CRUISE REPORT

HUDSON 94030

NEWFOUNDLAND BASIN

WOCE CONTROL VOLUME AR13

12 OCTOBER - 10 NOVEMBER, 1994

1. Highlights

a. WOCE Designation: Control Volume 4,
Atlantic Repeat Hydrographic Section 13

b. Expedition Designation: Hudson 94030

c. Chief Scientist:
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d. Ship: CSS Hudson

e. Ports of Call: October 12, 1994 Bedford Institute of Oceanography (BIO), Dartmouth, NS, Canada
November 10, 1994 BIO, Dartmouth, NS, Canada

f. Cruise Dates: October 12, 1994 to November 10, 1994

2. Cruise Summary Information

a. Cruise Track

A cruise track is included with time information in Figure 1. This map also shows the locations of the North Atlantic Current Meter Mooring Array (ACM6) set from Oceanus in August 1993.

The CTD station positions are shown in Figure 2 while the Moving Vessel CTD (MVCTD) stations are shown in Figure 3. Station numbers are indicated in both figures for clarity. Float deployments are shown in Figure 4. The boundaries of the station occupation region are defined by 38-47°N and 38-50°W.

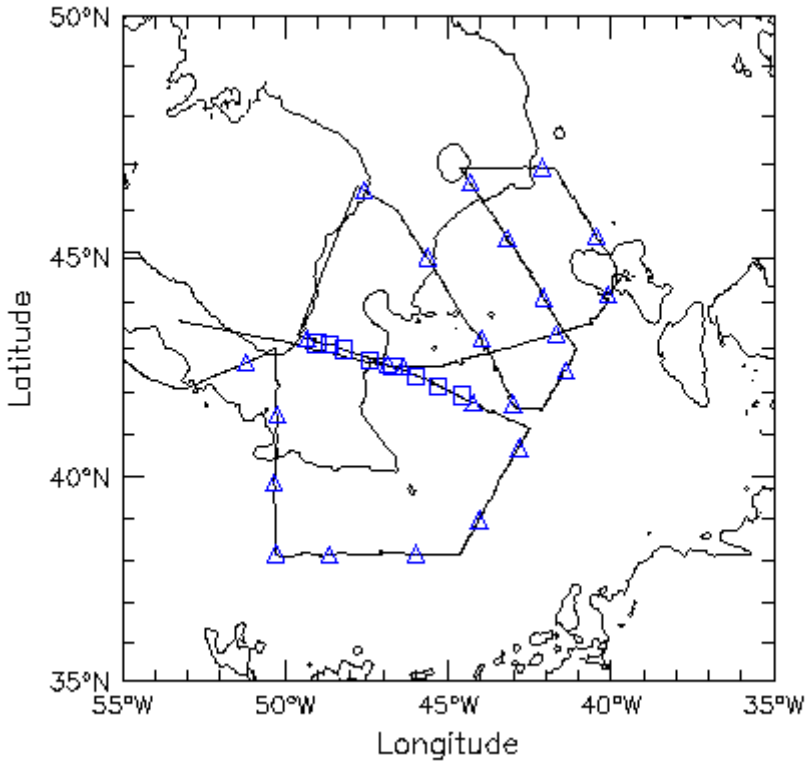

Figure 1. The Study Area and Cruise Track.

The 200m and 4000m isobaths are shown.

The following symbols are used:

Δ- midnight ship positions for each day in the study area. The symbol closest to the Tail of the Bank is on Oct. 15/94.

˘ - the North Atlantic Current Meter Mooring Array (ACM6) deployed in August/93.

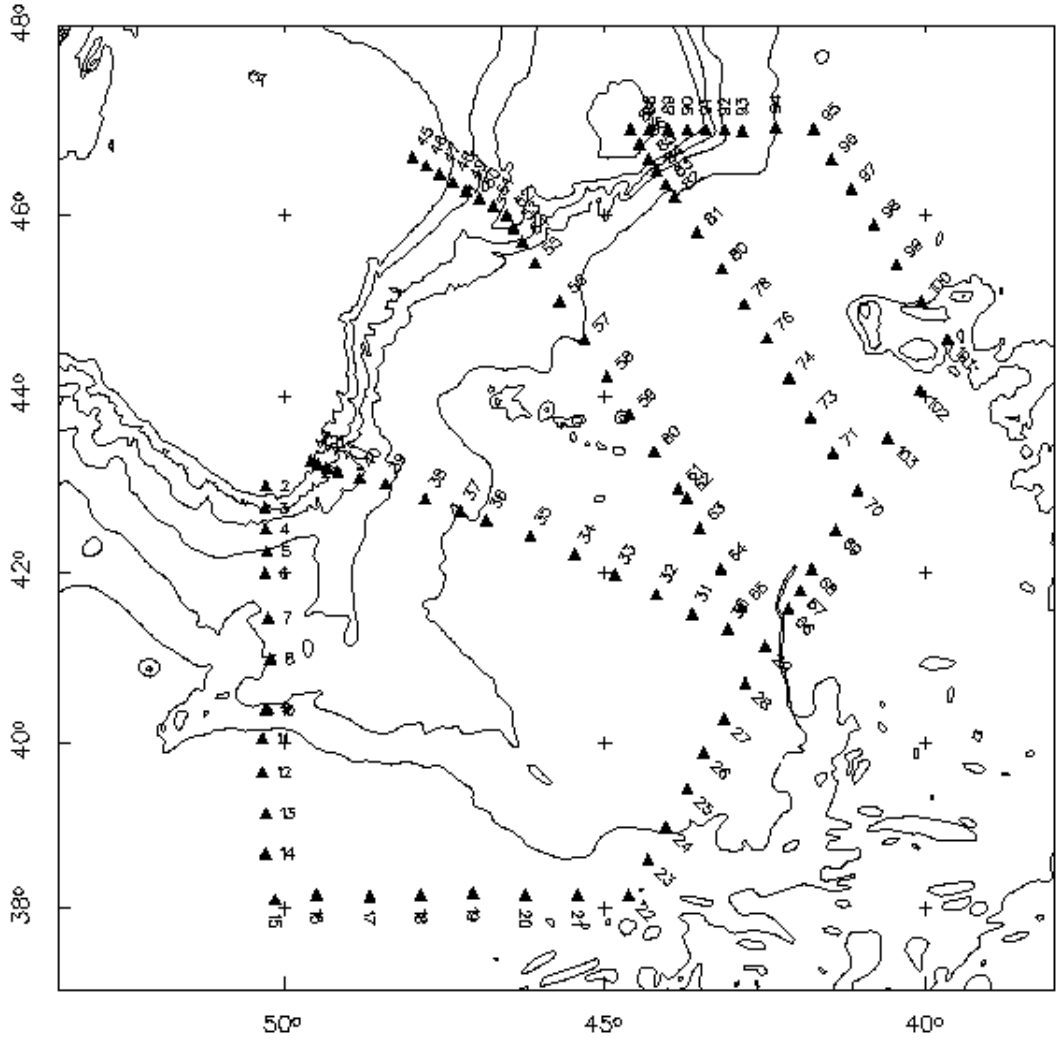

Figure 2. CTD Station Numbers and Positions.

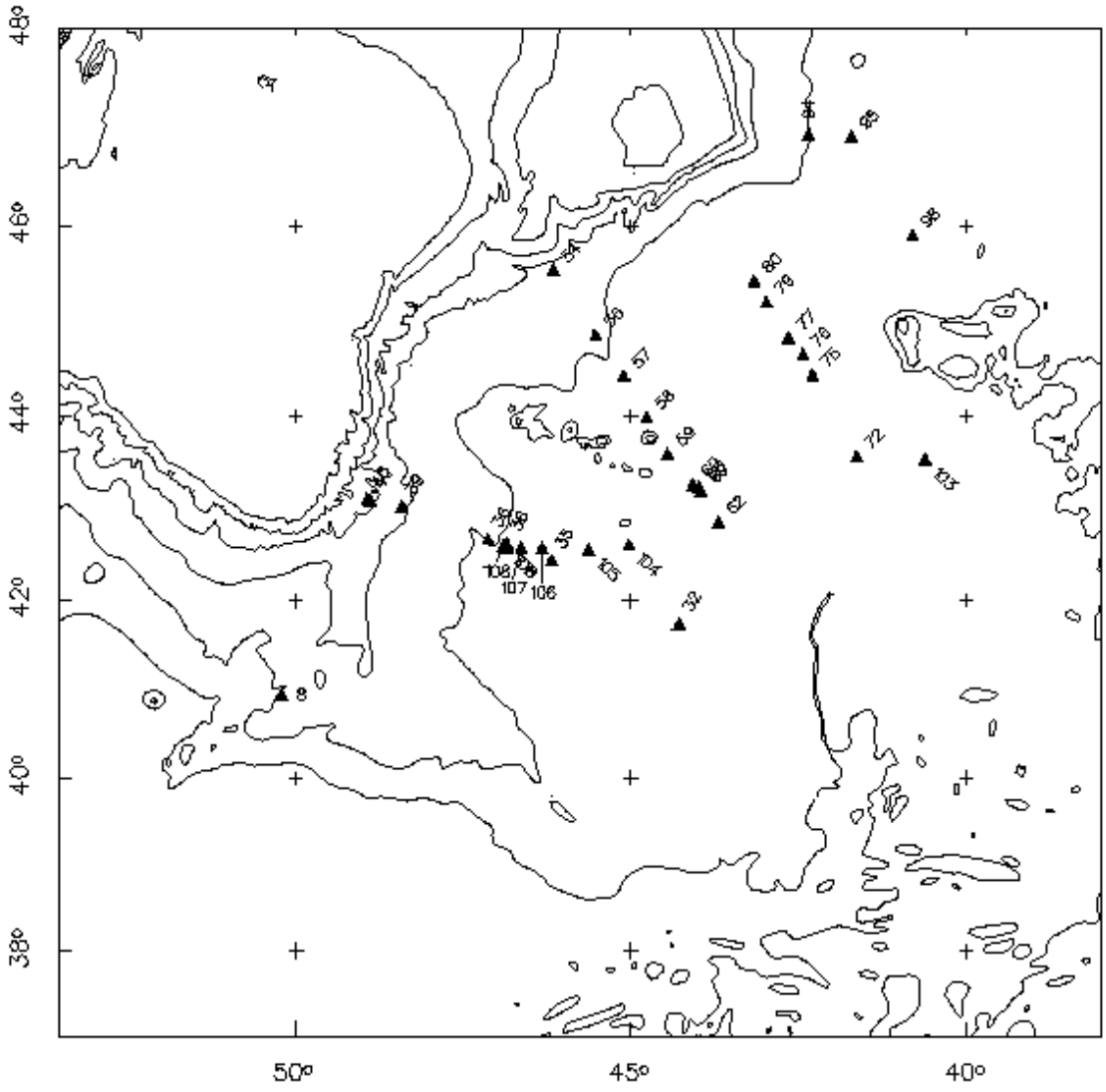

Figure 3. MVCTD Station Numbers and Positions.

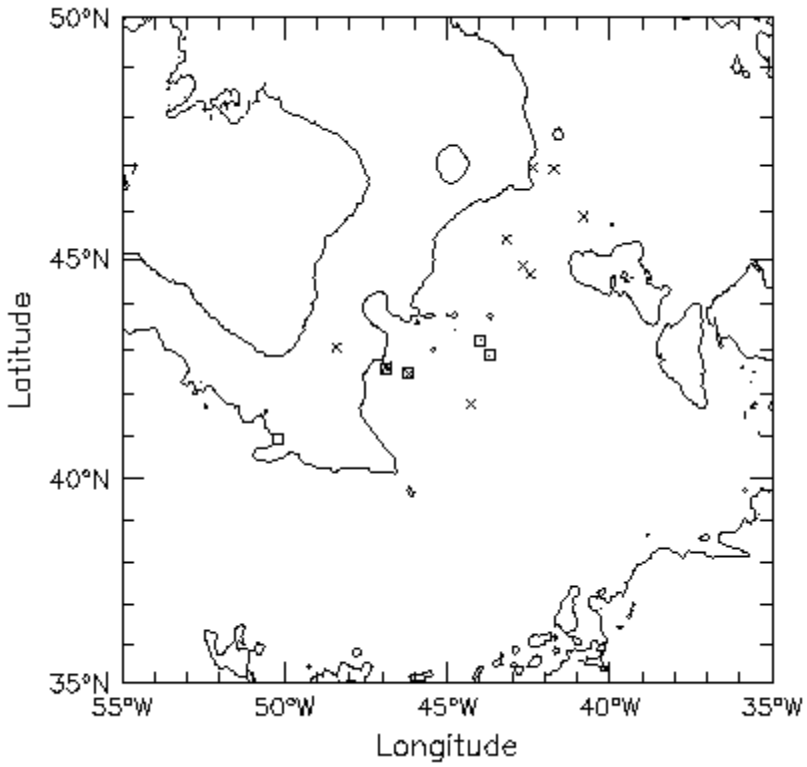

Figure 4. Float Deployments.

The study area is shown along with 200m and 4000m isobaths.

The following symbols are used:

_ - RAFOS float deployments.

ˇ - electric field float deployments.

b. Total Number of Stations Occupied

97 full depth CTD stations with up to 20 rosette samples analyzed for CFC's, carbon tetrachloride, methyl chloroform, total carbonate, alkalinity, oxygen, salinity and nutrients.
2 CTD stations without water sampling to depths of less than 1000m
10 XBT profiles
19 profiles to 600m using the moving vessel CTD

c. Floats and Drifters Deployed

A total of 27 RAFOS floats were released as planned on three of the four transects of the North Atlantic Current and on a repeat transect of the mooring section on the homeward voyage from the eastern side of the working area.

