

DEL-SG-05-90

Oceanographic Data Report Number 6:

Data from the CDR Cruises

July 1985 - July 1987

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University of Delaware

SEA GRANT



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by

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November 1988

Delaware Sea Grant College Program
University of Delaware
Newark, Delaware 19716

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The University of Delaware Sea Grant College Program is supported cooperatively by the National Oceanic and Atmospheric Administration, U.S. Department of Commerce and by the State of Delaware.

INTRODUCTION

This report presents physical, chemical, and biological data collected during 3 cruises on Chesapeake Bay during the summers of 1985, 1986, and 1987. These cruises covered the entire salinity gradient in the estuary, and include stations occupied in the Middle Atlantic Bight off the Delmarva Peninsula.

The data tables for each cruise in this report are accompanied by a cruise report outlining the events of the cruise, and by a chart(s) showing station positions occupied during the cruise.

This publication is the result, in part, of research sponsored by NOAA Office of Sea Grant, Department of Commerce, by the National Science Foundation; and by the College of Marine Studies.

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The University of Delaware Sea Grant College Program is supported cooperatively by the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, and by the State of Delaware.

We thank the crew of the R. V. Cape Henlopen for their aid in accomplishing the objectives of each cruise. Their help was instrumental in making the cruises a success.

MICROCOMPUTER DATABASE

The chemical, biological, and hydrographic data in this report is available as a sequential file on a 5 1/4 inch floppy disk for use with the IBM PC and compatible microcomputers running under MS-DOS.

The database contains 337 records of discrete water quality observations collected on the 3 oceanographic cruises during the summers of 1985, 1986, and 1987. Each record contains 64 fields, listing the hydrographic, chemical, and biological data measured for each observation.

A floppy disk containing the CHESAPEAKE BAY DATABASE and a 3 page description of the file structure of the disk is attached to the end of this report. To obtain further copies of the database contact,

Dr. T. M. Church
College of Marine Studies
University of Delaware
Newark, DE 19716.

SEE:
DELU-F-88-002

GLOSSARY

Each of the measured parameters in the following data tables is associated with a comment field which indicates special characteristics of the variable. The comment field is the single space following the last digit of the parameter and will usually be blank. However, it will contain a character if there is anything unusual about the variable. For instance, temperatures measured with the Neil Brown mark IIIb CTD are indicated by the letter 'C' following the temperature. Definitions of the comment characters are given in the 'Methods' section under the appropriate technique. The mathematical symbols '<' or '>' in any comment field mean that the true value of the parameter is less than or greater than the value given. A question mark '?' in the comment field indicates that, although the reported value is believed to be correct, there is some reason to doubt the reported value, usually due to confusion about the sample identification number.

Parameter	Description
STA	station name
DEPTH	depth in meters at which sample was taken
CAST TYPE	technique used to collect water samples, see discussion of Water Sampling in Methods section for description
LOCAL TIME	Eastern daylight saving time
WATER DEPTH	depth of water in meters
	Inorganics
SALINITY	salinity in parts per thousand (‰)
CL	chloride, micromolar
TEMP	water temperature in degrees Celsius (°C)
H2S	total dissolved hydrogen sulfide, micromolar
O2	dissolved oxygen, micromolar
% O2 SAT	percent oxygen saturation
pH(25C)	measured pH at 25°C and atmospheric pressure on NBS pH scale
ALK	total alkalinity, microequivalents/liter
TCO2	total dissolved inorganic carbon, micromolar

I	dissolved iodide, nanomolar
IO3	dissolved iodate, nanomolar
	Nutrients, Productivity, Light
PO4	dissolved phosphate, micromolar
NO3	dissolved nitrate, micromolar
NO2	dissolved nitrite, micromolar
NH4	dissolved ammonium, micromolar
SI	dissolved silicate, micromolar
SESTON	total suspended solids, milligrams/liter
Chl-a	chlorophyll-a, micrograms/liter
SECCHI	Secchi disk depth, centimeters
	Dissolved Trace Metals
FE	dissolved iron, micrograms/liter
CO	dissolved cobalt, micrograms/liter
NI	dissolved nickel, micrograms/liter
CU	dissolved copper, micrograms/liter
ZN	dissolved zinc, micrograms/liter
CD	dissolved cadmium, micrograms/liter
PB	dissolved lead, micrograms/liter

METHODS

Water Sampling

Water samples aboard the R/V Cape Henlopen were collected in 10 liter PVC Niskin bottles attached to a General Oceanics rosette sampler. Sampling depths were determined from continuous vertical temperature, salinity, and oxygen profiles measured with a Neil Brown mark IIIb CTD.

The technique used to collect a water sample is listed under the parameter 'Cast Type'.

Cast type - 'CTD' indicates that the water sample was taken with the General Oceanics rosette sampler.

- 'BOAT' indicates that the sample was collected by hand using 5 or 10 liter Niskin bottles from a small boat.

Temperature

Temperature was measured with reversing thermometers; 2 or 3 thermometers were used on each Niskin bottle. In cases where the reversing thermometers malfunctioned or where 4 minutes could not be allowed to equilibrate the reversing thermometers, temperature was taken from the CTD system. The CTD temperature may differ slightly from the actual temperature of the water sample, since the CTD temperature sensor lies 0.9 meters below the mid-point of the 10 liter Niskin bottles.

The precision (2σ) of the calculated temperatures, based on 530 replicate reversing thermometer readings, was 0.05°C.

A letter 'C' in the temperature comment field means that the temperature was taken from the CTD.

Salinity

Salinity was measured with an Industrial Instruments Model RS-7A portable induction salinometer. On cruise CDR-1, salinity was calculated from the measured conductivity ratio using the equations of Cox, Culkin, and Riley (1967). On cruises CDR-3 and CDR-4, salinity was calculated from the measured conductivity ratio using the Practical Salinity Scale 1978 (Dauphinee, 1980).

Note that salinities on these two salinity scales can differ by as much as 0.1‰ at salinities less than 1‰; the Practical Salinity Scale 1978 giving higher salinities.

The conductivity ratio of successive aliquots from the salinity sample was measured until the conductivity ratios of consecutive aliquots differed by less than 0.0001. The reported salinity is the average of salinities calculated from the last 2 conductivity readings. The precision (2σ) of the calculated salinity, based on 454 duplicate conductivity ratio measurements, was 0.002‰.

In a few cases where salinity samples were lost before analysis, salinities were taken from the CTD system. The CTD salinity may differ slightly from the actual salinity of the water sample, since the CTD conductivity sensor lies 0.9 meters below the mid-point of the 10 liter Niskin bottles.

A letter 'C' in the salinity comment field means that the salinity was taken from the CTD. A letter 'L' in the salinity comment field indicates that the salinity sample bottle leaked when turned upside down and shaken just before analysis; these samples may have been subject to evaporation during storage. However, no difference was found between salinities marked with an 'L' and salinities measured with the Neil Brown CTD. Therefore, salinities flagged with an 'L' are considered reliable.

Chloride

Chloride was measured by an automated potentiometric titration using a silver electrode and a double junction reference electrode (Corning #476067; 1 molar potassium nitrate outer filling solution). The potential was measured at 5 points after the endpoint, and the endpoint calculated by linear regression of the silver concentration versus volume of titrant added. Titrant (0.01 M AgNO_3) was added with a microcomputer controlled Metrohm model E535 5 ml digital buret readable to 0.001 ml. The electrode potential was measured to ± 0.1 mv with an Orion model 701A digital pH/mv meter, and recorded automatically by the microcomputer.

The relative precision (2 σ) of the chloride measurements, based on 43 replicate analyses, was 0.3%.

Oxygen and Percent Oxygen Saturation

Oxygen was measured by an automated version (Culberson and Huang, 1987) of the Winkler titration (Carpenter, 1965) using a microcomputer controlled Metrohm piston buret coupled with amperometric end-point detection. Titrant (0.14 N $\text{Na}_2\text{S}_2\text{O}_3$) was added with a Metrohm model E535 5 ml digital buret readable to 0.001 ml. Oxygen samples were measured in duplicate or triplicate.

The precision (2 σ) of the automated oxygen measurements, based on 365 replicate analyses, was 0.6 μM .

Percent oxygen saturation was calculated from the measured oxygen concentration using oxygen solubilities from Kester (1975).

Alkalinity

Total alkalinity was measured by an automated potentiometric titration using a semi-micro combination pH electrode (Corning #476050). A 25 ml sample was titrated with standardized 0.025 M HCl using a microcomputer controlled Metrohm model E535 5 ml digital buret readable to 0.001 ml. The titrant volume and electrode potential were measured at 5 pH values (3.9, 3.6, 3.42, 3.3, and 3.2), and the equivalence point calculated from linear regression of

hydrogen ion activity, corrected for carbonic acid ionization, versus volume of HCl added. Potentials were measured to ± 0.1 mv with an Orion model 701A digital pH/mv meter.

The precision (2σ) of the alkalinity measurements, based on 384 replicate analyses, was 5 μ equivalents/L.

pH

The reported pH values are the measured values at 25.0°C on the National Bureau of Standards pH Scale. Samples for pH measurement were brought to 25°C in a water bath prior to analysis. The pH was calculated from the measured electrode potential by the following equation,

$$\text{pH}(25^\circ\text{C}) = 7.413 - (E_x - E_{7.413})/59.157$$

where 7.413 is the pH of the NBS blood pH buffer at 25°C;

E_x is the measured electrode potential in the water sample; and

$E_{7.413}$ is the measured electrode potential in the buffer.

Potentials were measured to ± 0.1 mv with an Orion model 701A digital pH/mv meter.

pH was measured with a free diffusion pH assembly, similar to that of Culberson (1981), except that a 0.5 inch diameter pH electrode replaced the micro-blood pH electrode in the original pH assembly. The precision (2σ) of pH measurements with this assembly, based on 380 replicate analyses, was 0.005 pH units.

Total Dissolved Inorganic Carbon

Total dissolved inorganic carbon, TCO_2 , was calculated from the measured pH and alkalinity, using equations for the apparent dissociation constants of carbonic and boric acids from Millero (1979), and the boron to chlorinity ratio measured by Uppstrom (1974).

Hydrogen Sulfide

Total dissolved sulfide was determined on samples preserved with zinc acetate by the gas chromatographic method described by Cutter and Oatts (1987).

Iodide and Iodate

Dissolved iodide and iodate were determined by differential pulse polarography (Luther and Cole, 1988). The precision (1σ) of the analyses for each form of iodine was 2%.

Inorganic Nutrients

Cruise: CDR-1

The water sample for dissolved nutrient analysis was filtered through a precombusted Whatman GF/C filter (nominal pore size 1 μm) on board ship and quick frozen in dry ice for analysis ashore. Phosphate, nitrate, nitrite, and silicate were analyzed by manual colorimetry using standard methods (Strickland and Parsons, 1972), as modified in Sharp et. al. (1982). Ammonium was determined by the method of Solorzano (1969), as modified in Sharp et. al. (1982).

Each method was calibrated with standards prepared in pure water. No salt corrections have been applied to the reported values.

The ammonium standards prepared for cruise CDR-1 were apparently erroneous, and have not been used to calculate the ammonium values for this cruise. The comment character 'F' for ammonium on cruise CDR-1 indicates that ammonium values on this cruise were calculated using an assumed, theoretical value for the calibration factor F (=concentration of standard/absorbance of standard).

Nutrients were analyzed in duplicate. The standard deviation of each method, based on a statistical analysis of duplicate measurements, is given in Table 1. Detection limits using the above methods were 0.05 μM for phosphate, nitrate, and nitrite, and 0.1 μM for ammonium and silicate.

Table 1. Precision (standard deviation) of nutrient analyses. Values ending in ' μM ' are absolute standard deviations; values ending in '%' are relative standard deviations.

Nutrient	***** Cruise *****		
	CDR-1	CDR-3	CDR-4
PO ₄	0.05 μM	6%	10%
Si	5%	0.7%	0.7%
NO ₃	4%	0.07 μM	2%
NO ₂	0.02 μM	0.02 μM	0.04 μM
NH ₄	9%	7%	9%

Cruises: CDR-3 and CDR-4

Nutrients on cruises CDR-3 and CDR-4 were measured using methods from Strickland and Parsons (1972) as modified for an Alpkem Rapid Flow Analyzer. Calibrations were performed by standard additions, and all samples were analyzed in triplicate.

Aboard ship the water sample for dissolved nutrient analysis was pressure filtered, in line, successively through 1.0 μm and 0.4 μm Nuclepore filters held in all plastic, acid cleaned Geo-filters (Leonold Mold & Die Co., Denver, Colorado) under about 3.5 bar of filtered nitrogen gas pressure; and then quick frozen in dry ice for analysis ashore.

The standard deviation of each method, based on a statistical analysis of triplicate measurements, is given in Table 1.

Chlorophyll-a

Chlorophyll-a was measured by fluorometric analysis of acetone extracts (Strickland and Parsons, 1972). The fluorometer (Turner III) was calibrated with spectrophotometric measurements of chlorophyll extracts.

Seston

Total suspended seston was determined by passing a known volume of water through an acid rinsed, dried, preweighed Nuclepore filter (47 mm diameter, 0.4 μm pore size). After filtration, each filter was rinsed with distilled water, stored in a plastic petri dish, and frozen until analysis. In the laboratory, filters were dried at 70°C for 24 hours and reweighed.

The detection limit (3 σ) for total suspended seston, based on 43 measurements in offshore waters with low sestons, was 1.9 mg/L.

Dissolved Trace Metals

Samples for dissolved trace metal analysis were collected in Go-Flo (General Oceanics) bottles from a Kevlar (DuPont) hydrowire. Samples were pressure filtered, in line, successively through 142 mm diameter 1.0 μm and 0.4 μm Nuclepore filters held in all plastic acid cleaned Geo-filters (Leonold Mold & Die Co., Denver, Colorado) under about 3.5 bar of filtered nitrogen gas pressure.

Filters were back flushed after each sampling and reused until the filtering rate slowed sufficiently to indicate irreversible clogging, at which time the filter(s) was replaced.

Filtered seawater samples were collected in acid cleaned and distilled water (from a quartz still) rinsed polyethylene bottles, acidified to pH ≤ 2 , placed in ziplock plastic bags, and frozen until analysis. Samples were acidified on board in a portable plastic hood supplied with filtered air.

The acidified samples were extracted ashore by an APDC-DDDC/freon procedure (Kinrade and VanLoon, 1974; Danielsson et. al., 1978). Analysis was by graphite furnace atomic absorption spectrometry under filtered clean air conditions.

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Cruise Report

CDR-1

30 July - 4 August 1985

Yabled-25

5-7 August 1985

**Area: Chesapeake Bay
Delaware River and Bay
Middle Atlantic Bight**

Vessel: R/V Cape Henlopen

**Chief Scientists: T. M. Church and R. B. Biggs
College of Marine Studies
University of Delaware
Newark, Delaware**

Participants

**University of Delaware: C. Culberson, J. Pennock, M. Sarin, J. Sharp,
L. Cifuentes, R. Coffin, S. Compton, D. Debevec, C. Eisner, C. Epifanio,
T. Ferdelman, D. Lebauer, S. Murray, T. Pfeiffer, J. Roberts,
J. Scudlark, and J. Tramontano**

Woods Hole Oceanographic Institution: E. Sholkovitz and D. Mann

Old Dominion University: G. Cutter and D. Velinsky

University of South Carolina: J. Todd

Bermuda Biological Station: K. Binkley

**Supporting Agencies: Office of Sea Grant and
The National Science Foundation**

Cruise Summary:

This cruise was devoted primarily to a comparative study of the water column chemistries of Chesapeake and Delaware Bays. Chesapeake Bay was sampled from 31 July to 4 August, while the Delaware River and Bay was sampled between 5 and 7 August. The 2 legs of this cruise have been given different names: the Chesapeake leg is cruise CDR-1; the Delaware leg is cruise Yabled-25.

Chesapeake Bay Leg (CDR-1)

Measurements on this leg consisted of the following:

- (1) A transect across the continental shelf, stations CS1 to CS4, east of the entrance to Chesapeake Bay.

- (2) A salinity gradient survey of Chesapeake Bay, stations CB1 to CB23, sampled between 1 and 4 August.
- (3) An anchor station, CR1, occupied at the mouth of the Choptank River on 3 August.

A major goal of the Chesapeake Bay leg was to study the chemistry of the anoxic water in mid-bay. As part of this effort, Dr. G. Cutter (Old Dominion University) measured dissolved selenium species, iodine species, and hydrogen sulfide at many of the stations on this leg. The concentrations of these species are sensitive indicators of the oxidation-reduction potential of the water in which they occur.

Delaware River and Bay Leg (Yabled-25)

Measurements on this leg consisted of the following:

- (1) A salinity gradient survey, stations PO to CH, along the entire length of the Delaware Estuary from Trenton, New Jersey to the entrance of the bay at Cape Henlopen. These stations were occupied on 5 and 6 August.
- (2) A line of stations, DS3 to DS1, extending east across the continental shelf from the entrance to Delaware Bay. These stations were occupied on 7 August.

Data from the Delaware Bay leg are not given in this report. They are listed in,

University of Delaware Oceanographic Data Report Number 5: Yabled Cruises Part II, Data from YABLED-17 through YABLED-26, January-October 1985.
Delaware Sea Grant College Program DEL-SG-17-87, October 1987.

Radionuclide Measurements

One goal of this cruise was a detailed sampling of radionuclides in Chesapeake and Delaware Bays. During the cruise samples were taken for measurement of the following dissolved radionuclides,

University of Delaware: Po-210 and Pb-210
U-234 and U-238
Th-228 and Th-232

Woods Hole Oceanographic Institution: Pu-239 and Pu-240

University of South Carolina: Ra-224, Ra-226, Ra-228,
Ac-228, Th-228 and Be-10

In addition, grab samples and gravity cores for radium species were taken by Dr. J. Todd of the University of South Carolina.

Additional Specialized Chemical Measurements

- (1) Dissolved rare earth elements (La, Ce, Nd, Sm, Eu, Gd, Tb, Dy, Er, Yb, Lu) were measured on both legs of the cruise by Dr. E. Sholkovitz of the Woods Hole Oceanographic Institution.
- (2) Dissolved barium was measured by Dr. J. Todd of the University of South Carolina.
- (3) Dissolved arsenic samples were collected by Dr. T. Church of the University of Delaware.
- (4) Chlorinated hydrocarbons in air, water, and sediment samples were measured by K. Binkley of the Bermuda Biological Station.
- (5) Nutrient fluxes across the sediment-water interface in Delaware Bay were determined by measuring concentrations as a function of time in the water above incubated gravity cores. Contact Dr. J. Pennock of the College of Marine Studies for details of these measurements.
- (6) R. Biggs conducted 200 KHz acoustic profiling of the water column at several stations to resolve the concentrations of particulates and strong density gradients.

The parameters measured at each station are listed in the tables beginning on page 41. Plankton taxonomy, light profiles, dissolved combined amino acids, dissolved free amino acids, particulate amino acids, bacterial numbers, and bacterial production were measured at many stations but are not listed. In addition, surface temperature and salinity were continuously recorded during the cruise. Light energy in the visible spectrum was recorded and integrated for the entire cruise with a quantum meter.

An outline of activity during each day of the cruise is given on page 10. Station locations are shown on the following charts.

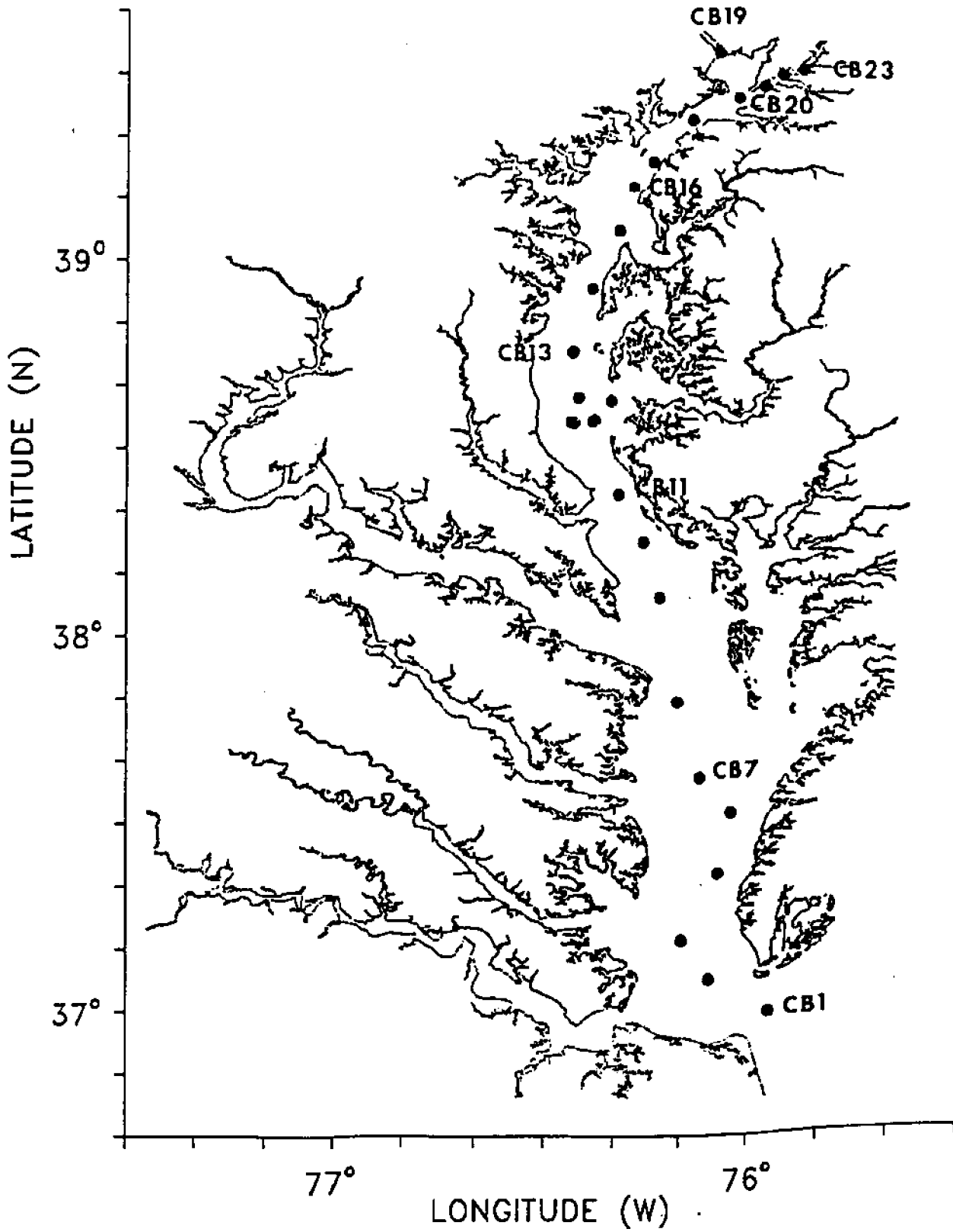
Cruise Outline

CDR-1

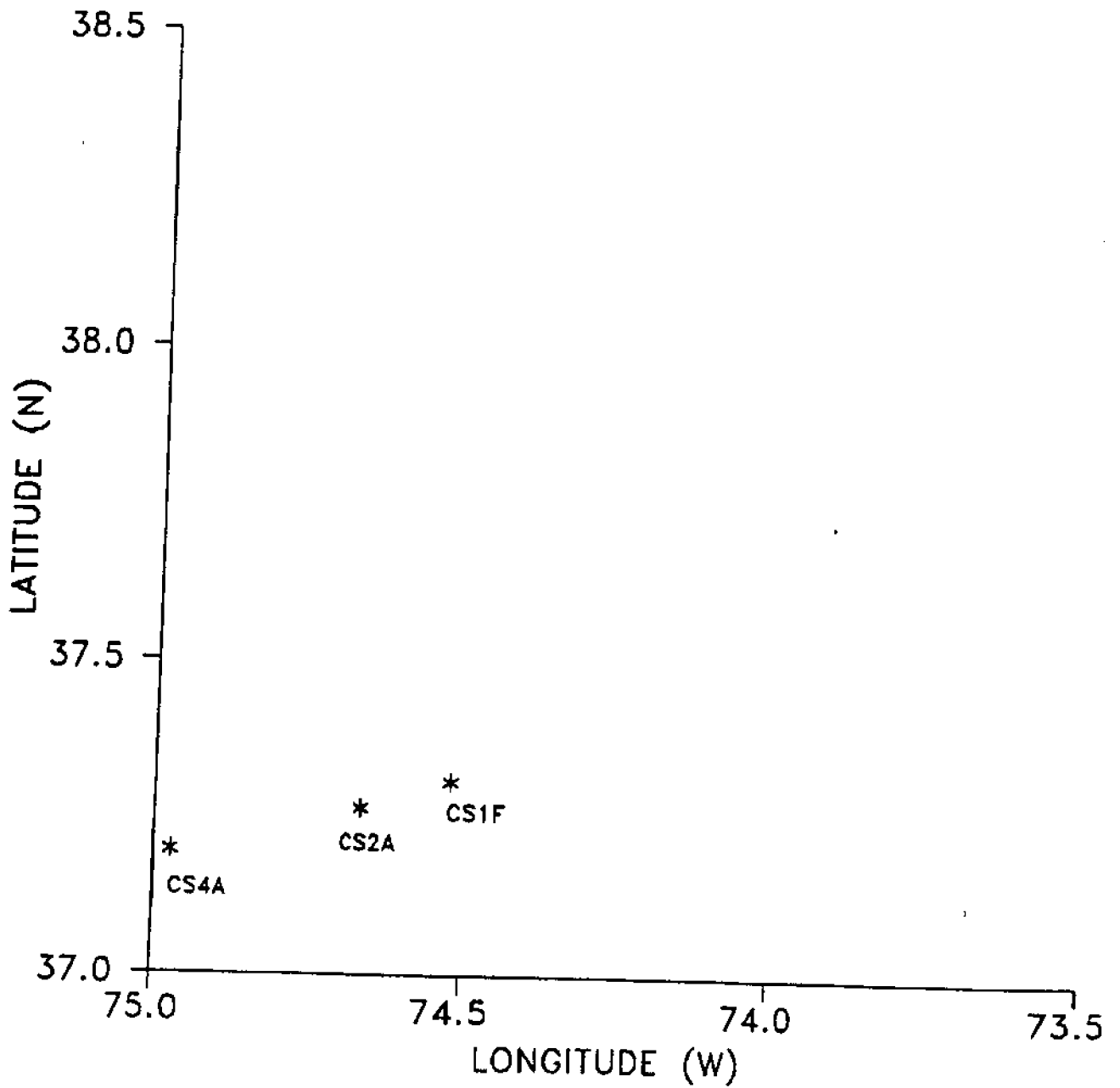
30 July - 4 August 1985

- 30 July Depart Lewes, Delaware at 17:20 for Washington-Norfolk Canyon (100 m isobath).
- 31 July Sample continental shelf off entrance to Chesapeake Bay. Stations CS1-CS4, CTD casts 1-12.
Dock in Norfolk at 23:00 to off-load samples and load gear and personnel.
- 1 August Sample high salinity region (30.6 - 16.7‰) of Chesapeake Bay. Stations CB1-CB9, CTD casts 13-23.
Dock at Piney Point, Maryland to off-load samples.
- 2 August Sample mid-salinity region (16.0 - 11.3‰) of Chesapeake Bay. Stations CB10-CB15, CTD casts 24-31).
Send zodiac small-boat to Annapolis to exchange personnel and off-load samples.
- 3 August Sample anoxic bottom waters off Choptank River. Stations CB12.34, CR1, CR3, CB12.44, CB13.45, CB14.46; CTD casts 32-46.
Dock in Baltimore to off-load samples.
- 4 August Sample low salinity region (9.0 - 0‰) of Chesapeake Bay. Stations CB16-CB23, CTD casts 47-54.
Transit Chesapeake and Delaware Canal and dock in Wilmington to exchange personnel, samples, and gear.

