Tape No. 927	ACCESSION NUMBER	74-0004

DATA DOCUMENTATION FORM

TR0004

NOAA FORM 24-13 (4-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
ROCKVILLE, MARYLAND 20852

L130

FORM APPROVED O.M.B. No. 41-R2651

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED

Oregon State University, School of Oceanography, Corvalis, Oregon 97331

2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED

Office of Naval Research Contract N00014-67-A-0369-0007, Project NR 083-102
National Science Foundation Grant GA 12113

3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT.

Oregon State University:

Y7001A ✓	YALOC-70	Y7206-C	Y7208-E
Y7001C ✓	Y7103-E	Y7207-A	
Y7005A ✓	Y7106-B	Y7207-C	
Y7006A ✓	Y7205-C	Y7207-E	

4. PLATFORM NAME(S)

R/V YAQUINA

5. PLATFORM TYPE(S) *(E.G., SHIP, BUOY, ETC.)*

Ship

6. PLATFORM AND OPERATOR NATIONALITY(IES)

PLATFORM	OPERATOR
USA	USA see attached

7. DATES

FROM: MO/DAY/YR	TO: MO/DAY/YR
1/6/70	8/30/72

8. ARE DATA PROPRIETARY?

[X] NO [ ] YES

IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR ____ MONTH ____

9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)?
(I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?)

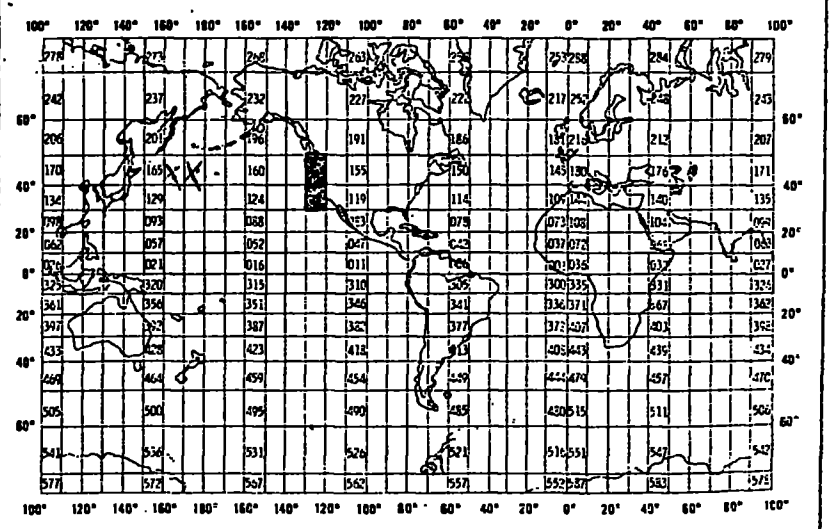
[ ] NO [X] YES [ ] PART *(SPECIFY BELOW)*

10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER *(AND ADDRESS IF OTHER THAN IN ITEM-1)*

Lou I. Gordon
(503)754-1271

11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED.

GENERAL AREA



USCOMM-DC 44282-P72

B. SCIENTIFIC CONTENT

Include enough information conceming manner of observation, instrumentation, analysis, and data reduction routines to make them understandable to future users. Furnish the minimum documentation considered relevant to each data type. Documentation will be retained as a permanent part of the data and will be available to future users. Equivalent information already available may be substituted for this section of the form (i.e., publications, reports, and manuscripts describing observational and analytical methods). If you do not provide equivalent infomation by attachment, please complete the scientific content section in a manner similar to the one shown in the following example.

EXAMPLE (HYPOTHETICAL INFORMATION)

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Salinity	‰	Nansen bottles	Inductive salinometer (Hytech model 5510)	N/A (Not applicable)
		STD Bissett-Berman Model 9006	N/A	Values averaged over 5-meter intervals
Water color	Forel scale	Visual comparison with Forel bottles	N/A	N/A
Sediment size	ϕ units and percent by weight	Ewing corer	Standard sieves. Carbonate fraction removed by acid treatment	Same as "Sedimentary Rock Manual," Folk '65

(SPACE IS PROVIDED ON THE FOLLOWING TWO PAGES FOR THIS INFORMATION)

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Date	Digits 1&2: Month Digits 3&4: Day	N/A	N/A	N/A
Time	Local	Ship's Clocks	N/A	N/A
Station	Arbitrary Name	N/A	N/A	N/A
Depth	Meters; if entry is a depth, this is coded by an "M" following the number. If a "*" follows the "M" this line of data is from a hydro-cast. If no "*", the data are from a PCO_2 cast.	Wire length & angle	N/A	Correction for wire angle by multiplying wire-length by cosine of wire angle.
Latitude	Degrees followed by minutes in decimal fractions	Ships position reports determined by radar, loran and satellite navigation	N/A	A positive number denotes north, a negative (-) number denotes south.
Longitude	Degrees followed by minutes in decimal fractions.	Ships position reports determined by radar, loran and satellite navigation.	N/A	A positive number denotes north, a negative (-) number denotes south.
Temperature	°C	Thermometer in equili-brator	N/A	Systematically higher than in-situ T by 0-0.7°C
Temperature In-situ	°C	Thermometer in equili-brator	N/A	----------

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Salinity	‰	Water from equilibrator (see sea PCO_2) or bottle cast.	Inductive salinometer Hytech Models 6220 for '70-'71 cruises. Cruises Y-7205C & 7207C used Bissett Berman Model 6230. Other '72 cruises with Industrial manufacturing engineering model 17. All data used method described by Brown & Hamon (1961).	
Sea Partial Pressure CO_2	10^{-6}ATM. or PPM	Non-dispersive infrared gas analyser. Mine safety applies model Lira 200. See Gordon & Park (1972).	CO_2 concentration measured with gas analyzer (IRA), of an air stream equilibrated with sea water.	Data corrected from non-linearity of IRA and change of concentration caused by driving the air stream.
Air Partial Pressure CO_2	10^{-6}ATM. or PPM	Non-dispersive infrared gas analyser-mine safety appliances model LIRA 200. See Gordon and Park (1972)	CO_2 concentration in undried atmospheric air pumped from top of bow jack staff or foremast or mainmast head, depending on wind direction.	Same as for PCO_2 except no pressure correction.
CO_2 saturation	10^{-6}ATM. or PPM	N/A	Difference between sea & air.	Simple arithmetic subtraction.
Barometric Pressure	Inches-of-mercury	Aneroid Barometer	N/A	N/A
Relative Humidity	%	Sling Psychrometer	N/A	Calculated as in Gordon & Park (1972).
Wind Direction	Degrees/10 to the nearest whole degree.	Bendix Anemometer	N/A	N/A
Wind Velocity	Beaufort Scale	Bendix Anemometer	N/A	N/A

