

UNIVERSITY OF WASHINGTON DEPARTMENT OF OCEANOGRAPHY

AD 651 344

Technical Report No. 134

PHYSICAL, CHEMICAL, AND BIOLOGICAL DATA
FROM THE NORTHEAST PACIFIC OCEAN:
COLUMBIA RIVER EFFLUENT AREA, JANUARY-JUNE 1963

Volume V

CNAV Oshawa Cruise Oshawa-2: 22 May - 12 June
Brown Bear Cruise 327: 24 June - 1 July

Prepared by
C. M. LOVE
With the Data Analysis Staff

Scientific Program
Under the general direction of
Clifford A. Barnes

U.S. Atomic Energy Commission
Contract No. AT(45-1)-1725
RLO-1725-36

Office of Naval Research
Contracts Nonr-477(10)
and Nonr-477(37)
Project NR 083 012

Reference M66-88
March 1966



STATEMENT NO.

Distribution of This Document Unlimited



ARCHIVE COPY

SEATTLE, WASHINGTON 98105

242

UNIVERSITY OF WASHINGTON
DEPARTMENT OF OCEANOGRAPHY
Seattle, Washington 98105

Technical Report No. 134

PHYSICAL, CHEMICAL, AND BIOLOGICAL DATA FROM THE NORTHEAST PACIFIC OCEAN:

COLUMBIA RIVER EFFLUENT AREA, JANUARY - JUNE 1963

Volume V

CNAV Oshawa Cruise Oshawa-2: 22 May - 12 June
Brown Bear Cruise 327: 24 June - 1 July

Prepared by

C. M. Love

With the Data Analysis Staff

Scientific Program

Under the general direction of

Clifford A. Barnes

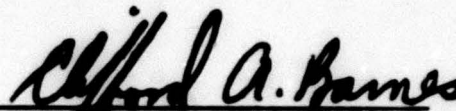
U.S. Atomic Energy Commission
Contract No. AT(45-1)-1725
RLO-1725-36

Office of Naval Research
Contracts Nonr-477(10)
and Nonr-477(37)
Project NR 083 012

Reference M65-59
March 1966



RICHARD H. FLEMING
Chairman



CLIFFORD A. BARNES
Principal Investigator

Reproduction in whole or in part is permitted
for any purpose of the United States Government

TABLE OF CONTENTS

	Page
INTRODUCTION	1
EXPLANATION OF DATA TABLES	1
Abbreviations and Headings Used in Data Tables	1
Codes Used for Reporting Observations	7
DATA TABLES	13

LIST OF FIGURES

	Page
1. Station locations Cruise <u>Oshawa-2</u> , 22 May - 12 June 1963 . . .	12
2. Station locations <u>Brown Bear</u> Cruise 327, 24 June - 1 July 1963	228

INTRODUCTION

The oceanographic
This report constitutes Volume V of Technical Report No. 134 and contains data from Cruise Oshawa-2, 22 May - 12 June 1963, and Brown Bear Cruise 327, 24 June - 1 July 1963. A discussion of the objectives of these cruises and the scientific program of which they were a part will be found in Volume I, together with descriptions of the observations made, the methods of collecting samples and the methods of determination of properties. A list of the personnel engaged in collecting and preparing the data and a bibliography will also be found in Volume I.

The cruise tracks and station locations for cruises Oshawa-2 and Brown Bear 327 will be found in Figures 1 and 2 of this volume.

The values of phosphate, silicate, and nitrate reported for Cruise Oshawa-2 were obtained from the analysis of samples which were frozen aboard ship immediately after collection and returned to Seattle for later analysis ashore. Phosphate data reported for Cruise 327 were obtained from shipboard analysis of unfrozen samples.

EXPLANATION OF DATA TABLES

The information in the data tables was transcribed directly from IBM cards using an IBM 1401 Data Processing System. A blank space in the tables or headings indicates that no observation was taken. The original data and the interpolated and computed values punched on the cards are in most cases recorded or coded in accordance with the procedures used by the National Oceanographic Data Center; however, some weather information is coded with U.S. Navy Hydrographic Office codes. The codes used to describe weather and sea conditions, etc., will be found in NODC Publication M-2 (National Oceanographic Data Center, 1964) or in H.O. Publication No. 606-c (U.S. Navy Hydrographic Office, 1956) and H.O. Publication No. 607 (U.S. Navy Hydrographic Office, 1955a). (See References in Volume I.) Some changes were made in the card format, but these do not affect the arrangement of the data in this report. Abbreviations and column headings are described below and, where necessary, the NODC or Hydrographic Office numerical codes have been reproduced to aid in interpreting the data.

Abbreviations and Headings Used in Data Tables

DATE	For Observed Values the date given is Greenwich day/month/year. For Biological Data the date given is local (ship's time, +8 zone) day/month/year.
HR (Hour)	Greenwich mean time to the nearest tenth of an hour of the messenger drop on the first cast.

LAT (Latitude and LONG (Longitude)	In degrees and minutes; or in degrees, minutes, and tenths of minutes on some stations.
SNDG (Depth of water)	Depth of water in meters at the station as determined by the ship's echo sounder. This depth was generally recorded immediately after the ship arrived on station.
WEA (Weather)	State of the weather. One of two possible codes was used for reporting present weather. A two-digit number in this space indicates use of WMO Code 4677, shown on page 9; one number preceded by an X indicates use of WMO Code 4501, shown on page 11. The X has no significance except to indicate which code was used.
WIND VEL <u> </u> DIR <u> </u> (Wind velocity and direction)	Wind velocity in knots. Wind direction, see code, page 8.
BAROM (Barometric pressure)	To obtain the barometric pressure in milli- bars, add 900 if this number is above 50; add 1000 if below 50.
TEMP DRY <u> </u> WET <u> </u> (Air temperature, dry, wet bulb)	In degrees Celsius
RELHU (Relative Humidity)	Expressed in per cent
WTRCLR (Water color)	Expressed according to the Forel-Ule scale. See code, page 10.
SECDI (Water trans- parency)	Depth in meters to which a 12-inch (30.5 cm) Secchi disk could be seen on daylight stations.
SEA <u> </u> DIR <u> </u> (Sea state and direction)	State of the sea, see code, page 8. Direc- tion from which sea was coming, see code, page 8.
SWELL <u> </u> DIR <u> </u> (Swell amount and direction)	Height and wave length of swell, see code, page 8. Direction from which swell was coming, see code, page 8.

DOM WAVE DIR HT <u> </u> PER <u> </u> (Dominant wave direction, height, and period)	Dominant wave characteristics (National Oceanographic Data Center, 1964) were reported on some cruises instead of sea and swell. Direction from which waves were coming, see code, page 8. Height of waves, see code, page 10. Period of waves, see code, page 11.
CLOUD TYPE <u> </u> AMT <u> </u> (Cloud type and amount)	Cloud type, see code, page 7. Amount of cloud cover, see code, page 7.
VIS (Visibility)	Range of visibility. See code, page 7.
WIRE ANGLE(S)	In degrees. Wire angles are tabulated only for those casts whose numbers appear in the "Cast" column at the left of the page, i.e., casts from which data were obtained. The first number is the wire angle for Cast 1, or the lowest numbered cast appearing, the second for Cast 2, etc. Dashes (- -) indicate the wire angle was not recorded for that cast.
CST (Cast)	Cast number.
DEPTH	Depth in meters from which sample was obtained.
TEMP (Temperature)	In degrees Celsius.
SAL (Salinity)	In parts per thousand (°/oo)
SIGMA-T (σ_t)	An expression for the density of sea water at atmospheric pressure, having the indicated temperature and salinity. To convert sigma-t values to density, divide by 1000 and add 1; thus sigma-t 22.42 = density 1.02242.
OXYGEN (Dissolved Oxygen)	
ML/L	In milliliters per liter
MGA/L	In milligram-atoms per liter
AOU (Apparent oxygen utilization)	In milligram-atoms per liter
SATN (Saturation)	Per cent of oxygen saturation
PHOS (Phosphate-phosphorus)	In microgram-atoms per liter ($\mu\text{g-at/l}$)

NITR (Nitrate-nitrogen)	In microgram-atoms per liter ($\mu\text{g-at/l}$)
SIL (Silicate-silicon)	In microgram-atoms per liter ($\mu\text{g-at/l}$)
CHL-A (Chlorophyll <u>a</u>)	In milligrams per cubic meter
PRODUCTIVITY, LAB-I (Incubator productivity)	Expressed as milligrams carbon assimilated per cubic meter per hour.
PRODUCTIVITY, DECK-I (Simulated <u>in situ</u> productivity)	Expressed as milligrams carbon assimilated per cubic meter per day.
LIGHT SAT	Data from light saturation experiments. Refer to text, page 6 of Volume I.
PROD (Productivity)	Productivity of sample receiving the indicated amount of illumination. Expressed as milligrams of carbon assimilated per cubic meter per hour.
FILT (Filter)	Indicates the per cent of total incubator illumination transmitted to the sample through a neutral density filter. The total incubator illumination in units of lux is listed at the bottom of the Biological Data section.
IRRAD (Irradiance)	Per cent of surface solar radiation reaching the indicated depth.
OXY (Dissolved oxygen)	Units are indicated in the column heading. In the Biological Data section oxygen is reported in milligram-atoms per liter. In the Interpolated and Computed Values oxygen is reported in milliliters per liter.
WATER COLUMN VALUES	Integrated values over the water column from the surface to the bottom of the euphotic zone for CHL-A, LAB-I, and DECK-I. The values at 100 meters and below are not included in this integration because they are below the euphotic zone.
MESSENGER TIME	Messenger time (ship's time, +8 zone) of the productivity cast.
INCOMING SOLAR RADIATION - AM ____ PM ____	Expressed in calories per square centimeter. The AM value is the integrated value of incoming radiation from sunrise to ship's noon; PM represents from ship's noon to sunset.

ZOOPLANKTON

Indicates that zooplankton samples were collected at this station. The information following indicates the type of sampler or net used, the type of tow made, the times of the tow, and the depths sampled, as follows:

(CLARKE-BUMPUS)	Clarke-Bumpus sampler
(HALF-METER NET)	Half-meter net
(MIDWATER, TRAWL)	Midwater trawl
HORIZ	Horizontal tow
VERT	Vertical tow
OBL	Oblique tow
STEP	Stepped tow
TIME (from - to)	Ship's time (+8 zone) of the tow
DEPTHS	Depths sampled

Example: Station 318-6

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0154-0204 DEPTHS 100, 70
0232-0243 30, 0

means that two horizontal tows using Clarke-Bumpus were made. The first tow began at 0154 ship's time, lasted until 0204 and sampled at 70 and 100 meters (two samplers on the wire). The second tow sampled at the surface and 30 meters and lasted from 0232 to 0243 ship's time.

LIGHT SATURATION
INCUBATOR ILLU-
MINATION

Total incubator illumination for light saturation experiments. Expressed in lux.

SP VOL ANOMALY
(Specific volume
anomaly, 10^{-6})

The anomaly of specific volume at the indicated temperature, salinity, and pressure compared to a standard water of 0°C temperature and 35 ‰ salinity, at the same pressure. Tabular values multiplied by 10^{-5} will give the anomaly in units of cubic centimeters per gram.

GEOPOT ANOMALY (Geo-
potential anomaly,
 $\Sigma\Delta D$)

Geopotential anomaly in dynamic meters of the layer of water between the surface and the indicated depth.

POT ENERGY (Potential energy anomaly)

Potential energy anomaly in units of 10^8 ergs per square centimeter of the layer of water between the surface and the indicated depth.

VAR RATIO (Variance ratio)

The ratio of the variance of the interpolation polynomial to the variance of the measurement. The value of the variance ratio is an indication of the adequacy of the vertical spacing of the observed values upon which the interpolation is based. See page 7 of Volume I. Values close to 1 indicate optimum spacing. Values greater than 3 indicate that the vertical spacing is inadequate to represent faithfully the distribution of properties in this region of the curve. In the case of missing values, where different combinations of observed values may be used to interpolate at the same depth, the variance ratio which indicates the worst spacing has been printed. Values greater than 100 have been printed as 99.99. If the observed depth corresponds to a desired standard depth, no interpolation is made and the variance ratio is not computed.

E(T) (Temperature interpolation error)

Interpolation error, in degrees Celsius, of the temperature value at this depth. For a discussion of the interpolation error, see page 7 of Volume I. If the observed depth corresponds to a desired standard depth, the interpolation error will be zero.

E(S) (Salinity interpolation error)

Interpolation error, in parts per thousand, of the salinity value at this depth. See comments under E(T) above.

E(O) (Oxygen interpolation error)

Interpolation error, in milliliters per liter, of the oxygen value at this depth. See comments under E(T) above.

*

Indicates a questionable value. See page 8 of Volume I.

†

Indicates a hand-interpolated value. See page 8 of Volume I.

Codes Used for Reporting Observations

Taken from National Oceanographic Data Center Publication M-2, "Processing Physical and Chemical Data from Oceanographic Stations," or U.S. Navy Hydrographic Office Publication No. 606-c, "Hydrographic Office Observers Manual, Bathythermograph Observations," or U.S. Navy Hydrographic Office Publication No. 607, "Instruction Manual for Oceanographic Observations."

Cloud Type (taken from NODC Publication M-2) WMO Code 0500

Code

0	Cirrus	Ci
1	Cirrocumulus	Cc
2	Cirrostratus	Cs
3	Alto cumulus	Ac
4	Altostratus	As
5	Nimbostratus	Ns
6	Stratocumulus	Sc
7	Stratus	St
8	Cumulus	Cu
9	Cumulonimbus	Cb
x	Cloud not visible owing to darkness, fog, duststorm, sandstorm, or other analogous phenomena	

Amount of Cloud Cover (taken from NODC Publication M-2) WMO Code 2700

Code

0	0	0
1	1 okta or less, but not zero	1/10 or less, but not zero
2	2 oktas	2/10 - 3/10
3	3 oktas	4/10
4	4 oktas	5/10
5	5 oktas	6/10
6	6 oktas	7/10 - 8/10
7	7 oktas or more, but not 8 oktas	9/10 or more, but not 10/10
8	8 oktas	10/10
9	Sky obscured, or cloud amount cannot be estimated	

Visibility (taken from NODC Publication M-2) WMO Code 4300

Code

0	Less than 50 metres (less than 55 yards)
1	50-200 metres (approx. 55-220 yards)
2	200-500 metres (approx. 220-550 yards)
3	500-1,000 metres (approx. 550 yards-5/8 n.m.)
4	1- 2 km (approx. 5/8-1 n.m.)

Code

5	2- 4 km	(approx. 1- 2 n.m.)
6	4-10 km	(approx. 2- 6 n.m.)
7	10-20 km	(approx. 6-12 n.m.)
8	20-50 km	(approx. 12-30 n.m.)
9	50 km or more	(30 n.m. or more)

Direction (taken from NODC Publication M-2)

Compass Direction from which Wind, Sea, or Swell is coming

Code

00	Calm, or no value
01 to 36	Each value represents 1/10 of the true direction in degrees, measured clockwise from the north, with 36 representing true north.

State of the Sea - Wind Waves (taken from NODC Publication M-2)

WMO Code 3700

Code	Description	Height (Feet)
0	Calm (Glassy)	0
1	Calm (Rippled)	0 - 1/3
2	Smooth (Wavelets)	1/3 - 1 2/3
3	Slight	1 2/3 - 4
4	Moderate	4 - 8
5	Rough	8 - 13
6	Very Rough	13 - 20
7	High	20 - 30
8	Very High	30 - 45
9	Phenomenal	over 45

Swell Conditions (taken from H.O. 606-c or H.O. 607)

Code	Approx. Height in Feet	Description	Approx. Length in Feet
0	0	No swell	0
1 2	1 - 6	Low swell	Short or average Long 0 - 600 Above 600
3 4 5	6 - 12	Moderate	Short Average Long 0 - 300 300 - 600 Above 600
6 7 8	Greater than 12	High	Short Average Long 0 - 300 300 - 600 Above 600
9	---	Confused	

NUMERICAL WEATHER CODES—PRESENT WEATHER

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Water Color (taken from NODC Publication M-2)

Forel-Ule scale and conversions from per cent yellow and
per cent brown scales

Per Cent Yellow	Per Cent Brown	Forel-Ule Scale	Code
0		I	01
2		II	02
5		III	03
9		IV	04
14		V	05
20		VI	06
27		VII	07
35		VIII	08
44		IX	09
54		X	10
65	0	XI	11
	2	XII	12
	5	XIII	13
	9	XIV	14
	14	XV	15
	20	XVI	16
	27	XVII	17
	35	XVIII	18
	44	XIX	19
	54	XX	20
	65	XXI	21

Height of Dominant Waves (taken from NODC Publication M-2) WMO Code 1555

Code

0 Less than 1/4 m (1 ft)
 1 1/2 m (1 1/2 ft)
 2 1 m (3 ft)
 3 1 1/2 m (5 ft)
 4 2 m (6 1/2 ft)
 5 2 1/2 m (8 ft)
 6 3 m (9 1/2 ft)
 7 3 1/2 m (11 ft)
 8 4 m (13 ft)
 9 4 1/2 m (14 ft)
 x Height not determined

Code If 50 is added to direction

0 5 m (16 ft)
 1 5 1/2 m (17 1/2 ft)
 2 6 m (19 ft)
 3 6 1/2 m (21 ft)
 4 7 m (22 1/2 ft)
 5 7 1/2 m (24 ft)
 6 8 m (25 1/2 ft)
 7 8 1/2 m (27 ft)
 8 9 m (29 ft)
 9 9 1/2 m (30 1/2 ft)

Period of Dominant Waves (taken from NODC Publication M-2) WMO Code 3155

Code		Code	
2	5 seconds or less	8	16 or 17 seconds
3	6 or 7 seconds	9	18 or 19 seconds
4	8 or 9 seconds	0	20 or 21 seconds
5	10 or 11 seconds	1	Over 21 seconds
6	12 or 13 seconds	x	Calm, or period not determined
7	14 or 15 seconds		

Present Weather (taken from NODC Publication M-2) WMO Code 4501

Code
figure

- 0 Clear (no cloud at any level)
- 1 Partly cloudy (scattered or broken)
- 2 Continuous layer(s) or cloud(s)
- 3 Sandstorm, duststorm, or blowing snow
- 4 Fog, thick dust or haze
- 5 Drizzle
- 6 Rain
- 7 Snow, or rain and snow mixed
- 8 Shower(s)
- 9 Thunderstorm(s)

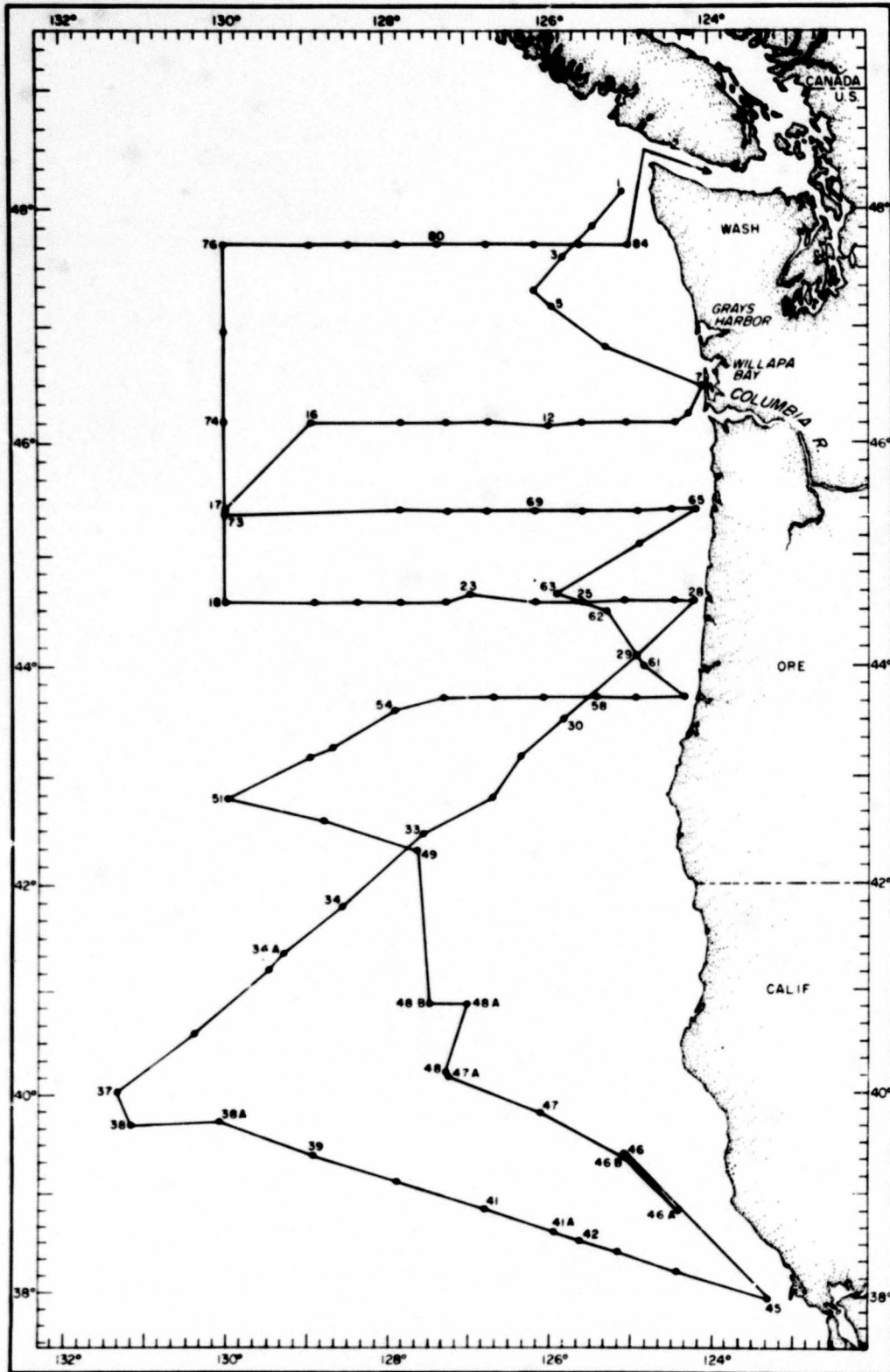


Fig. 1. Station locations Oshawa Cruise 002, 17-30 June 1963.

CNAV OSHAWA CRUISE 052 STATION 001 OBSERVED VALUES
 DATE 23/05/64 MR 06.7 LAT 48-10 N LONG 125-04 W WEA 22 WIND VEL 14 DIR 42
 BAROM 23.0 TEMP DRY 12.2 WFT 11.1 REL HU 88 WTRCLR SECDG 210 SEA 2 DIR 32 SWELL 1 DIR 27
 CLOUD TYPE AMT 2 VIS 7 WIRE ANGLE(S) 18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	12.55	30.548	23.06	8.04	0.718	-0.185	135	
1	5	12.55	30.550	23.06	8.00	0.715	-0.181	134	
1	10	12.28	30.615	23.34	8.25	0.737	-0.189	134	
1	19	9.73	31.058	23.94	6.46	0.577	-0.012	102	
1	29	9.21	31.586	24.44	5.40	0.482	0.088	85	
1	48	8.81	32.080	24.89	5.02	0.448	0.125	78	
1	72	8.30	32.864	25.58	4.26	0.380	0.197	66	
1	95	7.98	33.378	26.03	3.38	0.302	0.277	52	
1	119	7.63	33.574	26.23	2.96	0.264	0.319	45	
1	143	7.12	33.858	26.52	2.51	0.224	0.365	38	
1	167	6.98	33.991	26.65	2.43	0.217	0.374	37	

CNAV OSHAWA CRUISE 052 STATION 001 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-1	DECK-1	
0	1.47		30.442
5	1.60	0.94	30.473
10	1.01	1.22	30.746
20	0.83	3.30	31.303
100	0.90	0.00	33.451

23.36 32.70 - WATER COLUMN VALUES

MESSENGER TIME 2040

DEPTH	CNAV OSHAWA			CRUISE 052			STATION 001			INTERPOLATED AND COMPUTED VALUES							
	TEMP	(IT)		SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO					
0	12.55	0.00		30.548	0.000	23.06	481.7	0.000	0.00	8.04	0.00						
10	11.28	0.00		30.615	0.000	23.34	454.9	0.048	0.02	8.25	0.00						
20	9.69	0.01		31.115	0.003	24.00	392.7	0.090	0.09	6.32	0.01	0.88					
30	9.18	0.01		31.610	0.006	24.47	347.6	0.128	0.18	5.36	0.02	0.97					
50	8.76	0.00		32.147	0.005	24.95	302.7	0.193	0.45	4.97	0.00	0.91					
75	8.25	0.00		32.947	0.002	25.65	236.3	0.261	0.87	4.14	0.01	0.83					
100	7.91	0.00		33.430	0.012	26.08	196.0	0.315	1.36	3.27	0.01	0.77					
150	7.02	0.01		33.723	0.004	26.59	147.8	0.402	2.44	2.43	0.01	5.11					

CNAV USHAWA CRUISE 152 STATION 002 OBSERVED VALUES

DATE 23/05/63 MR CH-7 LAT 47-53 N LONG 125-27 W WEA 02 TIME VEL 14 DIR 32
 WARM 23.0 TEMP DRY 12.2 WET 11.1 WELPH 88 WTRCLM SECDI 787 SNGC 327
 CLOUD TYPE VIS 7 WIND ANGLE 20.23 SEA 3 DIR 32 SNGC 1 DIR 32

OST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	M/GAL	OXYGEN	ADU	SATN
1	0	12.59	30.777	23.23	7.49	0.960	-0.128	124	
1	5	11.44	31.205	23.77	8.02	0.716	-0.173	132	
1	9	11.08	31.163	23.80	7.24	0.64	-0.098	118	
1	19	9.77	31.701	24.46	5.92	0.529	0.035	94	
1	28	10.05	31.799	24.47	6.25	0.558	0.000	100	
1	47	9.50	32.199	24.87	6.04	0.539	0.024	96	
1	71	8.69	32.843	25.50	5.13	0.458	0.114	80	
1	94	8.01	33.319	25.97	3.95	0.353	0.226	61	
1	118	7.83	33.602	26.22	3.54	0.325	0.255	56	
1	141	7.64	33.804	26.41	3.08	0.275	0.307	47	
1	165	7.42	33.885	26.50	2.81	0.251	0.334	43	
2	185	7.28	33.903	26.54	2.61	0.233	0.354	40	
2	230	6.89	33.964	26.64	2.33	0.208	0.384	35	
2	276	6.38	34.003	26.74	2.04	0.182	0.417	30	
2	464	4.96	34.139	27.02	0.72	0.064	0.556	10	
2	712	4.28	34.268	27.20	0.67	0.060	0.570	9	

CNAV OSHAWA CRUISE 052 STATION 002 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-1	DECK-1	SAL
0	1.35	0.85		30.757
5	1.91	2.22		30.785
10	3.49	4.22		31.102
20	7.26	12.03		31.501
100	0.07	0.09		33.232

75.42 105.02 - WATER COLUMN VALUES

MESSANGER TIME 0214 INCOMING SOLAR RADIATION - AM 179 PM 242

INTERPOLATED AND COMPUTED VALUES												
DEPTH	CNAV	OSMAWA	CRUISE	OS2	STATION	OS2	SP VCL	GEOPOI	POT	CRX	ECO1	VAR
	TEMP	ECT	SAL	ES	SIGMA-T		ANOMALY	ANOMALY	ENERGY	M/S		RATIO
0	12.59	0.00	30.777	0.000	23.23		465.6	0.000	0.00	7.39	0.00	
10	10.91	0.04	31.206	0.021	23.86		405.1	0.044	0.02	7.09	0.01	1.00
20	9.69	0.03	31.719	0.007	24.47		347.7	0.082	0.08	5.93	0.03	0.85
30	10.07	0.03	31.833	0.003	24.49		345.4	0.117	0.17	4.27	0.01	0.96
50	9.40	0.00	32.279	0.006	24.95		302.3	0.182	0.43	5.95	0.01	0.86
75	8.55	0.01	32.938	0.001	25.60		241.2	0.251	0.86	4.90	0.03	0.78
100	7.94	0.02	33.403	0.005	26.05		198.3	0.306	1.35	3.84	0.04	0.73
150	7.56	0.00	33.846	0.003	26.45		160.9	0.397	2.49	2.96	0.01	0.68
200	7.16	0.00	33.923	0.002	26.57		150.5	0.475	3.89	2.50	0.01	0.91
250	6.67	0.01	33.983	0.001	26.68		140.2	0.549	5.58	2.00	0.00	0.61
300	6.15	0.01	34.022	0.000	26.78		131.2	0.617	7.51	1.85	0.02	1.21
400	5.34	0.01	34.097	0.000	26.94		116.8	0.742	11.97	1.12	0.05	1.13
500	4.79	0.00	34.161	0.000	27.06		106.6	0.855	17.16	0.81	0.14	60.08
600	4.46	0.01	34.216	0.000	27.14		99.6	0.959	23.04	0.62	0.11	65.08
700	4.29	0.00	34.263	0.000	27.19		95.1	1.057	29.60	0.65	0.02	99.99

CNAV OSHAWA CRUISE OS2 STATION 003 OBSERVED VALUES
 DATE 23/05/63 HR 13.4 LAT 47-36 N LONG 125-49 W SNRG 786 WEA 03 WIND VEL 16 DIR 33
 BAROM 21.0 TEMP DRY 11.7 WET 10.0 RELHU 81 WTRCLR SECDI SEA 2 DIR 33 SWEL 1 DIR 27
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 5

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	12.92	31.676	23.86	6.28	0.561	-0.036	107	
1	5	12.90	31.674	23.86	6.25	0.558	-0.033	106	
1	10	12.92	31.677	23.86	6.27	0.560	-0.035	107	
1	20	12.64	31.775	23.99	6.40	0.572	-0.044	108	
1	30	11.26	32.055	24.46	6.61	0.590	-0.048	109	
1	50	9.85	32.272	24.87	6.20	0.554	0.005	99	
1	75	9.12	32.797	25.40	5.21	0.465	0.101	82	
1	100	8.45	33.325	25.91	4.09	0.365	0.208	64	
1	125	8.00	33.662	26.25	3.72	0.332	0.246	57	
1	150	7.86	33.864	26.42	2.63	0.235	0.344	41	
1	175	7.57	33.903	26.50	2.64	0.236	0.347	40	

CNAV OSHAWA CRUISE OS2 STATION 003 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.12	0.24	31.667
5	0.12	0.21	31.666
10	0.12	0.20	31.668
20	0.12	0.27	31.725
2.39	4.50	-	WATER COLUMN VALUES

MESSANGER TIME 0435 INCOMING SOLAR RADIATION - AM 179 PM 242

DEPTH	CNAV OSHAMA		CRUISE 052		STATION 003		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E T	SAL	ETS	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	U/V	W/V	EIG	VAR RATIO
0	12.92	0.00	31.675	0.000	23.86	405.3	0.000	0.00	0.27	0.00	0.00	
10	12.92	0.00	31.677	0.000	23.86	405.3	0.041	0.00	0.27	0.00	0.00	
20	12.64	0.00	31.775	0.000	23.99	393.4	0.082	0.08	0.40	0.00	0.00	
30	11.26	0.00	32.055	0.000	24.40	348.6	0.119	0.18	0.61	0.00	0.00	
50	9.85	0.00	32.272	0.000	24.87	309.8	0.185	0.75	0.20	0.00	0.00	
75	9.12	0.00	32.797	0.000	25.50	260.1	0.257	0.90	0.21	0.00	0.00	
100	8.45	0.00	33.325	0.000	25.91	211.4	0.316	1.43	0.09	0.00	0.00	
150	7.86	0.00	33.864	0.000	26.42	163.8	0.411	2.61	0.63	0.00	0.00	

CNAV OSHAMA CRUISE 052 STATION 004 OBSERVED VALUES

DATE 23/05/63 HR 16.1 LAT 47-20 N LON 126-10 W SMDG 1920 WEA 02 WIND VEL 20 DIR 29
 BAROM 20.0 TEMP DRY 12.2 WET 11.1 RELHU 88 WTRCLR SEA 3 DIR 29 SWELL 2 DIR 27
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 9.28

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L		CX YGEN		ADU	SATN
					MGA/L	MG/L	ADU	SATN		
1	0	12.71	31.859	24.04	6.26	0.559	-0.032	106		
1	5	12.69	31.851	24.04	6.26	0.559	-0.032	106		
1	10	12.70	31.859	24.04	6.25	0.558	-0.031	106		
1	20	11.02	32.442	24.80	6.76	0.604	-0.060	111		
1	30	10.13	32.469	24.98	6.84	0.611	-0.056	110		
1	50	9.59	32.498	25.09	6.47	0.578	-0.016	103		
1	74	8.53	32.889	25.56	5.17	0.462	0.112	80		
1	99	7.96	33.304	25.97	4.36	0.389	0.190	67		
1	124	7.69	33.598	26.24	3.95	0.353	0.230	61		
1	149	7.55	33.829	26.44	3.19	0.285	0.298	49		
1	173	7.18	33.901	26.55	3.08	0.275	0.313	47		
2	265	6.36	33.995	26.73	2.03	0.181	0.418	30		
2	439	5.23	34.090	26.95	0.96	0.086	0.530	14		
2	657	4.31	34.227	27.16	0.36	0.032	0.598	5		
2	875	3.73	34.369	27.33	0.32	0.029	0.610	4		
2	1325	2.76	34.517	27.54	0.56	0.050	0.604	8		
2	1606	2.38	34.567	27.61	0.91	0.081	0.079	12		

CNAV OSHAWA CRUISE 052 STATION 004 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.06	0.17		31.878
5	0.04	0.22		31.880
10	0.05	0.24		31.907
20	0.12	0.29		32.210
100	0.05	0.10		33.206

1.36 4.73 - WATER COLUMN VALUES

MESSENGER TIME 0858 INCOMING SOLAR RADIATION - AM 179 PM 242

CNAV OSHAWA		CRUISE 052			STATION 004			INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	12.71	0.00	31.859	0.000	24.04	388.0	0.000	0.00	6.26	0.00				
10	12.70	0.00	31.859	0.000	24.04	388.0	0.040	0.02	6.25	0.00				
20	11.02	0.00	32.442	0.000	24.80	315.7	0.075	0.07	6.76	0.00				
30	10.13	0.00	32.469	0.000	24.98	299.3	0.106	0.15	6.84	0.00				
50	9.59	0.00	32.498	0.000	25.09	289.0	0.165	0.39	6.47	0.00				0.94
75	8.50	0.00	32.907	0.001	25.58	242.8	0.232	0.82	5.13	0.00				0.94
100	7.95	0.00	33.318	0.000	25.98	204.8	0.289	1.32	4.34	0.00				0.95
150	7.54	0.00	33.834	0.001	26.45	161.5	0.381	2.47	3.18	0.00				
200	6.88	0.03	33.945	0.009	26.63	145.1	0.458	3.85	2.11	0.05				1.31
250	6.46	0.02	33.991	0.006	26.72	136.8	0.529	5.49	2.22	0.03				0.87
300	6.10	0.01	34.018	0.003	26.79	130.9	0.597	7.39	1.75	0.02				0.89
400	5.44	0.01	34.073	0.003	26.91	119.9	0.723	11.92	1.12	0.02				0.76
500	4.93	0.01	34.127	0.000	27.01	110.7	0.840	17.28	0.72	0.01				0.75
600	4.51	0.01	34.190	0.000	27.11	102.1	0.947	23.33	0.45	0.01				0.73
700	4.18	0.01	34.257	0.001	27.20	94.3	1.046	29.95	0.33	0.01				0.77
800	3.91	0.01	34.322	0.002	27.28	87.1	1.138	37.01	0.30	0.02				0.61
1000	3.42	0.00	34.424	0.004	27.41	75.7	1.303	52.15	0.35	0.00				0.92
1200	2.99	0.00	34.490	0.004	27.50	67.2	1.448	68.45	0.45	0.00				0.87
1500	2.50	0.00	34.549	0.001	27.59	59.0	1.640	94.97	0.76	0.00				0.95

CNAV OSHAWA CRUISE 052 STATION 005 OBSERVED VALUES
 DATE 23/05/63 HR 19.5 LAT 47-12 N LCNG 125-57 W SNCG 1550 WEA 02 WIND VEL 18 DIR 32
 BAROM 21.0 TEMP DRY 14.4 WET 12.2 RELHU 77 WTRCLR SECCI SEA 2 DIR 32 SWELL 2 DIR 29
 CLOUD T-PE AMT 7 VIS 7 WIRE ANGLE(S) 26

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	12.89	31.714	23.89	6.40	0.572	-0.046	109	
1	5	12.89	31.726	23.90	6.50	0.581	-0.055	111	
1	9	12.90	31.710	23.89	6.44	0.575	-0.050	110	
1	18	11.36	32.325	24.65	6.81	0.608	-0.068	113	
1	27	10.15	32.310	24.85	6.84	0.611	-0.056	110	
1	45	9.65	32.429	25.03	6.85	0.612	-0.051	109	
1	69	9.05	32.702	25.33	5.61	0.501	0.067	88	
1	90	8.17	33.273	25.92	4.32	0.366	0.191	67	
1	113	7.89	33.606	26.22	3.70	0.330	0.249	57	
1	135	7.65	33.799	26.40	3.16	0.282	0.300	48	
1	158	7.49	33.853	26.47	3.04	0.272	0.313	46	
1	180	7.31	33.900	26.53	2.87	0.256	0.330	44	
1	280	5.82	33.954	26.77	2.36	0.211	0.397	35	

CNAV OSHAWA CRUISE OS2 STATION 005 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL
0	0.08	0.26			0.32	100		31.668
					0.28	59		
					0.34	47		
					0.38	33		
					0.09	18		
					0.03	6		
13	0.11	0.18					50	31.762
22	0.17	0.25					10	32.308
57	0.17	0.17					1	32.460
100	0.10	0.03						33.171
150	0.07							33.385
200	0.10							33.697

8.36 11.49 - WATER COLUMN VALUES

MESSANGER TIME 1142 INCOMING SOLAR RADIATION - AM 179 PM 242

LIGHT SATURATION INCUBATOR ILLUMINATION 21100

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP. VOL ANGMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	12.89	0.00	31.714	0.000	23.89	402.0	0.000	0.00	6.40	0.00	0.97
10	12.77	0.01	31.772	0.025	23.96	395.8	0.041	0.02	6.47	0.02	0.75
20	11.05	0.01	32.347	0.019	24.72	323.3	0.077	0.07	6.83	0.01	0.93
30	9.98	0.06	32.320	0.003	24.89	307.9	0.109	0.16	6.87	0.02	0.81
50	9.54	0.01	32.464	0.007	25.07	290.8	0.159	0.40	6.66	0.03	0.68
75	8.79	0.03	32.862	0.019	25.50	250.3	0.237	0.83	5.22	0.03	0.68
100	8.00	0.03	33.445	0.007	26.07	196.1	0.293	1.33	4.00	0.03	0.68
150	7.54	0.00	33.843	0.005	26.45	160.9	0.383	2.46	3.06	0.02	0.68
200	7.11	0.00	33.936	0.001	26.59	148.9	0.461	3.66	2.70	0.01	31.88
250	6.42	0.01	33.962	0.002	26.70	138.5	0.524	5.53	2.36	0.03	73.75

CNAV OSMAMA CRUISE 052 STATION 006 OBSERVED VALUES
 DATE 23/05/63 HR 23.4 LAT 46-51 N LONG 125-17 W SMOG 155 WEA 03 WIND VELOCITY DIR 33
 BAROM 21.0 TEMP ORY 14.4 WET 11.1 RECMO 67 WTRCLP SFCOT 155 SWELL 2 DIR 29
 CLOUD TYPE VIS 7 WIRE ANGLE 12.0

CS	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MG/L	OX/GEN	AOU	SA	N
1	0	12.85	31.414	23.67	6.41	0.573	0.046	1.09		
1	5	12.54	31.417	23.68	6.41	0.573	0.056	1.09		
1	10	12.37	31.663	23.95	6.59	0.589	0.057	1.11		
1	20	11.98	31.979	24.42	6.73	0.601	0.057	1.10		
1	29	10.77	32.261	24.71	6.74	0.602	0.054	1.10		
1	49	10.12	32.387	24.92	6.41	0.573	0.017	1.03		
1	77	9.52	32.585	25.17	5.33	0.476	0.086	85		
1	98	8.94	33.204	25.75	4.37	0.390	0.177	69		
1	123	8.15	33.627	26.20	3.24	0.289	0.287	50		
1	147	7.88	33.814	26.38	2.60	0.232	0.347	40		
2	181	7.34	33.930	26.55	2.45	0.219	0.367	37		
2	228	6.68	33.961	26.67	2.41	0.215	0.380	36		
2	276	6.29	33.989	26.74	2.03	0.181	0.419	30		
2	470	5.10	34.096	26.97	0.91	0.081	0.537	13		
2	710	4.24	34.281	27.21	0.36	0.032	0.598	5		
2	936	3.67	34.377	27.35	0.39	0.035	0.605	5		

CNAV OSHAWA CRUISE 052 STATION 006 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.16	0.28		31.473
13	0.19	0.44		31.413
22	0.24	0.41		31.758
57	0.58	0.24		32.406
100	0.05	0.03		33.093

18.58 19.80 - WATER COLUMN VALUES

MESSENGER TIME 1542 INCOMING SOLAR RADIATION - AM 179 PM 242

CNAV OSHAWA		CRUISE OS2			STATION 006		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP_VCL ANCMALY	GEOPT ANCMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	12.86	0.00	31.414	0.000	23.67	423.5	0.000	0.00	6.41	0.00		
10	12.37	0.00	31.663	0.000	23.95	396.5	0.042	0.02	6.59	0.00		
20	11.18	0.00	31.979	0.000	24.42	352.6	0.080	0.08	6.73	0.00		
30	10.73	0.00	32.275	0.006	24.72	323.4	0.114	0.16	6.73	0.00	0.99	
50	10.09	0.00	32.390	0.003	24.92	305.0	0.177	0.42	6.37	0.01	0.95	
75	9.50	0.00	32.609	0.004	25.19	279.8	0.251	0.89	5.29	0.00	0.94	
100	8.87	0.01	33.248	0.000	25.79	223.4	0.314	1.45	4.27	0.01	0.89	
150	7.84	0.00	33.829	0.001	26.40	166.0	0.412	2.67	2.57	0.01	0.92	
200	7.05	0.01	33.952	0.006	26.61	146.9	0.491	4.08	2.25	0.02	0.71	
250	6.48	0.01	33.974	0.000	26.70	138.4	0.563	5.74		0.02	0.60	
300	6.11	0.00	34.001	0.001	26.77	132.3	0.631	7.66	1.86	0.00	1.19	
400	5.47	0.01	34.056	0.002	26.89	121.4	0.759	12.24	1.24	0.00	1.15	
500	4.97	0.01	34.120	0.003	27.00	111.7	0.877	17.66	0.80	0.01	0.86	
600	4.58	0.02	34.198	0.006	27.11	102.3	0.985	23.75	0.52	0.01	0.68	
700	4.27	0.00	34.274	0.001	27.20	94.0	1.084	30.36	0.37	0.00	0.94	
800	4.01	0.01	34.336	0.003	27.28	87.3	1.176	37.42	0.27	0.03	5.81	

