3			

SUBSURFACE OBSERVATIONS						
SAMPLE DEPTH (M)	T °C ↓	S ‰ ↓	σ_t ↓	$\Sigma \Delta D$ ↓	O ₂ m l/l ↓	V _t ↓
0000	23 94	36 48	24 80	0 000		5022 1
0000	23 94	36 48	24 80			5022 1
0007	23 95	36 48	24 80			5022 6
0010	23 95	36 48	24 80	0 032		5022 8
0014	23 95	36 48	24 80			5023 1
0020	23 95	36 48	24 80	0 063		5023 4
0021	23 95	36 48	24 80			5023 5
0030	23 94	36 50	24 81	0 095		5024 0
0035	23 94	36 51	24 82			5024 3
0050	23 71	36 59	24 95	0 157		5023 6
0053	23 69	36 60	24 96			5023 7
0071	23 70	36 65	25 00			5025 0
0075	23 70	36 65	25 00	0 232		5025 3
0100	23 70	36 66	25 01	0 307		5026 8
0106	23 70	36 67	25 01			5027 2
0143	23 70	36 77	25 09			5029 8
0150	23 60	36 80	25 14	0 455		5029 5
0179	23 01	36 85	25 35			5026 5
0200	21 90	36 76	25 60	0 589		5017 9
0217		36 69				
0250	19 61	36 59	26 09	0 701		4999 8
0288	18 21	36 49	26 38			4988 6
0300	17 83	36 46	26 45	0 794		4985 5
0400	15 81	36 21	26 74	0 950		4970 4
0460	15 58	36 08	26 69			4971 1

APPENDIX IV

THERMAL ARRAY DATA

The following is a listing of temperature data taken as part of the thermal array described previously. The data points have been tabulated from the wire resistance thermometer placed at the 700' depth at Apex buoy A and the two dan buoys D and E (Figure 2). The data were collected at one minute intervals for 17 1/2 hours on 12 March 1960, and are reported in degrees Centigrade.

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960

24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
0015	23.5	23.1	23.6	0050	23.1	22.0	23.6	0125	22.2	21.4	23.2
0016	23.5	23.1	23.6	0051	23.1	21.9	23.6	0126	21.9	21.4	23.1
0017	23.5	23.1	23.6	0052	23.0	21.9	23.6	0127	21.8	21.3	23.1
0018	23.5	23.0	23.6	0053	23.0	21.8	23.6	0128	21.8	21.2	23.0
0019	23.5	23.0	23.6	0054	23.1	21.7	23.6	0129	21.7	20.9	23.0
0020	23.5	23.1	23.6	0055	23.1	21.8	23.6	0130	21.6	20.9	22.9
0021	23.5	23.1	23.6	0056	23.0	21.5	23.6	0131	21.6	20.8	22.8
0022	23.5	23.1	23.6	0057	23.0	21.5	23.5	0132	21.6	20.7	22.6
0023	23.5	23.1	23.6	0058	23.0	21.5	23.5	0133	21.6	20.6	22.4
0024	23.5	23.0	23.6	0059	23.0	21.5	23.5	0134	21.5	20.5	22.3
0025	23.5	23.0	23.6	0100	23.0	21.5	23.5	0135	21.4	20.5	22.1
0026	23.5	23.0	23.6	0101	23.0	21.5	23.5	0136	21.3	20.5	21.9
0027	23.5	22.8	23.6	0102	23.0	21.5	23.5	0137	21.3	20.5	21.8
0028	23.5	22.6	23.6	0103	22.9	21.5	23.5	0138	21.3	20.5	21.7
0029	23.5	22.5	23.6	0104	22.9	21.5	23.5	0139	21.3	20.5	21.7
0030	23.5	22.5	23.6	0105	22.9	21.4	23.5	0140	21.3	20.5	21.6
0031	23.5	22.6	23.6	0106	23.0	21.5	23.4	0141	21.3	20.5	21.7
0032	23.5	22.8	23.6	0107	23.0	21.4	23.4	0142	21.4	20.5	21.6
0033	23.5	23.0	23.6	0108	23.0	21.5	23.4	0143	21.3	20.5	21.5
0034	23.5	23.0	23.6	0109	23.0	21.5	23.4	0144	21.3	20.4	21.5
0035	23.5	23.0	23.6	0110	23.0	21.5	23.4	0145	21.3	20.4	21.5
0036	23.5	23.0	23.6	0111	23.0	21.5	23.4	0146	21.3	20.2	21.5
0037	23.4	22.8	23.6	0112	23.0	21.5	23.4	0147	21.3	20.1	21.5
0038	23.4	22.8	23.6	0113	23.0	21.5	23.4	0148	21.3	20.1	21.5
0039	23.4	22.4	23.6	0114	23.0	21.5	23.4	0149	21.3	20.0	21.4
0040	23.4	22.4	23.6	0115	22.9	21.4	23.4	0150	21.3	20.0	21.4
0041	23.4	22.3	23.6	0116	22.8	21.4	23.4	0151	21.3	20.0	21.4
0042	23.4	22.3	23.6	0117	22.8	21.4	23.4	0152	21.3	20.0	21.4
0043	23.4	22.4	23.6	0118	22.8	21.4	23.4	0153	21.3	19.9	21.4
0044	23.4	22.3	23.6	0119	22.8	21.4	23.4	0154	21.3	19.9	21.4
0045	23.4	22.3	23.6	0120	22.7	21.4	23.4	0155	21.3	19.9	21.4
0046	23.3	22.1	23.6	0121	22.6	21.4	23.3	0156	21.3	19.9	21.4
0047	23.1	22.0	23.6	0122	22.5	21.4	23.2	0157	21.3	19.9	21.4
0048	23.1	21.9	23.6	0123	22.4	21.4	23.2	0158	21.3	19.9	21.4
0049	23.1	21.8	23.6	0124	22.3	21.4	23.2	0159	21.4	19.9	21.4

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960

24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
0200	21.6	20.0	21.6	0235	22.0	20.4	22.5	0310	21.4	19.8	21.4
0201	22.2	20.3	22.0	0236	22.0	20.4	22.5	0311	21.4	19.8	21.4
0202	22.4	20.7	22.7	0237	22.0	20.4	22.5	0312	21.4	19.8	21.4
0203	22.5	21.0	22.7	0238	22.0	20.4	22.5	0313	21.4	19.9	21.4
0204	22.8	21.3	23.0	0239	22.0	20.4	22.7	0314	21.4	19.9	21.4
0205	22.9	21.4	23.1	0240	22.0	20.4	22.3	0315	21.3	19.9	21.4
0206	22.9	21.4	23.2	0241	21.9	20.4	22.2	0316	21.3	19.8	21.3
0207	22.9	21.4	23.2	0242	21.8	20.2	22.2	0317	21.2	19.8	21.3
0208	22.9	21.4	23.3	0243	21.8	20.1	22.1	0318	21.2	19.8	21.3
0209	22.9	21.4	23.3	0244	21.7	20.0	22.1	0319	21.2	19.8	21.3
0210	22.8	21.4	23.2	0245	21.6	20.0	22.1	0320	21.2	19.8	21.2
0211	22.7	21.4	23.2	0246	21.6	20.0	21.7	0321	21.2	19.8	21.1
0212	22.7	21.4	23.2	0247	21.4	19.9	21.5	0322	21.2	19.8	21.1
0213	22.6	21.4	23.2	0248	21.3	19.8	21.4	0323	21.2	19.8	21.1
0214	22.6	21.3	23.2	0249	21.4	19.8	21.4	0324	21.2	19.8	21.1
0215	22.6	21.3	23.2	0250	21.4	19.8	21.4	0325	21.2	19.8	21.1
0216	22.6	21.3	23.2	0251	21.5	19.8	21.4	0326	21.2	19.8	21.0
0217	22.6	21.3	23.2	0252	21.6	19.8	21.4	0327	21.2	19.8	21.0
0218	22.5	21.2	23.2	0253	21.7	19.9	21.5	0328	21.2	19.8	20.8
0219	22.3	21.0	23.0	0254	21.7	19.9	21.5	0329	21.2	19.8	20.6
0220	22.2	20.9	23.0	0255	21.8	19.9	21.8	0330	21.2	19.8	20.5
0221	22.2	20.9	22.8	0256	21.8	19.9	21.9	0331	21.2	19.8	20.3
0222	22.2	20.8	22.7	0257	21.8	19.9	22.0	0332	21.2	19.8	20.4
0223	22.1	20.8	22.6	0258	21.7	19.9	22.0	0333	21.2	19.8	20.4
0224	22.1	20.8	22.6	0259	21.7	19.9	21.9	0334	21.2	19.8	20.5
0225	22.0	20.7	22.5	0300	21.7	19.9	21.9	0335	21.2	19.8	20.6
0226	21.9	20.5	22.5	0301	21.7	19.9	21.8	0336	21.2	19.8	20.7
0227	21.7	20.5	22.4	0302	21.6	19.9	21.7	0337	21.2	19.8	20.8
0228	21.8	20.4	22.5	0303	21.5	19.9	21.5	0338	21.2	19.8	21.0
0229	21.9	20.4	22.5	0304	21.4	19.9	21.4	0339	21.2	19.8	21.0
0230	22.0	20.4	22.5	0305	21.3	19.9	21.4	0340	21.2	19.8	21.0
0231	22.0	20.4	22.5	0306	21.3	19.8	21.4	0341	21.2	19.8	21.0
0232	22.0	20.3	22.5	0307	21.3	19.8	21.4	0342	21.2	19.8	21.1
0233	22.0	20.3	22.5	0308	21.4	19.8	21.4	0343	21.2	19.8	21.0
0234	22.0	20.4	22.5	0309	21.4	19.8	21.4	0344	21.2	19.8	20.8