USCOMM-L- 44289-P72

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
pH	pH units	(1)Samples from equilibrator (see Sea PCO_2) or bottle casts, or (2)Direct measurement of water in equilibrator.	Types of instruments are pH meters and glass electrodes. If method is (1), Orion Model 801-method described by Park (1966); if method (2) Leeds & Northrup Model 7405-method Wyatt et al (1971).	N/A
Alkalinity	Milli-equivalents per kilogram	Samples from equilibrator (see Sea PCO_2) or bottle-casts.	Anderson Robinson Method and Wyatt et al. (1971). On cruises Y7103-E,Y7106-B & YALOC-70 alkalinity determined using 1.5 ML of 0.1N HCL, rather than the customary, 15 ML of 0.01 N Acid.	N/A
Total Carbon Dioxide	ML/L	Samples from equilibrator or bottle casts.	Gas chromatograph. See Parker et al.	N/A
Apparent O_2 Utilization	µMOL/KG	Hydrocast or pumped	Calculated from Carpenters solubility data.	Apparent O_2 utilization values calculated from Equation of Redfield (1942) Gilbert, Pawley & Parks (1968).
Phosphate Nitrate + Nitrite Silicate	µMOL/KG	Samples from equilibrator or bottle casts.	Technicon auto-analyzer by methods of Atlas-et-al (1971) and Wyatt et al 1971. Some samples frozen for analysis ashore for 1 year are indicated by "L" for cruise Y7006-A. Y7001-A & Y7001-C were analyzed by methods outlined by Barstow et al (1968). The method used for silicate was basically that of Armstrong et al (1967) continued next page.	

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Phosphate Nitrate + Nitrite Silicate (continued)			Nitrate + Nitrite by methods outlined by Armstrong et al (1967). Phosphate analysis by Bernhart & Wilhelms (1967).	
Dry Bulb Temperature	°C	Sling Psychrometer	N/A	N/A
Oxygen	ML STP/L and µMOL/KG	Samples from equilibrator or bottle casts.	Modified Winkler titration per Strickland and Parsons (1968).	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

Record Types 1-5 are 132 characters long and are found only in the first 5 files of data set.

Record Types 6-13A and 6-13B are 80 characters, found in files 6-13, and can be differentiated using character 80. 6-13A has a 1 in byte 80, 6-13B has a 2 in byte 80.

The first record of each file describes file no., cruise no., and date of cruise.

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

In chronological order. Each file on the tape represents an originators cruise.

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☒ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:
NAME AND PHONE NUMBER David Stanley (503) 754-1271
ADDRESS School of Oceanography, Oregon State University, Corvallis, Oregon 97331

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

5. RECORDING MODE
☒ BCD ☐ BINARY
☐ ASCII ☐ EBCDIC
☐ _____

6. NUMBER OF TRACKS (CHANNELS)
☒ SEVEN
☐ NINE
☐ _____

7. PARITY
☐ ODD
☒ EVEN

8. DENSITY
☐ 200 BPI ☐ 1600 BPI
☐ 556 BPI
☒ 800 BPI
☐ _____

9. LENGTH OF INTER-RECORD GAP (IF KNOWN) ☒ 3/4 INCH
☐ _____

10. END OF FILE MARK
☒ OCTAL 17
☐ _____

11. PASTE-ON-PAPER LABEL DESCRIPTION *(INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)*

Lou Gordon, David Stanley
Oregon State University
N. Pacific Surface PCO_2
V.2 1970-1972

12. PHYSICAL BLOCK LENGTH IN BYTES
132 1st 5 files; 80 last 8 files

13. LENGTH OF BYTES IN BITS
6

RECORD FORMAT DESCRIPTION

RECORD NAME 1 - 5

14. FIELD NAME	15. POSITION FROM - 1 MEASURED IN bytes (e.g., bits, bytes)	16. LENGTH NUMBER	16. LENGTH UNITS	17. ATTRIBUTES	18. USE AND MEANING
Date	1	4	bytes	I4	Month of year, day of month
Time	5	4	"	I4	Station time (local time)
Station	9	5	"	A5	Station name. Observations are taken at the surface unless the field contains a number followed by the letter "M". This indicates observations were taken at that depth (meters) for the preceding station. AH=Off Astoria,Ore.,along46°14.0'N BH=Off Brookings,Ore.,along 42°00.0'N CH=Off Coos Bay,Ore.,along 43°20.6'N DB=Off Depoe Bay,Ore.,on a line between 44°48.8N-124°05.4'W and 45°00.0N,124°34.6'W UH=Off Umpqua River,Ore.,along 43°39.0'N YH=Off Yachats,Ore.,along 44°20.0'N OR=Off Otter Rock,Ore.,44°45.3'N BC=Off Beaver Creek,Ore., 44°31.0'N A=Off Alsea,Ore.,along 44°26.0'N Y=Off Yachats,Ore.,along 44°20.0'N GK=Off Gwynn Knoll,Ore.,along 44.13.9'N HH=Off Heceta Head,Ore.,along 44°08.1'N FH=Off Florence,Ore.,along 43°59.0'N NH=Off Newport, Ore.,along 44°39.1'N Most stations are identified by a letter number code. Numerals that have a letter or letters prefix are the distance offshore in nautical miles. Thus NH-85 is a hydrographic station 85 miles off the coast from Newport, Oregon. All stations that have other than the above letter prefixes were numbered sequentially with the letter prefix designating either a particular leg of that cruise or designating what work was done on that particular station.

RECORD FORMAT DESCRIPTION

RECORD NAME 1-5

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN BYTES (e.g., bits, bytes)	16. LENGTH NUMBER	16. LENGTH UNITS	17. ATTRIBUTES	18. USE AND MEANING
Latitude	14	7	bytes	F7.3	Decimal degrees. North is a positive number and south a negative number.
Longitude	21	7	"	F7.3	Decimal degrees. North is a positive number and south is a negative number.
Temperature	28	7	"	F7.3	Centigrade
Salinity	35	7	"	F7.3	°/oo
pH	42	7	"	F7.3	pH units
Sea PCO_2	49	7	"	F7.2	PPM
Air PCO_2	56	7	"	F7.2	PPM
Satn CO_2	63	7	"	F7.2	PPM
Alkalinity	70	7	"	F7.2	MEQ/L
Oxygen	77	7	"	F7.2	ML/L
AOU	84	7	"	F7.2	ML/L
Phosphate	91	7	"	F7.2	µM
Nitrate	98	7	"	F7.2	µM
Silicate	105	7	"	F7.2	µM
DBT	112	7	"	F7.2	Dry Bulb Temperature/Centigrade
RH	119	7	"	F7.2	Relative Humidity/°/o
TCO_2	126	7	"	F7.2	ML/L