Five Electric Field Floats (EFF's) were released for the Applied Physics Laboratory, University of Washington, Seattle. The first EFF was released in the core of the Gulf Stream as it crossed 50°W. Two were released in the core of the North Atlantic Current (NAC) on the Mooring Section and two more on the Newfoundland Seamount Section. It was originally planned to set four EFF's across the velocity core of the NAC on the mooring section, however, the core was crossed too quickly to permit such a deployment.

d. Moorings Deployed or Recovered

No moorings were deployed or recovered.

3. List of Principal Investigators

Name	Affiliation	Responsibility
Allyn Clarke	BIO clarkea@mar.dfo-mpo.gc.ca	chief scientist CTD data, oxygens, salts, XBT
Peter Jones	BIO jonesp@mar.dfo-mpo.gc.ca	alkalinity, carbonate, CFCs
Tom Rossby	URI tom@rafos.gso.uri.edu	sound sources, RAFOS floats
Tom Sandford	University of Washington	Electric field floats
Jean-Guy Dessurault	BIO	MVCTD

4. Scientific Program and Methods

a. Narrative

This was primarily a hydrographic survey involving a series of full depth CTD/Tracer stations spaced at 20 nautical miles or less apart. The sections were selected to be either historical sections for which there were a number of earlier occupations or along TOPEX/POSEIDON ground paths. The sections enclosed four volumes of water; it is hoped that the section data and the boxes may be used to determine the splitting of the Gulf Stream, North Atlantic Current, Labrador Current and Deep Western Undercurrent within this topographically and dynamically complex region. Initial results indicate that this goal is achievable, at least, in the three southern-most boxes. It was originally intended to split the southern-most box into two parts with a section crossing the Southeast Newfoundland ridge (normally at a location at which the shallowest depth crossing the ridge would have been about 4000 metres). It was hoped that this section would reveal the Gulf Stream flowing eastward south of the ridge and the NA Current flowing to the west on the north side.

The RAFOS float program was led by Tom Rossby of the University of Rhode Island. The floats were set in and near the North Atlantic Current in order to map the lagrangian velocity fields on isopycnal surfaces in the upper pycnocline throughout the Newfoundland Basin. The floats were positioned by four sound sources moored in the north-west North Atlantic in July, 1993. The floats were programed to return to the surface and report their data in late June, 1995.

The Electric Field Floats were Lagrangian isobaric floats which measured the two horizontal components of the electric field as they moved with the current at a preset depth. The electric field allows one to estimate the vertically averaged horizontal velocity field at the float location. One float was released in the velocity core of the Gulf Stream and the remaining four floats were set in the core of the North Atlantic Current. The floats were programed to return to the surface and send back their data in late December 1994. The project leader was Tom Sandford of the University of Washington.

The MVCTD (described in Clarke et al., 1995) was an instrument development project led by Jean-Guy Desserault. This device consisted of a special winch, power block, launch, recovery chute, heavy brass body containing a Falmouth Scientific Instruments CTD, Onset Tattletail 8 computer and radio modem. The system is capable of obtaining profiles greater than 1000 metres while steaming at 12 knots. A profile was obtained by first turning on the CTD by sending a signal to the fish via its radio modem. The operator then entered the target depth and the ship's speed into the PC computer that controlled the winch and power block. The PC was then used to initiate the profile. The entire operation of deploying and recovering the fish was performed completely under

computer control. The radio modem was then used to download the data from the fish when recovery was complete. Unfortunately, the FSI CTD was equipped with a 600 dbar pressure transducer which restricted the profiles to 600m. This meant that the system was only operational in those areas in which the 10 degree isotherm was believed to be shallower than 600m.

5. Major Problems and Goals Not Achieved

Two major problems were encountered during this cruise.

The first problem dealt with the plumbing of the CTD unit. All sensors on this unit, except the pressure sensor, should be mounted in a duct through which a pump pulls sea water. However, for stations 1 through 14 inclusive, the pump was installed in reverse. This resulted in the flow direction proceeding first through the pump, then oxygen, conductivity and temperature sensors. A procedure to correct these initial stations has been developed, see Appendix 1 for details.

The second problem involved the large number of leaking rosette bottles. This problem was present throughout the entire cruise.

6. Other Incidents of Note

The hydraulics used to open and close the hatch for the boom in the winch room were destroyed some time prior to the cruise. On several occasions, while moving between stations, considerable amounts of water entered the hatch during sample collection. This produced a source of possible sample contamination, as well as, discomfort to the sampling crew.

7. List of Cruise Participants

Name	Responsibility		Affiliation
Brian Beanlands	MVCTD	BIO	
Larry Bellefontaine	Watchkeeper	BIO	
Gerry Boudreau	Computers/watchkeeper	BIO	
Mary-Elana Carr	RAFOS/EFF/watchkeeper	URI	
Bruce Carson	CTD tech./salts		BIO
Allyn Clarke	Chief Scientist		BIO
Pierre Clement	Nutrients		BIO
Jean-Guy Dessureault	MVCTD		BIO
Sandy Fontana	RAFOS/EFF/watchkeeper	URI	

Bob Gershey	CFC/Alkalinity/Carbonate	BDR Research
Cathy Griffiths	Watchkeeper	BIO
Mike Hingston	CFC/Alkalinity/Carbonate	BDR Research
John Moffatt	Oxygens	BIO
Liam Petrie	Watchkeeper	BIO
Charlie Ross	Data Quality/watchkeeper	BIO
Ed Verge	Watchkeeper	BIO
Igor Yashayaev	Data Quality/watchkeeper	Shirshov
Frank Zemlyak	CFC/Alkalinity/Carbonate	BIO

BIO	Bedford Institute of Oceanography P.O. Box 1006 Dartmouth, NS, CANADA B2Y 2A4
BDR	BDR Research Ltd. Box 652, Station 'M' Halifax, N.S., Canada, B3J 2T3
URI	University of Rhode Island Graduate School of Oceanography University of Rhode Island South Ferry Road Narragansett, RI 02882
Shirshov	P.P. Shirshov Institute of Oceanology Russian Academy of Sciences Krasikova, 23 Moscow, Russia

B. UNDERWAY MEASUREMENTS

1. Navigation and Bathymetry — Anthony W. Isenor

The navigation system onboard CSS Hudson consisted of a Trimble Navigation Loran-GPS 10X decoder and AGCNAV software. The decoder received the satellite fixes and decoded the signals to obtain latitude, longitude and time. The decoder signals were approximately 1 Hz.

The AGCNAV software ran on a PC and graphically indicated the ship's position, way-points, course, speed, etc. AGCNAV is a PC based display and way-point setting software package developed at the Atlantic Geoscience Centre at BIO.

All navigation data was logged directly to a micro VAX II. The navigation logging was conducted by the shipboard acquisition command procedure, LOGGER. LOGGER produces three files for each successful invocation, the .DATA, .TIME and .HEAD files. These files are then decoded using a PIPE deck, with the primary directive being NMEA_NAV, producing ASCII files containing date, time, position, ships heading, etc. LOGGER was initiated 19 times during the trip, to produce 19 groups of .DATA, .TIME, and .HEAD files.

The echo sounder system used for collecting bathymetric data consisted of a Universal Graphic Recorder model UGR-196C-11 connected to a hull mounted 12kHz transducer. The transducer beam width was 15 degrees. The sweep rate of the record was adjusted throughout the course of data collection to aid in identifying the bottom signal. The recorder was also linked to a clock, and thus could indicate five minute intervals on the sounder paper. The system was used to collect bathymetric soundings at five minute intervals while underway between stations. A total of 4100km of deep sea bathymetric sounding data was recorded.

During the cruise, the paper take-up mechanism began to fail on the Universal Graphic Recorder and the instrument was replaced by a Raytheon Line Scan Recorder, Model LSR 1811-1.

2. Acoustic Doppler Current Profiler — Murray Scotney

The Hudson was equipped with a hull mounted RDI acoustic doppler current profiler. The transducer (serial number 177) had SC ADCP electronics (serial number 172) converted for ship board use. Logging, using Transect software, was started on October 12, 1994 at 1830Z in Halifax Harbour (Bedford Basin). The configuration of the equipment resulted in a bin length of eight metres and a total of 50 bins. The raw data was stored to disk and backed up every two days. Two days of logging created

approximately 30 Mbytes of data. The data was also averaged in real-time over one minute intervals. ADCP logging was stopped on November 6, 1994. A total of 600 hours of Acoustic Doppler Current Profiler data was recorded.

3. Thermosalinograph

No instrument was used.

4. XBT and XCTD

10 XBT probes were dropped between CTD stations in frontal regions.

Profiles to 600 metres were obtained using a Falmouth Scientific Instruments model MCTD-DBP-S CTD (serial number 1323) mounted in a special fish that permits semi-automatic upper ocean profiling from a vessel steaming at normal cruising speeds.

All XBT and CTD profiles were placed on the GTS via TESAC messages.

5. Meteorological Observations

Routine reporting of meteorological variables was carried out by the ship's crew.

6. Atmospheric Chemistry

There was no atmospheric chemistry program.

C. HYDROGRAPHIC MEASUREMENTS - DESCRIPTIONS, TECHNIQUES AND CALIBRATIONS

1. CTD Measurements — Allyn Clarke, Anthony Isenor and Igor Yashayaev

a. Description of the Equipment and Technique

The CTD measurements were made with a standard SEABIRD model 9Plus CTD (serial number 09P 9984-0370, BIO System #5) that was equipped with a model 3-02/F temperature sensor, a model 4-02/0 conductivity sensor, a paroscientific digiquartz model 410K-105 pressure sensor and a model 13-02 dissolved oxygen sensor. All but the pressure sensor were mounted in a duct through which a pump pulled sea water. Hence, the water flow past the actual sensors was independent of the lowering rate; this simplified the data processing considerably.

The Seabird CTD was mounted vertically within the BIO designed and built CTD/Rosette platform. This platform consisted of a central 10 inch diameter aluminum tube, which at its upper end, had a space containing the sea unit for a General Oceanics Model 1015-24 bottle rosette unit (BIO Rosette #3 was used throughout the cruise) and at its bottom end, a smaller well that contained a General Oceanics model 6000 12 Khz pinger unit. The space between the central six inch diameter pinger well and the 10 inch outer tube was filled with lead and the bottom end of the tube was covered with a fibreglass nose cone that was acoustically transparent.

The CTD sea unit was placed in a six inch diameter aluminum tube that was welded to the central tube. The CTD sensors were held in a heavy aluminum cage of approximately six inches in diameter which was welded to the opposite side. Around the mid point and the top of the central column were attached aluminum rings on which 20, eight litre sampling bottles were fastened. The number of bottles was set by the maximum diameter that could comfortably be handled through the doors of the enclosed winch room on CSS Hudson. The bottles were somewhat protected from damage by metal bands which had larger diameters than the outer diameters of the bottles when they were mounted. These metal bands were situated just below the bottom of the bottles.

The rosette bottles were of a BIO design that were manufactured by Brooke Ocean Technology, a local ocean engineering company. They differed from standard rosette bottles in that their top and bottom caps rotated about a horizontal axis to close. The energy to close the bottles was provided by stretching rubber tubing between the outside edges of the two caps along the outside surface of the bottle. This design had two advantages. First, the tubing was not inside the bottle either before or after

the water sample had been captured. Second, the tubing was applied after the bottle was cocked in the rosette tripping mechanism, and hence, eliminated the struggle with the tubing when attempting to cock the General Oceanics Inc. rosette.

b. Sampling Procedure and Data Processing Techniques

The CTD was deployed with a lowering rate of 60 metres/min (40 metres/min in the upper 200 metres or deeper if the conditions were rough). It was recovered at a rate of 90 metres/min (40 metres/min when deeper than 4000 metres or when conditions were rough)

The CTD data was recorded onto disk by a 486 computer using SEABIRD SEASOFT Version 4.201 software. A screen display of temperature, oxygen and salinity profiles vs pressure was used to determine the depths at which bottles were to be tripped on the up cast. The bottles were tripped using the enable and fire buttons on the SEABIRD deck unit. The SEASAVE software stored 73 scans (3 seconds) at each bottle trip within a separate file.

At the end of the station, all the data and header files associated with the station were transferred immediately via Ethernet to a second 486 computer. The SEASAVE software was used on this second machine to create one and two dbar processed data files, an IGOSS TESAC message and a processed rosette trip file. All the raw and processed data files associated with the station were then transferred to the ship's micro Vax II computer for archive and subsequent access and distribution to various users on the vessel.

The data processing used the following steps:

DATCNV Converted the raw data to physical parameters.

SPLIT Split the data into DOWN and UP cast.

WILDEDIT For every block of 12 scans, flagged all scans whose pressure, temperature, conductivity and oxygen values differed from the mean by more than two standard deviations. Recomputed the mean and standard deviation from unflagged data then marked as bad all scans exceeding four standard deviations from these new values.

FILTER Used a low pass filter to time match pressure and conductivity parameters for salinity computation. Time constant used for conductivity is 0.045 seconds, for pressure 0.150 seconds.

LOOPEDIT Marked as bad, all cycles on the down trace for which the vertical velocity of the CTD unit was less than 0.1 metres/second.

ALIGNCTD Aligned the temperature, conductivity and oxygen values relative to the pressure values accounting for the time delays in the system. Time offsets of 0.010 seconds for conductivity, 0.000 seconds for temperature and 3.000 seconds for oxygen were used.

CELLTM A recursive filter used to remove the thermal mass effects from the conductivity data. Thermal anomaly amplitude and time constants of 0.0300 and 9.0000 were used.

DERIVE Computed oxygen values.