CNAV OSHAWA CRUISE 052 STATION 007 OBSERVED VALUES

NAHCOTTA

DATE 24/05/63 HR 04.1 LAT 46-31 N LONG 124-41 W MEA 02 WIND VEL 26 DIR 32
 BAROM 18.0 TEMP DRY 12.8 WET 10.6 RELHU 76 WTRCLR SNGD 475 SEA 3 DIR 32 SWELL 2 DIR 29
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 27.30 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	CXYGEN	ADU	SATN
1	0	13.77	29.774	22.23	6.33	0.565	-0.043	108	
1	5	13.77	29.768	22.22	6.36	0.568	-0.045	109	
1	10	13.77	29.790	22.22	6.37	0.569	-0.046	109	
1	19	11.59	30.722	23.35	6.62	0.591	-0.047	109	
1	28	10.39	32.252	24.77	6.78	0.606	-0.053	110	
1	46	9.59	32.535	25.12	5.72	0.511	0.051	91	
1	69	8.81	33.016	25.62	4.80	0.429	0.141	75	
1	92	8.39	33.434	26.01	3.66	0.327	0.247	57	
1	115	7.93	33.772	26.34	2.96	0.264	0.314	46	
1	138	7.70	33.858	26.44	2.46	0.220	0.361	38	
1	161	7.43	33.912	26.52	2.36	0.211	0.374	36	
1	185	7.05	33.940	26.60	2.53	0.226	0.364	38	
1	231	6.52	33.961	26.69	2.40	0.214	0.383	36	
1	277	6.05	33.993	26.77	1.95	0.174	0.430	29	

CNAV OSHAWA CRUISE 052 STATION 007 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-1	DECK-1	SAL
0	0.24	0.26		29.813
13	0.21	0.11		29.921
22	0.49	0.29		32.214
57	0.11	0.04		32.755
100	0.06	0.00		33.512

16.59 10.60 - WATER COLUMN VALUES

MESSENGER TIME 2029 INCOMING SOLAR RADIATION - AM 179 PM 242

DEPTH	CNAV OSHAWA		CRUISE 052		STATION 007		INTERPLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	13.77	0.00	29.774	0.000	22.23	561.3	0.000	0.00	6.33	0.00		
10	13.77	0.00	29.790	0.000	22.24	560.2	0.057	0.03	6.37	0.00		
20	11.42	0.01	30.882	0.026	23.52	437.7	0.107	0.10	6.65	0.01	0.86	
30	10.24	0.03	32.374	0.063	24.89	308.2	0.145	0.20	6.70	0.04	0.95	
50	9.43	0.00	32.616	0.005	25.21	277.8	0.204	0.44	5.55	0.02	0.82	
75	8.69	0.01	33.132	0.001	25.73	228.8	0.268	0.84	4.49	0.02	0.72	
100	8.22	0.01	33.570	0.007	26.14	189.9	0.320	1.31	3.38	0.01	0.67	
150	7.57	0.00	33.890	0.000	26.49	157.8	0.408	2.41	2.37	0.01	0.64	
200	6.86	0.01	33.949	0.002	26.63	144.5	0.484	3.77	2.57	0.01	0.84	
250	6.33	0.00	33.969	0.001	26.72	136.8	0.555	5.41	2.23	0.01	12.22	

CNAV OSHAWA CRUISE OS2 STATION 008 OBSERVED VALUES
 COLUMBIA RIVER ENTRANCE

DATE 24/05/63 MR 07.1 LAT 46-16 N LONG 124-16 W SNOG 71 WEA 02 WIND VEL 20 DIR 33
 BAROM 18.0 TEMP DRY 12.2 WET 10.0 RELHU 76 WTRCLR SECDJ SEA 2 DIR 33 SWELL 2 DIR 30
 CLOUD TYPE AMT 7 VIS 7 WIRL ANGLE(S) 10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.79	26.977	20.07	6.59	0.589	-0.056	110	
1	5	13.73	27.952	20.83	6.63	0.592	-0.063	112	
1	10	13.32	30.431	22.82	6.64	0.593	-0.068	113	
1	20	11.42	31.409	23.93	6.88	0.614	-0.071	113	
1	30	10.19	30.611	23.52	6.65	0.594	-0.033	106	
1	49	9.06	33.226	25.74	3.61	0.322	0.243	57	

CNAV OSHAWA CRUISE OS2 STATION 008 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	IAB-I	DECK-I	
0	0.88	1.08	26.680
2	0.77	0.59	27.844
4	0.66	0.82	28.282
8	0.42	0.45	30.194
60	0.45	0.27	33.398

5.24 5.62 - WATER COLUMN VALUES

MESSANGER TIME 2318 INCOMING SOLAR RADIATION - AM 179 PM 242

DEPTH	CNAV OSHAWA		CRUISE 052		STATION 008		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	13.79	0.00	26.977	0.000	20.07	767.8	0.000	0.00	6.59	0.00		
10	13.32	0.00	30.431	0.000	22.82	504.6	0.065	0.03	6.64	0.00		
20	11.42	0.00	31.409	0.000	23.93	398.8	0.110	0.09	6.88	0.00		
30	10.19	0.00	33.867	1.107	26.06	196.9	0.140	0.17	6.65	0.00	2.34	

CNAV OSHAWA CRUISE 052 STATION 009 OBSERVED VALUES

DATE 24/05/63 MR 08.6 LAT 46-12 N LCMG 124-26 W SMDG 128 WEA 02 WIND VEL 18 DIR 33
 BAROM 19.0 TEMP DRY . MET WTRCLR WTRCLR SEA 2 DIR 33 SWELL 2 DIR 30
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	13.88	25.736	19.10	6.33	0.565	-0.030		106
1	5	13.80	29.187	21.77	6.63	0.532	-0.068		113
1	10	11.89	30.555	23.19	6.70	0.598	-0.058		111
1	19	10.90	31.982	24.47	6.68	0.597	-0.049		109
1	29	10.56	32.253	24.74	6.65	0.594	-0.044		108
1	48	9.67	32.470	25.05	6.09	0.544	0.017		97
1	73	8.41	33.554	26.10	2.95	0.263	0.309		46
1	97	7.96	33.713	26.29	2.80	0.250	0.328		43
1	121	7.13	33.928	26.58	2.17	0.194	0.395		33

DEPTH	CNAV OSHAWA		CRUISE 052		STATION 009		INTERPLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	F(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	13.28	0.00	25.736	0.000	19.10	861.1	0.000	0.00	6.33	0.00		
10	11.89	0.00	30.555	0.000	23.19	469.8	0.068	0.02	6.70	0.00		
20	10.85	0.01	32.043	0.019	24.52	342.4	0.108	0.08	6.68	0.00	0.88	
30	10.52	0.00	32.263	0.008	24.75	320.9	0.142	0.17	6.65	0.01	0.97	
50	9.56	0.01	32.557	0.023	25.14	284.1	0.203	0.42	5.83	0.07	0.91	
75	8.37	0.01	33.583	0.012	26.13	190.7	0.263	0.78	2.89	0.04	0.88	
100	7.90	0.01	33.718	0.006	26.30	174.4	0.309	1.20	2.20	0.36	5.08	

CNAV OSHAWA CRUISE 052 STATION 010 OBSERVED VALUES
 DATE 24/05/63 HR 11.9 LAT 46-12 N LONG 125-02 W SNOG 1316 WEA 03 WIND VEL 29 DIR 32
 BAROM 19.0 TEMP DRY 12.2 WET 10.0 KELHU 76 WTRCLR SEA 2 DIR 33 SFC 102 DIR 30
 CLOUD TYPE AMT 8 VIS 7 WTRF ANGLE 5 23.23 SFCOT SEA 2 DIR 33 SFC 102 DIR 30

CS	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.56	29.252	21.87	6.22	0.556	-0.030	106	
1	5	13.55	29.251	21.87	6.24	0.557	-0.031	106	
1	9	12.70	32.040	24.18	6.34	0.566	-0.040	108	
1	18	11.1	32.356	24.61	6.56	0.586	-0.050	109	
1	27	10.35	32.379	24.87	6.82	0.609	-0.057	110	
1	46	9.65	32.464	25.05	6.32	0.564	-0.003	101	
2	69	8.81	33.029	25.63	4.76	0.425	0.144	75	
2	93	8.36	33.357	25.95	4.13	0.369	0.205	64	
2	115	7.76	33.593	26.23	3.94	0.352	0.230	61	
2	139	7.66	33.803	26.41	3.19	0.285	0.297	49	
2	165	7.36	33.897	26.52	2.95	0.263	0.322	45	
2	186	7.13	33.928	26.58	2.58	0.230	0.358	39	
2	233	6.57	33.960	26.68	2.40	0.214	0.382	36	
2	280	6.19	33.977	26.74	2.03	0.181	0.421	30	

CNAV OSHAWA CRUISE 052 STATION 010 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.30	0.84	29.196
5	0.25	0.83	29.222
10	0.34	0.71	31.983
6.45	11.58	-	WATER COLUMN VALUES

MESSANGER TIME 0420 INCOMING SOLAR RADIATION - AM 138 PM 214

DEPTH	CNAV OSHAMA			CRUISE 052			STATION 010			INTERPCLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	SAL	F(S)	SIGMA-T	SP. VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	13.56	0.00	29.252	0.000	21.87	595.7	0.000	0.00	6.23	0.00	0.97					
10	12.57	0.03	32.286	0.131	24.40	354.2	0.048	0.02	6.36	0.00	0.75					
20	11.40	0.03	32.373	0.009	24.68	327.2	0.083	0.07	6.63	0.01	0.94					
30	10.14	0.07	32.379	0.007	24.91	306.1	0.115	0.15	6.81	0.02	0.82					
50	9.49	0.01	32.553	0.018	25.15	283.4	0.174	0.39	6.05	0.05	0.74					
75	8.69	0.02	33.127	0.006	25.72	229.2	0.239	0.80	4.53	0.02	0.67					
100	8.15	0.02	33.438	0.001	26.05	198.8	0.292	1.28	4.08	0.03	0.68					
150	7.54	0.01	33.855	0.003	26.46	160.0	0.383	2.41	3.07	0.03	0.92					
200	6.96	0.01	33.941	0.001	26.61	146.4	0.460	3.79	2.49	0.04	16.74					
250	6.40	0.01	33.966	0.001	26.71	137.9	0.532	5.45	2.31	0.02						

CNAV OSHAWA CRUISE 052 STATION 011 OBSERVED VALUES

DATE 24/05/63 HR 15.6 LAT 46-12 N LONG 125-35 W SNOG 2296 MEAS 03 WIND VEL 30 DIR 33
 BAROM 20.0 TEMP DRY 11.1 WET 9.4 RELHU 81 WTRCLP SFCOT 33 SWELL 3 DIR 31
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLFIS 1.32

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		SATH	
					ML/L	MGA/L		
2	0	13.53	29.596	22.14	6.16	0.550	-0.024	105
2	4	13.51	29.596	22.14	6.17	0.551	-0.025	105
2	9	13.48	29.717	22.24	6.20	0.554	-0.028	105
2	17	10.78	32.230	24.68	6.69	0.598	-0.049	109
2	26	10.52	32.322	24.80	6.57	0.587	-0.036	107
2	43	10.28	32.326	24.84	6.63	0.592	-0.039	107
2	64	9.67	32.396	25.00	5.66	0.506	0.055	90
2	85	8.93	32.594	25.27	4.95	0.442	0.128	78
2	106	8.02	33.374	26.02	3.83	0.342	0.237	53
2	128	7.84	33.720	26.31	3.35	0.299	0.281	52
2	149	7.62	33.861	26.46	2.89	0.258	0.324	44
1	196	7.16	33.931	26.58	2.58	0.230	0.358	39
1	244	6.52	33.971	26.69	2.17	0.194	0.403	32
1	293	6.10	33.987	26.76	1.95	0.174	0.429	29
1	492	5.05	34.120	26.99	0.75	0.067	0.552	11
1	741	4.14	34.253	27.20	0.24	0.021	0.611	3
1	991	3.48	34.429	27.41	0.36	0.032	0.610	5
1	1491	2.57	34.529	27.57	0.73	0.065	0.592	10
1	1789	2.14	34.572	27.64	1.18	0.105	0.559	16

CNAV OSHAWA CRUISE 052 STATION 011 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-1	DECK-1	SAL
0	0.28	0.74		29.617
5	0.27	0.79		29.612
10	0.24	0.48		29.614
20	0.27	0.55		29.924

5.21 12.14 - WATER COLUMN VALUES

MESSENGER TIME 0811 INCOMING SOLAR RADIATION - AM 138 PM 214

CNAV OSHAWA		CRUISE 052			STATION 011		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPOT ANOMAL	POT ENERGY	OXY M/L	FCO	VAR P/ATTO	
0	13.53	0.00	29.595	0.000	22.14	569.8	0.000	0.00	6.16	0.00	0.90	
10	13.27	0.10	30.016	0.094	22.53	532.4	0.056	0.03	6.27	0.02	0.68	
20	10.51	0.11	32.425	0.105	24.88	308.5	0.098	0.09	6.65	0.03	0.88	
30	10.46	0.02	32.331	0.008	24.81	314.9	0.130	0.17	7.10	0.03	0.88	
50	10.10	0.01	32.338	0.002	24.88	308.9	0.133	0.43	6.46	0.05	0.72	
75	9.30	0.00	32.455	0.019	25.10	288.2	0.268	0.91	6.30	0.04	0.64	
100	8.25	0.03	33.144	0.035	25.80	222.0	0.332	1.47	5.14	0.04	0.70	
150	7.61	0.00	33.864	0.001	26.46	160.3	0.428	2.00	4.92	0.00	0.69	
200	7.11	0.01	33.935	0.000	26.59	148.8	0.506	4.92	4.92	0.00	0.69	
250	6.46	0.00	33.973	0.001	26.70	138.2	0.579	5.73	5.73	0.00	0.86	
300	6.05	0.00	33.991	0.001	26.77	132.3	0.647	7.05	7.05	0.00	1.09	
400	5.45	0.03	34.053	0.004	26.80	121.4	0.775	12.23	11.71	0.00	1.09	
500	5.02	0.00	34.124	0.000	27.00	112.0	0.893	17.65	0.72	0.00	0.90	
600	4.61	0.01	34.177	0.003	27.09	104.3	1.002	23.81	0.42	0.02	0.88	
700	4.27	0.00	34.231	0.000	27.17	97.2	1.104	30.60	0.26	0.01	0.90	
800	3.97	0.00	34.296	0.004	27.25	89.8	1.198	37.87	0.24	0.02	0.74	
1000	3.46	0.00	34.432	0.001	27.41	75.5	1.365	53.21	0.36	0.00	0.99	
1200	3.05	0.01	34.493	0.012	27.50	67.7	1.510	69.55	0.47	0.01	0.90	
1500	2.56	0.00	34.530	0.000	27.57	61.1	1.706	96.64	0.74	0.00	12.79	

CNAV OSHAWA CRUISE 052 STATION 012 OBSERVED VALUES

DATE 24/05/63 HR 19.6 LAT 46-10 N LONG 126-00 W WEA 02 WIND VEL 22 DIR 33
 BAROM 23.0 TEMP DRY 11.7 WET 8.3 RELHU 63 WTRCLR SECDI 2377 SEA 3 DIR 33 SWELL 3 DIR 31
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		SATN	
					ML/L	MGA/L	ADU	SATN
1	0	12.96	31.552	23.76	6.27	0.560	-0.035	107
1	5	12.96	31.540	23.75	6.36	0.568	-0.043	108
1	10	12.97	31.542	23.75	6.28	0.561	-0.036	107
1	20	10.94	32.392	24.78	6.89	0.615	-0.070	113
1	30	10.58	32.841	25.19	5.81	0.519	0.029	95
1	50	9.88	32.528	25.07	6.54	0.584	-0.026	105
1	75	9.23	32.608	25.23	6.23	0.556	0.009	98
1	99	8.28	33.322	25.94	4.19	0.374	0.201	65
1	124	7.98	33.689	26.27		0.000	0.578	0
1	148	7.77	33.856	26.43	3.00	0.268	0.312	46
1	172	7.53	33.910	26.51	2.79	0.249	0.334	43
1	197	7.29	33.948	26.57	2.59	0.231	0.355	39
1	248	6.63	33.979	26.69	2.22	0.198	0.397	33

CNAV OSHAWA CRUISE 052 STATION 012 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL
0	0.09	0.18	1.00	0.21	100	50	31.522
8	0.06	0.23	1.34	0.17	59		31.517
				0.11	47		
22	0.10	0.13	0.00	0.12	33	10	32.342
				0.03	18		
				0.00	6		
49	0.14	0.09				1	32.500
100	0.05	0.00					33.300
150							33.852
200	0.01						33.941

4.84 7.06 18.74 - WATER COLUMN VALUES

MESSANGER TIME 1150 INCOMING SOLAR RADIATION - AM 138 PM 214

LIGHT SATURATION INCUBATOR ILLUMINATION 19800

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	INTERPOLATED AND COMPUTED VALUES					VAR RATIO
						SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	
0	12.96	0.00	31.552	0.000	23.76	415.2	0.000	0.00	6.27	0.00	
10	12.97	0.00	31.542	0.000	23.75	416.4	0.042	0.02	6.28	0.00	
20	10.95	0.00	32.392	0.000	24.78	318.3	0.079	0.08	6.89	0.00	
30	10.58	0.00	32.641	0.132	25.04	293.9	0.110	0.16	6.96	0.12	1.10
50	9.88	0.00	32.528	0.000	25.07	291.4	0.169	0.40	6.54	0.00	
75	9.23	0.00	32.608	0.000	25.23	275.8	0.241	0.85	6.23	0.00	
100	8.26	0.00	33.342	0.001	25.96	207.4	0.301	1.39	4.14	0.01	0.99
150	7.75	0.00	33.863	0.001	26.44	162.3	0.395	2.56	2.98	0.00	0.89
200	7.26	0.00	33.951	0.000	26.58	149.7	0.473	3.96	2.57	0.00	6.83

CNAV OSHAWA CRUISE 052 STATION 013 OBSERVED VALUES

DATE 24/05/63 HR 23.9 LAT 46-12 N LONG 126-44 W WEA 03 WIND VEL 26 DIR 33
 BAROM 24.0 TEMP DRY 11.1 WET 9.4 RELHU 81 WTRCLR SEA 3 DIR 35 SWELL 3 DIR 32
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 12,10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	12.13	32.483	24.63	6.45	0.576	-0.045	108
1	5	12.10	32.482	24.64	6.46	0.577	-0.046	109
1	10	12.11	32.479	24.63	6.46	0.577	-0.046	109
1	20	12.02	32.494	24.66	6.44	0.575	-0.043	108
1	29	10.90	32.564	24.92	6.78	0.606	-0.060	111
1	49	9.99	32.544	25.06	6.59	0.589	-0.032	106
1	74	9.85	32.542	25.08	6.51	0.581	-0.023	104
1	98	8.55	33.297	25.89	4.37	0.390	0.182	68
1	123	8.33	33.591	26.14	3.74	0.334	0.240	58
1	147	8.16	33.838	26.36	2.96	0.264	0.311	46
1	172	7.74	33.916	26.48	2.81	0.251	0.329	43
2	198	7.40	33.954	26.56	2.55	0.228	0.357	39
2	247	6.80	33.984	26.67	2.27	0.203	0.390	34
2	297	6.30	34.004	26.75	1.98	0.177	0.424	29
2	496	5.06	34.124	27.00	0.82	0.073	0.545	12
2	742	4.18	34.286	27.22	0.25	0.022	0.609	4
2	990	3.54	34.409	27.38	0.38	0.034	0.607	5
2	1486	2.53	34.535	27.58	0.75	0.067	0.591	10
2	1781	2.11	34.575	27.64	1.16	0.104	0.561	16

CNAV OSHAWA CRUISE 052 STATION 013 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-1 DECK-1	SAL
0	0.16	0.40	32.464
8	0.13	0.41	32.461
22	0.15	0.26	32.471
49	0.33	0.34	32.550

9.71 16.00 - WATER COLUMN VALUES

MESSENGER TIME 0519 INCOMING SOLAR RADIATION - AM 138 PM 214

DEPTH	CNAV OSHAWA			CRUISE OS2			STATION O13			INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	12.13	0.00	32.483	0.000	24.63	331.6	0.000	0.00	6.45	0.00					
10	12.11	0.00	32.479	0.000	24.63	331.7	0.034	0.02	6.46	0.00					
20	12.02	0.00	32.494	0.000	24.66	329.2	0.067	0.07	6.44	0.00					
30	10.82	0.01	32.566	0.002	24.94	303.4	0.099	0.15	6.78	0.01	0.99				
50	9.99	0.02	32.536	0.005	25.05	292.4	0.159	0.40	6.61	0.02	0.95				
75	9.80	0.01	32.571	0.008	25.11	287.3	0.232	0.86	6.43	0.02	0.94				
100	8.51	0.01	33.330	0.006	25.91	211.9	0.295	1.42	4.29	0.02	0.89				
150	8.11	0.01	33.853	0.003	26.38	168.2	0.391	2.62	2.93	0.01	0.85				
200	7.37	0.00	33.956	0.000	26.57	151.0	0.471	4.05	2.54	0.00	0.98				
250	6.77	0.00	33.985	0.000	26.67	141.3	0.545	5.75	2.25	0.00	0.93				
300	6.28	0.00	34.006	0.000	26.75	134.1	0.614	7.71	1.96	0.00	1.02				
400	5.55	0.03	34.061	0.002	26.89	122.1	0.744	12.32	1.34	0.03	1.28				
500	5.04	0.00	34.127	0.000	27.00	112.1	0.862	17.77	0.80	0.00	0.98				
600	4.63	0.02	34.194	0.002	27.10	103.2	0.971	23.90	0.48	0.01	0.68				
700	4.30	0.01	34.259	0.001	27.19	95.5	1.071	30.59	0.29	0.01	0.79				
800	4.02	0.00	34.318	0.000	27.26	88.7	1.164	37.75	0.25	0.02	0.74				
1000	3.52	0.00	34.413	0.000	27.39	77.6	1.332	53.22	0.38	0.00	0.99				
1200	3.07	0.00	34.477	0.004	27.48	69.1	1.481	69.96	0.50	0.01	0.90				
1500	2.51	0.00	34.537	0.000	27.58	59.9	1.677	97.04	0.77	0.00	12.66				

CNAV OSHAWA CRUISE OS2 STATION 014 OBSERVED VALUES

DATE 25/05/63 HR 03.8 LAT 46-12 N LONG 127-16 W SMDG 2743 WEA 01 MIND VEL 30 DIR 34
 BAROM 24.0 TEMP DRY 10.6 WET 8.3 RELHU 73 WTRCLR SEA 3 DIR 34 SWELL 4 DIR 33
 CLOUD TYPE AMT 5 VIS 7 WIRE ANGLE(S) 7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	11.61	32.551	24.78	6.51	0.581	-0.045	108
1	5	11.60	32.545	24.78	6.53	0.583	-0.046	109
1	10	11.62	32.544	24.78	6.52	0.582	-0.046	109
1	20	11.58	32.549	24.79	6.56	0.586	-0.049	109
1	30	10.03	32.531	25.04	6.88	0.614	-0.059	111
1	50	9.71	32.534	25.10	6.52	0.582	-0.022	104
1	75	9.68	32.528	25.10	6.47	0.578	-0.018	103
1	100	8.34	33.015	25.69	5.11	0.456	0.120	79
1	125	7.93	33.573	26.19	3.52	0.314	0.265	54
1	150	7.76	33.759	26.36	3.20	0.286	0.295	49
1	175	7.58	33.869	26.47				
1	200	7.33	33.939	26.56	2.53	0.226	0.360	39

CNAV OSHAWA CRUISE OS2 STATION 014 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
0	0.11	0.13	32.549
8	0.10	0.13	32.544
22	0.16	0.09	32.537
49	0.23	0.06	32.525
100	0.02	0.00	33.112

7.80 4.72 - WATER COLUMN VALUES

MESSANGER TIME 1924 INCOMING SOLAR RADIATION - AM 138 PM 214

DEPTH	CNAV OSHAWA		CRUISE 052		STATION 014		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	11.61	0.00	32.551	0.000	24.78	317.4	0.000	0.00	6.51	0.00			
10	11.62	0.00	32.544	0.000	24.78	318.3	0.033	0.02	6.52	0.00			
20	11.58	0.00	32.549	0.000	24.79	317.4	0.065	0.07	6.56	0.00			
30	10.03	0.00	32.531	0.000	25.04	293.1	0.095	0.14	6.88	0.00			
50	9.71	0.00	32.534	0.000	25.10	288.2	0.154	0.38	6.52	0.00			
75	9.68	0.00	32.528	0.000	25.10	288.7	0.227	0.65	6.47	0.00			
100	8.34	0.00	33.015	0.000	25.59	232.9	0.292	1.43	5.11	0.00			
150	7.76	0.00	33.759	0.000	26.36	170.2	0.594	2.70	3.20	0.00			
200	7.33	0.00	33.939	0.000	26.56	151.6	0.475	4.14	2.53	0.00			

CNAV OSHAWA CRUISE 052 STATION 015 OBSERVED VALUES

DATE 25/05/63 HR 07.1 LAT 46-12 N LONG 127-50 W WEA 02 WIND VEL 10 DIR 35
 BAROM 25.0 TEMP DRY 10.0 WET 7.8 RELHU 74 WTRCLR SDCDI SDCDI SWELL 4 DIR 42
 CLOUD TYPE AMT 5 VIS 7 WIRE ANGLE(S) 12.3 SEA 2 DIR 35 SWELL 4 DIR 42

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
2	0	11.62	32.551	24.78	6.45	0.576	-0.039	107
2	5	11.60	32.554	24.79	6.44	0.575	-0.038	107
2	10	11.61	32.547	24.78	6.45	0.576	-0.039	107
2	20	11.58	32.542	24.78	6.45	0.576	-0.039	107
2	30	11.26	32.546	24.84	6.59	0.589	-0.048	109
2	50	9.78	32.545	25.10	6.61	0.590	-0.031	106
2	75	9.68	32.543	25.11	6.43	0.574	-0.014	102
2	100	8.76	32.828	25.48	5.54	0.495	0.076	87
2	125	7.89	33.324	26.00	4.49	0.401	0.180	69
2	150	7.60	33.708	26.34	3.70	0.330	0.253	57
2	176	7.39	33.845	26.48	3.28	0.293	0.293	50
1	186	7.20	33.890	26.54	3.11	0.278	0.310	47
1	238	6.58	33.929	26.65	2.80	0.250	0.347	42
1	287	5.97	33.948	26.75	2.41	0.215	0.390	36
1	482	4.73	34.073	26.99	0.96	0.086	0.538	14
1	729	3.96	34.249	27.22	0.03	0.003	0.633	0
1	979	3.38	34.375	27.37	0.31	0.028	0.616	4
1	1476	2.52	34.530	27.57	0.69	0.062	0.596	9
1	1773	2.12	34.575	27.64	0.11	0.010	0.655	1

CNAV OSHAWA CRUISE 052 STATION 015 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.13	0.16		32.555
8	0.12	0.14		32.552
22	0.12	0.08		32.552
49	0.11	0.13		32.541
100	0.11	0.03		32.553

5.79 5.46 - WATER COLUMN VALUES

MESSANGER TIME 2229 INCOMING SOLAR RADIATION - AM 138 PM 214

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION O15		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	11.62	0.00	32.551	0.000	24.78	317.5	0.000	0.00	6.45	0.00			
10	11.61	0.00	32.547	0.000	24.78	317.9	0.033	0.02	6.45	0.00			
20	11.58	0.00	32.542	0.000	24.78	317.9	0.065	0.07	6.45	0.00			
30	11.26	0.00	32.546	0.000	24.84	312.3	0.096	0.15	6.59	0.00			
50	9.78	0.00	32.545	0.000	25.10	288.5	0.157	0.39	6.61	0.00			
75	9.68	0.00	32.543	0.000	25.11	287.6	0.229	0.86	6.43	0.00			
100	8.76	0.00	32.828	0.000	25.48	252.9	0.297	1.47	5.54	0.00			
150	7.60	0.00	33.708	0.000	26.34	171.7	0.404	2.79	3.70	0.00			
200	7.08	0.03	33.910	0.005	26.57	150.4	0.486	4.23	3.02	0.01	0.98		
250	6.43	0.00	33.934	0.001	26.68	140.6	0.559	5.92	2.71	0.00	0.73		
300	5.85	0.01	33.955	0.001	26.77	132.4	0.628	7.86	2.30	0.00	1.10		
400	5.10	0.05	34.015	0.003	26.91	120.1	0.755	12.41	1.52	0.02	1.21		
500	4.66	0.01	34.086	0.001	27.01	110.6	0.872	17.77	0.85	0.00	0.92		
600	4.29	0.03	34.159	0.003	27.11	102.0	0.979	23.82	0.38	0.01	0.68		
700	4.02	0.01	34.229	0.001	27.19	94.5	1.078	30.44	0.08	0.00	0.85		
800	3.78	0.00	34.289	0.001	27.27	88.2	1.171	37.55	0.05	0.04	0.70		
1000	3.34	0.00	34.384	0.000	27.38	77.7	1.338	52.98	0.35	0.01	0.98		
1200	2.96	0.01	34.458	0.001	27.48	69.2	1.487	69.74	0.60	0.06	0.89		
1500	2.49	0.00	34.535	0.000	27.58	59.9	1.683	96.84	0.68	0.00	12.25		

CNAV OSHAWA CRUISE 052 STATION 016 OBSERVED VALUES

DATE 25/05/63 HR 12.6 LAT 46-12 N LONG 128-55 W WEA 01 WIND VEL 36 DIR 34
 BAROM 26.0 TEMP DRY 10.6 WET 94.4 RELHU 99 WTRCLR SEA 3 DIR 34 SWELL 3 DIR 34
 CLOUD TYPE VIS WIRE ANGLE(S) 18,10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SECDI	SATN
1	0	11.95	32.655	24.80	6.48	0.579	-0.046		109	
1	5	11.95	32.649	24.80	6.51	0.581	-0.049		109	
1	10	11.94	32.647	24.80	6.47	0.578	-0.045		108	
1	19	11.95	32.649	24.80	6.48	0.579	-0.046		109	
1	28	11.91	32.653	24.81	6.51	0.581	-0.049		109	
1	47	9.94	32.535	25.06	6.68	0.597	-0.040		107	
1	71	9.91	32.550	25.08	6.41	0.575	-0.017		103	
1	95	9.47	32.921	25.44	5.33	0.476	0.085		85	
1	116	7.62	33.170	25.91						
1	147	7.70	33.653	26.28	3.83	0.342	0.240		59	
1	167	7.37	33.831	26.47	3.68	0.329	0.257		56	
1	192	7.11	33.897	26.56	3.20	0.286	0.303		49	
1	240	6.45	33.934	26.67	2.84	0.254	0.345		42	
1	287	5.81	33.951	26.77	2.31	0.206	0.402		34	
2	495	4.70	34.116	27.03	0.75	0.067	0.557		11	
2	744	4.00	34.295	27.25	0.44	0.039	0.595		6	
2	994	3.47	34.412	27.39	0.78	0.070	0.573		11	
2	1495	2.48	34.532	27.58	0.78	0.070	0.589		11	
2	1794	2.07	34.578	27.65	1.30	0.116	0.549		17	

CNAV OSHAWA CRUISE 052 STATION 016 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.07	0.15	4.92	32.657
8	0.08	0.07		32.651
22	0.10	0.08		32.657
49	0.29	0.20		32.542
100	0.05	0.06		32.987

7.10 5.43 - WATER COLUMN VALUES

MESSENGER TIME 0521 INCOMING SOLAR RADIATION - AM 325 PM 329

CNAV OSHAWA CRUISE 052 STATION 016 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	11.95	0.00	32.655	0.000	24.80	315.7	0.000	0.00	6.48	0.00	
10	11.94	0.00	32.647	0.000	24.80	316.3	0.032	0.02	6.47	0.00	
20	11.96	0.01	32.650	0.001	24.79	316.6	0.064	0.07	6.48	0.00	0.86
30	11.72	0.07	32.642	0.004	24.83	313.3	0.096	0.15	6.53	0.01	0.96
50	9.87	0.06	32.522	0.003	25.05	291.7	0.157	0.40	6.69	0.01	0.86
75	9.91	0.03	32.103	0.010	25.12	286.8	0.230	0.86	6.28	0.01	0.80
100	9.02	0.09	32.981	0.004	25.56	245.5	0.297	1.46	5.12	0.01	0.98
150	7.66	0.01	33.687	0.000	26.31	174.1	0.402	2.77	3.81	0.01	0.78
200	7.01	0.01	33.908	0.002	26.58	149.5	0.484	4.22	3.12	0.02	0.91
250	6.31	0.00	33.938	0.001	26.70	138.8	0.557	5.89	2.73	0.01	0.77
300	5.69	0.02	33.959	0.001	26.79	130.2	0.625	7.80	2.18	0.00	1.13
400	5.00	0.10	34.032	0.007	26.93	117.6	0.750	12.27	1.31	0.00	1.40
500	4.68	0.00	34.120	0.000	27.04	108.4	0.864	17.52	0.73	0.00	0.97
600	4.35	0.02	34.197	0.002	27.13	99.8	0.969	23.45	0.48	0.04	0.68
700	4.09	0.01	34.266	0.001	27.22	92.6	1.066	29.93	0.41	0.03	0.79
800	3.87	0.00	34.326	0.001	27.29	86.5	1.157	36.90	0.50	0.03	0.75
1000	3.46	0.00	34.414	0.000	27.40	76.8	1.322	52.10	0.78	0.03	0.90
1200	3.03	0.01	34.474	0.004	27.48	68.9	1.469	68.73	0.77	0.08	0.90
1500	2.47	0.00	34.533	0.000	27.58	59.8	1.665	95.77	0.78	0.00	12.93

CNAV OSHAWA CRUISE 052 STATION 017 OBSERVED VALUES

DATE	HR	LAT	LONG	WIND	VEL	DIR	DIR					
25/05/63	18.3	45-25 N	130-00 W	02	01	01	01					
BAROM	TEMP	DRY	WET	REL	HU	SEA	WELL					
28.0	17.2	12.8	8.0	60	00	1	DIR					
CLOUD	TYPE	VIS	WIRE	ANGLE(S)	7.5	00	33					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SECDI	PHOS	NITR	SIL
1	0	12.29	32.614	24.70	6.66	0.595	-0.066	112	0.51	0.2	1	
1	5	12.24	32.612	24.71	6.68	0.597	-0.067	113	0.54	0.2	1	
1	10	12.17	32.606	24.72	6.48	0.579	-0.049	109	0.53	0.2	0	
1	20	12.12	32.620	24.74	6.43	0.574	-0.044	108	0.57	0.3	0	
1	30	12.02	32.630	24.77	6.63	0.592	-0.060	111	0.60	0.4	1	
1	50	9.88	32.554	25.09	6.41	0.573	-0.015	103	0.73	1.8	3	
1	74	9.85	32.554	25.09	6.36	0.568	-0.010	102	0.74	2.2	4	
1	99	8.70	32.870	25.52	5.60	0.500	0.072	87	1.12	11.1	11	
1	124	7.15	33.196	26.00	5.31	0.474	0.117	80	1.44	17.8	22	
1	149	7.01	33.454	26.22	4.85	0.433	0.159	73	1.47	18.7	26	
1	174	7.11	33.768	26.46	4.26	0.380	0.209	65	1.55	18.3	28	
1	200	6.96	33.891	26.57	3.85	0.344	0.247	58	1.69	23.2	35	
1	250	6.19	33.919	26.70	3.16	0.282	0.320	47	2.45	16.0	52	
1	300	5.53	33.944	26.80	2.50	0.223	0.389	36	2.60	26.0	45	
2	496	4.55	34.099	27.03	0.85	0.076	0.551	12	2.73	34.4	69	
2	743	4.09	34.312	27.25	0.32	0.029	0.604	5	2.81	31.6	77	
2	993	3.42	34.418	27.40	0.39	0.035	0.608	5	3.41	33.3	136	
2	1357	2.57	34.507	27.55	0.65	0.058	0.599	9	2.64	33.3	106	
2	1621	2.14	34.554	27.63	0.97	0.087	0.578	13	2.99	42.4	159	
2	1820	1.99	34.590	27.67	1.39	0.124	0.543	19	2.90	44.6	152	

CNAV OSHAWA CRUISE 052 STATION 017 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	PROD	LIGHT SAT	FILT	IRRAD	SAL
0	0.19	0.38	4.02	0.76	100		50	32.611
4	0.21	0.41	3.70				10	32.609
22	0.17	0.23	0.04				1	32.622
50	0.19	0.29	0.00					32.603
				1.73	59			
				0.40	47			
				0.23	33			
				0.11	18			
				0.11	6			

9.26 14.53 49.10 - WATER COLUMN VALUES

MESSANGER TIME 1145 INCOMING SOLAR RADIATION - AM 325 PM 329
 LIGHT SATURATION INCUBATOR ILLUMINATION 20000

CNAV OSHAWA		CRUISE OS2			STATION 017		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	12.29	0.00	32.614	0.000	24.70	324.8	0.000	0.00	6.66	0.00			
10	12.17	0.00	32.606	0.000	24.72	323.4	0.033	0.02	6.48	0.00			
20	12.12	0.00	32.620	0.000	24.74	321.7	0.066	0.07	6.43	0.00			
30	12.02	0.00	32.630	0.000	24.77	319.4	0.098	0.15	6.63	0.00			
50	9.88	0.00	32.554	0.000	25.09	289.4	0.159	0.40	6.41	0.00			
75	9.82	0.00	32.563	0.002	25.10	288.2	0.232	0.87	6.33	0.01	0.94		
100	8.63	0.01	32.884	0.000	25.54	246.8	0.289	1.46	5.59	0.00	0.94		
150	7.01	0.00	33.468	0.002	26.23	181.6	0.407	2.81	4.83	0.00	0.94		
200	6.96	0.00	33.891	0.000	26.57	150.2	0.491	4.29	3.85	0.00			
250	6.19	0.00	33.919	0.000	26.70	138.7	0.564	5.97	3.16	0.00			
300	5.53	0.00	33.944	0.000	26.80	129.3	0.631	7.87	2.50	0.00			
400	4.84	0.08	34.017	0.003	26.94	116.8	0.756	12.31	1.50	0.02	1.27		
500	4.54	0.00	34.103	0.000	27.04	108.0	0.869	17.53	0.83	0.00	0.98		
600	4.32	0.04	34.194	0.005	27.13	99.6	0.974	23.44	0.49	0.05	0.69		
700	4.15	0.03	34.278	0.003	27.22	92.3	1.071	29.91	0.33	0.03	0.79		
800	3.94	0.01	34.343	0.002	27.29	86.1	1.161	36.85	0.31	0.02	0.74		
1000	3.40	0.00	34.420	0.000	27.41	75.7	1.325	51.90	0.39	0.00	0.98		
1200	2.91	0.01	34.475	0.002	27.50	67.4	1.470	68.23	0.51	0.00	0.75		
1500	2.31	0.00	34.533	0.001	27.59	58.0	1.660	94.54	0.80	0.01	0.67		

CNAV OSHAWA CRUISE 052 STATION 018 OBSERVED VALUES															
DATE	26/05/63	HR	00.7	LAT	44-36 N	LONG	130-00 W	WEA	02	WIND	VEL	6	DIR	36	
BAROM	27.0	TEMP	DRY	11.1	WET	10.6	REL.HU	94	WTRCLR	SECDI	2852	SEA	1	DIR	36
CLOUD	TYPE	AMT	1	VIS	7	WIRE	ANGLE(S)	6.15				SMELL	2	DIR	34
C'T	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	MGA/L	AOU	SATN						
1	0	12.80	32.613	24.61	6.43	0.574	-0.051	110							
1	5	12.64	32.608	24.63	6.45	0.576	-0.051	110							
1	10	12.47	32.607	24.67	6.45	0.576	-0.049	109							
1	20	12.10	32.607	24.74	6.55	0.585	-0.054	110							
1	30	10.79	32.674	25.02	7.25	0.648	-0.101	119							
1	50	10.05	32.643	25.13	6.71	0.599	-0.044	108							
1	75	9.75	32.624	25.16	6.44	0.575	-0.016	103							
1	100	9.62	32.655	25.21	6.20	0.554	0.007	99							
1	125	7.65	33.038	25.81	5.60	0.500	0.085	85							
1	150	7.32	33.605	26.30	4.45	0.397	0.190	68							
1	175	7.30	33.862	26.50	3.64	0.325	0.262	55							
2	193	7.02	33.897	26.57	3.62	0.323	0.267	55							
2	242	6.21	33.931	26.70	2.97	0.265	0.337	44							
2	272	5.63	33.927	26.77	2.78	0.248	0.363	40							
2	430	4.71	34.058	26.98	1.05	0.094	0.530	15							
2	587	4.20	34.143	27.11	0.77	0.069	0.563	11							
2	869	3.47	34.346	27.34	0.26	0.023	0.620	4							
2	1019	3.15	34.416	27.43	0.29	0.025	0.624	4							

CNAV OSHAWA CRUISE 052 STATION 018 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.14	0.34		32.620
4	0.14	0.37		32.607
22	0.28	0.23		32.615
50	0.38	0.45		32.663
100	0.12	0.05		32.601

13.57 16.22 - WATER COLUMN VALUES

MESSANGER TIME 1622 INCOMING SOLAR RADIATION - AM 325 PM 329

DEPTH	CNAV OSHAWA		CRUISE 052		STATION 018		INTERPOLATED AND COMPUTED VALUES							VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)				
0	12.80	0.00	32.613	0.000	24.61	334.2	0.000	0.00	6.43	0.00				
10	12.47	0.00	32.607	0.000	24.67	328.8	0.034	0.02	6.45	0.00				
20	12.10	0.00	32.607	0.000	24.74	322.3	0.067	0.07	6.55	0.00				
30	10.79	0.00	32.674	0.000	25.02	294.9	0.098	0.15	7.25	0.00				
50	10.05	0.00	32.643	0.000	25.13	285.5	0.156	0.39	6.71	0.00				
75	9.75	0.00	32.624	0.000	25.16	282.7	0.228	0.85	6.44	0.00				
100	9.62	0.00	32.655	0.000	25.21	278.8	0.299	1.48	6.20	0.00				
150	7.32	0.00	33.605	0.000	26.30	175.5	0.413	2.88	4.45	0.00				
200	6.91	0.00	33.906	0.001	26.59	148.4	0.495	4.33	3.54	0.03			1.03	
250	6.05	0.01	33.930	0.001	26.72	136.2	0.566	5.98	2.91	0.01			0.67	
300	5.32	0.08	33.943	0.007	26.82	127.0	0.633	7.85	2.47	0.07			1.51	
400	4.73	0.08	34.025	0.008	26.96	115.0	0.755	12.21	1.37	0.07			1.10	
500	4.45	0.01	34.097	0.003	27.04	107.4	0.867	17.39	0.84	0.06			0.61	
600	4.16	0.00	34.153	0.001	27.12	100.9	0.972	23.32	0.74	0.01			0.97	
700	3.88	0.00	34.226	0.006	27.20	93.2	1.070	29.86	0.52	0.03			0.89	
800	3.63	0.00	34.298	0.005	27.29	85.8	1.161	36.82	0.35	0.02			0.90	
1000	3.19	0.00	34.410	0.001	27.42	74.0	1.323	51.68	0.27	0.00			11.85	

CNAV OSHAWA CRUISE 052 STATION 019 OBSERVED VALUES

DATE 26/05/63 HR 06.0 LAT 44-36 N LONG 128-54 W WEA 03 WIND VEL 10 DIR 01
 BAROM 26.0 TEMP DRY 11.1 WET 8.9 RELHU 75 WTRCLR SEA 1 DIR 01 SWELL 2 DIR 35
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 15, 15, 4

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SNDG	SECDI
3	0	12.21	32.618	24.72	6.44	0.575	-0.046		109	
3	5	12.21	32.620	24.72	6.35	0.567	-0.038		107	
3	10	12.22	32.615	24.72	6.43	0.574	-0.045		108	
3	20	12.05	32.614	24.75	6.44	0.575	-0.044		108	
3	30	11.87	32.622	24.79	6.52	0.582	-0.049		109	
3	50	10.22	32.622	25.08	6.47	0.578	-0.025		104	
3	75	10.25	32.643	25.09	6.32	0.564	-0.012		102	
3	100	9.09	32.716	25.34	5.94	0.531	0.037		94	
3	125	7.93	33.167	25.87	5.19	0.464	0.117		80	
3	150	8.12	33.654	26.22	3.94	0.352	0.224		61	
3	175	7.98	33.823	26.37	2.16	0.193	0.385		33	
1	190	7.71	33.892	26.47	2.34	0.209	0.372		36	
1	237	6.99	33.954	26.62	2.54	0.227	0.364		38	
1	285	6.46	33.985	26.71	2.26	0.202	0.396		34	
2	434	5.27	34.116	26.97	0.94	0.084	0.531		14	
2	958	3.59	34.384	27.36	0.40	0.036	0.605		6	
2	1454	2.50	34.521	27.57	0.66	0.059	0.599		9	
2	1753	2.09	34.571	27.64	1.16	0.104	0.562		16	