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960
24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
0345	21.1	19.8	20.6	0420	21.2	19.8	20.3	0455	22.5	20.4	22.0
0346	21.0	19.8	20.5	0421	21.2	19.8	20.3	0456	22.4	20.4	22.0
0347	21.0	19.8	20.4	0422	21.2	19.8	20.2	0457	22.4	20.3	21.8
0348	21.0	19.8	20.4	0423	21.2	19.8	20.2	0458	22.3	20.3	21.8
0349	21.0	19.8	20.4	0424	21.0	19.8	20.2	0459	22.3	20.2	21.7
0350	21.0	19.8	20.3	0425	21.2	19.8	20.2	0500	22.3	20.3	21.7
0351	21.0	19.8	20.3	0426	21.2	19.8	20.2	0501	22.3	20.4	21.7
0352	21.0	19.8	20.3	0427	21.2	19.8	20.3	0502	22.3	20.4	21.7
0353	21.0	19.8	20.3	0428	21.2	19.8	20.3	0503	22.3	20.5	21.7
0354	21.0	19.8	20.4	0429	21.3	19.8	20.4	0504	22.3	20.6	21.7
0355	21.2	19.8	20.4	0430	21.4	19.9	20.6	0505	22.3	20.6	21.7
0356	21.2	19.8	20.6	0431	21.7	19.9	20.8	0506	22.4	20.6	21.7
0357	21.2	19.8	20.7	0432	22.1	20.0	21.1	0507	22.4	20.6	21.7
0358	21.3	19.8	20.8	0433	22.2	20.1	21.3	0508	22.4	20.6	21.7
0359	21.2	19.8	21.0	0434	22.4	20.2	21.4	0509	22.4	20.5	21.7
0400	21.2	19.8	21.1	0435	22.4	20.2	21.7	0510	22.4	20.5	21.7
0401	21.3	19.8	21.1	0436	22.5	20.2	21.7	0511	22.3	20.4	21.6
0402	21.3	19.8	21.0	0437	22.5	20.2	21.8	0512	22.2	20.4	21.6
0403	21.2	19.8	21.0	0438	22.5	20.3	21.9	0513	22.2	20.4	21.5
0404	21.2	19.8	21.0	0439	22.4	20.3	21.8	0514	22.2	20.4	21.5
0405	21.2	19.8	21.0	0440	22.5	20.3	21.8	0515	22.1	20.4	21.4
0406	21.2	19.8	20.9	0441	22.4	20.3	21.8	0516	22.1	20.4	21.4
0407	21.2	19.8	20.8	0442	22.4	20.4	21.8	0517	22.1	20.4	21.4
0408	21.2	19.8	20.8	0443	22.4	20.4	21.8	0518	22.1	20.4	21.4
0409	21.2	19.8	20.8	0444	22.4	20.5	21.9	0519	22.1	20.4	21.4
0410	21.2	19.8	20.8	0445	22.4	20.6	22.0	0520	22.4	20.4	21.4
0411	21.2	19.8	20.7	0446	22.5	20.6	22.2	0521	22.5	20.4	21.4
0412	21.1	19.8	20.6	0447	22.5	20.5	22.2	0522	22.5	20.4	21.5
0413	21.1	19.8	20.5	0448	20.6	20.6	22.1	0523	22.5	20.4	21.5
0414	21.1	19.8	20.4	0449	22.7	20.6	21.8	0524	22.2	20.4	21.5
0415	21.2	19.8	20.4	0450	22.7	20.7	21.8	0525	22.0	20.4	21.4
0416	21.2	19.8	20.4	0451	22.7	20.7	21.8	0526	22.0	20.4	21.4
0417	21.2	19.8	20.4	0452	22.6	20.8	21.8	0527	22.0	20.4	21.4
0418	21.2	19.8	20.4	0453	22.6	20.7	21.9	0528	22.0	20.4	21.4
0419	21.2	19.8	20.3	0454	22.5	20.5	22.0	0529	22.0	20.4	21.4

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960

24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
0530	22.0	20.4	21.4	0605	22.6	20.6	21.7	0640	22.3	21.2	22.2
0531	21.9	20.4	21.4	0606	22.6	20.7	21.8	0641	22.2	21.2	22.2
0532	21.9	20.4	21.4	0607	22.5	20.7	22.0	0642	22.3	21.2	22.2
0533	21.9	20.3	21.4	0608	22.5	20.8	22.0	0643	22.3	21.2	22.2
0534	22.0	20.3	21.4	0609	22.5	20.8	22.0	0644	22.4	21.2	22.3
0535	22.2	20.4	21.4	0610	22.5	21.0	22.0	0645	22.4	21.2	22.4
0536	22.1	20.6	21.6	0611	22.4	21.0	22.0	0646	22.4	21.2	22.4
0537	22.1	20.8	21.7	0612	22.4	21.0	22.0	0647	22.4	21.3	22.4
0538	22.2	20.9	21.7	0613	22.4	20.8	22.0	0648	22.4	21.3	22.4
0539	22.2	20.9	21.7	0614	22.4	20.8	22.0	0649	22.5	21.4	22.4
0540	22.2	20.8	21.6	0615	22.3	21.0	22.1	0650	22.4	21.4	22.4
0541	22.1	20.7	21.6	0616	22.4	21.0	22.2	0651	22.4	21.4	22.4
0542	22.3	20.5	21.6	0617	22.4	21.0	22.2	0652	22.4	21.5	22.4
0543	22.3	20.4	21.6	0618	22.4	21.0	22.1	0653	22.5	21.5	22.5
0544	22.3	20.4	21.5	0619	22.4	21.0	22.0	0654	22.6	21.6	22.6
0545	22.4	20.4	21.6	0620	22.4	21.0	22.0	0655	22.7	21.7	22.6
0546	22.4	20.5	21.6	0621	22.4	21.1	22.0	0656	22.7	21.7	22.7
0547	22.5	20.5	21.6	0622	22.4	21.2	22.2	0657	22.7	21.8	22.8
0548	22.4	20.5	21.6	0623	22.4	21.2	22.2	0658	22.7	22.0	22.9
0549	22.2	20.5	21.8	0624	22.4	21.2	22.2	0659	22.7	22.1	22.9
0550	22.0	20.5	21.7	0625	22.4	21.2	22.2	0700	22.8	22.1	23.0
0551	22.0	20.5	21.4	0626	22.4	21.2	22.1	0701	22.8	22.1	23.0
0552	22.0	20.5	21.4	0627	22.4	21.2	22.1	0702	22.9	22.2	23.1
0553	22.0	20.6	21.4	0628	22.5	21.2	22.2	0703	22.9	22.2	23.2
0554	22.0	20.6	21.4	0629	22.4	21.3	22.2	0704	22.9	22.3	23.3
0555	22.0	20.5	21.4	0630	22.4	21.3	22.1	0705	23.0	22.3	23.3
0556	22.1	20.4	21.4	0631	22.4	21.3	22.2	0706	23.0	22.4	23.4
0557	No reading		21.6	0632	22.4	21.2	22.2	0707	23.1	22.4	23.4
0558	No reading		21.6	0633	22.4	21.2	22.2	0708	23.1	22.5	23.4
0559	22.3	20.5	21.7	0634	22.4	21.2	22.2	0709	23.0	22.4	23.4
0600	22.5	20.7	21.7	0635	22.4	21.2	22.1	0710	23.0	22.4	23.4
0601	22.5	20.8	21.7	0636	22.4	21.2	22.2	0711	23.0	22.5	23.4
0602	22.5	20.9	21.7	0637	22.4	21.2	22.2	0712	22.9	22.5	23.4
0603	22.6	20.9	21.7	0638	22.4	21.2	22.2	0713	22.9	22.4	23.4
0604	22.6	20.8	21.7	0639	22.4	21.2	22.2	0714	22.9	22.4	23.4