BINAVG Averaged the down cast into one or two dbar pressure bins. (Note: The procedure to produce the two dbar averages took about 5% of the total processing time).

DERIVE Computed salinity, potential temperature and $sigma_{theta}$.

c. Calibration Data

A calibration summary is presented in Table 1. The four headings in the Table (Shipboard Processing, First Calibration, ...) represent sections in the text that follows. In the Oxygen row, the numerals I, II, and III represent procedures that were followed to determine the applied coefficients. The procedures are described in section v. Oxygen Calibration Procedure. The numerics in this table (e.g. 1 - 104) represent station numbers.

Parameter	**24 Hz Data**		**1 and 2 dbar data**	
	Shipboard Processing	First Calibration	Second Calibration	Third Calibration
Conductivity	1-104	1-14[(1)] 15-104[(2)]		
Temperature	1-104	1-14[(3)] 15-104[(4)]		
Pressure	1-104	1-14[(5)]		
Salinity	1-104			2-14[(8)] 15-104[(9)]

Oxygen	1-104	45-104[6] I, II ⇒ 45-104	2-44[7] I, II ⇒ 2-44	2-44[10] 45-54[10] 55-84[10] 85-91[10] 92-104[10] I, III ⇒ 2-104

(1) : adjusted by -0.27 seconds (see Appendix 1); see Eqn. 1 section ii; coefficients as per "i. Shipboard Processing"
(2) : see Eqn. 1 section ii; coefficients as per "i. Shipboard Processing"
(3) : adjusted by -0.015 °C (see Appendix 1); see Eqn. 2 section ii; coefficients as per "i. Shipboard Processing"
(4) : see Eqn. 2 section ii; coefficients as per "i. Shipboard Processing"
(5) : adjusted by 7 seconds (see Appendix 1)
(6) : see section for expression and coefficients. This calibration was applied to all stations, 1-104. However, the resulting oxygen concentrations from station 1-44 were not used in subsequent analyses, thus only 45-104 are identified in the Table. Concentrations for stations 1-44 were subsequently replaced with results from the Second Calibration.
(7) : see section for expression and coefficients. The Second Calibration used the oxygen sensor mean temperature and current in the 1 or 2 dbar bin and did not use the oxygen concentration computed in the First Calibration.
(8) : see Eqn. 3 section iv
(9) : see Eqn. 4 section iv
(10) : see section; same expression but different coefficients for each group.
Table 1. Calibration Summary.

i. Shipboard Processing

The following calibration coefficients were used during the shipboard processing.

Conductivity Sensor (041375) Coefficients Used for Stations 1 to 104

$$\text{Conductivity} = (af^m + bf^2 + c + dt)/[10(1-9.57(10^{-8})p)]$$

where f is the frequency
m = 4.3
p is pressure in dbars
t is the temperature
a = 1.18499540E-05
b = 5.13875405E-01

c = -4.13341052E+00
d = 4.56046244E-05

Temperature Sensor (031638) Coefficients Used for Stations 1 to 104

Temperature = $1/\{a + b[\ln(f_o/f)] + c[\ln^2[f_o/f] + d[\ln^3(f_o/f)]\} - 273.15$

where ln indicates a natural logarithm
f is the frequency
a = 3.68096719E-03
b = 6.0268375E-04
c = 1.55348636E-05
d = 2.30707462E-06
f_o = 6034.53

Pressure Sensor (50601) Coefficients Used for Stations 1 to 104

Pressure = $C (1 - T_o^2/T^2) (1 - D[1 - T_o^2/T^2])$

where P is the pressure (psia)
T is the pressure period (μsec)
$C = C_1 + C_2 U + C_3 U^2$
$D = D_1 + D_2 U$
$T_o = T_1 + T_2 U + T_3 U^2 + T_4 U^3 + T_5 U^4$
U is the temperature (deg C)
U = Mt + B
t is the pressure temperature compensation
M = 0.01145
B = -8.57985
C_1 = -42746.87 psia
C_2 = 1.06915E+00 psia/deg C
C_3 = 1.26600E-02 psia/deg C^2
D_1 = 0.040873
D_2 = 0
T_1 = 30.09559 micro sec
T_2 = -5.61120E-05 micro sec/deg C
T_3 = 4.34504E-06 micro sec/deg C^2
T_4 = 2.42883E-09 micro sec/deg C^3
T_5 = 0

Oxygen Sensor (130266 and 130287) Coefficients for Stations 1 to 104

$$\text{Oxygen} = [\text{Soc}\ (\text{oc} + \text{tau} * \text{doc/dt}) + \text{Boc}] * \text{OXSAT}(T, S) * e^{\{\text{tcor}\ [T + \text{wt}*\ (T_o - T)] +\ \text{pcor} * p\}}$$

where Soc = 2.1015
oc is oxygen sensor current (microamps)
oc = mV + b
m = 2.4692E-07
V is the oxygen temperature sensor voltage signal
b = -4.1977E-10
tau = 2.0
doc/dt is the time derivative of oc
Boc = -0.0646
OXSAT is the oxygen saturation value
S is salinity (PSU)
e is natural log base
tcor = -0.033
wt = 0.67
T is the water temperature (°C)
T_o is the oxygen sensor internal temperature (°C)
$T_o = kV + c$
k = 8.8993
c = -7.0715
pcor = 1.5E-04
p is the pressure (psia)

Note: Between stations 44 and 45 there was an exchange of oxygen sensors because sensor 130266 was malfunctioning. Although oxygen sensor 130287 replaced sensor 130266 on the CTD unit; the coefficients for sensor 130266 were never replaced by the coefficients for sensor 130287 in the Seabird software.

ii. First Calibration

On this cruise, it was found that for stations 1 through 14 inclusive, the pump on the CTD was installed in reverse. This caused water to flow past the CTD sensors opposite to the normal flow direction. The detailed correction procedures are given in Appendix 1.

After the Appendix 1 correction was applied, the temperature and conductivity were calibrated using the following linear correction as obtained from the lab calibrations. The First Calibration was applied using SEASOFT modules.

Sensor Coefficients for Stations 1 to 104

$Conductivity_{calibrated} = Conductivity_{raw} * 1.00034089 - 0.00061$
Eqn. 1

Sensor Coefficients for Stations 1 to 104

$Temperature_{calibrated} = Temperature_{raw} * 1.00013922 + 0.0007$
Eqn. 2

The oxygen data was completely (station 1-104) reprocessed. The oxygen coefficients used in the reprocessing were based on the data for stations 45 - 104. These coefficients were applied to the Station 1-44 data in an attempt to improve water sample and CTD comparisons.

The oxygen calibration applied in First Calibration used processing stages I and II as described in the following section v. Oxygen Calibration Procedure. The resulting calibration is as follows:

$$Oxygen = [Soc\ (oc + tau * doc/dt) + Boc] * OXSAT(T, S) * e^{\{tcor\ [T + wt^*\ (T_o - T)] + pcor * p\}}$$

where Soc = 4.110
oc is oxygen sensor current (microamps)
oc = mV + b
m = 2.4692E-07
V is the oxygen temperature sensor voltage signal
b = -4.1977E-10
tau = 2.0
doc/dt is the time derivative of oc
Boc = -0.0574
OXSAT is the oxygen saturation value
S is salinity (PSU)
e is natural log base
tcor = -0.040
wt = 0.67
T is the water temperature (°C)
T_o is the oxygen sensor internal temperature (°C)
$T_o = kV + c$
k = 8.8993
c = -7.0715
pcor = 1.69E-04
p is the pressure (psia)

iii. Second Calibration

The Second Calibration used the 1 and 2 dbar mean oxygen temperature and current as input to determine the hardware coefficients for the oxygen sensor used on stations 2 to 44. For the second calibration, new coefficients were found and applied to stations 2 through 44 only. This calibration applied stages I and II as described in section v. Oxygen Calibration Procedure.

Oxygen Sensor Coefficients for Stations 2 to 44

$$Oxygen = (Soc \_ oc + Boc) \_ OXSAT(T_{in\ situ}, S_{in\ situ}) \_ \exp(arg);$$

where

$$OXSAT(T_{in\ situ}, S_{in\ situ}) = \exp [A1 + A2 \_ (100. / (T_{in\ situ} + 273.15)) + A3 \_ \ln ((T_{in\ situ} + 273.15) / 100.) + A4 \_ ((T_{in\ situ} + 273.15) / 100.) + S_{in\ situ} \_ (B1 + B2 \_ ((T_{in\ situ} + 273.15) / 100.) + B3 \_ ((T_{in\ situ} + 273.15) / 100.) \_ ((T_{in\ situ} + 273.15) / 100.))];$$

$$arg = tcor \_ (T_{in\ situ} + wt \_ (T_o - T_{in\ situ})) + pcor \_ p_{in\ situ} ;$$

Soc = 0.614
oc is the current from the oxygen sensor
Boc = 0.72
OXSAT is the oxygen saturation value
$T_{in\ situ}$ is the water temperature (°C)
$S_{in\ situ}$ is salinity (PSU)
A1 = -173.4292
A2 = 249.6339
A3 = 143.3483
ln (*natural logarithm*)
A4 = -21.8492
B1 = -0.033096
B2 = 0.014259
B3 = -0.001700
tcor = -0.0164
wt = 0.67
T_o is the oxygen sensor internal temperature (°C), where $T_o = kV + c$
k = 8.8993
V is the oxygen temperature sensor voltage signal
c = -7.0715

pcor = 3.95E-06
$p_{in\ situ}$ is the pressure (psia)

iv. Third Calibration

The following salinity corrections were made to the 1 and 2 dbar datasets.

$$\text{CTD Salinity}_{calibrated} = \text{CTD Salinity}_{raw} + 0.0040 \quad \text{(Stn. 2 - 14)} \qquad \text{Eqn. 3}$$

$$\text{CTD Salinity}_{calibrated} = \text{CTD Salinity}_{raw} + 0.0018 \quad \text{(Stn. 15 - 104)} \qquad \text{Eqn. 4}$$

The CTD oxygen Third Calibration used the results of the Second Calibration for the station 2-44 data and the results of the First Calibration for the station 45 to 104 data. The Third Calibration applied stages I and III as described in section v. Oxygen Calibration Procedure. The resulting oxygen corrections were applied to the 1 and 2 dbar datasets. The corrections were of the form:

$$Ox_{ctd} = Ox_{ctd} + o\_Ox_{ctd} + t_1\_T_{ctd} + t_2\_T_{ctd}^2 + t_3\_T_{ctd}^3 + t_4\_T_{ctd}^4 + p_1\_P_{ctd} + p_2\_P_{ctd}^2 + p_3\_P_{ctd}^3 + p_4\_P_{ctd}^4 + a + \text{Time\_cor (Station number)},$$

where for Stations 2 to 44:

a = -6.1523,
o = 0.906663,
t_1 = 0.25782,
t_2 = -0.0823562,
t_3 = 0.00824184,
t_4 = -0.000222572,
p_1 = 0.000331526,
p_2 = -1.20509E-007,
p_3 = 1.19481E-011,
p_4 = 0.0,
Time_cor (Station number) - see Table 2;

where for Stations 45 to 54:

a = -0.432137,
o = 0.0,
t_1 = 0.0,

t_2 = 0.0,
t_3 = 0.0,
t_4 = 0.0,
p_1 = 0.000975191,
p_2 = -4.89749E-007,
p_3 = 8.00916E-011,
p_4 = 0.0,
Time_cor (Station number) - see Table 2;

where for Stations 55 to 84 and 92 to 104:
a = -0.0652795,
o = 0.0,
t_1 = 0.0,
t_2 = 0.0,
t_3 = 0.0,
t_4 = 0.0,
p_1 = 0.000155021,
p_2 = -8.31746E-008,
p_3 = 2.21829E-011,
p_4 = -2.20387E-015,
Time_cor (Station number) - see Table 2;

where for Stations 85 to 91:
a = 2.139,
o = -0.379712,
t_1 = 0.0,
t_2 = 0.0,
t_3 = 0.0,
t_4 = 0.0,
p_1 = 0.000976793,
p_2 = -4.33667E-007,
p_3 = 0.0,
p_4 = 0.0,
Time_cor (Station number) - see Table 2.

Table 2. Time corrections used during the third recalibration of the CTD oxygen data.

Station number	Correction (Time_cor)	Station number	Correction (*Time_cor*)	Station number	Correction (*Time_cor*)
2	-.0564	37	0.2697	72	0.0800
3	-.0564	38	0.2077	73	0.1145
4	-.0568	39	0.2249	74	0.1193
5	-.0411	40	0.1608	75	0.1000
6	-.0069	41	0.1039	76	0.0980
7	.0548	42	0.2419	77	0.0800
8	.1100	43	0.2419	78	0.0624
9	.1848	44	0.2419	79	0.0500
10	.2104	45	-1.2447	80	0.0386
11	.1013	46	-0.5000	81	0.0029
12	.0887	47	0.2970	82	0.0186
13	.0396	48	2.3301	83	-0.0004
14	.0686	49	3.7974	84	-0.0092
15	.1184	50	4.4502	85	0.000
16	-.0276	51	4.4127	86	0.000
17	-.1520	52	3.5728	87	0.000
18	-.0039	53	2.4972	88	0.000
19	-0.0814	54	0.7181	89	0.000
20	-0.2208	55	-0.0108	90	0.000
21	-0.2645	56	-0.0442	91	0.000
22	-0.5040	57	-0.1054	92	0.0147
23	-0.5252	58	0.0078	93	0.0297
24	-0.4459	59	-0.0102	94	-0.0296
25	-0.3255	60	0.0473	95	-0.0156
26	-0.2460	61	0.0441	96	-0.0339
27	-0.0103	62	0.0450	97	-0.0265
28	0.1073	63	0.0468	98	-0.0652
29	0.1305	64	0.0979	99	-0.0025
30	-0.6365	65	0.1039	100	-0.0291
31	0.1767	66	0.0585	101	-0.0170
32	0.3133	67	0.0750	102	-0.0161
33	0.3320	68	0.1029	103	-0.0767
34	0.2505	69	0.0881	104	-0.0767
35	0.2234	70	0.0512		
36	0.2774	71	0.0542		

v. Oxygen Calibration Procedure

The calibration parameters for the CTD oxygen data were based on down trace CTD data and measurements of water sample oxygen concentration from bottles tripped on the uptrace. Although these datasets are inconsistent (to some degree) in time and spatial location, they were considered the only reliable source of information for calibration of CTD oxygen.