RECORD FORMAT DESCRIPTION

RECORD NAME 6-13a

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN bytes (e.g., bits, bytes)	16. LENGTH NUMBER	16. LENGTH UNITS	17. ATTRIBUTES	18. USE AND MEANING
Date	1	5	bytes	1X,I4	Month of year, Day of month
Time	5	4	"	1X,I4	Station time (local time)
Station	11	6	"	1X,A5	Station name. Observations are taken at the surface unless the field contains a number followed by the letter "M". This indicates observations were taken at that depth (meters) for the preceding station. AH=Off Astoria,Ore.,along 46°14.0'N BH=Off Brookings,Ore.,along 42°00.0'N CH=Off Coos Bay,Ore.,along 43°20.6'N DB=Off Depoe Bay,Ore.,on a line between 44°48.8N-124°05.4'W and 45°00.0N, 124°34.6'W UH=Off Umpqua River,Ore.,along 43°39.0'N YH=Off Yachats,Ore.,along 44°20.0'N OR=Off Otter Rock,Ore., 44°45.3'N BC=Off Beaver Creek,Ore., 44°31.0'N A=Off Alsea,Ore.,along 44°26.0'N Y=Off Yachats,Ore.,along 44°20.0'N GK=Off Gwynn Knoll,Ore.,along 44°13.9'N HH=Off Heceta Head,Ore.,along 44°08.1'N FH=Off Florence,Ore.,along 43°59.0'N NH=Off Newport,Ore.,along 44°39.1'N Most stations are identified by a letter number code. Numerals that have a letter or letters prefix are the distanc offshore in nautical miles. Thus NH-85 is a hydrographic station 85 miles off the coast from Newport, Oregon. All s tions that have other than the above letter prefixes were numbered sequentially with

(continued on next page)

RECORD FORMAT DESCRIPTION

RECORD NAME 6-13a

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN bytes (e.g., bits, bytes)	16. LENGTH NUMBER	16. LENGTH UNITS	17. ATTRIBUTES	18. USE AND MEANING
Station (continued)					the letter prefix designating either a particular leg of that cruise or designating what work was done on that particular station.
Latitude	17	9	bytes	F4.0,F5.1	Decimal degrees. North is a positive number and south a negative number.
Longitude	26	10	"	F5.0,F5.1	Decimal degrees. North is a positive number and south a negative number.
Temperature	36	6	"	F6.2	Equilibrator temperature °C
Temperature	42	6	"	F6.2	In situ temperature °C
Salinity	48	7	"	F7.3	°/oo
Sea PCO_2	55	7	"	F7.1	PPM
Air PCO_2	62	6	"	F6.1	PPM
SATN CO_2	68	7	"	F7.1	PPM
Data Card Identifier	75	6	"	5X,I1	Col. 80 contains 1

RECORD FORMAT DESCRIPTION

RECORD NAME 6-13B

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN bytes (e.g., bits, bytes)	16. LENGTH NUMBER	16. LENGTH UNITS	17. ATTRIBUTES	18. USE AND MEANING
Barometer	1	8	bytes	F8.2	Inches of mercury
Relative humidity	9	4	"	F4.0	%
Wind direction	13	3	"	F3.0	Wind direction/10
Wind velocity	16	2	"	F2.0	Beaufort scale
pH	18	6	"	F6.3	pH units
Alkalinity	24	5	"	F5.2	MEQ/KG.
TCO_2	29	5	"	F5.2	ML/KG
Oxygen ML	34	5	"	F5.2	ML/L
Oxygen	39	4	"	F4.0	µMOL/KG
AOU	43	4	"	F4.0	µMOL/KG
Phosphate	47	5	"	F5.2	µMOL/KG
Nitrate + Nitrite	52	5	"	F5.1	µMOL/KG
Silicate	57	4	"	F4.0	µMOL/KG
Salinity indicator	61	2	"	1X,A1	There is not necessarily new salinity data for every line. If the immediately preceding line's salinity is used to calculate units, this column will contain a "*". If there is a new salinity this column will remain blank.
DBT	63	5	"	F5.2	°C Dry Bulb Temperature
Data Card Identifier	68	13	"	12X,I1	Col. 80 contains 2

Access No - 74-0004
Inst - OREGON STATE UNIVERSITY

	CRUISE	FROM	TILL	
	Y7103E	3-28-71	3-31-71	✓
	Y7106B	6-12-71	6-16-71	✓
2NB 8	Y7205C	5-28-72	6-05-72	
	Y7206C	6-20-72	6-23-72	✓
	Y7207A	7-05-72	7-09-72	✓
	Y7207C	7-19-72	7-23-72	✓
	Y7207E	7-31-72	8-02-72	✓
	Y7208E	8-26-72	8-30-72	✓
1ST 5	Y7001A	1-06-70	1-09-70	✓
	Y7001C	1-25-70	1-27-70	✓
	Y7005A	5-04-70	5-10-70	✓
	Y7006A	6-16-70	6-30-70	✓
	YALOC-70	7-17-70	8-25-70	✓

NODC CR. TR0004

74-0004

School of Oceanography
Oregon State University
Corvallis, Oregon 97331 (503) 754-3504

14 December 1973

MEMORANDUM

TO: U. S. Dept. of Commerce
National Oceanic and Atmospheric Administration
National Oceanographic Data Center
Records Section
Rockville, MD 20852

FROM: Dr. Louis I. Gordon, Assistant Professor

SUBJECT: Enclosed data submission to NODC

The data in this submission comprise what may be thought of as "Volume 2, 1970-1972" of North Pacific surface P_{CO_2} data. Volume 1 was submitted earlier by Mr. Richard Tomlinson, Mr. David Standley, and myself, and received the NODC Accession number 73-0118.

The present submission contains data of a similar nature but some changes have been made in format and content reflecting changes in our technology and data processing methodology. The data documentation form has been filled out rather completely and will certainly answer most needs. The material referenced in the attached bibliography will serve as further documentation if necessary. Xerox copies of the explanatory material from appropriate OSU School of Oceanography Data Reports have been enclosed to assist in documentation. Finally, an additional data report which is in press at Oregon State University will be transmitted when available from the printers. We anticipate that this will occur in late January or early February.

If possible, would you please send us the accession number for the present data submission as soon as practical. This would be helpful in some internal procedures here at Oregon State University.

Thank you very much.

