

MOSS LANDING MARINE LABORATORIES

Contributions from Moss Landing Marine Laboratories No. 49
Technical Publication 78-1, CASUC-MLML-TP-78-1

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CALIFORNIA COOPERATIVE OCEANOGRAPHIC FISHERIES INVESTIGATIONS

HYDROGRAPHIC DATA REPORT, MONTEREY BAY

January to December 1977

by

Susan J. Chinburg
Stephen R. Lasley

1977

Supported by
State of California, Marine Research Committee
California Cooperative Oceanic Fisheries Investigations

MOSS LANDING MARINE LABORATORIES
of the
California State University and Colleges
Fresno, Hayward, Sacramento, San Francisco, San Jose and Stanislaus



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CALCOFI HYDROGRAPHIC DATA REPORT
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INTRODUCTION

The data contained in this report were obtained as a continuance of the nearly bi-weekly hydrographic observations initiated by personnel at Hopkins Marine Station over two decades ago. These observations have been supported through the years by the State of California Marine Research Committee, California Cooperative Oceanic Fisheries Investigations. Since July 1974, the hydrographic sampling program has been carried out by the investigators at Moss Landing Marine Laboratories. From July 1974 to June 1976, this work was done in conjunction with an interdisciplinary study of the squid, Loligo opalescens, supported by the National Office of Sea Grant via the University of California Sea Grant College Project Number R/F-15.

Five of the original CalCOFI stations (2201, 2202, 2203, 2204 and 2205) have been retained in our sampling routine and additional inner-bay stations have been added (1154 and 1121). Sampling was conducted on a monthly basis for the entire year. All observations were made aboard R/V OCONOSTOTA.

STATION LOCATIONS

Number	Latitude N.	Longitude W.	Depth (m)
2201	36°37.6'	121°53.7'	46
2202	36°41.2'	121°57.9'	104
2203	36°46.7'	122°01.3'	988
2204	36°50.9'	122°01.6'	82
2205	36°55.8'	122°00.7'	26
1121	36°37.6'	121°51.1'	18
1154	36°55.2'	121°52.8'	16

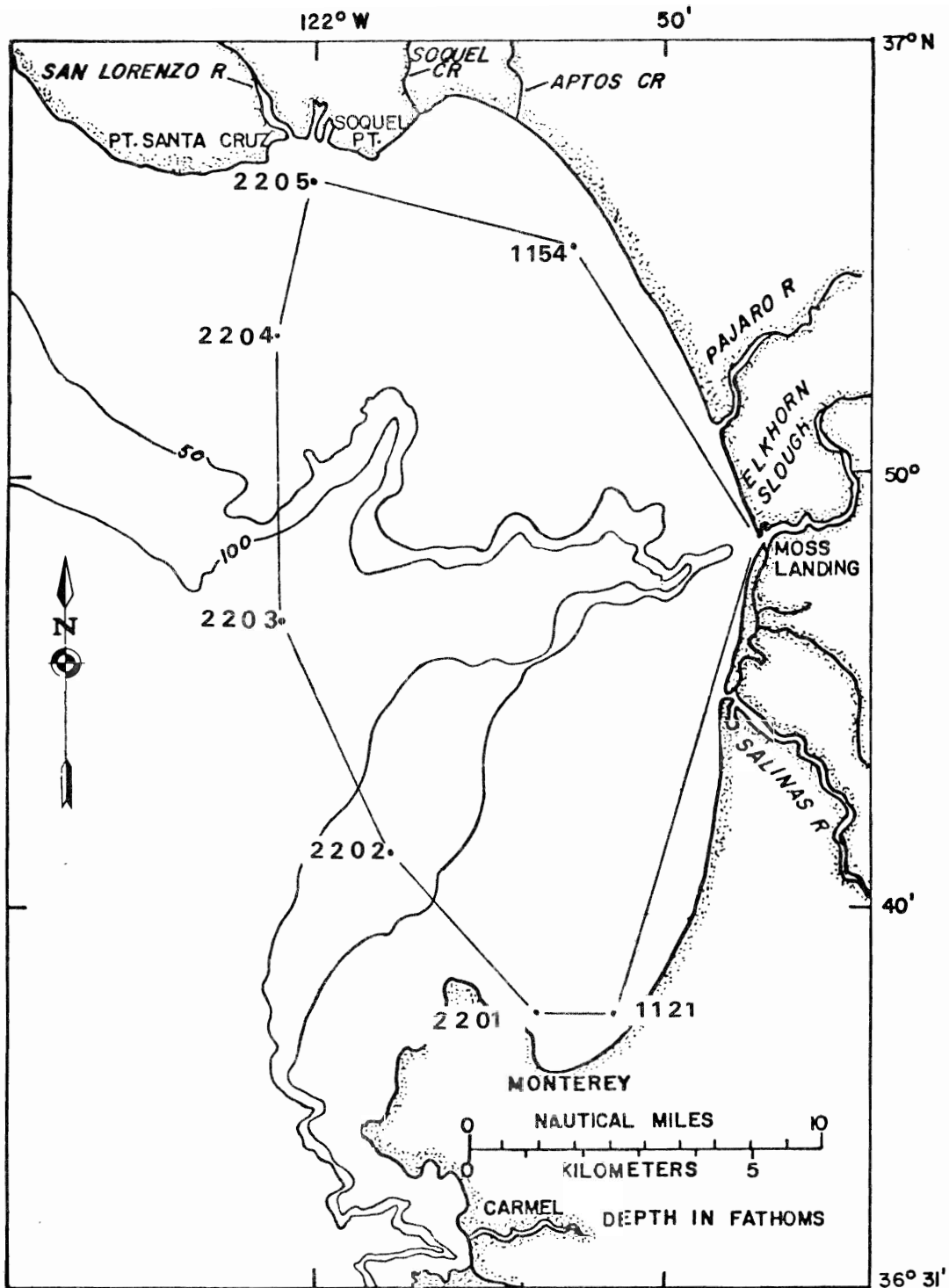


Figure 1: CalCOFI hydrographic station positions. 22 prefixes designate stations originated by Hopkins Marine Station; 11 prefixes designate stations originated by Moss Landing Marine Laboratories.

EXPLANATION OF TABLES

CRUISE	Moss Landing Marine Laboratories consecutive hydrographic cruise number.
STATION	Permanent hydrographic station numbers. IIXX designates Moss Landing Marine Laboratories numbers, 22XX CalCOFI numbers as originated by Hopkins Marine Station.
DATE	Local date of sampling.
HOUR	Local sampling time (Pacific Standard Time). Time of messenger release is given for one-cast stations; median time on-station is given for multi-cast stations. For two-cast stations, the time on-station was generally two hours.
N LATITUDE, W LONGITUDE	Observed station positions corresponding to sampling time given above. Drift while on-station was generally less than 0.5 miles. When greater drift was experienced, the ship was brought back to the station for subsequent casts.
TRANSP	Secchi disk depth, meters (not observed at night).
WAVES dir	Direction from which the dominant waves were coming, in tens of degrees according to WMO Code 0885.
ht	Height of dominant waves according to WMO Code 1555.
p	Period of dominant waves according to WMO Code 3155.
WIND dir	Direction from which the wind was blowing, in tens of degrees according to WMO Code 0877.
speed	Wind speed, in knots.
BAROM	Pressure, in millibars.
AIR TEMP °C	Air temperatures were obtained about 2m above surface.
dry	Dry-bulb air temperature, in degrees centigrade.
wet	Wet-bulb air temperature, in degrees centigrade.
WEATH	Present weather according to WMO Code 4677.

CLOUDS typ	Cloud type according to WMO Code 0500.
amt	Cloud amount in eights according to WMO Code 2700.
VISIB	Sea-level visibility according to WMO Code 4300.
DEPTH	Accepted depth in meters from which the sample was obtained, determined from wire length, wire angle and thermometric depth calculation.
TEMP	<u>In situ</u> water temperature, in degrees centigrade.
SALINITY	Salinity in grams/kilogram (‰ or ppt).
SIGMA T	Potential density anomaly, computed from the equations in Knudsen's Hydrographical Tables (1901).
OXYGEN	Dissolved oxygen concentration in ml(STP)/liter.
AOU	Apparent oxygen utilization in $\mu\text{g-atoms O}_2\text{-O/liter}$: the difference between the observed oxygen concentration and the oxygen solubility computed from the <u>in situ</u> temperature and salinity using the equations of Truesdale, <u>et al</u> (1955).
SAT	Percent of oxygen saturation computed from the <u>in situ</u> temperature and salinity using the equations of Truesdale, <u>et al</u> (1955).
PHOSPHATE	Concentration of reactive phosphate in $\mu\text{g-atoms PO}_4\text{-P/liter}$.
NITRATE	Concentration of dissolved nitrate in $\mu\text{g-atoms NO}_3\text{-N/liter}$.
NITRITE	Concentration of dissolved nitrite in $\mu\text{g-atoms NO}_2\text{-N/liter}$.
AMMONIA	Concentration of dissolved ammonia in $\mu\text{g-atoms NH}_3\text{-N/liter}$.
SILICA	Concentration of reactive silica in $\mu\text{g-atoms SiO}_2\text{-Si/liter}$.
*	Questionable data point. These values are suspect based upon preliminary analysis of the data and should be used with caution.

METHODS

Station Position

Station positions were determined using radar ranges with an accuracy of about ± 0.2 n mile near shore and ± 0.5 n mile at Station 2203, and recently by Loran-C with an accuracy of ± 0.1 n mile.

Hydrographic Sampling

Eight 5-liter Niskin plastic sampling bottles were used to obtain discrete water samples at the standard sampling depths: 0, 5, 10, 20, 30, 50, 75, 100, 150, 200, 250, 300, 400, 500, 600 and 800 m. Accepted sampling depths were determined from wire angle for depths less than 100 m and from a combination of wire angle and thermometric depth calculations for depths greater than 100 m.