The procedure for finding the calibrations to be applied to the downcast CTD oxygen was subdivided into three stages (both II and III are iterative procedures):

I. Creating a calibration file,
II. Computing non-linear 'hardware' coefficients,
III. Computing corrections of time drift and residual effects of pressure, temperature and oxygen (*secondary correction*).

I. Creating a Calibration File

1) The *calibration file* is used for finding and testing calibrations (set of coefficients) later applied to the CTD data, while computing CTD Oxygen. A base for this file consisted of discrete CTD readings of temperature, pressure, salinity, etc. averaged over three seconds at the depth and time of bottle tripping. The *calibration file* creation steps are outlined below;

2) Water sample salinity and oxygen concentration determined onboard were added to the *calibration file*;

3) For initial 'indirect' check of quality, the differences between water sample and calibrated CTD salinity were computed. If the absolute difference exceeded 0.004 the point (record) containing this data was considered unreliable and discarded from further analysis;

4) Next, a search and selection was performed for each record of the *calibration file*. The goal is to find a point in a downtrace profile in the same general water type.

   - data from a downtrace profile were restricted to a certain pressure (or/and) density (or/and) temperature (or/and) salinity vicinity of the uptrace point (the *calibration file*). This defines a *group*. Typical criteria (definition of vicinity): differences between uptrace and downtrace pressure 25 db, potential temperature 0.5K, salinity 0.02. [Note: For some upcast data points, no downcast point was found within the defined criteria. In these cases, the CTD oxygen in the SEA file is indicated with a null value of -9.0 and a quality flag of 9, not sampled.]

- find a point in the *group* which is closest to the uptrace data point (from the *calibration file*) in multidimensional space, where dimensions are normalized (weighted or rescaled) pressure, potential temperature, salinity and density. Normalization for each axis was done according to expected variability within a water type. In ultimate cases only one or two dimensions were chosen. The found point was identified as being "closest" to the upcast CTD data point at the time of bottle trip.

At this point, the downtrace CTD data has been added to the calibration file.

5) Next the dataset was split into *sets* based on distinct changes in the sensors behavior. The *set* represented quasi-steady periods of oxygen sensor behavior. This avoided extreme temporal drifts in any of the *sets* and allowed the use of the same non-linear coefficients for each *set*.

II. Computing Non-linear 'Hardware' Coefficients

1) A nonlinear multiparametric least square technique was used to determine the oxygen sensor processing coefficients (*soc, boc, tcor,* and *bcor*) using $oxygen_{ws}$ vs. downcast $temperature_{ctd}$, $salinity_{ctd}$, $pressure_{ctd}$, $oxygen\ current_{ctd}$ and $oxygen\ temperature_{ctd}$ (where the *ws*/*ctd* subscripts represents water sample/CTD data).

2) Applying the results of step II.1, the $oxygen_{ctd}$ was derived.

3) Compute $oxygen_{ws}$ - $oxygen_{ctd}$. Statistics of the difference were computed and the records that produced outliers (no matter if the outliers were produced by $oxygen_{ws}$ or $oxygen_{ctd}$) were marked or deleted from the *calibration file*.

4) Checking the $oxygen_{ws}$ - $oxygen_{ctd}$ distributions:

- if the differences ($oxygen_{ws}$ - $oxygen_{ctd}$) are randomly distributed versus all parameters (temperature, pressure, oxygen current, and oxygen temperature) and there are no evident outliers, proceed to stage III,

- otherwise, using the cleaned *calibration file* (derived in stage I and cleaned according to II.3) repeat all the steps of stage II until the first part of the check II.4 is true (typically, it requires 10 to 15 iterations to clean the *calibration file* and determine the oxygen sensor processing coefficients *soc, boc, tcor,* and *bcor*).

III. Computing corrections of time drift and residual effects of pressure, temperature and oxygen

1) Using the differences from II.4 (*first iteration on this stage*) or III.4 (*second and higher iteration*), compute the median $oxygen_{ws}$ - $oxygen_{ctd}$ for each station. The series of station-by-station medians represents the *time drift* of the sensor.

2) Subtract the individual station median (*time drift*, III.1) from the differences $oxygen_{ws}$ - $oxygen_{ctd}$ for that station, which must be taken from II.4.

3) Individually for pressure, temperature and then oxygen, use the *set* of stations (as defined in I.5) to compute a polynomial fit of the residuals from III.2 in pressure, temperature and oxygen.

4) Subtract the polynomial correction, derived in III.3, from the differences computed in II.4 (before subtraction of the *time-drift*). Check if there are any outliers.

5) Subtract the *time drift* (station median) from the results of III.4.

   - If these (*new* III.5) residuals don't depend on pressure, temperature, oxygen or time and their statistics is not improving with any sequential iteration (distribution getting tighter) advance to III.6.

   - Otherwise, use the results of step III.4 and repeat all the steps of stage III until the first bulleted part of III.5 is true. This iteration typically requires 7 to 14 repetitions.

6) Finalize calibration coefficients.

vi. CTD Quality Flagging

The processed 2 dbar CTD was quality flagged by applying "bad" flags to the near-surface data. This data would have been collected before the system pump was activated, and thus does not represent a measurement from a properly operating system. This typically meant that the temperature, salinity and oxygen data above 10 dbars is flagged using WOCE code "4".

2. Salinity — Bruce Carson

a. Description of Equipment and Technique

Salinity samples were analyzed on one of two Guildline Autosal model 8400 salinometers. Samples were drawn in 150 ml medicine bottles. New caps, equipped with plastic liners, were placed on the sample bottles for each use.

The salinometer cell was filled and rinsed three times with sample water before readings were recorded. Two readings of the salinometer were recorded for every sample and standardization. If the values fluctuated, more readings were taken.

b. Sampling Procedure and Data Processing Technique

Salinity samples were drawn into the medicine bottles after three rinses. The bottles were filled up to the shoulders and then capped with new caps with plastic liners.

Data files for each separate run were prepared. These files consisted of various metadata (date, cruise, lab temperature, geographic location, operator, etc.) and sample specific data such as the bath temperature, sample ID number, and average conductivity ratio. A PC based program computed the salinity using average conductivity ratio of the runs and the standard IAPSO formula. Any changes in the salinometer readings between successive standardizations was assumed to have occurred as a linear drift of the instrument. Thus, the program applied a correction to the ratios, which varied linearly with the samples analyzed. The salinity data was then placed in the water sample database.

c. Laboratory and Sample Temperatures

Full cases of samples were taken from the winch room to the GP lab where they were left for a period of at least 10 hours to equilibrate to laboratory temperature before being analyzed.

The baths in these two salinometers were kept at 21^{o}C and 24^{o}C. The salinometer which was just above the current laboratory temperature would be the one that was used for any given run of samples.

d. Replicate Analysis

A replicate salinity sample was drawn from one of the rosette bottles on most stations. In total, 93 replicate samples were drawn for 93 sample id numbers. Of these sample id numbers, two (sample numbers 151372 and 151377) had at least one unacceptable sample value. The 186 sample values are given in Table C.1. Statistics of the difference of acceptable replicate values follow. The statistics were determined using the absolute value of the replicate difference.

Statistic	Value
Number of Replicate Differences	91
Minimum	0
Maximum	0.0148
Mean	0.0013

Median	0.0006
Standard Deviation	0.0024

Table C.1 Replicate water sample salinity values.

Sample ID Number	Salinity	WOCE QF	Sample ID Number	Salinity	WOCE QF
150603	34.9270	2			
150603	34.9268	2	150857	34.8729	2
			150857	34.8729	2
150613	34.9211	2			
150613	34.9252	2	150877	34.8749	2
			150877	34.8751	2
150627	34.7655	2			
150627	34.7663	2			
150635	34.8647	2			
150635	34.8677	2			
150651	34.9390	2			
150651	34.9390	2			
150679	34.8937	2			
150679	34.8947	2			
150691	34.9061	2			
150691	34.9163	2			
150708	34.8792	2			
150708	34.8784	2			
150726	34.8463	2			
150726	34.8473	2			
150746	34.9479	2			
150746	34.9489	2			
150757	34.8793	2			
150757	34.8803	2			
150790	35.0453	2			
150790	35.0449	2			
150806	34.9559	2			
150806	34.9553	2			
150820	34.8844	2			
150820	34.8869	2			
150837	34.9064	2			
150837	34.9066	2			

Table C.1 Replicate water sample salinity values.

Sample ID Number	Salinity	WOCE QF	Sample ID Number	Salinity	WOCE QF
150908	35.0274	2			
150908	35.0270	2	151206	34.9134	2
			151206	34.9136	2
150917	34.8876	2			
150917	34.8880	2	151222	34.9437	2
			151222	34.9441	2
150943	34.9201	2			
150943	34.9213	2			
150963	34.9307	2			
150963	34.9321	2			
150977	34.8818	2			
150977	34.8835	2			
151003	34.9419	2			
151003	34.9431	2			
151017	34.8840	2			
151017	34.8842	2			
151042	34.9138	2			
151042	34.9142	2			
151060	34.9053	2			
151060	34.9055	2			
151080	34.9099	2			
151080	34.9119	2			
151097	34.9001	2			
151097	34.9006	2			
151121	34.9140	2			
151121	34.9158	2			
151137	34.8900	2			
151137	34.8904	2			
151160	34.9067	2			
151160	34.9061	2			
151177	34.8882	2			
151177	34.8883	2			

Sample ID Number	Salinity	WOCE QF
151238	34.9024	2
151238	34.9016	2
151265	34.9235	2
151265	34.9235	2
151284	34.9234	2
151284	34.9253	2
151316	35.1849	2
151316	35.1849	2
151342	34.9062	2
151342	34.9062	2
151355	34.7559	2
151355	34.7561	2
151362	34.8224	2
151362	34.8218	2
151370	33.2254	2
151370	33.2258	2
151372	33.1364	4
151372	33.5264	2
151374	33.5739	2
151374	33.5744	2
151377	33.7536	4
151377	33.7551	4
151382	33.2338	2
151382	33.2343	2
151383	34.4263	2
151383	34.4264	2
151387	34.8448	2
151387	34.8456	2
151396	34.8382	2
151396	34.8382	2
151404	34.9683	2
151404	34.9685	2
151409	34.6100	2
151409	34.6100	2
151411	34.8473	2
151411	34.8500	2

Sample ID Number	Salinity	WOCE QF
151425	34.8963	2
151425	34.8965	2
151442	34.8721	2
151442	34.8704	2
151457	34.9201	2
151457	34.9202	2
151473	34.8937	2
151473	34.8939	2
151493	34.8950	2
151493	34.8950	2
151513	34.8906	2
151513	34.8932	2
151535	34.8974	2
151535	34.8984	2
151553	34.8942	2
151553	34.8954	2
151575	34.9055	2
151575	34.9059	2
151597	34.9209	2
151597	34.9221	2
151613	34.8910	2
151613	34.8985	2
151643	34.9140	2
151643	34.9148	2
151657	34.9368	2
151657	34.9376	2
151673	34.8936	2
151673	34.8932	2
151693	34.8949	2
151693	34.8961	2
151714	34.9005	2
151714	34.9012	2
151733	34.8980	2
151733	34.9002	2
151754	34.9053	2
151754	34.9036	2

Sample ID Number	Salinity	WOCE QF	Sample ID Number	Salinity	WOCE QF
151777	35.0018	2	151962	34.8972	2
151777	35.0016	2	151962	34.8969	2
151805	34.9906	2	151985	34.9237	2
151805	34.9906	2	151985	34.9237	2
151818	34.9183	2	152001	34.8949	2
151818	34.9187	2	152001	34.8957	2
151833	34.8934	2	152022	34.8971	2
151833	34.8937	2	152022	34.8981	2
151860	34.8942	2	152046	34.9220	2
151860	34.8987	2	152046	34.9242	2
151873	34.8902	2	152061	34.8993	2
151873	34.8930	2	152061	34.8989	2
151895	34.9048	2	152084	34.9119	2
151895	34.9048	2	152084	34.9119	2
151912	34.8235	2	152101	34.9069	2
151912	34.8226	2	152101	34.9093	2
151917	32.8017	2	152123	34.9053	2
151917	32.8019	2	152123	34.9080	2
151927	34.8389	2	152153	34.9455	2
151927	34.8399	2	152153	34.9456	2
151932	34.8426	2	152167	34.9362	2
151932	34.8438	2	152167	34.9215	2
151947	34.8739	2			
151947	34.8607	2			

3. Oxygen — Pierre Clement

a. Description of Equipment and Technique

The automated procedure followed was based on the method developed by the Physical and Chemical Services Branch (PCS) of the Bedford Institute of Oceanography (BIO) (Levy et al. 1977).

The PCS procedure was a modified Winkler titration from Carritt and Carpenter (1966), using a whole bottle titration. In this method there was no starch indicator. A wetting agent (Wetting Agent A, BDH) was introduced to reduce bubble formation. The full description of the system and method can be found in Jones, et al. (1992).