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960
24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
0715	23.0	22.4	23.4	0750	23.4	22.7	23.5	0825	23.5	23.5	23.7
0716	23.1	22.4	23.4	0751	23.4	22.7	23.5	0826	23.5	23.5	23.7
0717	23.1	22.4	23.4	0752	23.4	22.7	23.5	0827	23.5	23.5	23.7
0718	23.1	22.4	23.4	0753	23.4	22.7	23.5	0828	23.5	23.5	23.7
0719	23.1	22.4	23.4	0754	23.4	22.7	23.5	0829	23.5	23.5	23.6
0720	23.1	22.4	23.4	0755	23.4	22.7	23.5	0830	23.6	23.6	23.6
0721	23.2	22.5	23.4	0756	23.4	22.7	23.5	0831	23.6	23.6	23.6
0722	23.1	22.4	23.5	0757	23.4	22.7	23.5	0832	23.6	23.6	23.6
0723	23.2	22.4	23.5	0758	23.4	22.7	23.5	0833	23.6	23.6	23.6
0724	23.2	22.4	23.5	0759	23.3	22.7	23.5	0834	23.6	23.6	23.6
0725	23.2	22.4	23.5	0800	23.3	22.7	23.5	0835	23.6	23.6	23.6
0726	23.1	22.4	23.5	0801	23.3	22.7	23.5	0836	23.6	23.6	23.6
0727	23.1	22.4	23.5	0802	23.3	22.7	23.5	0837	23.5	23.6	23.6
0728	23.2	22.4	23.5	0803	23.3	22.7	23.5	0838	23.6	23.6	23.6
0729	23.2	22.4	23.5	0804	23.4	22.7	23.5	0839	23.6	23.6	23.6
0730	23.3	22.4	23.5	0805	23.4	22.7	23.5	0840	23.6	23.6	23.6
0731	23.4	22.5	23.5	0806	23.4	22.8	23.5	0841	23.6	23.6	23.6
0732	23.4	22.6	23.5	0807	23.5	22.9	23.6	0842	23.6	23.6	23.6
0733	23.4	22.6	23.5	0808	23.5	23.0	23.6	0843	23.6	23.6	23.7
0734	23.4	22.7	23.5	0809	23.5	23.1	23.6	0844	23.6	23.6	23.7
0735	23.4	22.8	23.5	0810	23.5	23.2	23.6	0845	23.6	23.6	23.6
0736	23.4	22.9	23.6	0811	23.5	23.3	23.6	0846	23.6	23.6	23.6
0737	23.4	22.9	23.6	0812	23.5	23.3	23.6	0847	23.6	23.6	23.6
0738	23.4	23.0	23.6	0813	23.5	23.3	23.6	0848	23.6	23.6	23.6
0739	23.4	23.0	23.6	0814	23.5	23.3	23.6	0849	23.6	23.6	23.6
0740	23.4	23.0	23.6	0815	23.5	23.3	23.6	0850	23.6	23.6	23.6
0741	23.4	23.0	23.6	0816	23.5	23.4	23.7	0851	23.5	23.6	23.6
0742	23.4	23.0	23.6	0817	23.5	23.4	23.7	0852	23.5	23.6	23.6
0743	23.4	23.0	23.6	0818	23.5	23.5	23.7	0853	23.5	23.6	23.6
0744	23.4	22.9	23.5	0819	23.5	23.5	23.7	0854	23.5	23.6	23.6
0745	23.4	22.9	23.5	0820	23.5	23.5	23.7	0855	23.5	23.6	23.6
0746	23.4	22.8	23.5	0821	23.5	23.5	23.7	0856	23.5	23.6	23.6
0747	23.4	22.7	23.5	0822	23.5	23.5	23.7	0857	23.6	23.6	23.6
0748	23.4	22.7	23.6	0823	23.5	23.5	23.7	0858	23.6	23.6	23.6
0749	23.4	22.7	23.5	0824	23.5	23.5	23.7	0859	23.6	23.6	23.6

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960
24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
0900	23.6	23.6	23.6	0935	23.5	23.7	23.6	1010	23.5	23.6	23.6
0901	23.6	23.6	23.6	0936	23.5	23.7	23.6	1011	23.5	23.6	23.6
0902	23.6	23.6	23.6	0937	23.5	23.6	23.6	1012	23.5	23.6	23.6
0903	23.6	23.6	23.6	0938	23.5	23.6	23.6	1013	23.5	23.6	23.6
0904	23.6	23.6	23.6	0939	23.5	23.6	23.6	1014	23.5	23.6	23.6
0905	23.6	23.6	23.6	0940	23.5	23.6	23.6	1015	23.5	23.6	23.6
0906	23.6	23.6	23.6	0941	23.5	23.6	23.6	1016	23.5	23.6	23.6
0907	23.6	23.6	23.6	0942	23.5	23.6	23.6	1017	23.5	23.6	23.6
0908	23.6	23.6	23.6	0943	23.5	23.6	23.6	1018	23.5	23.6	23.6
0909	23.5	23.6	23.6	0944	23.5	23.6	23.6	1019	23.5	23.6	23.6
0910	23.5	23.6	23.6	0945	23.5	23.7	23.6	1020	23.5	23.6	23.6
0911	23.5	23.6	23.6	0946	23.5	23.7	23.6	1021	23.5	23.6	23.6
0912	23.6	23.6	23.6	0947	23.5	23.7	23.6	1022	23.5	23.6	23.6
0913	23.6	23.6	23.6	0948	23.5	23.7	23.6	1023	23.5	23.6	23.6
0914	23.6	23.6	23.6	0949	23.5	23.7	23.6	1024	23.5	23.6	23.6
0915	23.6	23.6	23.6	0950	23.5	23.7	23.6	1025	23.5	23.6	23.6
0916	23.6	23.6	23.6	0951	23.5	23.7	23.6	1026	23.5	23.6	23.6
0917	23.6	23.6	23.6	0952	23.6	23.7	23.6	1027	23.5	23.6	23.6
0918	23.6	23.7	23.6	0953	23.6	23.7	23.6	1028	23.5	23.6	23.6
0919	23.6	23.7	23.6	0954	23.6	23.7	23.6	1029	23.5	23.6	23.6
0920	23.6	23.7	23.6	0955	23.6	23.7	23.6	1030	23.5	23.6	23.6
0921	23.6	23.7	23.6	0956	23.6	23.7	23.6	1031	23.5	23.6	23.6
0922	23.6	23.7	23.6	0957	23.6	23.7	23.6	1032	23.5	23.6	23.6
0923	23.6	23.7	23.6	0958	23.6	23.7	23.6	1033	23.5	23.6	23.6
0924	23.6	23.7	23.6	0959	23.5	23.7	23.6	1034	23.5	23.6	23.6
0925	23.6	23.7	23.6	1000	23.5	23.7	23.6	1035	23.5	23.6	23.6
0926	23.6	23.7	23.6	1001	23.5	23.7	23.6	1036	23.5	23.6	23.6
0927	23.6	23.7	23.6	1002	23.5	23.6	23.6	1037	23.5	23.6	23.6
0928	23.6	23.7	23.6	1003	23.5	23.6	23.6	1038	23.5	23.6	23.6
0929	23.6	23.7	23.6	1004	23.5	23.6	23.6	1039	23.5	23.6	23.6
0930	23.6	23.7	23.6	1005	23.5	23.6	23.6	1040	23.5	23.6	23.6
0931	23.6	23.7	23.6	1006	23.5	23.6	23.6	1041	23.5	23.6	23.6
0932	23.6	23.7	23.6	1007	23.5	23.6	23.6	1042	23.5	23.6	23.6
0933	23.6	23.7	23.6	1008	23.5	23.6	23.6	1043	23.5	23.6	23.6
0934	23.5	23.7	23.6	1009	23.5	23.6	23.6	1044	23.5	23.6	23.6