STATION POSITIONS: CDR-1



OFFSHORE STATION POSITIONS: CDR-1



Cruise Report

CDR-3

11-21 July 1986

Area: Chesapeake Bay
Middle Atlantic Bight

Vessel: R/V Cape Henlopen

Chief Scientist: T. M. Church
College of Marine Studies
University of Delaware
Newark, Delaware

Participants

University of Delaware: C. Culberson, G. Luther, T. Deering, T. Ferdelman,
G. Gawarkiewicz, K. Johnston, A. Masse, R. McCarthy, P. Rowe, S. Murray,
J. Masselink, G. Chin-Leo, T. Pfeiffer, S. Rau

Woods Hole Oceanographic Institution: D. Mann and M. McCaffrey

Old Dominion University: G. Cutter, C. Krahfrost, J. Rodford, M. SanDiego,
R. Kluckhohn

Supporting Agency: The National Science Foundation

Cruise Summary:

This cruise was divided into 2 parts: (1) a leg in the Middle Atlantic Bight, off the Delmarva peninsula, from 11-15 July; and (2) a Chesapeake Bay leg, from 15-21 July 1986.

Middle Atlantic Bight Leg

Measurements on this leg consisted of the following:

- (1) A line of stations, DB1 through DB9, extending southeast across the continental shelf off the entrance to Delaware Bay. These stations, occupied on 12 July, consisted of vertical CTD profiles and were not sampled for chemistry.
- (2) One chemical station, CT-4, was sampled on 13 July. The salinity sensor on the CTD failed early on 13 July, and the ship returned to Lewes for CTD repairs after station CT-4.
- (3) A second line of stations, DB-10 through DB-7C, was sampled for complete chemical analysis along the DB line on 14 July after repair of the CTD. The major goal of this leg was to observe cross-frontal geochemical exchange, induced by extrusion of shelf water onto the continental slope.

Chesapeake Bay Leg

Measurements on this leg consisted of the following:

- (1) A salinity gradient survey of Chesapeake Bay, stations CB1 to CB44B, sampled between 16 and 20 July. Stations CB2 through CB15, occupied on 16 July during the trip upbay, were CTD casts designed to define the salinity structure of the bay. Samples for hydrogen sulfide were taken at CTD stations CB8 through CB11.

A complete set of chemical measurements was performed at stations CB16 through CB44B, which were sampled between 16 and 20 July.

- (2) A time series of water column chemistry was measured at station CB10, between 16 and 18 July, using a sequential water sampler from Old Dominion University.
- (3) Dissolved rare earth elements (La, Ce, Nd, Sm, Eu, Gd, Tb, Dy, Er, Yb, Lu) were sampled by D. Mann and M. McCaffrey of the Woods Hole Oceanographic Institution. These measurements are not listed in the following data tables.

A major goal of the Chesapeake Bay leg was to study the chemistry of the anoxic water in mid-bay. As part of this effort, Dr. G. Cutter (Old Dominion University) measured dissolved species of arsenic, antimony, selenium, iodine, and hydrogen sulfide at many of the stations on this leg. Iodine species and hydrogen sulfide were also measured by Dr. G. Luther (University of Delaware). The concentrations of these species are sensitive indicators of the oxidation-reduction potential of the water in which they occur. Contact Drs. Cutter and Luther for results of these measurements. Box cores for pore water analysis of rare earth elements and sulfide were taken at several stations.

The parameters measured at each station are listed in the tables beginning on page 41. In addition, surface temperature and salinity were continuously recorded during the cruise. Samples for dissolved trace metals were taken at most stations. On previous cruises, all samples for chemical analysis were taken from Niskin bottles attached to the rosette sampler. The only exceptions were trace metal samples which were taken from Go-Flo bottles attached to a Kevlar line. On this cruise both the Niskin and the Go-Flo bottles were attached to the rosette sampler, and were tripped within 30 seconds of each other. Samples for temperature (reversing thermometers), salinity, chloride, oxygen, alkalinity, pH, chlorophyll-a, seston, and sulfide were taken from the Niskin bottle. Water from the Go-Flo bottle was filtered, in-line, under nitrogen pressure; samples for trace metals, arsenic, antimony, selenium, nutrients, and iodine were taken from the Go-flo bottle.

An outline of activity during each day of the cruise is given on page 15. Station locations are shown on the following charts.

Cruise Outline

CDR-3
11-21 July 1986

11 July

2128 Depart Lewes, Delaware for station DB-1.

12 July

0200 Arrive DB-1. CTD failure on first cast.

0925 CTD fish replaced. Cast 1 (station DB-1) for physical parameters.

1046- DB (Delaware Bay) transect to establish across-shelf hydrography.
1405 Nine stations (casts 2-10). Decide placement of AF (Along Front) transect.

1605- AF transect stations 2-15 for establishment of along shelf
2343 hydrography. Steam 212° true from DB-5 to Washington Canyon (casts 11-28).

13 July

0014 Arrive AF16. Salinity sensor fails. No salinity or density data for casts 29-32.

0416- SSO (Survey Star) transect. Survey transect normal to AF transect.
0617 Four stations (casts 33-38), no salinity or density data.

0728- Begin CT (Chemical Transect) at 37°39'18"N, 74°41'50"W, heading
0822 135° true. Three stations for physical parameters, no salinity or density data (casts 37-39).

0839 Arrive station CT-4. Cast 40 for physical parameters, casts 41 and 42 for chemical parameters. Sample at 5 depths, with 1 Niskin and 1 GoFlo bottle at each depth.

1015 Depart for Lewes to repair CTD.

1633 Arrive Lewes. Alter original sampling strategy due to lost time.

2310 CTD repaired, depart Lewes for station DB-7C.

14 July

0630- Chemical station DB-7C, casts 43-45.
0747

Cruise Outline

CDR-3

11-21 July 1986

14 July

- 0820- Physical station DB-6C, cast 46.
0830
- 0902- Chemical station DB-5C, casts 47-48. Vertical plankton tow from
0950 30 meters to surface.
- 1036- Chemical station DB-4C, casts 49-52. Vertical plankton tow from
1210 bottom to surface.
- 1300- Chemical station DB-3C, casts 53-55. Two vertical plankton tows
1420 from bottom to 30 meters, and from 30 meters to surface.
- 1515- Chemical station DB-2C, casts 56-57.
1620
- 1715- Chemical station DB-1C, cast 58. Depart for station H2S.
1745

15 July

- 0221 Arrive at station H2S. Samples taken from GoFlo bottles for Old
Dominion University diurnal sulfide study (casts 59-62).
- 0747 Depart station H2S for station CB1 at mouth of Chesapeake Bay.
- 1200 Station CB1 (cast 64) occupied while underway to Norfolk.
- 1500 Dock in Norfolk and exchange gear and personnel.
- 2000 Depart Norfolk, underway to mouth of Potomac River.

16 July

- 0548- Chesapeake Bay CTD salinity transect (14.1 - 1.5‰), stations
1607 CB2-CB15, casts 1-15.
- 1103- Samples to test for presence of sulfide taken at CB8 through
1342 CB11.
- 1246 Old Dominion University sequential sampler moored at CB10.
- 1740 Anchored at Havre de Grace 'deep hole'.
- 1755 Small boat departed for 0‰ sample in Susquehanna River.

Cruise Outline

CDR-3

11-21 July 1986

16 July

- 2043 Small boat returned with sample from station CB16.
2142 Station CB17 taken at anchor.

17 July

- 0645 Depart Havre de Grace anchor station.
0750- Occupied low salinity (0.3 - 8.5‰) stations CB18 through CB24,
1800 casts 18-28.
1951 Arrive Baltimore and dock at Aquarium.

18 July

- 0255 Depart Baltimore for mooring site.
0515 Arrive at mooring site.
0700 Sequential sampler retrieved successfully.
0758- Anchored at anoxic station CB26 (10.8‰), stations CB26A to
1620 CB26FR, casts 30-36. Successful box core (#1, 19 cm) for Woods
Hole Oceanographic Institution.
1845- Adrift at anoxic station CB27 (12.3‰), stations CB27B to CB27C,
2100 casts 38-39. Successful box core (#2, 26.5 cm) for Old Dominion
University.
2136- Anchored at station CB27D, cast 40.
2250
2250 Depart for Choptank River anchorage.

19 July

- 0615- Anchored at anoxic station CB28 (12.5‰), stations CB28A to CB28E,
1113 casts 41-45. Successful box cores for Woods Hole (#3, 16 cm) and
Old Dominion University (#4, 19 cm).
1235- Mid-salinity (13.8 - 18.9‰) transect, stations CB29 to CB33,
2017 casts 46-52.
2225 Anchor 3 miles east of Occohannoch Neck.

Cruise Outline

CDR-3
11-21 July 1986

20 July

0536 Underway

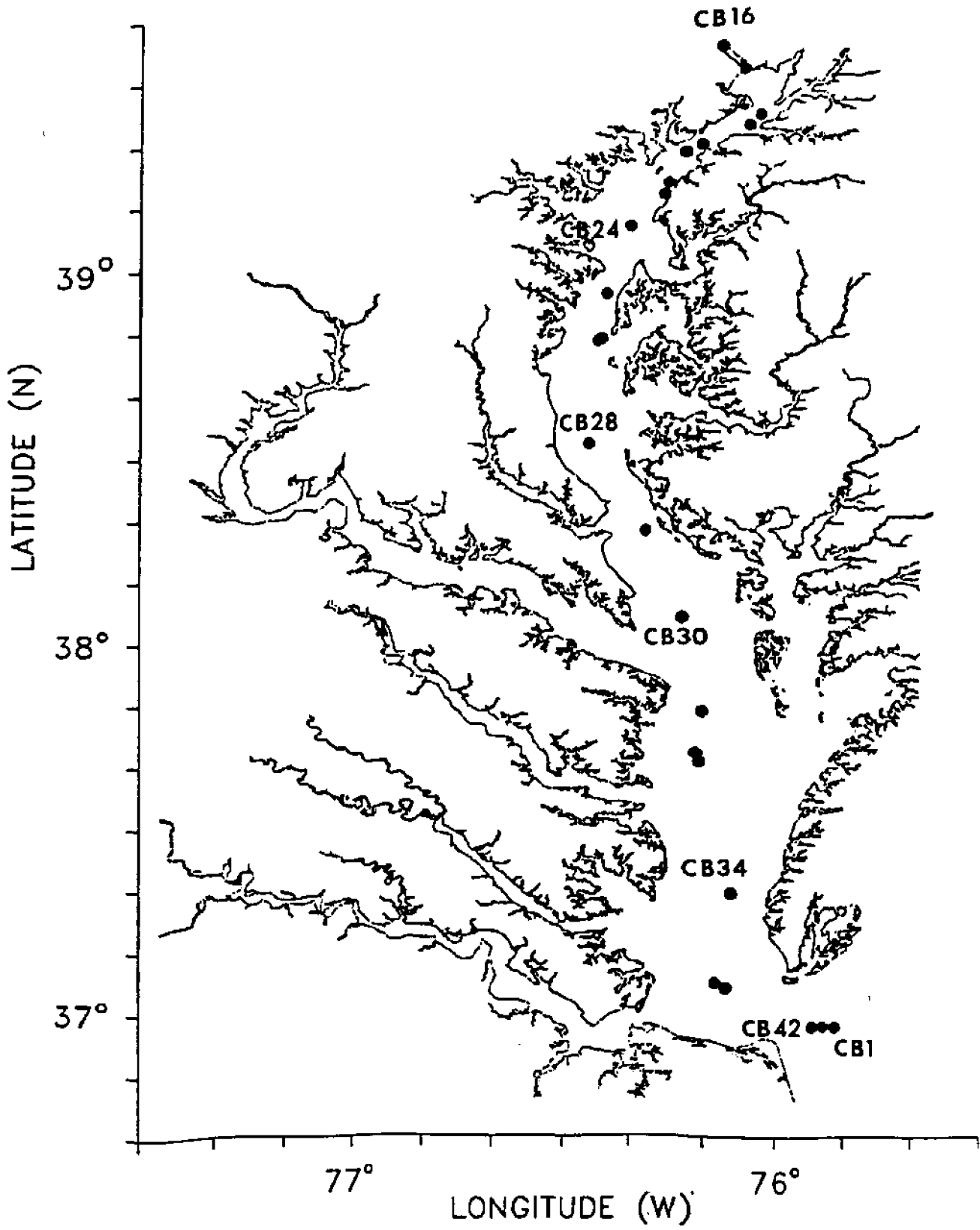
0645- High salinity (21.6 - 28.8‰) transect, stations CB34 to CB44,
1825 casts 53-67. Anchored at stations CB35 and CB44.

1930- Docked at Little Creek (Norfolk) to offload Old Dominion University
2100 and Woods Hole personnel, samples, and gear.

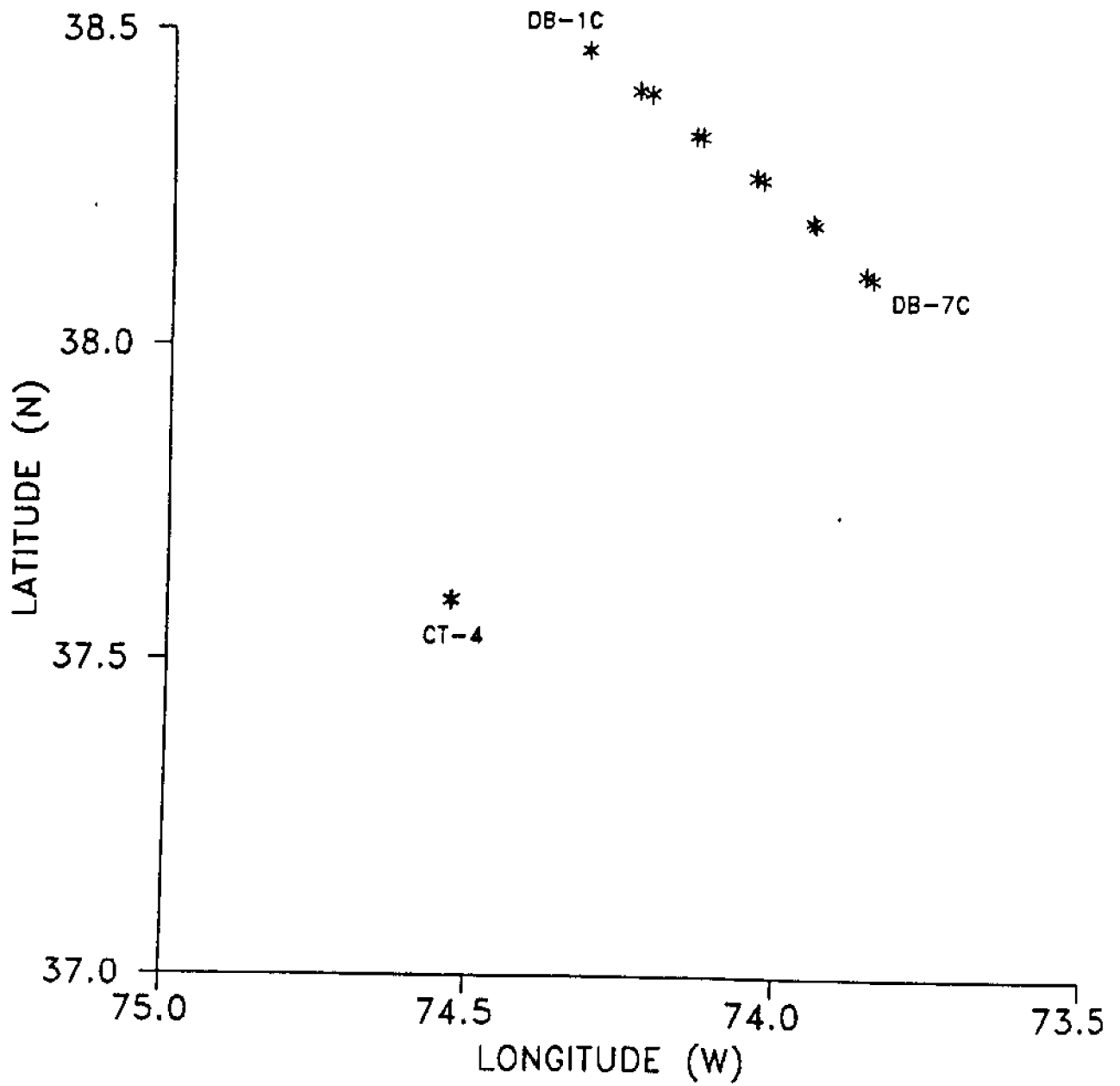
21 July

1000 Dock in Lewes to offload University of Delaware personnel, samples,
and gear. End of cruise.

STATION POSITIONS: CDR-3



OFFSHORE STATION POSITIONS: CDR-3



Cruise Report

CDR-4

27 June - 10 July 1988

**Area: Chesapeake Bay
Middle Atlantic Bight
Gulf Stream**

Vessel: R/V Cape Henlopen

**Chief Scientist: T. M. Church
College of Marine Studies
University of Delaware
Newark, Delaware**

Participants

**University of Delaware: T. Pfeiffer, M. Hartman, T. Ferdelman, C. Culberson,
G. Chin-Leo, R. Biggs, G. Luther, J. Smullen, D. Powell, R. McCarthy,
G. Gawarkiewicz**

**Oceanographic Interns: J. Moses, K. Brookshier, M. Tort, A. Matteoda,
S. Law, E. Ralph, J. Meyer, L. Leposky, L. Bender, J. Wu, A. Lipson**

**Old Dominion University: G. Cutter, M. SanDiego, R. Kluckhohn,
J. Radford-Knoery**

University of Connecticut: J. Venoit, T. Torgersen

Yale University: M. Kashgarian

Supporting Agency: The National Science Foundation

Cruise Summary:

The cruise was divided into 3 parts: (1) a Chesapeake Bay leg from 27 June to 3 July; (2) a Gulf Stream leg from 3-6 July; and (3) a leg on the continental shelf and shelfbreak between Chesapeake and Delaware Bays from 6-10 July.

Chesapeake Bay Leg

Measurements on this leg consisted of the following:

- (1) Three stations, S(South), S(Middle), S(North), in Delaware Bay near the entrance of the Chesapeake and Delaware Canal.
- (2) Six stations, CD1 through CD6, along the length of the Chesapeake and Delaware Canal.

- (3) Seven stations CB1 through CB7, in the channels bordering Susquehanna Flats.

The stations in Delaware bay, along the C&D Canal, and on the Susquehanna Flats were to study the effect of chemical exchange through the C&D Canal on the water chemistry of the upper Chesapeake.

- (4) A chemical transect, stations CB8 through CB61, along the length of Chesapeake Bay.
- (5) A 25 hour tidal drogue study south of the Chesapeake Bay Bridge. An in-situ sequential sampler for sampling bottom waters was deployed near the drogue.

A major goal of the Chesapeake Bay leg was to study the chemistry of the anoxic water in mid-bay. As part of this effort, Dr. G. Cutter (Old Dominion University) measured dissolved species of arsenic, antimony, selenium, and hydrogen sulfide at many of the stations on this leg. Iodine species and hydrogen sulfide were measured by Dr. G. Luther (University of Delaware). The concentrations of these species are sensitive indicators of the oxidation-reduction potential of the water in which they occur.

- (6) Vertical current profiles on several east-west and north-south transects along Chesapeake Bay were measured with an acoustic doppler current meter during 1-2 July by J. Smullen (University of Delaware).

Gulf Stream Leg

Measurements on this leg consisted of the following:

- (1) A CTD transect east across the shelf, stations GF1 to GF10, during 3-4 July.
- (2) Two transects southeast across the Gulf Stream, stations GF11 through GF21 and stations GF24 through GF33, during 4-5 July.
- (3) A CTD transect west across the shelf, stations GF34 to GF49, on 6 July.

Shelf and Shelfbreak Leg

This leg consisted of 4 east-west transects across the continental shelf and shelfbreak in the region between Chesapeake and Delaware Bays. The purpose of these transects was to study the physics and chemistry of the cold pool and of the shelfbreak front.

Radon (T. Torgersen, University of Connecticut) and carbon-14 (M. Kashgarian, Yale University) were measured at many stations along the transects.

Vertical current profiles at several of the stations along the transects were measured with an acoustic doppler current meter.

A detailed outline of the scientific activity on each leg of the cruise is given in the Cruise Outline beginning on page 24.

A listing of the purpose, date, time, position, and bottom depth of each station occupied during the cruise is given in Table 1 beginning on page 31. Stations for which no purpose is given were CTD casts; no discrete chemical samples were taken at these stations.

Station locations are shown on the charts following Table 1.