LIG

sw

letter written 1/10/74

ATTACHMENT to Data Documentation Form Continued

BIBLIOGRAPHY

Atlas, E. L., S. W. Hager, L. I. Gordon and P. K. Park. 1971. A practical manual for use of the Technicon AutoAnalyzer in seawater nutrient analyses; revised. 49 numb. leaves. (Oregon State University, Dept. of Oceanography, Technical Report 215, Reference no. 71-22)

Gilbert, W. E., W. M. Pawley and K. Park. 1968. Carpenter's oxygen solubility table and nomograph for sea water as a function of temperature and salinity. Journal of Oceanographic Society Japan 23: 252-255.

Gordon, L. I. and P. K. Park. 1972. A continuous P_{CO_2} measurement system. (Oregon State University, School of Oceanography, Technical Report 240, Reference no. 72-17. October 1972.

Park, Kilho, G. H. Kennedy and H. H. Dobson. 1964. Comparison of gas chromatographic method and pH-alkalinity method for determination of total carbon dioxide in sea water. Anal. Chem., 36: 1686.

Strickland, J. D. H. and T. R. Parsons. 1968. A practical handbook of seawater analysis. Fisheries Research Board of Canada, Ottawa. Bulletin 167. 311 p.

Enclosure 1

Part C.

2. Brief description of file organization.

TAPE 2207 contains chemical data for 13 cruises, each separated by one end of file mark. The first record of each file is a header giving cruise identification and inclusive dates. The first five files are written with one format while the last eight files are written with a new format. Each format is described in the documentation form.

Structure of the tape is shown below including the header records.

FILE 1. OSU CHEMICAL DATA FOR CRUISE Y7001A 1-06-70 TO 1-09-70
97 BCD RECORDS OF DATA
EOF

FILE 2. OSU CHEMICAL DATA FOR CRUISE Y7001C 1-25-70 TO 1-27-70
28 BCD RECORDS OF DATA
EOF

FILE 3. OSU CHEMICAL DATA FOR CRUISE Y7005A 5-04-70 TO 5-10-70
285 BCD RECORDS OF DATA
EOF

FILE 4. OSU CHEMICAL DATA FOR CRUISE Y7006A 6-16-70 TO 6-30-70
845 BCD RECORDS OF DATA
EOF

FILE 5. OSU CHEMICAL DATA FOR CRUISE YALOC-70 7-17-70 TO 8-25-70
803 BCD RECORDS OF DATA
EOF

FILE 6. OSU CHEMICAL DATA FOR CRUISE Y7103E 3-28-71 TO 3-31-71
217 BCD RECORDS OF DATA
EOF

FILE 7. OSU CHEMICAL DATA FOR CRUISE Y7106B 6-12-71 TO 6-16-71
311 BCD RECORDS OF DATA
EOF

FILE 8. OSU CHEMICAL DATA FOR CRUISE Y7205C 5-28-72 TO 6-05-72
1603 BCD RECORDS OF DATA
EOF

Enclosure 1 continued.

FILE 9. OSU CHEMICAL DATA FOR CRUISE Y7206C 6-20-72 TO 6-23-72
1075 BCD RECORDS OF DATA
EOF

FILE 10. OSU CHEMICAL DATA FOR CRUISE Y7207A 7-05-72 TO 7-09-72
903 BCD RECORDS OF DATA
EOF

FILE 11. OSU CHEMICAL DATA FOR CRUISE Y7207C 7-19-72 TO 7-23-72
807 BCD RECORDS OF DATA
EOF

FILE 12. OSU CHEMICAL DATA FOR CRUISE Y7207E 7-31-72 TO 8-02-72
747 BCD RECORDS OF DATA
EOF

FILE 13. OSU CHEMICAL DATA FOR CRUISE Y7208E 8-26-72 TO 8-30-72
2035 BCD RECORDS OF DATA
EOF
EOF
EOF
EOF
EOF

ATTACHMENT to Data Documentation Form

A. 7. Dates

From:	To:
1/06/70	1/09/70
1/25/70	1/27/70
5/04/70	5/10/70
6/16/70	6/30/70
7/17/70	8/25/70
3/28/71	3/31/71
6/12/71	6/16/71
5/28/72	6/05/72
6/20/72	6/23/72
7/05/72	7/09/72
7/19/72	7/23/72
7/31/72	8/02/72
8/26/72	8/30/72

B. SCIENTIFIC CONTENT continued

Name of Data Field	Reporting Units or Code	Methods of Obs. & Instrument used	Analytical Methods & Lab Procedures	Data Processing Tech.
Total carbon dioxide	~~millimeters~~ MICROLITERS? per kilogram	Samples from equilibrator or bottle casts	Gas chromatograph. See Park et al. (1964)	N/A
Oxygen	ml STP/l and µmol/kg	Samples from equilibrator or bottle casts	Winkler titration per Strickland and Parsons (1968)	N/A
AOU	µmol/kg	Calculated	N/A	Oxygen solubilities calculated from equation of Gilbert, Pawley and Park (1968)
Phosphate Nitrate(+ Nitrite) Silicate	µmol/kg	Samples from equilibrator or bottle casts	Technicon Auto-Analyzer by methods of Atlas et al. (1971) AND WYATT ET AL (1971) Some samples frozen for analysis ashore.	N/A
Dry bulb temperature	°C	Sling psychrometer	N/A	N/A

DEPARTMENT OF OCEANOGRAPHY

SCHOOL OF SCIENCE

OREGON STATE UNIVERSITY

Corvallis, Oregon 97331

HYDROGRAPHIC DATA FROM OREGON WATERS

1970

by

Bruce Wyatt
Richard Tomlinson
William Gilbert
Louis Gordon
and Dennis Barstow

Data Report No. 49
Office of Naval Research
Contract N00014-67-A-0369-0007
Project NR 083-102
NSF GA 12113

Reference 71-23
October 1971

John V, Byrne
Chairman

TABLE OF CONTENTS

TABLES

INTRODUCTION

Hydrographic Data from Oregon Waters, 1970, is the latest in a series of reports on the water masses along the Oregon coast. Reports for time periods beginning in 1955 are listed on page 10. Also included in this report are data from the Gulf of Alaska and Sea of Cortez.

DATA COLLECTING AND PROCESSING

Data were collected by Oregon State University personnel aboard the R/V YAQUINA and the R/V CAYUSE. Most of the cruises were concerned with surveying hydrographic conditions along a latitudinal track at 44°39.1'N and studying the Columbia River plume.

Most stations are identified by a letter-number code. Numerals that have a BH, CH, HH, GK, Y, A, BC, NH or DB prefix are the distance offshore in nautical miles. Thus NH-85 is a hydrographic station 85 miles off the coast from Newport, Oregon. All stations that have other letter prefixes were numbered sequentially with the letter prefix designating either a particular leg of that cruise or designating what work was done on that particular station. Cruise tracks are included to facilitate location of stations.