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960
 24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
1045	23.5	23.6	23.6	1120	23.5	23.6	23.6	1155	23.5	23.6	23.6
1046	23.5	23.6	23.6	1121	23.5	23.6	23.6	1156	23.5	23.6	23.6
1047	23.5	23.6	23.6	1122	23.5	23.6	23.6	1157	23.5	23.6	23.6
1048	23.5	23.6	23.6	1123	23.5	23.6	23.6	1158	23.5	23.6	23.6
1049	23.5	23.6	23.6	1124	23.5	23.6	23.6	1159	23.5	23.6	23.6
1050	23.5	23.6	23.6	1125	23.5	23.6	23.6	1200	23.5	23.6	23.6
1051	23.5	23.6	23.6	1126	23.5	23.6	23.6	1201	23.5	23.6	23.6
1052	23.5	23.6	23.6	1127	23.5	23.6	23.6	1202	23.5	23.6	23.6
1053	23.5	23.6	23.6	1128	23.5	23.6	23.6	1203	23.5	23.6	23.6
1054	23.5	23.6	23.6	1129	23.5	23.6	23.6	1204	23.5	23.6	23.6
1055	23.5	23.6	23.6	1130	23.5	23.6	23.6	1205	23.5	23.6	23.6
1056	23.5	23.6	23.6	1131	23.5	23.6	23.6	1206	23.5	23.6	23.6
1057	23.5	23.6	23.6	1132	23.5	23.6	23.6	1207	23.5	23.6	23.6
1058	23.5	23.6	23.6	1133	23.5	23.6	23.6	1208	23.5	23.6	23.6
1059	23.5	23.6	23.6	1134	23.5	23.6	23.6	1209	23.5	23.6	23.6
1100	23.5	23.6	23.6	1135	23.5	23.6	23.6	1210	23.5	23.6	23.6
1101	23.5	23.6	23.6	1136	23.5	23.6	23.6	1211	23.5	23.6	23.6
1102	23.5	23.6	23.6	1137	23.5	23.7	23.6	1212	23.5	23.6	23.6
1103	23.5	23.6	23.6	1138	23.5	23.7	23.6	1213	23.5	23.6	23.6
1104	23.5	23.6	23.6	1139	23.5	23.6	23.6	1214	23.5	23.6	23.6
1105	23.5	23.6	23.6	1140	23.5	23.6	23.6	1215	23.5	23.6	23.6
1106	23.5	23.6	23.6	1141	23.5	23.6	23.6	1216	23.5	23.6	23.6
1107	23.5	23.6	23.6	1142	23.5	23.6	23.6	1217	23.5	23.6	23.6
1108	23.5	23.6	23.6	1143	23.5	23.6	23.6	1218	23.5	23.6	23.6
1109	23.5	23.6	23.6	1144	23.5	23.6	23.6	1219	23.5	23.6	23.6
1110	23.5	23.6	23.6	1145	23.5	23.6	23.6	1220	23.5	23.6	23.6
1111	23.5	23.6	23.6	1146	23.5	23.6	23.6	1221	23.5	23.6	23.6
1112	23.5	23.6	23.6	1147	23.5	23.6	23.6	1222	23.5	23.6	23.6
1113	23.5	23.6	23.6	1148	23.5	23.6	23.6	1223	23.5	23.6	23.6
1114	23.5	23.6	23.6	1149	23.5	23.6	23.6	1224	23.5	23.6	23.6
1115	23.5	23.6	23.6	1150	23.5	23.6	23.6	1225	23.5	23.6	23.6
1116	23.5	23.6	23.6	1151	23.5	23.6	23.6	1226	23.5	23.6	23.6
1117	23.5	23.6	23.6	1152	23.5	23.6	23.6	1227	23.5	23.6	23.6
1118	23.5	23.6	23.6	1153	23.5	23.6	23.6	1228	23.5	23.6	23.6
1119	23.5	23.6	23.6	1154	23.5	23.6	23.6	1229	23.5	23.6	23.6

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960

24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
1230	23.5	23.6	23.6	1305	23.5	23.6	23.6	1340	23.5	23.5	23.6
1231	23.5	23.6	23.6	1306	23.5	23.6	23.6	1341	23.5	23.5	23.6
1232	23.5	23.6	23.6	1307	23.5	23.6	23.6	1342	23.6	23.5	23.6
1233	23.5	23.6	23.6	1308	23.5	23.6	23.6	1343	23.6	23.5	23.6
1234	23.5	23.6	23.6	1309	23.5	23.6	23.6	1344	23.6	23.5	23.6
1235	23.5	23.6	23.6	1310	23.5	23.6	23.6	1345	23.6	23.5	23.6
1236	23.5	23.6	23.6	1311	23.5	23.6	23.6	1346	23.6	23.5	23.6
1237	23.5	23.6	23.6	1312	23.5	23.6	23.6	1347	23.6	23.5	23.6
1238	23.5	23.6	23.6	1313	23.5	23.6	23.6	1348	23.6	23.5	23.6
1239	23.5	23.6	23.6	1314	23.5	23.6	23.6	1349	23.6	23.5	23.6
1240	23.5	23.6	23.6	1315	23.5	23.6	23.6	1350	23.6	23.5	23.6
1241	23.5	23.6	23.6	1316	23.5	23.6	23.6	1351	23.6	23.5	23.6
1242	23.5	23.6	23.6	1317	23.5	23.6	23.6	1352	23.6	23.5	23.6
1243	23.5	23.6	23.6	1318	23.5	23.6	23.6	1353	23.6	23.5	23.6
1244	23.5	23.6	23.6	1319	23.5	23.6	23.6	1354	23.6	23.5	23.6
1245	23.5	23.6	23.6	1320	23.5	23.6	23.6	1355	23.6	23.5	23.6
1246	23.5	23.6	23.6	1321	23.6	23.6	23.6	1356	23.6	23.5	23.6
1247	23.5	23.6	23.6	1322	23.6	23.6	23.6	1357	23.6	23.5	23.6
1248	23.5	23.6	23.6	1323	23.6	23.6	23.6	1358	23.6	23.5	23.6
1249	23.5	23.6	23.6	1324	23.5	23.6	23.6	1359	23.6	23.5	23.6
1250	23.5	23.6	23.6	1325	23.5	23.6	23.6	1400	23.6	23.5	23.6
1251	23.5	23.6	23.6	1326	23.5	23.6	23.6	1401	23.6	23.5	23.6
1252	23.5	23.6	23.6	1327	23.5	23.6	23.6	1402	23.6	23.5	23.6
1253	23.5	23.6	23.6	1328	23.5	23.6	23.6	1403	23.6	23.5	23.6
1254	23.5	23.6	23.6	1329	23.6	23.6	23.6	1404	23.6	23.5	23.6
1255	23.5	23.6	23.6	1330	23.6	23.6	23.6	1405	23.6	23.5	23.6
1256	23.5	23.6	23.6	1331	23.6	23.6	23.6	1406	23.6	23.5	23.6
1257	23.5	23.6	23.6	1332	23.6	23.6	23.6	1407	23.6	23.5	23.6
1258	23.5	23.6	23.6	1333	23.6	23.6	23.6	1408	23.6	23.5	23.6
1259	23.5	23.6	23.6	1334	23.6	23.6	23.6	1409	23.6	23.6	23.6
1300	23.5	23.6	23.6	1335	23.6	23.6	23.6	1410	23.6	23.6	23.6
1301	23.5	23.6	23.6	1336	23.6	23.6	23.6	1411	23.6	23.6	23.6
1302	23.5	23.6	23.6	1337	23.6	23.6	23.6	1412	23.6	23.6	23.6
1303	23.5	23.6	23.6	1338	23.6	23.6	23.6	1413	23.6	23.6	23.6
1304	23.5	23.6	23.6	1339	23.5	23.5	23.6	1414	23.6	23.6	23.6