The parameters measured at each station with discrete chemical measurements are listed in the tables beginning on page 41. In addition, surface temperature and salinity were continuously recorded during the cruise. Samples for dissolved trace metals were taken at many stations. On previous cruises, all samples for chemical analysis were taken from Niskin bottles attached to the rosette sampler. The only exceptions were trace metal samples which were taken from Go-Flo bottles attached to a Kevlar line. On this cruise both the Niskin and the Go-Flo bottles were attached to the rosette sampler, and were tripped within 30 seconds of each other. Samples for temperature (reversing thermometers), salinity, chloride, oxygen, alkalinity, pH, chlorophyll-a, seston, and sulfide were taken from the Niskin bottle. Water from the Go-Flo bottle was filtered, in-line, under nitrogen pressure; samples for trace metals, arsenic, antimony, selenium, nutrients, and iodine were taken from the Go-flo bottle.

CRUISE OUTLINE

CDR-4
and
CMS-667-12 Oceanographic Practicum (*)

27 JUNE - 10 JULY 1987

Leg 1 (ERPRO-2) - Chesapeake Bay

Cruise Participants

T. M. Church - Chief Scientist
T. Pfeiffer - Marine Coordinator
M. Hartman - Hydro chief and trace metals
T. Ferdelman - Chemistry interns and redox analyses
* J. Moses - CTD intern and salinometer
C. Culberson - DO and alkalinity
* K. Brookshier/M. Tort - Chemistry (pH)
G. Chin-Leo - Biology interns and bioparameters
R. Biggs - Acoustics and traps
G. Luther - Redox electrochemistry
J. Smullen - Acoustic doppler
G. Cutter - Old Dominion University coordinator
M. San Diego - Redox Assistant
R. Kluckhohn - Sediment and boat assistant

27 June

2230 Depart Lewes for C&D Canal. Steam up Delaware Bay.

28 June

0600-0850 Occupied stations S(South), S(Middle), and S(North) in the Delaware River near the entrance of the Chesapeake and Delaware Canal. Station S(Middle) was at the entrance of the Canal, while stations S(North) and S(South) were 5 nautical miles north and south of the entrance.

0945-1317 Occupied stations CD1 through CD6 along the length of the Chesapeake and Delaware Canal.

1150-1312 Sampled stations CB5, CB6, and CB7 along east side of Susquehanna Flats using Old Dominion University's small boat (ODU-1).

1527-1703 Sampled stations CB1 through CB4 along west side of Susquehanna Flats using small boat. ODU-1 returned at 1730.

1335-1815 At anchor on station CB8, Turkey Point anchorage
1815-2100 Underway for Annapolis towing ODU-1. Small boat moored to R/V Warfield at Chesapeake Bay Institute dock.
2240-2300 Underway for mooring station 854C

29 June

0010 Deploy sequential sampler from Old Dominion University
0120 Deploy current meter mooring
0217-0545 CTD transect - stations 858, 904, 922
0630 Arrive Turkey Point, station CB8 at anchor
0800-1417 Begin upper Chesapeake Bay chemical transect - stations CB8 through CB16
1435-1610 Small boat away for sampling
1455 On station 854C to change moorings
1640- Drogue launched. Begin 25 hour tidal drogue study. A station at the drogue (labeled 'D') and a station at the mooring (labeled 'M') were sampled once each hour. Odd numbered 'D' stations were sampled for complete chemistry.

30 June

1701-1715 Chemical station D25. End 24 hour drogue study.
1830-1845 ODU sequential sampler retrieved. Recover sediment traps (Biggs) and current meter at mooring.
1900- Begin CTD transect to Rappahannock River. Stations CB17 to CB34.

1 July

0437 End CTD transect at station CB34
0757-1858 Sample chemical stations from Rappahannock River to Annapolis. Stations CB35 to CB43B.
1851 Station CB43A - two Niskins from sulfide zone for in-situ sulfide consumption experiment (Cutter, Luther & Ferdelman)
1900-2000 Prepare acoustic doppler current meter for use

2000-2300 Cross-Bay acoustic doppler section (Smullen)
2113 Station FINE - 10 bottle cast for close sampling of bacterial parameters
2300-2400 Retrieve ODU-1 from Annapolis

2 July

0000 Underway with ODU-1 in tow
0500-0600 Anchor at Choptank buoy 64. Launch ODU-1 for coring (Cutter).
0630 Head south to buoy PR
0822-1053 Stations CB44 to CB47 to locate transition between oxic and anoxic bottom water
1115-1851 Two drogues released. Chemical stations CB47B through CB54. ODU-1 Returns to Norfolk, VA.
1900-2330 Acoustic doppler profiles
1. East to west - north of Potomac
2. North to south across Potomac mouth
3. West to east - south of Potomac
2338 CTD cast for Biggs

3 July

0034 CTD cast for Biggs
0643-1207 Lower Bay chemical transect. Stations CB55 to CB61.
1300 Arrive Little Creek, VA - Exchange personnel

Leg 2 (GULFEX 1)

Cruise Participants

- T. Church - Chief Scientist
- T. Pfeiffer - Marine Coordinator
- T. Ferdelman - Chemistry interns and redox analyses
- D. Powell - Hydro chief and trace elements
- R. McCarthy - Physical interns and CTD
- * A. Matteoda - Acoustic doppler
- C. Culberson - DO and alkalinity
- * S. Law - Chemistry (pH) and hydrocasts
- G. Cutter - Hydrogen sulfide and gallium
- G. Luther - Redox electrochemistry
- J. Radford-Knoery - Sulfide assistant
- * E. Ralph - CTD, salinometer - Biology
- * J. Meyer - CTD, salinometer
- * L. Leposky - Chlorophyll and hydrocasts

3 July

- 1730 Depart Little Creek, VA. Heading 150° to mid-shelf.
- 2130-0248 CTD transect east across shelf from GF1 to GF10

4 July

- 0714-1307 CTD transect southeast across Gulf Stream from GF11 to GF15
- 0821-0842 Station GF12B, eight 10-liter Niskin bottles collected for salinity substandard. Sargassum weed noted.
- 1449-0107 CTD transect northwest across Gulf Stream from GF16 to GF21
- 1449 GF16 - chemical station, 3 depths
- 1953 GF18 Chemical station, 3 depths.
- 2134 GF19 Chemical station, 3 depths.
- 2325 GF20 Chemical station, 3 depths.

5 July

- 0107-0449 CTD transect northeast along Gulf Stream north wall, stations GF21 to GF24
- 0600-1032 CTD transect southeast across Gulf Stream from GF24 to GF28

1032-0122 CTD transect northwest across Gulf Stream from GF28 to GF33
1225-1826 GF29 - chemical station, 6 depths to 1000m.
Ga samples on separate cast (Orions/Cutter).
2134-2341 GF32 - chemical station, 9 depths to 1500m

6 July

0427-1430 CTD transect west across shelf from GF34 to GF49
0758 GF42 - chemical station, 4 depths to 88m. Acoustic doppler
profile. Surface Ga samples for Orions/Cutter.
0945-1037 GF43 - chemical station, 4 depths to 80m. Surface Ga for
Orions/Cutter.
1106 GF44 - chemical station, 4 depths to 52m. Surface Ga for
Orions/Cutter.
Arrive Little Creek, VA to exchange personnel and equipment.

Leg 3 (POCO - 2)

Cruise Participants

- T. Church - Chief Scientist
- T. Pfeiffer - Marine Coordinator
- T. Ferdelman - Chemistry interns and redox analyses
- D. Powell - Hydro chief and trace elements
- G. Gawarkiewicz - Physical intern and CTD
- * L. Bender - Acoustic doppler
- C. Culberson - DO and alkalinity
- * J. Wu - Chemistry (pH) and hydrocasts
- G. Luther - Redox electrochemistry
- J. Radford-Knoery - Sulfide assistant
- J. Venoit (U. Conn.) - Sediments
- T. Torgersen (U. Conn.) - Radon
- * A. Lipson - Chlorophyll and radon
- M. Kashgarian (Yale) - Carbon-14

6 July

2100 Depart Norfolk, for CTD section north of Norfolk Canyon

7 July

- 0240-0648 CTD transect east across shelf, stations PG1 to PG9.
- 0750-0943 PG10 - chemical station, 5 depths to 70m. Surface and bottom sampling for C-14 (Yale). Radon samples at 5 depths (U. Conn.).
- 0935-1100 Gravity core attempts, no samples. Shipek grab, medium brown sand.
- 1125 Second shipek grab, fine grey sand (37°16'17" N, 74°35'54" W).
- 1249-2100 PG11 - chemical station, 5 depths to 1170m. Several casts for Radon and C-14.
- 2145-0130 PG12 (same position as PG2) - chemical station, 3 depths to 37m. Cast for C-14. Acoustic doppler profile.

8 July

- 0130-0601 CTD transect northeast along shelf, stations PG12 to PG16. Acoustic doppler profile.
- 0601-1219 CTD transect southeast across shelf, stations PG16 to PG23. Surface sulfide samples for Radford-Knoery (ODU) at PG15 and PG21.

0858-1249 PG23 - chemical station, 3 depths to 250m. Casts for Radon and C-14. Two shipek grabs (U. Conn.).

1330-1340 PG24 (same position as PG20). Radon sampling.

1416-1530 PG25 (same position as PG18) - chemical station, 3 depths to 56 m. Radon and C-14 casts.

1530-1806 CTD transect east across shelf, stations PG25 to PG29

1806-0020 CTD transect northeast along shelfbreak front (over Baltimore Canyon), stations PG29 to PG37. Acoustic doppler profile at PG31.

9 July

0020-0310 CTD transect northwest across shelf from PG37 to PG42

0310-0634 CTD transect southeast across shelf from PG42 to PG46

0634-0823 PG46 (same position as PG37). Seaward edge of northern shelfbreak transect. Chemical station, 5 depths to 163m. Multiple casts for Radon and C-14.

0900 PG46E - Shipek sediment grab. Fine brown sand.

1000 PG46F - sediment core (Benthos) for Torgersen (U. Conn.). 36 cm of "green mud", sectioned onboard (38°19'58" N, 73°32'10" W).

1030 PG46F - sediment core (Benthos) for Ferdelman (CMS) in 610 m water. 60 cm of "green mud", stored frozen (38°19'56" N, 73°32'03" W).

1030-1746 CTD transect northeast across shelf, stations PG46 to PG54

1131-1250 Radon casts at stations PG47 (same as position as PG38, PG45), PG48 (same as PG39), and PG49 (same as PG40)

1320-1530 PG50 (same position as PG44) - chemical station, 4 depths to 69m. Casts for Radon and C-14.

1600 PG51 (same position as PG43) - Radon cast at 40m.

1746-1930 PG54 - chemical station, 3 depths to 50m. Cast for C-14 and Radon. Shipek sediment grab, fine sand and shells.

2223-0534 CTD transect northeast across shelf, stations PG55 to PG70

10 July

0706 Arrive Lewes, switch to shore power.

Table 1. Station information for cruise CDR-4: 27 June - 10 July 1987

The column labeled End Time Gives the time the last Niskin bottle was tripped.

Positions marked with an asterisk '*' were directly calculated from the Loran-C readings (9960-X, 9960-Y), and have not been corrected for theoretical propagation delays.

Positions marked with the letter 'B' were taken from the Loran receiver on the bridge, and have not been corrected for theoretical propagation delays.

Positions not marked with an '*' or a 'B' have been corrected for theoretical propagation delays by plotting the Loran-C readings on the appropriate Loran-C overprinted nautical chart.

Cast Purpose	Cast #	Station Name	Date	End Time	Latitude (N)	Longitude (W)	Bottom Depth
CHEM	1	S(SOUTH)	28-JUN-87	07:01	39 28.6	75 33.5	9.1
CHEM	2	S(MIDDLE)	28-JUN-87	07:57	39 33.1	75 32.3	10.0
CHEM	3	S(NORTH)	28-JUN-87	08:45	39 38.2	75 34.1	13.7
CHEM	4	CD1	28-JUN-87	09:48	39 32.6	75 40.7	13.0
CHEM	5	CD2	28-JUN-87	10:34	39 32.1	75 46.5	11.9
CHEM	7	CD3	28-JUN-87	12:04	39 31.2	75 52.8	
CHEM	8	CD4	28-JUN-87	12:28	39 30.2	75 55.3	9.1
CHEM	9	CD5	28-JUN-87	12:51	39 28.4	75 57.7	12.2
CHEM	10	CD6	28-JUN-87	13:17	39 26.6	76 00.2	9.3
CHEM		CB5	28-JUN-87	11:50	39 32.3	75 58.8	2.0
CHEM		CB6	28-JUN-87	12:37	39 30.7	76 00.4	1.0
CHEM		CB7	28-JUN-87	13:12	39 29.3	76 00.1	5.0
CHEM		CB1	28-JUN-87	15:30	39 36.4	76 07.5	2.0
CHEM		CB2	28-JUN-87	16:00	39 33.0	76 04.9	7.0
CHEM		CB3	28-JUN-87	16:36	39 30.7	76 04.9	1.0
CHEM		CB4	28-JUN-87	17:03	39 28.8	76 04.3	5.0
	11	858	29-JUN-87	02:20			18.0
	12	858	29-JUN-87	02:27			18.6
	13	904	29-JUN-87	03:33			10.8
	14	922	29-JUN-87	05:48	*39 21.9	*76 08.2	7.3
CHEM	15	CB8	29-JUN-87	08:08	*39 26.1	*76 01.2	6.3
CHEM	16	CB9	29-JUN-87	08:47	39 23.6	76 04.8	7.2
CHEM	17	CB10	29-JUN-87	09:35	39 22.4	76 07.6	11.1
CHEM	18	CB11	29-JUN-87	10:15	39 19.7	76 12.5	10.3
CHEM	19	CB12	29-JUN-87	10:45	39 17.4	76 13.8	13.9
	20	CB13	29-JUN-87	11:25	*39 12.1	*76 15.0	12.1
	21	CB14	29-JUN-87	11:41	*39 10.7	*76 17.0	11.4
CHEM	22	CB14B	29-JUN-87	11:57	39 11.1	76 17.4	
CHEM	23	CB15	29-JUN-87	13:11	B39 03.5	B76 19.3	
CHEM	24	CB16	29-JUN-87	14:15	B38 57.7	B76 22.5	

Table 1 (continued). Station information for cruise CDR-4.

Cast Purpose	Cast #	Station Name	Date	End Time	Latitude (N)	Longitude (W)	Bottom Depth
CHEM	26	D1	29-JUN-87	16:57	B38 51.2	B76 23.7	
	27	M1	29-JUN-87	17:22			
	28	D2	29-JUN-87	18:06			29.8
	29	M2	29-JUN-87	18:29			26.2
CHEM	30	D3	29-JUN-87	19:08	B38 51.8	B76 23.6	29.0
	31	M3	29-JUN-87	19:31			25.7
	32	D4	29-JUN-87	19:55			29.2
	33	M4	29-JUN-87	20:27			23.9
CHEM	34	D5	29-JUN-87	21:09	B38 52.9	B76 23.7	29.2
	35	M5	29-JUN-87	21:43			25.9
	36	D6	29-JUN-87	22:06			26.1
	37	M6	29-JUN-87	22:36			24.3
CHEM	38	D7	29-JUN-87	23:15	B38 53.3	B76 23.6	24.3
	39	M7	29-JUN-87	23:40			23.9
	40	D8	30-JUN-87	00:06			23.7
	41	M8	30-JUN-87	00:36			23.7
CHEM	42	D9	30-JUN-87	01:14	B38 52.8	B76 23.8	
	43	M9	30-JUN-87	01:41			23.8
	44	D10	30-JUN-87	02:09			25.0
	45	M10	30-JUN-87	02:39			24.0
CHEM	46	D11	30-JUN-87	03:15	B38 52.2	B76 23.6	29.1
	47	M11	30-JUN-87	03:39			24.4
	48	D12	30-JUN-87	04:07			29.7
	49	M12	30-JUN-87	04:34			24.4
CHEM	50	D13	30-JUN-87	05:15	B38 52.4	B76 23.5	30.5
	51	M13	30-JUN-87	05:38			24.2
	52	D14	30-JUN-87	06:07			30.6
	53	M14	30-JUN-87	06:36			24.6
CHEM	54	D15	30-JUN-87	07:31	B38 52.4	B76 23.3	22.0
	55	M15	30-JUN-87	07:52			24.1
	56	D16	30-JUN-87	08:08			24.9
	57	M16	30-JUN-87	08:45			23.8
CHEM	58	D17	30-JUN-87	09:17	B38 53.1	B76 23.3	27.8
	59	M17	30-JUN-87	09:40			24.0
	60	D18	30-JUN-87	10:05			26.7
	61	M18	30-JUN-87	10:32			23.8
CHEM	62	D19	30-JUN-87	11:16	B38 53.1	B76 23.3	26.3
	63	M19	30-JUN-87	11:37			24.1
	64	D20	30-JUN-87	12:07			26.8
	65	M20	30-JUN-87	12:36			23.7
CHEM	66	D21	30-JUN-87	13:15	B38 52.0	B76 23.6	28.8
	67	M21	30-JUN-87	13:39			
	68	D22	30-JUN-87	14:09			29.2
	69	M22	30-JUN-87	14:38			23.7
CHEM	70	D23	30-JUN-87	15:18	B38 50.0	B76 24.0	30.5
	71	M23	30-JUN-87	15:43			24.0
	72	D24	30-JUN-87	16:14			21.4

Table 1 (continued). Station information for cruise CDR-4.

Cast Purpose	Cast #	Station Name	Date	End Time	Latitude (N)	Longitude (W)	Bottom Depth
CHEM	73	D25	30-JUN-87	17:15	B38 49.4	B76 24.0	
	74	CB17	30-JUN-87	19:35			23.7
	75	CB18	30-JUN-87	20:12	*38 45.0	*76 25.4	31.8
	76	CB19	30-JUN-87	20:47	*38 40.2	*76 24.6	36.6
	77	CB20	30-JUN-87	21:16	*38 35.8	*76 25.4	20.9
	78	CB21	30-JUN-87	21:44	*38 31.9	*76 25.2	20.8
	79	CB22	30-JUN-87	22:36	*38 25.0	*76 20.6	28.3
	80	CB23	30-JUN-87	22:59	*38 21.8	*76 19.3	26.2
	81	CB24	30-JUN-87	23:20	*38 19.1	*76 17.6	23.1
	82	CB25	30-JUN-87	23:48	*38 15.0	*76 15.8	25.8
	83	CB26	01-JUL-87	00:26	*38 11.0	*76 13.6	31.1
	84	CB27	01-JUL-87	01:14	*38 06.9	*76 13.0	38.0
	85	CB28	01-JUL-87	01:38	*38 03.9	*76 12.4	27.5
	86	CB29	01-JUL-87	02:06	*37 59.9	*76 12.2	23.4
	87	CB30	01-JUL-87	02:36	*37 56.0	*76 10.6	24.0
	88	CB31	01-JUL-87	03:28	*37 49.1	*76 10.0	32.2
	89	CB32	01-JUL-87	03:52	*37 46.0	*76 10.8	30.6
	90	CB33	01-JUL-87	04:21	*37 42.0	*76 10.7	23.1
	91	CB34	01-JUL-87	04:39	*37 40.1	*76 09.8	17.3
	92	CB35	01-JUL-87	07:59	*37 39.5	*76 08.2	13.0
CHEM	93	CB35B	01-JUL-87	08:39	37 39.6	76 08.6	14.2
CHEM	94	CB36	01-JUL-87	09:44	37 46.3	76 10.6	33.0
CHEM	95	CB37	01-JUL-87	10:44	37 52.6	76 09.7	43.0
CHEM	96	CB38	01-JUL-87	11:48	38 00.8	76 12.6	26.0
CHEM	97	CB39	01-JUL-87	12:36	38 06.3	76 13.0	31.5
	98	CB40	01-JUL-87	14:02	*38 18.7	*76 17.7	
CHEM	99	CB40A	01-JUL-87	14:20	38 19.1	76 17.8	
CHEM	100	CB41	01-JUL-87	16:06	38 33.4	76 25.8	24.2
	101	CB42	01-JUL-87	17:20	*38 45.1	*76 25.6	30.1
CHEM	102	CB42.102	01-JUL-87	17:41	38 45.3	76 26.3	
	103	CB43A	01-JUL-87	18:55	*38 47.9	*76 22.5	26.4
CHEM	104	CB43B	01-JUL-87	19:14	38 47.4	76 22.5	25.5
	105	FINE	01-JUL-87	21:25			31.1
	106	CB44	02-JUL-87	08:25	*38 19.3	*76 17.4	
	107	CB45	02-JUL-87	09:43	*38 06.2	*76 12.7	29.3
CHEM	108	CB46	02-JUL-87	10:19	38 01.1	76 12.6	
CHEM	109	CB47	02-JUL-87	10:53	37 57.8	76 10.6	
CHEM	110	CB47B	02-JUL-87	11:32	37 57.7	76 10.4	
CHEM	111	CB48	02-JUL-87	12:13	37 54.4	76 09.8	
	112	CB49	02-JUL-87	13:03	*37 59.9	*76 11.5	
CHEM	113	CB50	02-JUL-87	14:02	37 54.2	76 09.4	
CHEM	114	CB51	02-JUL-87	14:41	37 57.3	76 09.6	15.0
CHEM	115	CB51B	02-JUL-87	15:31	37 57.8	76 10.5	
CHEM	116	CB52	02-JUL-87	16:27	37 52.9	76 09.7	
CHEM	117	CB53	02-JUL-87	18:02	37 56.3	76 09.5	27.5
CHEM	118	CB54	02-JUL-87	18:51	37 59.5	76 11.6	
	119	BIGGS-1	02-JUL-87	23:55	*37 56.1	*76 13.3	

Table 1 (continued). Station information for cruise CDR-4.

Cast Purpose	Cast #	Station Name	Date	End Time	Latitude (N)	Longitude (W)	Bottom Depth
	120	BIGGS-2	03-JUL-87	00:40	*37 54.9	*76 09.8	26.4
	121	CB55	03-JUL-87	06:44	*37 29.9	*76 03.4	14.5
CHEM	122	CB55B	03-JUL-87	07:02	37 30.2	76 02.5	
CHEM	123	CB56	03-JUL-87	07:56	37 23.0	76 04.7	
CHEM	124	CB57	03-JUL-87	08:48	37 15.1	76 04.9	
CHEM	125	CB58	03-JUL-87	09:26	37 11.5	76 02.1	22.1
CHEM	126	CB59	03-JUL-87	10:15	37 06.5	76 08.6	
CHEM	127	CB60	03-JUL-87	11:14	37 00.4	76 02.2	
CHEM	128	CB61	03-JUL-87	12:07	37 03.1	75 58.7	13.7
	129	GF1	03-JUL-87	21:56	*36 43.1	*75 16.8	23.9
	130	GF2	03-JUL-87	22:51	*36 40.9	*75 09.0	38.4
	131	GF3	03-JUL-87	23:38	*36 39.1	*75 01.8	27.7
	132	GF4	04-JUL-87	00:24	*36 37.0	*74 55.0	38.7
	133	GF5	04-JUL-87	00:48	*36 36.4	*74 52.4	43.7
	134	GF6	04-JUL-87	01:11	*36 35.6	*74 50.1	48.0
	135	GF7	04-JUL-87	01:33	*36 34.9	*74 47.9	54.0
	136	GF8	04-JUL-87	01:55	*36 34.1	*74 45.6	86.1
	137	GF9	04-JUL-87	02:20	*36 33.3	*74 43.2	154.4
	138	GF10	04-JUL-87	02:52	*36 32.6	*74 40.9	
	139	GF11	04-JUL-87	07:29	*35 59.2	*74 08.5	
	140	GF12	04-JUL-87	08:38	*35 53.1	*74 02.4	
	141	GF12B	04-JUL-87	08:51	*35 53.6	*74 01.4	
	142	GF13	04-JUL-87	10:17	*35 49.2	*73 57.2	
	143	GF14	04-JUL-87	11:58	*35 46.9	*73 46.9	
	144	GF15	04-JUL-87	13:17	*35 41.4	*73 39.4	
CHEM	145	GF16	04-JUL-87	15:24	*35 42.3	*73 38.3	
	146	GF17	04-JUL-87	17:27	*35 48.5	*73 46.9	
CHEM	147	GF18	04-JUL-87	20:21	*35 49.9	*73 56.3	
CHEM	148	GF19	04-JUL-87	22:04	*35 54.1	*74 00.9	
CHEM	149	GF20	04-JUL-87	23:58	*35 59.4	*74 08.3	
	150	GF21	05-JUL-87	01:15	*36 06.2	*74 12.8	
	151	GF22	05-JUL-87	02:21	*36 13.4	*74 07.9	
	152	GF23	05-JUL-87	03:47	*36 23.0	*74 02.1	
	153	GF24	05-JUL-87	04:56	*36 30.3	*73 57.5	
	154	GF25	05-JUL-87	06:11	*36 24.0	*73 50.0	
	155	GF26	05-JUL-87	07:42	*36 18.0	*73 42.2	
	156	GF27	05-JUL-87	09:11	*36 11.6	*73 34.6	
	157	GF28	05-JUL-87	10:42	*36 07.8	*73 29.6	
	158	GF29.158	05-JUL-87	12:21	*36 11.4	*73 35.0	
CHEM	159	GF29.159	05-JUL-87	13:42	*36 14.5	*73 30.9	
CHEM	160	GF29.160	05-JUL-87	16:06	*36 13.1	*73 33.0	
	161	GF29.161	05-JUL-87	17:37	*36 14.0	*73 31.9	
	162	GF29.162	05-JUL-87	18:48	*36 13.2	*73 32.8	
	163	GF30	05-JUL-87	20:21	*36 17.9	*73 42.5	
	164	GF31	05-JUL-87	21:01	*36 21.3	*73 46.4	
CHEM	165	GF32	05-JUL-87	22:18	*36 24.1	*73 50.2	

Table 1 (continued). Station information for cruise CDR-4.