Temperature

The in situ temperature was determined from paired reversing thermometers. The average temperature is recorded when the thermometer agreed to within 0.05° C.

Salinity

Salinity was determined using a Beckman RS-7B precision induction salinometer. Analyses were made in the laboratory and salinity was computed from conductivity ratio using the equations of Cox, et al (1967). Substandard sea water was used to calibrate the salinometer before and after each set of 24 or fewer samples. Standard water was used each month to standardize the substandard water.

Dissolved Oxygen

Water samples were treated aboard ship to fix the oxygen in the basic

form. The samples were acidified and titrated in the laboratory within 36 hours of the sampling time using Carpenter's (1965) modification of the Winkler method. The total sample is titrated with approximately 0.010 N sodium thiosulfate to the starch endpoint. Precision of the analyses is about ± 0.06 ml/liter (2 SD).

Nutrient Ions

At each station, 500 ml samples were filtered and quick-frozen aboard ship and refrigerated at -10° C until analyzed ashore within three weeks of collection. Groups of 43 samples were quick-thawed in the laboratory just prior to the analyses for phosphate, nitrate, nitrite, ammonia and silica. Standards and reagent blanks were prepared fresh daily and were determined with each set of samples. The standard and blanks were read before and after each set of samples. A linear drift correction was added to each reading to correct for electronic and chemical drift over the 30-minute reading time using the PC-1000 and the 40-minute reading time using the DU-2 spectrophotometer.

Dissolved reactive phosphate was determined by the methods of Murphy and Riley (1962) described in Strickland and Parsons (1972). The method uses ascorbic acid to reduce the phospho-molybdate complex. The sample absorbance at 880 nm was determined with a 10 cm pathlength. The precision of the analyses was about ± 0.05 ug-at/l (2 SD).

The concentration of dissolved nitrate was determined by cadmium reduction of nitrate to nitrite (Wood, et al, 1967). This was followed by the measurement of nitrite as described below. The sample absorbance at 545 nm

was determined with a 1 cm path length. The precision of the analyses was about ± 0.5 ug-at/liter (2 SD).

Nitrite was determined by the method of Bendschneider and Robinson (1952) described by Strickland and Parsons (1972). The absorbance of the diazo color was determined with a 10 cm path length at 545 nm. The precision of this method is about ± 0.03 ug-at/liter (2 SD).

Ammonia was determined by the indophenol method of Solorzano (1969) with the color absorbance determined with a 10 cm path length at 650 nm. The precision of this method is about ± 0.1 ug-at/liter (2 SD).

Reactive silica was determined by the method of Mullin and Riley (1955) as modified by Strickland and Parsons (1972). The silicomolybdate complex was reduced by a metol-sulfite, oxalic acid solution. The precision of this method was about ± 1 ug-at/liter (2 SD). The color absorbance at 810 nm was determined with a 1 cm path length.

The Brinkman PC-1000 with a changeable probe was routinely used to measure color development of the above-mentioned nutrients. A Beckman DU-2 spectrophotometer was used as a back-up system.

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CRUISE DATA

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 51	1154	4 JAN 1977	8.2	36° 55.2'	121° 52.8'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
4	26	2	2	11	0	1017.9	7.2	6.3	0	8	6	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	14.10	33.457	25.00	6.21	-47	110	.38	1.1	.34	.1	4
5	14.13	33.444	24.98	5.73	-5	101	.23	5.9*	.28	.1	4
10	14.09	33.443	24.99	5.70	-2	101	.26	.9	.13	.1	3

* indicates questionable data

Nitrate appears anomalously high

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 51	2205	4 JAN 1977	9.2	36° 55.8'	122° .7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
4	26	1	2	36	2	1018.2	8.0	6.5	2	8	5	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%					
							ug-atoms/liter				
0	13.77	33.393	25.02	6.00	-25	105	.28	.0	.08	.5	7
5	13.78	33.391	25.01	5.98	-23	105	.38	.0	.10	.4	7
10	13.77	33.395	25.02	5.63	7	99	.44	.0	.09	.1	6
20	13.78	33.395	25.01	5.80	-7	102	.38	.0	.10	.0	7

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 51	2204	4 JAN 1977	11.2	36° 50.9'	122° 1.6'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
14	28	4	2	9	0	1018.3	10.1	8.3	2	8	6	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	14.56	33.485	24.92	6.18	-49	110	.26	.5	.15	.1	3
5	14.59	33.486	24.92	5.72	-9	102	.27	.9	.15	.1	4
10	14.56	33.482	24.92	5.84	-19	104	.37	1.0	.24	.1	5
20	14.55	33.484	24.92	5.63	0	100	.31	.9	.25	.0	5
30	14.50	33.478	24.93	5.66	-2	101	.17*	.6		.2	3
50	14.49	33.481	24.93	5.76	11	102	.39	.9	.08	.1	2

* indicates questionable data

Phosphate appears anomalously low

CRUISE STATION DATE HOUR N LATITUDE W LONGITUDE
 ML 51 2203 4 JAN 1977 12.0 36° 46.7' 122° 1.3'

TRANSP WAVES WIND BAROM AIR TEMP °C WEATH CLOUDS VISIB
 m dir ht p dir speed mb dry wet typ amt
 16 27 5 2 0 0 1017.0 13.1 9.8 2 8 6 7

DEPTH m	TEMP °C	SALINITY ppt	SIGMA T	OXYGEN ml/1	AOU ug-at/1	SAT %	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
							ug-atoms/liter				
0	14.52	33.490	24.93	7.55	-171	134	.22	2.4	.10	.1	5
5	14.54	33.486	24.93	7.07	-129	126	.36	10.9*	.06	.0	3
10	14.50	33.485	24.93	7.17	-137	128	.39	11.4*	.10	.6	3
20	14.50	33.527	24.97	7.92	-204	141	.19	1.0	.08	.0	3
30	14.47	33.527	24.97	7.35	-153	131	.14	.3	.07	.1	2
48	14.37	33.530	25.00	6.69	-93	119	.38	1.2	.19	.0	4
72	13.55	33.521	25.16	5.83	-8	102	.55	4.9	.11	.0	7
96	12.15	33.535	25.14	5.42	43	92	1.07	9.1	.10	.1	13
138	10.47	33.628	25.82	3.98	191	65	1.04	7.9**	.02	.0	23
186	8.75	33.888	26.31	3.01	298	47	1.94	27.7	.00	.1	40
234	8.10	33.961	26.47	2.50	352	39	2.44	23.9	.02	.0	44
283	7.63	34.011	26.57	2.12	392	33	2.25	25.1	.11	.0	51
379	6.81	34.059	26.73	1.52	457	23	2.38	30.5	.07	.3	57
476	6.10	34.113	26.86	.89	523	13	2.72	34.1	.00	.0	65
572	5.22	34.212	27.05	.98	528	14		32.3	.00	.1	80
765	4.53	34.282	27.18	.80	555	11	2.77	35.4	.02	.0	82

* indicates questionable data

* Nitrate appears anomalously high

**Nitrate appears anomalously low

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 51	2202	4 JAN 1977	13.9	36° 41.2'	121° 57.9'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt	
15	27	4	2	11	1	1016.0	14.8	12.0	2	8	3	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/1	%		ug-atoms/liter			
0	14.57	33.538	24.96	6.28	-59	112	.20	1.6	.21	.2	3
5	14.56	33.533	24.96	5.92	-26	105	.31		.16	.9	3
10	14.53	33.533	24.96	5.87	-22	104	.38	1.8	.20	.1	7
20	14.51	33.533	24.97	5.78	-13	103	.29	1.1	.24	.0	3
30	14.47	33.536	24.98	5.56	6	99	.24	.9	.25	.1	4
50	14.38	33.536	25.00	5.64	0	100	.32	1.5	.25	.2	4

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 51	2201	4 JAN 1977	14.9	36° 37.6'	121° 53.7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
9	27	3	2	32	1	1015.8	12.8	9.3	2	8	3	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	14.67	33.497	24.91	6.01	-35	107	.22	1.3	.18	.2	3
5	14.68	33.489	24.90	5.93	-28	106	.20	.4	.20	.1	6
10	14.59	33.524	24.94	5.83	-19	104	.29	.5	.25	.1	4
20	14.55	33.524	24.95	5.91	-25	105	.24	.3	.17	.2	3
30	14.49	33.536	24.97	5.76	-11	102	.27	.1	.12	.2	3

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 51	1121	4 JAN 1977	15.3	36° 37.7'	121° 51.1'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt	
7	27	2	2	33	1	1015.8	13.0	9.2	2	8	3	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	14.50	33.438	24.90	6.14	-45	109	.55	.5	.15	1.0	5
5	14.54	33.465	24.91	6.16	-47	110	.35	.4	.06	.6	4
10	14.58	33.495	24.92	5.85	-20	104	.43	.5	.05	.4	5

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 52	1154	15 FEB 1977	10.2	36° 55.2'	121° 52.8'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
12	26	1	3	13	1	1018.8	17.0	14.3	2	0	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	13.99	33.567	25.10	6.24	-49	110	.43	.0	.20	.3	8
5	14.02	33.568	25.10	6.05	-32	107	.24	.0	.14	.3	5
10	13.94	33.566	25.11	6.14	-40	108	.47	.0	.02	.3	5

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 52	2205	15 FEB 1977	12.0	36° 55.8'	122° .7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
6	28	1	3	28	2	1019.2	16.0	14.0	2	0	1	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%					
							ug-atoms/liter				
0	13.82	33.547	25.12	6.23	-46	109	.46	.0	.11	.3	10
5	13.65	33.545	25.16	5.95	-20	104	.42	.0	.44	.2	7
10	13.46	33.546	25.20	5.87	-10	102	.55	.6	.22	.3	8
20	13.40	33.547	25.21	5.52	20	96	.65	1.4	.28	.6	9