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960
24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
1415	23.6	23.6	23.6	1450	23.5	23.5	23.7	1525	23.6	23.5	23.7
1416	23.6	23.6	23.6	1451	23.5	23.4	23.7	1526	23.6	23.5	23.7
1417	23.5	23.6	23.6	1452	23.5	23.4	23.7	1527	23.6	23.5	23.7
1418	23.5	23.6	23.6	1453	23.5	23.5	23.7	1528	23.6	23.5	23.7
1419	23.5	23.5	23.6	1454	23.5	23.5	23.7	1529	23.6	23.5	23.7
1420	23.5	23.5	23.6	1455	23.5	23.5	23.7	1530	23.6	23.6	23.7
1421	23.5	23.5	23.6	1456	23.5	23.5	23.7	1531	23.6	23.6	23.7
1422	23.5	23.5	23.6	1457	23.6	23.5	23.7	1532	23.6	23.6	23.7
1423	23.5	23.6	23.6	1458	23.6	23.5	23.7	1533	23.6	23.5	23.7
1424	23.6	23.6	23.6	1459	23.6	23.5	23.7	1534	23.6	23.5	23.7
1425	23.6	23.6	23.6	1500	23.6	23.5	23.7	1535	23.6	23.5	23.7
1426	23.6	23.6	23.6	1501	23.5	23.5	23.7	1536	23.6	23.5	23.7
1427	23.6	23.6	23.6	1502	23.5	23.5	23.7	1537	23.6	23.5	23.7
1428	23.5	23.6	23.6	1503	23.5	23.5	23.7	1538	23.6	23.5	23.7
1429	23.5	23.6	23.6	1504	23.5	23.5	23.7	1539	23.6	23.5	23.7
1430	23.5	23.6	23.6	1505	23.5	23.4	23.7	1540	23.6	23.5	23.7
1431	23.5	23.5	23.7	1506	23.5	23.4	23.7	1541	23.6	23.5	23.7
1432	23.5	23.5	23.7	1507	23.5	23.4	23.7	1542	23.6	23.5	23.7
1433	23.5	23.5	23.7	1508	23.5	23.4	23.7	1543	23.6	23.5	23.7
1434	23.5	23.5	23.7	1509	23.5	23.5	23.7	1544	23.5	23.6	23.7
1435	23.5	23.5	23.7	1510	23.5	23.5	23.7	1545	23.5	23.6	23.7
1436	23.5	23.5	23.7	1511	23.5	23.5	23.7	1546	23.5	23.6	23.7
1437	23.5	23.5	23.7	1512	23.5	23.5	23.7	1547	23.6	23.6	23.7
1438	23.5	23.5	23.7	1513	23.5	23.5	23.7	1548	23.6	23.6	23.7
1439	23.5	23.5	23.7	1514	23.5	23.4	23.6	1549	23.6	23.6	23.7
1440	23.5	23.5	23.7	1515	23.5	23.4	23.6	1550	23.6	23.6	23.7
1441	23.5	23.5	23.7	1516	23.5	23.4	23.6	1551	23.6	23.6	23.7
1442	23.6	23.5	23.7	1517	23.5	23.4	23.6	1552	23.5	23.5	23.7
1443	23.6	23.5	23.7	1518	23.5	23.4	23.6	1553	23.5	23.5	23.7
1444	23.6	23.5	23.7	1519	23.5	23.4	23.7	1554	23.5	23.5	23.7
1445	23.6	23.5	23.7	1520	23.5	23.5	23.7	1555	23.5	23.5	23.7
1446	23.6	23.5	23.7	1521	23.5	23.5	23.7	1556	23.5	23.4	23.7
1447	23.6	23.5	23.7	1522	23.5	23.5	23.7	1557	23.5	23.4	23.7
1448	23.5	23.5	23.7	1523	23.5	23.5	23.7	1558	23.5	23.4	23.7
1449	23.5	23.5	23.7	1524	23.6	23.5	23.7	1559	23.5	23.4	23.7

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960
24°35'N 77°34'W

GMT	A	D	E	GMT	A	D	E	GMT	A	D	E
1600	23.5	23.4	23.7	1635	23.6	23.3	23.6	1710	23.6	22.9	23.6
1601	23.5	23.5	23.7	1636	23.6	23.3	23.6	1711	23.6	22.9	23.6
1602	23.5	23.5	23.7	1637	23.6	23.2	23.6	1712	23.6	22.9	23.6
1603	23.5	23.5	23.7	1638	23.6	23.3	23.6	1713	23.6	22.9	23.6
1604	23.5	23.5	23.7	1639	23.6	23.2	23.6	1714	23.6	22.9	23.6
1605	23.6	23.4	23.7	1640	23.6	23.1	23.6	1715	23.5	22.9	23.6
1606	23.6	23.4	23.6	1641	23.6	23.0	23.6	1716	23.5	22.9	23.6
1607	23.6	23.4	23.6	1642	23.6	23.1	23.6	1717	23.5	22.9	23.6
1608	23.5	23.4	23.6	1643	23.6	23.2	23.6	1718	23.5	22.9	23.6
1609	23.5	23.3	23.6	1644	23.6	23.1	23.6	1719	23.5	22.9	23.6
1610	23.5	23.3	23.6	1645	23.6	23.1	23.7	1720	23.5	22.9	23.6
1611	23.5	23.3	23.6	1646	23.6	23.2	23.7	1721	23.5	22.9	23.6
1612	23.5	23.3	23.6	1647	23.6	23.3	23.7	1722	23.5	22.9	23.6
1613	23.5	23.3	23.6	1648	23.6	23.3	23.7	1723	23.6	22.9	23.5
1614	23.6	23.2	23.6	1649	23.6	23.3	23.7	1724	23.6	22.9	23.5
1615	23.6	23.2	23.6	1650	23.6	23.3	23.7	1725	23.6	22.8	23.5
1616	23.6	23.3	23.6	1651	23.6	23.3	23.7	1726	23.6	22.8	23.5
1617	23.6	23.4	23.7	1652	23.6	23.2	23.7	1727	23.6	22.8	23.5
1618	23.6	23.4	23.7	1653	23.6	23.2	23.7	1728	23.6	22.8	23.5
1619	23.6	23.4	23.7	1654	23.6	23.1	23.7	1729	23.6	22.9	23.5
1620	23.6	23.5	23.7	1655	23.6	23.2	23.7	1730	23.5	22.9	23.5
1621	23.6	23.5	23.7	1656	23.6	23.3	23.7	1731	23.5	22.8	23.5
1622	23.6	23.5	23.7	1657	23.6	23.2	23.7	1732	23.5	22.8	23.5
1623	23.6	23.5	23.7	1658	23.6	22.9	23.7	1733	23.5	22.7	23.5
1624	23.6	23.5	23.7	1659	23.6	22.9	23.7	1734	23.5	22.7	23.5
1625	23.6	23.5	23.7	1700	23.6	22.9	23.7	1735	23.5	22.8	23.5
1626	23.6	23.5	23.7	1701	23.6	22.9	23.7	1736	23.5	22.8	23.5
1627	23.5	23.5	23.7	1702	23.6	22.9	23.7	1737	23.6	22.8	23.5
1628	23.5	23.5	23.7	1703	23.6	22.9	23.6	1738	23.6	22.8	23.5
1629	23.5	23.5	23.7	1704	23.6	22.9	23.6	1739	23.6	22.7	23.5
1630	23.5	23.5	23.7	1705	23.6	22.9	23.6	1740	23.6	22.7	23.4
1631	23.6	23.5	23.7	1706	23.6	22.9	23.6	1741	23.6	22.7	23.3
1632	23.6	23.4	23.6	1707	23.6	22.9	23.6	1742	23.6	22.7	23.3
1633	23.6	23.4	23.6	1708	23.6	22.9	23.6	1743	23.6	22.7	23.3
1634	23.6	23.3	23.6	1709	23.6	22.9	23.6	1744	23.6	22.7	23.3