Explanation

Letter	
DB	Off Depoe Bay, Oregon, on a line between 44°48.80', 124°05.38'N (DB-1) and 45°00.00', 124°34.64'N (DB-25)
OR	Off Otter Rock, Oregon, along 44°45.3'N
NH	Off Newport, Oregon, along 44°39.1'N
BC	Off Beaver Creek, Oregon, along 44°31.0'N
A	Off Alsea, Oregon, along 44°26.0'N
Y	Off Yachats, Oregon, along 44°20.0'N
GK	Off Gwynn Knoll, Oregon, along 44°13.9'N
HH	Off Heceta Head, Oregon, along 44°08.1'N
CH	Off Coos Bay, Oregon, along 43°20.6'N
BH	Off Brookings, Oregon, along 42°00.0'N

Depth

Depth determinations were made by the "depth-difference" method described in the U.S. Hydrographic Office Publication 607 (1968). At least once each year three to six calibration casts were made to monitor the

pressure coefficients for unprotected thermometers. Depth estimates have an approximate accuracy of 1.5 percent at 750 m depth. Depths of the second cast are followed by an asterisk if two or more casts were used as a single station.

Temperature

Thermometers were calibrated at Oregon State University using the Oceanography Department's calibration tank. A quartz thermometer system Hewlett-Packard Model 2801A was the standard. It was calibrated against a platinum resistance thermometer and a Mueller bridge calibrated by the U.S. Bureau of Standards. Intercalibration tests were also made with the University of Washington Department of Oceanography. Comparisons of results from five thermometers from the University of Washington indicated corrections obtained from our tests averaged within 0.007°C of corrections obtained from University of Washington calibrations for the previous year. This was only a preliminary attempt at intercalibration and a more conclusive test is planned for the Oceanographic Instrumentation Center to standardize our procedures and to reduce further the errors in temperature measurements resulting from procedure, time between calibrations, and the accuracy of the two standard thermometers.

The accuracy of reduced temperature readings is believed to be ±0.02°C for the reversing thermometers. All sampling bottles were equipped with two reversing thermometers. Those used below 200 m also have an unprotected thermometer for determination of thermometric depth.

Salinity

Salinity was determined with an inductive salinometer, Model 11, manufactured in Australia by Industrial Manufacturing Engineers Pty. Ltd. and with a Hytech salinometer, Model 6220. The method was described by Brown and Hamon (1961). Substandard water was prepared from seawater that had been collected 100 miles off Oregon and stored for three months. Copenhagen water was used as standard seawater.

Precision Comparison of Salinometers

The following experiment was conducted to determine if either of the laboratory salinometers in use at Oregon State University was more precise than the other.

Eleven sets of salinity samples at different concentrations were prepared containing six replications. Each set of replications was considered a separate experiment. Within these six replications, 3 samples were analyze with the Hytech salinometer and 3 with the Australian salinometer. The hypothesis was tested that there was no difference in salinity determinations between the two salinometers. The two-tailed T test was used (Li, 195

For 8 of the 11 sets of samples ranging in concentration from 32‰ to 37‰, the hypothesis was accepted at the 95% confidence interval. For samples at 30‰, the hypothesis was accepted at the 99% confidence level. For sets at 15‰ and 20‰ the hypothesis was rejected at the 99% confidence level.

The standard error (standard deviation/(number of samples)$^{1/2}$), a measure of precision, was more for the Hytech salinometer; i.e., the Hytech was less precise. The average standard error was 0.0026‰ for the Hytech compared to 0.0015‰ for the Australian salinometer.

Accuracy of Inductive Salinometers

The following experiment estimated the accuracy for inductive salinometers in use at Oregon State University Department of Oceanography. Artificial seawater samples prepared by the National Oceanographic Instrumentation Center (NOIC) were accepted as the primary standard. These samples, consisting of 6 replications of samples from each of 4 salinity concentrations, were assumed to be unbiased and precise to within ±0.004‰. The mean difference of salinity determinations for each set of 6 samples is given below:

NOIC Sample Concentration (‰)	Standard Error in ‰ of OSU Determinations (UNESCO Tables)
31.080	0.0001
34.248	0.0006
36.262	0.0013
39.212	0.0026

The mean standard error is 0.0012‰ which lies within the precision claimed (±0.004‰) for preparation of the standard seawater.

These samples were analyzed with the Australian salinometer, but since there is no difference in salinity determinations made between the Australian and the Hytech salinometer (see previous section), it is concluded that both the Hytech and the Australian salinometer have an accuracy within the range of precision for preparation of the artificial seawater, or ±0.004‰.

Oxygen

Most of the oxygens were run at sea. The modified Winkler method (Strickland and Parsons, 1968) was used.

The precision for land run oxygens given by Strickland and Parsons is $2s = 0.0336$ ml/l.

Automated Nutrient Analysis

All nutrient analysis procedures using the Autoanalyzer® have been described in detail by Atlas, et al. (1971). These methods were applied to samples from all 1970 cruises other than Y7001-A and Y7001-C, which were analyzed according to the methods outlined by Barstow, et al. (1968) and Hager, et al. (1968).

The method used for silicate analysis was basically that of Armstrong, et al. (1967). Three sampling tubes were used to give ranges of 0 - 12 µM, 0 - 50 µM, and 0 - 200 µM. Precision was estimated as ±1.6% at 2σ for 48 samples in the medium range.

Nitrate and nitrite concentrations were determined according to the method outlined by Armstrong, et al. (1967). Two sampling tubes were used in these analyses to give ranges of 0 - 15 µM and 0 - 40 µM. Precision has been estimated as ±3% at 2σ for 48 samples in the high range.

The phosphate analysis was a modification of the procedure of Bernhart and Wilhelms (1967) which substituted 1% (w/v) hydrazine sulfate for ascorbic acid. Sample to sample, precision was about ±1.8% at 2σ for 48 samples. This method gives a 10% increase in sample absorbance over that used for cruises Y7001-A and Y7001-C (Barstow, et al., 1969).

Manual Phosphate Analysis

When measured manually, phosphate was determined using a Beckman DU spectrophotometer and the method described by Barstow, et al. (1969). For cruises Y7001-A and Y7001-C, manual phosphate values were used to normalize those obtained using the Technicon Autoanalyzer® according to the Grasshoff modification described previously (Barstow, et al., 1969).

Reported values are determined by $y = ax - b$, where y is the reported value, a is the average slope, x is the Autoanalyzer® value, and b is the average intercept. The average slopes and intercepts used are given below.