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 52	2204	15 FEB 1977	12.9	36° 50.9'	122° 1.6'

TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB
m	dir ht p	dir speed	mb	dry wet		typ amt	
12	31 1 3	29 0	1018.9	17.7 15.1	2	0 1	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	13.77	33.529	25.12	6.18	-41	108	.29	.0	.02	.3	3
5	13.80	33.526	25.11	6.11	-35	107	.27	.0	.00	.7	2
10	13.63	33.526	25.15	6.00	-24	105	.20	.0	.00	.0	1
20	13.56	33.526	25.16	5.98	-21	104	.30	.0	.02	.0	2
30	13.66	33.530	25.14				.30	.0	.17*	.1	1
50	11.88	33.545	25.50	4.64	116	78	1.03	9.9	.06	.1	13

* indicates questionable data

Nitrite appears anomalously high

CRUISE STATION DATE HOUR N LATITUDE W LONGITUDE
 ML 52 2203 15 FEB 1977 14.0 36° 46.7' 122° 1.3'

TRANSP WAVES WIND BAROM AIR TEMP °C WEATH CLOUDS VISIB
 m dir ht p dir speed mb dry wet typ amt
 11 31 2 3 27 2 1018.9 15.8 14.3 2 0 2 7

DEPTH m	TEMP °C	SALINITY ppt	SIGMA T	OXYGEN ml/l	AOU ug-at/l	SAT %	PHOSPHATE	NITRATE ug-atoms/liter	NITRITE	AMMONIA	SILICA
0	13.79	33.529	25.12	6.51	-71	114	.35	4.2	.02	.0	5
5	13.71	33.525	25.13	6.23	-45	109	.30	7.8**	.03	.0	2
10	13.61	33.531	25.15	6.37	-57	111	.35	4.3	.06	.1	2
20	13.53	33.523	25.16	5.99	-22	104	.32		.10	.1	2
30	13.66	33.527	25.14	5.44	25	95	.52	2.0	.27	.2	5
50	11.99	33.527	25.47	4.87	92	83	.98	8.6	.04	.2	11
75	10.78	33.605	25.75	4.34	155	71	1.83*	5.8*	.01	.0	5*
98	10.21	33.706	25.93	3.83	207	62	1.09	9.1	.00	.0	17
146	9.60	33.827	26.12	3.33	259	53	1.45	12.2	.01	.2	29
194	8.60	33.982	26.41	2.61	335	41	1.65	19.7	.00	.1	35
242	8.08	34.022	26.52	2.62	341	41	1.65	15.1	.00	.0	28*
290	7.68	34.055	26.60	2.32	373	36	2.17	21.4	.13	.1	49
396	7.04	34.121	26.74	1.49	456	23	2.10	24.4	.01	.1	49
482	6.14	34.171	26.90				2.46	30.8	.01	.0	67
578	5.53	34.218	27.02	.76	543	11	2.63	22.7	.00	.1	74
770	4.61	34.348	27.22	.72	560	10	3.15	40.4	.14	.0	104

* indicates questionable data

*Phosphate appears anomalously high
 *Nitrate appears anomalously low
 **Nitrate appears anomalously high
 *Silica appears anomalously low

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 52	2202	15 FEB 1977	15.7	36° 41.2'	121° 57.9'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt	
11	31	4	3	27	2	1019.0	15.5	14.2	2	0	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	13.79	33.561	25.14	6.23	-46	109	.28	.1	.04	.1	2
5	13.68	33.560	25.16	6.02	-26	105	.26	.0	.06	.2	6
10	13.52	33.547	25.18	6.11	-33	107	.33	.9	.13	.5	2
20	12.92	33.566	25.32	5.37	39	92	.58	4.0	.16	.1	11
30	12.57	33.571	25.39	4.96	79	85	.80	7.4	.07	.1	11
50	11.31			4.72			.80	5.5	.01	.2	9

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 52	2201	15 FEB 1977	16.3	36° 37.6'	121° 53.7'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt	
8	32	4	3	29	2	1019.2	17.3	14.1	2	0	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	14.00	33.523	25.07	6.20	-46	109	.32	.0	.08	.3	1
5	13.97	33.568	25.11	6.23	-48	110	.29	.0	.18	.4	8
10	13.26	33.564	25.25	5.81	-3	101	.45	.6	.31	.2	5
20	12.55	33.567	25.39	5.17	61	88	.67	1.3	.21	.2	12
30	12.27	33.578	25.46	5.00	79	85	.72	5.5	.11	.2	15

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 52	1121	15 FEB 1977	16.7	36° 37.7'	121° 51.1'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt	
6	31	2	3	29	1	1019.1	16.8	14.5	2	0	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	14.53	33.566	24.99	6.56	-83	117	.49	4.6	.04	.7	4
5	14.42	33.549	25.00	6.24	-53	111	.23	.0	.05	.8	3
10	13.80	33.558	25.14	5.88	-15	103	.46	.1	.09	.5	4

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 53	1154	15 MAR 1977	10.6	36° 55.2'	121° 52.8'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
3	49	2	2	14	4	1015.5	11.2	10.5	3	8	8	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/1	%		ug-atoms/liter			
0	11.36	33.704	25.72	7.48	-131	125	.26	.6	.02	.1	1
5	11.34	33.702	25.73	6.21	-18	104	.17	1.1	.02	.0	1
10	11.36	33.702	25.72	6.69	-61	112	.19	2.9	.06	.0	1

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 53	2205	15 MAR 1977	11.6	36° 55.8'	122° .7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
3	16	3	2	16	2	1015.1	11.2	9.5	3	X 0 8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	10.86	33.710	25.82	6.32	-22	104	.61	3.2	.23	.4	8
5	10.85	33.714	25.82	6.30	-20	104	.63	2.3	.19	.2	8
10	10.88	33.713	25.82	5.38	61	89	.65	1.9	.19	.3	8
20	10.82	33.715	25.83	4.84	110	80	.63	3.8	.23	.4	9

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 53	2204	15 MAR 1977	13.1	36° 50.9'	122° 1.6'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt	
4	17	5	2	18	5	1013.6	11.3	9.8	3	8	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	10.87	33.684	25.80	6.75	-60	111	.57	3.4	.14	.2	7
5	10.86	33.687	25.80	6.65	-51	110	.55	5.2	.13	.6	9
10	10.86	33.695	25.81	5.30	68	87	.75	4.3	.17	.5	9
20	10.60	33.717	25.87	5.80	26	95	1.15	9.2	.22	.4	15
30	10.40	33.738	25.92	4.81	117	79	1.50	12.8	.31	.5	22
50	9.40	33.855	26.18	3.06	285	49	1.68	17.8	.10	.1	25

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 53	2203	15 MAR 1977	15.0	36° 46.7'	122° 1.3'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
4	18	5	2	19	4	1012.3			60	8 8 8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	10.84	33.637	25.76	6.57	-44	108	.81	6.0	.18	.1	10
5	10.83	33.632	25.76	6.57	-44	108	.77	6.4	.16	.2	10
10	10.86	33.647	25.77	6.53	-41	108	.87	5.4	.18	.1	9
20	10.81	33.644	25.78	6.39	-27	105	.73	4.7	.18	.2	9
30	10.71	33.673	25.82	3.69	214	61	.85	6.7	.17	.3	13
50	9.73	33.796	26.08	3.43	248	55	1.89	17.9	.12	.2	33
75		33.890		3.17			2.36	21.9	.09	.2	35
100	8.76	33.957	26.36	2.66	329	42	2.93	23.2	.08	.1	41

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 53	2202	15 MAR 1977	16.2	36° 41.2'	121° 57.9'

TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB
m	dir ht p	dir speed	mb	dry wet		typ amt	
4	18 4 2	17 3	1011.8		60	8 8	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	11.05	33.691	25.77	7.62	-140	126	.77	3.0	.05	.2	5
5	11.03	33.695	25.78	6.93	-78	115	.71	2.6	.06	.2	5
10	11.06	33.699	25.77	7.00	-85	116	.74	8.2	.06	.2	4
20	10.99	33.707	25.79	4.78	113	79	.96	4.1	.11	.4	8
30	10.41	33.727	25.91	3.76	211	61	1.50	10.2	.15	.6	16
50	9.83	33.759	26.03	3.55	237	57	2.30	14.8	.14	.4	28

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 54	1154	12 APR 1977	9.9	36° 55.2'	121° 52.8'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
6	26	1	3	25	1	1018.8	12.5	10.8	41	X	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	11.83	33.875	25.77	6.89	-85	116	.73	7.6	.17	.5	19
5	11.48	33.875	25.84	6.75	-68	113	.75	8.0	.16	.7	19
10	11.21	33.873	25.88	6.20	-16	103	.91	10.4	.14	.4	20

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 54	2205	12 APR 1977	11.5	36° 55.8'	122° .7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
6	27	2	2	26	2	1018.9	12.5	11.0	41	X 1 6

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%	ug-atoms/liter				
0	12.17	33.856	25.69	6.37	-42	108	.51	4.1	.09	.0	16
5	12.16	33.845	25.68	6.27	-33	106	.47	4.0	.08	.0	21
10	10.93	33.870	25.93	5.14	81	85	.93	10.1	.14	.2	31
20	9.93	33.902	26.13	4.78	125	77	1.48	16.4	.22	1.8	35

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 54	2204	12 APR 1977	13.3	36° 50.9'	122° 1.6'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
10	27	1	2	28	3	1018.0	12.4	10.8	41	X	1	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	10.19	33.883	26.07	4.91	110	80	1.12	13.3	.15	.8	22
5	10.18	33.900	26.08	4.88	113	79	1.42	17.7	.17	.2	27
10	10.18	33.887	26.07	4.38	158	71	1.44	17.7	.14	.1	28
20	9.81	33.888	26.14	4.50	152	73	1.33	15.7	.12	.3	32
30	9.79	33.891	26.14	4.09	188	66	1.55	19.2	.16	.3	37
50	8.84	33.955	26.35	3.81	225	60	1.52	17.5	.21	.6	36