THERMAL ARRAY DATA

TONGUE OF THE OCEAN 12 MARCH 1960
24°35'N 77°34'W

GMT	A	D	E
1745	23.6	22.7	23.4
1746	23.6	22.7	23.5
1747	23.6	22.7	23.5
1748	23.6	22.7	23.5
1749	23.6	22.7	23.6

APPENDIX V

CURRENT OBSERVATIONS

CURRENT OBSERVATIONS

TONGUE OF THE OCEAN

24°35'N 77°34'W

TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)	TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)
090940	10	033	.7	091545	10	059	.6
090945	25	303	.6	091600	25	337	.5
090948	50	287	.4	091605	50	319	.3
090952	75	306	.3	091610	75	306	.4
090959	100	257	.1	091615	100	296	.2
091002	150	290	.2	091625	150	299	.3
091007	200	288	.35	091635	200	289	.4
091029	10	058	.6	091702	10	360	.6
091033	25	315	.6	091706	25	295	.4
091040	50	284	.4	091710	50	291	.3
091055	75	295	.3	091717	75	291	.3
091100	100	287	.3	091723	100	285	.2
091108	150	289	.3	091734	150	286	.3
091115	200		<.2	091739	200	289	.3
091143	10	066	.6	091802	10	015	.6
091147	25	311	.5	091808	25	301	.4
091151	50	288	.4	091815	50	289	.3
091158	75	293	.3	091821	75	291	.2
091203	100	288	.3	091826	100		<.2
091208	150	291	.2	091832	150	288	.3
091215	200	294	.3	091840	200	285	.3
091237	10	058	.6	091900	10	360	.6
091243	25	301	.5	091907	25	297	.4
091248	50	288	.45	091914	50	295	.2
091253	75	289	.35	091924	75		<.2
091258	100	290	.3	091930	100	290	.2
091305	150	286	.3	091940	150	287	.3
091310	200	294	.3	091948	200	289	.3
091337	10	053	.6	092015	10	029	.4
091345	25	325	.4	092025	25	010	.35
091350	50	286	.4	092030	50	354	.3
091357	75	294	.3	092042	75	359	.3
091402	100	291	.3	092050	100	360	.3
091410	150	294	.3	092055	150		<.2
091417	200	290	.4	092102	200		<.2
091447	10	056	.6	092125	10	026	.2
091457	25	327	.6	092145	25	335	.2
091501	50	337	.4	092155	50	327	.2
091506	75	338	.5	092200	75	319	.2
091510	100	343	.2	092220	100	308	.2
091520	150	350	.4	092237	150		<.2
091526	200	359	.4	092255	200		<.2

CURRENT OBSERVATIONS

TONGUE OF THE OCEAN
24°35'N 77°34'W

TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)	TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)
092310	10		<.2	100645	10	055	.2
092345	25	319	.3	100652	25	061	.2
100005	50	328	.2	100701	50	032	.3
100012	75	308	.3	100707	75	029	.3
100020	100		<.2	100712	100	052	.5
100027	150		<.2	100730	150		<.2
100031	200		<.2	100735	200		<.2
100115	10	022	.3	100800	10	360	.2
100120	25	359	.4	100820	25	353	<.2
100125	50	360	.3	100830	50	360	<.2
100130	75	359	.3	100836	75		<.2
100136	100	360	.3	100840	100	354	.4
100142	150		<.2	100845	150		<.2
100146	200		<.2	100850	200		<.2
100218	10	022	.3	100930	10	360	.4
100233	25	360	.4	100940	25	360	.3
100236	50	070	.3	100945	50		<.2
100240	75	068	.4	100950	75		<.2
100244	100	086	.3	100955	100		<.2
100249	150		<.2	101000	150		<.2
100253	200		<.2	101005	200	088	.3
100320	10	035	.5	101030	10	306	.3
100331	25	036	.4	101036	25	328	.3
100337	50	033	.4	101042	50		<.2
100342	75	044	.5	101045	75		<.2
100347	100	067	.5	101057	100	327	<.2
100352	150		<.2	101100	150	360	<.2
100358	200		<.2	101110	200	360	.3
100427	10	044	.4	101138	10	313	.3
100434	25	036	.4	101143	25	343	.4
100439	50	034	.4	101150	50	360	.2
100445	75	061	.4	101200	75	332	<.2
100449	100	068	.5	101215	100	353	.2
100453	150		<.2	101225	150	049	.2
100500	200		<.2	101232	200	057	.35
100537	10	046	.2	101300	10	025	.4
100548	25	020	.25	101307	25	360	.4
100556	50	351	.2	101310	50	337	<.2
100559	75	007	.3	101328	75	345	.25
100612	100	021	.4	101332	100		<.2
100619	150		<.2	101337	150	032	.3
100624	200		<.2	101345	200	051	.35

CURRENT OBSERVATIONS

TONGUE OF THE OCEAN

24°35'N 77°34'W

TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)	TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)
101405	10	022	.5	102035	10	021	.5
101420	25	347	.4	102039	25	356	.3
101425	50		<.2	102044	50	319	.2
101427	75	346	.25	102050	75	354	.3
101440	100	360	.3	102055	100	359	.3
101445	150	041	.4	102100	150	049	.4
101450	200	062	.5	102105	200	066	.2
101515	10	360	.5	102140	10	360	.5
101525	25	353	.4	102144	25		<.2
101530	50	345	.3	102147	50	316	.25
101535	75	350	.2	102152	75	339	.3
101543	100	044	.4	102158	100	353	.25
101547	150	061	.45	102204	150	036	.3
101558	200	071	.5	102210	200		<.2
101645	10	020	.5	102245	10	022	.45
101655	25	358	.3	102249	25		<.2
101705	50	344	.2	102251	50	328	.2
101712	75		<.2	102257	75		<.2
101718	100	033	.3	102300	100	349	.2
101724	150	052	.3	102307	150	035	.3
101729	200	069	.3	102312	200		<.2
101746	10	026	.5	102350	10	028	.5
101750	25		<.2	102355	25	352	.3
101759	50		<.2	110002	50		<.2
101802	75		<.2	110005	75	340	.2
101805	100	359	.3	110015	100	347	.3
101810	150	050	.4	110025	150	046	.4
101817	200	061	.2	110035	200	027	.2
101840	10	025	.5	110100	10	032	.4
101843	25	357	.3	110105	25	357	.3
101850	50	345	.3	110110	50	360	.3
101856	75		<.2	110117	75	022	.3
101902	100	045	.3	110125	100	020	.3
101907	150	054	.3	110128	150	047	.4
101914	200	051	.3	110134	200	024	.3
101937	10	023	.5	110204	10	338	.4
101940	25		<.2	110208	25	353	.3
101944	50		<.2	110215	50	018	.35
101950	75		<.2	110218	75	026	.4
101955	100	359	.3	110223	100	033	.45
102000	150	044	.3	110228	150	026	.5
102005	200		<.2	110234	200	027	.5