Cruise	Average Slope	Average Intercept
Y7001-A	0.838	-0.09
Y7001-C	1.03	-0.36

Normalization was not necessary on subsequent cruises because of improved Autoanalyzer® techniques.

pH

An Orion model 801 digital pH meter was used for all pH determinations. Precisely weighed Beckman 7.41 buffers were used for instrument standardization. The method is described by Park (1966). Values for all cruises have

been corrected to *in situ* temperature using the O.S.U. CDC 3300 computer.

Alkalinity

The alkalinity was determined on the previously measured pH samples using the method of Anderson and Robinson (1946). On the YALOC-70 cruise, alkalinity was determined using 1.5 ml of 0.1 N hydrochloric acid, rather than the customary 15 ml of 0.01 N acid. The higher final salinities which resulted from this change lay within the range found by Culberson, *et al.* (1970) to correspond to a nearly constant value of the activity coefficient of hydrogen ions. Their value for the coefficient was used for the reduction of this data.

Precision of Chemical Data

The data for phosphate, nitrate and nitrite, silicate and A.O.U. (apparent oxygen utilization) were spot checked for the Newport and Depoe Bay hydrographic lines by visual inspection of vertical profiles plotted by the O.S.U. CDC 3300 computer. Assuming that seasonal changes below 500 meters are insignificant, examination of the data prompted no rejection of points.

All numerical estimates of precision are given as two standard deviations from the mean, based on replicate analysis from the same sampling bottle. The results for chemical data other than nutrients are summarized in Table 1.

It should be noted that, contrary to data processing methods previously used, negative nutrient values were not rejected and called zero.

All nutrient values for cruise C7002-D and those indicated by the letter, "L", for cruise Y7006-A were frozen for over one year prior to analysis. The pH and alkalinity values for cruise C7002-D were measured using a pH meter found to have a systematic inaccuracy of approximately +0.1 pH unit. No attempt has been made to correct the data for this effect. These portions of the data should therefore be considered as only approximations to environmental values. Obviously, spurious values in the C7002-D nutrient data were rejected by visual inspection.

Computations

All hydrographic data were processed with the aid of the CDC 3300 computer. Auxiliary temperature corrections and index corrections obtained from laboratory thermometer calibrations were applied with a computer program. Property values at standard depths are determined by three-point parabolic interpolation. (Two observed property points above the standard depth and one point below were interpolated parabolically: the result was averaged with similar interpolation by using one observed point above the standard depth and two points below.) The specific volume anomaly, dynamic height,

TABLE 1. Summary of Precision Estimates

Cruise	Y7005-A		Y7006-A		YALOC-70	
	mean ± 2 s	no. samples	mean ± 2 s	no. samples	mean ± 2 s	no. samples
Salinity (‰)			33.877 ± 0.000	5*	32.615 ± 0.003	9
					32.649 ± 0.004	10*
					32.926 ± 0.002	10
Oxygen (ml/l)	1.57 ± 0.29	5*	0.56 ± 0.08	7*	0.75 ± 0.20	10*
			1.34 ± 0.10	7*	6.59 ± 0.08	6
			2.47 ± 0.10	7*		
			2.50 ± 0.00	5*		
			2.53 ± 0.03	7*		
			3.60 ± 0.06	5*		
			4.22 ± 0.02	5*		
pH	7.505 ± 0.010	12*	7.710 ± 0.008	4*	8.064 ± 0.010	10
	8.074 ± 0.006	11*	7.971 ± 0.011	7*	8.065 ± 0.010	10
					8.203 ± 0.004	10
					8.226 ± 0.009	10
Alkalinity (meq/l)	2.43 ± 0.01	12*	2.17 ± 0.12	8*	2.23 ± 0.03	10
	2.54 ± 0.01	12*	2.26 ± 0.02	5*	2.24 ± 0.03	10
					2.24 ± 0.04	
					2.26 ± 0.03	
ΣCO_2 (μM)			2.21 ± 0.02	9*		
			2.29 ± 0.02			

* Replicate samples were run in succession rather than interspersed among other samples.

and sigma-t were computed by using interpolated properties. The same computer program has been used in all Oregon State University hydrographic data reports.

Weather codes and cloud cover codes were adopted from the National Oceanographic Data Center Manual "Processing Physical and Chemical Data from Oceanographic Stations," Publication M-2 (Rev. Aug. 1964).

ACKNOWLEDGMENTS

This work was supported by Office of Naval Research contract N00014-67-A-0369-0007 and National Science Foundation grant NSF GA-12113. Work at sea was under the supervision of Bruce Wyatt, Dennis Barstow, Lyndal Brixius, and Mark Halsey. Ronald Jones analyzed most of the salinity and dissolved oxygen samples and conducted salinity precision and accuracy tests. On cruise 7002, Lyndal Brixius analyzed all oxygen samples and David Helwig analyzed all salinity samples. The excellent cooperation of the officers and crew of the R/V CAYUSE and R/V YAQUINA is also gratefully acknowledged.

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DEPARTMENT OF OCEANOGRAPHY

SCHOOL OF SCIENCE

OREGON STATE UNIVERSITY

Corvallis, Oregon 97331

HYDROGRAPHIC DATA FROM OREGON WATERS

1971

by

Bruce Wyatt
Richard Tomlinson
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John V. Byrne
Chairman

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Most stations are identified by a letter-number code. Numerals having a prefix listed below are the distance offshore in nautical miles. Thus NH-85 is a hydrographic station 85 miles off the coast from Newport, Oregon. All stations that have other letter prefixes were numbered sequentially with the letter prefix designating either a particular station. Cruise tracks are included to facilitate location of stations.

Explanation

Letter	
AH	Off Astoria, Oregon, along 46° 14.0'N
BH	Off Brookings, Oregon, along 42° 00.0'N
CH	Off Coos Bay, Oregon, along 43° 20.6'N
DB	Off Depoe Bay, Oregon, on a line between 44° 48.8'N 124° 05.4'W and 45° 00.0'N, 124° 34.6'W
FH	Off Florence, Oregon, along 43° 59.0'N
NH	Off Newport, Oregon, along 44° 39.1'N
UH	Off Umpqua River, Oregon, along 43° 39.0'N
YH	Off Yachats, Oregon, along 44° 20.0'N

Depth

Depth determinations were made by the "depth-difference" method described in the U.S. Hydrographic Office Publication 607 (1968).

Depth estimates have an approximate accuracy of 1.5 percent at 750 m depth. Depths of the second cast are followed by an asterisk if two or more casts were used as a single station. Depths followed by a letter C indicate a CTD cast. Our conductivity-temperature-depth probe was manufactured by Geodyne. Depths followed by a letter A indicate a value of 2.50 was assumed for total alkalinity for the purpose of calculating the pH temperature correction.