CRUISE STATION DATE HOUR N LATITUDE W LONGITUDE
 ML 54 2203 12 APR 1977 15.9 36° 46.7' 122° 1.3'

TRANSP WAVES WIND BAROM AIR TEMP °C WEATH CLOUDS VISIB
 m dir ht p dir speed mb dry wet typ amt
 12 30 2 2 30 4 1017.0 12.0 10.5 1 8 0 7

DEPTH m	TEMP °C	SALINITY ppt	SIGMA T	OXYGEN ml/l	AOU ug-at/l	SAT %	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
							ug-atoms/liter				
0	9.81	33.797	26.07	5.31	80	86	1.50	19.4	.16	.3	35
5	9.79	33.805	26.08	5.80	36	93	1.50	17.2	.16	.3	35
10	9.82	33.800	26.07	5.62	52	91	1.51	15.1	.14	.5	32
20	9.67	33.837	26.12	5.15	96	83	1.55	17.0	.18	.7	37
30	9.68	33.918	26.18	4.83	124	78	1.63	15.2	.19	.7	39
50	9.17	33.915	26.26	4.47	162	71	1.81	23.1	.18	.5	43
75		33.956		3.95			1.77	20.9	.18	.5	44
147		34.083		2.12			1.99	23.6	.03	.0	48
195	7.51	34.125	26.68	1.86	417	29	1.86	23.4	.01	.0	47
244	7.32	34.153	26.73	1.74	430	27	2.54	31.8	.01	.0	61
293	6.96	34.150	26.78	1.40	465	21	2.59	16.5*	.00	.0	67
390	6.32	34.212	26.91	1.01	509	15	2.82	34.8	.00	.1	75
488	5.71	34.267	27.03	.84	533	12	2.91	35.8	.03	.0	90
585	5.23	34.322	27.13	.68	554	10	3.03	37.8	.00	.0	98
780	4.52	34.396	27.27	.61	571	9	3.14	39.0	.00	.0	108

* indicates questionable data

Nitrate appears anomalously low

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 54	2202	12 APR 1977	17.6	36° 41.2'	121° 57.9'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
9	29	3	2	27	2	1017.0	11.5	10.5	1	8	0	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/1	%					ug-atoms/liter
0	10.33	33.892	26.05	6.32	-16	103	1.51	16.4	.18	.8	39
5	10.26	33.888	26.06	6.35	-18	103	1.49	16.7	.18	.9	39
10	10.23	33.887	26.07	6.09	4	99	1.47	16.0	.20	.9	40
20	9.91	33.895	26.13	4.21	176	68	1.53	17.0	.18	.8	40
30	9.85	33.889	26.13	4.02	194	65	1.69	18.7	.18	.9	40
50	9.31	33.910	26.24	3.95	207	63	1.92	20.4	.18	.6	43

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 54	2201	12 APR 1977	18.6	36° 37.6'	121° 53.7'

TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB
m	dir ht p	dir speed	mb	dry wet		typ amt	
31	2 2	27 3	1017.0	10.6 9.8	3	3 3	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	10.94	33.824	25.89	7.15	-98	118	1.37	14.2	.10	.3	38
5	10.81	33.831	25.93	7.33	-112	121	1.37	14.6	.10	.3	39
10	10.54	33.859	25.99	6.95	-79	114	1.41	13.8	.10	.4	36
20	10.18	33.874	26.06	6.47	-28	105	1.43	13.2	.06	2.0	33
30	9.58	33.890	26.18	4.58	147	74	1.91	20.3	.15	1.7	41

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 54	1121	12 APR 1977	19.0	36° 37.7'	121° 51.1'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt	
33	2	2	26	3	1017.0	10.9	10.0	3	3	3	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	11.06	33.838	25.88	7.19	-103	119	1.45	15.8	.11	.7	34
5	11.06	33.838	25.88	7.19	-103	119	1.42	15.0	.09	.6	34
10	10.76	33.826	25.93	6.71	-56	111	1.33	14.1	.10	.5	34

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 55	1154	18 MAY 1977	10.8	36° 55.2'	121° 52.8'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
3	22	1	2	24	1	1020.2	11.8	9.4	2	3	6	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%					
							ug-atoms/liter				
0	12.68	33.845	25.58				.17	4.2	.00	.2	8
5	11.93	33.865	25.74	7.50	-140	127	.15	4.7	.10	.3	9
10	11.67	33.841	25.77	7.10	-102	119	.53	7.9	.08	.2	8

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 55	2205	18 MAY 1977	12.1	36° 55.8'	122° .7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
3	27	2	2	27	4	1020.0	12.9	10.7	2	3	6	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/1	%				ug-atoms/liter	
0	11.11	33.848	25.88	7.64	-143	127	.25	8.5	.27	.3	11
5	10.83	33.848	25.93	6.25	-16	103	.52	13.9	.34	.4	19
10	10.59	33.857	25.98	5.55	48	91	.59	16.5	.44	.5	27
20	10.06	33.846	26.08	4.18	177	68	1.01	16.4	.72	2.9	28

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 55	2204	18 MAY 1977	13.1	36° 50.9'	122° 1.6'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
13	27	1	2	26	3	1020.2	11.5	10.0	2	3	6	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%					
							ug-atoms/liter				
0	9.71	33.841	26.12	4.68	137	75	1.41	22.5	.42	.6	32
5	9.75	33.837	26.11	4.93	114	79	1.05	22.4	.48	.6	34
10	9.48	33.857	26.17	4.58	149	73	1.63	24.2	.43	.5	34
20	9.41	33.866	26.19	4.24	180	68	.66	18.0	.46	.7	27
30	9.38	33.881	26.20	4.38	168	70	.66	16.4	.42	1.0	26
50	9.36	33.905	26.22	4.31	174	69	1.53	25.3	.42	.9	35

CRUISE STATION DATE HOUR N LATITUDE W LONGITUDE
 ML 55 2203 18 MAY 1977 14.5 36° 46.7' 122° 1.3'

TRANSP WAVES WIND BAROM AIR TEMP °C WEATH CLOUDS VISIB
 m dir ht p dir speed mb dry wet typ amt
 X 27 2 1 27 3 1020.2 12.2 10.8 2 3 6 8

DEPTH m	TEMP °C	SALINITY ppt	SIGMA T	OXYGEN ml/l	AOU ug-at/l	SAT %	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
0	10.12	33.785	26.00	5.49	60	89	1.49	24.1	.49	.4	36
5	10.05	33.789	26.02	5.53	57	90	.72	16.9	.39	.4	23
10	9.59	33.808	26.11	4.88	121	78	1.26	27.3	.35	.5	35
20	9.62	33.834	26.13	4.99	110	80	.76	19.7	.53	.8	34
30	9.58	33.836	26.16	4.67	139	75	1.31	24.2	.41	.7	34
50	9.34	33.853	26.19	4.42	165	71	1.06	21.2	.44	.6	32
75	8.93	33.911	26.30	4.33	178	68	.95	19.5	.20	.4	34
100	8.48	34.014	26.45	3.37	269	53		23.5	.06	.2	37
150	7.91	34.095	26.60	2.04	395	32	1.91	30.7	.07	.1	46
198	7.56	34.126	26.67	1.66	434	25			.02	.0	
244	7.31	34.184	26.75	1.57	445	24			.05	.0	
295	6.79			1.36			2.74	43.9	.06	.0	40
392	6.14	34.236	26.96	1.86	525	13	2.97	48.9	.06	.2	81
481	5.53	34.295	27.08				3.01	45.9	.03	.1	91
573	4.98	34.357	27.19	.85	543	12			.01	.0	
756	4.46	34.408	27.29	.59	574	8		38.9	.01	.1	107

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 55	2202	18 MAY 1977	16.1	36° 41.2'	121° 57.9'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
9	27	2	2	26	2	1020.0	11.8	10.8	2	3 8 8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%	ug-atoms/liter				
0	10.70	33.873	25.97	6.31	-20	104	1.56	31.5	.56	.8	39
5	10.68	33.874	25.98	6.47	-34	106	.55	19.9	.54	1.1	31
10	10.44	33.867	26.01				.53	17.1	.41	.5	28
20	10.11	33.869	26.07	6.19	-2	101	.67	18.8	.49	.8	30
30	9.31	33.889	26.22	4.10	194	65	1.38*	18.6	.60	.5	42
50	9.03	33.925	26.29	3.79	225	60	.76	23.9	.40	.2	36

* indicates questionable data

Phosphate appears anomalously high

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 55	2201	18 MAY 1977	17.1	36° 37.6'	121° 53.7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt	
5	27	2	2	26	2	1020.0	13.0	11.2	2	3	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	13.71	33.798	25.34	9.06	-299	159	.13	15.3	.01	.0	19
5	13.76	33.800	25.33	7.93	-198	139	.06	14.0	.01	.2	13
10	13.39	33.794	25.40	9.35	-321	163	.05	11.6	.00	.1	13
20	11.06	33.831	25.88	5.77	23	96	.66	18.2	.30	1.9	24
30	9.60	33.891	26.17	4.01	198	64	1.03	19.8	.45	1.4	29

CRUIWE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 55	1121	18 MAY 1977	17.4	36° 37.7'	121° 51.1'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	27	2	2	26	2	1020.0	12.3	11.0	2	3	8	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/1	%			ug-atoms/liter		
0	13.63	33.801	25.36	7.87	-192	138	.25	17.2	.00	.2	20
5	13.61	33.798	25.36	7.54	-162	132	.08	18.1	.00	.1	19
10	12.93	33.794	25.49	7.81	-179	135	.07	10.7	.00	.0	18