In summary the automated titration system consisted of an IBM PC linked to a Brinkmann PC800 colorimeter and a Metrohm 655 Multi-Dosimat Automatic Titrator. The PC talked to the peripherals through a Data Translation, DT2806 and three Data Translation DTX350s.

b. Sampling Procedure and Data Processing Technique

The sampling bottles were 125ml Iodine flasks with custom ground stoppers (Levy et al. 1977). The flasks volumes were determined gravimetrically. The matched flasks and stoppers were etched with identification numbers and entered into the Oxygen program database.

For this cruise eight litre Niskin bottles were used to obtain the original sample. Then, the oxygen subsamples were drawn through the bottles spigot with a latex or silicone tube attached so as to introduce the water to the bottom of the flask. Once the flow was started, the flask was inverted to ensure that there was no air trapped in the tube. Next, the tube was partially pinched to reduce the flow rate and the flask reoriented and filled to overflowing. The flow was allowed to continue until at least two to three volumes had run through, then the flask slowly retracted with continuous low flow to ensure that no air got trapped in the flask. The flask was then brought to the reagent station and one millilitre of the Alkaline Iodide and Manganous Chloride Reagents were added and the stoppers carefully inserted, again ensuring that no air got into the flasks. The flasks were then shaken and carried to the lab for analysis.

c. Replicate Analysis

There were 1580 unique sample id numbers for the cruise. Oxygen samples were intentionally not drawn for 20 sample id numbers. Six sample id numbers did not have enough water in the Rosette bottle to sample for oxygen. While two others had totally unreliable data that was not reported. The remaining 1552 sample id numbers were analyzed for dissolved oxygen; of these sample id numbers, 1455 had one sample value, 10 had two sample values and 87 had three sample values. The replicate samples were taken from a water sample bottle at each station in order to monitor precision, which can be affected by flaws in sampling or titration.

Statistics of the replicate differences follow. Only the 233 acceptable values were used in calculating the 229 replicate differences. There were four sample id numbers having acceptable values including one replicate and 75 sample id numbers having acceptable values including two replicates.

Number of acceptable replicate differences
= 4 sample id numbers having one replicate * 1 possible difference
+ 75 sample id numbers having two replicates * 3 possible differences
= 229

Median of [(absolute difference/sample mean concentration) * 100%] = 0.28 %

Statistic	**Value (μmoles/kg)**
Minimum	0.0
Maximum	60.8
Mean	2.3
Median	0.8
Standard Deviation	7.3

Cumulative Frequency	Oxygen Difference (μmoles/kg)
50 %	≤ 0.8
68 %	≤ 1.5
95 %	≤ 5.3

All 281 oxygen replicate sample values with their respective quality flags are given in Table C.2.

Table C.2 Replicate water sample oxygen values in µmoles/kg.

Sample ID Number	Oxygen	WOCE QF	Sample ID Number	Oxygen	WOCE QF
150624	294.9	2	150826	276.3	2
150624	293.9	2			
			150838	275.2	2
150632	280.0	2	150838	273.9	2
150632	282.9	2	150838	272.3	2
150651	277.4	2			
150651	278.0	2			
150651	278.2	2			
150670	284.9	2			
150670	285.2	2			
150670	286.4	2			
150695	274.9	2			
150695	278.6	2			
150695	278.6	2			
150715	153.3	2			
150715	154.1	2			
150715	155.6	2			
150729	242.4	2			
150729	247.2	2			
150729	247.8	2			
150751	164.4	2			
150751	162.3	2			
150751	162.5	2			
150758	197.7	2			
150758	256.7	2			
150758	258.5	2			
150785	274.0	2			
150785	275.2	2			
150785	278.2	2			
150800	269.6	2			
150800	272.4	2			
150800	272.5	2			
150826	275.0	2			
150826	275.0	2			

Table C.2 Replicate water sample oxygen values in µmoles/kg.

Sample ID Number	Oxygen	WOCE QF	Sample ID Number	Oxygen	WOCE QF
150870	265.3	2	151058	272.2	2
150870	265.6	2	151058	271.8	2
150870	264.7	2			
			151080	280.1	4
150878	266.9	2	151080	-3.7	4
150878	267.8	2			
150878	268.3	2			
150907	267.7	2			
150907	267.3	2			
150907	267.3	2			
150932	170.1	2			
150932	169.8	2			
150932	170.1	2			
150944	273.1	2			
150944	273.5	2			
150944	273.6	2			
150974	217.6	4			
150974	190.4	4			
150975	210.6	2			
150975	204.5	2			
150975	202.9	2			
150993	213.8	2			
150993	213.8	2			
150993	213.9	2			
151001	271.8	2			
151001	273.7	2			
151001	273.7	2			
151023	270.7	2			
151023	270.7	2			
151023	272.4	2			
151041	274.1	2			
151041	274.7	2			
151041	276.1	2			
151058	272.0	2			

Sample ID Number	Oxygen	WOCE QF	Sample ID Number	Oxygen	WOCE QF
151081	274.6	2	151286	291.9	2
151081	274.7	2	151286	292.0	2
151081	276.4	2	151286	292.2	2
151111	181.6	2	151297	287.8	2
151111	190.5	2	151297	288.1	2
151111	191.3	2	151297	290.9	2
151128	262.9	2			
151128	263.8	2			
151129	239.6	2			
151129	239.6	2			
151129	238.2	2			
151143	278.4	2			
151143	278.6	2			
151143	278.6	2			
151156	19.6	3			
151156	215.6	2			
151163	281.6	2			
151163	282.7	2			
151163	283.2	2			
151180	277.9	2			
151180	278.1	2			
151180	279.3	2			
151201	280.1	2			
151201	284.4	2			
151201	279.9	2			
151226	280.8	2			
151226	280.9	2			
151226	279.7	2			
151240	283.5	2			
151240	283.5	2			
151240	283.7	2			
151257	281.8	2			
151257	287.0	2			
151257	286.2	2			

Sample ID Number	Oxygen	WOCE QF	Sample ID Number	Oxygen	WOCE QF
151330	263.3	2	151395	299.8	2
151330	267.9	2			
151330	262.6	2	151401	294.2	2
			151401	294.3	2
151341	289.6	2	151401	295.6	2
151341	290.5	2			
151341	289.1	2			
151354	295.8	2			
151354	295.8	2			
151354	295.8	2			
151364	291.7	2			
151364	292.5	2			
151364	291.8	2			
151368	291.8	2			
151368	291.8	2			
151368	292.2	2			
151372	318.6	2			
151372	321.4	2			
151372	321.4	2			
151376	316.9	2			
151376	318.0	2			
151376	318.8	2			
151377	301.5	2			
151377	312.8	2			
151377	315.7	2			
151381	320.9	2			
151381	320.6	2			
151381	320.6	2			
151386	330.7	2			
151386	330.8	2			
151386	331.8	2			
151388	301.8	2			
151388	301.9	2			
151388	302.2	2			
151395	299.4	2			
151395	299.7	2			

Sample ID Number	Oxygen	WOCE QF	Sample ID Number	Oxygen	WOCE QF
151408	256.9	2			
151408	257.3	2	151595	278.7	2
151408	257.3	2	151595	278.9	2
			151595	278.4	2
151414	276.7	2			
151414	271.4	2	151619	275.6	2
151414	274.9	2	151619	276.7	2
			151619	276.9	2
151427	287.5	2			
151427	284.6	2			
151427	284.1	2			
151436	285.2	2			
151436	285.8	2			
151436	286.2	2			
151442	296.9	4			
151442	298.2	4			
151454	290.1	2			
151454	291.5	2			
151454	289.8	2			
151476	284.3	2			
151476	334.0	2			
151476	283.9	2			
151502	283.9	2			
151502	287.2	2			
151502	287.5	2			
151526	237.6	2			
151526	241.2	2			
151526	237.7	2			
151536	279.5	2			
151536	281.1	2			
151536	281.2	2			
151571	179.6	2			
151571	180.2	2			
151571	183.3	2			
151576	279.9	2			
151576	280.1	2			
151576	279.7	2			

Sample ID Number	Oxygen	WOCE QF	Sample ID Number	Oxygen	WOCE QF
151637	279.2	2			
151637	281.2	2	151857	288.3	2
151637	279.6	2	151857	290.6	2
			151857	290.1	2
151663	273.5	2			
151663	273.5	2			
151663	273.8	2			
151681	272.0	4			
151681	283.2	4			
151682	280.3	2			
151682	281.6	2			
151682	279.7	2			
151694	283.5	2			
151694	284.6	2			
151694	282.3	2			
151717	282.4	4			
151717	272.7	4			
151717	281.4	4			
151752	232.1	2			
151752	231.9	2			
151752	231.7	2			
151755	280.3	2			
151755	280.8	2			
151755	280.8	2			
151781	279.9	2			
151781	280.3	2			
151781	280.3	2			
151801	287.7	2			
151801	287.8	2			
151801	287.4	2			
151820	277.9	2			
151820	278.4	2			
151820	277.1	2			
151852	269.2	2			
151852	269.7	2			
151852	270.0	2			

Sample ID Number	Oxygen	WOCE QF	Sample ID Number	Oxygen	WOCE QF
151879	288.5	2	152026	282.5	3
151879	290.5	2	152026	282.4	3
151879	291.6	2	152026	282.5	3
151896	290.5	2	152048	296.7	4
151896	291.1	2	152048	296.9	3
151896	292.5	2	152048	298.4	3
151916	307.1	2	152063	282.6	3
151916	307.4	2	152063	283.1	3
			152063	281.4	3
151931	301.0	2			
151931	303.2	2	152086	280.5	3
151931	300.8	2	152086	280.6	3
			152086	280.8	3
151941	1.0	4			
151941	291.5	4	152103	280.3	3
			152103	281.7	3
151947	287.8	2	152103	282.4	3
151947	288.8	2			
151947	287.6	2	152121	281.4	3
			152121	283.8	3
151964	288.0	3	152121	277.6	3
151964	288.5	3			
151964	289.9	3	152144	281.9	3
			152144	281.9	3
151984	287.4	3	152144	281.6	3
151984	287.4	3			
151984	287.7	3	152162	277.7	3
			152162	275.5	3
152005	286.5	3	152162	276.6	3
152005	284.6	3			
152005	284.8	3			

4. Nutrients — Pierre Clement

a. Description of Equipment and Technique

Nutrient concentrations were determined using a Technicon Autoanalyser II. The chemistries were standard Technicon (Silicate 186-72W, Phosphate 155-71W, Nitrate/Nitrite 158-71W) except for Phosphate which was modified by separating the Ascorbic Acid (4.0 gms/L) from the Mixed Reagent. This alteration was achieved by introducing the modified Mixed Reagent instead of water at the start of the sample stream at 0.23 ml/minute and the Ascorbic Acid was pumped into the stream between the two mixing coils at 0.32 ml/minute.

b. Sampling Procedure and Data Processing Technique

Duplicate nutrient subsamples were drawn into 30 ml HDPE (Nalge) wide mouth sample bottles from 8 litre Niskins. The bottles were 10% HCl washed, rinsed once with tap water, three times with Super-Q and oven dried at >100 Degrees F.

A sample run included six Working Standards run at the beginning and end. Duplicate Check Standards were run every 16 samples followed by blanks as a Baseline Check. These Standards were made up in 33 ppt NaCl (VWR, Analar grade) as was the wash water. The Standards were tested against CSK Solution Standards (Sagami Chemical Center, Japan).

Analog data was converted to digital, processed and statistics calculated by a Pascal 6.0 in house program (Logger) on a PC. Chart recordings, hard copy and disk copies of the data were kept for reference.

c. Replicate Analysis

A total of 3158 seawater samples were analyzed for silicate, phosphate and NO_2+NO_3. Included in these samples were a total of 1579 duplicate samples. Duplicate samples were drawn from each rosette bottle on every cast for the determination of silicate, phosphate and nitrate concentrations. Statistics relating to the precision of the sample values follow. All values are given in μmoles/kg. All sample values are listed in Table C.3.

Precision is a measure of the variability of individual measurements and in the following analysis two categories of precision were determined; field and analytical precision. Analytical precision is based on the pooled estimate of the standard deviation of the check standards over the course of a complete autoanalyzer run and is a measure of the greatest precision possible for a particular analysis. Field precision is based on the analysis of two or more water samples taken from a single Niskin sampling bottle and has an added component of variance due to subsampling, storage and natural sample variability.

Both categories of precision were determined by computing the variance, σ_i^2 , of each replicate set, where "i" is the index of the replicate set. In the case of analytical (field) precision, a replicate set consisted of all the check standards (duplicate samples). Given p replicate sets and n samples within any replicate set, the mean standard deviation, $\overline{\sigma}$, was determined from

$$\overline{\sigma} = \sqrt{\frac{\sum_{i=1}^{p} (n-1)_i \sigma_i^2}{\sum_{i=1}^{p} (n-1)_i}}$$

The precision expressed in percent was based on the mean concentration, M, of the check standards (analytical precision) or water samples (field precision) and was given by

$$P_{\%} = \frac{\overline{\sigma}}{M} \leftarrow 100\%$$

The following table indicates the analytical and field precision obtained for this cruise.

	Silicate	Phosphate	NO2+NO3
Number of Samples	3159	3159	3159
Number of Duplicates	1579	1579	1579
Mean concentration (µmoles/kg)	13.24	1.05	15.71
Field Precision (µmoles/kg)	0.23	0.03	0.24
Field Precision (%)	1.8	3.2	1.5
Analytical Precision (µmoles/kg)	0.57	0.05	0.27
Analytical Precision (%)	2.1	4.52	1.71
Detection Limit (µmoles/kg)	0.24	0.02	0.25

The laboratory temperature during all analyses was between 21 and 23 °C.