Cast Purpose	Cast #	Station Name	Date	End Time	Latitude (N)	Longitude (W)	Bottom Depth
CHEM	166	GF32B	06-JUL-87	00:50	*36 24.4	*73 50.1	
	167	GF33	06-JUL-87	01:40	*36 27.7	*73 54.3	
	168	GF34	06-JUL-87	04:35	*36 53.2	*74 22.4	
	169	GF35	06-JUL-87	05:35	*36 55.8	*74 34.4	
	170	GF36	06-JUL-87	05:54	*36 56.0	*74 36.3	
	171	GF37	06-JUL-87	06:11	*36 56.4	*74 38.7	99.0
	172	GF38	06-JUL-87	06:28	*36 57.2	*74 41.0	85.3
	173	GF39	06-JUL-87	06:43	*36 57.6	*74 43.4	84.8
	174	GF40	06-JUL-87	06:59	*36 58.0	*74 45.9	67.6
	175	GF41	06-JUL-87	07:13	*36 58.6	*74 48.3	58.4
CHEM	176	GF42	06-JUL-87	08:22	*36 56.2	*74 39.4	
CHEM	177	GF43	06-JUL-87	10:04	*36 57.1	*74 43.9	85.1
CHEM	178	GF44	06-JUL-87	11:25	*36 58.3	*74 48.7	58.1
	179	GF44B	06-JUL-87	11:41	*36 58.0	*74 49.0	56.1
	180	GF45	06-JUL-87	12:25	*37 00.0	*74 56.1	48.9
	181	GF46	06-JUL-87	13:04	*36 59.8	*75 04.9	43.2
	182	GF47	06-JUL-87	13:33	*36 59.7	*75 10.5	40.2
	183	GF48	06-JUL-87	14:01	*36 59.1	*75 17.0	31.6
	184	GF49	06-JUL-87	14:31	*36 58.5	*75 23.8	
	185	PG1	07-JUL-87	02:59	*37 19.7	*75 03.9	34.9
	186	PG2	07-JUL-87	03:30	*37 19.1	*74 59.4	41.4
	187	PG3	07-JUL-87	04:00	*37 18.4	*74 54.5	39.6
	188	PG4	07-JUL-87	04:32	*37 17.7	*74 49.5	49.3
	189	PG5	07-JUL-87	05:03	*37 16.9	*74 44.5	57.8
	190	PG6	07-JUL-87	05:35	*37 16.0	*74 39.8	86.5
	191	PG7	07-JUL-87	06:10	*37 15.0	*74 34.7	93.5
	192	PG8	07-JUL-87	06:35	*37 14.5	*74 32.4	123.6
	193	PG9	07-JUL-87	06:57	*37 13.9	*74 29.9	
CHEM	194	PG10	07-JUL-87	08:12	*37 16.1	*74 41.9	72.3
C-14	195	PG10MC	07-JUL-87	08:29	*37 16.0	*74 42.1	66.8
C-14	196	PG10MC2	07-JUL-87	08:46	*37 16.2	*74 41.7	72.1
RADON	197	PG10RN1	07-JUL-87	09:15	*37 16.1	*74 42.0	71.3
RADON	198	PG10RN2	07-JUL-87	09:43	*37 16.2	*74 41.8	71.1
	199	PG11	07-JUL-87	13:01	*37 13.5	*74 24.7	
CHEM	200	PG11B	07-JUL-87	14:11	*37 13.7	*74 25.2	1199.1
C-14	201	PG11C	07-JUL-87	14:45	*37 13.7	*74 25.7	
C-14, RADON	202	PG11D	07-JUL-87	15:18	*37 13.6	*74 26.1	
	203	PG11E	07-JUL-87	16:24	*37 13.5	*74 26.6	875.2
C-14, RADON	204	PG11F	07-JUL-87	18:21	*37 13.3	*74 24.7	
RADON	205	PG11G	07-JUL-87	19:35	*37 13.2	*74 24.9	1007.9
C-14	206	PG11H	07-JUL-87	20:56	*37 13.5	*74 24.8	1137.0
RADON	207	PG12A	08-JUL-87	00:09	*37 19.2	*74 59.7	39.4
C-14	208	PG12B	08-JUL-87	00:53	*37 19.1	*75 00.2	39.2
CHEM	209	PG12C	08-JUL-87	01:27	*37 19.1	*75 00.6	38.6
	210	PG13	08-JUL-87	02:54	*37 28.5	*74 53.0	26.3
	211	PG14	08-JUL-87	03:56	*37 36.6	*74 45.9	47.3

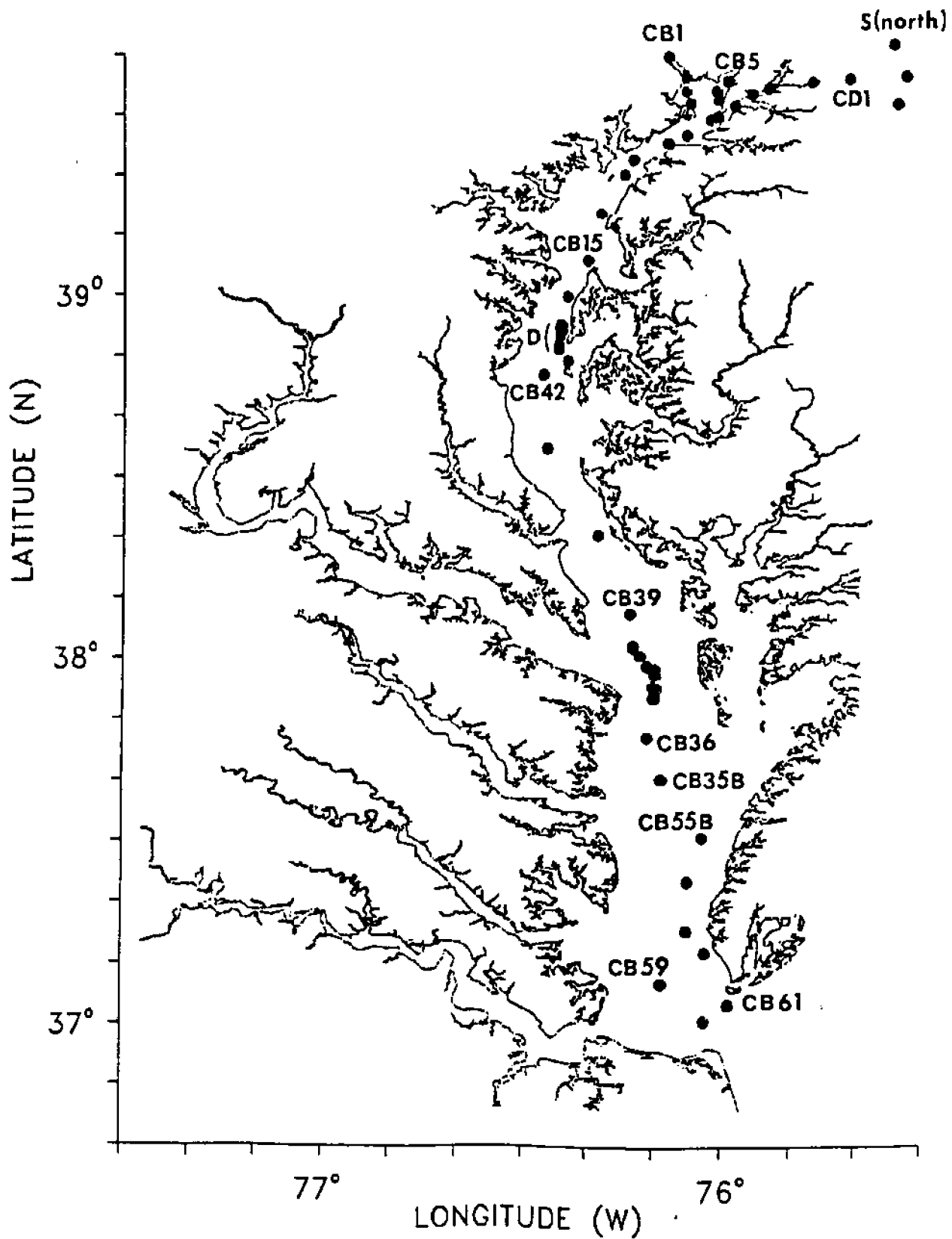
Table 1 (continued). Station information for cruise CDR-4.

Cast Purpose	Cast #	Station Name	Date	End Time	Latitude (N)	Longitude (W)	Bottom Depth
	212	PG15	08-JUL-87	05:03	*37 44.8	*74 38.8	54.2
	213	PG16	08-JUL-87	06:04	*37 53.3	*74 31.6	54.2
	214	PG17	08-JUL-87	06:35	*37 51.5	*74 27.0	60.6
	215	PG18	08-JUL-87	07:04	*37 49.8	*74 22.7	62.5
	216	PG19	08-JUL-87	07:35	*37 47.7	*74 18.4	77.7
	217	PG20	08-JUL-87	07:56	*37 46.8	*74 16.1	97.0
	218	PG21	08-JUL-87	08:18	*37 45.6	*74 14.1	112.9
	219	PG22	08-JUL-87	08:42	*37 44.5	*74 11.7	143.5
	220	PG23	08-JUL-87	09:09	*37 43.2	*74 09.6	294.1
C-14	221	PG23A	08-JUL-87	09:48	*37 43.1	*74 09.4	319.1
RADON	222	PG23B	08-JUL-87	10:33	*37 43.2	*74 09.3	336.3
C-14, RADON	223	PG23C	08-JUL-87	11:09	*37 43.4	*74 09.4	
CHEM	224	PG23D	08-JUL-87	12:45	*37 43.6	*74 09.6	262.9
RADON	225	PG24	08-JUL-87	13:44	*37 46.9	*74 16.1	96.3
C-14, RADON	226	PG25	08-JUL-87	14:41	*37 50.0	*74 22.7	61.5
RADON	227	PG25B	08-JUL-87	15:01	*37 50.3	*74 22.7	61.8
CHEM	228	PG25C	08-JUL-87	15:38	*37 50.0	*74 22.6	62.5
	229	PG26	08-JUL-87	16:31	*37 51.5	*74 17.4	71.6
	230	PG27	08-JUL-87	17:20	*37 52.0	*74 12.3	99.8
	231	PG28	08-JUL-87	17:54	*37 52.4	*74 07.1	134.8
	232	PG29	08-JUL-87	18:15	*37 52.4	*74 05.9	168.2
	233	PG30	08-JUL-87	18:47	*37 54.9	*74 01.3	154.5
	234	PG31	08-JUL-87	19:19	*37 57.7	*73 58.0	155.9
	235	PG32	08-JUL-87	19:46	*37 59.5	*73 55.8	165.4
	236	PG33.236	08-JUL-87	20:16	*38 01.8	*73 52.9	167.6
	237	PG33.237	08-JUL-87	21:54	*38 06.0	*73 47.6	
	238	PG34	08-JUL-87	22:20	*38 07.9	*73 46.3	159.1
	239	PG35	08-JUL-87	23:07	*38 11.8	*73 41.3	163.5
	240	PG36	08-JUL-87	23:52	*38 15.5	*73 39.0	159.2
	241	PG37	09-JUL-87	00:32	*38 18.8	*73 35.9	168.3
	242	PG38	09-JUL-87	01:09	*38 21.1	*73 40.0	116.8
	243	PG39	09-JUL-87	01:39	*38 23.7	*73 44.0	83.7
	244	PG40	09-JUL-87	02:10	*38 26.1	*73 48.1	64.3
	245	PG41	09-JUL-87	02:39	*38 28.5	*73 52.0	60.4
	246	PG42	09-JUL-87	03:06	*38 31.0	*73 55.9	54.8
	247	PG43	09-JUL-87	04:05	*38 27.8	*73 49.8	58.7
	248	PG44	09-JUL-87	04:43	*38 25.3	*73 45.7	71.0
	249	PG45	09-JUL-87	05:29	*38 21.4	*73 39.8	117.1
CHEM	250	PG46	09-JUL-87	06:59	*38 19.0	*73 35.7	165.6
C-14, RADON	251	PG46B	09-JUL-87	07:24	*38 18.7	*73 35.9	
RADON	252	PG46C	09-JUL-87	08:00	*38 18.6	*73 36.1	165.4
C-14	253	PG46D	09-JUL-87	08:37	*38 18.8	*73 35.8	167.3
RADON	254	PG47	09-JUL-87	11:40	*38 21.1	*73 39.9	118.2
RADON	255	PG48	09-JUL-87	12:16	*38 23.6	*73 44.0	83.9
RADON	256	PG49	09-JUL-87	12:59	*38 26.2	*73 48.1	64.0
C-14	257	PG50	09-JUL-87	13:35	*38 25.1	*73 45.2	72.1
RADON	258	PG50B	09-JUL-87	14:12	*38 25.1	*73 45.5	

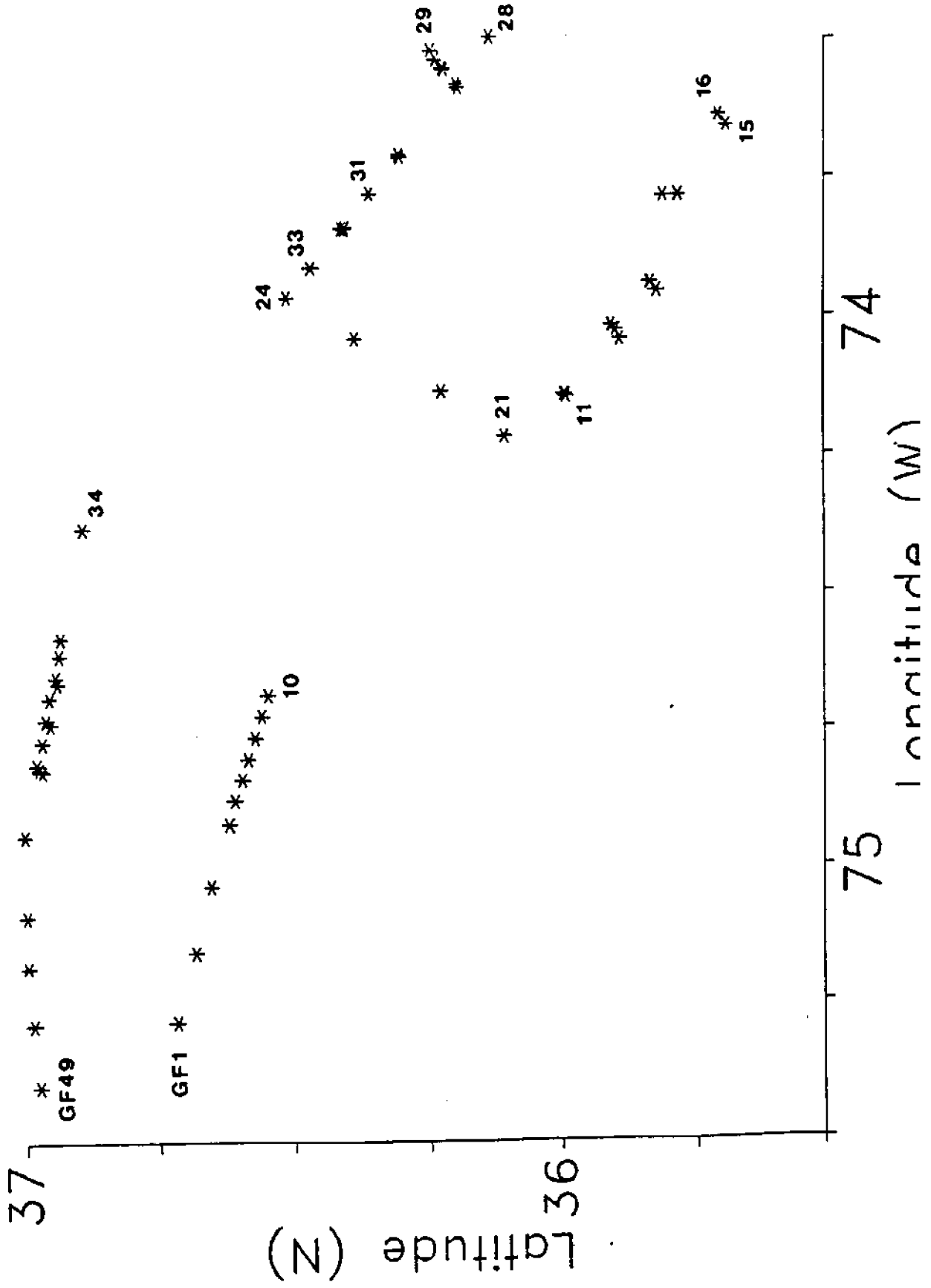
Table 1 (continued). Station information for cruise CDR-4.

Cast Purpose	Cast #	Station Name	Date	End Time	Latitude (N)	Longitude (W)	Bottom Depth
C-14, RADON	259	PG50C	09-JUL-87	14:45	*38 25.1	*73 45.5	71.8
CHEM	260	PG50D	09-JUL-87	15:29	*38 25.0	*73 45.4	73.4
RADON	261	PG51	09-JUL-87	16:12	*38 27.7	*73 49.8	59.3
	262	PG52	09-JUL-87	16:45	*38 29.9	*73 53.9	55.0
	263	PG53	09-JUL-87	17:17	*38 32.2	*73 57.9	
C-14	264	PG54	09-JUL-87	17:59	*38 35.0	*74 01.8	55.2
RADON	265	PG54B	09-JUL-87	18:27	*38 35.2	*74 01.8	55.5
CHEM	266	PG54C	09-JUL-87	19:24	*38 35.0	*74 01.6	55.4
	267	PG55	09-JUL-87	22:31	*38 02.1	*73 52.9	161.7
	268	PG56	09-JUL-87	23:01	*38 04.6	*73 56.5	115.9
	269	PG57	09-JUL-87	23:30	*38 07.1	*74 00.4	90.6
	270	PG58	09-JUL-87	23:50	*38 08.5	*74 02.4	74.5
	271	PG59	10-JUL-87	00:18	*38 11.0	*74 06.3	
	272	PG60	10-JUL-87	00:35	*38 12.4	*74 08.2	69.2
	273	PG61	10-JUL-87	01:01	*38 14.9	*74 12.1	
	274	PG62	10-JUL-87	01:30	*38 17.4	*74 16.0	54.9
	275	PG63	10-JUL-87	01:55	*38 20.0	*74 19.2	44.9
	276	PG64	10-JUL-87	02:21	*38 22.4	*74 23.1	36.2
	277	PG65	10-JUL-87	02:50	*38 24.4	*74 28.4	33.9
	278	PG66	10-JUL-87	03:15	*38 26.2	*74 28.9	37.8
	279	PG67	10-JUL-87	03:45	*38 29.2	*74 32.6	38.1
	280	PG68	10-JUL-87	04:24	*38 32.8	*74 38.7	22.3
	281	PG69	10-JUL-87	04:59	*38 36.4	*74 45.0	17.3
	282	PG70	10-JUL-87	05:36	*38 40.2	*74 51.0	27.6