CNAV OSHAWA CRUISE 052 STATION 019 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.07	0.18		32.619
4	0.11	0.11		32.623
22	0.11			32.615
50	0.28	0.18		32.615
100	0.09			32.625

7.78 7.05 - WATER COLUMN VALUES

MESSENGER TIME 2255 INCOMING SOLAR RADIATION - AM 325 PM 329

CNAV OSHAWA		CRUISE 052		STATION 019		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	12.21	0.00	32.618	0.000	24.72	323.0	0.000	0.00	6.44	0.00		
10	12.22	0.00	32.615	0.000	24.72	323.7	0.033	0.02	6.44	0.00		
20	12.05	0.00	32.614	0.000	24.75	320.9	0.066	0.07	6.44	0.00		
30	11.87	0.00	32.622	0.000	24.79	317.3	0.098	0.15	6.52	0.00		
50	10.22	0.00	32.622	0.000	25.08	289.8	0.159	0.40	6.47	0.00		
75	10.25	0.00	32.643	0.000	25.09	289.2	0.232	0.87	6.32	0.00		
100	9.09	0.00	32.716	0.000	25.34	266.1	0.302	1.49	5.94	0.00		
150	8.12	0.00	33.654	0.000	26.22	183.1	0.415	2.89	3.94	0.00		
200	7.54	0.00	33.916	0.006	26.51	156.2	0.500	4.41	2.43	0.00	1.172	
250	6.83	0.00	33.964	0.001	26.65	143.8	0.576	6.15	2.49	0.01	0.08	
300	6.32	0.01	33.998	0.001	26.74	135.2	0.646	8.13	2.13	0.02	1.08	
400	5.50	0.01	34.085	0.002	26.91	119.6	0.775	12.72	1.25	0.04	0.81	
500	4.94	0.06	34.161	0.003	27.04	108.3	0.890	18.01	0.67	0.10	1.12	
600	4.50	0.12	34.224	0.006	27.14	99.5	0.995	23.92	0.38	0.20	1.23	
700	4.14	0.14	34.279	0.007	27.22	92.2	1.092	30.38	0.21	0.23	1.17	
800	3.86	0.12	34.326	0.006	27.29	86.4	1.182	37.33	0.18	0.19	1.00	
1000	3.48	0.00	34.399	0.000	27.38	78.1	1.349	52.66	0.39	0.00	0.88	
1200	3.00	0.00	34.462	0.002	27.48	69.3	1.498	69.49	0.44	0.00	0.73	
1500	2.42	0.00	34.530	0.000	27.58	59.5	1.694	96.53	0.72	0.00	4.07	

CNAV OSHAWA CRUISE OS2 STATION O20 OBSERVED VALUES
 DATE 26/05/63 HR 09-6 LAT 44-36 N LONG 128-22 W WEA WIND VEL 10 DIR 01
 BAROM 24.0 TEMP DRY 11.1 WET 8.3 RELHU 68 WTRCLR SECDI 2834 SEA 1 DIR 01 SWELL 1 DIR 35
 CLOUD TYPE AMT 4 VIS 7 WIRE ANGLE(S) 10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
1	0	12.14	32.590	24.71	6.32	0.564	-0.034	106
1	5	12.13	32.587	24.71	6.36	0.568	-0.037	107
1	10	12.14	32.585	24.71	6.48	0.579	-0.048	109
1	20	12.13	32.586	24.71	6.44	0.575	-0.045	108
1	29	12.06	32.596	24.73	6.53	0.583	-0.052	110
1	48	10.49	32.635	25.05	6.53	0.583	-0.033	106
1	73	10.15	32.619	25.09	6.36	0.568	-0.014	103
1	97	9.01	32.774	25.37	5.89	0.526	0.042	193
1	121	7.56	33.101	25.87	5.42	0.484	0.102	83
1	146	8.22	33.629	26.19	3.86	0.345	0.230	60
1	170	7.97	33.836	26.39	3.23	0.288	0.289	50
1	195	7.62	33.914	26.50	2.98	0.266	0.316	46
1	244	6.85	33.986	26.66	2.42	0.216	0.376	36
1	293	6.13	33.967	26.74	2.35	0.210	0.393	35

CNAV OSHAWA CRUISE OS2 STATION O20 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
0	0.10	0.15	32.599
4	0.06	0.13	32.599
22	0.10	0.08	32.592
50	0.41	0.31	32.613
100	0.12	0.02	32.598

8.86 8.06 - WATER COLUMN VALUES

MESSANGER TIME 0203 INCOMING SOLAR RADIATION - AM 228 PM 291

CNAV OSHAWA		CRUISE 052			STATION 020		INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	12.14	0.00	32.590	0.000	24.71	323.8	0.000	0.00	6.32	0.00				
10	12.14	0.00	32.585	0.000	24.71	324.4	0.033	0.02	6.48	0.00				
20	12.13	0.00	32.586	0.000	24.71	324.4	0.066	0.07	6.44	0.00				
30	11.99	0.03	32.598	0.001	24.75	321.2	0.098	0.15	6.53	0.00				0.98
50	10.44	0.03	32.632	0.003	25.05	292.7	0.160	0.40	6.53	0.00				0.91
75	10.08	0.01	32.622	0.001	25.11	288.0	0.233	0.87	6.33	0.00				0.88
100	8.78	0.04	32.778	0.002	25.44	256.9	0.302	1.48	5.86	0.02				0.84
150	8.21	0.02	33.678	0.004	26.23	182.6	0.413	2.86	3.71	0.01				0.79
200	7.54	0.00	33.926	0.000	26.52	155.5	0.498	4.37	2.91	0.01				0.95
250	6.76	0.00	33.991	0.002	26.68	140.7	0.573	6.09	2.37	0.00				14.02

CNAV OSHAWA CRUISE OS2 STATION O21 OBSERVED VALUES

DATE 26/05/63 HR 12.0 LAT 44-36 N LONG 127-50 W SNCG 2834 WEA 03 WIND VEL 12 DIR 35
 BAROM 24.0 TEMP DRY 10.6 WET 8.3 RELHU 73 MTRCLR SEA 1 DIR 01 SWELL 1 DIR 35
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 12,18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	12.12	32.574	24.71	6.43	0.574	-0.043		108
1	5	12.10	32.577	24.71	6.52	0.582	-0.051		110
1	10	12.11	32.570	24.70	6.50	0.581	-0.050		109
1	20	12.08	32.576	24.71	6.46	0.577	-0.046		109
1	29	10.53	32.609	25.02	6.94	0.620	-0.070		113
1	49	10.09	32.590	25.08	6.56	0.586	-0.031		106
1	73	10.21	32.636	25.09	6.35	0.567	-0.014		103
1	98	7.99	32.945	25.68	5.63	0.503	0.078		87
1	122	8.06	33.331	25.98	4.47	0.399	0.179		69
1	147	8.22	33.648	26.20	3.54	0.316	0.259		55
1	171	7.83	33.788	26.37	3.53	0.315	0.264		54
2	186	7.31	33.834	26.48	3.76	0.336	0.251		57
2	233	6.67	33.927	26.64	3.45	0.308	0.287		52
2	279	6.04	33.922	26.72	3.06	0.273	0.329		45
2	466	4.59	34.046	26.99	0.95	0.085	0.541		14
2	699	3.95	34.240	27.21	0.36	0.032	0.603		5
2	933	3.69	34.401	27.36	0.37	0.033	0.606		5
2	1412	2.66	34.517	27.55	0.64	0.057	0.598		9
2	1704	2.17	34.563	27.63	1.06	0.095	0.569		14

CNAV OSHAWA CRUISE 052 STATION 021 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.17	0.27	2.36	32.584
4	0.14	0.13		32.580
22	0.20	0.25		32.584
50	0.65	0.28		32.599
100	0.04	0.01		32.901

15.68 11.64 - WATER COLUMN VALUES

MESSENGER TIME 0414 INCOMING SOLAR RADIATION - AM 228 PM 291

CNAV OSHAWA		CRUISE OS2		STATION 021		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANGMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	12.12	0.00	32.574	0.000	24.71	324.7	0.000	0.00	6.43	0.00	
10	12.11	0.00	32.570	0.000	24.70	325.0	0.033	0.02	6.50	0.00	
20	12.08	0.00	32.576	0.000	24.71	324.2	0.066	0.07	6.46	0.00	
30	10.45	0.03	32.609	0.001	25.03	294.2	0.097	0.15	6.94	0.02	0.99
50	10.11	0.02	32.589	0.001	25.07	290.5	0.156	0.39	6.55	0.00	0.95
75	10.03	0.06	32.654	0.002	25.14	284.9	0.228	0.85	6.31	0.00	0.89
100	7.95	0.03	32.977	0.002	25.72	230.2	0.293	1.43	5.54	0.01	0.88
150	8.20	0.00	33.672	0.001	26.22	182.9	0.397	2.73	3.50	0.01	0.84
200	7.04	0.05	33.871	0.001	26.55	152.7	0.482	4.23	3.75	0.05	1.12
250	6.43	0.00	33.930	0.004	26.57	141.0	0.556	5.94	3.31	0.00	0.64
300	5.81	0.02	33.929	0.003	26.75	133.9	0.625	7.89	2.81	0.04	1.18
400	4.95	0.04	33.987	0.008	26.90	120.4	0.754	12.47	1.66	0.09	1.15
500	4.44	0.02	34.074	0.001	27.03	109.1	0.869	17.80	0.77	0.03	0.84
600	4.12	0.04	34.157	0.003	27.13	100.1	0.975	23.75	0.44	0.07	0.67
700	3.95	0.00	34.241	0.000	27.21	92.8	1.073	30.25	0.36	0.00	0.99
800	3.82	0.02	34.316	0.001	27.28	86.7	1.163	37.24	0.32	0.02	0.61
1000	3.56	0.02	34.427	0.005	27.40	77.0	1.329	52.47	0.38	0.00	0.94
1200	3.14	0.04	34.486	0.010	27.48	69.2	1.477	69.16	0.47	0.01	0.89
1500	2.48	0.01	34.528	0.002	27.58	60.3	1.674	96.36	0.74	0.00	9.91

CNAV OSHAWA CRUISE OS2 STATION 022 OBSERVED VALUES
 DATE 26/05/63 HR 15.3 LAT 44-36 N LON 127-16 W WEA 02 WIND VEL 10 DIR 36
 BAROM 24.0 TEMP DRY 11.1 WET 8.3 RELHU 68 WTRCLR SEA 1 DIR 36 SWELL 2 DIR 36
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 10 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	12.06	32.558	24.70	6.38	0.570	-0.038		107
1	5	12.06	32.557	24.70	6.43	0.574	-0.043		108
1	10	12.07	32.559	24.70	6.38	0.570	-0.038		107
1	20	12.07	32.555	24.70	6.35	0.567	-0.036		107
1	29	11.72	32.559	24.77	6.52	0.582	-0.047		109
1	48	9.91	32.538	25.07	6.51	0.581	-0.024		104
1	72	10.00	32.592	25.10	6.27	0.560	-0.004		101
1	96	8.07	32.962	25.69	5.58	0.498	0.081		86
1	121	8.03	33.449	26.07	5.49	0.490	0.088		85
1	144	8.11	33.751	26.30	3.23	0.288	0.288		50
1	169	7.67	33.876	26.46	2.98	0.266	0.315		46
1	195	7.31	33.928	26.55	2.87	0.256	0.330		44

CNAV OSHAWA CRUISE OS2 STATION 022 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.03	0.25	32.562
4	0.13	0.20	32.563
22	0.11	0.16	32.566
50	0.12	0.15	32.563
5.59	8.45	-	WATER COLUMN VALUES

MESSANGER TIME 0729 INCOMING SOLAR RADIATION - AM 228 PM 291

CNAV OSHAWA		CRUISE OS2		STATION O22		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	12.06	0.00	32.558	0.000	24.70	324.8	0.000	0.00	6.38	0.00	
10	12.07	0.00	32.559	0.000	24.70	325.1	0.033	0.02	6.38	0.00	
20	12.07	0.00	32.555	0.000	24.70	325.6	0.066	0.07	6.35	0.00	
30	11.62	0.03	32.558	0.001	24.79	317.7	0.098	0.15	6.53	0.00	0.98
50	9.91	0.06	32.535	0.003	25.07	291.3	0.160	0.40	6.50	0.00	0.91
75	9.76	0.07	32.627	0.004	25.16	282.6	0.232	0.86	6.18	0.02	0.84
100	7.99	0.04	33.042	0.006	25.76	225.9	0.296	1.43	5.63	0.07	0.81
150	8.03	0.02	33.794	0.004	26.34	171.4	0.396	2.68	3.06	0.07	0.75

CNAV OSHAWA CRUISE OS2 STATION O23 OBSERVED VALUES

COMPARISON STATION WITH RV BROWN BEAR AND RV ACONA

DATE 26/05/63 HR 18.2 LAT 44-40 N LONG 126-59 W SNDG 2743 WEA 02 WIND VEL 10 DIR 33
 BAROM 25.0 TEMP DRY 13.3 WET 10.6 RELHU 72 WTRCLR SEA 1 DIR 33 SWELL 2 DIR 32
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 20, 8 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
2	0	12.14	32.553	24.69	6.36	0.568	-0.037	107	107
2	5	12.09	32.554	24.70	6.29	0.562	-0.031	106	106
2	10	12.07	32.550	24.70	6.33	0.565	-0.034	106	106
2	20	12.01	32.551	24.71	6.32	0.564	-0.032	106	106
2	30	11.61	32.527	24.76	6.41	0.573	-0.036	107	107
2	50	10.19	32.536	25.02	6.36	0.568	-0.014	103	103
2	74	9.46	32.883	25.41	5.36	0.479	0.083	85	85
2	99	8.39	33.513	26.07	3.95	0.353	0.220	62	62
2	124	8.09	33.764	26.31	3.29	0.294	0.282	51	51
2	149	7.92	33.893	26.44	2.88	0.257	0.321	45	45
2	174	7.71	33.905	26.48	2.79	0.249	0.332	41	41
1	182	7.77	33.917	26.48	2.64	0.236	0.344	41	41
1	229	7.02	33.972	26.63	2.49	0.222	0.368	38	38
1	276	6.42	33.986	26.72	2.07	0.185	0.414	31	31
1	462	5.08	34.121	26.99	0.81	0.072	0.546	12	12
1	694	4.26	34.294	27.22	0.27	0.024	0.606	4	4
1	925	3.68	34.404	27.37	0.47	0.042	0.597	7	7
1	1390	2.68	34.519	27.55	0.63	0.056	0.599	9	9
1	1601	2.19	34.565	27.63	1.04	0.093	0.571	14	14

CNAV OSHAWA CRUISE 052 STATION 023 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL
0	0.06	0.11	0.56	0.07	100	50	32.554
9	0.04	0.10	1.98	0.06	59	10	32.553
35	0.03	0.14	0.20				32.554
60	0.02	0.12	0.00	0.32	47		
	2.09	7.30	42.28	0.05	33		
				0.04	18		
				0.00	6		
						1	32.555

WATER COLUMN VALUES

MESSANGER TIME 1128 INCOMING SOLAR RADIATION - AM 228 PM 291

LIGHT SATURATION INCUBATOR ILLUMINATION 19800

CNAV OSHAWA				CRUISE 052				STATION 023				INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO						
0	12.14	0.00	32.553	0.000	24.69	326.6	0.000	0.00	6.36	0.00							
10	12.07	0.00	32.550	0.000	24.70	325.8	0.033	0.02	6.33	0.00							
20	12.01	0.00	32.551	0.000	24.71	324.8	0.066	0.07	6.32	0.00							
30	11.61	0.00	32.527	0.000	24.76	319.8	0.099	0.15	6.41	0.00							
50	10.19	0.00	32.536	0.000	25.02	295.7	0.161	0.40	6.36	0.00							
75	9.41	0.01	32.909	0.004	25.44	256.3	0.230	0.84	5.30	0.01	0.94						
100	8.37	0.00	33.528	0.002	26.08	195.2	0.287	1.34	3.91	0.00	0.94						
150	7.92	0.00	33.895	0.001	26.44	162.3	0.377	2.48	2.87	0.00	0.96						
200	7.44	0.01	33.936	0.004	26.54	153.4	0.457	3.90	2.64	0.02	0.87						
250	6.74	0.00	33.980	0.002	26.67	141.3	0.531	5.61	2.32	0.01	0.60						
300	6.18	0.02	34.000	0.002	26.76	133.3	0.600	7.57	1.87	0.00	1.19						
400	5.40	0.04	34.069	0.005	26.91	119.7	0.728	12.12	1.15	0.00	1.09						
500	4.91	0.02	34.151	0.002	27.04	108.7	0.843	17.42	0.66	0.01	0.83						
600	4.52	0.03	34.227	0.003	27.14	99.5	0.948	23.35	0.38	0.02	0.68						
700	4.24	0.00	34.297	0.000	27.22	92.0	1.045	29.80	0.27	0.00	0.97						
800	3.98	0.01	34.351	0.001	27.29	85.9	1.135	36.72	0.32	0.03	0.60						
1000	3.51	0.01	34.428	0.003	27.40	76.4	1.299	51.83	0.47	0.03	0.95						
1200	3.08	0.01	34.482	0.005	27.49	68.9	1.446	68.42	0.52	0.05	0.99						
1500	2.43	0.00	34.541	0.001	27.59	58.8	1.640	95.19	0.80	0.01	5.49						

CNAV OSHAWA CRUISE OS2 STATION 024 OBSERVED VALUES
 DATE 26/05/63 HR 22.5 LAT 44-36 N LONG 126-10 W SNDG 2907 WEA 03 WIND VEL 10 DIR 33
 BAROM 25.0 TEMP DRY 17.2 WET 12.8 RELHU 60 WTRCLR SEA 1 DIR 33 SWELL 1 DIR 32
 CLOUD TYPE AMT 6 VIS 7 WIRE ANGLE(S) 10,10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	12.45	32.656	24.71	6.28	0.561	-0.034	106	106
1	5	12.30	32.653	24.73	6.32	0.564	-0.036	107	107
2	10	12.22	32.643	24.74	6.38	0.570	-0.040	108	108
2	20	12.13	32.641	24.76	6.32	0.564	-0.034	106	106
2	30	12.13	32.648	24.76	6.37	0.569	-0.038	107	107
2	49	10.33	32.550	25.01	5.35	0.567	-0.015	103	103
2	74	9.65	32.817	25.33	5.52	0.493	0.067	88	88
2	99	8.20	33.437	26.04	4.17	0.372	0.204	65	65
2	123	8.21	33.778	26.30	3.19	0.285	0.290	50	50
2	148	7.83	33.919	26.47	2.98	0.266	0.313	46	46
2	173	7.46	33.928	26.53	2.72	0.243	0.341	42	42
2	197	7.17	33.955	26.59	2.61	0.233	0.355	40	40
2	246	6.27	33.938	26.70	2.88	0.257	0.344	43	43
2	295	5.93	33.970	26.77	2.24	0.200	0.406	33	33

CNAV OSHAWA CRUISE OS2 STATION 024 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.11	0.45	32.653
9	0.10	0.48	32.646
35	0.10	0.33	32.655
60	0.27	0.44	32.580

8.18 24.40 - WATER COLUMN VALUES

MESSANGER TIME 1440 INCOMING SOLAR RADIATION - AM 228 PM 291

CNAV OSHAWA		CRUISE OS2			STATION 024			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	12.45	0.00	32.656	0.000	24.71	324.6	0.000	0.00	6.28	0.00		
10	12.22	0.00	32.643	0.000	24.74	321.6	0.033	0.02	6.38	0.00		
20	12.13	0.00	32.641	0.000	24.76	320.4	0.065	0.07	6.32	0.00		
30	12.13	0.00	32.648	0.000	24.76	320.1	0.098	0.15	6.37	0.00		
50	10.29	0.02	32.553	0.001	25.02	296.1	0.160	0.40	6.33	0.00	0.95	
75	9.59	0.01	32.841	0.004	25.36	264.0	0.230	0.85	5.47	0.01	0.94	
100	8.19	0.01	33.456	0.000	26.06	198.0	0.288	1.36	4.12	0.00	0.94	
150	7.80	0.00	33.922	0.002	26.48	158.6	0.378	2.49	2.96	0.00	0.89	
200	7.11	0.01	33.955	0.001	26.60	147.5	0.455	3.87	2.63	0.02	0.97	
250	6.21	0.01	33.960	0.014	26.73	135.9	0.527	5.51	2.63	0.16	14.57	

CNAV OSHAWA CRUISE 052 STATION 025 OBSERVED VALUES

DATE 27/05/63 HR 00.9 LAT 44-36 N LONG 125-35 W WIND VEL 10 DIR 33
 BAROM 23.0 TEMP DRY 13.3 WET 10.0 RELHU 66 WTRCLR SEA 2 DIR 33 SWELL 2 DIR 34
 CLOUD TYPE AMT 4 VIS 7 WIRE ANGLE(S) 0.15 SDCI 2889 HEA 02

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.23	31.994	24.04	6.18	0.552	-0.031	106	
1	5	13.11	32.001	24.07	6.10	0.545	-0.023	104	
1	10	12.91	32.090	24.18	6.23	0.556	-0.033	106	
1	20	12.70	32.582	24.60	6.34	0.566	-0.042	108	
1	30	12.08	32.682	24.80	6.35	0.567	-0.036	107	
1	50	10.68	32.616	25.00	6.50	0.581	-0.033	106	
1	75	10.32	32.855	25.25	5.50	0.491	0.060	89	
1	100	9.09	33.439	25.90	3.98	0.355	0.209	63	
1	125	8.69	33.705	26.17	3.16	0.282	0.286	50	
1	150	8.12	33.827	26.36	2.52	0.225	0.350	39	
1	176	7.56	33.949	26.53	2.17	0.194	0.389	33	
2	189	7.38	33.976	26.58	2.14	0.191	0.394	33	
2	237	6.89	34.034	26.69	1.89	0.169	0.423	29	
2	285	6.38	34.055	26.78	1.55	0.138	0.461	23	
2	478	5.40	34.160	26.98	0.74	0.066	0.547	11	
2	725	4.39	34.305	27.21	0.34	0.030	0.598	5	
2	975	3.65	34.406	27.37	0.39	0.035	0.605	5	
2	1475	2.57	34.538	27.58	0.75	0.067	0.590	10	
2	1773	2.09	34.579	27.65	1.21	0.108	0.557	16	

BIOLOGICAL DATA

STATION 025

CRUISE 052

CNAV OSHAWA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.12	0.25		31.998
9	0.11	0.26		32.161
35	0.30	0.23		32.620
60	0.23	0.15		32.660
100	0.04	0.07		33.537

13.21 13.42 - WATER COLUMN VALUES

MESSANGER TIME 1755 INCOMING SOLAR RADIATION - AM 228 PM 291

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION O25		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	13.23	0.00	31.994	0.000	24.04	387.7	0.000	0.00	6.18	0.00			
10	12.91	0.00	32.090	0.000	24.18	374.9	0.039	0.02	6.23	0.00			
20	12.70	0.00	32.582	0.000	24.60	335.1	0.075	0.07	6.34	0.00			
30	12.08	0.00	32.682	0.000	24.80	316.7	0.107	0.16	6.35	0.00			
50	10.68	0.00	32.616	0.000	25.00	297.8	0.169	0.41	6.50	0.00			
75	10.32	0.00	32.855	0.000	25.25	274.7	0.241	0.87	5.50	0.00			
100	9.09	0.00	33.439	0.000	25.90	212.6	0.303	1.41	3.98	0.00			
150	8.12	0.00	33.827	0.000	26.36	170.3	0.399	2.62	2.52	0.00			
200	7.26	0.01	33.994	0.001	26.61	146.5	0.479	4.04	2.10	0.00	1.24		
250	6.75	0.00	34.041	0.001	26.72	136.9	0.551	5.69	1.80	0.00	0.72		
300	6.27	0.02	34.062	0.000	26.80	129.8	0.618	7.58	1.46	0.01	1.12		
400	5.68	0.06	34.115	0.001	26.92	119.7	0.744	12.08	0.99	0.02	1.20		
500	5.30	0.00	34.174	0.001	27.01	111.8	0.861	17.47	0.68	0.00	0.90		
600	4.87	0.00	34.234	0.002	27.11	103.1	0.969	23.58	0.47	0.01	0.68		
700	4.48	0.00	34.291	0.001	27.19	95.3	1.069	30.27	0.35	0.00	0.86		
800	4.15	0.01	34.339	0.001	27.27	88.7	1.162	37.42	0.33	0.01	0.69		
1000	3.59	0.00	34.415	0.000	27.38	78.2	1.331	52.96	0.40	0.00	0.97		
1200	3.11	0.01	34.476	0.001	27.48	69.6	1.481	69.83	0.50	0.01	0.89		
1500	2.53	0.00	34.542	0.000	27.58	59.8	1.678	96.98	0.78	0.00	12.33		

CNAV OSHAWA CRUISE OS2 STATION 026 OBSERVED VALUES

DATE 27/05/63 HR 04.2 LAT 44-36 N LONG 125-02 W WEA 02 WIND VEL 8 DIR 34
 BAROM 23.0 TEMP DRY 12.8 WEI 10.0 RELHU 70 WTRCLR SNDCG SEA 2 DIR 33 SMELL 2 DIR 35
 CLOUD TYPE AMT 6 VIS 7 WIRE ANGLE(S) 5 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	13.05	30.343	22.81	6.19	0.553	-0.024	105
1	5	13.04	30.370	22.83	6.23	0.556	-0.028	105
1	10	12.50	30.788	23.25	6.31	0.564	-0.031	106
1	20	11.47	31.982	24.37	6.54	0.584	-0.044	108
1	30	10.68	32.312	24.76	6.62	0.591	-0.043	108
1	50	10.26	32.455	24.95	6.22	0.556	-0.002	100
1	75	9.60	32.987	25.47	5.08	0.454	0.106	81
1	100	8.84	33.607	26.07	3.61	0.322	0.244	57
1	125	8.45	33.812	26.29	2.91	0.260	0.311	46
1	150	8.10	33.910	26.42	2.61	0.233	0.342	41
1	170	7.79	33.962	26.51	2.34	0.209	0.370	36
1	200	7.50	33.994	26.58	2.18	0.195	0.389	33
1	250	6.97	34.033	26.68	1.94	0.173	0.417	29
1	299	6.50	34.045	26.76	1.70	0.152	0.445	25

CNAV OSHAWA CRUISE OS2 STATION 026 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.13	0.08	30.333
9	0.19	0.06	30.797
35	0.53	0.18	32.195
60	0.60	0.16	32.474

24.81 7.96 - WATER COLUMN VALUES

MESSANGER TIME 2028 INCOMING SOLAR RADIATION - AM 228 PM 291

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION 026		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	13.05	0.00	30.343	0.000	22.81	505.9	0.000	0.00	6.19	0.00		
10	12.50	0.00	30.788	0.000	23.25	463.3	0.049	0.00	6.31	0.00		
20	11.47	0.00	31.982	0.000	24.37	357.4	0.091	0.09	6.54	0.00		
30	10.68	0.00	32.312	0.000	24.76	319.9	0.125	0.17	6.62	0.00		
50	10.26	0.00	32.455	0.000	24.95	302.8	0.187	0.43	6.22	0.00		
75	9.60	0.00	32.987	0.000	25.47	253.4	0.258	0.87	5.08	0.00		
100	8.84	0.00	33.607	0.000	26.07	196.3	0.314	1.37	3.61	0.00		
150	8.10	0.00	33.910	0.000	26.42	163.8	0.405	2.51	2.61	0.00		
200	7.50	0.00	33.994	0.000	26.58	149.9	0.484	3.93	2.18	0.00		
250	6.97	0.00	34.033	0.000	26.68	140.5	0.557	5.61	1.94	0.00		

CNAV OSHAWA CRUISE OS2 STATION 027 OBSERVED VALUES

DATE 27/05/63 HR 06.9 LAT 44-36 N LONG 124-26 W SNGD 73 WEA 02 WIND VEL 8 DIR 36
 BAROM 23.0 TEMP DRY 12.2 WET 10.0 RELHU 76 WTRCLR SECDI SEA 1 DIR 36 SWELL 2 DIR 35
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN	PHCS	NITR	SIL
1	0	11.08	31.861	24.34	6.45	0.576	-0.030	106	0.54	0.1	4
1	5	11.03	31.883	24.37	6.50	0.581	-0.034	106	0.58	0.2	5
1	10	11.05	31.868	24.35	6.47	0.578	-0.032	106	0.58	0.2	3
1	20	10.60	32.212	24.70	6.57	0.587	-0.037	107	0.61	0.2	4
1	30	10.21	32.353	24.87	6.50	0.581	-0.026	105	0.62	0.3	3
1	50	9.92	32.427	24.98	6.36	0.568	-0.010	102	0.87	2.3	5

79

CNAV OSHAWA CRUISE OS2 STATION 027 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
		LAB-I	
0	0.21	0.55	31.880
2	0.74	0.34	31.885
7	0.45	0.48	31.893
14	0.13	0.48	32.184
60	0.26	0.03	32.868

5.94 6.30 - WATER COLUMN VALUES

MESSENGER TIME 2001 INCOMING SOLAR RADIATION - AM 228 PM 291

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION 027		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	11.08	0.00	31.861	0.000	24.34	359.3	0.000	0.00	6.45	0.00		
10	11.05	0.00	31.868	0.000	24.35	358.4	0.037	0.02	6.47	0.00		
20	10.60	0.00	32.212	0.000	24.70	325.8	0.071	0.07	6.57	0.00		
30	10.21	0.00	32.353	0.000	24.87	309.2	0.103	0.15	6.50	0.00		
50	9.92	0.00	32.427	0.000	24.98	299.5	0.164	0.40	6.36	0.00		

CNAV OSHAWA CRUISE 052 STATION 028 OBSERVED VALUES
 YAQUINA BAY ENTRANCE
 DATE 27/05/63 HR 08.2 LAT 44-36 N LONG 124-12 W SNDG 58 WEA 02 WIND VEL 10 DIR 36
 BAROM 23.0 TEMP DRY 11.7 WET 10.0 RELHU 81 WTRCLR SECDI SEA 1 DIR 36 SWELL 1 DIR 35
 CLOUD TYPE AMT 1 VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	11.58	32.542	24.78	6.73	0.601	-0.064	112	
1	5	11.49	32.604	24.85	6.44	0.575	-0.037	107	
1	10	10.06	32.752	25.21	5.84	0.522	0.033	94	
1	20	8.84	33.276	25.82	3.71	0.331	0.237	58	
1	30	8.30	33.646	26.19	2.50	0.223	0.351	39	
1	50	7.81	33.883	26.45	1.80	0.161	0.419	28	

DEPTH	CNAV OSHAWA		CRUISE 052		STATION 028		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	11.58	0.00	32.542	0.000	24.78	317.5	0.000	0.00	6.73	0.00		
10	10.06	0.00	32.752	0.000	25.21	276.9	0.030	0.01	5.84	0.00		
20	8.84	0.00	33.276	0.000	25.82	219.4	0.055	0.05	3.71	0.00		
30	8.30	0.00	33.646	0.000	26.19	184.3	0.076	0.10	2.50	0.00		
50	7.81	0.00	33.883	0.000	26.45	160.0	0.110	0.24	1.80	0.00		

CNAV OSHAWA CRUISE OS2 STATION 029 OBSERVED VALUES

DATE 27/05/63 HR 11.7 LAT 44-07 N LONG 124-55 W WEA 02 WIND VEL 14 DIR 00
 BAROM 22.0 TEMP DRY 11.1 WET 10.0 RELHU 87 WTRCLR SMDG 201 SEA 1 DIR 36 SWELL 1 DIR 35
 CLOUD TYPE VIS 1 WIRE ANGLE(S) 20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	11.67	31.667	24.09	6.43	0.574	-0.035	106	
1	5	11.67	31.667	24.09	6.51	0.581	-0.042	108	
1	9	11.50	31.860	24.27	6.59	0.589	-0.048	109	
1	19	10.57	32.332	24.80	6.60	0.589	-0.038	107	
1	28	10.28	32.400	24.90	6.31	0.564	-0.010	102	
1	47	9.75	32.524	25.08	5.96	0.532	0.027	95	
1	71	9.44	32.893	25.42	5.14	0.459	0.103	82	
1	94	8.89	33.422	25.92	3.54	0.316	0.251	56	
1	118	7.96	33.780	26.34	2.40	0.214	0.364	37	
1	141	6.92	34.019	26.68	1.68	0.150	0.441	25	
1	165	6.72	34.043	26.72	1.75	0.156	0.438	26	

CB
 03

CNAV OSHAWA CRUISE OS2 STATION 029 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.36	0.77	31.670
5	0.31	0.37	31.676
17	0.99	1.58	32.230
34	1.06	0.87	32.420
100	0.07	0.00	33.472
26.84		35.38	- WATER COLUMN VALUES

MESSENGER TIME 0358 INCOMING SOLAR RADIATION - AM 353 PM 298

CNAV OSHAWA CRUISE OS2 STATION 029 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	11.67	0.00	31.667	0.000	24.09	383.7	0.000	0.00	6.43	0.00	
10	11.41	0.02	31.917	0.006	24.33	360.9	0.038	0.02	6.60	0.00	1.00
20	10.52	0.01	32.348	0.005	24.82	314.5	0.072	0.07	6.57	0.01	0.85
30	10.22	0.00	32.410	0.003	24.92	305.0	0.103	0.15	6.27	0.01	0.96
50	9.71	0.01	32.559	0.001	25.12	286.4	0.163	0.39	5.89	0.01	0.86
75	9.37	0.00	32.985	0.008	25.51	249.9	0.230	0.82	4.87	0.03	0.78
100	8.68	0.01	33.526	0.003	26.04	200.0	0.287	1.32	3.21	0.00	0.73
150	6.68	0.02	34.039	0.011	26.73	134.8	0.371	2.36	1.58	0.01	4.68

CNAV OSHAWA CRUISE OS2 STATION 030 OBSERVED VALUES

DATE 27/05/63 HR 16.0 LAT 43-32 N LONG 125-50 W SNDG 805 WEA 03 WIND VEL 16 DIR 36
 BAROM 22.0 TEMP DRY 18.3 WET 13.3 RELHU 56 WTRCLR SEA 2 DIR 36 SWELL 2 DIR 35
 CLOUD TYPE AMT 2 VIS 7 WIRE ANGLE(S) 13.23

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SECDI	SATN
1	0	12.95	32.433	24.44	6.07	0.542	-0.020	104	
1	5	12.92	32.431	24.44	6.07	0.542	-0.020	104	
1	10	12.94	32.426	24.43	6.07	0.542	-0.020	104	
1	20	12.89	32.485	24.49	6.12	0.547	-0.024	105	
1	29	12.66	32.583	24.61	6.23	0.556	-0.032	106	
1	49	11.29	32.655	24.92	6.32	0.564	-0.024	105	
1	73	10.12	32.914	25.33	5.52	0.493	0.060	89	
1	98	8.93	33.369	25.87	4.31	0.385	0.182	68	
1	122	8.35	33.663	26.19	3.65	0.326	0.247	57	
1	147	7.95	33.821	26.38	3.27	0.292	0.286	51	
1	171	7.57	33.907	26.50	2.88	0.257	0.325	44	
2	178	7.60	33.906	26.49	2.88	0.257	0.325	44	
2	223	7.07	33.982	26.63	2.39	0.213	0.376	36	
2	460	5.52	34.142	26.96	0.85	0.076	0.535	12	
2	706	4.46	34.318	27.22	0.29	0.026	0.601	4	

CNAV OSHAWA CRUISE 052 STATION 030 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.10	0.22		32.417
8	0.08	0.56		32.422
26	0.15	0.56		32.562
52	0.27	0.28		32.644

7.25 24.14 - WATER COLUMN VALUES

MESSENGER TIME 0813 INCOMING SOLAR RADIATION - AM 353 PM 298

DEPTH	CNAV OSHAWA			CRUISE OS2 STATION 030			INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	12.95	0.00	32.433	0.000	24.44	350.2	0.000	0.00	6.07	0.00			
10	12.94	0.00	32.426	0.000	24.43	350.8	0.036	0.02	6.07	0.00			
20	12.89	0.00	32.485	0.000	24.49	345.7	0.071	0.07	6.12	0.00			
30	12.60	0.01	32.587	0.003	24.62	333.1	0.105	0.16	6.25	0.00	0.99		
50	11.24	0.00	32.662	0.000	24.94	303.8	0.169	0.42	6.30	0.00	0.95		
75	10.01	0.01	32.950	0.004	25.37	262.7	0.241	0.87	5.42	0.01	0.89		
100	8.87	0.00	33.399	0.000	25.91	212.2	0.300	1.40	4.24	0.00	0.88		
150	7.91	0.00	33.833	0.002	26.39	166.8	0.396	2.60	3.23	0.00	0.87		
200	7.28	0.03	33.956	0.008	26.58	149.7	0.476	4.02	2.59	0.03	0.77		
250	6.83	0.03	34.010	0.007	26.68	140.3	0.549	5.70	2.15	0.01	1.34		
300	6.42	0.06	34.056	0.015	26.77	132.3	0.617	7.64	1.74	0.03	1.79		
400	5.79	0.05	34.120	0.013	26.91	120.7	0.745	12.20	1.11	0.02	1.25		
500	5.37	0.02	34.154	0.005	26.98	114.1	0.864	17.67	0.72	0.01	82.40		
600	5.00	0.01	34.202	0.013	27.07	107.1	0.975	23.96	0.47	0.02	68.70		
700	4.50	0.01	34.309	0.002	27.21	94.2	1.077	30.73	0.30	0.00	99.99		

CNAV OSHAWA CRUISE 052 STATION 031 OBSERVED VALUES

DATE 27/05/63 HR 19.4 LAT 43-12 N LONG 126-22 W SMDG 759 WEA 02 WIND VEL 14 DIR 02
 BAROM 23.0 TEMP DRY 17.8 WET 13.3 RELHU 60 WTRCLR SEA 1 DIR 02 SWE'L 1 DIR 35
 CLOUD TYPE VIS 7 WIRE ANGLE(S) ---

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	13.07	32.399	24.39	6.04	0.539	-0.019		104
1	5	12.99	32.399	24.40	6.13	0.547	-0.026		105
1	10	12.98	32.393	24.40	6.08	0.543	-0.021		104
1	20	12.90	32.409	24.43	6.15	0.549	-0.027		105
1	30	12.86	32.521	24.52	6.23	0.556	-0.034		106
1	50	11.30	32.660	24.92	6.45	0.576	-0.036		107
1	75	19.52	33.067	25.54	5.01	0.447	0.113		80
1	100	8.59	33.526	26.05	3.92	0.350	0.220		61
1	125	8.12	33.769	26.31	3.30	0.295	0.281		51
1	150	7.75	33.897	26.47	3.04	0.272	0.303		47
1	175	7.38	33.943	26.56	2.88	0.257	0.328		44
1	201	7.16	33.959	26.60	2.69	0.240	0.348		41
1	251	6.61	33.995	26.70	2.28	0.204	0.392		34
1	300	6.11	34.026	26.79	1.75	0.156	0.447		26

CNAV OSHAWA CRUISE OS2 STATION 031 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	CRUISE OS2	STATION 031	LIGHT PROD	SAT FILT	IRRAD	SAL
0	0.07	0.47	4.32		0.32 0.18 0.22 0.15	100		32.399
10	0.08	0.15	1.16		0.05	18	50	32.400
33	0.11	0.28	1.06		0.00	6	10	32.552
70	0.47	0.03	0.30				1	32.892
100	0.08	0.08						33.528
150	0.02							33.848

13.49 13.73 78.12 - WATER COLUMN VALUES

MESSENGER TIME 1130 INCOMING SOLAR RADIATION - AM 353 PM 298
 LIGHT SATURATION INCUBATOR ILLUMINATION 1900

DEPTH	CNAV OSHAWA			CRUISE 052			STATION 031			INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)		SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	13.07	0.00		32.399	0.000	24.39	354.9	0.000	0.00	6.04	0.00				
10	12.98	0.00		32.393	0.000	24.40	353.9	0.036	0.02	6.08	0.00				
20	12.90	0.00		32.409	0.000	24.43	351.5	0.072	0.07	6.15	0.00				
30	12.86	0.00		32.521	0.000	24.52	342.8	0.107	0.16	6.23	0.00				
50	11.30	0.00		32.660	0.000	24.92	305.0	0.172	0.43	6.45	0.00				
75	9.53	0.00		33.067	0.000	25.54	246.4	0.241	0.86	5.01	0.00				
100	8.59	0.00		33.526	0.000	26.05	198.6	0.297	1.36	3.92	0.00				
150	7.75	0.00		33.897	0.000	26.47	159.8	0.388	2.49	3.04	0.00				
200	7.17	0.00		33.959	0.000	26.60	147.9	0.465	3.88	2.70	0.00				0.93
250	6.62	0.00		33.994	0.000	26.70	138.7	0.538	5.55	2.29	0.00				0.97
300	6.11	0.00		34.026	0.000	26.79	130.4	0.605	7.46	1.75	0.00				

CNAV OSHAWA CRUISE 032 STATION 032 OBSERVED VALUES

DATE 27/05/63 HR 21.7 LAT 42-49 N LONG 126-43 W WEA 01 WIND VEL 12 DIR 01
 BAROM 22.0 TEMP DRY 14.4 WET 12.2 RELHU 77 WTRCLR SMDG 2907 SEA 1 DIR 02 SWELL 1 DIR 36
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 17.22

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	12.73	32.66	24.66	6.24	0.557	-0.034		106
1	5	12.64	32.658	24.67	6.32	0.564	-0.040		108
1	10	12.40	32.647	24.71	6.44	0.575	-0.048		109
1	19	12.30	32.652	24.73	6.35	0.567	-0.039		107
1	29	12.27	32.658	24.74	6.36	0.568	-0.039		107
1	48	10.93	32.683	25.01	6.36	0.568	-0.024		104
1	72	9.71	32.984	25.45	5.31	0.474	0.084		85
1	96	8.84	33.393	25.91	4.18	0.373	0.194		66
1	120	8.11	33.795	26.33	3.27	0.292	0.284		51
1	144	7.81	33.907	26.47	2.89	0.258	0.321		45
1	168	7.55	33.938	26.53	2.71	0.242	0.341		42
2	184	7.37	33.960	26.57	2.61	0.233	0.352		40
2	229	7.01	33.987	26.64	2.34	0.209	0.381		35
2	276	6.39	33.996	26.73	2.08	0.186	0.413		31
2	462	5.21	34.130	26.98	0.84	0.075	0.541		12
2	695	4.43	34.291	27.20	0.34	0.030	0.597		5
2	931	3.78	34.416	27.37	0.68	0.061	0.577		10
2	1431	2.68	34.541	27.57	0.77	0.069	0.586		10
2	1718	2.06	34.581	27.65	1.16	0.104	0.562		16

CNAV OSHAWA CRUISE 052 STATION 032 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.08	0.32		32.646
10	0.13	0.17		32.636
33	0.18	0.42		33.401
70	0.53	0.30		32.640