CURRENT OBSERVATIONS

TONGUE OF THE OCEAN

24°35'N 77°34'W

TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)	TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)
110305	10	054	.5	110940	10	035	.5
110308	25	031	.6	110943	25	027	.5
110314	50	046	.6	110945	50	048	.3
110318	75	052	.5	110952	75	043	.4
110323	100	041	.5	110958	100	028	.3
110328	150	051	.5	111004	150	026	.4
110345	200	033	.5	111010	200	050	.6
110410	10	027	.6	111040	10	035	.5
110417	25	023	.5	111046	25	360	.4
110423	50	019	.5	111050	50	360	.3
110428	75	046	.6	111055	75	360	.3
110432	100	039	.5	111100	100	357	.3
110435	150	051	.5	111106	150	019	.4
110442	200	036	.5	111112	200	044	.5
110512	10	040	.4	111133	10	038	.5
110515	25	360	.4	111137	25	355	.4
110520	50	019	.6	111142	50	360	.4
110530	75	033	.4	111146	75	354	.3
110535	100	038	.5	111152	100	335	.3
110540	150	046	.5	111158	150	021	.4
110550	200	031	.5	111204	200	053	.5
110620	10	035	.5	111224	10	045	.5
110623	25	023	.5	111228	25	360	.4
110630	50	020	.3	111233	50	042	.4
110638	75	011	.3	111237	75	360	.3
110650	100	020	.3	111242	100	360	.3
110655	150	042	.4	111251	150	028	.5
110700	200	025	.5	111256	200	054	.5
110745	10	047	.6	111317	10	079	.5
110749	25	031	.5	111321	25	038	.5
110752	50	022	.4	111325	50	038	.5
110756	75	039	.4	111330	75	040	.4
110802	100	036	.4	111335	100	359	.3
110805	150	036	.4	111339	150	026	.5
110811	200	041	.5	111344	200	056	.45
110839	10	051	.6	111404	10	065	.6
110843	25	045	.5	111408	25	030	.5
110846	50	051	.4	111412	50	035	.5
110851	75	042	.5	111416	75	051	.5
110901	100	039	.5	111420	100	035	.5
110906	150	034	.4	111424	150	036	.6
110910	200	060	.5	111428	200	064	.3

CURRENT OBSERVATIONS

TONGUE OF THE OCEAN
24°35'N 77°34'W

TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)	TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)
111448	10	048	.6	112049	10	015	.4
111454	25	022	.5	112058	25		<.2
111459	50	028	.5	112100	50	045	.5
111502	75	028	.4	112105	75	059	.6
111506	100	036	.5	112110	100	063	.6
111510	150	060	.6	112115	150	063	.5
111514	200	084	.4	112120	200		<.2
111536	10	061	.8	112145	10	340	.2
111539	25	029	.5	112200	25		<.2
111542	50	064	.3	112205	50	035	.4
111550	75	054	.6	112212	75	360	.5
111553	100	059	.6	112218	100	030	.5
111557	150	068	.6	112223	150	063	.5
111600	200	087	.6	112232	200	059	.3
111708	10	062	.8	112300	10	250	.3
111720	25	057	.5	112313	25		<.2
111722	50	052	.4	112315	50	097	.3
111727	75	038	.6	112322	75	086	.4
111734	100	043	.6	112328	100	090	.4
111737	150	048	.7	112333	150	078	.4
111740	200	058	.6	112345	200		<.2
111802	10	070	.8	120014	10	170	.4
111815	25	032	.5	120020	25		<.2
111819	50	028	.6	120023	50	101	.4
111823	75	047	.6	120030	75	081	.5
111826	100	049	.6	120036	100	077	.5
111830	150	067	.6	120040	150	072	.5
111835	200	079	.6	120045	200	126	.2
111900	10	040	.3	120110	10	158	.4
111909	25		<.2	120115	25		<.2
111912	50	042	.5	120119	50	102	.4
111915	75	045	.6	120124	75	078	.5
111918	100	053	.5	120127	100	075	.5
111923	150	057	.5	120130	150	068	.5
111927	200	075	.5	120138	200		<.2
111950	10		<.2	120210	10	132	.3
111955	25		<.2	120216	25		<.2
112000	50	360	.4	120220	50	081	.3
112003	75	360	.5	120227	75	074	.6
112008	100	360	.5	120234	100	078	.6
112020	150	017	.5	120240	150	071	.6
112023	200		<.2	120245	200		<.2

CURRENT OBSERVATIONS

TONGUE OF THE OCEAN

24°35'N 77°34'W

TIME (LOCAL)	DEPTH (METERS)	DIRECTION (°TRUE)	VELOCITY (KNOTS)	TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)
120314	10	118	.35	120903	10	127	.6
120321	25		<.2	120907	25	128	.4
120323	50		<.2	120911	50	112	.4
120330	75	057	.6	120918	75	112	.4
120334	100	060	.65	120924	100	071	.6
120340	150	061	.6	120930	150	064	.7
120355	200	031	.3	120935	200	042	.5
120424	10	094	.3	120957	10	129	.7
120428	25	106	.3	121000	25	151	.5
120434	50	086	.4	121005	50	120	.2
120439	75	064	.6	121013	75	106	.4
120442	100	067	.8	121020	100	073	.5
120449	150	082	.6	121025	150	073	.7
120456	200	090	.3	121028	200	043	.5
120520	10	083	.3	121050	10	123	.8
120524	25	086	.3	121055	25	145	.4
120530	50	106	.4	121100	50	109	.2
120535	75	055	.6	121113	75	107	.3
120538	100	060	.7	121117	100	075	.5
120544	150	062	.7	121122	150	061	.7
120552	200	054	.4	121125	200	035	.6
120618	10	086	.3	121155	10	143	.7
120624	25	105	.35	121203	25	125	.4
120628	50	110	.4	121205	50	100	.2
120632	75	068	.4	121213	75	106	.3
120637	100	056	.7	121223	100	084	.5
120642	150	060	.7	121228	150	070	.6
120646	200	043	.3	121235	200	065	.5
120705	10	115	.6	121320	10	126	1.0
120710	25	147	.5	121325	25	122	.5
120716	50	118	.4	121330	50	119	.2
120730	75	097	.5	121337	75	113	.35
120733	100	080	.7	121345	100	095	.35
120750	150	090	.7	121353	150	093	.6
120755	200	064	.4	121355	200	100	.4
120810	10	113	.6	121410	10	122	1.0
120815	25	136	.4	121425	25	132	.5
120818	50	116	.5	121430	50	096	.3
120823	75	114	.4	121445	75	108	.4
120828	100	089	.6	121452	100	100	.5
120833	150	090	.7	121457	150	097	.7
120841	200	060	.4	121500	200	080	.35

CURRENT OBSERVATIONS

TONGUE OF THE OCEAN
24°35'N 77°34'W

TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)	TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)
131530	10	192	.5	132045	10	133	.5
131533	25	145	.6	132050	25	186	.6
131537	50	153	.5	132055	50	147	.5
131542	75	141	.3	132100	75	145	.5
131547	100	126	.5	132104	100	136	.5
131551	150	159	.4	132108	150	126	.5
131555	200		<.2	132115	200	128	.3
131620	10	125	.4	132135	10	129	.6
131622	25	158	.6	132145	25	153	.6
131628	50	143	.5	132150	50	147	.6
131630	75	136	.5	132154	75	135	.6
131638	100	127	.6	132158	100	135	.6
131643	150	155	.6	132200	150	125	.5
131647	200	132	.3	132205	200	117	.4
131710	10	137	.5	132223	10	129	.6
131715	25	153	.6	132228	25	150	.6
131725	50	140	.6	132230	50	128	.5
131730	75	135	.5	132238	75	145	.6
131734	100	125	.6	132248	100	128	.6
131737	150	143	.6	132253	150	130	.4
131743	200	140	.4	132255	200	135	.3
131809	10	130	.4	140010	10	128	.5
131814	25	129	.6	140020	25	168	.6
131817	50	127	.6	140024	50	136	.5
131822	75	135	.4	140027	75	127	.5
131830	100	122	.7	140030	100	120	.5
131835	150	126	.5	140034	150	135	.5
131845	200	124	.5	140040	200	132	.2
131903	10	120	.6	140103	10	133	.5
131906	25	129	.6	140106	25	168	.5
131910	50	126	.6	140112	50	162	.4
131915	75	126	.6	140116	75	129	.5
131916	100	126	.65	140120	100	138	.4
131928	150	124	.6	140125	150	135	.5
131930	200	126	.4	140129	200		<.2
131955	10	155	.5	140148	10	124	.5
132004	25	150	.4	140153	25	169	.4
132008	50	146	.5	140156	50	145	.5
132014	75	145	.5	140200	75	140	.5
132018	100	132	.6	140204	100	135	.5
132022	150	156	.5	140207	150	171	.4
132026	200	145	.3	140215	200	128	.2