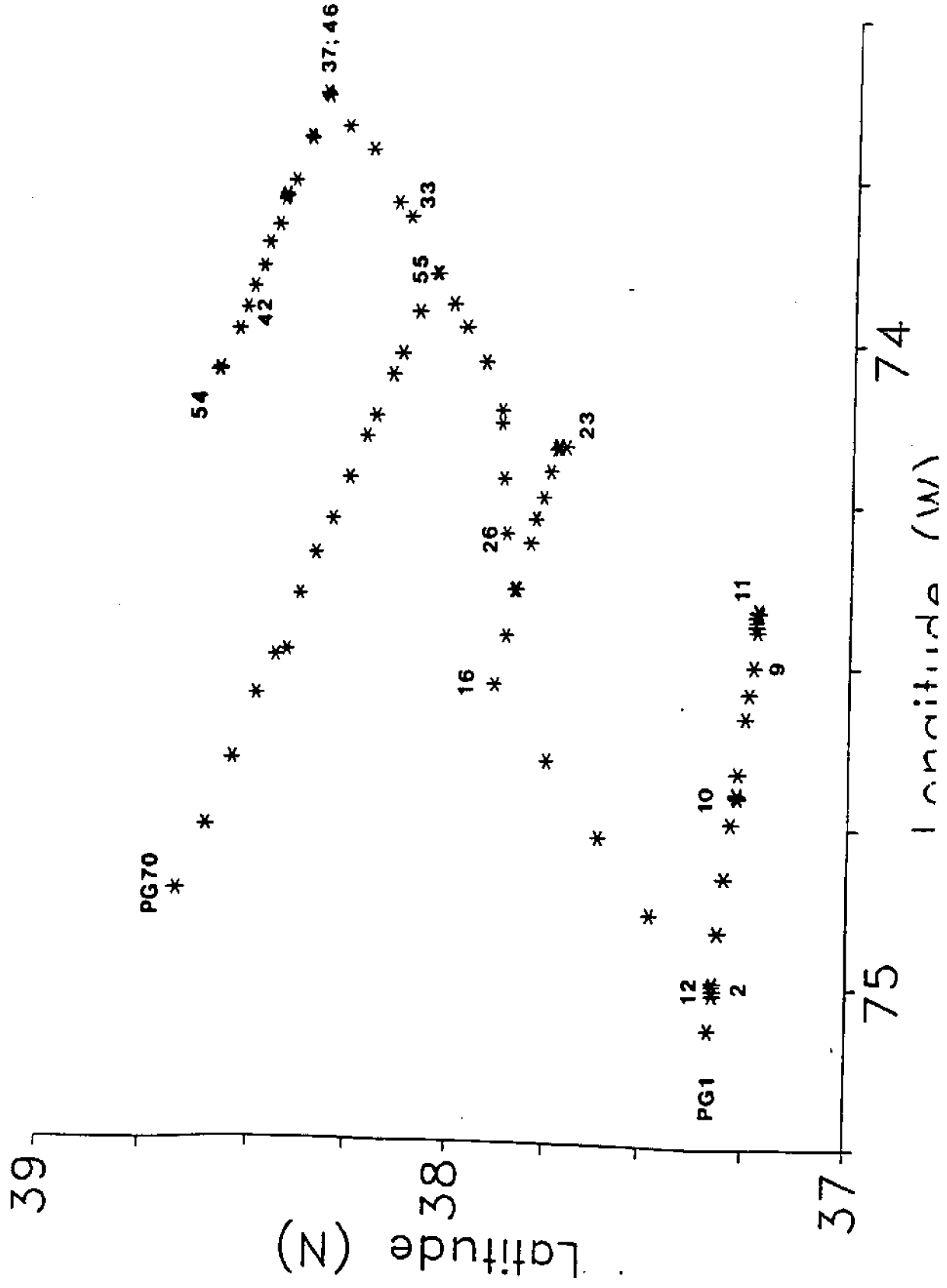
STATION POSITIONS: CDR-4



CDR-4: POSITIONS OF 'GF' STATIONS



CUR-4: POSITIONS OF 'PG' STATIONS



STATION	DEPTH (m)	SALINITY (ppt)	CL (µM)	TEMP (C)	H2S (µM)	O2 (µM)	SAT	PO2	PH (25C)	ALK (µeq/L)	TCO2 (µM)	PO4 (µM)	NO3 (µM)	NO2 (µM)	MNH (µM)	SI (µM)	SESTON (mg/L)
CS1F	1	32.948		24.92C		221.7	104		8.135	2269	2015	0.32	0.36	0.05<	0.10F	0.70	
CS1F	24	35.436		17.36C		247.0	102		8.140	2402	2115	0.27	0.27	0.02	0.43F	0.25	
CS1F	89	35.453		13.28		168.8	64		7.952	2393	2206	1.15	9.35	0.03	0.07F	4.12	
CS2A	1	33.140		25.47		219.4	104		8.147	2278	2015	0.21	0.32	0.05<	0.10<	1.21	
CS2A	50	34.262		11.18		227.7	83		7.971	2336	2150	0.88	4.45	0.24	0.10<	2.21	
CS2A	75	35.519		12.91		160.5	61		7.933	2397	2218	1.31	11.80	0.16	0.10<	4.62	
CS4A	1	32.764		25.53		221.6	105		8.145	2259	2002	0.27	0.10	0.05<	0.10<	0.10<	
CS4A	27	33.981		11.91		255.8	94		8.020	2321	2114	0.67	1.33	0.32	0.10<	0.85	
CS4A	35	33.952		11.14		240.4	87		7.976	2317	2132	0.80	1.93	0.54	0.10<	1.81	
CB1	2	30.487		23.89		234.1	106		8.102	2166	1954	0.47	0.06	0.04	0.97F	6.38	1.4
CB1	8	30.674		23.36		233.9	105		8.090	2177	1969	0.53	0.06	0.06	0.15F	5.67	
CB2	1	27.004		25.68		234.7	107		8.133	2010	1820	0.22	0.05<	0.06	0.10<	8.50	2.8
CB2	7	28.365		24.97		212.5	97		8.061	2075	1902	0.56	0.04	0.04	1.31F	8.45	
CB2	11	29.221		24.26		199.9	90		8.024	2114	1948	0.75	0.12	0.08	2.53F	10.40	
CB3	1	24.540		25.74		210.7	95		8.059	1904	1765	0.41	0.32	0.20	2.25F	14.80	3.7
CB3	9	27.384		25.21		193.1	88		8.019	2034	1886	0.78	0.30	0.21	3.14F	14.30	7.5
CB5	1	23.474		26.12		235.2	106		8.156	1851	1687	0.10	0.34	0.09	0.30F	13.40	3.6
CB5	14	27.208		25.09		161.9	73		7.943	2038	1918	1.07	0.40	0.31	7.58F	19.70	10.0
CB6	1	22.600		26.34		226.5	102		8.171	1809	1649	0.19	0.05<	0.16	0.30F	13.80	3.5
CB6	14	23.991		25.73		154.8	70		7.966	1883	1779	0.95	0.59	0.33	6.82F	22.70	3.6
CB7	2	20.113		26.27		232.7	103		8.175	1695	1558	0.08	0.05<	0.09	0.10<	16.90	2.6
CB7	10	21.986		25.76		142.5	63		7.947	1791	1706	0.73	0.41	0.26	5.06F	22.00	7.5
CB8	1	17.636		26.23		234.2	103		8.141	1584	1479	0.10	0.15	0.01	0.09F	20.40	2.8
CB8	29	21.938		25.65		74.0	33		7.710	1807	1781	1.12	0.01	0.37	11.30F	38.20	4.1
CB9	1	17.485		25.66		206.8	90		8.004	1547	1478	0.08	0.05<	0.06	2.28F	23.50	1.9
CB9	14	19.209		25.50		74.1	32		7.588	1669	1679	0.73	0.90	0.30	11.10F	38.10	
CB9	23	21.215		25.38		36.0	16		7.528	1778	1797	1.75	0.32	0.49	16.40F	61.70	2.4
CB10	1	16.816		25.76		202.3	87		7.861	1461	1425	0.10	0.11	0.18	3.53F	16.70	1.5
CB10	34	21.529		24.92		9.3	4		7.442	1806	1846	2.03	0.21	0.34	19.30F	57.70	2.7
CB11	5	16.189		25.62		206.6	89		7.943	1406	1447	0.13	0.05	0.15	3.84F	19.10	3.1
CB11	33	21.693		24.38	1.7	0.0	0		7.407	1834	1883	2.71	0.05<	0.03	22.50F	68.40	6.5
CB12	1	15.648		25.78		259.1	111		8.166	1479	1385	0.16	0.05<	0.10	0.46F	18.50	3.5
CB12	5	15.622		25.72		249.2	107		8.129	1481	1395	0.10	0.04	0.14	3.72F	22.60	
CB12	21	21.009		24.21	2.1	0.0	0		7.376	1809	1868	2.82	0.05	0.03	25.90F	64.30	8.7
CB13	1	14.337		25.91		226.1	97		7.953	1447	1405	0.33	0.74	0.73	10.30F	54.10	
CB13	7	14.715		25.51		186.1	80		7.794	1471	1455						
CB13	30	19.602		24.41	0.0	4.1	2		7.330	1729	1802	2.85	0.06	0.27	23.60F	63.50	6.1

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STATION	DEPTH (m)	SALINITY (ppt)	CL (um)	TEMP (C)	H2S (um)	O2 (um)	S02 SAT	pH (25C)	ALK (ueq/L)	TCO2 (um)	PO4 (um)	NO3 (um)	NO2 (um)	NH4 (um)	SI (um)	SESTON (mg/L)
CB14	1	14.094		25.55		167.7	71	7.674	1931	1937	0.70	0.77	0.96	12.20F	64.20	4.8
CB14	16	17.517		24.80		28.2	12	7.320	1627	1703						
CB14	35	19.044		24.32	0.0	1.4	1	7.320	1722	1799	2.65	0.05C	0.09	29.50F	65.30	3.4
CB15	1	11.307		25.61		237.3	99	7.900	1253	1234	0.87	3.10	0.76	7.61F	67.00	
CB15	11	16.652		24.81	0.0	26.0	11	7.282	1591	1679	1.89	0.31	0.95	24.30F	69.00	
CB12.34	24	20.498C		24.42C		8.8	4									
CR1	20	20.531C		24.31C		4.3	2									
CR3	12	18.110C		24.93C		55.1	24									
CR1B	21	20.376C		24.31C		2.9	1									
CR1C	1	15.825		25.62		275.9	118	8.146	1878	1387	0.29	0.31	0.20	0.13F	16.40	4.8
CR1C	7	16.610		25.21C		133.3	57	7.677	1534	1533	0.38	0.31	0.36	5.38F	18.40	3.7
CR1C	11	18.296		25.09C		49.0	21	7.409	1639	1691	0.91	0.28	0.56	13.50F	25.80	2.4
CR1C	14	19.052		24.81C		19.4	8	7.344	1697	1766	1.29	2.97	0.42	14.00F	26.90	2.3
CR1C	17	19.458		24.50C		5.3	2	7.325	1727	1801	1.82	0.41	0.41	17.10F	31.30	2.8
CR1C	20	19.774		24.46		3.8	2	7.327	1746	1820	1.93	0.26	0.38	19.30F	33.50	3.6
CR1D	20	19.281C		24.46C		5.2	2									
CR1E	1	15.357		26.29		312.0	135	8.182	1408	1315	0.19	0.77	0.25	0.39F	15.20	4.2
CR1E	8	17.131		25.30C		112.7	48	7.567	1565	1584	0.27	2.30	0.45	8.92F	22.30	3.0
CR1E	14	18.835		24.85C		18.9	8	7.332	1689	1761	0.94	1.22	0.57	16.50F	29.60	2.2
CR1E	19	18.944		24.59		12.1	5	7.325	1695	1769	1.45	0.35	0.56	18.60F	32.50	2.1
CB12.44	23	20.982C		24.42C		14.9	6									
CB13.45	30	20.417C		24.33C		2.5	1									
CB14.46	34	19.033C		24.38C		1.6	1									
CB16	1	8.911		25.23		213.4	87	7.720	1130	1141	0.44	8.24	0.70	5.24F	63.70	10.8
CB16	8	12.719		25.26		98.7	41	7.356	1369	1437	0.98	2.87	1.12	12.90F	70.90	15.6
CB17	1	5.985		25.27		213.8	86	7.586	991	1022	0.50	15.30	0.56	13.20F	55.50	9.8
CB17	9	11.200		25.44		103.6	43	7.290	1275	1356	1.24	6.16	1.00	22.10F	70.90	35.8
CB18	1	2.866		25.74		244.7	98	7.743	901	922	0.44	20.60	0.39	4.69F	46.40	12.9
CB18	7	4.707		25.76		187.9	76	7.374	944	1005	0.61	17.60	0.44	4.23F	55.60	2.3
CB19	1	0.044	468	25.73		235.8	93	7.805	1057	1089	0.13	35.30	4.17	0.24F	29.90	3.6
CB19	14	0.051	461	25.77		210.1	83	7.597	1059	1115	0.22	34.50	3.99	1.40F	29.60	7.2
CB20	1	1.235	18539	26.29		217.4	87	7.568	955	1001	0.61	20.70	0.42	4.45F	41.60	21.9
CB20	5	1.517	22945	25.64		197.9	78	7.450	942	1002	0.73	22.10	0.44	4.36F	42.90	26.1
CB21	1	1.353	20563	26.76C					916							
CB22	1	2.060	31528	26.68C					879							
CB23	1	2.464		26.61C					867							

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STATION	DEPTH (m)	FE	CO	NI	CU	ZN	CD	PB	CAST TYPE	DATE (mm/dd/yy)	LOCAL TIME	LATITUDE (deg min)	LONGITUDE (deg min)	WATER DEPTH (m)
CS1F	1	0.3	0.008	0.22	0.27	1.0	0.025	0.005	CTD	7/31/85	1051	37 18.6 N	74 31.1 W	113
CS1F	24	0.6	0.011	0.13	0.01	0.8	0.010	0.017	CTD	7/31/85	1051	37 18.6 N	74 31.1 W	113
CS1F	89	0.3	0.024	0.16	0.00	0.4	0.015	0.016	CTD	7/31/85	1051	37 18.6 N	74 31.1 W	113
CS2A	1	0.2	0.018	0.27	0.21	1.5	0.026	0.137	CTD	7/31/85	1352	37 16.0 N	74 39.8 W	87
CS2A	50	0.3	0.000	0.11	0.00	2.2	0.008	0.029	CTD	7/31/85	1352	37 16.0 N	74 39.8 W	87
CS2A	75	0.2	0.014	0.16	0.00	1.7	0.027	0.005	CTD	7/31/85	1352	37 16.0 N	74 39.8 W	87
CSNA	1								CTD	7/31/85	1723	37 11.8 N	74 58.3 W	38
CSNA	27								CTD	7/31/85	1723	37 11.8 N	74 58.3 W	38
CSNA	35								CTD	7/31/85	1723	37 11.8 N	74 58.3 W	38
CB1	2		0.005		0.40		0.029		CTD	8/01/85	732	36 59.7 N	75 56.8 W	11
CB1	8	40.9	0.014	0.40	0.40	1.7	0.050	0.129	CTD	8/01/85	732	36 59.7 N	75 56.8 W	11
CB2	1	0.8	0.012	0.34	0.18	2.8	0.028	0.035	CTD	8/01/85	918	37 5.0 N	76 5.7 W	14
CB2	7								CTD	8/01/85	918	37 5.0 N	76 5.7 W	14
CB2	11	0.5	0.000	0.26	0.41	1.7	0.064	0.036	CTD	8/01/85	918	37 5.0 N	76 5.7 W	14
CB3	1	0.3	0.016	0.45	0.40	0.4	0.022	0.125	CTD	8/01/85	1046	37 11.3 N	76 9.8 W	12
CB3	9	0.2	0.006	0.41	0.24	0.8	0.028	0.127	CTD	8/01/85	1046	37 11.3 N	76 9.8 W	12
CB5	1	0.3	0.001	0.40	0.25	2.7	0.027	0.000	CTD	8/01/85	1339	37 21.9 N	76 4.5 W	18
CB5	14	1.6	0.005	0.50	0.48	3.6	0.021	0.000	CTD	8/01/85	1339	37 21.9 N	76 4.5 W	18
CB6	1	1.5	0.043	0.63	0.72	0.7	0.032	0.119	CTD	8/01/85	1516	37 31.6 N	76 2.6 W	18
CB6	14								CTD	8/01/85	1516	37 31.6 N	76 2.6 W	18
CB7	2	1.5	0.003	0.80	1.13	2.8	0.041	0.265	CTD	8/01/85	1641	37 37.2 N	76 7.2 W	13
CB7	10	2.1	0.057	1.20	1.39	2.2	0.047	0.055	CTD	8/01/85	1641	37 37.2 N	76 7.2 W	13
CB8	1	1.4	0.016	1.00	0.63	1.4	0.033	0.056	CTD	8/01/85	1908	37 49.3 N	76 10.5 W	34
CB8	29	1.5	0.034	0.81	0.45	1.9	0.009	0.056	CTD	8/01/85	1908	37 49.3 N	76 10.5 W	34
CB9	1	0.8	0.006	0.97	0.65	2.7	0.016	0.000	CTD	8/02/85	835	38 6.0 N	76 13.2 W	27
CB9	14								CTD	8/02/85	835	38 6.0 N	76 13.2 W	27
CB9	23	1.6	0.027	0.70	0.43	3.7	0.005	0.000	CTD	8/02/85	835	38 6.0 N	76 13.2 W	27
CB10	1	1.9	0.024	0.98	0.51	1.4	0.008	0.069	CTD	8/02/85	1003	38 14.8 N	76 15.7 W	36
CB10	34	5.3	0.085	0.97	0.44	6.4	0.000	0.036	CTD	8/02/85	1003	38 14.8 N	76 15.7 W	36
CB11	5	1.3	0.013	1.12	0.49	1.1	0.006	0.000	CTD	8/02/85	1241	38 22.3 N	76 19.4 W	36
CB11	33	13.4	0.104	0.64	0.18	2.2	0.001	0.000	CTD	8/02/85	1241	38 22.3 N	76 19.4 W	36
CB12	1	2.0	0.000	1.16	0.60	1.9	0.006	0.000	CTD	8/02/85	1450	38 33.8 N	76 25.9 W	24
CB12	5								CTD	8/02/85	1450	38 33.8 N	76 25.9 W	24
CB12	21	14.5	0.099	1.09	0.36	3.6	0.009	0.011	CTD	8/02/85	1450	38 33.8 N	76 25.9 W	24
CB13	1	1.5	0.015	1.46	0.68	3.1	0.014	0.010	CTD	8/02/85	1728	38 45.1 N	76 26.1 W	33
CB13	7								CTD	8/02/85	1728	38 45.1 N	76 26.1 W	33
CB13	30	2.9	0.015	1.43	0.66	9.2	0.022	0.000	CTD	8/02/85	1728	38 45.1 N	76 26.1 W	33

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STATION	DEPTH (m)	FE	CO	NI	CU (ug/liter)	ZN	CD	PB	CST TYPE	DATE (mm/dd/yy)	LOCAL TIME	LATITUDE (deg min)	LONGITUDE (deg min)	WATER DEPTH (m)
CB14	1	1.3	0.030	1.81	0.74	1.8	0.015	0.000	CTD	8/02/85	1919	38 55.1 N	76 23.3 W	40
CB14	16								CTD	8/02/85	1919	38 55.1 N	76 23.3 W	40
CB14	35	3.8	0.112	1.20	0.18	2.8	0.007	0.000	CTD	8/02/85	1919	38 55.1 N	76 23.3 W	40
CB15	1	1.5	0.023	2.16	1.13	4.5	0.015	0.000	CTD	8/02/85	2042	39 4.3 N	76 19.4 W	14
CB15	11	1.6	0.057	0.78	0.42	5.6	0.019	0.087	CTD	8/02/85	2042	39 4.3 N	76 19.4 W	14
CB12.34	24								CTD	8/03/85	701	38 37.8 N	76 25.2 W	26
CR1	20								CTD	8/03/85	740	38 34.1 N	76 23.2 W	22
CR3	12								CTD	8/03/85	809	38 37.2 N	76 20.5 W	14
CR1B	21								CTD	8/03/85	921	38 34.2 N	76 23.0 W	22
CR1C	1								CTD	8/03/85	1040	38 34.2 N	76 23.0 W	22
CR1C	7								CTD	8/03/85	1040	38 34.2 N	76 23.0 W	22
CR1C	11								CTD	8/03/85	1040	38 34.2 N	76 23.0 W	22
CR1C	14								CTD	8/03/85	1040	38 34.2 N	76 23.0 W	22
CR1C	17								CTD	8/03/85	1040	38 34.2 N	76 23.0 W	22
CR1C	20	7.0	0.068	0.97	0.13	2.4	0.022	0.000	CTD	8/03/85	1040	38 34.2 N	76 23.0 W	22
CR1D	20	5.0	1.281	1.42	1.14	9.6	0.053	0.023	CTD	8/03/85	1255	38 34.2 N	76 23.0 W	22
CR1E	1								CTD	8/03/85	1535	38 34.2 N	76 23.0 W	21
CR1E	8								CTD	8/03/85	1535	38 34.2 N	76 23.0 W	21
CR1E	14								CTD	8/03/85	1535	38 34.2 N	76 23.0 W	21
CR1E	19								CTD	8/03/85	1535	38 34.2 N	76 23.0 W	21
CB12.44	23								CTD	8/03/85	1722	38 34.0 N	76 26.3 W	25
CB13.45	30								CTD	8/03/85	1826	38 45.2 N	76 26.0 W	32
CB14.46	34								CTD	8/03/85	1948	38 55.1 N	76 23.3 W	34
CB16	1	3.0	0.031	2.65	0.92	2.0	0.043	0.042	CTD	8/04/85	727	39 11.3 N	76 17.3 W	10
CB16	8	10.3	0.144	2.73	1.00	5.9	0.029	0.025	CTD	8/04/85	727	39 11.3 N	76 17.3 W	10
CB17	1	2.4	0.001	2.23	1.35	5.5	0.032	0.001	CTD	8/04/85	841	39 15.4 N	76 14.4 W	11
CB17	9	3.0	0.056	2.91	1.19	29.1	0.060	0.080	CTD	8/04/85	841	39 15.4 N	76 14.4 W	11
CB18	1	2.1	0.002	1.91	1.86	0.3	0.034	0.172	CTD	8/04/85	1021	39 22.1 N	76 8.6 W	9
CB18	7	39.8	0.055	3.13	2.47	3.4	0.066	0.118	CTD	8/04/85	1021	39 22.1 N	76 8.6 W	9
CB19	1	9.1	0.021	1.25	1.35	1.5	0.024	0.083	CTD	8/04/85	1252	39 33.0 N	76 4.8 W	16
CB19	14								CTD	8/04/85	1252	39 33.0 N	76 4.8 W	16
CB20	1	123.3	0.157	1.98	1.60	26.2	0.053	0.307	CTD	8/04/85	1447	39 25.8 N	76 2.0 W	7
CB20	5								CTD	8/04/85	1447	39 25.8 N	76 2.0 W	7
CB21	1								CTD	8/04/85	1616	39 27.9 N	75 58.2 W	8
CB22	1								CTD	8/04/85	1641	39 29.9 N	75 55.7 W	14
CB23	1								CTD	8/04/85	1702	39 31.0 N	75 52.9 W	13

STATION	DEPTH (m)	SALINITY (ppt)	CL (um)	TEMP (C)	H2S (um)	O2 (um)	SAT	PH (25C)	ALK (umol/L)	TCO2 (um)	POM (um)	NO3 (um)	NO2 (um)	MNH (um)	SI (um)	SESTON (mg/L)	chl-a (ug/L)	SECCHI (cm)	I (nm)	I03 (nm)
CT-4-81	2	32.391		24.58		227.9	106	8.136	2248	1999	0.26	0.27	0.10	1.91	0.82	0.8	0.12			
CT-4-81	16	33.054		21.78		241.4	107	8.140	2283	2025	0.24	0.18	0.00	2.75	0.67	0.7	0.08			
CT-4-81	24	34.486		18.28		269.2	113	8.157	2360	2075	0.38	0.04	0.06	3.30	1.11	0.4	0.04			
CT-4-82	32	34.202		13.46		289.8	110	8.111	2347	2090	0.87	0.08	0.00	7.75	1.59	0.7	0.13			
CT-4-82	50	34.261		10.80C		240.9	87	7.985	2343	2150	2.10	3.02	0.28	3.16	4.67	0.3	0.07			
DB-1C	2	32.427		25.01		232.1	108	8.148	2232	1978		0.06	0.06		0.84	0.6	0.11	750		
DB-1C	22	33.364		286.3		286.3	92	8.007	2293	2098	1.24	0.20	0.00		1.63	0.8	0.43			
DB-1C	34	33.532		9.66		262.3		7.962	2307	2131	1.62	1.53	0.50		3.39	0.4	0.89			
DB-2C-56	1	32.322		24.85		231.2	108	8.148	2230	1977	0.07	0.16	0.05		0.72	0.5	0.11	900		
DB-2C-57	10	32.277		24.06		237.4	109	8.143	2232	1982	0.05	0.31	0.04		0.65	0.5	0.12			
DB-2C-57	22	33.385		10.37		321.8	114	8.069	2295	2070	1.01	0.15	0.00		1.69	1.0	0.35			
DB-2C-57	47	33.649		9.76		259.7	91	7.968	2312	2132	1.76		0.58		3.90	0.5	0.09			
DB-3C-53	2	32.368		24.52		232.4	108	8.142	2233	1983	0.09	0.22	0.04		0.58	0.1	0.11			
DB-3C-55	23	34.307		15.52		287.2	114	8.128	2337	2071	0.60	0.06	0.00		1.18	0.5	0.15	1100		
DB-3C-55	30	34.030		11.81		284.8	105	8.066	2328	2098	1.21	0.41	0.04		1.96	0.6	0.24			
DB-3C-55	48	34.204		10.59		234.9	84	7.973	2335	2148	2.21	3.41	0.23		5.99	0.7	0.09			
DB-4C-50	2	32.187		24.02		233.5	107	8.134	2221	1977	0.18	0.29	0.00		0.46	0.4	0.07	10000		
DB-4C-52	15	32.228		19.17		261.9	110	8.112	2229	1995	0.43	0.75	0.06		0.57	0.6	0.15			
DB-4C-52	29	34.3117		11.48C		257.8	94	8.029	2343	2128	1.83	4.64	0.18		4.17	0.6	0.35			
DB-4C-52	64	34.395		11.09C		227.1	82	7.976	2345	2155	2.20	4.56	0.10		6.55	0.4	0.06			
DB-5C-47	2	31.942		23.38		237.6	108	8.123	2220	1984	0.45	0.06	0.00		2.15	0.5	0.09	1050		
DB-5C-48	17	33.842		19.22		263.0	112	8.119	2307	2037	0.31	0.19	0.00		0.61	0.5	0.10			
DB-5C-48	29	34.700		14.01		280.3	108	8.111	2363	2102	1.01	0.21	0.00		0.83	0.9	0.29			
DB-5C-48	74	34.396		11.02C		224.1	81	7.968	2344	2158	2.28	4.37	0.04		6.88	0.6	0.05			
DB-7C-44	2	32.011		23.64		234.3	107	8.118	2215	1981	0.35	0.11	0.00		1.45	0.4	0.06			
DB-7C-45	14	34.883		21.42		249.6	111	8.199	2377	2062	0.00	0.13	0.00		2.10	0.73	0.5	0.07		
DB-7C-45	40	35.554		18.34		257.7	109	8.173	2407	2099	0.09	0.11	0.00		2.99	1.43	0.5	0.09		
DB-7C-45	101	35.689		13.26C		187.9	72	8.171	2403	2096	2.58	10.60	0.00		3.88	0.7	0.00			
CB1	2	30.800		22.44		254.2	112	8.126	2179	1953	1.87	0.17	0.04		3.54	0.47				
CB1	9	32.192		19.22		263.1	111	8.041	2244	2044	2.31	0.50	0.03		2.21	1.09				
CB16	1	0.143	412	27.34		172.8	70	7.490	1022	1032	0.21	13.07	3.33		6.91	2.84	5.8	1.26	0	0
CB17	2	0.137	382	27.47		203.0	82	7.692	993	1034	0.11	14.52	2.38		3.94	5.24	4.7	1.83	0	0
CB17	10	0.135	381	26.76		146.4	59	7.344	982	1077	0.30	31.32	5.98		6.75	13.30	5.6	0.85		
CB188	3	0.891	13107	26.12		200.2	80	7.432	794	850	0.69	25.04	0.36		4.61	33.90	20.7	1.94	0	0
CB19	3	1.047	15632	26.05		212.5	85	7.488	790	837	0.69	24.59	0.31		3.78	33.20	19.0	1.94	0	0
CB208	2	2.493		25.94		210.7	84	7.485	861	908	0.60	23.23	0.37		4.01	38.00	12.9	1.90	72	0
CB218	2	3.077		26.02		203.3	82	7.455	894	945	0.48	22.63	0.37		5.45	42.20	12.6	1.91	64	0
CB218	9	4.514		25.65		162.5	65	7.305	978	1055	0.86	19.93	0.37		9.03	46.30	31.9	1.57	112	0
CB22	1	4.850		26.49		221.8	91	7.668	997	1022	0.68	17.71	0.39		4.68	46.30	11.4	3.10	121	0
CB22	11	12.850		23.77		24.7	10	7.263	1483	1581	1.87	1.68	0.16		54.10	8.5	0.55	248	0	0