17.96 22.51 - WATER COLUMN VALUES

MESSENGER TIME 1426 INCOMING SOLAR RADIATION - AM 353 PM 298

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION O32		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	12.73	0.00	32.667	0.000	24.66	328.9	0.000	0.00	6.24	0.00		
10	12.40	0.00	32.647	0.000	24.71	324.6	0.033	0.02	6.44	0.00	0.88	
20	12.31	0.01	32.652	0.000	24.73	322.7	0.066	0.07	6.35	0.00	0.97	
30	12.22	0.02	32.657	0.001	24.75	321.0	0.098	0.15	6.37	0.01		
50	10.81	0.00	32.700	0.002	25.04	293.8	0.160	0.40	6.30	0.01	0.91	
75	9.59	0.00	33.032	0.002	25.51	249.9	0.229	0.83	5.16	0.01	0.84	
100	8.70	0.01	33.470	0.007	25.99	204.3	0.286	1.34	4.00	0.01	0.80	
150	7.74	0.00	33.918	0.003	26.48	158.1	0.377	2.48	2.83	0.01	0.75	
200	7.24	0.02	33.974	0.001	26.60	147.9	0.454	3.86	2.51	0.00	1.03	
250	6.74	0.02	33.992	0.001	26.68	140.5	0.527	5.54	2.22	0.00	0.61	
300	6.17	0.03	34.009	0.003	26.77	132.4	0.596	7.48	1.91	0.02	1.19	
400	5.46	0.06	34.077	0.006	26.91	119.8	0.723	12.02	1.23	0.04	1.09	
500	5.05	0.01	34.158	0.001	27.02	109.9	0.839	17.36	0.69	0.01	0.83	
600	4.69	0.03	34.228	0.001	27.12	101.5	0.946	23.38	0.42	0.01	0.67	
700	4.42	0.00	34.294	0.000	27.20	94.3	1.045	29.97	0.34	0.00	0.97	
800	4.13	0.00	34.352	0.000	27.28	87.5	1.137	37.05	0.45	0.04	0.61	
1000	3.62	0.01	34.441	0.002	27.40	76.6	1.303	52.32	0.70	0.03	0.96	
1200	3.16	0.01	34.499	0.005	27.49	68.5	1.450	68.89	0.74	0.07	0.92	
1500	2.54	0.00	34.551	0.001	27.59	59.3	1.644	95.71	0.81	0.01	1.12	

CNAV OSHAWA CRUISE 052 STATION 033 OBSERVED VALUES

DATE 28/05/63 HR 03.2 LAT 42-28 N LONG 127-35 W MEA 03 WIND VEL 14 DIR 34
 BAROM 20.0 TEMP DRY 14.4 WEI 13.3 RELHU 89 WTRCLR SECDI 2925 SEA 1 DIR 34 SWELL 2 DIR 35
 CLOUD TYPE AMT 7 VIS 7 WIRE ANGLE(S) 24,13

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
2	0	13.21	32.690	24.58	6.17	0.551	-0.033	106
2	5	13.18	32.693	24.59	6.24	0.557	-0.039	107
2	10	12.68	32.687	24.69	6.28	0.561	-0.037	107
2	20	12.42	32.690	24.74	6.36	0.568	-0.041	108
2	29	12.28	32.693	24.77	6.34	0.566	-0.038	107
2	49	10.93	32.770	25.07	6.14	0.548	-0.004	101
2	73	9.72	33.165	25.59	4.79	0.428	0.130	77
2	98	9.37	33.363	25.80	4.29	0.383	0.178	68
2	122	9.09	33.519	25.97	3.82	0.341	0.223	60
2	147	8.25	33.838	26.35	2.69	0.240	0.334	42
2	171	7.41	33.979	26.58	2.05	0.183	0.402	31
1	181	7.40	33.993	26.59	1.97	0.176	0.409	30
1	227	6.60	34.038	26.74	1.76	0.157	0.439	26
1	274	6.16	34.056	26.81	1.48	0.132	0.470	22
1	469	4.98	34.197	27.06	0.62	0.055	0.564	9
1	715	4.15	34.319	27.25	0.50	0.045	0.587	7
1	962	3.54	34.437	27.41	0.39	0.035	0.606	5
1	1458	2.07	34.542	27.62	0.82	0.073	0.592	11
1	1755	2.12	34.584	27.65	1.30	0.116	0.548	17

CNAV OSHAWA CRUISE 052 STATION 033 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.08	0.09		32.683
10	0.08	0.16		32.701
33	0.20	0.14		32.682

11.42 7.29 - WATER COLUMN VALUES

MESSENGER TIME 1912 INCOMING SOLAR RADIATION - AM 353 PM 298

CNAV OSHAWA		CRUISE 052			STATION 033		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	13.21	0.00	32.690	0.000	24.58	336.2	0.000	0.00	6.17	0.00		
10	12.68	0.00	32.687	0.000	24.69	326.7	0.034	0.02	6.28	0.00		
20	12.42	0.00	32.690	0.000	24.74	322.0	0.067	0.07	6.36	0.00		
30	12.23	0.01	32.693	0.001	24.78	318.5	0.099	0.15	6.34	0.00	0.99	
50	10.87	0.00	32.785	0.004	25.10	288.4	0.160	0.40	6.09	0.01	0.95	
75	9.67	0.01	33.186	0.002	25.61	239.9	0.226	0.82	4.73	0.01	0.89	
100	9.36	0.01	33.374	0.002	25.81	221.5	0.285	1.34	4.26	0.01	0.88	
150	8.16	0.01	33.860	0.003	26.38	168.3	0.383	2.56	2.60	0.01	0.88	
200	6.91	0.08	34.036	0.014	26.69	138.7	0.460	3.94	1.79	0.07	0.88	
250	6.36	0.01	34.048	0.001	26.78	131.3	0.528	5.50	1.63	0.00	0.59	
300	5.96	0.01	34.073	0.003	26.85	125.0	0.593	7.33	1.33	0.00	1.22	
400	5.31	0.02	34.143	0.006	26.98	113.0	0.713	11.62	0.86	0.01	1.17	
500	4.85	0.01	34.214	0.001	27.09	103.3	0.822	16.64	0.57	0.02	0.86	
600	4.48	0.02	34.266	0.002	27.17	96.1	0.923	22.32	0.49	0.04	0.67	
700	4.19	0.00	34.313	0.001	27.24	90.2	1.017	28.60	0.49	0.01	0.51	
800	3.93	0.01	34.362	0.001	27.31	84.5	1.105	35.40	0.45	0.01	0.66	
1000	3.40	0.03	34.449	0.002	27.43	73.5	1.265	50.10	0.40	0.00	0.96	
1200	2.73	0.09	34.501	0.006	27.53	63.5	1.404	65.72	0.51	0.02	0.89	
1500	2.26	0.15	34.547	0.000	27.61	56.4	1.586	90.91	0.88	0.00	11.79	

CNAV OSHAWA CRUISE 052 STATION 034 OBSERVED VALUES

DATE	HR	LAT	LONG	W	SEA	DIR	WIND	VEL	DIR
28/05/63	08.4	41.49	128.36	W	01	00	00	00	00
BAROM	DRY	WET	RELHU	WTRCLR	SNDG	3109	SECDI	SMELL	1 DIR
20.0	13.3	12.2	88	0	0	00	00	00	36
CLOUD	VIS	WIRE	ANGLE(S)	4, 0					
TYPE	4	7							
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.29	32.714	24.59	6.26	0.559	0.042	108	
1	5	13.27	32.719	24.60	6.28	0.561	0.043	108	
1	10	12.82	32.704	24.67	6.36	0.568	0.046	109	
1	20	12.42	32.706	24.75	6.36	0.568	0.041	108	
1	30	11.50	32.694	24.91	6.55	0.585	0.047	109	
1	50	10.77	32.664	25.02	6.52	0.582	0.036	107	
1	75	10.12	32.716	25.17	6.01	0.537	0.017	97	
1	100	9.08	33.146	25.68	4.98	0.445	0.121	79	
1	125	8.66	33.538	26.05	3.53	0.315	0.254	55	
1	150	8.37	33.750	26.26	3.36	0.300	0.272	52	
1	176	8.13	33.856	26.38	2.86	0.255	0.320	44	
2	200	7.97	33.908	26.44	2.65	0.237	0.341	41	
2	250	7.20	34.000	26.63	2.14	0.191	0.396	33	
2	299	6.51	34.011	26.73	1.93	0.172	0.425	29	
2	499	5.11	34.558	27.02	0.68	0.061	0.557	10	
2	748	4.15	34.306	27.24	0.31	0.028	0.604	4	
2	999	3.55	34.418	27.39	0.38	0.034	0.607	5	
2	1498	2.56	34.548	27.59	0.86	0.077	0.580	12	
2	1797	2.11	34.591	27.66	1.32	0.118	0.547	18	

CNAV OSHAWA CRUISE 0S2 STATION 034 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.07	0.22		32.711
10	0.16	0.48		32.708
33	0.06	0.71		32.659
70	0.26	0.20		32.717
100	0.03	0.06		33.140

9.69 34.60 - WATER COLUMN VALUES

MESSENGER TIME 0050 INCOMING SOLAR RADIATION - AM 269 PM 214

CNAV USHAMA		CRUISE OS2		STATION 034		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.29	0.00	32.714	0.000	24.59	335.9	0.000	0.00	6.26	0.00	
10	12.82	0.00	32.704	0.000	24.67	328.1	0.034	0.02	6.36	0.00	
20	12.42	0.00	32.706	0.000	24.75	320.8	0.067	0.07	6.36	0.00	
30	11.50	0.00	32.694	0.000	24.91	305.5	0.098	0.15	6.55	0.00	
50	10.77	0.00	32.664	0.000	25.02	295.8	0.159	0.40	6.52	0.00	
75	10.12	0.00	32.716	0.000	25.17	281.7	0.231	0.86	6.01	0.00	
100	9.08	0.00	33.146	0.000	25.68	234.1	0.296	1.44	4.98	0.00	
150	8.37	0.00	33.750	0.000	26.26	179.6	0.401	2.74	3.36	0.00	
200	7.97	0.00	33.908	0.000	26.44	162.9	0.487	4.28	2.65	0.00	
250	7.20	0.00	34.000	0.000	26.63	146.1	0.565	6.07	2.14	0.00	
300	6.50	0.00	34.012	0.000	26.73	136.5	0.636	8.08	1.92	0.00	1.01
400	5.63	0.07	34.077	0.008	26.89	121.8	0.767	12.73	1.29	0.06	1.33
500	5.10	0.00	34.159	0.000	27.02	110.5	0.884	18.13	0.68	0.00	0.99
600	4.65	0.02	34.223	0.000	27.12	101.3	0.991	24.15	0.42	0.04	0.69
700	4.29	0.01	34.280	0.000	27.21	93.8	1.089	30.72	0.31	0.02	0.78
800	4.01	0.01	34.332	0.000	27.28	87.6	1.181	37.78	0.30	0.01	0.76
1000	3.55	0.00	34.418	0.000	27.39	77.5	1.348	53.15	0.38	0.00	1.00
1200	3.12	0.00	34.482	0.002	27.48	69.3	1.497	69.91	0.52	0.00	0.89
1500	2.56	0.00	34.548	0.000	27.59	59.7	1.693	96.97	0.86	0.00	12.84

CNAV OSHAWA CRUISE OS2 STATION 34A BIOLOGICAL DATA

DATE 28/05/63 LAT 41-21 N LONG 129-17 W

DEPTH CHL-A PRODUCTIVITY SAL
LAB-I DECK-I

0 0.10 0.48 5.16 32.719

MESSENGER TIME 0415 INCOMING SOLAR RADIATION - AM 269 PM 214

CNAV OSHAWA CRUISE OS2 STATION 035 OBSERVED VALUES

DATE 28/05/63 HR 13.4 LAT 41-13 N LONG 129-30 W SNGD 3109 WEA 01 WIND VEL 0 DIR 00
 BAROM 18.0 TEMP DRY 13.9 WET 13.3 RELHU 94 WTRCLR SECDI SEA 0 DIR 00 SWELL 0 DIR 00
 CLOUD TYPE AMT 6 VIS 7 WIRE ANGLE(S) 0, 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	13.87	32.714	24.47	6.10	0.545	-0.034	107
1	5	13.54	32.711	24.54	6.23	0.556	-0.042	108
1	10	12.77	32.691	24.67	5.47	0.578	-0.055	110
1	20	12.57	32.694	24.71	6.44	0.575	-0.050	109
1	30	12.52	32.697	24.73	6.40	0.572	-0.046	109
1	50	10.71	32.614	24.99	6.52	0.582	-0.035	106
1	75	10.36	32.647	25.08	6.36	0.568	-0.017	103
1	100	9.09	33.148	25.68	4.94	0.441	0.124	78
1	125	8.50	33.494	26.04	4.07	0.364	0.208	64
1	150	7.98	33.688	26.27	3.79	0.338	0.240	59
1	176	7.70	33.852	26.44	3.39	0.303	0.278	52
2	197	7.46	33.926	26.53	3.01	0.269	0.315	46
2	246	6.87	33.994	26.67	2.27	0.203	0.389	34
2	295	6.36	34.021	26.76	1.81	0.162	0.438	27
2	394	5.19	34.135	26.99	0.82	0.073	0.543	12
2	741	4.19	34.311	27.24	0.31	0.028	0.604	4
2	989	3.51	34.432	27.41	0.35	0.031	0.610	5
2	1487	2.53	34.544	27.58	0.86	0.077	0.581	12
2	1786	2.16	34.590	27.65	1.44	0.129	0.535	19

CNAV OSHAWA CRUISE 052 STATION 035 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.09	0.33		32.707
10	0.08	0.35		32.689
33	0.17	0.55		32.684
70	0.20	0.26		32.632
100	0.06	0.03		32.983

10.54 28.77 - WATER COLUMN VALUES

MESSENGER TIME 0559 INCOMING SOLAR RADIATION - AM 269 PM 214

DEPTH	CNAV OSHAWA			CRUISE OS2 STATION O35			INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	13.87	0.00	32.714	0.000	24.47	347.1	0.000	0.00	6.10	0.00			
10	12.77	0.00	32.691	0.000	24.67	328.1	0.035	0.02	6.47	0.00			
20	12.57	0.00	32.694	0.000	24.71	324.4	0.067	0.07	6.44	0.00			
30	12.52	0.00	32.697	0.000	24.73	323.5	0.100	0.15	6.40	0.00			
50	10.71	0.00	32.614	0.000	24.99	298.4	0.163	0.41	6.52	0.00			
75	10.36	0.00	32.647	0.000	25.08	290.7	0.237	0.88	6.36	0.00			
100	9.09	0.00	33.148	0.000	25.68	234.1	0.303	1.47	4.94	0.00			
150	7.98	0.00	33.688	0.000	26.27	178.6	0.407	2.77	3.79	0.00			
200	7.42	0.00	33.933	0.001	26.54	153.4	0.491	4.25	2.96	0.00	0.99		
250	6.83	0.00	33.997	0.001	26.67	141.2	0.565	5.96	2.23	0.00	0.91		
300	6.32	0.00	34.024	0.000	26.76	133.3	0.634	7.91	1.77	0.00	1.04		
400	5.63	0.05	34.079	0.001	26.89	121.7	0.763	12.51	1.17	0.04	1.30		
500	5.16	0.00	34.139	0.000	27.00	112.6	0.881	17.96	0.80	0.00	0.97		
600	4.71	0.01	34.212	0.004	27.11	102.9	0.990	24.09	0.52	0.01	0.68		
700	4.33	0.00	34.282	0.002	27.20	94.1	1.089	30.72	0.35	0.01	0.80		
800	4.01	0.01	34.344	0.000	27.29	86.7	1.181	37.76	0.29	0.01	0.74		
1000	3.48	0.00	34.436	0.000	27.41	75.5	1.345	52.84	0.36	0.00	0.99		
1200	3.04	0.00	34.493	0.005	27.50	67.5	1.490	69.17	0.50	0.00	0.90		
1500	2.51	0.00	34.546	0.000	27.59	59.3	1.683	95.82	0.88	0.00	12.78		

CNAV OSHAWA CRUISE OS2 STATION 036 OBSERVED VALUES

DATE 28/05/63 HR 19.0 LAT 40-37 N LONG 130-25 W WEA 01 WIND VEL 12 DIR 21
 BAROM 18.0 TEMP DRY 17.2 WET 15.6 RELHU 85 WTRCLR SEA 2 DIR 21 SWELL 1 DIR 23
 CLOUD TYPE VIS 4 VIS 7 WIRE ANGLE(S) 12.27

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	MG/L	AOU	SECDI	SATN
1	0	14.84	32.953	24.45	5.91	0.528	0.528	-0.027	105	
1	5	14.76	32.941	24.46	5.85	0.522	0.522	-0.021	104	
1	10	14.56	32.935	24.50	6.09	0.544	0.544	-0.041	108	
1	20	14.15	32.928	24.58	6.01	0.537	0.537	-0.029	106	
1	29	13.54	32.906	24.69	6.12	0.547	0.547	-0.033	106	
1	49	12.20	32.945	24.98	6.31	0.564	0.564	-0.035	107	
1	74	11.82	32.972	25.07	6.46	0.577	0.577	-0.044	108	
1	98	11.44	33.009	25.17	5.94	0.531	0.531	0.007	99	
1	123	9.98	33.157	25.54	5.39	0.481	0.481	0.073	87	
1	147	8.42	33.407	25.98	5.13	0.458	0.458	0.115	80	
1	172	8.04	33.586	26.18	4.85	0.433	0.433	0.144	75	
2	173	8.05	33.621	26.21	4.83	0.431	0.431	0.146	75	
2	217	8.07	33.910	26.43	4.24	0.379	0.379	0.197	66	
2	261	7.39	33.965	26.57	3.58	0.320	0.320	0.265	55	
2	438	5.17	34.007	26.89	1.83	0.163	0.163	0.454	26	
2	660	4.20	34.238	27.18	0.44	0.039	0.039	0.592	6	
2	883	3.69	34.377	27.34	0.29	0.026	0.026	0.613	4	
2	1349	2.77	34.526	27.55	0.74	0.066	0.066	0.588	10	
2	1643	2.32	34.569	27.62	1.05	0.094	0.094	0.567	14	

CNAV OSHAWA CRUISE 052 STATION 036 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.00	0.06	0.00	32.927
15	0.00	0.03	0.00	32.927
41	0.04	0.07	0.00	32.948
70	0.06	0.05	0.00	32.914
100	0.19	0.25		32.992
150	0.03			33.251
200	0.00			33.682

1.91 3.81 0.00 - WATER COLUMN VALUES

MESSENGER TIME 1131 INCOMING SOLAR RADIATION - AM 269 PM 214

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION 036		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	14.84	0.00	32.953	0.000	24.45	349.0	0.000	0.00	5.91	0.00			
10	14.56	0.00	32.935	0.000	24.50	344.9	0.035	0.02	6.09	0.00			
20	14.15	0.00	32.928	0.000	24.58	337.4	0.070	0.07	6.01	0.00			
30	13.46	0.01	32.907	0.001	24.70	325.8	0.103	0.16	6.13	0.00	0.99		
50	12.17	0.01	32.946	0.000	24.98	299.3	0.166	0.41	6.32	0.00	0.95		
75	11.81	0.01	32.972	0.001	25.07	291.5	0.241	0.89	6.44	0.00	0.94		
100	11.35	0.01	33.017	0.000	25.19	280.6	0.313	1.53	5.89	0.00	0.89		
150	8.34	0.02	33.433	0.000	26.02	202.6	0.434	3.05	5.10	0.00	0.86		
200	8.05	0.06	33.807	0.013	26.35	171.6	0.529	4.72	4.48	0.00	0.74		
250	7.59	0.02	33.963	0.007	26.54	154.3	0.611	6.61	3.74	0.00	0.64		
300	6.81	0.01	33.981	0.012	26.66	142.9	0.686	8.72	3.11	0.03	1.31		
400	5.56	0.01	34.005	0.012	26.84	126.3	0.822	13.56	2.12	0.02	0.96		
500	4.77	0.05	34.066	0.010	26.98	113.4	0.943	19.13	1.33	0.01	0.75		
600	4.34	0.05	34.170	0.010	27.11	101.6	1.051	25.24	0.71	0.01	0.72		
700	4.09	0.01	34.268	0.001	27.22	92.4	1.149	31.77	0.36	0.02	0.79		
800	3.85	0.02	34.333	0.002	27.29	85.7	1.239	38.70	0.26	0.04	0.60		
1000	3.44	0.00	34.428	0.003	27.41	75.5	1.402	53.71	0.35	0.03	0.93		
1200	3.04	0.00	34.494	0.003	27.50	67.5	1.547	70.03	0.54	0.04	0.87		
1500	2.52	0.00	34.550	0.001	27.59	59.2	1.740	96.64	0.93	0.01	7.44		

CNAV OSHAWA CRUISE 052 STATION 037 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.00	0.11		33.073
15	0.00	0.00		33.153
41	0.00	0.16		33.087
70	0.04	0.00		33.121
100	0.02	0.05		33.076

0.64 3.48 - WATER COLUMN VALUES

MESSENGER TIME 1838 INCOMING SOLAR RADIATION - AM 269 PM 214

CNAV OSHAWA				CRUISE 052				STATION 037				INTERPOLATED AND COMPUTED VALUES			
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	14.95	0.00	33.089	0.000	24.53	341.3	0.000	0.00	5.88	0.00	0.95				
10	14.72	0.00	33.156	0.000	24.63	331.9	0.034	0.02	5.88	0.00	0.93				
20	14.05	0.00	33.159	0.000	24.78	318.5	0.067	0.07	5.84	0.00	0.99				
30	13.42	0.00	33.109	0.000	24.87	310.2	0.099	0.15	5.92	0.00	0.84				
50	13.09	0.00	33.115	0.001	24.94	304.0	0.161	0.40	5.91	0.00	0.97				
75	12.33	0.01	33.064	0.000	25.05	294.1	0.236	0.88	6.03	0.01	0.93				
100	11.15	0.14	33.124	0.004	25.31	269.3	0.307	1.52	5.67	0.05	0.84				
150	8.37	0.02	33.517	0.005	26.08	196.9	0.424	2.98	5.26	0.00	0.84				
200	8.15	0.00	33.912	0.001	26.42	165.3	0.516	4.60	4.55	0.01	0.97				
250	7.85	0.00	33.971	0.000	26.51	157.3	0.597	6.47	4.30	0.00	0.91				
300	6.97	0.01	33.968	0.000	26.63	146.0	0.674	8.63	3.66	0.00	0.82				
400	5.26	0.24	33.978	0.018	26.86	124.8	0.810	13.49	2.15	0.10	2.85				
500	4.55	0.21	34.050	0.016	27.00	112.0	0.930	18.98	1.22	0.08	1.84				
600	4.32	0.04	34.146	0.002	27.10	103.3	1.038	25.11	0.75	0.06	0.97				
700	3.98	0.11	34.218	0.005	27.19	94.8	1.138	31.78	0.45	0.17	0.87				
800	3.71	0.13	34.287	0.006	27.27	87.5	1.231	38.87	0.28	0.20	0.76				
1000	3.43	0.03	34.415	0.001	27.40	76.5	1.397	54.13	0.37	0.05	0.88				
1200	3.08	0.01	34.494	0.011	27.50	68.0	1.543	70.61	0.53	0.07	0.94				
1500	2.56	0.01	34.572	0.018	27.60	58.0	1.735	97.04	0.82	0.12	0.94				
2000	1.95	0.00	34.619	0.000	27.69	49.7	2.008	145.92	1.58	0.00	0.93				
2500	1.72	0.00	34.650	0.000	27.73	46.3	2.253	202.53	2.14	0.00	0.90				
3000	1.58	0.00	34.670	0.000	27.76	44.7	2.485	268.47	2.53	0.00	5.38				

CNAV OSHAWA CRUISE OS2 STATION 038 OBSERVED VALUES
 DATE 29/05/63 HR 10.3 LAT 39-44 N LONG 131-12 W WEA 02 WIND VEL 4 DIR 30
 BAROM 20.0 TEMP DRY 12.2 WET 11.1 RELHU 88 WTRCLR SECDI 4462
 CLOUD TYPE AMT 5 VIS 7 WIRE ANGLE(S) 0, 9 SEA 1 DIR 23 SWELL 1 DIR 26

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	15.00	32.899	24.37	5.91	0.528	-0.029	106
1	5	14.92	32.891	24.39	5.88	0.525	-0.025	105
1	10	14.01	32.904	24.59	5.91	0.528	-0.019	104
1	20	13.93	32.908	24.61	5.95	0.531	-0.022	104
1	30	13.86	32.902	24.62	5.96	0.532	-0.022	104
1	50	13.03	32.878	24.77	5.99	0.535	-0.015	103
1	75	12.59	32.879	24.85	6.09	0.544	-0.019	104
1	100	11.89	32.900	25.00	6.03	0.539	-0.006	101
1	125	10.55	33.018	25.33	5.57	0.497	0.050	91
1	150	9.02	33.197	25.73	5.25	0.469	0.097	83
1	176	8.16	33.498	26.09	4.86	0.434	0.142	75
2	197	8.31	33.675	26.21	4.12	0.368	0.206	64
2	246	7.88	33.925	26.47	4.03	0.360	0.218	62
2	295	7.17	33.954	26.59	3.52	0.314	0.274	53
2	493	5.08	34.050	26.94	1.36	0.121	0.497	20
2	739	4.08	34.260	27.21	0.36	0.032	0.601	5

CNAV OSHAWA CRUISE OS2 STATION 038 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.00		32.891
15	0.00		32.899
41	0.00		32.880
70	0.03		32.877

0.50 - WATER COLUMN VALUES

MESSENGER TIME 0304 INCOMING SOLAR RADIATION - AM 223 PM 252

CNAV OSHAWA		CRUISE OS2			STATION 038		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	15.00	0.00	32.899	0.000	24.37	356.2	0.000	0.00	5.91	0.00		
10	14.01	0.00	32.904	0.000	24.59	336.2	0.035	0.02	5.91	0.00		
20	13.93	0.00	32.908	0.000	24.61	334.6	0.069	0.07	5.95	0.00		
30	13.86	0.00	32.902	0.000	24.62	333.9	0.103	0.16	5.96	0.00		
50	13.03	0.00	32.878	0.000	24.77	320.2	0.169	0.43	5.99	0.00		
75	12.59	0.00	32.879	0.000	24.85	312.5	0.248	0.94	6.09	0.00		
100	11.89	0.00	32.900	0.000	25.00	298.8	0.325	1.63	6.03	0.00		
150	9.02	0.00	33.197	0.000	25.73	230.3	0.459	3.29	5.25	0.00		
200	8.30	0.01	33.697	0.000	26.23	183.4	0.563	5.14	4.09	0.03	0.99	
250	7.83	0.00	33.932	0.003	26.48	159.9	0.650	7.12	4.00	0.01	0.91	
300	7.10	0.00	33.956	0.000	26.60	148.7	0.727	9.32	3.46	0.01	1.04	
400	5.91	0.00	34.003	0.004	26.80	130.9	0.868	14.34	2.31	0.06	1.29	
500	5.03	0.00	34.054	0.000	26.94	117.4	0.994	20.11	1.29	0.00	44.87	
600	4.44	0.00	34.117	0.004	27.06	106.7	1.107	26.48	0.54	0.05	63.33	
700	4.13	0.00	34.212	0.003	27.17	97.1	1.210	33.34	0.46	0.05	73.06	

CNAV OSHAWA CRUISE 052 STATION 38A BIOLOGICAL DATA

DATE 29/05/63 LAT 39-43 N LONG 130-05 W

DEPTH CHL-A PRODUCTIVITY SAL
LAB-J DECK-J

0 0.00 0.02 0.95 32.894

MESSENGER TIME 0415 INCOMING SOLAR RADIATION - AM 223 PM 252

CNAV OSHAWA CRUISE 052 STATION 039 OBSERVED VALUES

DATE 29/05/63 HR 17.8 LAT 39-24 N LONG 128-57 W SNCG 2075 WEA 02 WIND VEL 4 DIR 31
 BAROM 22.0 TEMP DRY 17.2 WET 16.7 RELHU 95 WTRCLR SECDI SEA 1 DIR 31 SWELL 1 DIR 26
 CLOUD TYPE AMT 8 VIS 6 WIRE ANGLE: 3,10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	14.68	32.765	24.34	5.90	0.527	-0.024	105	
1	5	14.51	32.753	24.37	5.95	0.531	-0.027	105	
1	10	13.70	32.746	24.53	6.13	0.547	-0.035	107	
1	20	13.16	32.744	24.64	6.05	0.540	-0.022	104	
1	30	13.08	32.745	24.65	6.12	0.547	-0.027	105	
1	50	12.43	32.815	24.83	6.18	0.552	-0.026	105	
1	75	11.82	32.771	24.91	6.27	0.560	-0.026	105	
1	100	11.35	32.818	25.04	6.07	0.542	-0.003	101	
1	125	9.64	32.982	25.46	5.31	0.474	0.085	85	
1	150	8.53	33.346	25.92	4.65	0.415	0.157	73	
1	176	8.11	33.627	26.20	4.10	0.366	0.210	64	
2	195	7.89	33.796	26.37	3.70	0.330	0.248	57	
2	244	7.56	33.946	26.53	3.71	0.331	0.251	57	
2	293	6.58	33.939	26.66	3.12	0.279	0.318	47	
2	489	5.23	34.104	26.96	0.92	0.082	0.534	13	
2	732	4.19	34.295	27.23	0.28	0.025	0.606	4	
2	976	3.55	34.407	27.38	0.28	0.025	0.616	4	
2	1473	2.63	34.538	27.57	0.88	0.079	0.577	12	
2	1771	2.17	34.584	27.65	1.36	0.121	0.542	18	

CNAV OSHAWA CRUISE 052 STATION 039 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL
0	0.01	0.01	0.40				32.738
11	0.02	0.05	0.24	1.39	00	50	32.747
36	0.01	0.03	0.02	0.20	05	10	32.739
70	0.00	0.05	0.00	0.28	55		
100	0.13	0.02		0.16	37		
150	0.02			0.11	19		
	0.65	2.89	7.12	0.14	6		
						1	32.773
							32.757
							33.438

MESSENGER TIME 1128 INCOMING SOLAR RADIATION - AM 223 PM 252
 LIGHT SATURATION INCUBATOR ILLUMINATION 18800
 WATER COLUMN VALUES

CNAV OSHAWA CRUISE OS2 STATION 039 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	F(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	14.68	0.00	32.765	0.000	24.34	359.5	0.000	0.00	5.90	0.00	
10	13.70	0.00	32.746	0.000	24.53	341.7	0.036	0.02	6.13	0.00	
20	13.16	0.00	32.744	0.000	24.64	331.8	0.070	0.07	6.05	0.00	
30	13.08	0.00	32.745	0.000	24.65	330.4	0.103	0.16	6.12	0.00	
50	12.43	0.00	32.815	0.000	24.33	313.7	0.168	0.42	6.18	0.00	
75	11.82	0.00	32.771	0.000	24.91	306.5	0.246	0.92	6.27	0.00	
100	11.35	0.00	32.818	0.000	25.04	295.3	0.322	1.60	6.07	0.00	
150	8.53	0.00	33.346	0.000	25.92	211.9	0.450	3.19	4.65	0.00	
200	7.86	0.02	33.824	0.004	26.39	167.6	0.545	4.88	3.68	0.03	1.01
250	7.45	0.02	33.949	0.003	26.55	153.3	0.626	6.74	3.65	0.01	0.86
300	6.45	0.02	33.942	0.002	26.68	141.6	0.701	8.83	3.03	0.01	1.06
400	5.56	0.15	34.011	0.013	26.85	125.9	0.836	13.65	1.81	0.05	1.26
500	5.17	0.00	34.114	0.000	26.98	114.7	0.957	19.24	0.86	0.01	0.95
600	4.69	0.01	34.197	0.003	27.10	103.7	1.067	25.44	0.44	0.07	0.68
700	4.30	0.01	34.273	0.001	27.20	94.5	1.167	32.11	0.28	0.03	0.83
800	3.99	0.01	34.332	0.002	27.28	87.4	1.259	39.19	0.24	0.02	0.70
1000	3.50	0.00	34.416	0.000	27.39	77.1	1.426	54.50	0.30	0.00	0.93
1200	3.09	0.01	34.478	0.003	27.48	69.2	1.574	71.21	0.49	0.02	0.90
1500	2.59	0.00	34.543	0.000	27.58	60.5	1.771	98.45	0.92	0.00	12.63

CNAV OSHAWA CRUISE 052 STATION 040 OBSERVED VALUES

DATE 30/05/63 HR 00.1 LAT 39-10 N LONG 127-55 W SNOG 4388 WEA 02 WIND VEL 0 DIR 00
 BAROM 22.0 TEMP DRY 18.9 WET 16.7 RELHU 80 WTRCLR SEA 0 DIR 00 SWELL 1 DIR 01
 CLOUD TYPE AMT 6 VIS 7 WIRE ANGLE(S) 5,20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	14.73	32.748	24.32	5.94	0.531	-0.028	106
1	5	13.81	32.749	24.51	5.99	0.535	-0.023	105
1	10	13.52	32.750	24.57	6.07	0.542	-0.027	105
1	20	13.20	32.750	24.63	6.12	0.547	-0.028	105
1	30	13.13	32.753	24.65	6.08	0.543	-0.024	105
1	50	11.76	32.733	24.90	6.32	0.564	-0.030	106
1	75	10.96	32.704	25.02	6.27	0.560	-0.016	103
1	100	10.01	32.953	25.37	5.40	0.482	0.072	87
1	125	8.95	33.213	25.75	4.87	0.435	0.132	77
1	150	8.38	33.475	26.04	4.55	0.406	0.167	71
1	175	8.04	33.762	26.32	4.23	0.378	0.199	66
2	187	8.00	33.858	26.40	3.91	0.349	0.228	61
2	233	7.33	33.957	26.57	3.45	0.308	0.278	53
2	278	6.60	33.957	26.67	2.93	0.262	0.335	44
2	466	5.11	34.052	26.93	1.36	0.121	0.497	20
2	697	4.44	34.284	27.19	0.31	0.028	0.600	4
2	935	3.86	34.421	27.36	0.31	0.028	0.608	4
2	1415	2.73	34.544	27.57	0.80	0.071	0.583	11
2	1708	2.25	34.612	27.66	1.32	0.118	0.544	18

CNAV OSHAWA CRUISE 052 STATION 040 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.02	0.04		32.737
11	0.03	0.06		32.746
36	0.09	0.06		32.733
70	0.21	0.08		32.685
100	0.13	0.02		32.938

6.85 4.49 - WATER COLUMN VALUES

MESSENGER TIME 1642 INCOMING SOLAR RADIATION - AM 223 PM 252

CNAV OSHAWA		CRUISE DS2			STATION 040		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	14.73	0.00	32.748	0.000	24.32	361.7	0.000	0.00	5.94	0.00		
10	13.52	0.00	32.750	0.000	24.57	337.9	0.036	0.02	6.07	0.00		
20	13.20	0.00	32.750	0.000	24.63	332.1	0.069	0.07	6.12	0.00		
30	13.13	0.00	32.753	0.000	24.65	330.8	0.103	0.16	6.08	0.00		
50	11.76	0.00	32.733	0.000	24.90	307.7	0.167	0.42	6.32	0.00		
75	10.96	0.00	32.704	0.000	25.02	296.5	0.243	0.90	6.27	0.00		
100	10.01	0.00	32.953	0.000	25.37	262.9	0.314	1.53	5.40	0.00		
150	8.38	0.00	33.475	0.000	26.04	200.1	0.430	2.99	4.55	0.00		
200	7.77	0.03	33.911	0.010	26.47	159.8	0.521	4.59	3.84	0.04	0.95	
250	7.05	0.01	33.962	0.004	26.62	146.8	0.598	6.37	3.25	0.00	0.63	
300	6.34	0.03	33.962	0.001	26.71	138.1	0.670	8.40	2.70	0.01	1.20	
400	5.44	0.06	34.005	0.002	26.86	124.9	0.803	13.14	1.82	0.01	1.17	
500	4.97	0.02	34.085	0.005	26.98	114.3	0.924	18.69	1.14	0.00	0.84	
600	4.64	0.05	34.185	0.009	27.09	104.0	1.034	24.90	0.63	0.00	0.67	
700	4.43	0.00	34.286	0.000	27.19	95.1	1.135	31.61	0.31	0.00	0.98	
800	4.18	0.00	34.353	0.002	27.27	86.1	1.227	38.73	0.23	0.04	0.62	
1000	3.69	0.01	34.444	0.004	27.40	77.3	1.395	54.12	0.34	0.00	0.94	
1200	3.21	0.02	34.502	0.008	27.49	68.8	1.543	70.80	0.51	0.01	0.88	
1500	2.57	0.00	34.560	0.001	27.59	58.9	1.737	97.59	0.94	0.00	9.86	

CNAV OSHAWA CRUISE 052 STATION 041 OBSERVED VALUES

DATE 30/05/63 HR 06.4 LAT 38-54 N LONG 126-50 W WEA 41 WIND VEL 0 DIR 00
 BAROM 22.0 TEMP DRY 13.3 WET 12.8 RELHU 95 WTRCLR SECDI SNDCG 4206 SEA 0 DIR 00 SWELL 1 DIR 24
 CLOUD TYPE VIS 5 WIRE ANGLE(S) 2.0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	14.02	32.682	24.41	5.90	0.527	-0.017	103
1	5	13.97	32.692	24.43	6.06	0.541	-0.031	106
1	10	13.42	32.675	24.53	6.06	0.541	-0.025	105
1	20	13.16	32.676	24.58	6.12	0.547	-0.028	105
1	30	13.14	32.683	24.59	6.13	0.547	-0.028	105
1	50	11.34	32.641	24.90	6.40	0.572	-0.032	106
1	75	10.49	32.728	25.12	5.89	0.526	0.023	96
1	100	9.43	33.106	25.59	5.02	0.448	0.113	80
1	125	8.61	33.763	26.23	3.34	0.298	0.271	52
1	150	8.46	33.874	26.37	3.79	0.338		
1	176	8.28	33.874	26.37	2.92	0.261	0.312	45
2	194	7.97	33.935	26.46	2.72	0.243	0.334	42
2	243	7.19	34.004	26.63	2.39	0.213	0.374	36
2	291	6.73	34.024	26.71	1.99	0.178	0.416	30
2	490	5.35	34.154	26.99	0.82	0.073	0.541	12
2	730	4.48	34.332	27.23	0.36	0.032	0.594	5
2	974	3.74	34.434	27.38	0.36	0.032	0.606	5
2	1463	2.68	34.538	27.57	0.84	0.075	0.580	11
2	1755	2.45	34.587	27.63	1.36	0.121	0.537	18

CNAV OSHAMA CRUISE 052 STATION 041 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.06	0.20		32.669
11	0.00	0.05		32.662
36	0.07	0.21		32.662
70	0.16	0.06		32.670
100	0.08	0.02		33.080

5.01 9.09 - WATER COLUMN VALUES

MESSENGER TIME 2203 INCOMING SOLAR RADIATION - AM 223 PM 252

DEPTH	CNAV OSHAWA		CRUISE 052		STATION 041		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	14.02	0.00	32.682	0.000	24.41	352.4	0.000	0.00	5.90	0.00			
10	13.42	0.00	32.675	0.000	24.53	341.5	0.035	0.02	6.06	0.00			
20	13.16	0.00	32.676	0.000	24.58	336.7	0.070	0.07	6.12	0.00			
30	13.14	0.00	32.683	0.000	24.59	336.1	0.103	0.16	6.13	0.00			
50	11.34	0.00	32.641	0.000	24.90	307.1	0.168	0.42	6.40	0.00			
75	10.49	0.00	32.728	0.000	25.12	286.9	0.243	0.90	5.89	0.00			
100	9.43	0.00	33.106	0.000	25.59	242.4	0.310	1.49	5.02	0.00			
150	8.46	0.00	33.915	0.073	26.37	168.7	0.413	2.77	3.79	0.00	1.13		
200	7.86	0.00	33.949	0.002	26.49	158.4	0.496	4.25	2.67	0.01	1.02		
250	7.11	0.01	34.008	0.001	26.64	144.3	0.572	6.00	2.33	0.00	0.83		
300	6.65	0.00	34.029	0.000	26.72	137.3	0.643	8.00	1.92	0.00	1.08		
400	5.88	0.01	34.090	0.002	26.87	124.1	0.775	12.71	1.26	0.00	1.30		
500	5.30	0.00	34.162	0.001	27.00	112.7	0.895	18.21	0.79	0.00	0.95		
600	4.89	0.03	34.239	0.004	27.11	103.0	1.003	24.35	0.52	0.02	0.67		
700	4.56	0.01	34.311	0.002	27.20	94.7	1.103	31.01	0.38	0.01	0.84		
800	4.25	0.00	34.367	0.002	27.28	87.9	1.196	38.11	0.33	0.01	0.70		
1000	3.67	0.00	34.442	0.001	27.40	77.2	1.363	53.47	0.37	0.00	0.97		
1200	3.16	0.01	34.492	0.004	27.49	69.0	1.511	70.16	0.51	0.01	0.89		
1500	2.63	0.00	34.544	0.000	27.58	60.9	1.709	97.47	0.90	0.00	1.91		

CNAV OSHAWA CRUISE OS2 STATION 41A BIOLOGICAL DATA

DATE 30/05/63 LAT 38-38 N LONG 125-58 W

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
-------	-------	-----------------------	--------	-----

0	0.02	0.09	0.90	32.927
---	------	------	------	--------

MESSENGER TIME 0432 INCOMING SOLAR RADIATION - AM 257 PM 191

CNAV OSHAWA CRUISE 052 STATION 042 OBSERVED VALUES

DATE	HR	LAT	LONG	WEA	SEA	WIND	DIR	VEL	DIR	DIR
30/05/63	14.1	38.35 N	125.40 W	02	00	00	00	00	00	00
BAROM	20.0	TEMP DRY	13.3	WET	12.8	RELHU	95	WTRCLR	SECDI	3931
CLOUD	TYPE	AMT	8	VIS	7	WIRE	ANGLE(S)	9.10		
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN	
1	0	13.48	32.822	24.63	5.97	0.533	-0.018	104		
1	5	13.46	32.818	24.63	5.89	0.526	-0.011	102		
1	10	13.47	32.808	24.62	6.07	0.542	-0.027	105		
1	20	13.39	32.809	24.64	5.92	0.529	-0.013	102		
1	30	13.27	32.814	24.67	6.05	0.540	-0.023	104		
1	50	13.16	32.852	24.72	6.00	0.536	-0.018	103		
1	75	11.86	32.893	25.00	5.97	0.533	-0.001	100		
1	100	10.71	33.122	25.39	5.79	0.517	0.028	195		
1	125	9.98	33.352	25.69	4.60	0.411	0.143	74		
1	150	9.64	33.648	25.98	3.66	0.327	0.230	59		
1	175	8.58	33.686	26.18	3.63	0.324	0.246	57		
1	200	8.53	33.867	26.33	3.19	0.285	0.285	50		
1	250	7.47	33.953	26.55	3.63	0.324	0.260	56		
1	300	6.74	33.958	26.66	3.12	0.279	0.316	47		
2	493	5.27	34.119	26.97	0.86	0.077	0.538	12		
2	739	4.48	34.338	27.23	0.35	0.031	0.595	5		
2	988	3.71	34.442	27.39	0.43	0.038	0.600	6		
2	1487	2.75	34.550	27.57	0.91	0.081	0.573	12		
2	1984	2.01	34.602	27.67	1.49	0.133	0.533	20		
2	2482	1.77	34.641	27.72	2.11	0.188	0.483	28		
2	2980	1.61	34.673	27.76	2.56	0.229	0.444	34		
2	3530	1.55	34.677	27.77	2.90	0.259	0.415	38		

CNAV OSHAWA CRUISE 052 STATION 042 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.05	0.13		32.811
11	0.02	0.17		32.808
36	0.07	0.26		32.823
70	0.04	0.13		32.813