Temperature

Thermometers were calibrated at Oregon State University using the Oceanography Department's calibration tank. A quartz thermometer system Hewlett-Packard Model 2801A was the standard. It was calibrated against a platinum resistance thermometer and a Mueller bridge calibrated by the U.S. Bureau of Standards. Intercalibration tests were also made with the University of Washington Department of Oceanography. Comparisons of results from five thermometers from the University of Washington indicated corrections obtained from our tests averaged within 0.007° C of corrections obtained from University of Washington calibrations for the previous year. This was only a preliminary attempt at intercalibration and a more conclusive test is planned for the Oceanographic Instrumentation Center to standardize our procedures and to reduce further the errors in temperature measurements resulting from procedure, time between calibrations, and the accuracy of the two standard thermometers.

The accuracy of reduced temperature readings is believed to be ±0.02° C for the reversing thermometers. All sampling bottles were equipped with two reversing thermometers. Those used below 200 m also have an unprotected thermometer for determination of thermometric depth.

Salinity

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Precision Comparison of Salinometers

Eleven sets of samples at different concentrations were prepared containing six replications. Each set of replications was considered a

separate experiment. Within these six replications, three samples were analyzed with the Hytech salinometer and three were analyzed with the Australian salinometer. The hypothesis was tested that there was no difference in salinity determinations between the two salinometers. The two-tailed t-test was used (p. 100, Li 1964). For 8 of the 11 sets of samples ranging in concentration from 32‰ to 37‰, the hypothesis was accepted at the 95% confidence interval. For samples at 30‰, the hypothesis was accepted at the 99% confidence level. For sets at 15‰ and 20‰ the hypothesis was rejected at the 99% confidence level.

The standard error (standard deviation/(number of samples) $^{1/2}$), a measure of precision, was less for the Hytech salinometer, i.e., the Hytech was more precise. The average standard error was 0.0026‰ for the Hytech compared to 0.0015‰ for the Australian salinometer.

Accuracy of Inductive Salinometers

To obtain an estimate of accuracy for inductive salinometers in use at Oregon State University Department of Oceanography, the following experiment was conducted. Artificial seawater samples prepared by the National Oceanographic Instrumentation Center (NOIC) were accepted as the primary standard. These samples were assumed to be unbiased and precise to within ±004‰. The samples consisted of six replications of samples from each of four salinity concentrations. The mean difference of salinity determinations for each set of six samples is given below:

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31.080	0.0001
34.248	0.0006
36.262	0.0013
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The mean standard error is 0.0012‰ which lies within the precision claimed (±0.004‰) for preparation of the standard seawater.

These samples were analyzed with the Australian salinometer, but there is no difference in salinity determinations made between the Australian and the Hytech salinometer (see previous section). It is therefore concluded that both the Hytech and the Australian salinometer have an accuracy within the range of the precision for preparation of the artificial seawater.

Oxygen

Most of the oxygens were run at sea. The modified Winkler method (Strickland and Parsons, 1968) was used.

Oxygen Determination Precision

The precision of oxygen analysis was examined from seven sets of observations, each of a different concentration. Each set of observations contained seven replications. The standard error and the standard deviation were calculated for each of the sets (p. 44, Li 1964). The standard error in most cases is within the precision given by Strickland and Parsons (p. 23-26, 1968) of $0.0336/n^{1/2}$ ml/L in the range of from 0.06 to 89.6 ml/L.

Comparison of Standard Errors

for Oxygen Analysis

Number of Observations	Mean	Standard Error	Strickland and Parsons Precision
5	4.22	± 0.005 ml/L	± .015 ml/L
5	3.60	± 0.014	± .015
7	2.47	± 0.017	± .013
5	2.50	± 0.000	± .015
7	2.53	± 0.005	± .013
7	1.33	± 0.017	± .013
7	0.56	± 0.014	± .013

Automated Nutrient Analysis

The nutrient analysis procedures for cruises Y7103-E and Y7106-B have been described in detail by Atlas et al. (1971) and by Wyatt et al. (1971).

TABLE 1. Summary of Precision Estimates for Automated Nutrient Analyses

Cruise	Y7103-E			Y7106-B		
	mean	2s	no. samples	mean or range	2s	no. samples
PO_4	0.84	0.03	5	0.63[c]	0.04	6[b]
	1.74	0.06	5	2.74[c]	0.16	6[b]
(μM)	1.80	0.04	5	3.12	0.03	10[b]
	2.75	0.02	5	5.28[c]	0.04	5
	2.99	0.02	9	0.28-3.50[a]	0.07	18 pairs
	3.03	0.03	5			
	3.26	0.06	10			
NO_3+NO_2	7.02	0.29	5	6.14[c]	0.21	6[b]
	8.40	0.36	5	29.25[c]	0.43	6[b]
(μM)	20.63	0.60	5	42.23	0.89	10[b]
	34.33	0.43	5	44.44[c]	0.13	6
	36.85	1.50	10	0.10-45.77[a]	0.45	17 pairs
	38.07	0.60	10			
	37.94	0.45	5			
SiO_4	8.53	0.57	5	19.80[c]	0.50	6[b]
	13.17	0.22	5	86.68	2.24	10[b]
(μM)	25.53	0.47	5	93.91[c]	1.09	6[b]
	60.58	0.89	5	192.55[c]	1.86	6
	69.54	0.99	10	2.78-141.52[a]	0.87	16 pairs
	72.46	2.13	5			
	79.94	1.23	10			

[a] Precision estimates calculated from a series of duplicate samples using the relationship, $s = (\Sigma(X_1-X_2)^2/2n)1/2$, where X_1 and X_2 are the values of duplicate samples, and n is the number of duplicate sets.

[b] Replicate samples run interspersed among other samples, rather than consecutively.

[c] Standard

Various sizes of sampling tubes were used with the Auto Analyzer® to give ranges of 0-12μM, 0-50μM and 0-200μM for silicate, and 0-40μM and 0-60μM for nitrate and nitrite. Sample to sample precisions were estimated for sets of replicate samples. These results are listed in Table 1.

Problems were encountered with the nitrate reduction columns used on cruise Y7103-E. The pertinent nitrate + nitrite data was corrected for column drift assuming linear changes between standards run at the beginning and end of lots of 18 samples each. Table 2 lists the samples corrected in this manner.

pH

pH values were determined according to the method described by Wyatt et al. (1970). Precision estimated for cruise Y7106-B was ±0.01 pH units at 2σ for 5 samples.

Alkalinity

The procedure used for the alkalinity determinations has been outlined by Wyatt et al. (1971). For both Y7103-E and Y7106-B, 1.5 ml of 0.01N hydrochloric acid was used, rather than 15 ml of 0.01N acid, as specified by the technique of Anderson and Robinson (1946). The value of the activity coefficient of hydrogen ions determined by Culberson et al. (1970) was used for the reduction of the present data.