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STATION	DEPTH (m)	SALINITY (ppt)	CL (um)	TEMP (C)	M2S (um)	O2 (um)	S02 SAT	pH (ZSC)	ALK (umg/L)	TCO2 (um)	PON (um)	NO3 (um)	NO2 (um)	MN (um)	SI (um)	SESSTON (mg/L)	Chl-a (ug/L)	SECCHI (cm)	I (mM)	IO3 (mM)	
CB23B	1	6.600		26.76		191.6	80	7.569	1097	1132	0.97	15.33	0.37	7.94	48.30	7.3	1.70	90	144	0	
CB23B	13	14.470		23.35	0.0	4.4	2	7.269	1557	1853	2.30	1.08	0.08	7.85	38.60	5.4			258	0	
CB24	1	8.650		26.08		285.2	119	8.315	1217	1150	1.10	3.99	0.20	3.56	51.30	4.7	3.25	150	165	0	
CB24	12	16.870		23.00	0.2	0.4	0	7.350	1661	1733	3.30	0.15	0.03		46.40	4.3			284	0	
CB26B	1	10.980		26.00	0.0	254.5	107	8.236	1335	1262	0.71	2.70	0.09	1.22	40.60	2.7	1.67		172	0	
CB26B	4	11.630		25.59	0.0	233.6	98	8.203	1369	1296	0.72	0.30	0.05	0.48	45.70	3.0			187	0	
CB26B	6	12.510		25.41	0.0	120.8	51	7.603	1408	1430	0.66	0.26	0.04	1.42	42.20	2.8			194	0	
CB26D	10	16.990		23.58	0.0	2.2	1	7.290	1612	1698	0.79	0.13	0.00	7.93	47.90	2.3		160	264	0	
CB26D	20	18.910		23.51	0.4	0.0	0	7.392	1718	1775	2.99	0.10	0.02	8.24	41.00	2.3			305	0	
CB26D	28	19.730		23.73	1.0	0.0	0	7.407	1749	1801	6.21	0.06	0.02	7.25	44.90	6.1			324	0	
CB26FR	11	18.380		23.47																	
CB26FR	22	19.340		23.64		0.0	0	7.406													
CB26FR	29	19.850		23.78																	
CB27B	1	12.060		26.48	0.0	313.9	134	8.509	1367	1217	1.02	0.42	0.00	0.94	40.90	2.9			166	0	
CB27B	7	14.000		24.55	0.0	1.8	1	7.180	1465	1583	1.19	0.11	0.00	2.70	43.70	3.8			200	0	
CB27B	12	18.873		23.86	0.1	0.1	0	7.352	1699	1766	1.78	0.58	0.00	8.19	26.007	1.6			254	0	
CB27D	6	13.499		25.48	0.0	115.8	49	7.665	1425	1434	0.99	0.46	0.00	0.69	57.10	1.7			251	0	
CB27D	16	20.311		24.01	0.4	0.0	0	7.408	1759	1810	2.86	0.08	0.02	8.15	39.90	3.7			344	0	
CB27D	29	20.663		24.08	0.0	1.1	0	7.402	1768	1820	2.43	0.43	0.00	7.94	35.70	1.1			349	0	
CB28B	1	12.624		26.63		220.5	95	8.180	1377	1303	0.97	0.24	0.00	0.83	34.30	2.7	1.74		172	0	
CB28B	4	12.622		26.600		218.0	93	8.174	1377	1304	1.07	0.00	0.00	0.96	37.20	2.9			164	0	
CB28B	8	16.015		25.22		23.8	10	7.344	1562	1633	2.47	0.00	0.04	8.09	44.60	1.6			238	0	
CB28D	9	15.472		25.21		13.0	6	7.372	1532	1596	2.72	0.17	0.03	8.08	43.50	2.8			253	0	
CB28D	16	21.592		24.25		1.2	0	7.397	1802	1853	3.06	0.10	0.07	6.26	41.80	1.2			312	0	
CB28D	20	22.007		24.19	0.0	0.0	0	7.405	1822	1871	2.72	0.14	0.10	1.12	42.20	1.5			362	0	
CB29B	1	13.676		27.61		276.9	122	8.392	1390	1257	1.23	0.16	0.00	2.27	31.20	5.3	0.39		213	0	
CB29B	14	22.164		24.56		2.4	1	7.404	1815	1863	2.90	0.11	0.00	5.55	39.50	0.9			322	0	
CB29B	31	23.492		24.36	0.0	19.8	9	7.487	1877	1901	3.18	0.29	0.15	8.24	39.30	0.9			360	20	
CB30	1	14.512		28.09		406.7	181	8.845	1434	1122	1.28	0.11	0.00	1.64	30.10	14.9			246	0	
CB30	27	23.827		24.56	0.0	31.1	14	7.545	1888	1896	3.53	0.41	0.30	8.26	38.60	3.3			348	26	
CB31	1	15.003		29.16		403.7	183	8.928	1495	1126	1.18	0.05	0.00	0.86	24.80	11.8	12.15		252	0	
CB31	31	24.725		24.65		43.0	19	7.601	1928	1919	3.46	0.35	0.19	6.61	33.10	3.8			334	63	
CB32B	1	16.565		28.18		309.5	139	8.635	1537	1274	1.23	0.00	0.00	0.78	12.50	4.3	3.00	180	250	0	
CB32B	22	24.745		24.56		51.0	23	7.657	1926	1903	3.53	0.60	0.31	9.33	31.60	4.6			320	56	
CB33	1	18.796		28.70		332.9	153	8.558	1640	1372	1.42	0.00	0.00	1.03	18.60	5.1	2.15		254	0	
CB33	18	24.822		24.52		53.7	24	7.674	1930	1902	2.82	0.63	0.32	10.09	33.10	12.1			303	67	
CB34	1	20.584		27.74		260.3	119	8.547	1731	1436	0.57	0.15	0.00	0.81	11.80	2.5	0.76		285	0	
CB34	17	27.928		24.04		181.7	81	8.032	2060	1902	1.73	0.13	0.07	4.98	6.34	7.2			316	86	
CB35B	1	22.256		27.57		242.8	112	8.419	1806	1546	0.63	0.00	0.00	1.43	9.05	2.6	0.46	250	249	69	
CB35B	9	29.415		22.65		235.9	104	8.101	2123	1922	1.80	0.01	0.02	2.20	2.01	5.1			279	126	

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STATION	DEPTH (m)	SALINITY (ppt)	CL (µM)	TEMP (C)	H2S (µM)	O2 (µM)	SAT	PO2	pH (25C)	ALK (µM/L)	TOO2 (µM)	PO4 (µM)	NO3 (µM)	NO2 (µM)	NH4 (µM)	SI (µM)	SESTON (mg/L)	CHL-a (µg/L)	SECCHI (cm)	I (µM)	IO3 (µM)
CB37B	1	25.200		26.18		285.4	112	8.260	1940	1714	1.06	0.00	0.00	0.00	1.69	8.94		0.11	300	259	96
CB37B	12	29.873		22.00		241.0	105	8.099	2142	1938	1.04	0.00	0.00	0.00	3.32	2.94				274	136
CB42	2	30.561		22.75		277.3	123	8.170	2178	1932	1.93	0.00	0.00	0.00	4.27	0.54	2.0	0.44		216	188
CB42	7	31.301		21.22		278.4	121	8.136	2205	1968	2.04	0.00	0.00	0.00	1.81	0.32	2.2			221	202
CB44B	1	28.778		26.83		267.8	126	8.268	2100	1824	1.33	0.00	0.00	0.00	2.31	0.55	2.6			248	155
CB44B	9	32.543		17.84		278.9	115	8.063	2265	2051	2.34	0.00	0.00	0.00	1.54	0.67	1.7			203	227

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STATION	DEPTH (m)	CAST TYPE	DATE (mm/dd/yy)	LOCAL TIME	LATITUDE (deg min)	LONGITUDE (deg min)	WATER DEPTH (m)
CT-A.01	2	CTD	7/13/86	949	37 35.6 N	74 31.8 W	68
CT-A.01	16	CTD	7/13/86	949	37 35.6 N	74 31.8 W	68
CT-A.01	24	CTD	7/13/86	949	37 35.6 N	74 31.8 W	68
CT-A.02	32	CTD	7/13/86	1017	37 35.7 N	74 31.6 W	66
CT-A.02	60	CTD	7/13/86	1017	37 35.7 N	74 31.6 W	66
DB-1C	2	CTD	7/14/86	1742	38 27.9 N	74 19.1 W	42
DB-1C	22	CTD	7/14/86	1742	38 27.9 N	74 19.1 W	42
DB-1C	34	CTD	7/14/86	1742	38 27.9 N	74 19.1 W	42
DB-2C.56	1	CTD	7/14/86	1519	38 24.0 N	74 14.1 W	56
DB-2C.57	10	CTD	7/14/86	1617	38 23.7 N	74 12.9 W	56
DB-2C.57	22	CTD	7/14/86	1617	38 23.7 N	74 12.9 W	56
DB-2C.57	47	CTD	7/14/86	1617	38 23.7 N	74 12.9 W	56
DB-3C.53	2	CTD	7/14/86	1306	38 19.7 N	74 8.4 W	55
DB-3C.55	23	CTD	7/14/86	1344	38 19.6 N	74 7.8 W	55
DB-3C.55	30	CTD	7/14/86	1344	38 19.6 N	74 7.8 W	55
DB-3C.55	46	CTD	7/14/86	1344	38 19.6 N	74 7.8 W	55
DB-4C.50	2	CTD	7/14/86	1054	38 15.6 N	74 2.6 W	70
DB-4C.52	15	CTD	7/14/86	1154	38 15.3 N	74 2.0 W	70
DB-4C.52	29	CTD	7/14/86	1154	38 15.3 N	74 2.0 W	70
DB-4C.52	64	CTD	7/14/86	1154	38 15.3 N	74 2.0 W	70
DB-5C.47	2	CTD	7/14/86	906	38 11.3 N	73 57.1 W	81
DB-5C.48	17	CTD	7/14/86	938	38 11.0 N	73 56.9 W	81
DB-5C.48	29	CTD	7/14/86	938	38 11.0 N	73 56.9 W	81
DB-5C.48	74	CTD	7/14/86	938	38 11.0 N	73 56.9 W	81
DB-7C.44	2	CTD	7/14/86	702	38 6.2 N	73 51.9 W	132
DB-7C.45	14	CTD	7/14/86	737	38 5.8 N	73 51.3 W	132
DB-7C.45	40	CTD	7/14/86	737	38 5.8 N	73 51.3 W	132
DB-7C.45	101	CTD	7/14/86	737	38 5.8 N	73 51.3 W	132
CB1	2	CTD	7/15/86	1215	36 57.8 N	75 51.2 W	12
CB1	9	CTD	7/15/86	1215	36 57.8 N	75 51.2 W	12
CB16	1	BOAT	7/16/86	1946	39 36.6 N	76 7.7 W	3
CB17	2	CTD	7/16/86	2159	39 32.9 N	76 4.7 W	12
CB17	10	CTD	7/16/86	2159	39 32.9 N	76 4.7 W	12
CB18B	3	CTD	7/17/86	819	39 25.3 N	76 2.4 W	7
CB19	3	CTD	7/17/86	859	39 23.8 N	76 3.9 W	7
CB20B	2	CTD	7/17/86	1019	39 21.0 N	76 10.3 W	9
CB21B	2	CTD	7/17/86	1111	39 19.9 N	76 12.4 W	10
CB21B	9	CTD	7/17/86	1111	39 19.9 N	76 12.4 W	10
CB22	1	CTD	7/17/86	1301	39 15.1 N	76 14.5 W	13
CB22	11	CTD	7/17/86	1301	39 15.1 N	76 14.5 W	13

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STATION	DEPTH (m)	CAST TYPE	DATE (mm/dd/yy)	LOCAL TIME	LATITUDE (deg min)	LONGITUDE (deg min)	WATER DEPTH (m)
CB238	1	CTD	7/17/86	1427	39 13.3 N	76 15.1 W	15
CB238	13	CTD	7/17/86	1427	39 13.3 N	76 15.1 W	15
CB24	1	CTD	7/17/86	1607	39 8.0 N	76 19.8 W	13
CB24	12	CTD	7/17/86	1607	39 8.0 N	76 19.8 W	13
CB268	1	CTD	7/18/86	940	38 57.0 N	76 23.3 W	29
CB268	4	CTD	7/18/86	940	38 57.0 N	76 23.3 W	29
CB268	6	CTD	7/18/86	940	38 57.0 N	76 23.3 W	29
CB268	10	CTD	7/18/86	1110	38 57.0 N	76 23.3 W	29
CB268	20	CTD	7/18/86	1110	38 57.0 N	76 23.3 W	29
CB268	28	CTD	7/18/86	1110	38 57.0 N	76 23.3 W	29
CB268R	11	CTD	7/18/86	1402	38 57.0 N	76 23.3 W	30
CB268R	22	CTD	7/18/86	1402	38 57.0 N	76 23.3 W	30
CB268R	29	CTD	7/18/86	1402	38 57.0 N	76 23.3 W	30
CB278	1	CTD	7/18/86	1916	38 49.3 N	76 24.6 W	32
CB278	7	CTD	7/18/86	1916	38 49.3 N	76 24.6 W	32
CB278	12	CTD	7/18/86	1916	38 49.3 N	76 24.6 W	32
CB278	6	CTD	7/18/86	2157	38 49.7 N	76 24.0 W	30
CB27D	16	CTD	7/18/86	2157	38 49.7 N	76 24.0 W	30
CB27D	29	CTD	7/18/86	2157	38 49.7 N	76 24.0 W	30
CB288	1	CTD	7/19/86	739	38 32.7 N	76 26.0 W	22
CB288	4	CTD	7/19/86	739	38 32.7 N	76 26.0 W	22
CB288	8	CTD	7/19/86	739	38 32.7 N	76 26.0 W	22
CB288	9	CTD	7/19/86	916	38 32.7 N	76 26.0 W	22
CB288	16	CTD	7/19/86	916	38 32.7 N	76 26.0 W	22
CB288	20	CTD	7/19/86	916	38 32.7 N	76 26.0 W	22
CB298	1	CTD	7/19/86	1345	38 18.7 N	76 17.7 W	35
CB298	14	CTD	7/19/86	1345	38 18.7 N	76 17.7 W	35
CB298	31	CTD	7/19/86	1345	38 18.7 N	76 17.7 W	35
CB30	1	CTD	7/19/86	1519	38 4.6 N	76 12.8 W	31
CB30	27	CTD	7/19/86	1519	38 4.6 N	76 12.8 W	31
CB31	1	CTD	7/19/86	1652	37 49.2 N	76 10.3 W	38
CB31	31	CTD	7/19/86	1652	37 49.2 N	76 10.3 W	38
CB328	1	CTD	7/19/86	1944	37 42.3 N	76 11.1 W	24
CB328	22	CTD	7/19/86	1944	37 42.3 N	76 11.1 W	24
CB33	1	CTD	7/19/86	2033	37 41.0 N	76 10.7 W	20
CB33	18	CTD	7/19/86	2033	37 41.0 N	76 10.7 W	20
CB34	1	CTD	7/20/86	658	37 19.6 N	76 6.3 W	19
CB34	17	CTD	7/20/86	658	37 19.6 N	76 6.3 W	19
CB358	1	CTD	7/20/86	945	37 5.0 N	76 8.3 W	10

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STATION	DEPTH (m)	CAST TYPE	DATE (mm/dd/yy)	LOCAL TIME	LATITUDE (deg min)	LONGITUDE (deg min)	WATER DEPTH (m)
CB378	1	CTD	7/20/86	1127	37 4.3 N	76 6.9 W	13
CB378	12	CTD	7/20/86	1127	37 4.3 N	76 6.9 W	13
CB42	2	CTD	7/20/86	1510	36 57.8 N	75 54.6 W	9
CB42	7	CTD	7/20/86	1510	36 57.8 N	75 54.6 W	9
CB44B	1	CTD	7/20/86	1738	36 57.9 N	75 53.0 W	10
CB44B	9	CTD	7/20/86	1738	36 57.9 N	75 53.0 W	10

STATION	DEPTH (m)	SALINITY (ppt)	CL (um)	TEMP (C)	H2S (um)	O2 (um)	SO2 SAT	pH (25C)	ALK (ueq/L)	TCO2 (um)	PO4 (um)	NO3 (um)	NO2 (um)	NHR (um)	SI (um)	SESTON (mg/L)	CHI-a (ug/L)
S(south)	1	6.790		25.28		199.7	81	7.361	1084	1150	2.04	107.70	0.96	13.18	21.34	54.4	2.37
S(middle)	1	4.310		25.36		201.9	81	7.383	1004	1069		135.70	1.06	12.07	20.63	46.2	
S(north)	1	1.929		25.47		180.4	71	7.290	971	1061	2.88	173.30	1.37	14.10	12.92	49.4	2.55
CD1	1	5.687		25.69C		201.7	82	7.388	1033	1102	2.14	114.60	0.72	13.52	23.15	120.7	3.20
CD2	1	3.230		25.67C		182.7	73	7.199	901	998	1.22	76.98	0.75	18.48	22.73	70.1	0.99
CD3	1	1.874		26.07C		189.8	76	7.238	863	954	1.33	81.43	0.76	17.82	23.36	23.1	0.90
CD4	1	1.406		26.19C		193.8	77	7.301	906	990	1.15	56.04	0.90	18.14	25.91	16.5	0.73
CD5	1	0.968	14157	25.95C		191.4	76	7.358	949	1028	1.13	50.91	1.01	18.23	20.52	16.5	1.09
CD6	1	0.920	13469	26.15C		195.9	78	7.375	937	1013	1.02	49.09	0.94	18.19	24.78	16.3	0.75
CB1	1	0.104	418	25.76		247.0	97	7.790	1076	1110	0.56	67.58	1.88	9.34	10.43	0.5	0.67
CB2	1	0.105	422	26.43		226.9	90	7.734	1128	1170		52.14	3.16	10.85	22.95	2.3	3.38
CB3	1	0.107	456	26.07		299.0	118	8.517	1130	1117	0.52	38.64	1.91	4.67	19.12	5.0	3.88
CB4	1	0.106	446	25.83		266.3	105	8.204	1124	1129	0.40	39.76	1.97	11.52	17.67	20.3	5.07
CB5	1	0.104	444	25.62		232.7	91	7.816	1114	1147	0.40	28.17	1.44	8.96	30.79	12.9	5.93
CB6	1	0.106	438	24.84		276.2	107	8.482	1133	1123	0.38	37.38	2.03	9.15	15.79	21.7	7.17
CB7	1	0.116	624	26.32		227.7	91	7.799	1096	1130	0.35		0.71	13.83	32.30		5.50
CB8	1	0.669	9471	25.49		187.0	73	7.352	982	1068	0.987	42.277	0.907	19.117	24.537	24.6	1.26
CB9	1	1.279	19113	25.48		203.1	80	7.369	922	995	1.09	45.64	0.71	19.03	34.26	10.6	1.29
CB10	1	1.926		25.32		223.7	88	7.487	927	979	0.50	49.86	0.78	8.63	40.34	5.3	1.46
CB11	1	4.382		24.91		218.0	87	7.510	979	1023	0.71	36.73	0.53	11.38	32.00	8.0	1.67
CB12	1	5.692		24.74		250.0	100	7.861	1015	1019	0.39	22.64	0.46	12.60	20.94	10.3	9.60
CB12	11	9.279		23.78		75.1	30	7.131	1163	1284	0.17	6.85	0.37	9.52	36.39	22.5	0.59
CB14B	1	8.011		24.46		271.4	109	8.084	1101	1073	0.20	17.77	0.34	4.14	51.48	0.6	2.55
CB14B	8	10.136		23.36		88.7	35	7.200	1201	1303	0.23		0.33	13.48	34.65	1.4	0.36
CB15	1	9.852		25.09		380.5	156	8.586	1165	1034	0.20	0.08	0.00<	5.08		6.0	11.24
CB15	13	14.263		20.47		2.8	1	7.263	1451	1542	0.46	1.12	0.39	27.34	42.72	0.4	0.58
CB16	1	10.938		24.66		310.5	127	8.345	1219	1129	2.14	0.057	0.207	37.80	53.437	10.0	4.31
CB16	25	16.954		18.56	26.8	0.0	0	7.494	1685	1722		0.97	0.00<	37.80	42.63	6.8	1.46
D1	1	11.581		24.78	0.0	302.3	125	8.372	1223	1123	0.05	5.86	0.00<	1.17	43.75	1.7	0.99
D1	6	12.823		24.48C	0.0	103.5	43	7.742	1329	1327	0.21	0.79	0.00<	4.34	51.31	1.0	0.33
D1	11	14.940		20.33C	3.1	0.0	0	7.353	1484	1552	0.70	0.78	0.10	26.94	39.47	0.0<	0.53
D1	16	15.929		19.36C	24.0	0.0	0	7.432	1580	1631		2.58	0.16	36.87	36.87	0.0<	1.53
D1	27	17.184		18.63C	50.3	0.0	0	7.532	1717	1746		0.39	0.15	38.98	38.98	2.6	2.72
D3	1	11.871		24.60		254.2	105	8.164	1243	1181		0.54	0.00<	39.17	39.17	0.0<	2.28
D3	27	17.010		18.68C		0.0	0	7.506	1684	1718	2.08	0.15	0.49	16.40	43.18	0.8	0.45
D5	1	11.987		24.44		238.2	98	8.071	1252	1205	0.19	0.16	0.00<	4.66	37.26	1.6	2.35
D5	27	17.178		18.62C		0.0	0	7.533	1720	1749	2.15	0.18	0.48	32.60	40.87	2.7	1.26
D7	1	12.189		24.41		222.7	92	8.011	1256	1217	0.29	0.70	0.00<	6.82	38.36	0.0<	0.04
D7	22	16.930C		18.63C		0.0	0	7.503	1694	1730	2.13	0.10	0.45	35.39	42.89	2.3	0.89
D9	1	12.260		24.37		221.7	91	7.886	1255	1220	0.03	0.81	0.00<	4.35	44.01	1.6	1.29
D9	21	15.854		19.28C		0.0	0	7.435	1589	1640	1.40	0.76	0.07	39.14	40.48	0.7	0.72