3.38 13.60 - WATER COLUMN VALUES

MESSENGER TIME 0616 INCOMING SOLAR RADIATION - AM 257 PM 191

DEPTH	CNAV OSHAWA			CRUISE OS2			STATION 042			INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	13.48	0.00	32.822	0.000	24.63	331.6	0.000	0.00	5.97	0.00					
10	13.47	0.00	32.808	0.000	24.62	332.7	0.034	0.02	6.07	0.00					
20	13.39	0.00	32.809	0.000	24.64	331.4	0.067	0.07	5.92	0.00					
30	13.27	0.00	32.814	0.000	24.67	328.9	0.101	0.15	6.05	0.00					
50	13.16	0.00	32.852	0.000	24.72	324.5	0.166	0.42	6.00	0.00					
75	11.86	0.00	32.893	0.000	25.00	298.2	0.245	0.92	5.97	0.00					
100	10.71	0.00	33.122	0.000	25.39	262.0	0.315	1.55	5.79	0.00					
150	9.64	0.00	33.648	0.000	25.98	206.6	0.434	3.03	3.66	0.00					
200	8.53	0.00	33.867	0.000	26.33	174.2	0.530	4.74	3.19	0.00					
250	7.47	0.00	33.953	0.000	26.55	153.3	0.612	6.63	3.63	0.00					
300	6.74	0.00	33.958	0.000	26.66	143.7	0.687	8.74	3.12	0.00					
400	5.80	0.06	34.027	0.009	26.83	127.7	0.824	13.63	1.88	0.09					1.24
500	5.24	0.01	34.126	0.000	26.98	114.6	0.946	19.25	0.82	0.01					0.97
600	4.85	0.05	34.220	0.005	27.10	103.9	1.057	25.46	0.44	0.08					0.69
700	4.56	0.03	34.307	0.003	27.20	95.1	1.157	32.16	0.32	0.05					0.80
800	4.28	0.01	34.370	0.002	27.28	88.0	1.250	39.28	0.34	0.02					0.73
1000	3.68	0.00	34.446	0.000	27.40	77.0	1.417	54.64	0.44	0.00					0.99
1200	3.24	0.02	34.499	0.003	27.49	69.4	1.565	71.36	0.62	0.01					0.82
1500	2.73	0.00	34.552	0.000	27.57	61.4	1.764	98.86	0.92	0.00					0.96
2000	2.00	0.00	34.603	0.000	27.68	51.4	2.051	149.92	1.51	0.00					0.95
2500	1.76	0.00	34.642	0.000	27.73	47.4	2.302	208.14	2.13	0.00					0.95
3000	1.61	0.00	34.674	0.000	27.76	44.7	2.537	274.85	2.58	0.00					5.21

CNAV OSHAWA CRUISE 052 STATION 043 OBSERVED VALUES

DATE 30/05/63 HR 19.2 LAT 38-28 N LONG 125-12 W SNDG 3657 WEA 01 WIND VEL 10 DIR 31
 BAKOM 22.0 TEMP DRY 17.2 WET 15.0 RELHU 79 WTRCLR SECDI 30 SEA 1 DIP 31 SWELL 1 DIR 35
 CLOUD TYPE AMT 7 VIS 7 WIRE ANGLE(S) 9,23,20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.34	32.534	24.44	6.07	0.542	-0.025	105	
1	5	13.11	32.541	24.49	6.12	0.547	-0.027	105	
1	10	13.09	32.539	24.49	6.16	0.550	-0.030	106	
1	20	13.03	32.550	24.51	6.16	0.550	-0.029	106	
1	30	12.94	32.561	24.54	6.12	0.547	-0.025	105	
1	50	12.45	32.686	24.73	6.13	0.547	-0.021	104	
1	74	11.16	32.970	25.19	5.66	0.506	0.035	94	
1	99	9.86	33.268	25.65	5.03	0.449	0.106	81	
1	124	9.27	33.480	25.91	4.39	0.392	0.170	70	
1	149	8.70	33.729	26.19	3.74	0.334	0.234	59	
1	173	8.28	33.889	26.38	3.24	0.289	0.284	50	
2	182	8.34	34.009	26.47	2.34	0.209	0.363	37	
2	230	7.90	34.063	26.57	2.15	0.192	0.386	33	
2	275	7.48	34.086	26.65	1.76	0.157	0.426	27	
2	460	5.78	34.168	26.94	0.77	0.069	0.539	11	
2	692	4.75	34.318	27.19	0.27	0.024	0.598	4	
2	933	3.97	34.453	27.38	0.35	0.031	0.603	5	
3	1423	2.79	34.545	27.56	0.85	0.076	0.577	12	
3	1642	2.46			2.44	0.218			

CNAV OSHAWA CRUISE 052 STATION 043 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL
0	0.05	0.08	1.58	0.36	100		32.538
				0.30	75		
				0.26	55		
				0.17	37		
				0.07	19		
				0.01	6		
8	0.04	0.23	2.02			50	32.540
29	0.06	0.22	0.50			10	32.560
64	0.25	0.33	0.06			1	32.754
100	0.16	0.05					33.211
150	0.07						33.670
200	0.04						33.996

6.59 15.60 50.66 - WATER COLUMN VALUES

MESSENGER TIME 1144 INCOMING SOLAR RADIATION - AM 257 PM 191
 LIGHT SATURATION INCUBATOR ILLUMINATION 18300

CNAV OSHAMA		CRUISE OS2			STATION 043		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	13.34	0.00	32.534	0.000	24.44	350.1	0.000	0.00	6.07	0.00			
10	13.09	0.00	32.539	0.000	24.49	345.3	0.036	0.02	6.16	0.00			
20	13.03	0.00	32.550	0.000	24.51	343.6	0.070	0.07	6.16	0.00			
30	12.94	0.00	32.561	0.000	24.54	341.3	0.105	0.16	6.12	0.00			
50	12.45	0.00	32.686	0.000	24.73	323.5	0.172	0.43	6.13	0.00	0.94		
75	11.10	0.00	32.983	0.000	25.21	278.3	0.247	0.91	5.64	0.00	0.94		
100	9.83	0.00	33.277	0.001	25.66	236.1	0.312	1.49	5.00	0.00	0.96		
150	8.68	0.00	33.739	0.001	26.21	185.1	0.418	2.82	3.70	0.01			
200	8.08	0.06	34.020	0.008	26.51	156.3	0.504	4.35	2.50	0.14	0.92		
250	7.71	0.00	34.075	0.001	26.61	147.7	0.581	6.11	1.99	0.01	0.59		
300	7.23	0.01	34.097	0.001	26.70	140.0	0.654	8.16	1.58	0.01	1.22		
400	6.29	0.03	34.141	0.002	26.86	125.5	0.788	12.94	1.01	0.02	1.12		
500	5.55	0.02	34.193	0.002	26.99	113.5	0.908	18.49	0.63	0.01	0.82		
600	5.07	0.04	34.257	0.003	27.10	103.9	1.018	24.67	0.39	0.01	0.67		
700	4.72	0.00	34.323	0.000	27.19	95.8	1.119	31.40	0.27	0.00	0.96		
800	4.37	0.01	34.383	0.001	27.28	88.1	1.212	38.55	0.26	0.02	0.61		
1000	3.77	0.00	34.483	0.001	27.42	75.4	1.377	53.74	0.28	0.07	8.94		
1200	3.26	0.00	34.544	0.003	27.52	66.3	1.521	69.91	0.33	0.16	13.09		
1500	2.66	0.00							1.26	0.02	17.38		

CINAV OSHAWA CRUISE OS2 STATION 044 OBSERVED VALUES

DATE 31/05/63 HR 02.5 LAT 38-17 N LONG 124-28 W MEA 02 WIND VEL 16 DIR 32
 BAROM 20.0 TEMP DRY 13.3 WET 13.3 RELHU 99 WTRCLR SEA 2 DIR 32 SWELL 2 DIR 36
 CLOUD TYPE VIS 3 WIRE ANGLE(S) 22.8

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SECDI	SATN
1	0	13.64	33.014	24.75	6.07	0.542	-0.030	106		
1	5	13.63	33.013	24.75	6.01	0.537	-0.024	105		
1	9	13.62	33.014	24.75	6.14	0.548	-0.036	107		
1	19	12.81	33.019	24.92	6.24	0.557	-0.036	107		
1	28	11.54	33.203	25.30	5.31	0.474	0.061	89		
1	46	10.12	33.463	25.75	4.32	0.386	0.165	70		
1	70	9.77	33.583	25.91	3.84	0.343	0.212	62		
1	93	9.25	33.731	26.11	3.38	0.302	0.259	54		
1	116	8.90	33.897	26.29	2.83	0.253	0.312	45		
1	139	8.61	33.984	26.40	2.60	0.232	0.336	41		
1	163	8.28	34.012	26.48	2.37	0.212	0.361	37		
2	194	7.59	33.986	26.56	2.92	0.261	0.321	45		
2	243	6.99	34.009	26.66	2.49	0.222	0.368	38		
2	292	6.47	34.030	26.75	1.94	0.173	0.424	29		
2	486	5.41	34.216	27.03	0.58	0.052	0.561	8		
2	728	4.45	34.359	27.25	0.27	0.024	0.603	4		
2	972	3.72	34.440	27.39	0.43	0.038	0.600	6		
2	1465	2.78	34.546	27.56	0.90	0.080	0.573	12		
2	1759	2.27	34.587	27.64	1.32	0.118	0.544	18		

CNAV OSHAWA CRUISE OS2 STATION 044 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I DECK-I	SAL
0	0.33	0.27	33.010
6	0.30		33.011
22	0.56	0.63	33.006
43	0.22	0.29	33.288
100	0.12	0.03	33.750

16.87 19.48 - WATER COLUMN VALUES

MESSENGER TIME 1839 INCOMING SOLAR RADIATION - AM 257 PM 191

DEPTH	CNAV OSHAWA			CRUISE OS2 STATION 044			INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0	13.64	0.00	33.014	0.000	24.75	320.6	0.000	0.00	6.07	0.00	1.00		
10	13.58	0.01	33.010	0.003	24.76	320.0	0.033	0.02	6.18	0.01	0.85		
20	12.67	0.01	33.036	0.003	24.96	301.2	0.064	0.06	6.15	0.02	0.95		
30	11.32	0.01	33.239	0.000	25.37	262.3	0.092	0.14	5.16	0.01			
50	10.01	0.05	33.491	0.007	25.79	222.2	0.141	0.33	4.21	0.02	0.84		
75	9.66	0.01	33.613	0.000	25.95	208.0	0.195	0.68	3.74	0.00	0.75		
100	9.13	0.00	33.785	0.003	26.17	187.6	0.245	1.12	3.20	0.01	0.69		
150	8.47	0.01	34.003	0.001	26.44	162.3	0.333	2.24	2.46	0.02	0.63		
200	7.50	0.01	33.987	0.001	26.57	150.4	0.412	3.65	2.91	0.03	0.90		
250	6.91	0.00	34.012	0.000	26.67	141.3	0.486	5.34	2.41	0.00	0.84		
300	6.41	0.01	34.037	0.002	26.76	133.5	0.555	7.29	1.86	0.00	1.06		
400	5.77	0.05	34.127	0.009	26.91	119.8	0.683	11.86	1.04	0.01	1.23		
500	5.35	0.00	34.226	0.000	27.04	108.4	0.798	17.16	0.53	0.01	0.93		
600	4.92	0.01	34.293	0.002	27.15	99.3	0.903	23.07	0.31	0.04	0.67		
700	4.54	0.00	34.347	0.001	27.23	91.9	1.000	29.51	0.25	0.02	0.85		
800	4.21	0.00	34.387	0.002	27.30	85.9	1.090	36.43	0.29	0.01	0.69		
1000	3.66	0.01	34.448	0.000	27.40	76.6	1.254	51.57	0.45	0.00	0.97		
1200	3.23	0.03	34.497	0.001	27.48	69.5	1.402	68.26	0.62	0.00	0.90		
1500	2.72	0.00	34.551	0.000	27.57	61.4	1.601	95.78	0.94	0.00	12.15		

CNAV OSHAWA CRUISE OS2 STATION 045 OBSERVED VALUES

DATE 31/05/63 HR 10.1 LAT 38-00 N LONG 123-20 W WEA 02 WIND VEL 24 DIR 31
 BAROM 17.0 TEMP DRY 11.1 WET 11.1 RELHU 99 WTRCLR SECDI 102 SEA 3 DIR 31 SWELL 1 DIR 35
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
1	0	10.84	33.365	25.55	5.90	0.527	0.016	97
1	5	10.84	33.370	25.56	6.34	0.566	-0.023	104
1	10	10.86	33.367	25.55	6.37	0.569	-0.026	105
1	20	10.76	33.382	25.58	6.33	0.565	-0.022	104
1	30	9.86	33.600	25.90	5.08	0.454	0.100	82
1	49	9.42	33.651	26.02	3.81	0.340	0.219	61
1	74	8.77	33.888	26.30	2.87	0.256	0.310	45

CNAV OSHAWA CRUISE OS2 STATION 045 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
0	9.39	36.23	33.370
2	9.15	32.55	33.367
7	9.93	29.53	33.371
14	9.38	32.61	33.376

133.84 441.51 - WATER COLUMN VALUES

MESSANGER TIME 0224

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION 045		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	10.84	0.00	33.365	0.000	25.55	244.1	0.000	0.00	5.90	0.00		
10	10.86	0.00	33.367	0.000	25.55	244.5	0.025	0.01	6.37	0.00		
20	10.76	0.00	33.382	0.000	25.58	241.9	0.050	0.05	6.33	0.00		
30	9.86	0.00	33.600	0.000	25.90	211.3	0.072	0.11	5.08	0.00		
50	9.42	0.01	33.762	0.070	26.10	192.8	0.113	0.27	3.77	0.00	13.22	

CNAV OSHAWA CRUISE 052 STATION 046 OBSERVED VALUES

DATE 4/06/63 HR 21.5 LAT 39-26 N LONG 125-07 W WEA 00 WIND VEL 22 DIR 34
 BAROM 20.0 TEMP DRY 15.0 WET 14.4 RELHU 94 WTRCLR SECDI 3017 SEA 4 DIR 99 SWELL 4 DIR 34
 CLOUD TYPE 8 VIS 6 WIRE ANGLE(S) 20,20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SECDI	SATN
1	0	13.84	32.935	24.65	5.96	0.532	-0.022		104	
1	5	13.82	32.937	24.65	5.98	0.534	-0.023		105	
1	9	13.82	32.920	24.64	5.92	0.529	-0.018		103	
1	19	13.80	32.934	24.65	5.92	0.529	-0.018		103	
1	29	13.79	32.975	24.69	5.99	0.535	-0.024		105	
1	48	13.77	32.927	24.65	6.00	0.536	-0.024		105	
1	72	13.61	32.911	24.68	5.99	0.535	-0.022		104	
1	96	11.71	32.951	25.07	5.81	0.519	0.015		197	
1	119	10.39	33.173	25.48	5.29	0.472	0.077		86	
1	143	9.14	33.406	25.87	4.72	0.422	0.142		75	
1	168	8.80	33.630	26.10	4.23	0.378	0.190		67	
2	192	8.71	33.653	26.13	4.27	0.381	0.187		67	
2	240	8.44	33.963	26.41	3.16	0.282	0.289		49	
2	276	7.46	33.990	26.58	3.14	0.280	0.303		48	
2	479	5.42	34.046	26.89	1.48	0.132	0.481		22	
2	715	4.49	34.281	27.18	0.31	0.028	0.599		4	
2	950	3.84	34.416	27.36	0.37	0.033	0.603		5	
2	1419	2.80	34.537	27.56	0.82	0.073	0.580		11	
2	1599	2.32	34.581	27.63	1.24	0.111	0.550		17	

CNAV OSHAWA CRUISE 052 STATION 046

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILTR	BIOLOGICAL DATA SAL
0	0.07	0.12		0.16	100	32.930
				0.13	75	
				0.09	55	
				0.21	37	
				0.01	19	
11	0.10	0.11		0.00	6	32.933
35	0.11	0.10				32.948
71	0.14	0.13				32.932
100	0.06	0.03				32.933

8.05 8.12 - WATER COLUMN VALUES

MESSENGER TIME 1345 INCOMING SOLAR RADIATION - AM 181 PM 147

LIGHT SATURATION INCUBATOR ILLUMINATION 18800

CNAV OSHAWA			CRUISE OS2			STATION 046			INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO					
0	13.84	0.00	32.935	0.000	24.65	330.3	0.000	7.00	5.96	0.00	1.00					
10	13.82	0.00	32.919	0.001	24.64	331.3	0.034	0.02	5.91	0.00	0.87					
20	13.80	0.00	32.939	0.001	24.66	329.7	0.067	0.07	5.93	0.00	0.97					
30	13.79	0.00	32.974	0.002	24.69	327.2	0.100	0.15	5.99	0.00						
50	13.79	0.02	32.924	0.000	24.65	331.5	0.167	0.43	6.00	0.00	0.91					
75	13.41	0.04	32.909	0.003	24.71	325.6	0.249	0.96	5.98	0.00	0.84					
100	11.46	0.01	32.983	0.004	25.15	285.0	0.326	1.64	5.73	0.01	0.78					
150	8.98	0.02	33.480	0.006	25.95	208.8	0.451	3.19	4.55	0.01	0.72					
200	8.71	0.02	33.703	0.015	26.17	189.0	0.551	4.98	4.10	0.07	0.93					
250	8.19	0.03	33.980	0.006	26.47	161.7	0.639	7.01	3.12	0.03	0.68					
300	7.03	0.08	33.997	0.005	26.65	144.8	0.717	9.18	3.00	0.06	1.40					
400	5.79	0.19	34.026	0.012	26.83	127.7	0.854	14.08	2.25	0.13	1.71					
500	5.30	0.02	34.065	0.004	26.92	119.8	0.979	19.84	1.33	0.01	0.89					
600	4.83	0.05	34.161	0.012	27.05	108.1	1.094	26.32	0.75	0.02	0.66					
700	4.52	0.01	34.265	0.003	27.17	97.7	1.198	33.24	0.35	0.00	0.91					
800	4.23	0.01	34.338	0.002	27.26	89.8	1.293	40.53	0.25	0.04	0.65					
1000	3.71	0.00	34.435	0.002	27.39	78.2	1.463	56.16	0.40	0.00	0.95					
1200	3.25	0.00	34.496	0.006	27.48	69.7	1.613	73.04	0.56	0.01	0.88					
1500	2.65	0.00	34.549	0.001	27.58	60.7	1.811	100.43	0.93	0.00	0.57					

CNAV OSHAWA CRUISE OS2 STATION 46A BIOLOGICAL DATA

DATE 4/06/63 LAT 38-50 N LONG 124-25 W

DEPTH	CHL-A	PRODUCTIVITY	SAL
0	0.57	1.62	33.123

LAB-1 DECK-1 MESSENGER TIME 0350 INCOMING SOLAR RADIATION - AM 181 PM 147

CNAV OSHAWA CRUISE OS2 STATION 468 BIOLOGICAL DATA

DATE 4/06/63 LAT 39-22 N LONG 125-05 W

DEPTH CHL-A PRODUCTIVITY LAB-I DECK-I SAL PHOS NITR SIL

0 0.11 0.16 2.90 32.948 0.60 0.6 0.6 2

MESSENGER TIME 1210 INCOMING SOLAR RADIATION - AM 181 PM 147

CNAV OSHAWA CRUISE OS2 STATION 047 OBSERVED VALUES

DATE 5/06/63 HR 05.5 LAT 39-50 N LONG 126-08 W SNDG 4279 WEA 02 WIND VEL 26 DIR 34
 BAROM 19.0 TEMP DRY 14.4 WET 13.9 RELHU 95 WTRCLR SEA 4 DIR 34 SWELL 4 DIR 34
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 8,15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	13.63	32.774	24.57	6.12	0.547	-0.033	106
1	5	13.62	32.760	24.56	6.00	0.536	-0.022	104
1	10	13.64	32.762	24.55	6.07	0.542	-0.029	106
1	20	13.63	32.769	24.56	6.04	0.539	-0.026	105
1	30	13.58	32.768	24.57	6.06	0.541	-0.027	105
1	50	13.51	32.771	24.59	6.08	0.543	-0.028	105
1	74	10.75	32.946	25.24	5.85	0.522	0.023	96
1	99	9.05	33.449	25.92	4.19	0.374	0.191	66
1	124	8.39	33.676	26.20	3.73	0.333	0.239	58
1	149	8.09	33.873	26.40	3.01	0.269	0.307	47
1	174	7.72	33.955	26.52	2.72	0.243	0.338	42
2	190	7.26	33.971	26.59	2.65	0.237	0.350	40
2	239	6.83	34.029	26.70	1.95	0.174	0.418	29
2	287	6.44	34.060	26.78	1.56	0.139	0.459	23
2	478	4.96	34.120	27.00	0.81	0.072	0.548	12
2	718	4.40	34.331	27.23	0.30	0.027	0.601	4
2	956	3.52	34.418	27.39	0.39	0.035	0.607	5
2	1440	2.66	34.540	27.57	0.85	0.076	0.580	12
2	1733	2.15	34.592	27.65	1.37	0.122	0.542	18

CNAV OSHAWA CRUISE 052 STATION 047 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I DECK-I	SAL
0	0.07	0.04	32.780
11	0.08	0.11	32.768
35	0.08	0.07	32.771
71	0.17	0.16	32.776

7.24 7.17 - WATER COLUMN VALUES

MESSENGER TIME 2132 INCOMING SOLAR RADIATION - AM 181 PM 147

CNAV OSHAWA		CRUISE 052			STATION 047		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	13.63	0.00	32.774	0.000	24.57	338.0	0.000	0.00	6.12	0.00			
10	13.64	0.00	32.762	0.000	24.55	339.4	0.035	0.02	6.07	0.00			
20	13.63	0.00	32.769	0.000	24.56	338.9	0.069	0.07	6.04	0.00			
30	13.58	0.00	32.768	0.000	24.57	338.3	0.103	0.16	6.06	0.00			
50	13.51	0.00	32.771	0.000	24.59	337.2	0.171	0.44	6.08	0.00			
75	10.66	0.00	32.966	0.004	25.27	272.2	0.248	0.92	5.79	0.02	0.94		
100	9.01	0.00	33.461	0.002	25.93	209.7	0.308	1.46	4.16	0.01	0.94		
150	8.08	0.00	33.878	0.000	26.40	165.9	0.403	2.64	2.99	0.00	0.94		
200	7.11	0.04	33.983	0.001	26.62	145.3	0.481	4.04	2.52	0.03	1.10		
250	6.74	0.00	34.038	0.001	26.72	137.1	0.553	5.68	1.84	0.01	0.75		
300	6.32	0.01	34.064	0.002	26.79	130.3	0.620	7.58	1.48	0.01	1.11		
400	5.50	0.03	34.096	0.008	26.92	118.9	0.746	12.07	1.02	0.04	1.20		
500	4.89	0.02	34.139	0.004	27.03	109.4	0.861	17.38	0.74	0.00	0.90		
600	4.61	0.07	34.226	0.011	27.13	100.6	0.967	23.35	0.48	0.01	0.67		
700	4.42	0.02	34.315	0.003	27.22	92.8	1.065	29.87	0.32	0.00	0.90		
800	4.10	0.02	34.369	0.004	27.30	85.9	1.155	36.82	0.29	0.02	0.65		
1000	3.42	0.02	34.432	0.000	27.41	75.0	1.318	51.79	0.41	0.00	0.96		
1200	3.01	0.05	34.487	0.001	27.50	67.6	1.463	68.08	0.57	0.01	0.89		
1500	2.57	0.01	34.552	0.000	27.59	59.7	1.656	94.83	0.94	0.00	11.23		

CNAV OSHAWA CRUISE OS2 STATION 47A BIOLOGICAL DATA

DATE 5/06/63 LAT 40-09 N LONG 127-15 W
DEPTH CHL-A PRODUCTIVITY SAL
LAB-I DECK-I
0 0.08 0.30 4.94 32.535
MESSENGER TIME 0413 INCOMING SOLAR RADIATION - AM 242 PM 250

CNAV OSHAWA CRUISE OS2 STATION 048 OBSERVED VALUES

DATE 5/06/63 HR 13.2 LAT 40-13 N LONG 127-18 W WEA 02 WIND VEL 36 DIR 01
BAROM 21.0 TEMP DRY 12.2 WET 11.7 RELHU 94 WTRCLR SECDI SEA 4 DIR 01 SWELL 4 DIR 34
CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 5
CST DEPTH TEMP SAL SIGMA-T ML/L MGA/L OXYGEN AUO SATN
1 1 13.97 32.475 24.27 5.90 0.527 -0.016 103
1 1 13.93 32.475 24.27 5.92 0.529 -0.017 103
1 1 13.94 32.494 24.29 5.94 0.531 -0.019 104
1 1 13.89 32.481 24.29 6.01 0.537 -0.025 105
1 1 12.99 32.592 24.55 6.19 0.553 -0.032 106
1 1 11.59 32.661 24.87 6.27 0.560 -0.023 104
1 1 10.47 32.790 25.17 5.73 0.512 0.038 93
1 1 9.30 33.175 25.66 4.87 0.435 0.128 77
1 1 8.46 33.451 26.01 4.19 0.374 0.198 65
1 1 8.13 33.782 26.32 3.42 0.305 0.270 53
1 1 7.73 33.909 26.48 3.09 0.276 0.305 48

BIOLOGICAL DATA

CNAV OSHAWA CRUISE 052 STATION 048

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	SAL
0	0.09	0.20		0.35	100	32.492
				0.29	66	
				0.26	50	
				0.30	33	
				0.09	18	
				0.01	6	
11	0.08	0.19				32.491
35	0.16	0.25				32.609
71	0.46	0.19				32.753
100	0.10	0.00				33.224

15.07 15.57 - WATER COLUMN VALUES

MESSENGER TIME 0527 INCOMING SOLAR RADIATION - AM 242 PM 250

LIGHT SATURATION INCUBATOR ILLUMINATION 18700

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION 048		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	13.97	0.00	32.475	0.000	24.27	366.6	0.000	0.00	5.90	0.00		
10	13.94	0.00	32.494	0.000	24.29	364.9	0.037	0.02	5.94	0.00		
20	13.89	0.00	32.481	0.000	24.29	365.1	0.074	0.08	6.01	0.00		
30	12.99	0.00	32.592	0.000	24.55	340.0	0.110	0.17	6.19	0.00		
50	11.59	0.00	32.661	0.000	24.87	310.0	0.175	0.43	6.27	0.00		
75	10.47	0.00	32.790	0.000	25.17	282.0	0.250	0.91	5.73	0.00		
100	9.30	0.00	33.175	0.000	25.66	235.3	0.315	1.48	4.87	0.00		
150	8.13	0.00	33.782	0.000	26.32	173.8	0.418	2.77	3.42	0.00		

CNAV OSHAWA CRUISE OS2 STATION 48A BIOLOGICAL DATA

DATE 5/06/63 LAT 40-51 N LONG 127-01 W

DEPTH CHL-A PRODUCTIVITY PHOS NITR SIL

LAB-I DECK-I SAL

0 0.07 0.70 2.44 32.585 0.64 0.1 2

MESSENGER TIME 1205 INCOMING SOLAR RADIATION - AM 242 PM 250

CNAV OSHAWA CRUISE OS2 STATION 48B BIOLOGICAL DATA

DATE 6/06/63 LAT 41-55 N LONG 127-30 W

DEPTH CHL-A PRODUCTIVITY PHOS NITR SIL

LAB-I DECK-I SAL

0 0.19 0.64 6.66 32.739

MESSENGER TIME 0408 INCOMING SOLAR RADIATION - AM 120 PM 231

CNAV OSHAWA CRUISE 052 STATION 049 OBSERVED VALUES

DATE 6/06/63 HR 18.3 LAT 42-20 N LONG 127-39 W WEA 02 WIND VEL 30 DIR 36
 BAROM 23.0 TEMP DRY 12.2 WET 9.4 RELHU 70 WTRCLR SECDI SNDDG 2880 SEA 4 DIR 36 SWELL 5 DIR 34
 CLOUD TYPE VIS 8 WIRE ANGLE(S) 8,15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.22	32.705	24.59	6.19	0.553	-0.035		107
1	5	13.20	32.701	24.60	6.23	0.556	-0.038		107
1	10	13.22	32.699	24.59	6.24	0.557	-0.039		108
1	20	13.21	32.700	24.59	6.31	0.564	-0.045		109
1	30	13.18	32.707	24.60	6.27	0.560	-0.041		108
1	50	11.01	32.838	25.11	6.38	0.570	-0.027		105
1	75	10.28	32.920	25.30	5.52	0.493	0.058		89
1	100	9.50	33.280	25.71	4.46	0.398	0.161		71
1	124	9.11	33.469	25.92	3.95	0.353	0.211		63
1	149	8.45	33.788	26.28	2.87	0.256	0.315		45
1	175	7.27	33.996	26.61	1.98	0.177	0.410		30
2	193	6.63	34.024	26.72	1.74	0.155	0.440		26
2	241	6.12	34.054	26.81	1.47	0.131	0.471		22
2	290	5.79	34.073	26.87	1.22	0.109	0.499		18
2	484	4.82	34.205	27.09	0.48	0.043	0.579		7
2	725	4.04	34.335	27.28	0.27	0.024	0.609		4
2	967	3.56	34.430	27.40	0.35	0.031	0.610		5
2	1452	2.56	34.554	27.59	0.96	0.086	0.571		13
2	1741	2.15	34.595	27.66	1.33	0.119	0.545		18

BIOLOGICAL DATA

CNAV OSHAWA CRUISE OS2 STATION 049

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	PROD	LIGHT SAT FILT	SAL	PHOS	NITR	SIL
0	0.15	0.42	1.12	0.49	100	32.709	0.53	0.2	0
0	0.19	0.35	3.72	0.25	66	32.702	0.68	0.4	0
33	0.19	0.57	0.00			32.708	1.08		1
70	0.54	0.17	0.00	0.17	50	32.793	0.97	6.2	6
100	0.13	0.05		0.28	33	33.239	1.58	19.3	23
				0.16	18				
				0.08	6				

19.57 28.26 66.98 - WATER COLUMN VALUES

MESSINGER TIME 1133 INCOMING SOLAR RADIATION - AM 120 PM 231

LIGHT SATURATION INCUBATOR ILLUMINATION 20200

DEPTH	CNAV DSHAWA			CRUISE 052 STATION 049			INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	13.22	0.00	32.705	0.000	24.59	335.3	0.000	0.00	6.19	0.00			
10	13.22	0.00	32.699	0.000	24.59	336.0	0.034	0.02	6.24	0.00			
20	13.21	0.00	32.700	0.000	24.59	335.9	0.068	0.07	6.31	0.00			
30	13.18	0.00	32.707	0.000	24.60	335.1	0.102	0.16	6.27	0.00			
50	11.01	0.00	32.838	0.000	25.11	286.9	0.165	0.41	6.38	0.00			
75	10.28	0.00	32.920	0.000	25.30	269.3	0.235	0.86	5.52	0.00			
100	9.50	0.00	33.280	0.000	25.71	230.7	0.298	1.42	4.46	0.00			
150	8.41	0.00	33.799	0.000	26.29	176.5	0.400	2.70	2.83	0.00	0.94		
200	6.50	0.03	34.031	0.001	26.74	133.7	0.478	4.08	1.68	0.01	1.02		
250	6.05	0.00	34.058	0.000	26.82	126.7	0.544	5.59	1.42	0.00	0.80		
300	5.73	0.00	34.079	0.001	26.88	121.7	0.607	7.35	1.17	0.00	1.08		
400	5.19	0.01	34.144	0.005	27.00	111.5	0.724	11.56	0.74	0.00	1.22		
500	4.76	0.00	34.215	0.000	27.10	102.2	0.832	16.53	0.45	0.01	0.92		
600	4.40	0.01	34.272	0.000	27.19	94.7	0.932	22.13	0.31	0.02	0.67		
700	4.10	0.00	34.323	0.000	27.26	88.5	1.024	28.30	0.27	0.01	0.86		
800	3.88	0.01	34.368	0.000	27.32	83.4	1.111	35.00	0.27	0.01	0.68		
1000	3.49	0.00	34.441	0.000	27.42	75.1	1.272	49.77	0.38	0.01	0.96		
1200	3.06	0.02	34.499	0.001	27.50	67.3	1.416	66.04	0.60	0.02	0.89		
1500	2.48	0.00	34.562	0.000	27.60	57.7	1.606	92.27	1.03	0.00	11.42		

CNAV OSHAWA CRUISE 052 STATION 050 OBSERVED VALUES

DATE 7/06/63 HR 01.8 LAT 42-37 N LONG 128-49 W WEA 02 WIND VEL 36 DIR 35
 BAROM 25.0 TEMP DRY 13.3 WET 11.1 RELHU 77 WTRCLR SEA 4 DIR 35 SWELL 5 DIR 34
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 30, 6

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	13.13	32.680	24.59	6.15	0.549	-0.030	106	
1	4	13.10	32.677	24.60	6.26	0.559	-0.040	108	
1	9	13.11	32.677	24.59	6.17	0.551	-0.032	106	
1	17	13.09	32.677	24.60	6.22	0.556	-0.036	107	
1	26	13.05	32.674	24.61	6.19	0.553	-0.033	106	
1	43	10.99	32.643	24.97	6.56	0.586	-0.042	108	
1	65	10.56	32.654	25.05	6.22	0.556	-0.007	101	
1	87	9.74	32.890	25.37	5.52	0.493	0.065	88	
1	109	9.07	33.393	25.87	4.22	0.377	0.188	67	
1	130	8.51	33.643	26.15	3.55	0.317	0.254	56	
1	152	8.00	33.768	26.33	3.48	0.311	0.267	54	
2	200	7.61	33.908	26.49	3.35	0.299	0.283	51	
2	249	6.72	33.948	26.65	3.28	0.293	0.302	49	
2	299	6.19	33.954	26.72	2.73	0.244	0.358	40	
2	499	4.91	34.111	27.00	0.90	0.080	0.540	13	
2	749	3.99	34.293	27.25	0.34	0.030	0.604	5	
2	999	3.41	34.411	27.40	0.35	0.031	0.612	5	
2	1497	2.55	34.545	27.58	0.85	0.076	0.581	12	
2	1794	2.12	34.587	27.65	1.32	0.118	0.547	18	

CNAV OSHAWA CRUISE OS2 STATION OS0 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.09	0.21	32.665
10	0.09	0.20	32.680
33	0.09	0.12	32.660
70	0.07	0.14	32.661

5.87 10.45 - WATER COLUMN VALUES

MESSANGER TIME 1800 INCOMING SOLAR RADIATION - AM 120 PM 231

CNAV OSHAWA CRUISE OS2 STATION OS0				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.13	0.00	32.680	0.000	24.59	335.4	0.000	0.00	6.15	0.00	0.90
10	13.11	0.00	32.677	0.000	24.59	335.5	0.034	0.02	6.17	0.01	0.68
20	13.12	0.03	32.677	0.000	24.59	335.9	0.068	0.07	6.21	0.01	0.88
30	12.61	0.12	32.667	0.002	24.68	327.5	0.102	0.16	6.28	0.03	
50	10.74	0.11	32.631	0.006	25.00	297.6	0.164	0.41	6.52	0.02	0.73
75	10.20	0.02	32.731	0.002	25.17	282.0	0.237	0.88	5.96	0.01	0.64
100	9.33	0.00	33.186	0.021	25.67	235.0	0.303	1.45	4.75	0.05	0.66
150	8.04	0.00	33.760	0.001	26.32	174.1	0.406	2.74	3.47	0.01	0.84
200	7.61	0.00	33.908	0.000	26.49	157.8	0.489	4.23	3.35	0.00	
250	6.71	0.00	33.948	0.000	26.65	143.3	0.565	5.98	3.27	0.00	0.98
300	6.18	0.00	33.955	0.000	26.73	136.7	0.636	7.97	2.72	0.00	1.01
400	5.43	0.04	33.021	0.009	26.87	123.6	0.767	12.66	1.69	0.03	1.30
500	4.91	0.00	34.112	0.000	27.00	111.6	0.886	18.12	0.90	0.00	1.00
600	4.47	0.02	34.189	0.002	27.11	101.8	0.994	24.18	0.52	0.05	0.69
700	4.13	0.01	34.260	0.001	27.21	93.4	1.092	30.76	0.35	0.04	0.77
800	3.85	0.01	34.321	0.001	27.28	86.6	1.183	37.76	0.31	0.01	0.77
1000	3.41	0.00	34.411	0.000	27.40	76.4	1.348	52.94	0.35	0.00	1.00
1200	3.03	0.01	34.478	0.002	27.49	68.5	1.495	69.49	0.49	0.01	0.90
1500	2.55	0.00	34.546	0.000	27.58	59.8	1.690	96.43	0.85	0.00	12.86

CNAV OSHAWA CRUISE 052 STATION 051 OBSERVED VALUES

DATE 7/06/63 HR 08.5 LAT 42-48 N LONG 130-00 W WEA 02 WIND VEL 10 DIR 32
 BAROM 24.0 TEMP DRY 13.3 WET 12.8 RELHU 95 WTRCLR SEA 2 DIR 32 SWELL 1 DIR 34
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 5.23 SDC1 SECD1 SDC2 SECD2

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	13.63	32.714	24.52	6.18	0.552	-0.038	107
1	5	13.63	32.708	24.51	6.22	0.556	-0.042	108
1	10	13.65	32.705	24.51	6.18	0.552	-0.038	107
1	20	13.45	32.703	24.55	6.29	0.562	-0.046	109
1	30	11.03	32.652	24.97	6.99	0.624	-0.081	115
1	50	10.66	32.651	25.03	6.61	0.590	-0.043	108
1	75	10.51	32.645	25.05	6.26	0.559	-0.010	102
1	100	10.16	32.701	25.15	6.04	0.539	0.014	97
1	125	8.41	33.180	25.81	5.34	0.477	0.097	93
1	150	8.06	33.584	26.18	4.79	0.428	0.150	74
1	174	7.78	33.801	26.39	3.89	0.347	0.233	60
2	178	7.87	33.772	26.35	3.96	0.354	0.225	61
2	223	7.35	33.925	26.55	3.38	0.302	0.284	52
2	268	6.59	33.952	26.67	2.90	0.259	0.337	43
2	454	4.99	34.128	27.01	1.43	0.128	0.492	21
2	687	4.03	34.232	27.19	0.39	0.035	0.599	5
2	923	3.47	34.366	27.36	0.30	0.027	0.616	4
2	1401	2.68	34.528	27.56	0.69	0.062	0.594	9
2	1877	2.04	34.596	27.67	1.42	0.127	0.539	19
2	2357	1.78	34.634	27.72	1.90	0.170	0.501	25
2	2832	1.64	34.657	27.75	2.48	0.221	0.451	33
2	3102	1.61	34.672	27.76	2.55	0.228	0.445	34

CNAV OSHAWA CRUISE 052 STATION 051 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.14	0.26		32.697
10	0.10	0.26		32.695
33	0.09	0.21		32.761
70	0.11	0.19		32.707

7.06 15.33 - WATER COLUMN VALUES

MESSENGER TIME 0231 INCOMING SOLAR RADIATION - AM 119 PM 108

CNAV OSHAWA		CRUISE OS2		STATION OS1		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANCMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.63	0.00	32.714	0.000	24.52	342.5	0.000	0.00	6.18	0.00	
10	13.65	0.00	32.705	0.000	24.51	343.7	0.035	0.02	6.18	0.00	
20	13.45	0.00	32.703	0.000	24.55	340.3	0.070	0.07	6.29	0.00	
30	11.03	0.00	32.652	0.000	24.97	300.6	0.102	0.15	6.99	0.00	
50	10.66	0.00	32.651	0.000	25.03	294.9	0.162	0.40	6.61	0.00	
75	10.51	0.00	32.645	0.000	25.05	293.3	0.236	0.87	6.26	0.00	
100	10.16	0.00	32.701	0.000	25.15	284.0	0.309	1.53	6.04	0.00	
150	8.06	0.00	33.584	0.000	26.18	187.4	0.427	2.99	4.79	0.00	
200	7.59	0.04	33.891	0.019	26.49	158.7	0.515	4.54	3.53	0.09	0.80
250	6.90	0.02	33.948	0.005	26.63	145.8	0.591	6.30	3.08	0.00	0.57
300	6.20	0.04	33.982	0.004	26.74	134.9	0.662	8.30	2.60	0.01	1.28
400	5.29	0.06	34.076	0.006	26.93	117.8	0.790	12.84	1.78	0.01	1.07
500	4.74	0.02	34.153	0.004	27.06	106.6	0.903	18.05	1.15	0.00	0.80
600	4.30	0.03	34.199	0.006	27.14	99.0	1.007	23.90	0.67	0.00	0.68
700	3.99	0.00	34.239	0.001	27.20	93.4	1.104	30.39	0.37	0.01	0.93
800	3.73	0.01	34.297	0.003	27.28	87.0	1.195	37.41	0.27	0.03	0.60
1000	3.32	0.01	34.400	0.001	27.40	76.3	1.360	52.60	0.33	0.01	0.93
1200	2.98	0.01	34.475	0.002	27.49	68.2	1.507	69.09	0.46	0.02	0.78
1500	2.53	0.01	34.547	0.002	27.59	59.4	1.701	95.89	0.84	0.02	0.76
2000	1.95	0.01	34.608	0.000	27.68	50.4	1.980	145.67	1.55	0.01	0.72
2500	1.72	0.00	34.642	0.001	27.73	47.0	2.228	203.11	2.10	0.02	0.75
3000	1.62	0.00	34.666	0.000	27.75	45.4	2.464	270.13	2.51	0.03	2.30

CNAV OSHAWA CRUISE 052 STATION 052 OBSERVED VALUES

DATE 7/06/63 HR 16.0 LAT 43-12 N LONG 128-58 W WEA 02 WIND VEL 26 DIR 34
 BAROM 22.0 TEMP DRY 13.3 WET 12.8 RELHU 95 WTRCLR SEA 3 DIR 34 SWELL 3 DIR 35
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 25.38

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	C	13.09	32.690	24.61	6.13	0.547	-0.028		105
1	5	13.07	32.683	24.61	6.29	0.562	-0.042		108
1	9	13.09	32.687	24.61	6.22	0.556	-0.036		107
1	18	13.07	32.689	24.61	6.15	0.549	-0.029		106
1	27	12.91	32.690	24.64	6.18	0.552	-0.030		106
1	45	10.99	32.664	24.98	6.52	0.582	-0.039		107
1	67	10.68	32.669	25.04	6.29	0.562	-0.014		103
1	89	9.92	32.787	25.26	5.68	0.507	0.049		91
1	112	8.62	33.210	25.80	4.76	0.425	0.146		74
1	134	8.51	33.597	26.12	3.76	0.336	0.235		59
1	156	8.36	33.844	26.33	2.93	0.262	0.311		46
2	161	8.30	33.855	26.35	2.82	0.252	0.321		44
2	201	7.70	33.958	26.52	2.49	0.222	0.358		38
2	238	7.12	33.978	26.62	2.44	0.218	0.371		37
2	392	5.59	34.061	26.88	1.31	0.117	0.494		19
2	586	4.70	34.179	27.08	0.55	0.049	0.575		3
2	800	4.00	34.335	27.28	0.29	0.026	0.608		4
2	1257	2.99	34.498	27.51	0.55	0.049	0.601		8
2	1537	2.52	34.548	27.59	0.82	0.073	0.585		11

CNAV OSHAWA CRUISE 052 STATION 052 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.10	0.18		32.682
10	0.05	0.11		32.680
33	0.09	0.17		32.680
70	0.36	0.13		32.657
100	0.62	0.08		32.740