The conversion to mass units for the analytical precision and detection limits used a standard density of 1.02443 kg/L corresponding to 33 ppt and 15°C. The conversion of individual sample values from volume to mass units used a potential density with a fixed temperature of 15°C.

The nutrient detection limits noted in the above table were applied to the dataset. All values at or below the detection limits were set to zero.

The following duplicate measurements were used to compute the values given in the SEA file. All values that follow are in μmoles/kg.

Table C.3 Nutrient replicate water sample values in μmoles/kg.

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
150601	12.07	1.17	17.80	5 5	150609				5 5
5					5				
150601	12.06	1.14	18.16	5 5					
5					150610				5 5
					5				
150602	11.97	1.35	18.28	5 5	150610				5 5
5					5				
150602	11.98	1.18	18.16	5 5					
5					150611				5 5
					5				
150603	11.79	1.21	18.35	5 5	150611				5 5
5					5				
150603	11.91	1.17	18.27	5 5					
5					150612				5 5
					5				
150604	12.02	1.23	17.98	5 5	150612				5 5
5					5				
150604	12.23	1.19	18.14	5 5					
5					150613				5 5
					5				
150605	12.02	1.22	18.01	5 5	150613				5 5
5					5				
150605	11.97	1.16	17.71	5 5					
5					150614				5 5
					5				
150606	11.92	1.29	18.22	5 5	150614				5 5
5					5				
150606	11.95	1.22	18.36	5 5					
5					150615				5 5
					5				
150607	11.85	1.20	18.23	5 5	150615				5 5
5					5				
150607	11.99	1.28	18.32	5 5					
5					150616				5 5
					5				
150608	11.79	1.23	17.98	5 5	150616				5 5
5					5				
150608	11.98	1.22	17.92	5 5					
5					150617				5 5
					5				
150609				5 5	150617				5 5
5					5				

Table C.3 Nutrient replicate water sample values in μmoles/kg.

ID	SiO4	PO4	NO2+NO3	WOCE QF
1506185				5 5
1506185				5 5
1506195				5 5
1506195				5 5
1506205				5 5
1506205				5 5
150621 2	9.57	1.00	10.46	3 2
150621 2	9.70	0.98	10.65	3 2
150622 2	7.60	0.88	7.95	3 2
150622 2	7.63	0.85	7.89	3 2
150623 2	0.91	0.28	0.60	3 2
150623 2	0.77	0.30	0.57	3 2
150624 2	10.42	1.07	17.34	3 2
150624 2	10.58	1.06	17.41	3 2
150625 2	10.37	1.06	17.54	3 2
150625 2	10.72	1.07	17.53	3 2
150626 2	10.38	1.09	17.63	3 2
150626 2	10.39	1.08	17.80	3 2
150627 2	10.76	1.08	17.32	3 2
150627 2	10.79	1.08	17.21	3 2
150628 2	10.62	1.09	17.50	3 2
150628 2	10.71	1.07	17.03	3 2
150629 2	10.87	1.04	15.88	3 2
150629 2	10.97	1.06	15.79	3 2
150630 2	11.02	1.01	12.24	3 2
150630 2	10.98	1.01	12.33	3 2
150631 2	1.20	0.32	0.71	3 2
150631 2	1.38	0.31	0.84	3 2
150632 2	13.76	1.11	17.91	3 2
150632 2	13.81	1.10	18.03	3 2
150633 5				5 5
150633 5				5 5
150634 2	10.95	1.06	17.59	3 2
150634 2	11.00	1.09	17.46	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
15063522	11.15	1.07	17.30	32	15064422	12.01	1.24	18.94	32
15063522	11.40	1.08	17.46	32	15064422	12.08	1.22	19.41	32
15063622	11.11	1.09	17.38	32	150645 5				55
15063622	11.35	1.11	17.76	32	150645 5				55
15063722	11.00	1.08	17.83	32	15064622	1.09	0.28	0.00	32
15063722	11.06	1.09	17.64	32	15064622	1.27	0.25	0.00	32
15063822	11.32	1.10	17.31	32	15064722	17.57	1.07	16.45	32
15063822	11.24	1.08	17.48	32	15064722	17.75	1.08	16.61	32
15063922	10.68	1.08	17.34	32	15064822	16.20	1.12	16.62	32
15063922	10.72	1.10	17.48	32	15064822	16.10	1.12	16.77	32
15064022	10.77	1.10	17.79	32	15064922	16.04	1.10	16.55	32
15064022	10.77	1.10	17.60	32	15064922	16.12	1.10	16.67	32
15064122	11.25	1.14	17.97	32	15065022	16.73	1.16	17.43	32
15064122	11.54	1.14	18.17	32	15065022	16.65	1.16	17.57	32
15064222	10.91	1.12	17.76	32	15065122	15.60	1.16	17.57	32
15064222	10.86	1.13	17.68	32	15065122	15.33	1.15	17.30	32
15064322	10.39	1.12	17.55	32	15065222	15.35	1.19	17.99	32
15064322	10.29	1.11	17.25	32	15065222	15.38	1.18	18.02	32

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
15065312	14.55	1.17	17.94	32	15066212	12.30	1.29	18.02	32
15065312	14.83	1.17	17.94	32	15066212	12.43	1.29	18.16	32
15065412	13.44	1.20	17.56	32	15066312	10.54	1.10	14.77	32
15065412	13.57	1.18	17.68	32	15066312	10.60	1.11	14.60	32
15065512	12.60	1.16	16.93	32	15066412	10.08	1.07	13.00	32
15065512	12.76	1.20	16.83	32	15066412	10.11	1.06	12.86	32
15065612	12.29	1.19	17.12	32	15066512	8.00	1.02	8.89	32
15065612	12.17	1.19	17.10	32	15066512	8.11	1.02	9.05	32
15065712	12.06	1.20	17.51	32	15066612	1.20	0.24	0.29	32
15065712	12.28	1.20	17.30	32	15066612	1.07	0.26	0.00	32
15065812	12.08	1.21	17.25	32	15066712	18.80	1.04	16.81	32
15065812	12.23	1.22	17.36	32	15066712	18.38	1.19	16.78	32
15065912	12.07	1.24	17.46	32	15066812	18.85	1.05	16.99	32
15065912	12.08	1.24	17.71	32	15066812	19.00	1.05	17.11	32
15066012	10.91	1.18	16.12	32	15066912	18.56	1.06	17.06	32
15066012	10.87	1.17	16.32	32	15066912	18.66	1.06	17.02	32
15066112	12.52	1.32	18.65	32	150670 5				55
15066112	12.64	1.32	18.70	32	15067012	17.73	1.06	17.56	32

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
150671 2	16.84	1.07	17.73	3 2	150680 2	11.93	1.09	18.63	3 2
150671 2	16.77	1.06	17.67	3 2	150680 2	12.11	1.10	18.77	3 2
150672 2	16.01	1.08	17.73	3 2	150681 2	11.71	1.10	18.70	3 2
150672 2	16.08	1.09	17.83	3 2	150681 2	11.66	1.11	19.03	3 2
150673 2	14.93	1.07	17.68	3 2	150682 2	11.09	1.12	19.25	3 2
150673 2	14.93	1.07	17.74	3 2	150682 2	11.19	1.13	19.35	3 2
150674 2	17.07	1.11	18.43	3 2	150683 2	11.34	1.14	19.48	3 2
150674 2	17.44	1.12	18.43	3 2	150683 2	11.25	1.27	18.81	3 2
150675 2	16.37	1.12	18.90	3 2	150684 2	10.67	1.09	18.11	3 2
150675 2	15.90	1.25	18.43	3 2	150684 2	10.42	1.06	18.41	3 2
150676 2	14.77	1.10	18.53	3 2	150685 2	11.67	1.07	17.19	3 2
150676 2	14.68	1.11	18.59	3 2	150685 2	11.79	1.10	17.47	3 2
150677 2	13.51	1.11	19.01	3 2	150686 2	0.72	0.25	0.00	3 2
150677 2	13.69	1.10	18.61	3 2	150686 2	0.87	0.13	0.31	3 2
150678 2	11.88	1.05	18.38	3 2	150687 5				5 5
150678 2	12.05	1.10	18.74	3 2	150687 2	21.25	1.22	18.53	3 2
150679 2	11.42	1.07	18.44	3 2	150688 5				5 5
150679 2	11.63	1.08	18.32	3 2	150688 2	20.47	1.09	18.48	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1506892	19.98	1.08	18.44	3 2	1506982	11.06	1.10	19.01	3 2
15068955				5 5	1506982	11.23	1.09	18.92	3 2
15069005				5 5	1506992	12.14	1.16	19.34	3 2
1506902	19.41	1.09	18.22	3 2	1506992	11.98	1.10	19.25	3 2
15069115				5 5	1507002	11.73	1.12	19.25	3 2
1506912	17.62	1.08	18.20	3 2	1507002	11.57	1.12	19.41	3 2
15069225				5 5	1507012	11.07	1.13	18.90	3 2
1506922	15.72	1.08	18.14	3 2	1507012	11.26	1.11	19.05	3 2
1506932	16.58	1.14	19.08	3 2	1507022	10.60	1.12	18.82	3 2
15069335				5 5	1507022	10.86	1.12	18.97	3 2
1506942	15.49	1.13	19.46	3 2	1507032	10.07	1.08	16.92	3 2
1506942	15.67	1.13	19.40	3 2	1507032	10.56	1.17	16.68	3 2
1506952	14.56	1.10	18.73	3 2	1507042	7.27	0.87	8.80	3 2
1506952	14.76	1.21	18.45	3 2	1507042	7.32	0.86	8.86	3 2
1506962	13.25	1.10	19.15	3 2	1507052	1.86	0.33	0.76	3 2
1506962	13.47	1.10	18.88	3 2	1507052	1.72	0.39	0.72	3 2
1506972	11.26	1.10	18.70	3 2	1507062	0.78	0.27	0.00	3 2
1506972	11.31	1.08	18.61	3 2	1507062	0.83	0.27	0.00	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1507075				5 5	1507162	4.15	0.60	10.78	3 2
1507075				5 5	1507162	4.33	0.51	10.99	3 2
1507082	10.60	1.13	17.98	3 2	1507173	17.67	1.09	18.33	3 3
1507082	10.93	1.06	18.17	3 2	1507173	17.74	1.16	18.09	3 3
1507092	11.25	1.05	18.53	3 2	1507183	16.96	1.11	18.67	3 3
1507092	11.30	1.09	18.46	3 2	1507183	17.03	1.11	18.57	3 3
1507102	10.63	1.08	18.11	3 2	1507192	15.86	1.12	18.39	3 2
1507102	10.87	1.06	18.31	3 2	1507192	16.03	1.12	18.58	3 2
1507112	10.32	1.07	17.95	3 2	1507202	17.04	1.27	18.71	3 2
1507112	10.35	1.08	18.19	3 2	1507202	16.62	1.16	18.56	3 2
1507122	10.96	1.21	18.36	3 2	1507212	16.76	1.15	18.87	3 2
1507122	10.73	1.09	18.41	3 2	1507212	17.02	1.15	19.21	3 2
1507132	12.36	1.21	20.61	3 2	1507222	14.42	1.13	18.88	3 2
1507132	12.38	1.23	20.68	3 2	1507222	14.55	1.12	18.69	3 2
1507142	12.52	1.21	20.07	3 2	1507232	13.72	1.12	18.52	3 2
1507142	13.07	1.23	20.22	3 2	1507232	13.74	1.11	18.83	3 2
1507152	13.54	1.39	24.23	3 2	1507242	11.34	1.12	18.12	3 2
1507152	13.78	1.38	24.19	3 2	1507242	11.42	1.07	18.11	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
150725 2	11.14	1.11	18.48	3 2	150734 2	2.29	0.28	4.37	3 2
150725 2	11.14	1.08	18.39	3 2	150734 2	2.46	0.27	4.37	3 2
150726 2	10.62	1.06	17.54	3 2	150735 2	1.56	0.11	0.00	3 2
150726 2	10.64	1.07	17.68	3 2	150735 2	1.60	0.09	0.25	3 2
150727 2	11.40	1.13	19.20	3 2	150736 2	1.95	0.15	0.00	3 2
150727 2	11.60	1.12	18.83	3 2	150736 2	1.75	0.12	0.00	3 2
150728 2	11.10	1.10	17.56	3 2	150737 2	20.46	1.19	17.64	3 2
150728 2	11.25	1.21	17.26	3 2	150737 2	21.06	1.05	17.84	3 2
150729 2	12.15	1.21	19.28	3 2	150738 2	15.16	1.11	18.04	3 2
150729 2	12.17	1.21	19.15	3 2	150738 2	15.28	1.08	17.92	3 2
150730 2	13.84	1.43	24.01	3 2	150739 2	20.33	1.11	17.63	3 2
150730 2	14.26	1.48	24.06	3 2	150739 2	20.41	1.10	17.44	3 2
150731 2	9.58	1.10	20.04	3 2	150740 2	18.98	1.10	17.80	3 2
150731 2	9.48	1.13	20.11	3 2	150740 2	18.93	1.10	17.86	3 2
150732 2	5.20	0.66	12.91	3 2	150741 2	17.73	1.10	17.95	3 2
150732 2	5.11	0.71	12.87	3 2	150741 2	17.50	1.10	17.89	3 2
150733 2	2.64	0.36	6.43	3 2	150742 2	16.58	1.13	17.86	3 2
150733 2	2.71	0.35	6.54	3 2	150742 2	16.65	1.09	17.72	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
150743	14.86	1.11	17.62	3	2	150752	8.53	1.13	19.00	3	2
150743	15.12	1.12	17.87	3	2	150752	8.93	1.16	18.99	3	2
150744	13.57	1.16	17.18	3	2	150753	2.79	0.61	10.59	3	2
150744	13.69	1.15	17.41	3	2	150753	3.49	0.60	10.60	3	2
150745	13.28	1.16	17.70	3	2	150754	0.65	0.16	3.48	3	2
150745	13.37	1.15	18.35	3	2	150754	0.50	0.17	3.40	3	2
150746	12.03	1.16	18.14	3	2	150755	-0.13	0.11	2.07	4	2
150746	11.93	1.16	18.28	3	2	150755	0.00	0.11	2.11	3	2
150747	11.62	1.17	18.29	3	2	150756	-0.29	0.03	0.28	4	2
150747	11.77	1.19	18.14	3	2	150756	0.56	0.05	0.39	3	2
150748	10.37	1.13	17.14	3	2	150757	36.80	1.35	20.77	3	2
150748	10.19	1.13	17.33	3	2	150757	37.45	1.34	20.99	3	2
150749	11.54	1.21	18.58	3	2	150758	28.75	1.24	19.52	3	2
150749	11.30	1.21	18.68	3	2	150758	28.50	1.26	19.88	3	2
150750	12.68	1.31	20.63	3	2	150759	34.59	1.37	20.97	3	2
150750	13.43	1.31	21.04	3	2	150759	35.04	1.34	20.50	3	2
150751	13.37	1.46	23.40	3	2	150760	31.13	1.26	19.54	3	2
150751	13.73	1.46	23.80	3	2	150760	31.28	1.27	19.47	3	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
150761	28.73	1.25	19.18	3	2	150770	10.27	1.10	17.95	3	2
150761	28.90	1.25	19.33	3	2	150770	10.05	1.12	17.94	3	2
150762	21.92	1.22	19.00	3	2	150771	10.93	1.22	19.99	3	2
150762	22.18	1.20	18.66	3	2	150771	11.32	1.23	19.89	3	2
150763	21.18	1.18	18.90	3	2	150772	11.17	1.27	20.01	3	2
150763	21.26	1.20	18.90	3	2	150772	11.31	1.28	20.13	3	2
150764	16.95	1.10	17.40	3	2	150773	10.05	1.34	22.69	3	2
150764	16.89	1.10	17.33	3	2	150773	10.29	1.33	22.89	3	2
150765	17.76	1.19	18.75	3	2	150774	1.00	0.39	7.03	3	2
150765	17.64	1.18	18.50	3	2	150774	1.19	0.36	7.12	3	2
150766	13.68	1.13	18.20	3	2	150775	0.95	0.14	1.95	3	2
150766	13.75	1.14	18.36	3	2	150775	1.18	0.15	1.88	3	2
150767	14.28	1.17	18.50	3	2	150776	1.72	0.11	0.30	3	2
150767	14.48	1.16	18.73	3	2	150776	2.24	0.08	0.31	3	2
150768	12.00	1.12	18.05	3	2	150777	42.49	1.34	21.35	3	2
150768	12.21	1.12	17.73	3	2	150777	41.01	1.32	21.72	3	2
150769	11.05	1.13	17.97	3	2	150778	10.74	1.09	19.04	3	2
150769	11.34	1.12	17.99	3	2	150778	11.21	1.06	19.43	3	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
15077922	34.97	1.28	20.70	32	15078884	12.00	1.14	29.53	32
15077922	35.68	1.28	20.62	32	15078882	12.02	1.14	18.82	32
15078022	32.37	1.25	20.05	32	15078922	11.43	1.16	19.04	32
15078022	32.60	1.25	20.76	32	15078922	11.43	1.15	18.78	32
15078122	29.32	1.24	19.71	32	15079022	11.93	1.22	21.24	32
15078122	29.45	1.24	20.27	32	15079022	12.17	1.21	20.21	32
15078222	23.50	1.19	19.11	32	15079122	13.73	1.41	23.50	32
15078222	23.71	1.20	19.37	32	15079122	13.90	1.40	23.14	32
15078322	23.14	1.18	19.02	32	15079222	9.80	1.18	19.96	32
15078322	23.32	1.17	18.95	32	15079222	10.16	1.18	19.74	32
15078422	19.47	1.14	18.56	32	15079322	5.18	0.78	13.05	32
15078422	19.55	1.15	18.19	32	15079322	5.32	0.74	12.89	32
15078522	17.61	1.15	18.64	32	15079422	3.42	2.04	9.18	34
15078522	17.53	1.14	18.61	32	15079422	3.50	0.51	9.40	32
15078622	14.76	1.15	18.56	32	15079522	1.71	0.21	2.45	32
15078622	14.80	1.14	18.48	32	15079522	1.76	0.22	2.50	32
15078722	13.25	1.14	18.31	32	15079622	0.84	0.08	0.00	32
15078722	13.31	1.12	18.55	32	15079622	0.90	0.09	0.00	32