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 56	1154	22 JUN 1977	6.5	36° 55.2'	121° 52.8'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
7	23	1	3	12	1	1012.0	14.0	12.5	2	7	7	6

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	13.32	33.809	25.43	6.75	-89	117	.41	3.5	.14	1.3	3
5	12.84	33.814	25.53	6.78	-86	117	.47	4.7	.16	1.3	19
10	12.83	33.821	25.53	6.49	-60	112	.45	1.7	.17	1.2	18

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 56	2205	22 JUN 1977	8.0	36° 55.8'	122° .7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	27	1	3	17	1	1012.0	12.0	11.5	1	7	7	6

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	14.26	33.795	25.22	7.59	-173	135	.07	2.2	.05	.5	4
5	13.93	33.794	25.29	7.54	-165	133	.13		.06	.6	2
10	11.41	33.816	25.82	5.83	15	97	.87	7.1	.07	1.5	9
20	11.07	33.827	25.87	5.35	61	89	1.33	7.1	.42	.0	12

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 56	2204	22 JUN 1977	10.3	36° 50.9'	122° 1.6'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
7	27	2	3	14	1	1013.0	14.5	12.5	45	9 4

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%			ug-atoms/liter		
0	11.34	33.866	25.85	5.49	45	92	1.48	15.6	.33	2.4	25
5	11.16	33.869	25.89	5.48	48	91	.89	5.6	.25	2.8	12
10	10.77	33.876	25.96	5.20	77	86	.91	6.0	.26	2.8	12
20	10.11	33.880	26.08	4.58	141	74	1.73	18.2	.18	2.2	31
30	9.97	33.874	26.10	4.35	163	70	1.36	11.9	.20	2.7	19
55	9.38	33.869	26.19	3.69	229	59	1.07	8.5	.20	1.5	14

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 56	2203	22 JUN 1977	12.5	36° 46.7'	122° 1.3'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
9	29	3	3	25	1	1013.0	13.8	12.2	1	7	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	12.34	33.791	25.61	5.99	-10	102	1.08	6.1	.22	.9	16
5	12.00	33.804	25.69	6.16	-21	104		6.4	.22	1.1	15
10	10.89	33.789	25.87	5.70	32	94	1.35	12.7	.18	1.0	24
20	10.57	33.787	25.92	5.50	53	90	1.40	15.0	.18	1.0	25
30	10.52	33.796	25.94	5.41	62	89	1.30		.18	1.2	
50	9.72	33.811	26.09	4.32	169	70	1.68	21.4	.22	.7	30
75	9.21	33.893	26.24	3.50	248	56			.27	.5	
100	8.77	33.993	26.39	2.68	327	42	2.01	16.9	.35	.0	32
144	8.34	34.108	26.54	2.13	381	33				.1	
192	7.82	34.102	26.62	1.94	405	30				.0	
240	7.48	34.151	26.70	1.48	451	23	2.65	25.2		.0	49
288	7.27	34.174	26.75	1.26	473	19	2.25	20.5		.0	41
385	6.66	34.207	26.86	1.15	492	17	2.66	25.3		.0	51
481	6.03	34.243	26.97	.75	536	11	2.35			.0	
577	5.50	34.293	27.08	.48	568	7	2.52			.0	
770	4.61	34.382	27.25	.45	584	6	2.83			.0	59

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 56	2202	22 JUN 1977	14.5	36° 41.2'	121° 57.9'

TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB
m	dir ht p	dir speed	mb	dry wet		typ amt	
	27 4 3	25 2	1012.5		2	7 1	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	11.43	33.789	25.78				1.14	12.9	.14	5.0	26
5	11.10	33.785	25.83	6.10	-6	100	.82	6.8	.16	1.0	18
10	10.81	33.793	25.89	5.93	12	98	1.03	8.6	.16	1.4	18
20	10.20	33.774	25.98	5.04	99	82	1.09	8.8	.26	1.4	19
30		33.864		3.67			1.48	7.2	.31	2.3	19
54	9.40	33.887	26.20				1.34	10.5	.33	1.3	19

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 56	2201	22 JUN 1977	15.5	36° 37.6'	121° 53.7'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt	
X	30	2	3	27	2	1012.8	14.5	13.0	2	7	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	14.36*	33.821	25.22	8.08	-218	144	.08	.3	.00	.3	9
5	14.16	33.819	25.26	8.31	-237	147	.91	.0	.00	.1	7
0	11.70	33.826	25.75	8.42	-220	142	.29	.1	.13	.0	9
20	10.30	33.835	26.01	4.76	123	78	1.60	14.7	.34	3.1	31
30	9.92	33.838	26.08	4.83	121	78	1.15	6.8	.38	4.2	17

* indicates questionable data

Paired thermometer read 14.47

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 56	1121	22 JUN 1977	16.2	36° 37.7'	121° 51.1'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt	
	31	2	4	27	2	1012.5	14.6	13.1	2	7	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%					
							ug-atoms/liter				
0	14.26	33.820	25.24	8.30	-237	147	.00	.3	.00	.1	9
5	14.13	33.825	25.27	8.42	-246	149	.00	.0	.00	.0	8
10	13.96	33.823	25.31	8.81	-279	155	.01	.0	.00	.1	9

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 57	1154	11 JUL 1977	10.5	36° 55.2'	121° 55.8'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	25	0	2	20	1	1014.8	11.2	10.7	0	7	9	5

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%	ug-atoms/liter				
0	13.62	34.083	25.58	7.46	-156	131		.7	.01	.3	6
5	13.26	34.120	25.68	6.98	-110	122		.5	.05	.2	7
10	11.53	34.203	26.08	4.80	103	81		7.8	.22	.7	7

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 57	2205	11 JUL 1977	12.4	36° 55.8'	122° .7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	25	1	2	17	1	1014.9	12.0	11.2	2	7	8	5

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	13.93	34.106	25.53	7.98	-206	141		2.1	.06	.2	0
5	12.43	34.141	25.86	7.42	-140	127		1.7	.06	.2	0
10	10.74	34.188	26.21	4.80	112	79		10.7	.33	1.3	9
20	9.92	34.229	26.38	3.86	206	63		20.3	.37	1.9	24

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 57	2204	11 JUL 1977	13.5	36° 50.9'	122° 1.6'

TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB
m	dir ht p	dir speed	mb	dry wet		typ amt	
11	22 0 2	24 1	1015.0	12.3 11.3	2	7 8	6

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	10.86	34.218	26.21	5.46	52	90		12.2	.34	2.2	12
5	10.81	34.218	26.22	5.28	68	87		14.9	.28	1.1	10
10	10.44	34.210	26.28	4.90	107	80		15.4	.39	1.3	14
20	9.90*	34.230	26.39	4.28	169	69		18.5	.27	.6	16
30	9.54	34.299	26.50	3.37	254	54		17.0	.31	.4	19
48	8.91	34.401	26.68	2.08	377	33		28.5	.05	.6	32

* indicates questionable data Paired thermometer read 9.98

CRUISE STATION DATE HOUR N LATITUDE W LONGITUDE
 ML 57 2203 11 JUL 1977 14.5 36° 46.7' 122° 1.3'

TRANSP WAVES WIND BAROM AIR TEMP °C WEATH CLOUDS VISIB
 m dir ht p dir speed mb dry wet typ amt
 9 27 2 3 25 1 1015.0 12.8 11.5 2 7 8 7

DEPTH m	TEMP °C	SALINITY ppt	SIGMA T	OXYGEN ml/l	AOU ug-at/1	SAT %	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
							ug-atoms/liter				
0	11.35	33.938	25.91	5.54	40	93					
5	11.21	33.953	25.94	5.51	44	92	16.0	.30	1.6	18	
10	10.84	34.202	26.20	4.87	105	81					
20	10.30	34.198	26.30	4.65	131	76					
30	10.09	34.204	26.34	3.73	217	61	9.1	.33	1.4	15	
50	9.12	34.019	26.35	3.11	284	49	16.9	.04	.8	17	
75	9.00			2.46			22.9	.02	.0	23	
99	8.87	34.152	26.50	2.10	377	33	19.8	.28	.0	16*	
143	8.59	34.506	26.82	1.93	394	30	24.0	.21	.6	28	
188	8.42	34.509	26.85	1.93	396	30		.07	1.0	25	
237	8.18	34.543	26.91	1.89	403	30	31.2	.18	.2	41	
278	7.85	34.563	26.97	1.76	419	27	25.9	.13	.6	34	
368	7.03	34.606	27.13	1.67	438	25	33.2	.09	.6	55	
458	6.38	34.657	27.25	1.41	470	21	29.8	.08	.7	55	
548	5.59	34.721	27.41	.92	526	14	27.8	.07	.4	57	
728	4.98	34.768	27.52	.47	575	7	36.6	.06	.2	88	

56

* indicates questionable data

Silicate appears anomalously low

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 57	2202	11 JUL 1977	16.6	36° 41.2'	121° 57.9'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	21	2	2	23	2	1015.0	12.8	11.6	2	7	8	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	11.84	33.885	25.77	6.96	-91	117		8.4	.25	.4	9
5	11.83	33.892	25.78	7.04	-98	119		6.4	.31	.4	6
10	11.20	33.876	25.89	5.92	8	99		12.2	.24	.6	13
20	10.05	33.879	26.09	4.45	153	72		19.0	.31	1.0	20
30	10.01	33.898	26.11	4.19	177	68		16.3	.38	1.1	14
48	9.32	34.044	26.34	2.89	301	46		22.8	.26	.8	23

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 57	2201	11 JUL 1977	17.6	36° 37.6'	121° 53.7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
6	29	2	2	27	2	1014.3	13.2	11.9	1	7	7	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	13.25	33.849	25.47	8.59	-252	149		2.3	.04	.2	2
5	13.17	33.853	25.49	8.74	-265	152		.0	.01	.3	1
10	12.34*	33.860	25.66	7.91	-182	135		.1	.09	.4	2
20	10.11	33.949	26.13					20.5	.43	2.3	22
30	10.11	33.982	26.16	4.22	173	69		22.5	.41	2.2	26