10.48 10.27 - WATER COLUMN VALUES

MESSENGER TIME 0843 INCOMING SOLAR RADIATION - AM 119 PM 108

INTERPOLATED AND COMPUTED VALUES

DEPTH	CNAV OSHAWA			CRUISE OS2 STATION OS2			INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	13.09	0.00	32.690	0.000	24.61	333.9	0.000	0.00	6.13	0.00	0.97	
10	13.09	0.00	32.687	0.000	24.61	334.4	0.034	0.02	6.21	0.00	0.75	
20	13.06	0.01	32.690	0.000	24.61	333.9	0.068	0.07	6.15	0.00	0.93	
30	12.61	0.08	32.686	0.001	24.70	326.0	0.101	0.15	6.24	0.02		
50	10.84	0.08	32.658	0.002	25.00	297.3	0.164	0.41	6.52	0.01	0.78	
75	10.46	0.08	32.689	0.006	25.09	289.2	0.238	0.88	6.11	0.00	0.66	
100	9.25	0.07	32.971	0.014	25.51	249.7	0.306	1.49	5.27	0.01	0.65	
150	8.40	0.00	33.779	0.007	26.28	178.0	0.413	2.82	3.14	0.00	0.63	
200	7.72	0.00	33.959	0.002	26.52	155.6	0.497	4.32	2.49	0.00	0.97	
250	6.96	0.01	33.984	0.000	26.65	144.0	0.573	6.06	2.37	0.02	1.14	
300	6.37	0.03	34.011	0.000	26.75	135.0	0.643	8.04	2.05	0.08	1.42	
400	5.54	0.01	34.065	0.000	26.89	121.6	0.773	12.66	1.27	0.00	0.95	
500	5.01	0.04	34.124	0.000	27.00	111.9	0.891	18.09	0.81	0.01	0.66	
600	4.65	0.00	34.190	0.001	27.09	103.8	0.999	24.23	0.52	0.00	0.92	
700	4.30	0.01	34.264	0.003	27.19	95.2	1.100	30.93	0.36	0.02	0.60	
800	4.00	0.00	34.335	0.000	27.28	87.3	1.192	38.02	0.29	0.00		
1000	3.50	0.01	34.427	0.005	27.40	76.3	1.358	53.24	0.32	0.04	0.92	
1200	3.09	0.01	34.487	0.002	27.49	68.6	1.505	69.79	0.48	0.02	0.91	
1500	2.58	0.00	34.541	0.001	27.58	60.5	1.701	96.91	0.79	0.00	16.36	

CNAV OSHAWA CRUISE 052 STATION 053 OBSERVED VALUES

DATE 7/06/63 HR 19.2 LAT 43-17 N LONG 128-41 W WEA 02 WIND VEL 24 DIR 34
 BAROM 23.0 TEMP DRY 14.4 WET 13.3 RELHU 89 WTRCLR SMDG 2890 SEA 3 DIR 35 SWELL 3 DIR 35
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 25

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		SATN	
					ML/L	MGA/L	AQU	
1	0	12.96	32.699	24.64	0.561	-0.040	108	
1	5	12.92	32.699	24.65	0.562	-0.040	108	
1	9	12.94	32.697	24.64	0.562	-0.041	108	
1	18	12.93	32.701	24.65	0.564	-0.042	108	
1	27	12.93	32.706	24.65	0.565	-0.044	108	
1	45	10.80	32.670	25.02	0.595	-0.049	109	
1	68	10.34	32.644	25.08	0.574	-0.023	104	
1	91	9.85	32.688	25.20	0.542	0.015	97	
1	114	9.10	33.032	25.58	0.531	0.034	94	
1	136	8.31	33.511	26.08	0.367	0.207	64	
1	160	8.12	33.794	26.33	0.286	0.290	50	

CNAV OSHAWA CRUISE OS2 STATION OS3 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	P40S	NITR	SIL
0	0.09	0.28	2.66				32.700	0.48		0
5	0.09	0.16	2.06			50	32.700	0.44		1
15	0.09	0.10	0.00			10	32.694	0.51	0.1	0
34	0.11	0.18	0.00	0.06	100	1	32.697	0.51		0
				0.07						
				0.06						
				0.08						
				0.04						
				0.04						
100	0.18	0.00					32.763	0.72	5.5	2
150	0.12						33.290			
200	0.00						33.509	1.85	22.6	28

3.25 5.00 22.10 - WATER COLUMN VALUES

MESSENGER TIME 1152 INCOMING SOLAR RADIATION - AM 119 PM 108

LIGHT SATURATION INCUBATOR ILLUMINATION I9100

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION OS3		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANCMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	12.96	0.00	32.699	0.000	24.64	330.8	0.000	0.00	6.28	0.00	0.97		
10	12.94	0.00	32.697	0.000	24.64	330.8	0.034	0.02	6.29	0.00	0.75		
20	12.96	0.02	32.703	0.000	24.64	331.0	0.067	0.07	6.31	0.00	0.93		
30	12.62	0.10	32.702	0.002	24.71	325.0	0.100	0.15	6.39	0.02	0.79		
50	10.59	0.07	32.660	0.001	25.05	293.1	0.162	0.41	6.65	0.02	0.69		
75	10.21	0.01	32.638	0.008	25.10	288.9	0.236	0.88	6.31	0.01	0.66		
100	9.58	0.01	32.795	0.006	25.32	267.7	0.306	1.50	6.12	0.08	3.78		
150	8.19	0.05	33.733	0.009	26.27	178.3	0.418	2.89	3.24	0.07			

CNAV OSHAMA CRUISE 052 STATION 054 OBSERVED VALUES

DATE 8/06/63 HR 00.6 LAT 43-37 N LONG 127-55 W WEA 02 WIND VEL 20 DIR 36
 BAROM 23.0 TEMP DRY 13.9 WET 12.8 RELHU 88 WTRCLR SECDI 3292 SEA 3 DIR 35 SWELL 3 DIR 35
 CLOUD TYPE VIS 8 WIRE ANGLE(S) 15,16

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
1	0	13.07	32.719	24.64	6.19	0.553	-0.033	106
1	5	13.07	32.719	24.64	6.08	0.543	-0.023	104
1	10	13.08	32.716	24.63	5.81	0.519	0.001	100
1	20	13.05	32.718	24.64	6.16	0.550	-0.030	106
1	30	12.99	32.717	24.65	6.22	0.556	-0.035	107
1	49	10.13	32.661	25.13	6.53	0.583	-0.029	105
1	74	9.88	32.634	25.15	6.20	0.554	0.004	199
1	98	7.89	33.004	25.75	5.57	0.497	0.085	85
1	123	7.79	33.340	26.02	4.82	0.430	0.152	74
1	148	7.92	33.735	26.31	3.64	0.325	0.254	56
1	173	7.88	33.849	26.41	3.27	0.292	0.287	50
2	193	7.70	33.889	26.47	3.11	0.278	0.303	48
2	241	7.16	33.942	26.58	2.92	0.261	0.327	44
2	288	6.44	33.927	26.67	3.00	0.268	0.331	45
2	482	4.99	34.119	27.00	0.81	0.072	0.547	12
2	723	4.26	34.273	27.20	0.27	0.024	0.606	4
2	968	3.58	34.399	27.37	0.32	0.029	0.612	4
2	1462	2.64	34.519	27.56	0.76	0.068	0.588	10
2	1759	2.19	34.567	27.63	1.20	0.107	0.556	16

CNAV OSHAWA CRUISE 052 STATION 054 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.07	0.10	32.716
5	0.06	0.12	34.082
15	0.05	0.14	32.720
34	0.24	0.42	32.607

3.71 7.14 - WATER COLUMN VALUES

MESSANGER TIME 1615 INCOMING SOLAR RADIATION - AM 119 PM 108

150

CNAV OSHAWA CRUISE 052 STATION 054				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.07	0.00	32.719	0.000	24.64	331.4	0.000	0.00	6.19	0.00	
10	13.08	0.00	32.716	0.000	24.63	332.1	0.034	0.02	5.81	0.00	
20	13.05	0.00	32.718	0.000	24.64	331.6	0.067	0.07	6.16	0.00	
30	12.99	0.00	32.717	0.000	24.65	330.8	0.101	0.15	6.22	0.00	
50	10.10	0.04	32.655	0.002	25.13	285.4	0.163	0.41	6.53	0.00	0.95
75	9.80	0.02	32.646	0.003	25.17	281.7	0.234	0.86	6.18	0.00	0.94
100	7.84	0.02	33.031	0.001	25.77	224.6	0.298	1.43	5.52	0.00	0.89
150	7.92	0.00	33.751	0.002	26.33	173.1	0.398	2.68	3.59	0.01	0.89
200	7.63	0.00	33.901	0.000	26.49	158.7	0.482	4.17	3.07	0.00	0.98
250	7.02	0.01	33.941	0.002	26.60	148.1	0.559	5.95	2.93	0.01	0.79
300	6.30	0.02	33.934	0.004	26.69	139.8	0.632	8.00	2.90	0.05	1.11
400	5.41	0.07	34.017	0.019	26.87	123.6	0.765	12.74	1.89	0.23	1.26
500	4.91	0.01	34.133	0.001	27.02	110.2	0.883	18.16	0.72	0.02	0.91
600	4.55	0.05	34.202	0.002	27.11	101.8	0.990	24.19	0.36	0.08	0.67
700	4.30	0.02	34.261	0.001	27.19	95.4	1.089	30.84	0.26	0.03	0.87
800	4.04	0.00	34.317	0.000	27.26	89.1	1.182	38.02	0.25	0.02	0.68
1000	3.51	0.00	34.410	0.001	27.39	77.6	1.351	53.52	0.34	0.00	0.97
1200	3.09	0.01	34.470	0.005	27.48	69.8	1.501	70.36	0.48	0.00	0.89
1500	2.58	0.00	34.525	0.000	27.57	61.7	1.701	98.00	0.81	0.00	12.04

CNAV OSHAWA CRUISE OS2 STATION 055 OBSERVED VALUES
 DATE 8/06/63 HR 04.8 LAT 43-44 N LONG 127-18 W WEA 02 WIND VEL 20 DIR 35
 BAROM 23.0 TEMP DRY 13.3 WET 12.2 RELHU 88 WTRCLR SMDG 2926 SEA 3 DIR 35 SWELL 4 DIR 33
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 11 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.15	32.593	24.52	6.05	0.540	-0.021	104	
1	5	13.14	32.591	24.52	6.16	0.550	-0.031	106	
1	10	13.16	32.595	24.52	6.15	0.549	-0.030	106	
1	19	13.15	32.592	24.52	6.16	0.550	-0.031	106	
1	29	13.13	32.613	24.54	6.12	0.547	-0.027	105	
1	48	10.56	32.621	25.02	6.59	0.589	-0.040	107	
1	72	10.21	32.603	25.07	6.31	0.564	-0.010	102	
1	96	8.63	32.949	25.59	5.32	0.475	0.097	83	
1	119	8.20	33.191	25.85	4.82	0.430	0.147	75	
1	143	8.01	33.591	26.19	3.91	0.349	0.229	60	
1	168	7.63	33.787	26.40	3.62	0.323	0.259	56	
1	192	7.38	33.855	26.49	3.75	0.335	0.251	57	
1	240	6.79	33.942	26.64	2.87	0.256	0.337	43	
1	287	6.22	33.960	26.73	2.46	0.220	0.382	37	

CNAV OSHAWA CRUISE OS2 STATION 055 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.06	0.04	32.591
5	0.09	0.08	32.592
15	0.05	0.06	32.593
34	0.07	0.10	32.596
2.24	2.52	-	WATER COLUMN VALUES

MESSANGER TIME 2110 INCOMING SOLAR RADIATION - AM 119 PM 108

DEPTH	CNAV OSHAWA	CRUISE 052	STATION 055	INTERPOLATED AND COMPUTED VALUES							
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP_VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.15	0.00	32.593	0.000	24.52	342.2	0.000	0.00	6.05	0.00	
10	13.16	0.00	32.595	0.000	24.52	342.5	0.035	0.02	6.15	0.00	
20	13.17	0.01	32.594	0.001	24.52	343.0	0.070	0.07	6.15	0.00	0.88
30	13.01	0.04	32.614	0.000	24.57	338.7	0.104	0.16	6.14	0.01	0.97
50	10.49	0.06	32.613	0.005	25.03	294.9	0.168	0.42	6.60	0.00	0.91
75	10.01	0.04	32.639	0.008	25.13	285.7	0.241	0.89	6.19	0.02	0.84
100	8.51	0.02	32.989	0.005	25.64	237.2	0.307	1.47	5.23	0.02	0.78
150	7.91	0.01	33.664	0.003	26.26	179.3	0.412	2.78	3.77	0.01	0.72
200	7.29	0.00	33.874	0.000	26.51	155.8	0.496	4.28	3.64	0.05	0.92
250	6.66	0.00	33.952	0.000	26.66	142.4	0.571	6.01	2.67	0.03	14.57

CNAV OSHAWA CRUISE 052 STATION 056 OBSERVED VALUES

DATE 8/06/63 HR 08.3 LAT 43-44 N LONG 126-41 W SNDG 2926 WEA 01 WIND VEL 24 DIR 35
 BAROM 22.0 TEMP DRY 12.8 MET 11.7 RELHU 88 WTRCLR SEA 4 DIR 35 SWELL 4 DIR 33
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 22.15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	13.51	32.489	24.37	6.07	0.542	-0.026	105
1	5	13.50	32.524	24.40	6.04	0.539	-0.024	105
1	19	13.50	32.488	24.37	6.09	0.544	-0.028	105
1	28	13.46	32.489	24.37	6.00	0.536	-0.020	104
1	46	13.46	32.549	24.43	6.09	0.544	-0.028	105
1	70	11.47	32.616	24.86	6.62	0.591	-0.053	110
1	92	9.98	32.899	25.34	5.44	0.486	0.069	88
1	92	8.66	33.490	26.01	3.98	0.355	0.214	62
1	117	8.44	33.712	26.22	3.37	0.301	0.271	53
1	140	8.16	33.876	26.39	2.81	0.251	0.324	44
1	165	7.73	33.955	26.51	2.50	0.223	0.357	38
2	190	7.51	33.977	26.56	2.37	0.212	0.372	36
2	237	7.03	34.000	26.65	2.16	0.195	0.395	33
2	281	6.49	34.018	26.74	1.79	0.160	0.438	27
2	471	5.30	34.137	26.98	0.93	0.083	0.532	14
2	709	4.38	34.298	27.21	0.30	0.027	0.601	4
2	949	3.66	34.391	27.36	0.46	0.041	0.598	6
2	1434	2.59	34.518	27.56	0.74	0.066	0.591	10
2	1726	2.15	34.570	27.64	1.14	0.102	0.562	15

CNAV OSHAWA		CRUISE 052		STATION 056		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	F(T)	SAL	E(S)	SIGMA-T	SP_VDL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.51	0.00	32.489	0.000	24.37	356.7	0.000	0.00	6.07	0.00	1.00
10	13.50	0.00	32.484	0.001	24.37	357.1	0.036	0.02	6.08	0.01	0.85
20	13.51	0.01	32.495	0.001	24.37	356.8	0.072	0.07	6.00	0.00	0.95
30	13.28	0.05	32.555	0.003	24.47	348.2	0.108	0.17	6.17	0.03	
50	11.17	0.03	32.642	0.004	24.93	304.2	0.174	0.43	6.51	0.04	0.84
75	9.63	0.03	33.036	0.020	25.50	250.3	0.243	0.87	5.09	0.04	0.73
100	8.52	0.05	33.590	0.016	26.11	192.9	0.299	1.36	3.72	0.04	0.71
150	7.98	0.01	33.917	0.002	26.45	161.6	0.389	2.49	2.66	0.01	0.67
200	7.42	0.00	33.983	0.001	26.58	149.5	0.467	3.89	2.34	0.01	0.89
250	6.87	0.01	34.005	0.000	26.67	141.2	0.540	5.58	2.07	0.01	0.69
300	6.32	0.02	34.028	0.001	26.77	133.0	0.609	7.53	1.67	0.02	1.19
400	5.61	0.06	34.088	0.002	26.90	120.8	0.737	12.10	1.15	0.04	1.24
500	5.17	0.01	34.158	0.001	27.01	111.3	0.855	17.50	0.82	0.01	0.87
600	4.75	0.02	34.228	0.003	27.11	102.2	0.962	23.57	0.51	0.01	0.67
700	4.41	0.00	34.292	0.000	27.20	94.3	1.062	30.19	0.31	0.00	0.94
800	4.09	0.00	34.339	0.002	27.27	88.0	1.154	37.28	0.31	0.03	0.64
1000	3.53	0.00	34.407	0.000	27.38	78.1	1.322	52.75	0.48	0.01	0.95
1200	3.05	0.00	34.465	0.001	27.48	69.7	1.472	69.62	0.58	0.02	0.89
1500	2.48	0.00	34.531	0.000	27.58	60.1	1.669	96.85	0.81	0.00	10.78

CNAV OSHAWA CRUISE OS2 STATION 057 OBSERVED VALUES
 DATE 8/06/63 HR 13.0 LAT 43-44 N LONG 126-04 W SNOG 2968 MEA 02 WIND VEL 16 DIR 34
 BAROM 22.0 TEMP DRY 12.2 WET 11.7 RELHU 94 WTRCLR SEA 2 DIR 34 SWELL 3 DIR 35
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 10 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AGU	SATN
1	0	14.00	31.108	23.21	5.89	0.526	-0.011	102	
1	5	13.96	31.107	23.21	5.92	0.529	-0.013	102	
1	10	13.96	31.476	23.50	5.96	0.532	-0.018	103	
1	20	13.16	32.553	24.49	6.13	0.547	-0.028	105	
1	30	12.63	32.633	24.65	6.32	0.564	-0.040	108	
1	50	11.57	32.632	24.85	6.29	0.562	-0.025	105	
1	75	9.98	32.940	25.37	5.39	0.481	0.074	87	
1	100	8.80	33.402	25.92	4.27	0.381	0.187	67	
1	125	8.37	33.654	26.18	3.51	0.313	0.259	55	
1	149	8.10	33.780	26.32	3.11	0.278	0.298	48	
1	175	7.80	33.855	26.43	2.89	0.258	0.322	45	
1	199	7.60	33.913	26.50	2.65	0.237	0.346	41	
1	249	7.19	33.962	26.60	2.20	0.196	0.391	33	
1	299	6.78	33.996	26.68	1.93	0.172	0.421	29	

CNAV OSHAWA CRUISE OS2 STATION 057 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY
0	0.12	0.53
5	0.10	0.24
15	0.09	0.15
34	0.11	0.22
100	0.12	0.04

3.39 7.39 - WATER COLUMN VALUES

MESSANGER TIME 0442 INCOMING SOLAR RADIATION - AM 137 PM 141

DEPTH	CNAV OSHAWA	CRUISE 052	STATION 057	INTERPOLATED AND COMPUTED VALUES							
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	14.00	0.00	31.108	0.000	23.21	467.6	0.000	0.00	5.89	0.00	
10	13.96	0.00	31.476	0.000	23.50	440.0	0.046	0.02	5.96	0.00	
20	13.16	0.00	32.553	0.000	24.49	345.8	0.086	0.08	6.13	0.00	
30	12.63	0.00	32.633	0.000	24.65	330.3	0.120	0.17	6.32	0.00	
50	11.57	0.00	32.632	0.000	24.85	311.8	0.185	0.43	6.29	0.00	
75	9.98	0.00	32.940	0.000	25.37	262.9	0.257	0.89	5.39	0.00	
100	8.80	0.00	33.402	0.000	25.92	210.9	0.317	1.42	4.27	0.00	
150	8.09	0.00	33.784	0.000	26.33	173.0	0.413	2.63	3.10	0.00	0.95
200	7.59	0.00	33.915	0.000	26.50	157.1	0.497	4.12	2.64	0.00	0.99
250	7.18	0.00	33.962	0.000	26.60	148.6	0.574	5.90	2.19	0.00	14.18

CNAV OSHAWA CRUISE OS2 STATION 058 OBSERVED VALUES

DATE 8/06/63 HR 16.2 LAT 43-44 N LONG 125-25 W WEA 02 WIND VEL 14 DIR 02
 BAROM 22.0 TEMP DRY 13.9 WET 12.2 RELHU 82 WTRCLR SECDI SNRG 3018 SEA 2 DIR 02 SWELL 2 DIR 36
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.97	29.020	21.61	6.00	0.536	-0.013		102
1	5	13.93	29.023	21.62	6.00	0.536	-0.012		102
1	10	14.05	29.827	22.21	6.03	0.539	-0.019		104
1	20	12.95	32.595	24.56	6.35	0.567	-0.046		109
1	30	12.44	32.657	24.71	6.38	0.570	-0.043		108
1	49	11.05	32.675	24.98	6.16	0.550	-0.007		101
1	73	9.65	32.835	25.34	5.12	0.457	0.102		82
1	97	9.12	33.207	25.72	4.23	0.378	0.187		67
1	121	8.45	33.562	26.10	3.46	0.309	0.263		54
1	146	8.27	33.738	26.26	2.81	0.251	0.323		44
1	170	7.91	33.857	26.41	2.50	0.223	0.355		39

CNAV OSHAWA CRUISE OS2 STATION 058 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.25	0.63	29.024
5	0.25	0.65	29.039
15	0.31	0.49	32.486
34	0.24	0.47	32.657
100	0.06	0.02	33.237

9.19 18.14 - WATER COLUMN VALUES

MESSANGER TIME 0837 INCOMING SOLAR RADIATION - AM 137 PM 141

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION OS8		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPCT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	13.97	0.00	29.020	0.000	21.61	620.6	0.000	0.00	6.00	0.00			
10	14.05	0.00	29.827	0.000	22.21	562.9	0.060	0.03	6.03	0.00			
20	12.95	0.00	32.595	0.000	24.56	338.8	0.106	0.09	6.35	0.00			
30	12.44	0.00	32.657	0.000	24.71	325.0	0.139	0.18	6.38	0.00			
50	10.98	0.00	32.678	0.000	24.99	298.2	0.202	0.43	6.12	0.01	0.95		
75	9.59	0.01	32.862	0.003	25.37	262.5	0.272	0.88	5.04	0.00	0.89		
100	9.03	0.01	33.257	0.003	25.77	225.1	0.334	1.43	4.13	0.00	0.84		
150	8.24	0.01	33.758	0.001	26.28	177.2	0.435	2.70	2.73	0.00	5.52		

CNAV OSHAWA CRUISE 052 STATION 059 OBSERVED VALUES

DATE 8/06/63 HR 19.1 LAT 43-44 N LONG 124-56 W SNDG 1244 WEA 02 WIND VEL 10 DIR 01
 BAROM 22.0 TEMP DRY 14.4 WET 12.8 RELHU 83 WTRCLR SEA 2 DIR 01 SWELL 3 DIR 34
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	12.85	30.838	23.23	6.23	0.562	-0.033		106
1	4	12.82	30.827	23.22	6.65	0.594	-0.065		112
1	8	12.72	30.868	23.27	6.61	0.590	-0.060		111
1	16	10.97	31.856	24.36	6.34	0.566	-0.019		104
1	24	10.44	32.328	24.82	6.33	0.565	-0.014		102
1	40	9.98	32.446	24.99	6.46	0.577	-0.020		104
1	61	9.56	32.622	25.19	5.80	0.518	0.043		92
1	82	8.94	33.147	25.70	4.51	0.403	0.165		71
1	102	8.58	33.511	26.04	3.46	0.309	0.262		54
1	122	8.26	33.767	26.29	2.99	0.267	0.307		47
1	142	7.99	33.843	26.39	2.64	0.236	0.341		41
1	164	7.61	33.918	26.50	2.39	0.213	0.369		37
1	204	7.00	33.978	26.64	2.18	0.195	0.396		33
1	245	6.56	34.017	26.73	1.92	0.171	0.425		29

CNAV OSHAWA CRUISE OS2 STATION 059 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	0.25	0.21	1.38	0.25	100	50	30.722	0.43	0.4	6
6	0.21	0.31	1.12	0.19	66		30.799	0.45	0.6	7
				0.18	50					
14	0.26	0.33	0.00	0.11	33	10	31.559	0.51	0.6	5
38	1.23	0.52	0.42	0.02	18	1	32.405	0.66	0.6	4
	17.01	14.33	11.98	0.00	6					

17.01 14.33 11.98 - WATER COLUMN VALUES

MESSANGER TIME 1148 INCOMING SOLAR RADIATION - AM 137 PM 141

LIGHT SATURATION INCUBATOR ILLUMINATION 18000

CNAV OSHAWA		CRUISE 052		STATION 059		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	12.85	0.00	30.838	0.000	23.23	465.8	0.000	0.00	6.29	0.00	
10	12.32	0.10	31.083	0.054	23.51	438.4	0.046	0.02	6.54	0.02	0.89
20	10.62	0.04	32.141	0.010	24.64	331.2	0.085	0.08	6.32	0.01	0.59
30	10.21	0.03	32.436	0.044	24.94	303.1	0.117	0.16	6.40	0.03	0.83
50	9.78	0.02	32.507	0.014	25.07	291.4	0.177	0.41	6.24	0.01	0.68
75	9.14	0.02	32.961	0.018	25.52	248.4	0.245	0.84	4.96	0.03	0.69
100	8.61	0.00	33.480	0.000	26.01	202.3	0.301	1.34	3.55	0.01	0.87
150	7.86	0.00	33.873	0.001	26.43	163.1	0.393	2.49	2.54	0.00	0.66
200	7.05	0.00	33.975	0.001	26.63	145.2	0.471	3.88	2.19	0.01	0.87

CNAV OSHAWA CRUISE DS2 STATION 060 OBSERVED VALUES

THREE MILE LAKE

DATE 8/06/63 HR 22.1 LAT 43-44 N LCG 124-19 W SMDG 101 WEA 02 WIND VEL 2 DIR 99
 BAROM 22.0 TEMP DRY 15.0 WET 13.9 RELHU 89 WTRCLR SECDI SEA 0 DIR CO SWELL 1 DIR 32
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 5

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	12.93	32.492	24.49	7.43	0.664	-0.142	127	
1	5	12.68	32.514	24.55	7.49	0.669	-0.144	127	
1	10	12.16	32.584	24.71	7.50	0.670	-0.140	126	
1	20	8.98	33.282	25.80	3.58	0.320	0.247	56	
1	30	8.57	33.513	26.04	3.35	0.299	0.272	52	
1	50	8.27	33.675	26.22	2.68	0.239	0.335	42	
1	75	7.60	33.884	26.48	1.90	0.170	0.413	29	

CNAV OSHAWA CRUISE DS2 STATION 060 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.43	4.19	32.496
3	1.14	2.20	32.501
10	1.72	5.96	32.583
19	1.21	0.77	33.251
90	0.14	0.03	34.018

6.45 68.12 - WATER COLUMN VALUES

MESSANGER TIME 14.8 INCOMING SOLAR RADIATION - AM 137 PM 141

INTERPOLATED AND COMPUTED VALUES

DEPTH	CNAV OSHAWA	CRUISE 052	STATION 060	SP. VOL. ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	TEMP E(T)	SAL	E(S)	SIGMA-T					
10	12.93	32.492	0.000	24.49	345.5	0.000	7.43	0.00	
20	12.16	32.584	0.000	24.71	324.9	0.034	7.50	0.00	
30	8.98	33.282	0.000	25.80	221.1	0.062	3.58	0.00	
	8.57	33.513	0.000	26.04	198.1	0.083	3.35	0.00	
50	8.27	33.675	0.000	26.22	182.0	0.121	2.68	0.00	
75	7.60	33.884	0.000	26.48	157.5	0.164	1.90	0.00	

CNAV OSHAWA CRUISE OS2 STATION 061 OBSERVED VALUES

DATE 9/06/63 HR 00.9 LAT 44-01 N LONG 124-50 W WEA 41 WIND VEL 10 DIR 33
 BAROM 22.0 TEMP DRY 13.9 WET 13.9 RELHU 99 WTRCLR SECDI 104 SFA 1 DIR 33 SWELL 2 DIR 33
 CLOUD TYPE AMT 8 VIS 6 WIRE ANGLE(S) 5

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
1	0	13.73	30.240	22.59	6.19	0.553	-0.032	106
1	5	13.05	30.545	22.96	6.38	0.570	-0.042	108
1	10	12.86	30.728	23.14	6.46	0.577	-0.048	109
1	20	10.80	32.161	24.62	6.64	0.593	-0.045	108
1	30	10.49	32.319	24.80	6.64	0.593	-0.042	108
1	50	9.61	32.502	25.09	5.78	0.516	0.045	92
1	75	8.91	33.135	25.69	4.16	0.372	0.196	65

INTERPOLATED AND COMPUTED VALUES

DEPTH	CNAV OSHAWA		CRUISE 052		STATION 061		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	13.73	0.00	30.240	0.000	22.59	526.2	0.000	0.00	6.19	0.00		
10	12.86	0.00	30.728	0.000	23.14	474.3	0.051	0.03	6.46	0.00		
20	10.80	0.00	32.161	0.000	24.62	332.8	0.092	0.08	6.64	0.00		
30	10.49	0.00	32.319	0.000	24.80	316.2	0.124	0.17	6.64	0.00		
50	9.61	0.00	32.502	0.000	25.09	289.1	0.185	0.42	5.78	0.00		
75	8.91	0.00	33.135	0.000	25.69	231.9	0.251	0.83	4.16	0.00		

CNAV OSHAWA CRUISE CS2 STATION 062 OBSERVED VALUES

DATE 9/06/63 HR 04.3 LAT 44-31 N LONG 125-17 W SNDG 2926 WEA 02 WIND VEL 16 DIR 33
 BAROM 20.0 TEMP DRY 13.3 WET 12.8 RELHU 95 WTRCLR SEA 3 DIR 33 SWELL 3 DIR 32
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 21

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	14.27	29.785	22.14	5.94	0.531	-0.013		103
1	5	14.24	29.775	22.13	5.97	0.533	-0.016		103
1	9	14.24	29.852	22.19	5.94	0.531	-0.013		103
1	18	13.50	32.014	24.01	6.25	0.558	-0.041		108
1	27	12.74	32.656	24.65	6.36	0.568	-0.044		108
1	46	11.11	32.642	24.94	6.40	0.572	-0.029		105
1	68	10.09	32.748	25.20	5.75	0.514	0.041		93
1	91	9.12	33.377	25.85	4.24	0.379	0.185		57
1	114	8.70	33.646	26.13	3.40	0.304	0.265		53
1	126	8.43	33.797	26.29	2.92	0.261	0.311		46
1	160	8.17	33.904	26.41	2.65	0.237	0.338		41
1	183	7.82	33.951	26.50	2.42	0.216	0.363		37
1	229	7.24	34.003	26.62	2.07	0.185	0.402		32
1	274	6.77	34.070	26.71	1.92	0.171	0.422		29

CNAV OSHAWA CRUISE CS2 STATION 062 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.14	0.32	29.827
6	0.09	0.13	29.844
19	0.17	0.38	31.049
38	0.23	0.20	32.657
100	0.07	0.01	33.359

6.21 10.15 - WATER COLUMN VALUES

MESSENGER TIME 1952 INCOMING SOLAR RADIATION - AM 137 PM 141

CNAV OSHAWA		CRUISE 052			STATION 062			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	GXY ML/L	E(O)	VAR RATIO	
0	14.27	0.00	29.785	0.000	22.14	570.1	0.000	0.00	5.94	0.00	0.97	
10	14.18	0.02	30.062	0.070	22.37	548.2	0.057	0.03	5.97	0.01	0.75	
20	13.33	0.00	32.240	0.032	24.21	372.0	0.103	0.10	6.29	0.00	0.94	
30	12.46	0.02	32.712	0.043	24.75	321.3	0.138	0.18	6.39	0.01		
50	10.89	0.02	32.638	0.009	24.98	299.6	0.201	0.44	6.34	0.00	0.80	
75	9.76	0.02	32.930	0.031	25.40	260.1	0.271	0.88	5.30	0.05	0.70	
100	8.93	0.03	33.502	0.015	25.98	205.5	0.330	1.40	3.88	0.03	0.76	
150	8.22	0.04	33.899	0.015	26.40	166.4	0.423	2.58	2.65	0.06	0.95	
200	7.59	0.00	33.975	0.001	26.55	152.6	0.504	4.02	2.27	0.00	0.84	
250	7.01	0.00	34.016	0.001	26.66	142.3	0.578	5.73	1.97	0.00	11.95	

CNAV OSHAWA CRUISE 052 STATION 063 OBSERVED VALUES

DATE 9/06/63 HR 07.2 LAT 44-40 N LONG 125-54 W WEA 02 WIND VEL 18 DIR 34
 BAROM 19.0 TEMP DRY 13.3 WET 12.2 RELHU 88 WTRCLR SECDI 2834 SEA 2 DIR 34 SWELL 3 DIR 32
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
1	0	14.22	31.209	23.24	5.94	0.531	-0.018	103
1	5	14.24	31.212	23.24	5.97	0.533	-0.021	104
1	9	14.26	31.212	23.23	5.94	0.531	-0.018	104
1	18	13.79	32.231	24.11	6.25	0.558	-0.044	109
1	27	12.48	32.578	24.64	6.36	0.568	-0.041	108
1	46	10.60	32.542	24.95	6.40	0.572	-0.023	104
1	70	10.59	32.662	25.05	5.75	0.514	0.035	94
1	94	9.32	32.995	25.52	4.24	0.379	0.184	67
1	118	8.11	33.361	25.99	3.40	0.304	0.274	53
1	141	7.99	33.718	26.29	2.92	0.261	0.317	45
1	165	7.68	33.866	26.45	2.65	0.237	0.345	41
1	189	7.55	33.939	26.53	2.42	0.216	0.367	37
1	237	7.55	33.978	26.56	2.07	0.185	0.398	32
1	285	6.02	33.949	26.74	1.92	0.171	0.433	28

CNAV OSHAWA CRUISE 052 STATION 063 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.07	0.12	31.235
6	0.13	0.03	31.241
19	0.12	0.04	31.242
38	0.11	0.06	32.069
100	0.23	0.03	32.737

4.36 1.87 - WATER COLUMN VALUES

MESSANGER TIME 2251 INCOMING SOLAR RADIATION - AM 137 PM 141

CNAV OSHAWA		CRUISE OS2		STATION 063		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP_VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	14.22	0.00	31.209	0.000	23.24	464.4	0.000	0.00	5.94	0.00	0.97
10	14.25	0.00	31.307	0.034	23.31	458.0	0.047	0.02	5.97	0.01	0.75
20	13.52	0.03	32.347	0.013	24.26	367.8	0.089	0.09	6.29	0.00	0.95
30	12.09	0.01	32.603	0.026	24.73	322.6	0.123	0.17	6.39	0.01	
50	10.55	0.09	32.548	0.001	24.97	300.7	0.186	0.43	6.35	0.00	0.83
75	10.37	0.04	32.721	0.005	25.13	285.5	0.260	0.90	5.44	0.04	0.76
100	8.96	0.03	33.085	0.001	25.65	236.9	0.326	1.48	3.98	0.01	0.73
150	7.87	0.01	33.791	0.006	26.36	169.4	0.428	2.76	2.80	0.01	0.67
200	7.60	0.06	33.957	0.002	26.53	154.1	0.510	4.21	2.32	0.00	0.90
250	7.38	0.03	33.973	0.001	26.58	150.6	0.586	5.98	2.01	0.00	14.64

CNAV OSHAWA CRUISE 052 STATION 064 OBSERVED VALUES
 DATE 9/06/63 HR 11.9 LAT 45-07 N LONG 124-52 W WEA 02 WIND VEL 16 DIR 34
 BAROM 14.0 TEMP DRY 13.3 WET 12.8 RELHU 95 WTRCLR S.A 0 DIR 00 SWELL 1 DIR 33
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 5 SECDI 714

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	13.69	27.990	20.87	6.16	0.550	-0.021	104
1	5	13.69	28.085	20.94	6.24	0.557	-0.028	105
1	10	13.37	31.435	23.59	6.05	0.540	-0.019	104
1	20	11.18	32.420	24.76	6.55	0.585	-0.043	108
1	30	10.41	32.442	24.91	6.85	0.612	-0.060	111
1	49	9.84	32.507	25.06	6.09	0.544	0.014	97
1	74	9.37	32.944	25.47	4.94	0.441	0.121	78
1	99	8.95	33.413	25.91	3.94	0.352	0.214	62
1	124	8.62	33.647	26.14	3.32	0.297	0.273	52
1	149	8.29	33.782	26.30	2.92	0.261	0.313	45
1	174	7.93	33.889	26.43	2.60	0.232	0.346	40
1	199	7.53	33.929	26.52	2.50	0.223	0.360	38
1	248	6.97	33.977	26.64	2.16	0.193	0.398	33
1	298	6.37	34.013	26.75	1.84	0.164	0.435	27

CNAV OSHAWA CRUISE 052 STATION 064 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
0	0.35	0.77	27.682
6	0.31	0.49	29.806
19	0.28	0.30	32.382
38	1.27	0.60	32.462
100	0.38	0.56	32.917

20.58 17.46 - WATER COLUMN VALUES

MESSANGER TIME 0410 INCOMING SOLAR RADIATION - AM 187 PM 194

CNAV OSHAWA		CRUISE OS2			STATION 064		INTERPLACED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	13.69	0.00	27.990	0.000	20.87	691.2	0.000	0.00	6.16	0.00		
10	13.37	0.00	31.435	0.000	23.59	431.7	0.057	0.02	6.05	0.00		
20	11.18	0.00	32.420	0.000	24.76	320.1	0.095	0.08	6.55	0.00		
30	10.41	0.00	32.442	0.000	24.91	305.8	0.126	0.16	6.85	0.00		
50	9.82	0.00	32.520	0.002	25.07	290.9	0.187	0.40	6.04	0.00	0.95	
75	9.35	0.00	32.965	0.002	25.49	251.2	0.255	0.84	4.89	0.00	0.94	
100	8.94	0.00	33.426	0.001	25.92	211.2	0.313	1.35	3.91	0.00	0.94	
150	8.28	0.00	33.787	0.000	26.30	175.5	0.411	2.58	2.90	0.00	0.94	
200	7.52	0.00	33.930	0.000	26.53	154.9	0.494	4.06	2.49	0.00	0.99	
250	6.95	0.00	33.978	0.000	26.64	144.3	0.569	5.80	2.14	0.00	13.22	

CNAV OSHAWA CRUISE OS2 STATION 065 OBSERVED VALUES

NETARTS BAY

DATE 9/06/63 HR 15.2 LAT 45-25 N LONG 124-11 W SNDG 133 WEA 02 WIND VEL 16 DIR 32
 BAROM 17.0 TEMP DRY 13.9 WET 12.8 RELHU 88 WTRCLR 4 SEA 3 DIR 32 SWELL 2 DIR 33
 CLOUD TYPE AMT 6 VIS 7 WIRE ANGLE(S)

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	13.17	25.460	19.02	6.81	0.608	-0.064	112
1	5	12.70	30.949	23.34	6.51	0.581	-0.051	110
1	10	11.84	31.752	24.12	6.59	0.589	-0.052	110
1	20	10.13	32.212	24.78	6.54	0.584	-0.028	105
1	30	9.81	32.328	24.92	5.99	0.535	0.024	96
1	45	9.10	32.699	25.32	5.19	0.464	0.104	82
1	70	8.27	33.479	26.06	3.02	0.270	0.305	47
1	95	7.17	33.931	26.58	2.16	0.193	0.395	33
1	120	6.74	33.971	26.67	1.99	0.178	0.416	30

CNAV OSHAWA CRUISE OS2 STATION 065 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	2.36	6.51	24.914
3	2.23	4.22	30.566
11	1.15	1.61	31.855
22	1.34	1.27	32.225

34.12 55.26 - WATER COLUMN VALUES

MESSANGER TIME 0722 INCOMING SOLAR RADIATION - AM 187 PM 194

INTERPOLATED AND COMPUTED VALUES

DEPTH	CNAV OSHAWA		CRUISE 052		STATION 065		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	13.17	0.00	25.460	0.000	19.02	668.7	0.000	0.00	6.81	0.00		
10	11.84	0.00	31.752	0.000	24.12	380.5	0.063	0.02	6.59	0.00		
20	10.13	0.00	32.212	0.000	24.78	318.2	0.099	0.07	6.54	0.00		
30	9.81	0.00	32.328	0.000	24.92	304.7	0.130	0.15	5.99	0.00		
50	8.93	0.02	32.860	0.014	25.48	252.1	0.186	0.38	4.75	0.06	0.86	
75	8.03	0.03	33.599	0.002	26.19	184.7	0.241	0.72	2.77	0.02	0.77	
100	7.00	0.01	33.959	0.009	26.62	144.2	0.283	1.09	2.09	0.01	5.34	

CNAV OSHAWA CRUISE OS2 STATION 066 OBSERVED VALUES

DATE 9/06/63 HR 16.7 LAT 45-25 N LONG 124-29 W WEA 02 WIND VEL 20 DIR 32
 BAROM 17.0 TEMP DRY 13.3 WET 12.8 RELHU 95 WTRCLK SECDI 384 SEA 2 DIR 31 SWELL 2 DIR 31
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 30

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AGU	SATN
1	0	12.85	30.728	23.14	6.31	0.564	-0.034	106
1	4	12.82	30.721	23.14	6.42	0.573	-0.044	108
1	9	12.79	30.792	23.20	6.45	0.576	-0.046	109
1	17	11.80	32.179	24.46	6.57	0.587	-0.051	109
1	26	10.88	32.357	24.76	6.55	0.585	-0.039	107
1	43	9.95	32.444	24.99	6.29	0.562	-0.005	101
1	65	9.19	32.801	25.39	5.11	0.456	0.109	81
1	88	8.43	33.404	25.98	3.75	0.335	0.238	58
1	110	8.09	33.677	26.24	2.95	0.263	0.313	46
1	132	7.79	33.848	26.42	2.80	0.250	0.330	43
1	154	7.57	33.908	26.50	2.65	0.237	0.346	41
1	176	7.25	33.943	26.57	2.45	0.219	0.368	37

CNAV OSHAWA CRUISE OS2 STATION 066 BIOLOGICAL DATA

DEPTH	CHL-A	LAB-I	PRODUCTIVITY	DECK-I	SAL
0	0.65	2.12			30.647
6	0.63	1.77			30.652
19	0.95	1.38			32.013
32.16	45.24	- WATER COLUMN VALUES			

MESSANGER TIME 0854 INCOMING SOLAR RADIATION - AM 187 PM 194

CNAV OSHAWA		CRUISE OS2		STATION 066		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	12.85	0.00	30.728	0.000	23.14	473.9	0.000	0.00	6.31	0.00	0.90
10	12.69	0.02	30.954	0.050	23.35	454.6	0.047	0.02	6.47	0.00	0.68
20	11.47	0.00	32.325	0.051	24.63	332.0	0.087	0.08	6.58	0.00	0.88
30	10.60	0.02	32.385	0.015	24.83	313.2	0.119	0.16	6.53	0.01	
50	9.68	0.02	32.531	0.002	25.10	288.0	0.180	0.41	5.97	0.03	0.73
75	8.83	0.02	33.069	0.023	25.65	235.7	0.246	0.83	4.49	0.03	0.66
100	8.22	0.01	33.578	0.008	26.15	189.3	0.299	1.30	3.24	0.01	0.64
150	7.61	0.00	33.902	0.002	26.49	157.5	0.387	2.40	2.68	0.00	0.78

CNAV OSHAMA CRUISE 052 STATION 067 OBSERVED VALUES

DATE 9/06/63 HR 19.5 LAT 45-24 N LONG 124-54 W WEA 01 WIND VFL 24 DIR 33
 BAROM 17.0 TEMP DRY 13.3 WET 13.3 RELHU 99 WTRCLR SEA 3 DIR 33 SWELL 3 DIR 31
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 40

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	13.66	31.169	23.32	6.08	0.543	-0.024	105
1	3	13.59	31.170	23.34	6.18	0.552	-0.032	106
1	5	13.61	31.167	23.33	6.15	0.549	-0.030	106
1	10	13.11	31.367	23.58	5.68	0.507	0.017	97
1	15	11.71	32.138	24.44	6.53	0.583	-0.046	109
1	25	10.68	32.475	24.89	6.54	0.584	-0.036	107
1	40	10.31	32.567	25.02	5.99	0.535	0.017	97
1	57	9.44	32.957	25.47	5.01	0.447	0.114	80
1	73	9.17	33.361	25.83	4.18	0.373	0.190	66
1	86	8.97	33.541	26.00	3.63	0.324	0.241	57
1	101	8.69	33.648	26.13	3.05	0.272	0.296	48
1	119	8.53	33.736	26.22	2.78	0.248	0.322	44
1	145	6.26	33.842	26.35	2.55	0.228	0.346	40
1	175	7.97	33.904	26.44	2.31	0.206	0.371	36