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STATION	DEPTH (m)	SALINITY (ppt)	CL (uM)	TEMP (C)	H2S (uM)	O2 (uM)	SAT	PH (pH)	ALK (uM)	TCO2 (uM)	PO4 (uM)	NO3 (uM)	NO2 (uM)	MNH (uM)	SI (uM)	SESTON (mg/L)	Chl-a (ug/L)
D11	1	12.354		24.28	217.6	89	7.962	1258	1226	0.21	0.74	0.000	6.22	43.98	0.00	1.36	
D11	25	17.022		18.61C	0.0	0	7.513	1684	1717	2.05	0.32	0.55	33.24	42.27	0.5	0.62	
D13	1	12.186		24.14	229.8	94	8.015	1244	1205	0.22	0.83	0.000	6.25	42.47	1.3	1.46	
D13	28	17.103		18.61C	0.0	0	7.522	1713	1744	2.16	0.13	0.50	16.98	43.13	1.1	1.06	
D15	1	12.378		24.17	227.9	93	8.020	1254	1213	0.15	0.79	0.31	5.35	40.05	0.00	1.57	
D15	19	15.737		19.00C	0.0	0	7.433	1589	1641	1.52	0.53	0.000	37.43	42.11	0.00	0.69	
D17	2	12.400		24.17	219.9	90	7.978	1258	1223	0.19	0.75	0.09	5.14	41.36	0.4	1.63	
D17	24	16.878		18.69C	0.0	0	7.509	1682	1716	1.98	0.12	0.44	28.92	41.40	1.0	0.39	
D19	1	12.422		24.32	223.1	92	7.980	1261	1226	0.27	1.41	0.000	6.79	45.90	1.6	1.63	
D19	24	16.776		18.66C	0.0	0	7.510	1666	1700	1.89	0.12	0.43	43.64	42.29	1.6	0.48	
D21	1	12.413		24.79	251.5	104	8.112	1248	1192	0.23	0.81	0.08	4.28	55.14	2.1	2.66	
D21	25	17.028		18.63C	0.0	0	7.513	1705	1738	1.86	0.12	0.46	38.50	43.84	0.00	0.48	
D23	1	12.407		24.84	254.6	106	8.124	1244	1186	0.36	0.84	0.16	4.75	46.69	0.8	2.42	
D23	28	16.578		18.82C	0.0	0	7.500	1672	1709	1.84	0.08	0.51	38.50	44.01	7.4	0.82	
D25	1	12.315		24.96	253.9	106	8.101	1244	1190	0.26	0.89	0.11	2.97	44.11	1.3	2.72	
D25	9	12.663		23.20C	158.3	64	7.771	1287	1281	0.44	1.09	0.13	10.00	42.19	0.1	0.92	
D25	13	14.155		20.98C	1.0	0	7.237	1444	1542	0.66	1.82	0.59	29.70	43.22	0.5	0.34	
D25	20	15.294		19.49C	0.0	0	7.395	1554	1614	0.66	0.317	0.367		41.787	3.5	0.53	
CB358	1	17.413		25.36	219.0	94	8.218	1583	1458	0.06	0.09	0.47	1.69	24.10	1.4	1.19	
CB358	12	21.751		23.82	51.6	22	7.679	1785	1767	0.51	0.36	0.62	21.52	35.31	1.6	0.61	
CB36	1	16.141		25.07	214.9	91	8.167	1535	1435	0.13	0.13	0.43	2.32	21.49	1.4	1.11	
CB36	31	22.085		23.62	45.2	19	7.660	1806	1791	0.81	0.12	0.28	22.41	43.64	3.2	0.45	
CB37	1	15.274		24.91	200.9	85	8.161	1497	1405	0.14	0.58	0.23	2.15	24.65	12.8	1.64	
CB37	37	21.992		23.47	26.8	11	7.608	1811	1809	0.90	0.37	0.64	22.14	39.90	2.6	0.69	
CB38	1	14.943		25.75	232.7	100	8.276	1458	1342	0.14	0.60	0.23	1.56	21.55	3.4	0.85	
CB38	23	20.202		23.07	1.4	1	7.618	1746	1747	0.98	0.21	0.55	21.98	35.74	2.0	0.31	
CB39	1	15.017		25.79	229.4	98	8.255	1433	1323	0.16	0.58	0.22	2.35	23.00	2.4	0.73	
CB39	28	19.647		22.30	0.0	0	7.658	1776	1770	1.34	0.08	0.46	48.27	48.27	0.6	0.44	
CB40A	1	14.550		26.05	245.5	105	8.218	1365	1271		0.00	0.19	27.17	27.17	0.7	1.77	
CB40A	32	18.618		20.33	0.0	0	7.667	1808	1804		0.01	0.12	42.97	42.97	2.5	0.30	
CB41	1	13.264		26.52	257.2	111	8.232	1289	1203		0.01	0.17	26.80	26.80	1.1	1.12	
CB41	21	17.179		19.47	0.0	0	7.556	1715	1739		0.00	0.13	39.41	39.41	2.2	0.52	
CB42.102	1	12.747		26.36	246.8	105	7.946	1224	1193		0.30	0.29	38.90	38.90	2.2	1.26	
CB42.102	23	16.965		19.12	0.0	0	7.551	1701	1726		0.10	0.17	42.58	42.58	1.7	0.46	
CB43B	1	18.304		25.53C	374.8	156	8.641	1174	1023		3.43	0.44	40.78	40.78	0.0	0.00	

STATION	DEPTH (m)	SALINITY (ppt)	CL (um)	TEMP (C)	H2S (um)	O2 (um)	SAT	S02	PH (25C)	ALK (umq/L)	TCO2 (um)	PON (um)	NO3 (um)	NO2 (um)	NH4 (um)	SI (um)	SESTON (mg/L)	CH1-a (ug/L)	
CB46	22	19.990C		22.92C		0.0	0												
CB47	24	20.222C		23.14C		2.7	1												
CB47B	1	15.165		25.67	0.0	229.2	98	8.233	1493	1384	0.12	0.71	0.20	0.20	1.13	31.20	2.2	1.26	
CB47B	26	20.790		23.29		N.A	2	7.577	1780	1789	1.15	0.25	0.60	0.60	12.86	39.56	1.7	0.48	
CB48	1	15.717		25.63		217.0	93	8.173	1508	1410	0.17	0.00C	0.48	0.48	1.81	24.69	2.2	1.60	
CB48	20	20.322		23.21		7.6	3	7.595	1750	1756	1.16	0.21	0.60	0.60	14.53	37.19	1.2	0.34	
CB50	1	15.738		25.88		227.3	98	8.208	1513	1406	0.19	0.00C	0.52	0.52	4.13	17.95	2.2	1.03	
CB50	19	20.183		23.18		3.0	1	7.596	1740	1746	0.90	0.03	0.14	0.14	16.68	20.60	0.2	0.28	
CB51	1	15.186		26.31		240.3	104	8.274	1502	1382	0.13	0.00C	0.51	0.51	1.25	25.26	2.2	1.26	
CB51	12	17.369		24.37		71.9	30	7.764	1608	1588	0.49	0.13	0.50	0.50	8.58	25.59	0.7		
CB51B	27	20.651		23.26		3.2	1	7.580	1762	1770	1.27	0.23	0.58	0.58	15.36	39.45	1.9		
CB52	1	15.254		25.78		230.5	99	8.233	1497	1388	0.26	0.00C	0.47	0.47	4.93	27.07	0.0C		
CB52	31	21.947		23.49		22.7	10	7.594	1614	1815	1.08	0.27	0.28	0.28	18.87	44.61	0.0C		
CB53	1	15.465		25.99		233.6	101	8.282	1496	1383	0.14	0.00C	0.53	0.53	1.96	23.94	2.2	1.02	
CB53	25	21.011		23.34		7.6	3	7.577	1782	1790	1.30	0.21	0.26	0.26	14.10	42.26	0.7	0.41	
CB54	1	15.086		25.81		230.6	99	8.257	1485	1371	0.18	0.16	0.57	0.57	3.17	30.79	0.0C	1.26	
CB54	20	20.383		23.15		0.9	0	7.589	1761	1768	1.29	0.08	0.19	0.19	39.54	1.5	0.48		
CB55B	1	20.957		25.81		230.4	102	8.235	1744	1577	0.07	0.00C	0.08	0.08	1.94	22.43	2.0	0.78	
CB55B	16	23.741		23.35		91.4	39	7.787	1868	1816	0.62	0.41	0.38	0.38	21.42	28.01	5.4	0.20	
CB56	1	21.924		25.13		212.8	94	8.066	1783	1664	0.05	0.00C	0.11	0.11	2.10	20.21	3.6	1.40	
CB56	19	25.379C		22.92		142.5	62	7.896	1938	1846	0.42	0.01	0.24	0.24	8.41	19.37	9.2	0.27	
CB57	1	22.554C		25.20		221.2	98	8.129	1813	1667	0.06	0.00C	0.12	0.12	0.33	19.12	3.0	0.70	
CB57	36	25.794		23.10		155.3	67	7.925	1948	1845	0.43	0.43	0.00C	0.17	8.20	17.09	11.1	0.37	
CB58	1	23.187		25.52		220.3	98	8.126	1832	1682	0.14	0.00C	0.11	0.11	2.02	19.56	2.4	2.94	
CB58	19	25.726		23.89		168.9	74	7.967	1949	1832	0.37	0.00C	0.15	0.15	7.41	17.83	19.3	0.74	
CB59	1	23.494		24.80		222.7	98	8.053	1857	1729	0.15	0.00C	0.13	0.13	1.83	23.13	2.9	0.76	
CB59	12	30.180		17.74		226.1	91	7.949	2132	1989	0.23	0.00C	0.15	0.15	1.24	9.31	4.3	0.58	
CB60	1	25.095		23.44		233.4	102	8.054	1913	1772	0.02	0.02	0.14	0.14	0.00C	18.50	2.6	0.84	
CB60	15	31.297		15.59		250.3	98	7.962	2178	2022	0.83	0.00C	0.16	0.16	2.34	6.71	13.0	0.84	
CB61	1	26.042		24.68		221.6	99	8.074	1961	1804		0.11	0.35	0.35	0.61	15.08	7.0	0.48	
CB61	11	26.769		23.44		220.7	97	8.043	1978	1827	0.13	0.00C	0.14	0.14	0.61	11.97	4.9	0.70	
GF16	9	36.143		28.43C		204.5	103	8.249	2424	2061	0.64	0.64	0.62	0.24	0.18	0.89		0.01	
GF16	81	36.463		25.65C		202.7	98	8.215	2432	2088	0.81	0.28	0.33	0.33	0.80	0.88		0.05	
GF16	249	36.532		19.03		205.9	88	8.145	2443	2141	0.90	2.08	0.06	0.06	0.04	0.85		0.00	
GF18	5	35.619		28.05C		210.6	105	8.239	2399	2056	1.13	0.12	0.38	0.38	3.21	0.78		0.01	
GF18	69	36.518		25.06C		187.5	90	8.189	2449	2120	1.23	0.15	0.36	0.36	0.79	0.79		0.05	
GF18	250	36.423		17.71		192.7	81	8.100	2438	2164	0.76	4.46	0.23	0.23	0.41	1.50		0.00	

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STATION	DEPTH (m)	SALINITY (ppt)	CL (um)	TEMP (C)	H2S (um)	O2 (um)	SAT	PO2 (25C)	ALK (umol/L)	TOC2 (um)	POA (um)	PO3 (um)	PO2 (um)	PO4 (um)	SI (um)	SESTON (mg/L)	Chl-a (ug/L)
GF19	0	35.117		27.44		207.9	103	8.203	2368	2049	0.87	0.07	0.13	0.10	0.22		0.02
GF19	30	36.230		27.99		207.4	104	8.236	2429	2074	1.31	0.14	0.34	3.23	0.74		0.03
GF19	248	35.620		12.65C		145.6	55	7.910	2390	2221	1.51	14.50	8.00C	0.16	7.69		0.01
GF20	2	33.088		24.83		221.9	104	8.142	2271	2012	0.54	0.05	0.11	1.93	0.21		0.02
GF20	58	36.303		21.09C		199.3	89	8.150	2444	2141	0.97	2.06	0.72	8.48	1.32		0.22
GF20	240	35.281		10.15		134.2	48	7.827	2385	2254		18.86	0.30	0.82	12.87		0.00
GF29-159	4	34.836		27.49		208.8	103	8.191	2353	2045	0.30	0.13	0.36	1.11	0.16		0.03
GF29-159	98	36.314		21.23		211.4	94	8.166	2448	2135	0.95	0.61	0.39	0.66	0.82		0.02
GF29-159	270	35.762		13.81		143.9	56	7.927	2398	2220	1.75	13.39	0.34	3.02	7.77		0.00
GF29-160	509	35.041		6.30C		201.7	66	7.820	2380	2253	1.76	18.24	0.13	2.29	13.16		0.00
GF29-160	762	34.975		4.69		252.3	79	7.846	2368	2231	1.76	15.54	0.09	2.92	11.03		0.00
GF29-160	999	34.969		4.28		264.7	82	7.858	2369	2227	1.75	15.12	0.15	2.84	11.65		0.00
GF32	3	33.637		25.30		219.3	104	8.152	2293	2023	0.25	0.17	0.33	0.70	0.23		0.02
GF32	20	35.656		26.72C		211.5	103	8.201	2404	2079	0.79	0.33	0.31	0.30	0.42		0.03
GF32	38	34.574		18.93C		257.6	109	8.128	2349	2080	0.60	0.26	0.30	1.76	0.09		0.13
GF32	99	35.950		16.72C		160.0	66	8.000	2423	2207	1.51	8.30	0.16	4.62	4.62		0.03
GF32	199	35.146		9.07C		142.1	49	7.794	2376	2259	1.92	19.93	0.31	3.94	14.48		0.00
GF32B	297	35.073		7.06		180.6	60	7.866	2371	2250	1.54	17.66	0.35	1.76	13.20		0.01
GF32B	598	34.996		4.85C		246.2	78	7.842	2368	2233	1.02	14.41	0.36	0.60	11.46		0.00
GF32B	998	34.958		4.14C		270.0	84	7.856	2366	2225	1.14	13.59	0.33	1.39	10.69		0.00
GF32B	1500	34.966		3.82		272.0	84	7.865	2361	2217	1.85	14.02	0.34	2.80	12.10		0.00
GF42	4	31.849		23.89		227.8	104	8.100	2200	1977	0.25	0.21	0.25	1.28	0.13		0.04
GF42	24	35.383		19.82C		265.4	115	8.184	2397	2085	0.85	0.27	0.28	0.53	0.22		0.07
GF42	39	33.687		9.03C		269.3	93	7.967	2310	2131	1.15	1.57	0.21	4.34	2.55		1.0
GF42	87	34.820		12.16		232.4	86	8.009	2359	2150	0.64	4.85	0.66	4.86	4.24		0.03
GF43	4	31.699		23.91		228.1	104	8.089	2191	1975		0.09	0.27		0.37		0.04
GF43	19	34.243		21.21C		251.9	112	8.170	2388	2086	0.80	0.07	0.29	4.81	0.56		0.07
GF43	50	34.034L		10.11C		267.4	95	7.988	2323	2131	0.63	2.38	0.58	2.25	3.30		0.20
GF43	79	34.200		10.65		248.8	89	7.979	2331	2142	0.58	4.40	0.39	1.95	4.60		0.05
GF44	4	31.699		23.91		228.1	104	8.089	2191	1975		0.09	0.27		0.37		0.04
GF44	19	34.243		21.21C		251.9	112	8.170	2388	2086	0.80	0.07	0.29	4.81	0.56		0.07
GF44	50	34.034L		10.11C		267.4	95	7.988	2323	2131	0.63	2.38	0.58	2.25	3.30		0.20
GF44	79	34.200		10.65		248.8	89	7.979	2331	2142	0.58	4.40	0.39	1.95	4.60		0.05
GF44	4	31.699		23.91		228.1	104	8.089	2191	1975		0.09	0.27		0.37		0.04
GF44	19	34.243		21.21C		251.9	112	8.170	2388	2086	0.80	0.07	0.29	4.81	0.56		0.07
GF44	50	34.034L		10.11C		267.4	95	7.988	2323	2131	0.63	2.38	0.58	2.25	3.30		0.20
GF44	79	34.200		10.65		248.8	89	7.979	2331	2142	0.58	4.40	0.39	1.95	4.60		0.05
PG10	3	31.560		23.79		229.4	104	8.081	2182	1971	0.55	0.20	0.21	1.27	0.44		0.05
PG10	14	34.414		20.85C		262.9	115	8.142	2340	2065	0.11	0.09	0.28	0.78	0.53		0.06
PG10	35	33.309L		8.90C		314.4	108	8.011	2290	2094	0.22	0.19	0.24	0.77	0.59		0.06
PG10	50	33.338		8.18C		267.7	90	7.923	2295	2138	0.49	2.03	0.21	4.03	6.12		0.12
PG10	69	33.376		8.27		263.8	89	7.923	2295	2137	0.60	1.65	0.36	3.98	5.04		0.06
PG10	5	31.562		23.46		231.7	105	8.099	2185	1966	0.22	0.23	0.08	1.15	6.56		0.06
PG10	20	32.941		10.47C		333.9	118	8.057	2270	2056	0.33	0.09	0.11	1.90	8.72		0.14
PG10	35	33.171		8.06C		293.9	99	7.956	2286	2116	0.33	0.86	0.18	1.93	4.21		0.04
PG10	50	33.338		8.18C		267.7	90	7.923	2295	2138	0.49	2.03	0.21	4.03	6.12		0.12
PG10	69	33.376		8.27		263.8	89	7.923	2295	2137	0.60	1.65	0.36	3.98	5.04		0.06
PG11B	5	33.909		24.84C		220.4	103	8.160	2311	2033	0.02	0.00C	0.09	0.80	11.60		0.04
PG11B	39	35.953L		19.13C		244.2	105	8.169	2424	2114	0.53	0.08	0.26	4.09	10.63		0.04
PG11B	225	35.887		13.50C		225.4	87	8.025	2409	2182	0.447	13.737	0.497	0.007	10.837		0.00
PG11B	703	34.986		4.73C		249.0	78	7.939	2369	2235	1.84	17.09	0.24	3.45	13.91		0.00
PG11B	1165	34.963		4.15		267.3	83	7.856	2365	2224	0.82	16.59	0.09	0.86	12.53		0.00

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STATION	DEPTH (m)	SALINITY (ppt)	CL (um)	TEMP (C)	H2S (um)	O2 (um)	SO2 SAT	pH (25C)	ALK (ueq/L)	TCO2 (um)	PO4 (um)	NO3 (um)	NO2 (um)	MNH (um)	SI (um)	SESSON (mg/L)	Chl-a (ug/L)
GF19	0	35.117		27.44		207.9	103	8.203	2368	2049	0.87	0.07	0.13	0.10	0.22		0.02
GF19	30	36.230		27.99		207.4	104	8.236	2429	2074	1.31	0.14	0.34	3.23	0.74		0.03
GF19	248	35.620		12.65C		145.6	55	7.910	2390	2221	1.51	14.50	0.00C	0.16	7.69		0.01
GF20	2	33.088		24.83		221.9	104	8.142	2271	2012	0.54	0.05	0.11	1.93	0.21		0.02
GF20	58	36.303		21.09C		199.3	89	8.150	2444	2141	0.97	2.00	0.72	0.48	1.32		0.22
GF20	240	35.281		10.15		134.2	48	7.827	2385	2254		18.86	0.30	0.82	12.87		0.00
GF29.159	4	31.836		27.49		208.0	103	8.191	2353	2045	0.30	0.13	0.36	1.11	0.16		0.03
GF29.159	96	36.314		21.23		211.4	94	8.166	2448	2135	0.95	0.61	0.39	0.66	0.82		0.02
GF29.159	270	35.762		13.81		143.9	56	7.927	2398	2220	1.75	13.39	0.34	3.02	7.77		0.00
GF29.160	509	35.041		6.30C		201.7	66	7.820	2380	2253	1.76	18.24	0.13	2.29	13.16		0.00
GF29.160	762	34.975		4.69		252.3	79	7.846	2368	2231	1.76	15.54	0.09	2.92	11.03		0.00
GF29.160	999	34.969		4.28		264.7	82	7.858	2369	2227	1.75	15.12	0.15	2.84	11.65		0.00
GF32	3	33.637		25.30		219.3	104	8.152	2293	2023	0.25	0.17	0.33	0.70	0.23		0.02
GF32	20	35.656		26.72C		211.5	103	8.201	2404	2079	0.79	0.33	0.31	0.30	0.42		0.03
GF32	38	34.574		18.93C		257.6	109	8.128	2439	2080	0.60	0.26	0.30	1.76	0.09		0.13
GF32	99	35.950		16.72C		160.0	66	8.000	2423	2207	1.51	8.30	0.40	1.16	4.62		0.03
GF32	199	35.146		9.07C		142.1	49	7.794	2376	2259	1.92	19.93	0.31	3.94	14.48		0.00
GF32B	297	35.073		7.06		180.6	60	7.806	2371	2250	1.54	17.66	0.35	1.76	13.20		0.01
GF32B	598	34.996		4.85C		246.2	78	7.842	2368	2233	1.02	14.41	0.36	0.60	11.46		0.00
GF32B	998	34.958		4.14C		270.0	84	7.856	2366	2225	1.14	13.59	0.33	1.39	10.69		0.00
GF32B	1500	34.966		3.82		272.0	84	7.865	2361	2217	1.05	14.02	0.34	2.80	12.10		0.00
GF42	4	31.849		23.89		227.8	104	8.100	2200	1977	0.25	0.21	0.25	1.28	0.13		0.04
GF42	24	35.383		19.62C		265.4	115	8.184	2397	2085	0.85	0.27	0.28	0.53	0.22		0.07
GF42	39	33.687		9.03C		269.3	93	7.967	2310	2131	1.15	1.57	0.21	4.34	2.55		1.0
GF42	87	34.820		12.16		232.4	86	8.009	2359	2150	0.84	4.85	0.66	4.88	4.24		0.5
GF43	4	31.699		23.91		228.1	104	8.089	2191	1975		0.09	0.27		0.37		0.3
GF43	19	35.243		21.21C		251.9	112	8.170	2388	2086	0.80	0.07	0.29	4.81	0.56		0.5
GF43	50	34.034L		10.11C		267.4	95	7.988	2323	2131	0.63	2.38	0.58	2.25	3.30		0.0C
GF43	79	34.200		10.65		248.8	89	7.979	2331	2142	0.58	4.40	0.39	1.95	4.80		0.3
GF44	3	31.560		23.79		229.4	104	8.081	2182	1971	0.55	0.20	0.21	1.27	0.44		0.0C
GF44	14	34.414		20.85C		262.9	115	8.142	2340	2065	0.11	0.09	0.28	0.78	0.53		0.06
GF44	35	33.309L		8.90C		314.4	108	8.011	2290	2094	0.22	0.19	0.24	0.77	0.59		0.0C
GF44	52	33.627		8.90		263.4	91	7.943	2309	2141	0.73	2.02	0.46	2.24	4.07		0.12
PG10	5	31.562		23.46		231.7	105	8.099	2185	1966	0.22	0.23	0.08	1.15	6.56		0.06
PG10	20	32.941		10.47C		333.9	118	8.057	2270	2056	0.33	0.09	0.11	1.90	8.72		0.4
PG10	35	33.173		8.06C		293.9	99	7.956	2286	2116	0.33	0.86	0.18	1.93	4.21		0.0
PG10	50	33.338		8.18C		267.7	90	7.923	2295	2138	0.49	2.03	0.21	4.03	6.12		0.12
PG10	69	33.376		8.27		263.8	89	7.923	2295	2137	0.60	1.65	0.36	3.98	5.04		0.0C
PG11B	5	33.909		24.84C		220.4	103	8.160	2311	2033	0.02	0.00C	0.09	0.80	11.60		0.04
PG11B	39	35.953L		19.13C		244.2	105	8.169	2424	2114	0.53	0.08	0.26	4.09	10.63		0.0C
PG11B	225	35.887		13.50C		225.4	87	8.025	2409	2182	0.447	13.737	0.497	0.007	10.837		0.00
PG11B	703	34.986		4.73C		249.0	78	7.939	2369	2235	1.84	17.09	0.24	3.45	13.91		0.0C
PG11B	1165	34.963		4.15		267.3	83	7.856	2365	2224	0.82	16.59	0.09	0.86	12.53		0.0