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
15079722	37.47	1.35	21.08	32	15080622	15.73	1.17	18.62	32
15079722	38.23	1.35	21.20	32	15080622	15.48	1.16	18.33	32
15079822	20.56	1.21	19.66	32	15080722	13.79	1.15	18.34	32
15079822	20.69	1.21	20.41	32	15080722	14.10	1.31	18.33	32
15079922	34.62	1.32	21.05	32	15080822	12.27	1.15	17.73	32
15079922	35.84	1.31	20.78	32	15080822	12.43	1.12	17.95	32
15080022	32.28	1.29	20.30	32	15080922	11.84	1.14	18.06	32
15080022	32.65	1.28	19.93	32	15080922	12.20	1.12	17.92	32
15080122	29.94	1.27	19.88	32	15081022	11.52	1.16	18.86	32
15080122	29.92	1.27	19.96	32	15081022	11.70	1.15	18.31	32
15080222	25.63	1.23	19.12	32	15081122	11.83	1.18	18.88	32
15080222	25.82	1.21	18.95	32	15081122	11.69	1.20	19.16	32
15080322	23.08	1.19	18.68	32	15081222	12.20	1.29	20.63	32
15080322	23.52	1.19	18.92	32	15081222	12.25	1.26	20.54	32
15080422	19.69	1.21	18.64	32	15081322	11.47	1.31	21.20	32
15080422	19.73	1.17	18.24	32	15081322	11.36	1.33	21.37	32
15080522	17.68	1.18	18.82	32	15081422	5.51	0.78	13.18	32
15080522	17.67	1.18	18.63	32	15081422	5.45	0.79	13.16	32