CNAV OSHAWA CRUISE 052 STATION 067 BIOLOGICAL DATA

DATE 9/06/63 LAT 45-24 N LONG 124-54 W

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	1.49	6.58	1.05	100	IRRAD	SAL	PHOS	NITR	SIL
0	0.55					0.93	66		31.188	0.42	0.1	3
						0.76	50					
						0.64	33					
4	0.40	2.40	10.58			0.41	18					
						0.07	6	50	31.190			

MESSENGER TIME 1148 INCOMING SOLAR RADIATION - AM 187 PM 194

LIGHT SATURATION INCUBATOR ILLUMINATION 18700

CNAV OSHAWA		CRUISE 052		STATION 067		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.66	0.00	31.169	0.000	23.32	56.5	0.000	0.00	6.08	0.00	
10	13.11	0.00	31.367	0.000	23.58	431.8	0.045	0.02	5.68	0.00	
20	11.01	0.07	32.421	0.058	24.79	317.1	0.083	0.08	6.69	0.08	0.77
30	10.50	0.07	32.520	0.027	24.96	301.5	0.114	0.16	6.41	0.01	0.76
50	9.79	0.04	32.776	0.011	25.27	271.6	0.172	0.39	5.43	0.02	0.67
75	9.14	0.00	33.396	0.001	25.86	216.1	0.233	0.78	4.09	0.00	0.79
100	8.71	0.00	33.643	0.001	26.12	191.7	0.285	1.23	3.08	0.00	0.90
150	8.21	0.00	33.858	0.000	26.37	169.3	0.376	2.39	2.51	0.00	9.75

CNAV OSHAWA CRUISE OS2 STATION 068 OBSERVED VALUES
 DATE 9/06/63 HR 22.9 LAT 45-24 N LCNG 175-35 W WEA 02 WIND VEL 24 DIR 32
 BAROM 18.0 TEMP DRY WEI RELHU WTRCLR SMDG 1615 SEA 4 DIR 31 SWELL 4 DIR 32
 CLOUD TYPE VIS 7 WIRE ANGLE(S) --- SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	14.06	30.856	23.00	5.92	0.529	-0.013	103	
1	5	14.03	30.858	23.01	5.99	0.535	-0.019	104	
1	10	14.04	30.864	23.01	5.99	0.535	-0.019	104	
1	20	13.94	31.015	23.15	5.96	0.532	-0.016	103	
1	30	11.69	32.364	24.62	6.53	0.583	-0.047	109	
1	50	10.53	32.547	24.97	6.19	0.553	-0.003	101	
1	74	9.70	32.873	25.36	5.19	0.464	0.095	83	
1	99	9.06	33.391	25.87	4.18	0.373	0.192	66	
1	123	8.76	33.668	26.13	3.28	0.293	0.275	52	
1	148	8.40	33.814	26.30	2.79	0.249	0.323	44	
1	174	7.93	33.891	26.43	2.55	0.228	0.350	39	
1	199	7.57	33.937	26.52	2.37	0.212	0.371	36	

CNAV OSHAWA CRUISE OS2 STATION 068 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.21	0.43	30.870
4	0.25	0.40	30.874
18	0.23	0.50	30.925

13.72 18.21 - WATER COLUMN VALUES

MESSANGER TIME 1515 INCOMING SOLAR RADIATION - AM 187 PM 194

CNAV OSHAWA CRUISE 052 STATION 069 OBSERVED VALUES

DATE 10/06/63 HR 01.6 LAT 45-24 N LONG 126-10 W WIND VEL 24 DIR 35
 BAROM 18.0 TEMP DRY 7 WET 7 WTRCLR SEA 4 DIR 35 SWELL 4 DIR 35
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SECDI	SATN
1	0	14.07	31.040	23.14	5.92	0.529	-0.014			103
1	5	14.05	31.045	23.15	5.95	0.531	-0.016			103
1	10	14.05	31.095	23.19	5.99	0.535	-0.020			104
1	20	13.39	31.992	24.01	6.14	0.548	-0.030			106
1	29	12.09	32.576	24.71	6.48	0.579	-0.047			109
1	49	10.21	32.558	25.03	6.51	0.581	-0.028			105
1	74	9.60	32.948	25.43	5.15	0.460	0.099			82
1	99	8.94	33.493	25.97	3.89	0.347	0.219			61
1	123	8.60	33.702	26.19	3.09	0.276	0.294			48
1	147	8.35	33.814	26.31	2.87	0.256	0.316			45
1	173	7.88	33.885	26.44	2.70	0.241	0.337			42
1	197	7.51	33.933	26.53	2.50	0.223	0.360			38

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION 069		INTERPOLATED AND COMPUTED VALUES							VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)				
0	14.07	0.00	31.040	0.000	23.14	473.9	0.000	0.00	5.92	0.00	0.00	0.99		
10	14.05	0.00	31.095	0.000	23.19	469.7	0.048	0.02	5.99	0.00	0.00	0.95		
20	13.39	0.00	31.992	0.000	24.01	391.4	0.091	0.09	6.14	0.00	0.00	0.94		
30	11.95	0.00	32.593	0.017	24.75	321.0	0.127	0.18	6.51	0.00	0.00	0.94		
50	10.18	0.01	32.568	0.002	25.05	293.2	0.189	0.43	6.47	0.01	0.00	0.86		
75	9.63	0.00	32.972	0.003	25.45	255.0	0.258	0.87	5.09	0.00	0.00			
100	8.92	0.00	33.506	0.001	25.98	205.1	0.316	1.38	3.85	0.00	0.00			
150	8.30	0.00	33.824	0.001	26.33	173.1	0.411	2.58	2.85	0.00	0.00			

CNAV OSHAWA CRUISE 052 STATION 070 OBSERVED VALUES

DATE 10/06/53 HR 04-0 LAT 45-24 N LON 126-45 W WIND VFL 24 DIR 32
 BAROM 19.0 TEMP DRY 12.2 WET 11.1 RELHU 88 WTRCLR SEA 4 DIR 32 SWELL 4 DIR 32
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 18.30

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	13.62	31.762	23.79	6.04	0.539	-0.022	104
1	5	13.62	31.763	23.79	5.99	0.535	-0.018	103
1	10	13.63	31.764	23.79	6.08	0.543	-0.026	105
1	20	13.03	32.159	24.21	5.96	0.532	-0.010	102
1	29	11.63	32.535	24.77	6.61	0.590	-0.054	110
1	49	10.34	32.585	25.03	6.34	0.566	-0.014	103
1	73	9.61	32.635	25.19	5.80	0.518	0.043	92
1	97	8.39	33.256	25.87	4.24	0.379	0.196	66
1	121	8.48	33.653	26.17	3.36	0.300	0.271	53
1	145	8.12	33.841	26.37	2.82	0.252	0.324	44
1	170	7.82	33.897	26.46	2.58	0.230	0.349	40
2	173	7.89	33.881	26.43	2.61	0.233	0.345	40
2	216	7.46	33.957	26.55	2.36	0.211	0.373	36
2	260	6.87	33.981	26.66	2.16	0.193	0.399	33
2	435	5.13	34.060	26.94	1.06	0.095	0.523	15
2	661	4.41	34.241	27.16	0.32	0.029	0.599	5
2	893	3.78	34.364	27.32	0.30	0.027	0.611	4
2	1357	2.77	34.506	27.53	0.46	0.041	0.613	6
2	1827	2.09	34.588	27.66	1.19	0.106	0.559	16
2	2308	1.77	34.640	27.72	1.84	0.164	0.506	25
2	2548	1.74	34.648	27.73	1.95	0.174	0.497	26

CNAV OSHAWA CRUISE 052 STATION 070 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.15	0.02		31.773
4	0.17	0.09		31.777
18	0.15	0.10		31.783

9.03 3.60 - WATER COLUMN VALUES

MESSENGER TIME 2015 INCOMING SOLAR RADIATION - AM 187 PM 194

INTERPLATED AND COMPUTED VALUES

DEPTH	CNAV OSHAWA			CRUISE OS2			STATION 070			INTERPLATED AND COMPUTED VALUES				
	TEMP	E(T)	SAL	SAL	E(S)	SIGMA-T	SP_VCL ANCMALY	GEOPT ANOMALY	POT ENERGY	OXY M/L/L	E(O)	VAR RATIO		
0	13.62	0.00	31.762	31.762	0.000	23.79	412.2	0.000	0.00	6.04	0.00			
10	13.63	0.00	32.764	32.764	0.000	23.79	412.5	0.042	0.02	6.08	0.00			
20	13.03	0.00	32.159	32.159	0.000	24.21	372.3	0.082	0.08	5.96	0.00			
30	11.53	0.01	32.550	32.550	0.009	24.80	316.6	0.116	0.17	6.63	0.02	0.99		
50	10.31	0.01	32.581	32.581	0.004	25.04	294.2	0.178	0.42	6.33	0.01	0.95		
75	9.49	0.02	32.680	32.680	0.010	25.25	274.5	0.249	0.88	5.68	0.02	0.89		
100	8.38	0.03	33.317	33.317	0.000	25.92	211.0	0.311	1.42	4.10	0.01	0.84		
150	8.07	0.01	33.856	33.856	0.005	26.39	167.4	0.406	2.61	2.76	0.01	0.79		
200	7.60	0.03	33.939	33.939	0.003	26.52	155.4	0.487	4.07	2.43	0.01	0.75		
250	7.01	0.01	33.978	33.978	0.002	26.63	145.1	0.563	5.81	2.20	0.00	0.85		
300	6.38	0.00	33.998	33.998	0.002	26.73	136.0	0.634	7.81	1.91	0.03	1.30		
400	5.40	0.00	34.043	34.043	0.002	26.89	121.5	0.764	12.44	1.28	0.03	1.92		
500	4.33	0.06	34.111	34.111	0.005	27.01	110.8	0.881	17.84	0.77	0.00	0.75		
600	4.31	0.05	34.191	34.191	0.005	27.11	102.1	0.989	23.90	0.45	0.00	0.72		
700	4.30	0.00	34.265	34.265	0.001	27.19	95.0	1.088	30.54	0.29	0.02	0.80		
800	4.02	0.00	34.321	34.321	0.001	27.27	88.6	1.181	37.69	0.26	0.03	0.60		
1000	3.52	0.00	34.406	34.406	0.002	27.38	78.1	1.350	53.20	0.30	0.01	0.90		
1200	3.07	0.00	34.469	34.469	0.003	27.48	69.7	1.499	70.08	0.36	0.01	0.77		
1500	2.53	0.00	34.536	34.536	0.001	27.58	60.2	1.697	97.36	0.66	0.02	0.69		
2000	1.93	0.00	34.611	34.611	0.001	27.69	50.0	1.977	147.24	1.46	0.02	0.77		
2500	1.74	0.00	34.648	34.648	0.000	27.73	46.8	2.224	204.28	1.94	0.00	3.64		

CNAV OSHAWA CRUISE 052 STATION 071 OBSERVED VALUES
 DATE 10/06/63 HR 08-2 LAT 45-24 N LONG 127-16 W WEA 03 WIND VEL 24 DIR 34
 BAROM 20.0 TEMP DRY 12.2 WET 11.1 RELHU 88 WTRCLR SECDI 2816 SEA 4 DIR 34 SWELL 4 DIR 32
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 25

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	12.99	32.401	24.41	6.18	0.552	-0.030	106
1	5	12.98	32.397	24.40	6.13	0.547	-0.026	105
1	9	12.98	32.364	24.38	6.18	0.552	-0.030	106
1	18	12.97	32.396	24.41	6.15	0.549	-0.027	105
1	26	12.99	32.400	24.40	6.13	0.547	-0.026	105
1	44	10.24	32.541	25.02	6.61	0.590	-0.037	107
1	69	9.81	32.532	25.08	6.37	0.569	-0.010	102
1	88	8.60	32.899	25.56	5.10	0.455	0.117	80
1	109	8.20	33.446	26.05	3.98	0.355	0.221	62
1	130	8.28	33.752	26.27	3.02	0.270	0.304	47
1	154	7.97	33.846	26.39	2.72	0.243	0.335	42
1	176	7.69	33.904	26.48	2.54	0.227	0.354	39

CNAV OSHAWA CRUISE 052 STATION 071 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.09	0.22	32.404
4	0.14	0.19	32.404
18	0.11	0.14	32.398
59	0.28	0.36	32.553
10.19	13.41	-	WATER COLUMN VALUES

MESSANGER TIME 0725 INCOMING SOLAR RADIATION - AM 200 PM 314

DEPTH	CNAV	OSHAWA	CRUISE	OS2	STATION	071	INTERPOLATED AND COMPUTED VALUES							
	TEMP	E	T	SAL	E	S	SIGMA-T	SP	VOL	GEOPH	POT	OXY	E	VAR
								ANOMALY	ANOMALY	ANOMALY	ENERGY	M/1E	0.00	RATIO
0	12.99	0.00	0.00	32.401	0.000	0.000	24.41	353.3	0.000	0.000	0.00	6.18	0.00	0.97
10	12.98	0.00	0.003	32.355	0.003	0.003	24.38	356.0	0.035	0.035	0.02	6.18	0.00	0.71
20	13.01	0.02	0.002	32.396	0.002	0.002	24.40	354.9	0.072	0.072	0.07	6.14	0.00	0.95
30	12.46	0.17	0.009	32.429	0.009	0.009	24.53	342.1	0.107	0.107	0.16	6.23	0.04	0.95
50	10.02	0.16	0.024	32.524	0.024	0.024	25.04	293.8	0.171	0.171	0.42	6.67	0.02	0.80
75	9.43	0.06	0.007	32.624	0.007	0.007	25.21	277.6	0.243	0.243	0.88	6.01	0.04	0.65
100	8.28	0.02	0.016	33.217	0.016	0.016	25.85	217.0	0.305	0.305	1.43	5.43	0.01	0.66
150	8.04	0.01	0.006	33.841	0.006	0.006	26.38	168.0	0.402	0.402	2.65	2.74	0.02	0.81

CNAV OSHAWA CRUISE OS2 STATION 072 OBSERVED VALUES

DATE 10/06/63 HR 11.3 LAT 45-25 N LONG 127-50 W WEA 01 WIND VEL 18 DIR 35
 BAROM 21.0 TEMP DRY 12.2 WET 11.1 RELHU 88 WTRCLR SECDI SNDC 2926 SEA 3 DIR 34 SWELL 4 DIR 32
 CLOUD TYPE VIS 6 WIRE ANGLE(S) 18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	12.89	32.426	24.44	6.18	0.552	-0.029		106
1	5	12.88	32.422	24.44	6.18	0.552	-0.029		106
1	10	12.89	32.421	24.44	6.13	0.547	-0.025		105
1	19	12.59	32.416	24.44	6.08	0.543	-0.020		104
1	28	12.70	32.447	24.50	6.12	0.547	-0.022		104
1	47	10.28	32.559	25.02	6.61	0.590	-0.038		107
1	71	9.86	32.623	25.14	5.95	0.531	0.026		95
1	95	8.76	33.334	25.87	4.24	0.379	0.190		67
1	118	7.93	33.598	26.21	3.90	0.348	0.231		60
1	142	7.73	33.787	26.38	3.55	0.317	0.264		55
1	167	7.51	33.889	26.49	3.20	0.286	0.298		49
1	191	7.31	33.930	26.55	2.86	0.255	0.331		44

CNAV OSHAWA CRUISE OS2 STATION 072 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.15	0.31	32.422
4	0.16	0.27	32.419
18	0.19	0.30	32.419
59	0.14	0.00	32.417
9.87	11.30	-	WATER COLUMN VALUES

MESSANGER TIME 0337 INCOMING SOLAR RADIATION - AM 200 PM 314

DEPTH	CNAV OSHAWA			CRUISE OS2			STATION 072			INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	12.89	0.00	32.426	0.000	24.44	349.6	0.000	0.00	6.18	0.00					
10	12.89	0.00	32.421	0.000	24.44	350.2	0.036	0.02	6.13	0.00					
20	12.88	0.01	32.418	0.000	24.44	350.4	0.071	0.07	6.08	0.00					0.86
30	12.47	0.07	32.459	0.002	24.55	340.1	0.106	0.16	6.18	0.02					0.96
50	10.17	0.07	32.552	0.013	25.04	294.2	0.170	0.42	6.60	0.01					0.86
75	9.69	0.02	32.734	0.025	25.26	273.6	0.241	0.88	5.65	0.06					0.80
100	8.54	0.01	33.412	0.009	25.97	206.4	0.302	1.41	4.11	0.04					0.75
150	7.66	0.00	33.828	0.001	26.43	163.6	0.395	2.58	3.44	0.00					0.69

CNAV OSHAWA CRUISE 052 STATION 073 OBSERVED VALUES

DATE 10/06/63 HR 19.4 LAT 45-24 N LONG 130-00 W WEA 41 WIND VEL 20 DIR 34
 BAROM 22.0 TEMP DRY 13.3 WET 11.7 RELHU 83 WTRCLR SEA 3 DIR 34 SWELL 4 DIR
 CLOUD TYPE VIS 8 VIS 7 WIRE ANGLE(S) 15.25

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SECDI	SATN
1	0	12.73	32.593	24.60	6.33	0.565	-0.041		108	
1	5	12.70	32.593	24.61	6.18	0.552	-0.028		105	
1	10	12.71	32.595	24.61	6.26	0.559	-0.035		107	
1	20	12.69	32.590	24.61	6.20	0.554	-0.029		106	
1	30	12.68	32.593	24.61	6.24	0.557	-0.033		106	
1	49	10.02	32.574	25.08	6.69	0.598	-0.042		107	
1	73	9.63	32.588	25.15	6.47	0.578	-0.017		103	
1	98	9.15	32.640	25.27	6.15	0.549	0.017		97	
1	123	8.31	33.275	25.90	4.64	0.414	0.161		72	
1	147	7.68	33.660	26.29	3.77	0.337	0.246		58	
1	172	7.49	33.871	26.48	3.25	0.290	0.294		50	
2	182	7.38	33.858	26.49	3.14	0.280	0.305		48	
2	273	6.82	33.928	26.62	2.83	0.253	0.340		43	
2	273	6.30	33.946	26.70	2.53	0.226	0.375		38	
2	460	5.01	34.077	26.96	1.03	0.092	0.528		15	
2	697	4.02	34.240	27.20	0.35	0.031	0.603		5	
2	1442	3.02	34.473	27.48	0.54	0.048	0.601		7	
2	1741	2.15	34.576	27.64	1.27	0.113	0.551		17	

CNAV OSHAWA CRUISE DS2 STATION 073 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	0.09	0.20	0.72	0.19	100	50	32.587	0.60	0.4	1
7	0.09	0.18	1.78	0.34	66		32.588	0.57	0.6	1
				0.10	50					
27	0.08	0.16	0.14	0.08	33	10	32.592	0.59	0.4	1
66	0.10	0.10	0.56	0.03	18	1	32.593	0.58	0.4	0
	5.90	9.85	41.62	0.02	6					

- WATER COLUMN VALUES

MESSENGER TIME 1142 INCOMING SOLAR RADIATION - AM 200 PM 314

LIGHT SATURATION INCUBATOR ILLUMINATION 18600

CNAV OSHAWA		CRUISE OS2			STATION 073		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMLY	GEPOT ANOMLY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	12.73	0.00	32.593	0.000	24.60	334.4	0.000	0.00	6.33	0.00		
10	12.71	0.00	32.595	0.000	24.61	334.1	0.034	0.02	6.26	0.00		
20	12.69	0.00	32.590	0.000	24.61	334.3	0.068	0.07	6.20	0.00		
30	12.68	0.00	32.593	0.000	24.61	334.1	0.101	0.16	6.24	0.00		
50	9.97	0.02	32.574	0.000	25.09	289.4	0.164	0.41	6.69	0.01	0.95	
75	9.60	0.00	32.581	0.007	25.15	283.5	0.236	0.87	6.47	0.01	0.89	
100	9.09	0.01	32.684	0.010	25.32	268.4	0.306	1.49	6.04	0.02	0.89	
150	7.65	0.01	33.689	0.004	26.32	173.8	0.417	2.86	3.69	0.01	0.89	
200	7.17	0.01	33.931	0.026	26.58	150.0	0.499	4.32	2.96	0.03	0.85	
250	6.55	0.00	33.940	0.002	26.67	141.8	0.573	6.01	2.68	0.00	0.59	
300	6.06	0.02	33.962	0.002	26.75	134.5	0.642	7.98	2.30	0.03	1.23	
400	5.33	0.03	34.030	0.003	26.89	121.6	0.772	12.59	1.49	0.05	1.10	
500	4.81	0.01	34.106	0.001	27.01	110.9	0.889	17.99	0.85	0.02	0.84	
600	4.36	0.02	34.176	0.001	27.12	101.5	0.996	24.03	0.52	0.04	0.61	
700	4.01	0.00	34.241	0.000	27.20	93.5	1.095	30.60	0.34	0.00	1.00	
800	3.84	0.10	34.284	0.009	27.26	89.2	1.187	37.71	0.20	0.02	1.10	
1000	3.52	0.20	34.358	0.018	27.35	81.6	1.360	53.65	0.07	0.05	1.29	
1200	3.26	0.18	34.419	0.017	27.42	75.6	1.519	71.62	0.16	0.04	1.20	
1500	2.91	0.01	34.489	0.001	27.51	68.2	1.738	101.89	0.66	0.00	20.01	

CNAV OSHAWA CRUISE 052 STATION 074 OBSERVED VALUES

DATE 11/06/63 HR 00.7 LAT 46-12 N LONG 130-00 W WEA 02 WIND VEL 20 DIR 34
 BAROM 21.0 TEMP DRY 15.0 WET 13.9 RELHU 89 WTRCLR SECDI SEA 3 DIR 34 SWELL 3 DIR 34
 CLOUD TYPE VIS 4 VIS 7 WIRE ANGLE(S) 11,25

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SNDG	SATN
1	0	12.72	32.560	24.58	6.34	0.566	-0.042		108	
1	5	12.67	32.556	24.59	6.32	0.564	-0.040		108	
1	10	12.58	32.553	24.60	6.37	0.569	-0.043		108	
1	20	12.50	32.567	24.63	6.28	0.561	-0.034		107	
1	30	10.87	32.578	24.94	6.60	0.589	-0.044		108	
1	49	10.00	32.582	25.09	6.34	0.566	-0.010		102	
1	74	9.32	32.544	25.17	6.51	0.581	-0.017		103	
1	98	8.95	32.771	25.40	5.76	0.514	0.054		90	
1	123	7.26	32.951	25.79	5.72	0.511	0.080		86	
1	147	7.13	33.512	26.25	4.77	0.426	0.165		72	
1	173	7.11	33.811	26.49	4.04	0.361	0.229		61	
2	183	7.11	33.830	26.50	4.03	0.360	0.230		61	
2	229	6.48	33.911	26.65	3.46	0.309	0.289		52	
2	275	5.83	33.917	26.74	2.95	0.263	0.344		43	
2	460	4.52	34.021	26.98	1.20	0.107	0.520		17	
2	687	3.96	34.216	27.19	0.43	0.038	0.597		6	
2	924	3.39	34.341	27.34	0.30	0.027	0.617		4	
2	1405	2.51	34.503	27.55	0.68	0.061	0.597		9	
2	1693	2.13	34.572	27.64	1.23	0.110	0.555		17	

CNAV OSHAWA CRUISE 052 STATION 074 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.26	0.37		32.608
7	0.29	0.37		32.565
27	0.24	0.39		32.566
66	0.40	0.13		32.587

19.77 20.38 - WATER COLUMN VALUES

MESSENGER TIME 1745 INCOMING SOLAR RADIATION - AM 200 PM 314

CNAV OSHAWA		CRUISE 052			STATION 074			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	12.72	0.00	32.560	0.000	24.58	336.6	0.000	0.00	6.34	0.00		
10	12.58	0.00	32.553	0.000	24.60	334.8	0.034	0.02	6.37	0.00		
20	12.50	0.00	32.567	0.000	24.63	332.5	0.068	0.07	6.28	0.00		
30	10.87	0.00	32.578	0.000	24.94	303.4	0.100	0.15	6.60	0.00		
50	9.96	0.00	32.578	0.002	25.09	289.0	0.160	0.39	6.35	0.01	0.35	
75	9.31	0.01	32.551	0.002	25.18	281.3	0.231	0.85	6.48	0.01	0.94	
100	8.81	0.04	32.779	0.006	25.43	257.3	0.299	1.46	5.76	0.02	0.89	
150	7.13	0.01	33.555	0.005	26.28	176.7	0.409	2.81	4.68	0.01	0.89	
200	6.89	0.01	33.910	0.028	26.60	147.8	0.490	4.26	3.70	0.07	0.86	
250	6.18	0.01	33.918	0.003	26.70	138.7	0.563	5.93	3.22	0.00	0.60	
300	5.57	0.03	33.923	0.002	26.78	131.2	0.631	7.85	2.67	0.01	1.21	
400	4.79	0.05	33.978	0.003	26.91	119.2	0.757	12.36	1.69	0.02	1.10	
500	4.38	0.03	34.055	0.004	27.02	109.7	0.873	17.68	0.93	0.02	0.82	
600	4.11	0.04	34.141	0.006	27.11	101.1	0.979	23.68	0.60	0.03	0.67	
700	3.93	0.00	34.224	0.000	27.20	93.8	1.078	30.24	0.41	0.00	0.93	
800	3.68	0.00	34.282	0.002	27.27	87.5	1.169	37.30	0.31	0.02	0.60	
1000	3.23	0.00	34.373	0.001	27.39	77.3	1.336	52.64	0.31	0.00	0.94	
1200	2.84	0.00	34.445	0.003	27.48	68.9	1.484	69.32	0.42	0.01	0.89	
1500	2.37	0.00	34.527	0.000	27.58	59.2	1.679	96.18	0.84	0.00	9.21	

CNAV OSHAWA CRUISE 052 STATION 075 OBSERVED VALUES

DATE 11/06/63 HR 05.6 LAT 46-58 N LONG 130-00 W SNDG 2560 MEA 45 WIND VEL 18 DIR 30
 BAROM 18.0 TEMP DRY 12.2 WET 12.2 RELHU 99 WTRCLR SEA 3 DIR 30 SWELL 3 DIR 32
 CLOUD TYPE AMT 9 VIS 3 WIRE ANGLE(S) 22,22

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SECDI	SATN
1	0	12.14	32.440	24.60	6.42	0.573	-0.042	108		
1	5	12.13	32.436	24.60	6.52	0.582	-0.051	110		
1	9	12.14	32.440	24.60	6.53	0.583	-0.052	110		
1	18	11.91	32.435	24.64	6.46	0.577	-0.043	108		
1	27	11.79	32.447	24.67	6.54	0.584	-0.049	109		
1	45	9.47	32.494	25.11	6.79	0.606	-0.043	108		
1	68	9.27	32.523	25.16	6.33	0.565	0.000	100		
1	90	8.87	32.539	25.24	6.33	0.565	0.005	99		
1	123	7.48	33.093	25.87	5.08	0.454	0.134	77		
1	136	7.16	33.537	26.27	4.19	0.374	0.226	63		
1	159	7.12	33.828	26.50	3.46	0.309	0.281	52		
2	181	6.99	33.882	26.56	3.30	0.295	0.296	50		
2	226	6.43	33.926	26.67	2.87	0.256	0.343	43		
2	272	5.87	33.933	26.75	2.41	0.215	0.392	35		
2	455	4.69	34.050	26.98	1.08	0.096	0.528	15		
2	681	3.95	34.223	27.20	0.39	0.035	0.601	5		
2	908	3.40	34.336	27.34	0.29	0.026	0.618	4		
2	1362	2.55	34.502	27.55	0.60	0.054	0.604	8		
2	1658	2.20	34.556	27.62	0.96	0.086	0.578	13		

CNAV OSHAWA CRUISE 052 STATION 075 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.55	0.40		32.442
7	0.57	0.39		32.441
27	0.59	0.37		32.425
66	0.16	0.03		32.527
100				32.528

30.01 18.40 - WATER COLUMN VALUES

MESSENGER TIME 2147 INCOMING SOLAR RADIATION - AM 200 PM 314

CNAV OSHAWA		CRUISE 052			STATION 075		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	12.14	0.00	32.440	0.000	24.60	334.9	0.000	0.00	6.42	0.00	0.97		
10	12.12	0.01	32.440	0.000	24.60	334.8	0.034	0.02	6.52	0.00	0.75		
20	11.91	0.02	32.437	0.000	24.64	331.5	0.068	0.07	6.47	0.00	0.93		
30	11.43	0.11	32.455	0.001	24.74	322.1	0.101	0.15	6.60	0.02			
50	9.30	0.09	32.502	0.001	25.14	284.3	0.162	0.40	6.71	0.04	0.79		
75	9.18	0.01	32.513	0.011	25.17	282.0	0.233	0.86	6.34	0.04	0.67		
100	8.46	0.06	32.630	0.006	25.37	263.1	0.302	1.47	6.11	0.00	0.91		
150	7.10	0.03	33.766	0.015	26.46	160.6	0.409	2.78	3.65	0.02	0.75		
200	6.78	0.02	33.908	0.002	26.61	146.5	0.486	4.16	3.13	0.00	0.83		
250	6.13	0.00	33.931	0.002	26.71	137.1	0.557	5.80	2.63	0.00	0.58		
300	5.62	0.02	33.946	0.002	26.79	130.3	0.625	7.71	2.16	0.00	1.22		
400	4.93	0.04	34.006	0.004	26.92	118.7	0.750	12.19	1.40	0.00	1.06		
500	4.50	0.02	34.086	0.002	27.03	108.9	0.865	17.48	0.88	0.01	0.80		
600	4.16	0.02	34.163	0.003	27.13	100.1	0.971	23.43	0.54	0.02	0.69		
700	3.90	0.00	34.234	0.000	27.21	92.8	1.068	29.93	0.37	0.01	0.89		
800	3.64	0.00	34.287	0.001	27.28	86.8	1.159	36.91	0.29	0.02	0.59		
1000	3.20	0.00	34.377	0.000	27.39	76.6	1.324	52.12	0.31	0.01	0.92		
1200	2.81	0.00	34.453	0.001	27.49	67.9	1.471	68.61	0.43	0.01	0.85		
1500	2.37	0.00	34.533	0.000	27.59	58.6	1.663	95.16	0.76	0.00	7.63		

CNAV OSHAWA CRUISE DS2 STATION 076 OBSERVED VALUES									
DATE	HR	LAT	LONG	W	WEA	DIR	VEL	DIR	DIR
11/06/63	10.3	47.43	130.00	W	45	29	20	29	29
BAROM	DRY	WET	RELHU	WTRCLR	SECDI	2926	SEA	2	DIR
15.0	11.7	11.7	18.7	8	107	107	SWELL	1	DIR
CLOUD	TYPE	VIS	WIRE	ANGLE(S)	18.7	8	32		
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	12.07	32.456	24.62	6.38	0.570	-0.038	107	
1	5	12.05	32.461	24.63	6.40	0.572	-0.040	107	
1	9	12.07	32.459	24.63	6.36	0.568	-0.036	107	
1	18	11.88	32.501	24.69	6.40	0.572	-0.038	107	
1	28	11.53	32.462	24.73	6.31	0.564	-0.026	105	
1	46	8.02	32.465	25.15	6.48	0.579	-0.010	102	
1	69	8.74	32.502	25.23	6.37	0.569	0.004	99	
1	93	8.01	32.729	25.51	5.84	0.522	0.060	90	
2	115	7.95	32.747	25.54	5.80	0.518	0.064	89	
1	116	6.87	33.205	26.05	5.19	0.464	0.132	78	
1	140	6.62	33.530	26.33	4.73	0.422	0.175	71	
2	151	6.64	33.483	26.29	4.72	0.422	0.176	71	
1	164	6.63	33.715	26.48	4.27	0.381	0.215	64	
2	192	6.52	33.865	26.61	3.72	0.332	0.266	56	
2	362	4.90	34.016	26.93	1.34	0.120	0.502	19	
2	587	4.10	34.169	27.14	0.57	0.051	0.582	8	
2	827	3.49	34.316	27.32	0.35	0.031	0.611	5	
2	1323	2.59	34.476	27.53	0.52	0.046	0.611	7	
2	1822	2.04	34.569	27.65	1.27	0.113	0.553	17	
2	2323	1.79	34.631	27.71	1.80	0.161	0.509	24	
2	2673	1.70	34.646	27.73	2.15	0.192	0.480	29	

CNAV OSHAWA CRUISE 052 STATION 076 BIOLOGICAL DATA

DEPTH	CHL-A	LAB-I	PRODUCTIVITY DECK-I	SAL
0	0.38	0.62	7.30	32.462
7	0.38	0.42		32.458
27	0.38	0.47		32.460
66	0.37	0.18		32.498
100	0.11	0.01		32.584

24.98 25.22 - WATER COLUMN VALUES

MESSENGER TIME 0400 INCOMING SOLAR RADIATION - AM 195 PM 208

CNAV OSHAWA			CRUISE OS2			STATION 076			INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	12.07	0.00	32.456	0.000	24.62	332.5	0.000	0.00	6.38	0.00	0.97				
10	12.06	0.00	32.464	0.002	24.63	331.9	0.034	0.02	6.36	0.00	0.78				
20	11.85	0.02	32.496	0.003	24.70	326.0	0.067	0.07	6.38	0.01	0.93				
30	11.26	0.07	32.459	0.001	24.77	318.7	0.100	0.15	6.32	0.01					
50	8.87	0.09	32.464	0.003	25.18	280.7	0.160	0.40	6.49	0.00	0.82				
75	8.55	0.04	32.560	0.013	25.30	269.2	0.229	0.84	6.23	0.03	0.74				
100	7.75	0.12	32.823	0.045	25.62	238.8	0.293	1.41	5.70	0.05	0.68				
150	6.62	0.02	33.546	0.052	26.35	170.6	0.396	2.69	4.64	0.07	0.63				
200	6.45	0.02	33.887	0.009	26.64	143.8	0.476	4.10	3.57	0.00	1.18				
250	6.01	0.09	33.992	0.048	26.78	131.1	0.545	5.69	2.73	0.00	2.12				
300	5.53	0.10	34.038	0.049	26.87	122.4	0.609	7.49	2.02	0.00	1.79				
400	4.70	0.03	34.044	0.001	26.97	113.3	0.728	11.74	1.10	0.05	0.83				
500	4.31	0.05	34.114	0.001	27.07	104.5	0.838	16.81	0.67	0.09	0.68				
600	4.06	0.00	34.178	0.000	27.15	97.9	0.940	22.57	0.55	0.00	0.93				
700	3.79	0.01	34.242	0.001	27.23	91.0	1.035	28.93	0.42	0.02	0.61				
800	3.55	0.00	34.301	0.000	27.30	84.7	1.124	35.77	0.35	0.01	0.81				
1000	3.13	0.01	34.387	0.005	27.41	75.1	1.286	50.65	0.33	0.01	0.86				
1200	2.77	0.00	34.448	0.004	27.49	67.8	1.431	66.97	0.41	0.01	0.79				
1500	2.36	0.00	34.515	0.001	27.58	59.9	1.625	93.80	0.77	0.03	0.67				
2000	1.93	0.01	34.596	0.001	27.68	51.1	1.907	144.08	1.47	0.01	0.71				
2500	1.74	0.00	34.642	0.000	27.73	47.2	2.157	201.97	1.97	0.00	2.78				

CNAV OSHAWA CRUISE 052 STATION 077 OBSERVED VALUES

DATE 11/06/63 HR 15.9 LAT 47-43 N LONG 128-55 W WEA 41 WIND VEL 20 DIR 27
 BAROM 14.0 TEMP DRY 13.3 WET 12.8 RELHU 95 WTRCLR SECDI 2578 SEA 3 DIR 27 SWELL 2 DIR 32
 CLOUD TYPE AMT 8 VIS 5 WIRE ANGLE(S) 7, ---

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
1	0	11.94	32.348	24.56	6.37	0.569	-0.035	107
1	5	11.93	32.347	24.57	6.50	0.581	-0.047	109
1	10	11.93	32.343	24.56	6.38	0.570	-0.036	107
1	19	11.92	32.346	24.57	6.40	0.572	-0.038	107
1	29	11.80	32.345	24.59	6.24	0.557	-0.022	104
1	49	9.28	32.304	24.99	6.50	0.581	-0.014	103
1	73	8.78	32.453	25.18	6.14	0.548	0.024	96
1	97	8.92	32.964	25.56	4.98	0.445	0.124	78
1	122	7.55	33.495	26.18	3.88	0.347	0.238	59
1	146	7.39	33.747	26.40	3.38	0.302	0.284	52
1	172	7.17	33.870	26.53	2.98	0.266	0.322	45
2	186	7.05	33.884	26.55	3.04	0.272	0.319	46
2	233	6.58	33.921	26.65	2.92	0.261	0.336	44
2	280	6.04	33.952	26.74	2.24	0.200	0.404	33
2	467	5.91	34.070	26.85	0.95	0.085	0.521	14
2	701	4.11	34.262	27.21	0.30	0.027	0.606	4
2	935	3.54	34.384	27.36	0.28	0.025	0.616	4
2	1417	2.60	34.509	27.55	0.63	0.056	0.600	9
2	1711	2.71	34.566	27.59	1.06	0.095	0.560	14

CNAV OSHAWA CRUISE 052 STATION 077 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.75	1.26		32.348
7	0.81	1.88		32.352
27	0.96	1.29		32.346
66	0.25	0.11		32.369

46.65 69.99 -- WATER COLUMN VALUES

MESSENGER TIME 0806 INCOMING SOLAR RADIATION - AM 195 PM 208

CNAV OSHAWA		CRUISE OS2		STATION 077		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	11.94	0.00	32.348	0.000	24.56	338.1	0.000	0.00	6.37	0.00	
10	11.93	0.00	32.343	0.000	24.56	338.5	0.035	0.02	6.38	0.00	
20	11.93	0.01	32.346	0.000	24.57	338.5	0.069	0.07	6.38	0.01	0.88
30	11.69	0.04	32.342	0.002	24.61	334.8	0.103	0.16	6.25	0.01	0.98
50	9.23	0.01	32.304	0.001	25.00	297.8	0.166	0.42	6.50	0.00	0.95
75	8.81	0.03	32.489	0.005	25.21	278.3	0.239	0.88	6.06	0.01	0.89
100	8.76	0.05	33.035	0.005	25.64	237.6	0.304	1.46	4.83	0.01	0.85
150	7.36	0.00	33.775	0.001	26.43	163.4	0.405	2.70	3.29	0.01	0.83
200	6.92	0.00	33.896	0.000	26.58	149.2	0.484	4.11	3.06	0.00	1.18
250	6.38	0.01	33.933	0.000	26.68	140.1	0.557	5.79	2.70	0.03	0.65
300	5.98	0.07	33.964	0.001	26.76	133.4	0.626	7.74	2.03	0.03	1.16
400	5.84	0.17	34.026	0.002	26.83	128.2	0.758	12.47	1.24	0.06	1.13
500	5.67	0.06	34.098	0.002	26.90	122.1	0.884	18.30	0.81	0.01	0.85
600	4.92	0.12	34.180	0.005	27.06	107.8	1.000	24.83	0.48	0.02	0.67
700	4.12	0.00	34.261	0.000	27.21	93.3	1.102	31.58	0.30	0.00	0.99
800	3.79	0.05	34.320	0.001	27.29	86.0	1.192	38.55	0.25	0.02	0.62
1000	3.36	0.02	34.407	0.003	27.40	76.2	1.356	53.65	0.30	0.00	0.95
1200	2.92	0.04	34.466	0.005	27.49	68.2	1.503	70.14	0.41	0.00	0.89
1500	2.68	0.07	34.524	0.001	27.56	62.9	1.702	97.75	0.74	0.00	10.32

CNAV OSHAWA CRUISE 052 STATION 078 OBSERVED VALUES

DATE 11/06/63 HR 19.1 LAT 47-43 N LONG 128-27 W WEA 41 WIND VEL 12 DIR 29
 BAROM 14.0 TEMP DRY 14.4 WET 13.3 RELHU 89 WTRCLR SNGD 2633 SEA 2 DIR 29 SWELL 2 DIR 31
 CLOUD TYPE VIS 6 WIRE ANGLE(S) 11 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
		TEMP			MGA/L			
1	0	12.13	32.296	24.49	6.46	0.577	-0.045	109
1	5	12.08	32.284	24.49	6.48	0.579	-0.046	109
1	10	12.08	32.291	24.49	6.38	0.570	-0.038	107
1	20	12.01	32.291	24.51	6.37	0.569	-0.036	107
1	29	12.00	32.291	24.51	6.38	0.570	-0.037	107
1	48	9.43	32.414	25.05	6.50	0.581	-0.017	103
1	73	8.88	32.424	25.14	6.27	0.560	0.011	98
1	97	7.85	32.978	25.73	5.05	0.451	0.132	77
1	122	7.07	33.425	26.19	4.59	0.410	0.182	69
1	146	7.19	33.704	26.39	4.07	0.364	0.225	62
1	172	7.13	33.865	26.53	3.19	0.285	0.304	48
1	197	6.86	33.912	26.60	2.96	0.264	0.328	45
1	246	6.20	33.941	26.71	2.43	0.217	0.385	36
1	295	5.68	33.941	26.78	2.24	0.200	0.410	33

CNAV QSHAWA CRUISE 052 STATION 078 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	0.48	0.56	3.96	0.75	100	50	32.282	0.62	0.1	6
6	0.54	0.55	2.62	0.66	66	10	32.281	0.70	0.3	8
25	0.62	0.55	0.66	0.66	66		32.295	0.69	0.3	8
60	0.48	0.37	0.00	0.52	50	1	32.287	0.66	0.3	7

33.29 29.88 62.44 - WATER COLUMN VALUES

MESSENGER TIME 1139 INCOMING SOLAR RADIATION - AM 195 PM 208

LIGHT SATURATION INCUBATOR ILLUMINATION 18500

DEPTH	CNAV OSHAWA		CRUISE OS2		STATION 078		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	12.13	0.00	32.296	0.000	24.43	345.3	0.000	0.00	6.46	0.00			
10	12.08	0.00	32.291	0.000	24.49	345.0	0.035	0.02	6.38	0.00			
20	12.01	0.00	32.291	0.000	24.51	344.0	0.070	0.07	6.37	0.00			
30	11.88	0.04	32.297	0.002	24.54	341.6	0.105	0.16	6.39	0.00	0.98		
50	9.34	0.05	32.407	0.009	25.06	291.9	0.168	0.42	6.51	0.01	0.91		
75	8.80	0.01	32.462	0.008	25.19	280.1	0.240	0.88	6.17	0.02	0.88		
100	7.72	0.01	33.039	0.000	25.80	222.4	0.304	1.44	4.98	0.02	0.85		
150	7.19	0.00	33.737	0.001	26.42	164.0	0.401	2.65	3.92	0.02	0.82		
200	6.82	0.00	33.915	0.001	26.61	146.5	0.479	4.04	2.92	0.00	0.97		
250	6.15	0.00	33.950	0.005	26.73	135.9	0.550	5.68	2.39	0.00	13.66		

CNAV OSHAWA CRUISE 052 STATION 079 OBSERVED VALUES

DATE 11/06/63 HR 21.6 LAT 47-43 N LONG 127-50 W WEA 01 WIND VEL 14 DIR 28
 BAROM 13.0 TEMP DRY 15.6 WET 14.4 RELHU 88 WTRCLR SECDI 3017 SEA 2 DIR 28 SWELL 1 DIR
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 20.35