STATION	DEPTH (m)	SALINITY (ppt)	CL (µM)	TEMP (C)	H2S (µM)	O2 (µM)	S02 SAT	pH (25C)	ALK (µeq/L)	TCO2 (µM)	PO4 (µM)	NO3 (µM)	NO2 (µM)	NH4 (µM)	SI (µM)	SESTON (mg/L)	Chl-a (ug/L)
PG12C	2	31.504		23.96		231.9	106	8.070	2185	1980	0.28	0.00<	0.10	1.79	14.34	0.0<	0.03
PG12C	23	32.875		8.59		310.6	106	7.984	2261	2082	0.42	0.00<	0.13	1.78	4.59	0.0<	0.36
PG12C	36	32.883		8.47C		308.1	104	7.981	2262	2084	0.11	0.00<	0.07	1.36	5.82	0.0<	0.23
PG23D	4	31.452		23.03		238.0	107	8.133	2184	1949	0.11	0.00<	0.09	0.93	8.26	0.0<	0.07
PG23D	35	33.726		10.54C		286.4	102	8.006	2315	2117	0.33	1.09	0.54	1.20	6.28	0.0<	0.29
PG23D	250	35.215		9.34		148.0	52	7.821	2380	2252	1.21	21.62	0.15		15.04	0.3	0.02
PG25C	5	31.370		22.96		236.0	106	8.111	2170	1947	0.11	0.00<	0.08	0.78	25.52	0.0<	0.05
PG25C	34	32.896		6.99		279.9	92	7.912	2267	2118	0.36	0.76	0.13	3.12	7.47	0.1	0.37
PG25C	56	32.923		7.05		273.6	90	7.903	2277	2131	0.37	0.86	0.12	2.54	5.43	0.1	0.15
PG46	2	31.996		21.85		238.7	105	8.090	2211	1991	0.41	0.00<	0.12	1.53	7.15	0.0<	0.03
PG46	21	33.803		16.26C		298.2	120	8.116	2310	2057	0.08	0.00	0.06	0.75	12.96	0.3	0.09
PG46	43	34.692		12.66C		256.0	96	8.046	2360	2133	0.34	2.82	0.18	0.81	6.58	0.0<	0.15
PG46	70	35.587		14.45C		201.4	79	8.021	2397	2175	0.82	8.33	0.17	2.13	5.33	0.3	0.03
PG46	162	35.502		12.11		174.7	65	7.929	2391	2214	1.01	15.32	0.11	2.35	12.77	0.7	0.00
PG50D	2	31.264		23.17		242.8	109	8.126	2163	1934	0.12	0.00<	0.10	1.06	10.38	0.0<	0.11
PG50D	35	33.016		7.61C		286.9	95	7.916	2273	2121	0.68	1.76	0.41	2.74	7.91	0.3	0.09
PG50D	50	33.428		8.69C		277.5	95	7.947	2293	2125	0.37	3.27	0.72	2.74	9.39	0.2	0.11
PG50D	69	34.018		10.49		245.1	87	7.964	2319	2139	0.42	5.87	0.38	1.23	8.50	0.0<	0.04
PG54C	4	31.212		23.06		242.0	109	8.138	2163	1929		0.007	0.117		9.737	0.0<	0.08
PG54C	26	32.806		7.44C		286.8	95	7.926	2260	2106		0.267	0.227		5.197	0.0<	0.43
PG54C	49	32.797		7.03		266.5	87	7.885	2261	2124		0.947	0.417		6.137	0.0<	0.16

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CDR-b: 28 June - 10 July 1987

STATION	DEPTH (m)	CAST TYPE	DATE (mm/dd/yy)	LOCAL TIME	LATITUDE (deg min)	LONGITUDE (deg min)	WATER DEPTH (m)
S(south)	1	CTD	6/28/87	701	39 28.6 N	75 33.5 W	9
S(middle)	1	CTD	6/28/87	757	39 33.1 N	75 32.3 W	10
S(north)	1	CTD	6/28/87	805	39 38.2 N	75 34.1 W	14
CD1	1	CTD	6/28/87	948	39 32.6 N	75 40.7 W	13
CD2	1	CTD	6/28/87	1034	39 32.1 N	75 46.5 W	12
CD3	1	CTD	6/28/87	1204	39 31.2 N	75 52.8 W	10
CD4	1	CTD	6/28/87	1228	39 30.2 N	75 55.3 W	9
CD5	1	CTD	6/28/87	1251	39 28.4 N	75 57.7 W	12
CD6	1	CTD	6/28/87	1317	39 26.6 N	76 0.2 W	9
CB1	1	BOAT	6/28/87	1530	39 36.4 N	76 7.5 W	2
CB2	1	BOAT	6/28/87	1600	39 33.0 N	76 4.9 W	7
CB3	1	BOAT	6/28/87	1636	39 30.7 N	76 4.9 W	1
CB4	1	BOAT	6/28/87	1703	39 28.8 N	76 4.3 W	5
CB5	1	BOAT	6/28/87	1150	39 32.3 N	75 58.8 W	2
CB6	1	BOAT	6/28/87	1237	39 30.7 N	76 0.4 W	1
CB7	1	BOAT	6/28/87	1312	39 29.3 N	76 0.1 W	5
CB8	1	CTD	6/29/87	808	39 26.1 N	76 1.2 W	6
CB9	1	CTD	6/29/87	847	39 23.6 N	76 4.8 W	7
CB10	1	CTD	6/29/87	935	39 22.4 N	76 7.6 W	11
CB11	1	CTD	6/29/87	1015	39 19.7 N	76 12.5 W	10
CB12	1	CTD	6/29/87	1045	39 17.4 N	76 13.8 W	14
CB12	11	CTD	6/29/87	1045	39 17.4 N	76 13.8 W	14
CB14B	1	CTD	6/29/87	1157	39 11.1 N	76 17.4 W	9
CB14B	8	CTD	6/29/87	1157	39 11.1 N	76 17.4 W	9
CB15	1	CTD	6/29/87	1311	39 3.5 N	76 19.3 W	14
CB15	13	CTD	6/29/87	1311	39 3.5 N	76 19.3 W	14
CB16	1	CTD	6/29/87	1415	38 57.7 N	76 22.5 W	26
CB16	25	CTD	6/29/87	1415	38 57.7 N	76 22.5 W	26
D1	1	CTD	6/29/87	1657	38 51.2 N	76 23.7 W	28
D1	6	CTD	6/29/87	1657	38 51.2 N	76 23.7 W	28
D1	11	CTD	6/29/87	1657	38 51.2 N	76 23.7 W	28
D1	16	CTD	6/29/87	1657	38 51.2 N	76 23.7 W	28
D1	27	CTD	6/29/87	1657	38 51.2 N	76 23.7 W	28
D3	1	CTD	6/29/87	1908	38 51.8 N	76 23.6 W	29
D3	27	CTD	6/29/87	1908	38 51.8 N	76 23.6 W	29
D5	1	CTD	6/29/87	2109	38 52.9 N	76 23.7 W	29
D5	27	CTD	6/29/87	2109	38 52.9 N	76 23.7 W	29
D7	1	CTD	6/29/87	2315	38 53.3 N	76 23.6 W	24
D7	22	CTD	6/29/87	2315	38 53.3 N	76 23.6 W	24
D9	1	CTD	6/30/87	114	38 52.8 N	76 23.8 W	22
D9	21	CTD	6/30/87	114	38 52.8 N	76 23.8 W	22

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CDR-4: 28 June - 10 July 1987

STATION	DEPTH (m)	CAST TYPE	DATE (mm/dd/yy)	LOCAL TIME	LATITUDE (deg min)	LONGITUDE (deg min)	WATER DEPTH (m)
D11	1	CTD	6/30/87	315	38 52.2 N	76 23.6 W	29
D11	25	CTD	6/30/87	315	38 52.2 N	76 23.6 W	29
D13	1	CTD	6/30/87	515	38 52.4 N	76 23.5 W	31
D13	28	CTD	6/30/87	515	38 52.4 N	76 23.5 W	31
D15	1	CTD	6/30/87	731	38 52.4 N	76 23.3 W	22
D15	19	CTD	6/30/87	731	38 52.4 N	76 23.3 W	22
D17	2	CTD	6/30/87	917	38 53.1 N	76 23.3 W	28
D17	24	CTD	6/30/87	917	38 53.1 N	76 23.3 W	28
D19	1	CTD	6/30/87	1116	38 53.1 N	76 23.3 W	26
D19	24	CTD	6/30/87	1116	38 53.1 N	76 23.3 W	26
D21	1	CTD	6/30/87	1315	38 52.0 N	76 23.6 W	29
D21	25	CTD	6/30/87	1315	38 52.0 N	76 23.6 W	29
D23	1	CTD	6/30/87	1518	38 50.0 N	76 24.0 W	31
D23	28	CTD	6/30/87	1518	38 50.0 N	76 24.0 W	31
D25	1	CTD	6/30/87	1715	38 49.4 N	76 24.0 W	21>
D25	9	CTD	6/30/87	1715	38 49.4 N	76 24.0 W	21>
D25	13	CTD	6/30/87	1715	38 49.4 N	76 24.0 W	21>
D25	20	CTD	6/30/87	1715	38 49.4 N	76 24.0 W	21>
CB358	1	CTD	7/01/87	839	37 39.6 N	76 8.6 W	14
CB358	12	CTD	7/01/87	839	37 39.6 N	76 8.6 W	14
CB36	1	CTD	7/01/87	944	37 46.3 N	76 10.6 W	33
CB36	31	CTD	7/01/87	944	37 46.3 N	76 10.6 W	33
CB37	1	CTD	7/01/87	1044	37 52.6 N	76 9.7 W	43
CB37	37	CTD	7/01/87	1044	37 52.6 N	76 9.7 W	43
CB38	1	CTD	7/01/87	1148	38 0.8 N	76 12.6 W	26
CB38	23	CTD	7/01/87	1148	38 0.8 N	76 12.6 W	26
CB39	1	CTD	7/01/87	1236	38 6.3 N	76 13.0 W	32
CB39	28	CTD	7/01/87	1236	38 6.3 N	76 13.0 W	32
CB40A	1	CTD	7/01/87	1420	38 19.1 N	76 17.8 W	33>
CB40A	32	CTD	7/01/87	1420	38 19.1 N	76 17.8 W	33>
CB41	1	CTD	7/01/87	1606	38 33.4 N	76 25.8 W	24
CB41	21	CTD	7/01/87	1606	38 33.4 N	76 25.8 W	24
CB42.102	1	CTD	7/01/87	1741	38 45.3 N	76 26.3 W	24>
CB42.102	23	CTD	7/01/87	1741	38 45.3 N	76 26.3 W	24>
CB43B	1	CTD	7/01/87	1914	38 47.4 N	76 22.5 W	26
CB43B	22	CTD	7/01/87	1914	38 47.4 N	76 22.5 W	26

CTD	DATE	TIME	LONG	LAT	DEPTH (m)
CB46	7/02/87	1019	38 1.1 N	76 12.6 W	23>
CB47	7/02/87	1053	37 57.8 N	76 10.6 W	25>
CB47B	7/02/87	1132	37 57.7 N	76 10.4 W	27>
CB47B	7/02/87	1132	37 57.7 N	76 10.4 W	27>
CB48	7/02/87	1213	37 54.4 N	76 9.8 W	21>
CB48	7/02/87	1213	37 54.4 N	76 9.8 W	21>
CB50	7/02/87	1402	37 54.2 N	76 9.4 W	20>
CB50	7/02/87	1402	37 54.2 N	76 9.4 W	20>
CB51	7/02/87	1441	37 57.3 N	76 9.6 W	15
CB51	7/02/87	1441	37 57.3 N	76 9.6 W	15
CB51B	7/02/87	1531	37 57.8 N	76 10.5 W	28>
CB52	7/02/87	1627	37 52.9 N	76 9.7 W	39>
CB52	7/02/87	1627	37 52.9 N	76 9.7 W	39>
CB53	7/02/87	1802	37 56.3 N	76 9.5 W	28
CB53	7/02/87	1802	37 56.3 N	76 9.5 W	28
CB54	7/02/87	1851	37 59.5 N	76 11.6 W	21>
CB54	7/02/87	1851	37 59.5 N	76 11.6 W	21>
CB55B	7/03/87	702	37 30.2 N	76 2.5 W	17>
CB55B	7/03/87	702	37 30.2 N	76 2.5 W	17>
CB56	7/03/87	756	37 23.0 N	76 4.7 W	20>
CB56	7/03/87	756	37 23.0 N	76 4.7 W	20>
CB57	7/03/87	848	37 15.1 N	76 4.9 W	38>
CB57	7/03/87	848	37 15.1 N	76 4.9 W	38>
CB58	7/03/87	926	37 11.5 N	76 2.1 W	22
CB58	7/03/87	926	37 11.5 N	76 2.1 W	22
CB59	7/03/87	1015	37 6.5 N	76 8.6 W	13>
CB59	7/03/87	1015	37 6.5 N	76 8.6 W	13>
CB60	7/03/87	1114	37 0.4 N	76 2.2 W	16>
CB60	7/03/87	1114	37 0.4 N	76 2.2 W	16>
CB61	7/03/87	1207	37 3.1 N	75 58.7 W	14
CB61	7/03/87	1207	37 3.1 N	75 58.7 W	14
GF16	7/04/87	1524	35 42.3 N	73 38.3 W	
GF16	7/04/87	1524	35 42.3 N	73 38.3 W	
GF16	7/04/87	1524	35 42.3 N	73 38.3 W	
GF18	7/04/87	2021	35 49.9 N	73 56.3 W	
GF18	7/04/87	2021	35 49.9 N	73 56.3 W	
GF18	7/04/87	2021	35 49.9 N	73 56.3 W	

STATION	DEPTH (m)	CAST TYPE	DATE (mm/dd/yy)	LOCAL TIME	LATITUDE (deg min)	LONGITUDE (deg min)	WATER DEPTH (m)
October 16, 1986							
CDR-41 26 June - 10 July 1987							
GF19	8	CTD	7/04/87	2204	35 54.1 N	74 0.9 W	
GF19	30	CTD	7/04/87	2204	35 54.1 N	74 0.9 W	
GF19	240	CTD	7/04/87	2204	35 54.1 N	74 0.9 W	
GF20	2	CTD	7/04/87	2358	35 59.4 N	74 8.3 W	
GF20	58	CTD	7/04/87	2358	35 59.4 N	74 8.3 W	
GF20	240	CTD	7/04/87	2358	35 59.4 N	74 8.3 W	
GF29.159	4	CTD	7/05/87	1342	36 14.5 N	73 30.9 W	
GF29.159	98	CTD	7/05/87	1342	36 14.5 N	73 30.9 W	
GF29.159	270	CTD	7/05/87	1342	36 14.5 N	73 30.9 W	
GF29.160	509	CTD	7/05/87	1606	36 13.1 N	73 33.0 W	
GF29.160	762	CTD	7/05/87	1606	36 13.1 N	73 33.0 W	
GF29.160	999	CTD	7/05/87	1606	36 13.1 N	73 33.0 W	
GF32	3	CTD	7/05/87	2218	36 24.1 N	73 50.2 W	
GF32	20	CTD	7/05/87	2218	36 24.1 N	73 50.2 W	
GF32	38	CTD	7/05/87	2218	36 24.1 N	73 50.2 W	
GF32	99	CTD	7/05/87	2218	36 24.1 N	73 50.2 W	
GF32	199	CTD	7/05/87	2218	36 24.1 N	73 50.2 W	
GF32B	297	CTD	7/06/87	50	36 24.4 N	73 50.1 W	
GF32B	598	CTD	7/06/87	50	36 24.4 N	73 50.1 W	
GF32B	998	CTD	7/06/87	50	36 24.4 N	73 50.1 W	
GF32B	1500	CTD	7/06/87	50	36 24.4 N	73 50.1 W	
GF42	4	CTD	7/06/87	822	36 56.2 N	74 39.4 W	
GF42	24	CTD	7/06/87	822	36 56.2 N	74 39.4 W	
GF42	39	CTD	7/06/87	822	36 56.2 N	74 39.4 W	
GF42	87	CTD	7/06/87	822	36 56.2 N	74 39.4 W	
GF43	4	CTD	7/06/87	1004	36 57.1 N	74 43.9 W	85
GF43	19	CTD	7/06/87	1004	36 57.1 N	74 43.9 W	85
GF43	50	CTD	7/06/87	1004	36 57.1 N	74 43.9 W	85
GF43	79	CTD	7/06/87	1004	36 57.1 N	74 43.9 W	85
GF44	3	CTD	7/06/87	1125	36 58.3 N	74 48.7 W	58
GF44	14	CTD	7/06/87	1125	36 58.3 N	74 48.7 W	58
GF44	35	CTD	7/06/87	1125	36 58.3 N	74 48.7 W	58
GF44	52	CTD	7/06/87	1125	36 58.3 N	74 48.7 W	58
PG10	5	CTD	7/07/87	812	37 16.1 N	74 41.9 W	72
PG10	20	CTD	7/07/87	812	37 16.1 N	74 41.9 W	72
PG10	35	CTD	7/07/87	812	37 16.1 N	74 41.9 W	72
PG10	50	CTD	7/07/87	812	37 16.1 N	74 41.9 W	72
PG10	69	CTD	7/07/87	812	37 16.1 N	74 41.9 W	72
PG11B	5	CTD	7/07/87	1411	37 13.7 N	74 25.2 W	1199
PG11B	39	CTD	7/07/87	1411	37 13.7 N	74 25.2 W	1199
PG11B	225	CTD	7/07/87	1411	37 13.7 N	74 25.2 W	1199
PG11B	703	CTD	7/07/87	1411	37 13.7 N	74 25.2 W	1199
PG11B	1165	CTD	7/07/87	1411	37 13.7 N	74 25.2 W	1199

October 16, 1988				CGM-8, 28 June - 10 July 1987			
STATION	DEPTH (m)	CAST TYPE	DATE (mm/dd/yy)	LOCAL TIME	LATITUDE (deg min)	LONGITUDE (deg min)	WATER DEPTH (m)
PG12C	2	CTD	7/08/87	127	37 19.1 N	75 0.6 W	39
PG12C	23	CTD	7/08/87	127	37 19.1 N	75 0.6 W	39
PG12C	36	CTD	7/08/87	127	37 19.1 N	75 0.6 W	39
PG23D	4	CTD	7/08/87	1245	37 43.6 N	74 9.6 W	263
PG23D	35	CTD	7/08/87	1245	37 43.6 N	74 9.6 W	263
PG23D	250	CTD	7/08/87	1245	37 43.6 N	74 9.6 W	263
PG25C	5	CTD	7/08/87	1538	37 50.0 N	74 22.6 W	63
PG25C	34	CTD	7/08/87	1538	37 50.0 N	74 22.6 W	63
PG25C	56	CTD	7/08/87	1538	37 50.0 N	74 22.6 W	63
PG46	2	CTD	7/09/87	659	38 19.0 N	73 35.7 W	166
PG46	21	CTD	7/09/87	659	38 19.0 N	73 35.7 W	166
PG46	43	CTD	7/09/87	659	38 19.0 N	73 35.7 W	166
PG46	70	CTD	7/09/87	659	38 19.0 N	73 35.7 W	166
PG46	162	CTD	7/09/87	659	38 19.0 N	73 35.7 W	166
PG50D	2	CTD	7/09/87	1529	38 25.0 N	73 45.4 W	73
PG50D	35	CTD	7/09/87	1529	38 25.0 N	73 45.4 W	73
PG50D	50	CTD	7/09/87	1529	38 25.0 N	73 45.4 W	73
PG50D	69	CTD	7/09/87	1529	38 25.0 N	73 45.4 W	73
PG54C	4	CTD	7/09/87	1924	38 35.0 N	74 1.6 W	55
PG54C	26	CTD	7/09/87	1924	38 35.0 N	74 1.6 W	55
PG54C	49	CTD	7/09/87	1924	38 35.0 N	74 1.6 W	55

CHESAPEAKE BAY DATABASE (Version 1.00)

**College of Marine Studies
University of Delaware
Newark, Delaware 19716**

12 November 1988

Prepared by Dr. Charles H. Culberson

CONTENTS OF THE CHESAPEAKE BAY DATABASE

The CHESAPEAKE BAY DATABASE contains 337 records of discrete water quality observations, collected on 3 oceanographic cruises during the summers of 1985, 1986, and 1987. Each record contains 64 fields, listing the hydrographic, chemical, and biological data measured for each observation.

The database is written as the sequential ASCII file 'CHESBAY.1' on a 5 1/4 inch floppy disk for use with the IBM PC and compatible microcomputers running under MS-DOS.

The database contains data from the following cruises:

Cruise Number	Cruise Name	Date
39	CRO1	30 July - 4 August 1985
41	CRO3	11 July - 21 July 1986
42	CRO4	27 June - 10 July 1987

A printed listing of the data contained in the database is given in the following report: Data from the CDR Cruises. University of Delaware Oceanographic Data Report Number 6. November 1988.

Table 1 lists the order of occurrence of the 64 variables that constitute 1 record of the database.

Each field in a record is ended by a carriage return (ASCII 13) followed by a line feed (ASCII 10). There is no special delimiter which indicates the end of a record. Blank fields (string or numeric) are indicated by a period (ASCII 46).

String variables are not delimited by quotation marks, and several of the long Comment fields (the 64th field) contain commas. If a BASIC program is used to read the disk, the 'LINE INPUT#' statement, not the 'INPUT#' statement, should be used.

The program 'READCHES.BAS' on the disk containing the CHESAPEAKE BAY DATABASE is a GW-BASIC program which lists the data in each field for successive records of the database. Because of the large amounts of data involved, this program is slow in operation, but it will allow you to look at the contents of the first few records and to compare them to the results of any translation programs you use.

Most of the measured parameters in the database are associated with a comment field which indicates special characteristics of the parameter. The comment field, a single character, is the variable immediately following the measured parameter in Table 1. The comment field will usually be blank, but it will contain a character if there is anything unusual about the variable.

The mathematical symbols '<' or '>' in any comment field mean that the true value of the parameter is less than or greater than the value given.

A question mark '?' in the comment field indicates that, although the reported value is believed to be correct, there is some reason to doubt the reported value, usually due to confusion about the sample identification number.

The letter 'C' in the temperature comment field means that the temperature was taken from the CTD.

The letter 'L' in the salinity comment field means that the salinity was taken from the CTD. The letter 'L' means that the salinity sample bottle leaked; these samples may have been subject to evaporation during storage. However, no difference was found between salinities marked with an 'L' and those measured with the Neil Brown CTD. Therefore, salinities flagged with an 'L' are considered reliable.

The letter 'F' in a nutrient comment field indicates that the given concentration was calculated with an assumed value of the calibration factor F (=concentration of standard/absorbance of standard).

Nutrients from cruise CRO1 were calibrated with standards prepared in pure water and have not been corrected for salt effects. Nutrients from cruises CRO3 and CRO4 were standardized by standard additions and need no correction for salt effects.

Table 1. Variables in the CHESAPEAKE BAY DATABASE.

Variable Number	Parameter
1	Cruise number
2	Cruise name
3	Station name
4	Sample depth (m)
5	Cast type
6	Date (mmddyy)
7	Time, 24 hour (hhmm)
8	Latitude (degrees north)
9	Latitude (minutes)
10	Longitude (degrees west)
11	Longitude (minutes)
12	Bottom depth (m)
13	Bottom depth comment
14	Salinity (‰)
15	Salinity comment
16	Chloride (μM)
17	Chloride comment
18	Water temperature (°C)
19	Water temperature comment

Table 1. Variables in the CHESAPEAKE BAY DATABASE (continued).

Variable Number	Parameter
20	Dissolved sulfide (μM)
21	Dissolved sulfide comment
22	Dissolved oxygen ($\mu\text{g-at/l}$)
23	Dissolved oxygen comment
24	Oxygen saturation (percent)
25	pH (25°C, NBS scale)
26	pH comment
27	Alkalinity ($\mu\text{equivalents/l}$)
28	Alkalinity comment
29	Total dissolved inorganic carbon (μM)
30	Dissolved phosphate (μM)
31	Dissolved phosphate comment
32	Dissolved nitrate (μM)
33	Dissolved nitrate comment
34	Dissolved nitrite (μM)
35	Dissolved nitrite comment
36	Dissolved ammonium (μM)
37	Dissolved ammonium comment
38	Dissolved silicate (μM)
39	Dissolved silicate comment
40	Dissolved iodide (nM)
41	Dissolved iodide comment
42	Dissolved iodate (nM)
43	Dissolved iodate comment
44	Seston, total suspended solids (mg/l)
45	Seston, total suspended solids comment
46	Chlorophyll-a ($\mu\text{g/l}$)
47	Chlorophyll-a comment
48	Secchi depth (cm)
49	Secchi depth comment
50	Dissolved iron ($\mu\text{g/l}$)
51	Dissolved iron comment
52	Dissolved cobalt ($\mu\text{g/l}$)
53	Dissolved cobalt comment
54	Dissolved nickel ($\mu\text{g/l}$)
55	Dissolved nickel comment
56	Dissolved copper ($\mu\text{g/l}$)
57	Dissolved copper comment
58	Dissolved zinc ($\mu\text{g/l}$)
59	Dissolved zinc comment
60	Dissolved cadmium ($\mu\text{g/l}$)
61	Dissolved cadmium comment
62	Dissolved lead ($\mu\text{g/l}$)
63	Dissolved lead comment
64	Comment: This field has a maximum length of 199 characters and lists anything unusual about the station or the measured parameters.