TABLE 2. Y7103-E Nitrate Nitrite Samples Corrected for Effect of Reduction Column Drift.

Station	Sample Depth
NH 5	All depths
10	"
15	"
25	"
35	0-100m
45	2m, 20m, 50m, 150m, 600m
65	All depths
85	"
DB 5	"

Computations

All hydrographic data were processed with the aid of the CDC 3300 computer. Auxiliary temperature corrections and index corrections obtained from laboratory thermometer calibrations were applied with a computer program. Property values at standard depths are determined by three-point parabolic interpolation. (Two observed property points above the standard depth and one point below were interpolated parabolically: the result was averaged with similar interpolation by using one observed point above the standard depth and two points below.) The specific volume anomaly, dynamic height, and sigma-t were computed by using interpolated properties. The same computer program has been used in all Oregon State University hydrographic data reports.

Weather codes and cloud cover codes were adopted from the National Oceanographic Data Center Manual "Processing Physical and Chemical Data from Oceanographic Stations," Publication M-2 (Rev. Aug. 1964).

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Password:
 accNo    fleA refNo   proj inst ship startDate  cruise       catId
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 7400004  L130 TR0004  9999 3103 31YQ 1972/06/20 Y7206C           283971
 7400004  L130 L05490  9999 3103 31YQ 1972/07/31 Y7207E           283972
 7400004  L130 L05491  9999 3103 31YQ 1970/05/04 Y7005A           283973
 7400004  L130 L05492  9999 3103 31YQ 1972/07/05 Y7207A           283974
 7400004  L130 L05493  9999 3103 31YQ 1970/07/17 YALOC-70         283975
 7400004  L130 L05494  9999 3103 31YQ 1972/05/28 Y7205C           283976
 7400004  L130 L05495  9999 3103 31YQ 1970/01/25 Y7001C           283977
 7400004  L130 L05496  9999 3103 31YQ 1971/03/28 Y7103E           283978
 7400004  L130 L05497  9999 3103 31YQ 1972/07/19 Y7207C           283979
 7400004  L130 L05498  9999 3103 31YQ 1970/01/06 Y7001A           283980
 7400004  L130 L05499  9999 3103 31YQ 1971/06/12 Y7106B           283981
 7400004  L130 L05500  9999 3103 31YQ 1972/08/26 Y7208E           283982

(13 rows affected)
```

```
Password:
 accNo    fleA refNo   ship staCnt      recCnt      startDate   endDate
 -------- ---- ------- ---- ---------- ---------- ----------- -----------
 7400004  L130 L05501  31YQ           97         845 Jun 16 1970 Jun 30 1970
 7400004  L130 TR0004  31YQ           64        1075 Jun 20 1972 Jun 23 1972
 7400004  L130 L05490  31YQ           64         747 Jul 31 1972 Aug  2 1972
 7400004  L130 L05491  31YQ           78         285 May  4 1970 May 10 1970
 7400004  L130 L05492  31YQ           74         903 Jul  5 1972 Jul  9 1972
 7400004  L130 L05493  31YQ          311         803 Jul 17 1970 Aug 25 1970
 7400004  L130 L05494  31YQ           86        1603 May 28 1972 Jun  5 1972
 7400004  L130 L05495  31YQ           22          28 Jan 25 1970 Jan 27 1970
 7400004  L130 L05496  31YQ           20         217 Mar 28 1971 Mar 31 1971
 7400004  L130 L05497  31YQ           36         807 Jul 19 1972 Jul 23 1972
 7400004  L130 L05498  31YQ           29          97 Jan  6 1970 Jan  9 1970
 7400004  L130 L05499  31YQ           55         311 Jun 12 1971 Jun 16 1971
 7400004  L130 L05500  31YQ           93        2035 Aug 26 1972 Aug 30 1972

(13 rows affected)
```

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Password:
 accNo   fleA refNo  proj inst ship    startDate  cruise   catId
 ------- ---- ------ ---- ---- ------- ---------- -------- ----------
 7400004 L130 TR0004 9999 3103 31YQ    1972/06/20 Y7206C       283971
 7400004 L130 L05490 9999 3103 31YQ    1972/07/31 Y7207E       283972
 7400004 L130 L05491 9999 3103 31YQ    1970/05/04 Y7005A       283973
 7400004 L130 L05492 9999 3103 31YQ    1972/07/05 Y7207A       283974
 7400004 L130 L05493 9999 3103 31YQ    1970/07/17 YALOC-70     283975
 7400004 L130 L05494 9999 3103 31YQ    1972/05/28 Y7205C       283976
 7400004 L130 L05495 9999 3103 31YQ    1970/01/25 Y7001C       283977
 7400004 L130 L05496 9999 3103 31YQ    1971/03/28 Y7103E       283978
 7400004 L130 L05497 9999 3103 31YQ    1972/07/19 Y7207C       283979
 7400004 L130 L05498 9999 3103 31YQ    1970/01/06 Y7001A       283980
 7400004 L130 L05499 9999 3103 31YQ    1971/06/12 Y7106B       283981
 7400004 L130 L05500 9999 3103 31YQ    1972/08/26 Y7208E       283982
 7400004 L130 L05501 9999 3103 31YQ    1970/06/16 Y7006A       283983

(13 rows affected)
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7400047

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Password:
 accNo   fleA refNo  ship staCnt recCnt startDate  endDate
 ------- ---- ------ ---- ------ ------ ---------- ----------
 7400004 L130 TR0004 31YQ 64     1075   72/06/20   72/06/23
 7400004 L130 L05490 31YQ 64     747    72/07/31   72/08/02
 7400004 L130 L05491 31YQ 78     285    70/05/04   70/05/10
 7400004 L130 L05492 31YQ 74     903    72/07/05   72/07/09
 7400004 L130 L05493 31YQ 311    803    70/07/17   70/08/25
 7400004 L130 L05494 31YQ 86     1603   72/05/28   72/06/05
 7400004 L130 L05495 31YQ 22     28     70/01/25   70/01/27
 7400004 L130 L05496 31YQ 20     217    71/03/28   71/03/31
 7400004 L130 L05497 31YQ 36     807    72/07/19   72/07/23
 7400004 L130 L05498 31YQ 29     97     70/01/06   70/01/09
 7400004 L130 L05499 31YQ 55     311    71/06/12   71/06/16
 7400004 L130 L05500 31YQ 93     2035   72/08/26   72/08/30
 7400004 L130 L05501 31YQ 97     845    70/06/16   70/06/30

(13 rows affected)
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