* indicates questionable data

Paired thermometer read 12.42

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 57	1121	11 JUL 1977	18.1	36° 37.7'	121° 51.1'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	29	1	2	26	1	1014.3	14.0	12.3	1	7	6	6

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	13.73	33.837	25.37	8.77	-273	154		1.1	.06	.5	1
5	13.67	33.841	25.38	8.70	-266	152		.0	.04	.2	0
10	13.23	33.840	25.47	8.90	-280	155		.0	.09	.2	0

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 58	1154	10 AUG 1977	10.0	36° 55.2'	121° 52.8'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
5	25	0	2	17	0	1014.2	14.5	13.8	45	X 9 3

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%	ug-atoms/liter				
0	14.40	33.642	25.08	8.05	-216	143	.24	.1	.06	.3	3
5	13.93	33.662	25.19	7.99	-206	141	.17	.0	.03	.2	0
10	13.64	33.663	25.25	7.82	-188	137	.39	.0	.02	.1	2

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 58	2205	10 AUG 1977	11.9	36° 55.8'	122° .7'

TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB
m	dir ht p	dir speed	mb	dry wet		typ amt	
5	27 0 X	20 0	1014.0	14.0 13.0	0	X 8	3

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	15.48	33.726	24.91	8.50	-267	154	.22	.2	.01	.9	10
5	14.16	33.691	25.16	8.00	-209	141	.29	.1	.01	.1	13
10	12.96	33.712	25.42	7.17	-123	124	.57	3.0	.05	.3	3*
20	11.10	33.665	25.74	4.83	107	80	1.59	10.5	.30	3.4	20

* indicates questionable data

Silica appears anomalously low

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 58	2204	10 AUG 1977	13.4	36° 50.9'	122° 1.6'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	29	1	3	28	1	1013.9	17.0	13.8	2	7	8	6

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/1	%		ug-atoms/liter			
0	13.94	33.752	25.26	7.79	-189	137	.35	.5	.05	.2	6
5	13.81	33.769	25.30	7.61	-171	134	.42	.7	.07	2.4	5
10	13.10	33.816	25.48	6.98	-108	121	.74	2.1	.04	.7	7
20	11.52	33.820	25.78	5.58	35	93	1.32	8.8	.23	1.3	19
30	10.22*	33.856	26.04	3.80	209	62	1.86	19.7*	.33	1.3	26
50	9.67	33.902	26.17	3.13	276	50	1.87	9.2	.36	.7	12

* indicates questionable data

Paired thermometer read 10.30
Nitrate appears anomalously high

CRUISE STATION DATE HOUR N LATITUDE W LONGITUDE
 ML 58 2203 10 AUG 1977 16.1 36° 46.7' 122° 1.3'

TRANSP WAVES WIND BAROM AIR TEMP °C WEATH CLOUDS VISIB
 m dir ht p dir speed mb dry wet typ amt
 8 27 1 3 27 1 1013.9 16.1 2 7 7 7

DEPTH m	TEMP °C	SALINITY ppt	SIGMA T	OXYGEN ml/l	AOU ug-at/1	SAT %	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
							ug-atoms/liter				
0	14.45	33.762	25.16	7.59	-176	135	.29	1.5	.00	.2	5
5	13.88	33.746	25.26	7.48	-160	132	.28	2.7	.03	.1	7
10	13.73	33.772	25.32	7.63	-172	134	.37	3.5	.01	.6	6
20	11.86*	33.759	25.67	5.81	11	98	.93	6.8	.10	1.2	
30	9.91	33.831	26.08	3.82	211	62	1.72	19.6	.29	1.7	20
50	9.72	33.884	26.15	3.10	278	50	1.79	21.7	.34	2.1	32
75		33.893		2.80			2.00	18.9	.41	.7	26
98	9.43	33.946	26.25	2.44	340	39	2.15	22.9	.32	.1	33
146	9.26	34.000	26.32	2.22	362	35	2.21	21.6	.35	.0	36
194	8.98	34.080	26.42	2.06	379	33	2.26	21.7	.11	.1	19*
240	8.32	34.138	26.57	2.05	389	32	2.42	28.1	.07	.0	46
289	8.02	34.168	26.64	1.62	431	25					
385	7.25	34.251	26.82	1.08	489	16	2.59	21.1*	.03	.0	27*
482	6.29	34.300	26.98	.70	537	10	3.06	33.8	.00	.0	77
580	5.82	34.333	27.07	.63	550	9	3.32	32.9	.01	.0	72
778	4.81	34.430	27.27	.65	563	9	3.33	38.0	.03	.0	101

* indicates questionable data

Paired thermometer read 11.98
 Nitrate appears anomalously low
 Silicate appears anomalously low

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 58	2202	10 AUG 1977	17.5	36° 41.2'	121° 57.9'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
7	29	0	3	24	1	1013.0	14.0		2	7	7	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	13.40*	33.652	25.29	7.45	-152	130	.33	.7	.04	.3	8
5	13.02	33.621	25.34	6.90	-99	119	.48	6.8	.16	.2	8
10	11.95	33.570	25.51	5.90	2	100	.78	7.2	.16	.9	7
20	11.53	33.527	25.55	5.22	68	87	1.23	10.0	.31	1.5	10
30		33.599		5.16			1.28	15.1	.32	1.4	16
50	11.29**	33.789	25.80	4.06	173	68	1.44	7.2*	.17	.0	11

* indicates questionable data

*Paired thermometer read 13.59

**Paired thermometer read 11.03

*Nitrate appears anomalously low

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 58	2201	10 AUG 1977	18.4	36° 37.6'	121° 53.7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
7	23	0	X	24	1	1013.0	15.0	14.5	2	7	8	6

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	14.96	33.560	24.89	8.33	-247	150	.33	.7	.04	.3	8
5	14.75	33.562	24.94	8.10	-224	145	.48	6.8	.16	.2	8
10	11.52	33.629	25.64	5.37	54	90	.78	7.2	.16	.9	7
20	10.43	33.662	25.86	4.76	122	78	1.23	10.0	.31	1.5	10
30	10.82			4.16			1.28	15.1	.32	1.4	16

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 58	1121	10 AUG 1977	18.8	36° 37.7'	121° 51.1'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
6	23	1	3	28	1	1012.9	14.8	14.5	2	7	8	6

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	14.41*	33.558	25.01	12.19	-585	217	.20	.5	.00	2.0	1
5	13.65**	33.577	25.18	11.23	-492	196	.28	.9	.00	.1	2
10	11.07	33.672	25.75	7.13	-98	118	1.21	12.1	.00	1.7	13

9

* indicates questionable data

*Paired thermometer read 14.85
 **Paired thermometer read 13.75

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 59	1154	7 SEP 1977	10.9	36° 55.2'	121° 52.8'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt	
9	27	2	3	21	0	1016.5	12.0	11.9	45	X	9	3

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	14.94	33.671	24.98	7.14	-139	128	.39	.0	.13	.8	5
5	13.47*	33.624	25.25	7.33	-143	128	.43	.0	.15	.5	7
10	12.84	33.647	25.40	5.46	31	94	1.14	3.2	.26	2.9	9

* indicates questionable data

Paired thermometer read 13.55

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE						
ML 59	2205	7 SEP 1977	12.5	36° 55.8'	122° .7'						
TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB				
m	dir ht p	dir speed	mb	dry wet		typ amt					
7	27 2 2	25 1	1016.9	16.0 15.5	2	X 9	4				
DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%			ug-atoms/liter		
0	14.30*	33.629	25.09	7.88	-200	140	.54	.0	.02	.5	4
5	13.21**	33.636	25.32	7.41	-147	128	.53	.0	.07	.8	1
10	12.58	33.659	25.46	5.32	47	91	1.19	4.2	.37	3.7	11
20	12.15	33.694	25.57	4.76	101	81	1.42	7.4	.40	4.8	15

* indicates questionable data

*Paired thermometer read 14.38

**Paired thermometer read 13.29

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 59	2204	7 SEP 1977	13.7	36° 50.9'	122° 1.6'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt
9	30	3	2	24	1	1016.9	14.2		2	X	9 4

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/1	%		ug-atoms/liter			
0	13.57	33.625	25.23	6.33	-54	111	.65	2.4	.27	1.0	6
5	13.12*	33.629	25.33	6.12	-30	106	.79	3.3	.31	1.1	6
10	12.54	33.657	25.46	5.32	47	91	1.14	8.3	.65	1.8	11
20	11.38	33.674	25.70	4.26	155	71	1.43	11.6	.58	2.8	26
30	11.13	33.697	25.76	4.01	180	67	1.56	15.2	.54	2.0	19*
50	10.44	33.752	25.92	3.46	237	57	1.65	21.3	.54	1.0	24

* indicates questionable data

Paired thermometer read 13.18
Silica appears anomalously low

CRUISE STATION DATE HOUR N LATITUDE W LONGITUDE
 ML 59 2203 7 SEP 1977 15.5 36° 46.7' 122° 1.3'

TRANSP WAVES WIND BAROM AIR TEMP °C WEATH CLOUDS VISIB
 m dir ht p dir speed mb dry wet typ amt
 10 28 2 2 28 2 1016.2 13.1 2 X 8 5