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	12.86	32.351	24.39	6.74	0.602	-0.079	115
1	5	12.81	32.349	24.40	6.33	0.565	-0.041	108
1	10	12.78	32.346	24.40	6.23	0.556	-0.032	106
1	19	12.68	32.356	24.43	6.31	0.564	-0.038	107
1	29	12.53	32.364	24.47	6.23	0.556	-0.029	106
1	49	9.66	32.486	25.07	6.57	0.587	-0.026	105
1	73	9.27	32.486	25.13	6.40	0.572	-0.006	101
1	97	8.63	32.659	25.37	5.91	0.528	0.046	92
1	122	7.09	33.148	25.97	5.29	0.472	0.120	80
1	146	7.02	33.477	26.24	4.54	0.405	0.181	68
1	171	7.18	33.780	26.46	3.86	0.255	0.333	43
2	155	7.38	33.719	26.38	3.47	0.310	0.276	53
2	193	7.13	33.908	26.56	3.15	0.281	0.308	48
2	233	6.49	33.926	26.66	2.98	0.266	0.332	45
2	405	5.17	34.046	26.92	1.06	0.095	0.522	15
2	631	4.31	34.212	27.15	0.35	0.032	0.598	5
2	869	3.88	34.354	27.31	0.27	0.024	0.612	4
2	1361	2.91	34.510	27.52	0.65	0.058	0.593	9
2	1659	2.47	34.562	27.60	1.06	0.095	0.564	14

CNAV OSHAWA CRUISE 052 STATION 079 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.41	0.59		32.359
6	0.71	0.49		32.359
25	0.52	0.48		32.364
60	0.51	0.05		32.365

33.06 21.60 - WATER COLUMN VALUES

MESSENGER TIME 1447 INCOMING SOLAR RADIATION - AM 195 PM 208

CNAV OSHAWA		CRUISE OS2		STATION 079		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	12.86	0.00	32.351	0.000	24.39	354.6	0.000	0.00	6.74	0.00	
10	12.78	0.00	32.346	0.000	24.40	353.7	0.036	0.02	6.23	0.00	
20	12.69	0.01	32.356	0.001	24.43	351.4	0.072	0.07	6.30	0.01	0.88
30	12.40	0.05	32.370	0.002	24.50	345.4	0.107	0.16	6.24	0.01	0.98
50	9.61	0.02	32.486	0.002	25.08	290.3	0.171	0.42	6.57	0.00	0.95
75	9.24	0.01	32.492	0.001	25.14	284.5	0.243	0.88	6.37	0.00	0.89
100	8.43	0.04	32.713	0.008	25.44	256.5	0.311	1.49	5.84	0.00	0.85
150	7.13	0.06	33.566	0.025	26.29	175.8	0.420	2.84	4.17	0.11	0.61
200	7.03	0.01	33.913	0.005	26.58	149.1	0.502	4.29	3.12	0.01	0.81
250	6.29	0.03	33.936	0.001	26.70	138.8	0.575	5.96	2.81	0.05	1.19
300	5.80	0.07	33.968	0.003	26.78	130.9	0.643	7.88	2.28	0.12	1.47
400	5.19	0.01	34.042	0.000	26.92	119.1	0.769	12.39	1.12	0.01	0.95
500	4.72	0.02	34.117	0.002	27.03	109.0	0.884	17.69	0.60	0.06	0.69
600	4.39	0.01	34.190	0.001	27.12	100.7	0.990	23.66	0.38	0.03	0.82
700	4.16	0.02	34.257	0.000	27.20	94.1	1.088	30.22	0.29	0.02	0.70
800	3.98	0.02	34.317	0.000	27.27	88.4	1.181	37.32	0.25	0.02	0.64
1000	3.61	0.01	34.409	0.003	27.38	79.0	1.350	52.91	0.32	0.01	0.92
1200	3.22	0.02	34.474	0.004	27.47	71.0	1.502	70.04	0.46	0.01	0.88
1500	2.68	0.07	34.535	0.001	27.57	62.1	1.704	97.99	0.84	0.00	7.55

CNAV OSHAWA CRUISE 052 STATION 080 OBSERVED VALUES

DATE 12/06/63 HR 00-6 LAT 47-43 N LONG 127-20 W WIND VEL 14 DIR 30
 BAROM 13.0 TEMP DRY 15.6 WET 13.9 RELHU 83 WTRCLR SECDI 2560 WEA 02
 CLOUD TYPE AMT 7 VIS 7 WIRE ANGLE(S) 12 WIND DIR 30 SWELL 2 DIR 27

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		SATN	
					ML/L	MGA/L	AOU	
1	0	13.32	32.020	24.05	6.17	0.551	-0.032	105
1	5	13.27	32.021	24.06	6.17	0.551	-0.031	106
1	10	13.22	32.034	24.08	6.18	0.552	-0.031	106
1	20		32.169		6.13	0.547		
1	34		32.217		6.23	0.556		
1	54		32.408		6.69	0.598		
1	78		32.448		6.34	0.566		
1	103		33.006		5.32	0.475		
1	128		33.367		4.93	0.440		
1	152		33.614		4.36	0.389		
1	177		33.833		3.74	0.334		
1	201		33.897		3.53	0.315		
1	250		33.934		2.69	0.240		
1	299		33.963		1.85	0.165		

DEPTH	CNAV OSHAMA		CRUISE 052		STATION 080		INTERPOLATED AND COMPUTED VALUES				
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.32	0.00	32.020	0.000	24.05	387.5	0.000	0.00	6.17	0.00	
10	13.22	0.00	32.034	0.000	24.08	384.8	0.039	0.02	6.18	0.00	
20			32.169	0.000					6.13	0.00	
30			32.208	0.008					6.18	0.00	0.68
50			32.370	0.008					6.61	0.03	0.75
75			32.435	0.013					6.43	0.01	0.83
100			32.930	0.013					5.44	0.02	0.84
150			33.596	0.001					4.41	0.00	0.88
200			33.896	0.001					3.54	0.00	0.92
250			33.934	0.000					2.69	0.00	

CNAV OSHAWA CRUISE 052 STATION 081 OBSERVED VALUES

DATE 12/06/63 HR 02.8 LAT 47-43 N LONG 126-44 W WEA 03 WIND VEL 10 DIR 30
 BAROM 12.0 TEMP DRY 14.4 MET 12.8 RELHU 83 WTRCLR SECDI 2377 SEA 2 DIR 30 SWELL 2 DIR 34
 CLOUD TYPE AMT 7 VIS 7 WIRE ANGLE(S) 15.32

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.01	31.693	23.86	6.15	0.549	-0.025	105	
1	5	12.98	31.687	23.86	6.14	0.548	-0.024	105	
1	10	12.98	31.709	23.87	6.15	0.549	-0.025	105	
1	20	12.84	31.718	23.91	6.14	0.548	-0.023	104	
1	29	12.68	31.804	24.00	6.18	0.552	-0.025	105	
1	48	9.75	32.514	25.08	6.53	0.583	-0.024	104	
1	72	9.50	32.515	25.12	6.37	0.569	-0.006	101	
1	98	9.05	32.614	25.27	6.04	0.539	0.029	95	
1	121	7.28	33.126	25.93	5.20	0.464	0.126	79	
1	145	6.93	33.500	26.27	4.72	0.422	0.172	71	
1	169	7.08	33.725	26.43	4.17	0.372	0.218	63	
2	170	7.12	33.774	26.46	4.01	0.358	0.231	61	
2	212	6.70	33.913	26.63	3.42	0.305	0.289	51	
2	255	6.15	33.919	26.70	2.99	0.267	0.336	44	
2	432	4.83	34.008	26.93	1.33	0.119	0.504	19	
2	655	4.28	34.217	27.16	0.37	0.033	0.597	5	
2	887	3.62	34.349	27.33	0.25	0.022	0.618	3	
2	1364	2.72	34.496	27.53	0.57	0.051	0.604	8	
2	1658	2.30	34.545	27.60	0.92	0.082	0.579	12	

CNAV OSHAWA CRUISE 052 STATION 081 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.15	0.22		31.694
6	0.17	0.09		31.697
25	0.15	0.07		31.694
60	0.40	0.09		32.488

13.66 5.29 - WATER COLUMN VALUES

MESSENGER TIME 1940 INCOMING SOLAR RADIATION - AM 195 PM 208

CNAV OSHAWA		CRUISE OS2		STATION 081		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.01	0.00	31.693	0.000	23.86	405.8	0.000	0.00	6.15	0.00	
10	12.98	0.00	31.709	0.000	23.87	404.3	0.041	0.02	6.15	0.00	
20	12.84	0.00	31.718	0.000	23.91	401.2	0.082	0.08	6.14	0.00	
30	12.54	0.05	31.840	0.011	24.06	386.9	0.122	0.19	6.20	0.01	0.98
50	9.66	0.05	32.531	0.014	25.10	287.7	0.190	0.45	6.53	0.01	0.91
75	9.48	0.02	32.514	0.005	25.12	286.6	0.262	0.92	6.35	0.01	0.84
100	8.76	0.06	32.686	0.012	25.37	263.4	0.331	1.54	5.91	0.02	0.81
150	6.96	0.02	33.563	0.002	26.31	173.8	0.441	2.89	4.58	0.02	0.77
200	6.86	0.02	33.888	0.001	26.58	149.1	0.523	4.34	3.59	0.01	0.75
250	6.21	0.00	33.922	0.002	26.70	138.9	0.595	6.01	3.04	0.00	0.78
300	5.71	0.02	33.933	0.001	26.77	132.3	0.664	7.94	2.52	0.02	1.36
400	4.98	0.02	33.986	0.001	26.90	120.9	0.791	12.50	1.59	0.02	0.94
500	4.60	0.05	34.070	0.007	27.01	111.1	0.908	17.90	0.93	0.02	0.73
600	4.36	0.04	34.164	0.006	27.11	102.3	1.016	23.97	0.51	0.01	0.73
700	4.15	0.01	34.248	0.001	27.19	94.6	1.116	30.60	0.30	0.02	0.78
800	3.86	0.01	34.307	0.002	27.27	87.8	1.208	37.70	0.23	0.03	0.60
1000	3.37	0.01	34.395	0.003	27.39	77.2	1.375	53.05	0.28	0.01	0.93
1200	2.98	0.01	34.460	0.003	27.48	69.3	1.523	69.78	0.40	0.02	0.88
1500	2.52	0.00	34.520	0.001	27.57	61.4	1.722	97.25	0.73	0.00	7.64

CNAV OSHAWA CRUISE 052 STATION 082 OBSERVED VALUES
 DATE 12/06/63 HR 05.8 LAT 47-43 N LONG 126-08 W WEA 01 WIND VEL 18 DIR 33
 BAROM 14.0 TEMP DRY 12.8 WET 11.1 RELHU 82 WTRCLR SCDI 1829 SEA 2 DIR 33 SWELL 2 DIR 34
 CLOUD TYPE VIS 6 WIRE ANGLE(S) ---

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	13.01	31.891	24.01	6.12	0.547	-0.023		104
1	5	13.00	31.896	24.01	6.18	0.552	-0.029		105
1	9	12.97	31.896	24.02	6.18	0.552	-0.028		105
1	18	12.83	31.933	24.08	6.16	0.550	-0.025		105
1	27	10.34	32.263	24.78	6.68	0.597	-0.044		108
1	46	9.44	32.400	25.04	6.04	0.539	0.024		96
1	68	8.68	32.808	25.47	5.12	0.457	0.115		80
1	92	7.71	33.142	25.88	4.96	0.443	0.141		76
1	114	7.29	33.495	26.22	3.98	0.355	0.233		60
1	137	7.81	33.768	26.36	2.87	0.256	0.324		44
1	161	7.50	33.864	26.48	2.71	0.242	0.342		41
1	183	7.34	33.919	26.54	2.44	0.218	0.368		37
1	230	6.78	33.948	26.64	2.37	0.212	0.382		36
1	275	6.12	33.969	26.75	2.08	0.186	0.417		31

CNAV OSHAWA CRUISE 052 STATION 082 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.73	0.08	31.888
6	0.12	0.12	31.902
25	0.38	0.21	32.060
60	0.19	0.09	32.607
100	0.01	0.03	33.240
17.33	8.94	-	WATER COLUMN VALUES

MESSANGER TIME 2147 INCOMING SOLAR RADIATION - AM 195 PM 208

CNAV OSHAWA		CRUISE OS2		STATION 082		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	13.01	0.00	31.891	0.000	24.01	391.2	0.000	0.00	6.12	0.00	0.97	
10	13.01	0.04	31.892	0.004	24.01	391.5	0.040	0.02	6.17	0.01	0.75	
20	12.32	0.11	32.001	0.013	24.23	370.9	0.078	0.08	6.28	0.03	0.94	
30	9.99	0.13	32.303	0.021	24.87	309.4	0.113	0.17	6.66	0.05		
50	9.30	0.01	32.468	0.009	25.11	286.8	0.173	0.41	5.85	0.02	0.80	
75	8.38	0.02	32.909	0.006	25.60	240.9	0.239	0.83	5.08	0.06	0.72	
100	7.48	0.02	33.273	0.005	26.02	201.6	0.295	1.32	4.65	0.03	0.65	
150	7.69	0.04	33.834	0.006	26.43	163.6	0.387	2.48	2.73	0.05	0.66	
200	7.16	0.01	33.937	0.004	26.58	149.5	0.466	3.89	2.39	0.04	0.88	
250	6.49	0.00	33.951	0.003	26.68	140.3	0.539	5.57	2.33	0.02	13.39	

CNAV OSHAWA CRUISE 052 STATION 083 OBSERVED VALUES

DATE 12/06/63 HR 08.0 LAT 47-43 N LONG 125-35 W WEA 01 WIND VEL 12 DIR 28
 BAROM 13.0 TEMP DRY 11.7 WET 10.0 RELHU 81 WTRCLR SEA 2 DIR 28 SWELL 2 DIR 34
 CLOUD TYPE AMT 2 VIS 7 WIRE ANGLE(S) 17.25

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		AOJ	SATN
					ML/L	MGA/L		
1	0	12.49	31.762	24.01	6.25	0.558	-0.029	105
1	5	12.48	31.763	24.01	6.32	0.564	-0.035	107
1	10	12.38	31.753	24.02	6.29	0.562	-0.031	106
1	19	11.83	31.794	24.16	6.41	0.573	-0.035	107
1	28	10.37	32.156	24.69	6.36	0.568	-0.015	103
1	47	9.55	32.411	25.03	5.95	0.531	0.031	94
1	71	8.87	33.330	25.88	3.19	0.464	0.227	60
1	95	8.71	33.330	25.88	3.84	0.343	0.227	60
1	119	8.11	33.674	26.24	3.11	0.278	0.299	48
1	143	7.67	33.830	26.42	2.70	0.241	0.341	41
1	167	7.27	33.913	26.55	2.71	0.242	0.345	41
2	180	7.20	33.930	26.57	2.42	0.216	0.372	37
2	226	6.72	33.956	26.66	2.27	0.203	0.392	34
2	271	6.29	33.984	26.74	1.95	0.174	0.426	29
2	455	5.19	34.099	26.96	0.87	0.078	0.539	13
2	686	4.34	34.256	27.18	0.30	0.027	0.602	4
2	915		34.372		0.27	0.024		
2	1014		34.413		0.30	0.027		

CNAV OSHAWA		CRUISE OS2		STATION 083		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	12.49	0.00	31.762	0.000	24.01	391.2	0.000	0.00	6.25	0.00	
10	12.38	0.00	31.753	0.000	24.02	390.0	0.040	0.02	6.29	0.00	
20	11.67	0.03	31.830	0.008	24.21	372.1	0.078	0.08	6.41	0.00	0.86
30	10.21	0.04	32.198	0.012	24.75	320.6	0.113	0.17	6.33	0.00	0.97
50	9.44	0.00	32.467	0.007	25.09	289.0	0.175	0.42	5.88	0.01	1.00
75	8.84	0.02	32.942	0.028	25.55	245.2	0.242	0.84	4.96	0.03	1.03
100	8.60	0.02	33.413	0.003	25.96	207.1	0.299	1.35	3.65	0.01	0.76
150	7.53	0.01	33.861	0.000	26.47	159.4	0.391	2.50	2.72	0.04	0.76
200	7.01	0.02	33.944	0.002	26.61	146.9	0.468	3.88	2.28	0.06	1.21
250	6.48	0.00	33.971	0.000	26.70	138.7	0.540	5.54	2.11	0.01	0.57
300	6.07	0.02	34.002	0.000	26.78	131.7	0.608	7.46	1.75	0.00	1.25
400	5.44	0.02	34.064	0.000	26.90	120.5	0.736	12.01	1.14	0.01	1.07
500	5.02	0.01	34.131	0.001	27.01	111.6	0.853	17.41	0.70	0.01	61.99
600	4.68	0.03	34.199	0.002	27.10	103.4	0.961	23.53	0.43	0.01	54.77
700			34.264	0.000					0.29	0.00	0.92
800			34.317	0.001					0.24	0.02	0.89
1000			34.407	0.000					0.30	0.00	4.22

CNAV OSHAWA CRUISE OS2 STATION 084 OBSERVED VALUES
 HOH RIVER

DATE 12/06/63 HR 10.8 LAT 47-43 N LONG 125-00 W SNOG 139 WEA 01 WIND VEL 8 DIR 32
 BAROM 14.0 TEMP DRY 11.1 WET 10.0 RELHU 87 WTRCLR SECDI SEA 2 DIR 28 SWELL 1 DIR 34
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
1	0	12.54	31.435	23.75	6.33	0.565	-0.035	107
1	5	12.52	31.428	23.74	6.41	0.573	-0.042	108
1	10	12.52	31.431	23.75	6.44	0.575	-0.045	108
1	19	11.36	31.682	24.15	6.36	0.568	-0.025	105
1	29	9.62	32.272	24.91	6.07	0.542	0.020	96
1	48	8.79	32.555	25.26	5.38	0.481	0.091	84
1	72	7.91	33.086	25.81	4.52	0.404	0.178	69
1	95	7.47	33.559	26.24	3.39	0.303	0.283	52
1	119	7.30	33.774	26.43	3.05	0.272	0.315	46

CNAV OSHAWA CRUISE OS2 STATION 084 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.95	1.29	31.432
6	0.91	1.58	31.425
25	1.99	0.71	31.909
60	0.07	0.00	32.782
100	0.04	0.00	33.028
69.25	42.75	-	WATER COLUMN VALUES

MESSANGER TIME 0310

CNAV OSHAWA		CRUISE 052			STATION 084			INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	12.54	0.00	31.435	0.000	23.75	416.2	0.000	0.00	6.33	0.00			
10	12.52	0.00	31.431	0.000	23.75	416.3	0.042	0.02	6.44	0.00			
20	11.18	0.02	31.740	0.009	24.23	370.2	0.082	0.08	6.34	0.00	0.88		
30	9.53	0.03	32.299	0.010	24.94	302.6	0.116	0.17	6.04	0.00	0.97		
50	8.70	0.00	32.596	0.003	25.31	268.4	0.173	0.40	5.31	0.00	0.91		
75	7.83	0.00	33.156	0.004	25.87	214.8	0.234	0.78	4.36	0.02	0.83		
100	7.41	0.00	33.635	0.003	26.31	173.8	0.283	1.22	3.21	0.01	5.19		

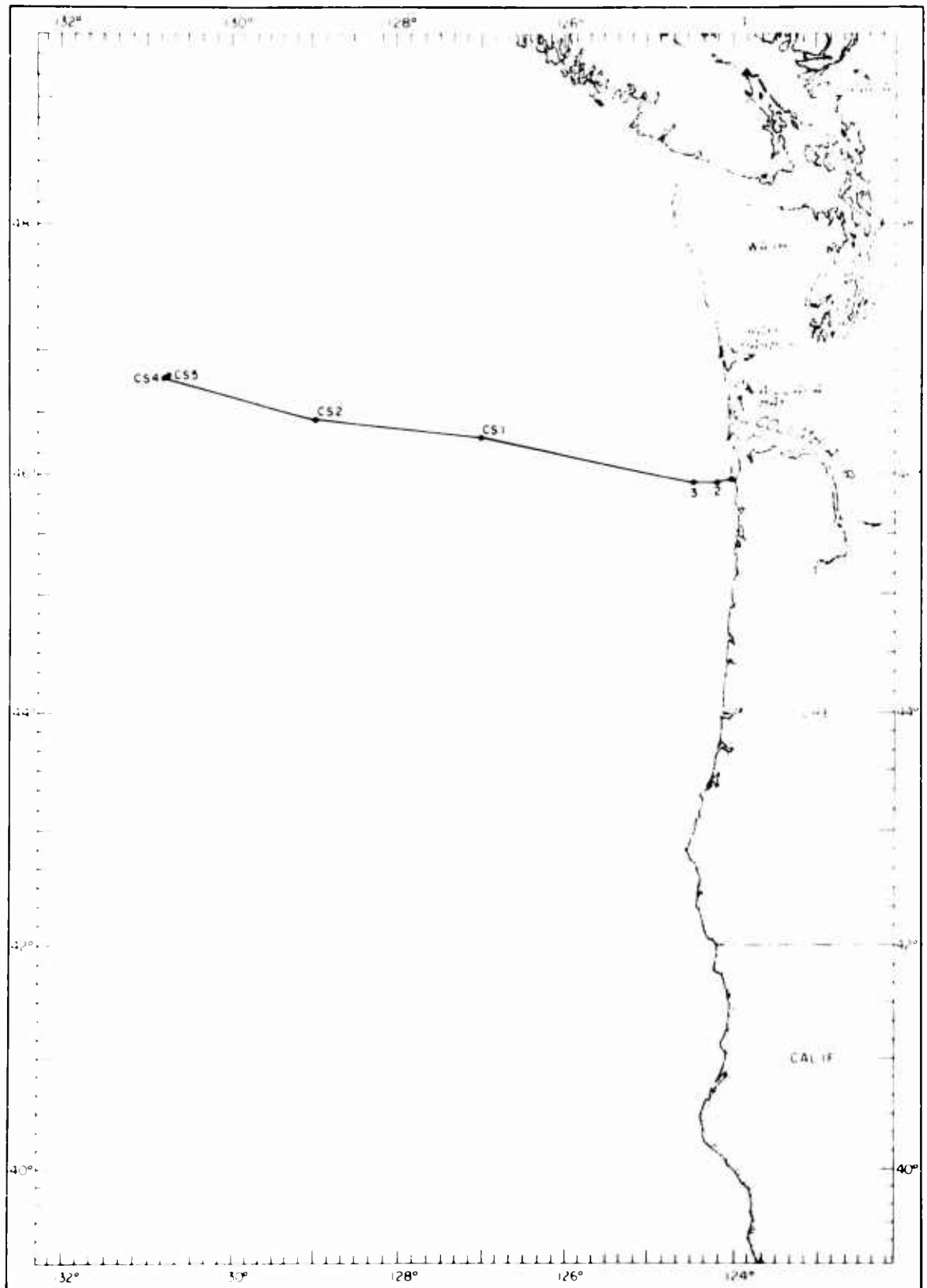


Fig. 2. Station locations Brown Bear Cruise 327, 24 June — 1 July 1963.

BROWN BEAR CRUISE 327 STATION 001 OBSERVED VALUES
 TILLAMOOK HEAD
 DATE 25/06/63 HR 00.0 LAT 45-56.2N LONG 124-01.0W SMDG 59 WEA X8 WIND VEL 17 DIR 21
 BAROM 22.0 TEMP DRY 13.1 WET 12.8 RELHU 97 WTRCLR SECDI 59 DOM WAVE CIR 21 H1 3 PER 2
 CLOUD TYPE 5 AMT 8 VIS 6 WIRE ANGLE(S) 12

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN	PHOS
1	0	13.38	26.127	19.50	8.13	0.726	-0.186	135	0.20	
1	5	13.32	26.657	19.92	8.27	0.739	-0.200	137	0.18	
1	10	11.22	31.782	24.26	6.92	0.618	-0.074	114	0.62	
1	15	10.28	32.538	25.01	6.10	0.545	0.008	99	1.04	
1	20	9.49	32.702	25.26	4.70	0.420	0.142	75	1.74	
1	25	8.35	32.886	25.59	3.36	0.300	0.276	52	2.09	
1	30	8.10	33.259	25.91	3.17	0.283	0.295	49	2.10	
1	39	7.60	33.817	26.42	2.14	0.191	0.392	33	2.43	
1	49	7.37	33.883	26.51	1.90	0.170	0.416	29	2.49	

BROWN BEAR CRUISE 327 STATION 001		INTERPOLATED AND COMPUTED VALUES									
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.38	0.00	26.127	0.000	19.50	823.1	0.000	0.00	8.13	0.00	
10	11.22	0.00	31.782	0.000	24.26	367.7	0.060	0.02	6.92	0.00	
20	9.49	0.00	32.702	0.000	25.26	271.8	0.093	0.07	4.70	0.00	
30	8.10	0.00	33.259	0.000	25.91	210.2	0.117	0.13	3.17	0.00	

BROWN BEAR CRUISE 327 STATION 002 OBSERVED VALUES

DATE 25/06/63 HR 01.6 LAT 45-55.0N LONG 124-10.8W SMDG 95 MEA X2 WIND VEL 16 DIR 34
 BAROM 23.0 TEMP DRY 12.4 WEI 12.1 RELHU 97 WTRCLR SDCDI 95 DOM WAVE DIR 34 HT 4 PER
 CLOUD TYPE 5 AMT 9 VIS 4 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN	PHOS
1	0	12.42	27.378	20.64	7.75	0.692	-0.146	127	0.34
1	5	10.58	31.856	24.43	5.80	0.518	0.034	94	0.97
1	10	9.48	32.737	25.29	4.94	0.441	0.121	78	1.46
1	14	8.82	32.892	25.52	3.58	0.320	0.250	56	2.10
1	19	8.08	33.149	25.83	3.04	0.272	0.307	47	2.19
1	24	7.86	33.340	26.01	2.71	0.242	0.339	42	2.22
1	29	7.66	33.490	26.16	2.92	0.261	0.322	45	2.20
1	38	7.42	33.809	26.44	2.16	0.193	0.392	33	2.49
1	57	6.96	33.955	26.62	1.75	0.156	0.435	26	2.64
1	76	6.64	33.980	26.69	1.80	0.161	0.435	27	2.51

BROWN BEAR CRUISE 327 STATION 002 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	12.42	0.00	27.378	0.000	20.64	713.6	0.000	0.00	7.75	0.00	
10	9.48	0.00	32.737	0.000	25.29	268.9	0.050	0.01	4.94	0.00	
20	8.01	0.01	33.191	0.001	25.87	213.8	0.074	0.05	2.94	0.01	0.77
30	7.63	0.00	33.528	0.004	26.19	183.6	0.094	0.10	2.86	0.03	0.94
50	7.12	0.00	33.950	0.023	26.60	145.6	0.127	0.23	1.78	0.05	0.79
75	6.65	0.00	33.970	0.004	26.68	138.4	0.163	0.46	1.77	0.01	33.28

BROWN BEAR CRUISE 327 STATION 003 OBSERVED VALUES
 DATE 25/06/63 HR 03.7 LAT 45-55.0N LONG 124-26.5W SNDG 82 WEA X1 WIND VEL 10 DIR 33
 BAROM 24.0 TEMP DRY MET RELHU WTRCLR SECDI 82 DOM WAVE DIR 32 HT 2 PER
 CLOUD TYPE 5 AMT 7 VIS 6 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN	PHOS
1	0	13.23	30.226	22.68	8.68	0.775	-0.248	147	0.26
1	5	12.70	30.754	23.19	8.53	0.762	-0.231	144	0.43
1	10	11.48	32.012	24.39	7.13	0.637	-0.097	118	0.87
1	15	10.34	32.264	24.78	6.37	0.569	-0.016	103	0.97
1	19	9.70	32.347	24.95	5.71	0.510	0.051	91	1.17
1	29	8.45	32.636	25.38	4.95	0.442	0.134	77	1.49
1	38	8.34	32.872	25.58	3.83	0.342	0.234	59	2.03
1	57	7.72	33.627	26.26	2.20	0.196	0.385	34	2.54
1	77	7.43	33.899	26.51	1.86	0.166	0.419	28	2.62
1	95	6.97	33.980	26.64	1.96	0.175	0.416	30	2.76
1	114	6.45	33.992	26.72	1.65	0.147	0.451	25	2.82
1	134	6.42	33.995	26.73	1.58	0.141	0.458	24	2.85

BROWN BEAR CRUISE 327 STATION 003		INTERPOLATED AND COMPUTED VALUES								
DEPTH	TEMP E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.23	30.226	0.000	22.68	517.9	0.000	0.00	8.68	0.00	
10	11.48	32.012	0.000	24.39	355.1	0.044	0.02	7.13	0.00	
20	9.54	32.374	0.002	25.00	296.9	0.077	0.07	5.62	0.03	1.00
30	8.42	32.661	0.002	25.40	259.1	0.105	0.14	4.83	0.01	0.85
50	7.96	33.357	0.032	26.01	201.3	0.152	0.32	2.67	0.01	0.78
75	7.46	33.888	0.005	26.50	155.2	0.197	0.60	1.85	0.01	0.88
100	6.81	33.987	0.002	26.67	139.6	0.234	0.94	1.89	0.02	0.73

BROWN BEAR CRUISE 327 STATION CSI OBSERVED VALUES

DATE 25/06/63 HR 18.5 LAT 46-17.0N LONG 127-00.0W SMDG 2679 WEA X2 WIND VEL 9 DIR 29
 BAROM 28.0 TEMP DRY WET RELHU WTRCLR SEA 2 DIR 29 SMELL 2 DIR 37
 CLOUD TYPE 6 AMT 7 VIS 7 WIRE ANGLE(S) 6

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN	PHOS
1	0	14.43	31.778	23.63	6.14	0.548	-0.040	108	0.40	
1	5	14.49	31.778	23.62	6.15	0.549	-0.041	108	0.31	
1	10	14.49	31.774	23.62	6.17	0.551	-0.043	108	0.33	
1	25	13.27	32.269	24.25	6.41	0.573	-0.053	110	0.43	
1	49	10.00	32.468	25.00	6.54	0.584	-0.028	105	0.66	
1	74	9.10	32.665	25.30	5.80	0.518	0.049	91	1.09	
1	98	8.20	33.130	25.80	4.72	0.422	0.156	73	1.64	
1	149	7.81	33.698	26.30	3.33	0.297	0.283	51	1.91	
1	198	7.37	33.913	26.53	2.72	0.243	0.343	41	2.29	
1	247	6.56	33.940	26.67	2.96	0.264	0.332	44	2.32	
1	296	6.16	33.987	26.75	2.12	0.189	0.413	31	2.69	

BROWN BEAR CRUISE 327 STATION CSI				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	14.43	0.00	31.778	0.000	23.63	426.8	0.000	0.00	6.14	0.00	
10	14.49	0.00	31.774	0.000	23.62	428.6	0.044	0.02	6.17	0.00	
20	13.81	0.04	32.078	0.039	23.99	393.2	0.085	0.09	6.32	0.01	0.88
30	12.56	0.11	32.341	0.020	24.44	350.4	0.122	0.18	6.48	0.01	0.84
50	9.94	0.02	32.473	0.002	25.01	296.4	0.188	0.44	6.52	0.00	0.94
75	9.06	0.00	32.683	0.003	25.32	267.7	0.259	0.89	5.76	0.00	0.94
100	8.17	0.01	33.161	0.001	25.83	219.5	0.320	1.44	4.65	0.00	0.99
150	7.80	0.00	33.705	0.000	26.31	174.8	0.419	2.68	3.31	0.00	0.97
200	7.34	0.01	33.916	0.001	26.54	153.4	0.502	4.16	2.73	0.01	0.94
250	6.52	0.00	33.940	0.001	26.67	141.4	0.576	5.87	2.96	0.01	5.22

BROWN BEAR CRUISE 327 STATION CS2 OBSERVED VALUES

DATE 26/06/63 HR 00.9 LAT 46-25.0N LONG 127-57.0W SNOG 2725 WEA X2 WIND VEL 14 DIR 25
 BAROM 27.0 TEMP DRY 14.2 WET 11.7 RELHU 74 WTRCLR SECDI DOM WAVE DIR 34 HT 2 PER
 CLOUD TYPE 7 AMT 8 VIS 5 WIRE ANGLE(S) 20,15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN	PHOS
2	0	14.15	32.550	24.29	6.24	0.557	-0.048	110	0.97	
2	5	14.23	32.554	24.27	6.16	0.550	-0.042	108	0.97	
2	10	14.22	32.547	24.27	6.20	0.554	-0.046	109	0.93	
2	15	14.04	32.577	24.33	6.16	0.550	-0.040	108	1.01	
2	20	13.74	32.566	24.38	6.10	0.545	-0.032	106	0.54	
2	30	12.15	32.569	24.70	6.37	0.569	-0.038	107	0.62	
2	39	10.57	32.555	24.97	6.52	0.582	-0.033	106	0.69	
2	59	9.48	32.550	25.15	6.34	0.566	-0.003	101	0.82	
2	79	9.27	32.530	25.17	6.43	0.574	-0.009	102	0.87	
2	98	9.20	32.595	25.23	6.31	0.564	0.003	100	0.93	
2	123	7.55	32.956	25.76	5.73	0.512	0.075	87	0.88	
2	148	7.18	33.410	26.16	4.86	0.434	0.156	74	1.67	
2	197	7.15	33.850	26.51	3.80	0.339	0.249	58	1.99	
2	247	6.42	33.928	26.67	3.10	0.277	0.322	46	2.84	
2	296	5.91	33.978	26.78	2.07	0.185	0.421	30	2.71	
1	369	5.18	34.005	26.89	1.57	0.140	0.477	23	2.95	
1	554	4.54	34.158	27.08	0.56	0.050	0.576	8	3.28	
1	738	4.06	34.280	27.23	0.31	0.028	0.606	4	3.30	

DEPTH	BROWN BEAR		CRUISE 327		STATION CS2		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	14.15	0.00	32.550	0.000	24.29	364.6	0.000	0.00	6.24	0.00			
10	14.22	0.00	32.547	0.000	24.27	366.5	0.037	0.02	6.20	0.00			
20	13.74	0.00	32.566	0.000	24.38	355.9	0.074	0.08	6.10	0.00			
30	12.15	0.00	32.569	0.000	24.70	326.2	0.108	0.16	6.37	0.00			
50	9.71	0.10	32.551	0.002	25.11	287.0	0.170	0.41	6.45	0.04	0.83		
75	9.27	0.02	32.531	0.003	25.17	282.1	0.242	0.87	6.41	0.01	0.77		
100	9.08	0.04	32.616	0.003	25.26	273.3	0.311	1.50	6.28	0.00	0.91		
150	7.18	0.01	33.437	0.002	26.19	186.1	0.427	2.93	4.80	0.00	0.98		
200	7.11	0.01	33.860	0.003	26.53	154.5	0.513	4.45	3.76	0.01	0.92		
250	6.39	0.00	33.932	0.000	26.68	140.3	0.587	6.16	3.03	0.01	0.92		
300	5.87	0.00	33.980	0.001	26.79	130.8	0.656	8.09	2.03	0.01	0.96		
400	5.01	0.04	34.027	0.004	26.93	118.0	0.781	12.57	1.36	0.01	1.00		
500	4.63	0.05	34.109	0.005	27.03	108.6	0.896	17.83	0.80	0.01	0.83		
600	4.48	0.03	34.199	0.002	27.12	101.2	1.002	23.81	0.41	0.01	21.85		
700	4.24	0.03	34.266	0.003	27.20	94.3	1.100	30.39	0.28	0.01	20.78		

BROWN BEAR CRUISE 327 STATION CS4 OBSERVED VALUES
 AT ANCHOR ON PINNACLE OF COBB SEAMOUNT

DATE 27/06/63 HR 04.8 LAT 46-46.4N LONG 130-48.8W SNOG 82 WEA X3 WIND VEL 9 DIR 33
 BAROM 15.0 TEMP DRY 12.6 WET 9.8 RELHU 70 WTRCLR SECDI SEA 3 DIR 33 SWELL 1 DIR 32
 CLOUD TYPE 8 AMT 3 VIS 7 WIRE ANGLE(S) 2

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN	PHOS
1	0	13.08	32.550	24.50	6.91	0.617	-0.097	119	0.32	
1	5	13.17	32.533	24.47	6.35	0.567	-0.048	109		
1	10	13.15	32.542	24.48	6.39	0.571	-0.051	110		
1	20	13.01	32.547	24.51	6.39	0.571	-0.050	110		
1	30	11.57	32.536	24.78	6.53	0.583	-0.046	109		
1	39	10.63	32.530	24.94	6.61	0.590	-0.042	108		
1	49	9.16	32.527	25.18	6.71	0.599	-0.032	106		
1	59	8.87	32.519	25.22	6.87	0.614	-0.043	107		
1	70	8.82	32.520	25.23	6.85	0.612	-0.040	107		
1	80	8.62	32.525	25.26	6.90	0.616	-0.042	107	0.78	

BROWN BEAR CRUISE 327 STATION CS4				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	13.08	0.00	32.550	0.000	24.50	344.0	0.000	0.00	6.91	0.00	
10	13.15	0.00	32.542	0.000	24.48	346.2	0.035	0.02	6.39	0.00	
20	13.01	0.00	32.547	0.000	24.51	343.4	0.070	0.07	6.39	0.00	
30	11.57	0.00	32.536	0.000	24.78	318.4	0.103	0.16	6.53	0.00	
50	9.10	0.01	32.526	0.000	25.19	279.5	0.164	0.40	6.73	0.00	0.87
75	8.76	0.01	32.522	0.000	25.24	275.2	0.233	0.85	6.85	0.01	4.09

BROWN BEAR CRUISE 327 STATION CS5 OBSERVED VALUES
 AT ANCHOR ON PINNACLE OF COBB SEAMOUNT

DATE 28/06/63 HR 06.4 LAT 46-47.0N LONG 130-46.0W SNOG 260 WEA X2 WIND VEL 17 DIR 32
 BAROM 21.0 TEMP DRY 12.4 WET 10.4 RELHU 78 WTRCLR SECDI SEA 2 DIR 32 SWELL 2 DIR 27
 CLOUD TYPE 8 AMT 6 VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN	PHOS
1	0	13.02	32.544	24.51						0.58
1	5	13.08	32.546	24.50						0.67
1	10	13.08	32.549	24.50						0.64
1	25	13.03	32.543	24.51						0.78
1	49	9.53	32.536	25.13						0.90
1	74	8.50	32.531	25.29						1.62
1	98	7.22	32.972	25.82						1.67
1	148	6.61	33.641	26.42						
1	197	6.44	33.817	26.58						

BROWN BEAR CRUISE 327 STATION CS5		INTERPOLATED AND COMPUTED VALUES									
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(D)	VAR RATIO
0	13.02	0.00	32.544	0.000	24.51	343.3	0.000	0.00			
10	13.08	0.00	32.549	0.000	24.50	344.3	0.035	0.02			0.88
20	13.14	0.06	32.546	0.001	24.49	346.0	0.070	0.07			0.84
30	12.37	0.18	32.541	0.000	24.63	332.3	0.104	0.16			
50	9.47	0.02	32.531	0.003	25.14	284.7	0.166	0.41			0.94
75	8.44	0.01	32.546	0.003	25.31	268.8	0.236	0.85			4.09
100	7.16	0.01	33.007	0.001	25.85	217.2	0.297	1.40			0.98
150	6.25	0.23	33.659	0.000	26.48	157.6	0.392	2.57			14.46

DOCUMENT CONTROL DATA - R&D

(Security classification of title body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) University of Washington, Department of Oceanography. Seattle, Washington 98105		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE PHYSICAL, CHEMICAL, AND BIOLOGICAL DATA FROM THE NORTHEAST PACIFIC OCEAN: COLUMBIA RIVER EFFLUENT AREA, JANUARY - JUNE 1963. VOLUME V.			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Interim Report January - June 1963			
5. AUTHOR(S) (Last name, first name, initial) Love, Cuthbert M. With the Data Analysis Staff			
6. REPORT DATE November 1965		7a. TOTAL NO. OF PAGES 236	7b. NO. OF REFS 35 (in Vol. I only)
8a. CONTRACT OR GRANT NO Nonr-477(10) AT(45-1)-1725 Nonr-477(37) b. PROJECT NO NR 083 012		9a. ORIGINATOR'S REPORT NUMBER(S) Technical Report No. 134, Vol. V	
		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) Reference MCE-59 AEC-R10-1725-26	
10. AVAILABILITY/LIMITATION NOTICES This report has been furnished to the OTS and DDC. Copies may be requested through these agencies.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office of Naval Research San Francisco, California	
13. ABSTRACT This report contains tabulated physical, chemical, and biological data collected during Cruise <u>Oshawa-2</u> of the CNAV <u>Oshawa</u> and Cruise 327 of the Research Vessel <u>Brown Bear</u> during the months of May - June 1963 in an area within 335 miles of the coasts of Washington, Oregon, and northern California. These data were collected as part of a year-round study which has as its objective the determination of the gross features of the movement and dispersion of Columbia River effluent water in the northeast Pacific.			

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Oceanographic data Physical oceanographic data Chemical oceanographic data Biological oceanographic data Oceanographic cruises Research Vessel <u>Brown Bear</u> CNAV <u>Oshawa</u> Northeast Pacific Ocean Washington - Oregon coast Columbia River Effluent water						

INSTRUCTIONS

1. **ORIGINATING ACTIVITY:** Enter the name and address of the contractor, subcontractor, grantee, Department of Defense activity or other organization (*corporate author*) issuing the report.
- 2a. **REPORT SECURITY CLASSIFICATION:** Enter the overall security classification of the report. Indicate whether "Restricted Data" is included. Marking is to be in accordance with appropriate security regulations.
- 2b. **GROUP:** Automatic downgrading is specified in DoD Directive S200.10 and Armed Forces Industrial Manual. Enter the group number. Also, when applicable, show that optional markings have been used for Group 3 and Group 4 as authorized.
3. **REPORT TITLE:** Enter the complete report title in all capital letters. Titles in all cases should be unclassified. If a meaningful title cannot be selected without classification, show title classification in all capitals in parenthesis immediately following the title.
4. **DESCRIPTIVE NOTES:** If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusive dates when a specific reporting period is covered.
5. **AUTHOR(S):** Enter the name(s) of author(s) as shown on or in the report. Enter last name, first name, middle initial. If military, show rank and branch of service. The name of the principal author is an absolute minimum requirement.
6. **REPORT DATE:** Enter the date of the report as day, month, year, or month, year. If more than one date appears on the report, use date of publication.
- 7a. **TOTAL NUMBER OF PAGES:** The total page count should follow normal pagination procedures. I.e., enter the number of pages containing information.
- 7b. **NUMBER OF REFERENCES:** Enter the total number of references cited in the report.
- 8a. **CONTRACT OR GRANT NUMBER:** If appropriate, enter the applicable number of the contract or grant under which the report was written.
- 8b, 8c, & 8d. **PROJECT NUMBER:** Enter the appropriate military department identification, such as project number, subproject number, system numbers, task number, etc.
- 9a. **ORIGINATOR'S REPORT NUMBER(S):** Enter the official report number by which the document will be identified and controlled by the originating activity. This number must be unique to this report.
- 9b. **OTHER REPORT NUMBER(S):** If the report has been assigned any other report numbers (*either by the originator or by the sponsor*), also enter this number(s).
10. **AVAILABILITY/LIMITATION NOTICES:** Enter any limitations on further dissemination of the report, other than those

imposed by security classification, using standard statements such as:

- (1) "Qualified requesters may obtain copies of this report from DDC."
- (2) "Foreign announcement and dissemination of this report by DDC is not authorized."
- (3) "U. S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users shall request through _____."
- (4) "U. S. military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through _____."
- (5) "All distribution of this report is controlled. Qualified DDC users shall request through _____."

If the report has been furnished to the Office of Technical Services, Department of Commerce, for sale to the public, indicate this fact and enter the price, if known.

11. **SUPPLEMENTARY NOTES:** Use for additional explanatory notes.
12. **SPONSORING MILITARY ACTIVITY:** Enter the name of the departmental project office or laboratory sponsoring (*paying for*) the research and development. Include address.
13. **ABSTRACT:** Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as (TS), (S), (C), or (U).

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. **KEY WORDS:** Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location, may be used as key words but will be followed by an indication of technical context. The assignment of links, roles, and weights is optional.