CURRENT OBSERVATIONS

TONGUE OF THE OCEAN

24°35'N 77°34'W

TIME (LOCAL)	DEPTH (METERS)	DIRECTION (° TRUE)	VELOCITY (KNOTS)
140235	10	120	.6
140255	25	164	.5
140300	50	126	.4
140305	75	145	.5
140310	100	146	.4
140320	150	155	.4
140324	200	120	.2
140400	10	133	.6
140405	25	146	.6
140408	50	155	.4
140414	75	128	.6
140418	100	124	.5
140422	150	146	.5
140429	200	121	.3
140458	10	145	.6
140502	25	146	.6
140505	50	136	.5
140510	75	138	.4
140515	100	130	.4
140520	150	131	.3
140527	200	128	.2
140553	10	115	.6
140558	25	149	.5

APPENDIX VI

RADIATION DATA

The following is a listing of incident and reflected radiation data. The points were picked off the Brown recorder chart paper, averaged over 1/2 hourly intervals and tabulated.

REFLECTED RADIATION DATA

GR CALCM²

TONGUE OF THE OCEAN

24°35'N 77°34'W

HOUR SPAN	LOCATION: ST'B'D			LOCATION: PORT			LOCATION: STEM		
	9	10	11	9	10	11	9	10	11
	MARCH	MARCH	MARCH	MARCH	MARCH	MARCH	MARCH	MARCH	MARCH
0500-0530	.00	.00	.00	.00	.00	.00	.00	.00	.00
0530-0600	.00	.00	.00	.00	.00	.00	.00	.00	.00
0600-0630	.17	.05	.28	.16	.06	.51	.16	.05	.27
0630-0700	.42	3.46	.76	.29	.30	1.07	.42	.35	.60
0700-0730	.74	2.04	1.84	.51	.95	1.78	.60	1.26	1.45
0730-0800	.82	2.33	2.41	.51	1.33	2.49	.38	1.43	1.45
0800-0830	.87	2.86	2.70	.41	1.46	1.91	.66	1.50	1.57
0830-0900	1.88	2.90	2.66	.60	1.18	1.35	1.08	1.05	1.13
0900-0930	3.33	2.90	2.83	.80	.83	1.07	1.06	.79	.85
0930-1000	3.28	3.03	2.73	.69	.68	.92	1.00	.47	.58
1000-1030	2.70	3.08	2.97	.69	.55	.71	.99	.54	.40
1030-1100	2.23	2.29	2.28	.68	.52	.66	1.17	1.09	.98
1100-1130	1.75	2.00	1.93	.86	.51	.64	1.04	1.14	1.26
1130-1200	1.91	1.98	1.99	.89	.56	.61	1.04	1.13	1.27
1200-1230	1.92	2.02	1.93	.94	.61	.59	1.14	1.14	1.16
1230-1300	2.15	2.03	1.98	.80	.55	.55	1.19	1.12	1.12
1300-1330	1.86	2.04	2.05	.75	.54	.56	1.19	1.09	1.10
1330-1400	1.70	2.06	2.02	.75	.45	.46	1.04	1.05	1.07
1400-1430	1.79	1.90	2.01	.43	.59	.45	.88	1.18	1.05
1430-1500	2.27	2.41	2.17	.49	.56	.60	1.03	1.04	1.00
1500-1530	2.92	3.01	2.90	.63	.58	.54	.97	1.05	1.01
1530-1600	2.60	3.08	3.74	.65	.56	.52	.86	1.01	1.01
1600-1630	2.36	2.78	3.04	.55	.62	.50	.82	1.17	1.01
1630-1700	2.57	2.79	2.82	.51	.43	.48	1.02	.93	1.17
1700-1730	1.98	2.32	2.18	.44	.55	.42	.61	.44	.89
1730-1800	.62	1.13	1.18	.36	.39	.39	.27	.26	.47
1800-1830	.32	.22	.38	.32	.19	.34	.32	.22	.34
1830-1900	.22	.31	.39	.22	.31	.38	.22	.31	.38
1900-1930	.21	.38	.23	.21	.38	.25	.21	.38	.25
1930-2000	.17	.00	.00	.17	.00	.00	.17	.00	.00
2000-2030	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTALS	45.76	57.40	54.45	15.31	16.23	20.80	21.54	23.19	24.84

INCIDENT RADIATION DATA

GR CALCM²

TONGUE OF THE OCEAN

24°35'N 77°34'W

HOUR SPAN	LOCATION: TOP AERO SHACK				LOCATION: STEM			
	9	10	11	12	9	10	11	12
	MARCH	MARCH	MARCH	MARCH	MARCH	MARCH	MARCH	MARCH
0500-0530	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0530-0600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0600-0630	0.0	0.3	0.4	1.8	0.1	0.0	0.0	1.4
0630-0700	1.4	2.7	2.0	3.0	1.5	1.3	1.9	1.5
0700-0730	4.9	5.9	7.1	4.0	4.2	3.3	3.6	3.2
0730-0800	7.1	11.6	13.2	10.2*	5.8	6.2	6.8	7.8*
0800-0830	6.2	18.1	17.0	16.4*	5.8	11.1	11.6	12.4*
0830-0900	18.3	22.8	23.3	22.7	15.8	16.6	17.4	17.0
0900-0930	27.4	24.1	24.4	27.9	22.1	19.8	20.4	21.9
0930-1000	28.8	29.8	27.9	30.4	24.9	25.5	24.2	31.2
1000-1030	30.6	32.3	33.6	33.3	27.8	28.5	29.2	30.5
1030-1100	35.1	36.1	36.2	33.0	32.3	32.5	32.0	30.4
1100-1130	25.1	37.9	38.9	24.1	24.0	35.0	37.4	23.8
1130-1200	30.7	38.8	36.5	26.9	26.6	36.8	36.1	27.7
1200-1230	32.7	38.0	41.4	39.0	31.7	35.2	39.5	38.1
1230-1300	36.0	38.1	39.8	38.8	33.8	38.3	37.0	39.2
1300-1330	36.1	37.8	39.4	31.9	35.7	38.4	40.1	34.9
1330-1400	26.3	36.2	36.9	28.0*	27.8	37.8	37.8	31.3*
1400-1430	22.7	33.7	34.2	24.0*	24.1	36.6	37.7	27.7*
1430-1500	29.0	30.7	31.1	20.0	33.2	33.4	32.0	24.0
1500-1530	26.9	27.2	27.2	12.6	29.3	31.4	31.5	23.1
1530-1600	20.9	22.0	22.8	20.8	21.7	27.8	27.3	13.8
1600-1630	15.4	17.5	17.7	14.6	20.0	23.8	24.0	20.2
1630-1700	11.6	11.5	12.1	12.4	17.9	18.4	17.2	14.0
1700-1730	7.8	7.0	6.6	5.0	12.3	12.1	11.8	10.0*
1730-1800	3.5	2.8	2.6	0.0*	5.9	5.5	5.4	6.0*
1800-1830	0.5	0.3	0.0	0.0	1.9	0.0	0.1	2.0*
1830-1900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0*
TOTALS	485.0	563.2	572.3	480.8	486.2	555.3	562.0	493.1*

* ESTIMATED VALUES

U. S. Navy Hydrographic Office

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1. Oceanography - Tongue of the Ocean
2. Tongue of the Ocean - Oceanography

3. ASWEPS

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