DEPTH m	TEMP °C	SALINITY ppt	SIGMA T	OXYGEN ml/l	AOU ug-at/1	SAT %	PHOSPHATE	NITRATE ug-atoms/liter	NITRITE	AMMONIA	SILICA
0	13.36	33.652	25.30	6.03	-25	105	.74	4.5	.25	1.2	7
5	13.35	33.649	25.30	6.05	-27	105	.63	4.1	.20	1.1	7
10	13.11	33.635	25.34	5.76	2	100	.85	6.2	.30	2.0	8
20	12.77	33.648	25.41	5.69	12	98	.88	8.2	.32	1.7	9
30	12.57	33.660	25.46	5.51	30	94	.97	8.9	.36	2.0	11
46	11.26	33.679	25.72	5.38	56	90	1.47	16.2	.56	2.3	19
70	10.20	33.730	25.95	4.31	164	70	1.28	18.5	.21	.2	26
94	9.80	33.793	26.06	3.34	256	54	1.77	19.4	.11	.0	28
144	9.50	33.931	26.22	3.06	284	49	2.05	24.8	.07	.0	35
192	9.15	34.010	26.34	2.04	379	32	1.95	37.4*	.04	.1	44
238	8.82	34.050	26.42	1.95	391	31	2.24	26.5	.04	.0	36
285	8.30	34.094	26.54	1.68	422	26	2.48	23.3	.07	.2	41
375	7.40	34.128	26.70	1.56	445	24	2.63	30.3	.09	.5	51
464	6.53	34.179	26.86	.74	530	11	2.82	33.3	.07	.2	58
550	5.93	34.224	26.97	.65	547	10	2.93	34.1	.03	.1	66
720	4.85	34.318	27.17	.39	586	6	3.07	33.3	.00	.2	106

* indicates questionable data

Nitrate appears anomalously high

CRUISE STATION DATE HOUR N LATITUDE W LONGITUDE
 ML 59 2202 7 SEP 1977 17.9 36° 41.2' 121° 57.9'

TRANSP WAVES WIND BAROM AIR TEMP °C WEATH CLOUDS VISIB
 m dir ht p dir speed mb dry wet typ amt
 5 27 2 2 24 2 1015.2 15.0 .0 2 8 5

DEPTH m	TEMP °C	SALINITY ppt	SIGMA T	OXYGEN ml/l	AOU ug-at/l	SAT %	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
							ug-atoms/liter				
0	13.47*	33.636	25.26	6.92	-106	121	.52	2.2	.19	.3	4
5	13.49	33.626	25.25	6.79	-94	118	.55	2.5	.15	.5	5
10	12.85	33.632	25.38	6.07	-23	104	1.18	8.5	.34	1.8	12
20	12.06	33.634	25.54	5.05	77	85	.65*	4.3	.27	1.1	7
30	11.58	33.642	25.63	4.53	129	76	1.08	10.3	.34	1.7	17
50	11.27**	33.668	25.71	4.11	170	68	1.35	13.7	.46	1.5	20

* indicates questionable data

*Paired thermometer read 13.54
 **Paired thermometer read 11.21
 Phosphate appears anomalously low

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 59	2201	7 SEP 1977	18.8	36° 37.6'	12° 53.7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	28	1	3	26	2	1015.2	15.6		2	7	6	5

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/1	%					
0	14.27*	33.608	25.08	7.33	-150	130	.27	.0	.08	.3	4
5	14.25	33.603	25.08	7.32	-149	130	.28	.0	.08	.1	4
0	13.65	33.606	25.20	7.13	-126	125	.38	.2	.13	.2	5
20	12.22	33.591	25.47	4.97	82	84	1.11	9.7	.38	2.3	12
30	11.76	33.610	25.58	4.78	104	80	1.27	12.4	.48	2.0	15

* indicates questionable data

Paired thermometer read 14.35

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 59	1121	7 SEP 1977	19.2	36° 37.7'	121° 51.1'

TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB
m	dir ht p	dir speed	mb	dry wet		typ amt	
10	32 1 3	29 1	1015.2	16.0	2	X 6	4

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/1	%			ug-atoms/liter		
0	14.99	33.586	24.91	7.47	-170	134	.23	.0	.09	.1	5
5	14.96	33.587	24.91	7.60	-181	137	.25	.0	.05	4.2	4
10	14.96	33.581	24.91	7.48	-171	134	.27	.0	.01	.0	4

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 60	1154	5 OCT 1977	10.0	36° 55.2'	121° 52.8'

TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB
m	dir ht p	dir speed	mb	dry wet		typ amt	
6	23 0 X	32 1	1014.5	13.8 12.8	45	X 9	3

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	16.90	33.592	24.48				.22	.7	.01	.8	6
5	16.84	33.590	24.49				.17	.5	.03	.6	6
10	15.14	33.584	24.87				.57	2.8	.23	.6	7

CRUISE STATION DATE HOUR N LATITUDE W LONGITUDE
 ML 60 2205 5 OCT 1977 11.3 36° 55.8' 122° .7'

TRANSP WAVES WIND BAROM AIR TEMP °C WEATH CLOUDS VISIB
 m dir ht p dir speed mb dry wet typ amt
 11 23 0 2 32 1 1015.0 14.4 13.4 44 X 8 5

DEPTH m	TEMP °C	SALINITY ppt	SIGMA T	OXYGEN ml/l	AOU ug-at/1	SAT %	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
0	16.41	33.597	24.60	6.09	-61	113	.22	.5	.00	.0	5
5	16.20*	33.597	24.64	6.05	-55	111	.25	2.5	.00	.1	5
10	15.39**	33.592	24.82	6.02	-45	109	.24	.2	.01	.2	4
20	13.50	33.605	25.23	4.59	102	80	1.15	7.0	.63	1.2	12

* indicates questionable data

*Paired thermometer read 16.39
 **Paired thermometer read 15.78

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 60	2204	5 OCT 1977	12.8	36° 50.9'	122° 1.6'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
11	26	0	2	32	0	1015.2	14.9	12.9	2	7	8	6

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	15.37	33.503	24.76	6.28	-67	114	.21	.2	.07	.0	3
5	15.33	33.504	24.77	6.49	-86	117	.20	.0	.08	.1	3
10	14.20	33.491	25.00	5.74	-7	101	.49	3.1	.24	.1	6
20	12.73	33.568	25.36	4.78	94	82	.93	9.9	.54	.7	8
30	12.61	33.578	25.39	4.73	99	81	1.11	11.6	.57	.1	9
50	11.38	33.656	25.68	4.00	178	67	1.32	15.0	.59	.3	12

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 60	2203	5 OCT 1977	15.6	36° 46.7'	122° 1.3'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
11	29	1	2	27	1	1015.2	16.7	15.5	1	0 2 7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	15.84	33.562	24.70	6.14	-60	112	.28	2.2	.00	.0	4
5	15.46*	33.559	24.78	6.20	-61	112	.23	1.0	.00	.0	3
10	13.57	33.532	25.16	5.92	-17	103	.50	5.5	.34	.5	6
20	12.63	33.518	25.34	4.96	79	85	.65	11.4	.30	.6	8
30	12.50	33.517	25.36	4.83	92	82	.93	12.4	.13	.1	9
58	11.42	33.595	25.63	4.03	175	67	1.35	15.9	.07	.0	12
88	10.77**	33.673	25.80	3.65	217	60	1.44	18.0	.04	.5	14
117	10.47	33.689	25.87	3.48	235	57	1.47	17.7	.22	.4	15
154	9.81	33.853	26.11	2.86	299	46	1.71	20.0	.00	.1	17
204	9.37	33.960	26.27	2.45	340	39	1.81	22.4	.00	2.5	18
254	8.57	34.087	26.49	1.82	406	29	2.46	30.8	.00	.0	27
305	7.93	34.133	26.63	1.57	437	24	2.63	32.9	.00	.5	31
408	7.09	34.176	26.73	1.09	491	17	2.96	34.1	.00	.4	38
511	6.30	34.227	26.93	.75	532	11	3.17	36.9	.00	.1	44
613	5.68	34.275	27.04	.61	554	9	3.30	37.4	.00	.0	50
819	4.49	34.389	27.27	.61	572	9	2.99	37.8	.00	.5	54

* indicates questionable data

* Paired thermometer read 15.56
 ** Paired thermometer read 10.69

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 60	2202	5 OCT 1977	17.2	36° 41.2'	121° 57.9'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
11	29	2	2	30	2	1014.2	15.8	14.7	1	0	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	14.01	33.542	25.08	6.08	-36	107	.49	5.1	.26	.2	6
5	13.38	33.540	25.21	5.34	37	93	.75	8.8	.34	.1	7
10	13.07	33.551	25.28	5.16	56	86	.84	10.4	.43	.3	8
20	13.00	33.552	25.29	5.16	57	89	.90	10.0	.43	.5	8
30	12.95	33.548	25.30	4.15	148	72	.88	9.1	.36	.2	8
50	12.16	33.559	25.46	4.49	126	76	1.25	9.3	.45	.1	8

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 60	2201	5 OCT 1977	18.1	36° 37.6'	121° 53.7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
8	33	1	X	30	2	1014.1	15.4	13.9	1	0	2	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	16.27	33.567	24.61	6.00	-51	111	.25	2.7	.06	.4	4
5	15.26	33.543	24.81	5.59	-5	101	.51	6.4	.25	.5	4
10	14.90	33.536	25.08	5.38	27	95	.64	6.8	.33	.2	4
20	13.55	33.535	25.17	5.19	48	91	.97	5.8	.27	.1	2
30	12.90	33.548	25.31	4.82	88	83	1.08	5.3	.40	.5	2

08

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE							
ML 60	1121	5 OCT 1977	18.8	36° 37.7'	121° 51.1'							
TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
9	32	2	2	29	2	1013.9	15.4	13.9	1	7	4	7
DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA	
m	°C	ppt		ml/l	ug-at/1	%			ug-atoms/liter			
0	16.41	33.555	24.56	6.14	-65	113	.18	.4	.00	.4	2	
5	16.33*	33.554	24.58	6.14	-64	113	.11	.7	.00	.3	2	
10	15.06**	33.542	24.86	5.12	39	92	.72	3.3	.00	.4	2	

* indicates questionable data

*Paired thermometer read 16.40

**Paired thermometer read 14.83

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE							
ML 61	1154	19 NOV 1977	8.5	36° 55.2'	121° 52.8'							
TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	27	1	2	31	2	1005.8	8.2	6.4	0	X	8	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%					
											ug-atoms/liter
0	11.96	33.499	25.45	6.94	-90	117	.19	3.6	.15	1.1	7
5	11.96	33.470	25.43	6.85	-82	116	.20	1.8	.18	1.0	8
10	11.46	33.528	25.47	4.65	120	78	1.10	12.4	.34		23

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 61	2205	19 NOV 1977	10.0	36° 55.8'	122° .7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
5	26	1	3	2	0	1009.1	9.4	7.7	2	X 5 8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	11.69	33.477	25.49	6.50	-48	109	.30	4.3	.05	.4	5
5	11.68	33.474	25.49	6.47	-45	108	.35	3.6	.14	.5	5
10	11.65	33.473	25.49	6.40	-39	107	.33	4.1	.24	.5	4
20	11.27	33.515	25.59	4.55	131	76	1.22	11.9	.41	1.9	17

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 61	2204	19 NOV 1977	11.2	36° 50.9'	122° 1.6'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
6	28	2	2	14	0	1009.1	8.5	6.4	2	X	8	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	11.61	33.494	25.51	6.27	-27	105	.48	7.2	.28	1.5	9
5	11.57	33.525	25.55	6.06	-7	101	.72	10.7	.21	.4	10
0	11.20	33.524	25.61	4.69	119	78	1.20	16.3	.41	.4	17
20	10.89	33.543	25.68	4.33	155	71	1.31	16.4	.41	.2	19
30	10.89	33.527	25.67	4.55*	135	75	1.14*	6.7*	.34	.4	5*
50	10.39	33.626	25.83	3.76	212	61	1.59	19.3	.26	.2	27

* indicates questionable data

Phosphate appears anomalously low
 Nitrate appears anomalously low
 Silica appears anomalously low
 Oxygen appears anomalously high

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE						
ML 61	2203	19 NOV 1977	13.0	36° 46.7'	122° 1.3'						
TRANSP	WAVES	WIND	BAROM	AIR TEMP °C	WEATH	CLOUDS	VISIB				
m	dir ht p	dir speed	mb	dry wet		typ amt					
7	29 3 2	22 1	1009.1	8.9 5.6	2	X 8	8				
DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	11.56	33.509	25.54	6.40	-38	107	.46	7.1	.28	.1	11
5	11.50	33.509	25.55	6.20	-19	104	.56	8.2	.31	.2	11
10	11.49	33.545	25.58	5.90	8	99	.59	8.8	.28	.3	8
20	11.42	33.534	25.58	5.35	58	89	.75	11.0	.24	.6	10
30	11.12	33.586	25.68	4.66	123	77	1.12	16.4	.29	.2	17
56	10.75	33.607	25.76	4.06	180	67	1.42	6.5*	.15	.0	
82	10.29	33.744	25.94	3.47	238	57	1.62	19.7	.04	.2	25
112	10.01	33.841	26.07	3.12	273	51	1.73	21.0	.01	.0	30
153	9.48	33.893	26.20	2.82	306	45	1.87	22.3	.01	.4	30
204	9.12	33.955	26.30	2.53	336	40	1.59*	20.2	.00		23*
255	8.54	34.043	26.46	2.05	386	32	2.22	27.6	.00	.0	44
305	7.93	34.132	26.62	1.55	438	24	2.34	29.6	.06	.5	49
407	7.25	34.155	26.74	1.29	471	20	2.69	32.3	.00	.0	64
509	6.30	34.236	26.93	.84	524	13	2.88	27.2	.01	.3	58
611	5.47	34.277	27.07	.62	556	9	3.20	39.9	.06	.2	93**
814	3.96	34.374	27.31	.48	592	7	2.93	29.5	.00	.2	87

* indicates questionable data

Phosphate appears anomalously low
 Nitrate appears anomalously low
 * Silica appears anomalously low
 ** Silica appears anomalously high

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 62	2201	6 DEC 1977	14.9	36° 37.6'	121° 53.7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
7	32	3	3	32	3	1009.1	13.9	12.8	2	X	6	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	12.23	33.551	25.44	5.66	21	96	.99	9.6	.43	.8	13
5	12.01	33.558	25.49	5.52	36	93					
10	11.53	33.588	25.60	5.21	69	87					
20	11.42	33.607	25.64	4.93	95	82					
30	11.24	33.622	25.68	4.53	133	75					

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 62	2203	6 DEC 1977	12.3	36° 46.7'	122° 1.3'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
8	31	5	3	32	4	1019.3	13.8	12.2	0	X 6 7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	12.19	33.526	25.43	6.51	-55	110					
5	12.22	33.529	25.43	5.88	1	100					
10	12.02	33.566	25.49	5.90	2	100	.72	8.3	.19	.2	10
20	11.63	33.599	25.59	5.26	63	88					
30	11.37	33.619	25.66	5.10	80	85	1.36	15.5	.15	.4	19
56	10.87	33.663	25.78	4.09	176	67					
84	10.49	33.723	25.89	3.84	203	63					
112	10.42	33.736	25.92	3.34	248	55					
154	10.04	33.784	26.02	2.90	292	47					
205	9.33	33.900	26.23	2.61	326	42					
257	8.58	34.020	26.44	2.09	382	33					
308	8.16	34.077	26.55	1.88	406	29	1.33	18.0	.12	.1	23
411	6.98	34.138	26.76	1.14	488	17					
514	6.18	34.184	26.91	.78	532	12					
617		34.257		.57							
822	4.38	34.363	27.26	.55	579	8	2.57	30.3	.03	.9	85

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 62	2204	6 DEC 1977	11.1	36° 50.9'	122° 1.6'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
9	30	2	2	29	1	1029.5	15.8	12.9	1	X 6 7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	12.55	33.480	25.33	6.78	-83	116	.25	3.5	.14	.3	1
5	12.50	33.502	25.35	6.90	-93	118	.33	7.0	.25	.8	5
10	11.62	33.442	25.47	5.10	78	85					
20	10.99	33.438	25.58	5.00	94	83	1.05	12.5	.23	.3	12
30	11.04	33.463	25.59	4.88	104	81	1.12	11.9	.37	.5	17
50	10.45	33.617	25.82	3.83	205	63					

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 62	2205	6 DEC 1977	10.0	36° 55.8'	122° .7'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
8	27	1	2	17	0	1032.8	12.8	11.8	41	0	4	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/1	ug-at/1	%		ug-atoms/liter			
0	12.67	33.396	25.24	6.81	-86	117	.22	4.4	.22	.3	1
5	12.57	33.398	25.26	6.66	-72	114	.28	6.5	.18		5
10	12.12	33.431	25.37	5.65	23	96	.81	8.6	.39	.4	8
20	11.66	33.536	25.54	4.75	108	80	1.14	12.6	.53	1.3	18

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 62	1154	6 DEC 1977	9.1	36° 55.2'	121° 52.8'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
9	15	0	3	24	1	1026.1	11.3	10.9	45	X	5	7

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%			ug-atoms/liter		
0	12.63	33.506	25.33	7.13	-115	122	.09	2.3	.14	.0	6
5	12.60	33.504	25.33	7.33	-132	125	.13	1.0	.19	.9	4
10	12.00	33.550	25.48	5.37	49	91	.80	16.0	.30	1.5	10

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 61	1121	19 NOV 1977	16.7	36° 37.7'	121° 51.1'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB	
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt		
5	32	2	2	31	3	1009.1	9.2	6.4	2	X	8	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	12.15	33.511	25.43	7.34	-128	124	.32	2.0	.77	.1	3
5	12.10	33.522	25.44	6.96	-94	118	.41	6.5	.18		5
10	11.89	33.526	25.49	6.31	-33	106					

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 61	2201	19 NOV 1977	16.2	36° 37.6'	121° 53.7'

TRANSP	WAVES			WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS		VISIB
m	dir	ht	p	dir	speed	mb	dry	wet		typ	amt	
5	32	2	3	31	3	1009.1	9.7	7.5	2	X	8	8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	11.92	33.527	25.48	6.61	-61	111					
5	11.89	33.554	25.51	6.37	-39	107	.58	7.6	.32	.3	9
10	11.82	33.531	25.50	6.26	-28	105	.54	6.5	.21	.3	7
20	11.79	33.532	25.51	6.06	-10	102	.72	10.1	.29	1.0	9
30	11.29	33.597	25.65	4.57	129	76	1.22	15.2	.71	.6	19

CRUISE	STATION	DATE	HOUR	N LATITUDE	W LONGITUDE
ML 61	2202	19 NOV 1977	15.1	36° 41.2'	121° 57.9'

TRANSP	WAVES		WIND		BAROM	AIR TEMP °C		WEATH	CLOUDS	VISIB
m	dir	ht	p	dir	speed	mb	dry	wet	typ	amt
7	29	3	2	31	1	1009.1	12.2	8.8	2	X 8 8

DEPTH	TEMP	SALINITY	SIGMA T	OXYGEN	AOU	SAT	PHOSPHATE	NITRATE	NITRITE	AMMONIA	SILICA
m	°C	ppt		ml/l	ug-at/l	%		ug-atoms/liter			
0	11.82	33.525	25.50	6.37	-38	107	.97	8.2	.20	.3	10
5	11.81	33.526	25.50	6.33	-34	106					
10	11.78	33.527	25.51	6.11	-14	103	.59	7.8	.24	.0	9
20	11.76	33.531	25.52	5.91	4	99	.74	7.8	2.20*	.8	22*
30	11.76	33.531	25.52	5.77	16	97	.71	8.0	.19	.2	9
50	10.97	33.640	25.74	4.06	178	67					

* indicates questionable data

Nitrite appears anomalously high
Silica appears anomalously high