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
150815 2	3.58	0.54	9.00	3 2	150824 2	19.74	1.19	17.98	3 2
150815 2	3.84	0.54	9.02	3 2	150824 2	20.15	1.17	18.15	3 2
150816 2	0.60	0.10	0.00	3 2	150825 2	17.63	1.18	18.12	3 2
150816 2	1.11	0.13	0.00	3 2	150825 2	18.78	1.20	18.10	3 2
150817 2	36.31	1.40	20.90	3 2	150826 2	16.12	1.21	18.47	3 2
150817 2	36.46	1.36	20.91	3 2	150826 2	16.16	1.20	18.36	3 2
150818 2	17.45	1.19	18.65	3 2	150827 2	14.01	1.18	18.35	3 2
150818 2	18.31	1.18	18.75	3 2	150827 2	14.05	1.16	18.30	3 2
150819 2	33.42	1.35	20.45	3 2	150828 2	12.56	1.16	18.16	3 2
150819 2	32.81	1.34	20.34	3 2	150828 2	12.63	1.17	18.18	3 2
150820 2	29.52	1.37	19.95	3 2	150829 2	11.95	1.16	18.09	3 2
150820 2	38.80	1.31	19.85	3 2	150829 2	11.77	1.17	18.18	3 2
150821 2	33.70	1.28	19.38	3 2	150830 2	11.82	1.18	18.40	3 2
150821 2	33.85	1.28	19.33	3 2	150830 2	11.59	1.17	18.52	3 2
150822 2	28.67	1.25	19.18	3 2	150831 2	11.88	1.22	18.87	3 2
150822 2	29.19	1.25	19.34	3 2	150831 2	11.97	1.22	19.01	3 2
150823 2	24.52	1.21	18.73	3 2	150832 2	12.13	1.25	19.98	3 2
150823 2	23.96	1.19	18.52	3 2	150832 2	12.20	1.26	19.52	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
150833 2	13.27	1.43	22.76	3 2	150842 2	15.97	1.13	18.18	2 2
150833 2	13.66	1.44	23.02	3 2	150842 2	15.77	1.15	17.86	2 2
150834 2	10.55	1.25	19.95	3 2	150843 2	13.98	1.14	17.58	2 2
150834 2	10.76	1.24	20.32	3 2	150843 2	14.07	1.09	17.66	2 2
150835 2	4.36	0.61	10.06	3 2	150844 2	12.43	1.10	17.66	2 2
150835 2	4.17	0.62	9.96	3 2	150844 2	12.72	1.10	18.08	2 2
150836 2	1.11	0.15	0.00	3 2	150845 2	11.88	1.11	17.85	2 2
150836 2	1.19	0.16	0.00	3 2	150845 2	11.95	1.07	17.89	2 2
150837 2	27.06	1.34	18.15	2 2	150846 2	11.43	1.25	17.53	2 2
150837 2	27.07	1.18	18.49	2 2	150846 2	11.52	1.10	17.94	2 2
150838 5				5 5	150847 2	11.18	1.12	17.92	2 2
150838 5				5 5	150847 2	11.53	1.11	18.34	2 2
150839 2	21.60	1.18	17.97	2 2	150848 2	11.28	1.12	18.71	2 2
150839 2	21.78	1.16	18.31	2 2	150848 2	11.30	1.13	18.71	2 2
150840 2	19.90	1.17	18.23	2 2	150849 2	11.46	1.17	18.89	2 2
150840 2	19.97	1.16	18.57	2 2	150849 2	11.50	1.15	19.12	2 2
150841 2	17.75	1.13	18.10	2 2	150850 2	12.46	1.24	20.15	2 2
150841 2	17.83	1.14	18.33	2 2	150850 2	12.17	1.24	20.03	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
150851 2	10.84	1.13	16.49	2 2	150860 2	30.91	1.25	19.35	2 2
150851 2	10.95	1.11	16.97	2 2	150860 2	31.21	1.22	19.47	2 2
150852 2	7.28	0.99	16.45	2 2	150861 2	28.85	1.20	18.88	2 2
150852 2	7.41	0.96	16.45	2 2	150861 2	28.94	1.21	18.92	2 2
150853 2	2.78	0.47	8.17	2 2	150862 2	27.24	1.22	18.71	2 2
150853 2	2.86	0.40	8.23	2 2	150862 2	27.21	1.37	18.73	2 2
150854 2	1.26	0.22	2.97	2 2	150863 2	23.72	1.20	18.42	2 2
150854 2	1.41	0.27	2.95	2 2	150863 2	24.00	1.18	18.50	2 2
150855 2	1.74	0.31	4.72	2 2	150864 2	21.07	1.19	18.41	2 2
150855 2	1.70	0.29	4.69	2 2	150864 2	21.14	1.19	18.39	2 2
150856 2	0.83	0.11	0.00	2 2	150865 2	19.41	1.16	18.06	2 2
150856 2	0.86	0.10	0.00	2 2	150865 2	19.46	1.18	18.10	2 2
150857 2	41.65	1.50	21.18	2 2	150866 2	16.30	1.13	17.94	2 2
150857 2	42.93	1.35	21.29	2 2	150866 2	16.28	1.12	17.47	2 2
150858 2	22.29	1.14	18.08	2 2	150867 2	13.67	1.13	17.70	2 2
150858 2	22.95	1.08	18.36	2 2	150867 2	13.94	1.11	17.34	2 2
150859 2	34.01	1.26	19.88	2 2	150868 2	12.66	1.14	17.57	2 2
150859 2	34.13	1.26	19.99	2 2	150868 2	12.87	1.12	17.52	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1508692	12.44	1.12	17.67	2 2	1508782	38.45	1.38	20.27	2 2
1508692	12.84	1.15	17.44	2 2	1508782	38.34	1.38	20.30	2 2
1508702	12.36	1.32	17.71	2 2	1508795				5 5
1508702	12.19	1.17	18.30	2 2	1508795				5 5
1508712	12.71	1.22	19.31	2 2	1508802	31.85	1.33	19.29	2 2
1508712	12.67	1.23	19.15	2 2	1508802	32.04	1.32	19.07	2 2
1508722	14.12	1.35	21.37	2 2	1508812	28.83	1.29	18.87	2 2
1508722	14.23	1.36	21.25	2 2	1508812	29.20	1.30	18.53	2 2
1508732	12.73	1.35	22.29	2 2	1508822	25.03	1.25	18.57	2 2
1508732	12.75	1.36	22.25	2 2	1508822	25.11	1.26	18.61	2 2
1508742	4.17	0.61	9.65	2 2	1508832	20.55	1.25	17.84	2 2
1508742	4.31	0.49	9.68	2 2	1508832	20.62	1.22	18.01	2 2
1508752	1.79	0.22	2.32	2 2	1508842	17.88	1.22	17.61	2 2
1508752	1.88	0.17	2.41	2 2	1508842	17.59	1.22	17.68	2 2
1508762	1.71	0.14	0.00	2 2	1508852	15.66	1.18	17.33	2 2
1508762	1.70	0.15	0.00	2 2	1508852	15.82	1.18	17.62	2 2
1508772	41.68	1.40	20.95	2 2	1508862	14.60	1.18	17.33	2 2
1508772	42.08	1.40	20.77	2 2	1508862	14.66	1.20	17.53	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
15088712	13.91	1.21	18.05	2 2	15089612	0.72	0.08	0.00	3 2
15088712	13.94	1.21	17.72	2 2	15089612	0.80	0.10	0.00	3 2
15088813	11.63	1.19	17.50	2 2	15089712	35.29	1.34	19.89	2 2
15088813	11.69	1.19	16.79	2 2	15089712	36.31	1.36	20.10	2 2
15088912	11.42	1.19	17.80	2 2	15089812	33.45	1.37	20.04	2 2
15088912	11.45	1.19	17.94	2 2	15089812	36.19	1.38	20.08	2 2
150890 5				5 5	15089912	34.57	1.36	19.59	2 2
150890 5				5 5	15089912	34.51	1.36	19.58	2 2
15089112	12.24	1.30	19.49	2 2	15090012	33.29	1.35	19.85	2 2
15089112	12.20	1.31	19.29	2 2	15090012	33.38	1.34	20.01	2 2
15089222	10.81	1.36	20.67	2 2	15090122	30.34	1.34	19.13	2 2
15089222	10.94	1.35	20.70	2 2	15090122	30.35	1.32	19.34	2 2
15089312	1.64	0.30	3.96	2 2	15090212	13.08	1.26	18.68	2 2
15089312	1.88	0.29	3.85	2 2	15090212	13.34	1.27	18.72	2 2
15089412	1.42	0.27	3.85	2 2	15090312	22.58	1.24	18.34	2 2
15089412	1.48	0.28	3.91	2 2	15090312	21.97	1.22	18.09	2 2
15089512	1.45	0.26	3.18	2 2	15090412	20.25	1.27	18.37	2 2
15089512	1.55	0.27	3.08	2 2	15090412	20.02	1.27	18.39	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
150905 2	17.89	1.26	18.09	2 2	150914 2	2.50	0.45	6.45	2 2
150905 2	18.17	1.26	18.40	2 2	150914 2	2.58	0.47	6.54	2 2
150906 2	16.64	1.25	18.49	2 2	150915 2	1.53	0.24	3.33	2 2
150906 2	16.77	1.26	18.22	2 2	150915 2	1.56	0.25	3.41	2 2
150907 2	14.34	1.23	18.45	2 2	150916 2	1.01	0.07	0.00	2 2
150907 2	14.64	1.23	18.39	2 2	150916 2	1.07	0.09	0.00	2 2
150908 2	12.80	1.25	18.09	2 2	150917 2	35.54	1.34	19.71	2 2
150908 2	12.93	1.24	18.40	2 2	150917 2	35.41	1.33	19.52	2 2
150909 2	12.35	1.26	18.71	2 2	150918 2	36.06	1.37	20.13	2 2
150909 2	11.13	1.26	18.62	2 2	150918 2	36.24	1.38	19.88	2 2
150910 2	11.90	1.27	18.59	2 2	150919 2	32.14	1.34	19.01	2 2
150910 2	12.06	1.29	18.50	2 2	150919 2	32.28	1.33	19.06	2 2
150911 2	12.33	1.29	19.31	2 2	150920 2	31.76	1.34	18.90	2 2
150911 2	12.26	1.27	18.90	2 2	150920 2	32.51	1.35	19.08	2 2
150912 2	12.75	1.39	21.01	2 2	150921 2	25.06	1.31	18.62	2 2
150912 2	12.74	1.39	21.04	2 2	150921 2	24.93	1.31	18.64	2 2
150913 2	6.29	0.97	14.37	2 2	150922 2	26.06	1.30	18.39	2 2
150913 2	6.39	0.98	14.17	2 2	150922 2	26.07	1.31	18.68	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
150923	21.86	1.27	17.85	2	2	150932	13.51	1.48	22.31	2	2
150923	21.90	1.27	17.81	2	2	150932	13.46	1.48	22.07	2	2
150924	19.75	1.29	18.20	2	2	150933	2.85	0.51	6.68	2	2
150924	20.18	1.30	18.23	2	2	150933	3.00	0.50	6.84	2	2
150925	17.68	1.25	17.81	2	2	150934	1.95	0.29	4.03	2	2
150925	17.84	1.25	17.70	2	2	150934	1.96	0.30	4.01	2	2
150926	14.48	1.21	17.24	2	2	150935	1.97	0.27	3.56	2	2
150926	14.50	1.20	17.29	2	2	150935	2.13	0.29	3.53	2	2
150927	16.86	1.27	17.96	2	2	150936	1.46	0.07	0.00	2	2
150927	16.80	1.24	17.72	2	2	150936	1.36	0.08	0.00	2	2
150928	14.43	1.25	17.62	2	2	150937	37.76	1.36	19.89	2	2
150928	14.06	1.25	17.62	2	2	150937	37.40	1.37	19.86	2	2
150929	12.82	1.24	17.63	2	2	150938	35.49	1.37	19.70	2	2
150929	12.84	1.25	17.94	2	2	150938	36.18	1.37	19.81	2	2
150930	12.04	1.29	18.68	2	2	150939	34.84	1.35	19.36	2	2
150930	12.10	1.30	18.91	2	2	150939	34.95	1.34	19.63	2	2
150931	12.73	1.34	19.27	2	2	150940	31.12	1.32	19.18	2	2
150931	12.76	1.34	19.50	2	2	150940	31.45	1.31	19.28	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
150941 2	27.50	1.29	18.75	2 2	150950 2	12.37	1.22	18.14	2 2
150941 2	28.02	1.27	18.80	2 2	150950 2	11.79	1.23	18.27	2 2
150942 2	24.51	1.26	18.16	2 2	150951 2	12.43	1.24	18.49	2 2
150942 2	24.46	1.27	18.06	2 2	150951 2	12.53	1.25	18.44	2 2
150943 2	22.84	1.25	17.98	2 2	150952 2	11.81	1.29	19.22	2 2
150943 2	23.21	1.24	18.44	2 2	150952 2	11.87	1.30	19.22	2 2
150944 2	19.15	1.23	17.98	2 2	150953 2	5.64	0.93	13.95	2 2
150944 2	18.80	1.25	18.18	2 2	150953 2	5.78	0.93	14.40	2 2
150945 2	17.86	1.23	17.87	2 2	150954 2	2.59	0.48	6.60	2 2
150945 2	17.79	1.21	17.68	2 2	150954 2	2.50	0.46	6.66	2 2
150946 5				5 5	150955 2	1.20	0.21	2.85	2 2
150946 5				5 5	150955 2	1.24	0.22	2.91	2 2
150947 2	14.12	1.21	17.65	2 2	150956 2	0.78	0.08	0.00	2 2
150947 2	14.26	1.22	17.98	2 2	150956 2	0.86	0.09	0.00	2 2
150948 2	13.63	1.20	17.60	2 2	150957 2	37.67	1.33	20.18	2 2
150948 2	13.70	1.22	18.05	2 2	150957 2	38.42	1.34	20.25	2 2
150949 2	12.01	1.21	18.10	2 2	150958 2	36.32	1.34	19.92	2 2
150949 2	12.10	1.20	18.13	2 2	150958 2	36.98	1.36	20.30	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
150959	33.51	1.36	20.13	2	2	150968	11.57	1.27	18.55	2	2
150959	33.81	1.36	20.19	2	2	150968	11.67	1.24	18.44	2	2
150960	34.36	1.33	19.40	2	2	150969	11.66	1.28	19.29	2	2
150960	34.10	1.33	19.57	2	2	150969	11.95	1.31	19.25	2	2
150961	23.26	1.26	18.61	2	2	150970	12.76	1.32	20.55	2	2
150961	22.86	1.28	18.50	2	2	150970	12.80	1.36	20.92	2	2
150962	23.58	1.20	16.94	2	2	150971	10.42	1.31	19.77	2	2
150962	23.62	1.23	17.78	2	2	150971	10.50	1.30	20.03	2	2
150963	19.64	1.24	18.11	2	2	150972	5.40	0.85	13.08	2	2
150963	19.66	1.24	18.04	2	2	150972	5.47	0.87	13.08	2	2
150964	17.71	1.24	17.84	2	2	150973	2.59	0.43	6.68	2	2
150964	17.74	1.22	17.79	2	2	150973	2.58	0.45	6.67	2	2
150965	14.42	1.22	17.54	2	2	150974	1.62	0.22	3.40	2	2
150965	14.64	1.21	17.56	2	2	150974	1.62	0.24	3.44	2	2
150966	12.96	1.21	17.57	2	2	150975	1.36	0.15	2.34	2	2
150966	12.87	1.21	17.62	2	2	150975	1.36	0.15	2.37	2	2
150967	12.14	1.27	18.29	2	2	150976	1.06	0.06	0.00	2	2
150967	12.20	1.26	18.10	2	2	150976	1.07	0.08	0.00	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
150977	34.96	1.31	20.05	2	2	150986	15.66	1.22	17.76	2	2
150977	35.88	1.36	19.80	2	2	150986	15.55	1.23	18.07	2	2
150978	35.37	1.33	19.92	2	2	150987	13.80	1.23	17.86	2	2
150978	35.38	1.34	19.67	2	2	150987	13.88	1.24	18.03	2	2
150979	33.04	1.34	19.55	2	2	150988	12.63	1.23	17.90	2	2
150979	33.22	1.34	19.45	2	2	150988	12.66	1.25	17.90	2	2
150980	30.80	1.33	19.11	2	2	150989	11.99	1.26	17.94	2	2
150980	30.97	1.31	18.98	2	2	150989	12.09	1.24	18.20	2	2
150981	27.34	1.30	18.71	2	2	150990	12.11	1.30	18.80	2	2
150981	27.15	1.30	18.57	2	2	150990	12.11	1.30	18.91	2	2
150982	25.04	1.28	18.37	2	2	150991	12.45	1.34	19.44	2	2
150982	25.23	1.27	18.75	2	2	150991	12.65	1.34	19.80	2	2
150983	21.99	1.27	18.28	2	2	150992	12.70	1.37	20.47	2	2
150983	21.99	1.26	18.46	2	2	150992	12.67	1.39	20.53	2	2
150984	21.44	1.28	19.04	2	2	150993	1.92	0.26	3.13	2	2
150984	21.53	1.28	18.84	2	2	150993	1.69	0.24	3.00	2	2
150985	19.68	1.29	18.77	2	2	150994	4.71	0.73	10.56	2	2
150985	19.78	1.27	18.49	2	2	150994	4.94	0.71	10.40	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
150995	1.77	0.22	2.86	2	2	151004	18.07	1.23	18.35	2	2
150995	1.90	0.24	2.96	2	2	151004	18.32	1.23	18.38	2	2
150996	1.38	0.07	0.00	2	2	151005	16.84	1.25	18.31	2	2
150996	1.43	0.08	0.00	2	2	151005	16.87	1.19	18.39	2	2
150997	35.58	1.35	20.19	2	2	151006	13.57	1.18	18.14	2	2
150997	35.57	1.41	19.76	2	2	151006	13.78	1.16	18.57	2	2
150998	34.92	1.33	19.78	2	2	151007	12.33	1.17	18.25	2	2
150998	34.93	1.36	19.74	2	2	151007	12.16	1.24	18.23	2	2
150999	32.76	1.30	19.83	2	2	151008	11.72	1.17	18.49	2	2
150999	33.60	1.31	19.92	2	2	151008	11.85	1.17	18.48	2	2
151000	31.64	1.27	19.50	2	2	151009	10.51	1.13	17.79	2	2
151000	31.85	1.28	19.63	2	2	151009	10.46	1.15	17.70	2	2
151001	23.64	1.24	18.91	2	2	151010	11.31	1.21	19.02	2	2
151001	23.09	1.24	18.82	2	2	151010	11.14	1.21	19.09	2	2
151002	22.55	1.22	18.40	2	2	151011	12.37	1.31	20.75	2	2
151002	22.32	1.22	18.54	2	2	151011	12.69	1.29	21.04	2	2
151003	21.46	1.26	18.80	2	2	151012	10.05	1.21	20.14	2	2
151003	21.58	1.26	18.52	2	2	151012	10.16	1.23	20.27	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151013 2	3.55	0.57	9.27	2 2	151022 2	21.15	1.21	19.80	2 2
151013 2	3.64	0.63	9.39	2 2	151022 2	21.27	1.25	20.19	2 2
151014 2	2.12	0.35	6.03	2 2	151023 2	18.30	1.19	19.57	2 2
151014 2	2.12	0.34	6.03	2 2	151023 2	18.39	1.21	19.60	2 2
151015 2	1.45	0.18	3.01	2 2	151024 2	15.47	1.19	18.89	2 2
151015 2	1.37	0.17	3.00	2 2	151024 2	15.96	1.19	19.33	2 2
151016 2	1.20	0.07	0.00	2 2	151025 2	13.36	1.17	18.82	2 2
151016 2	1.22	0.07	0.00	2 2	151025 2	13.19	1.18	18.81	2 2
151017 2	37.47	1.36	20.95	2 2	151026 2	12.74	1.16	18.72	2 2
151017 2	38.05	1.32	20.98	2 2	151026 2	12.34	1.17	18.72	2 2
151018 2	35.71	1.34	20.59	2 2	151027 2	11.97	1.18	18.96	2 2
151018 2	35.96	1.33	20.74	2 2	151027 2	12.17	1.19	19.09	2 2
151019 2	31.51	1.29	20.02	2 2	151028 2	11.99	1.17	19.12	2 2
151019 2	31.49	1.28	20.05	2 2	151028 2	12.30	1.19	18.99	2 2
151020 2	27.18	1.24	19.32	2 2	151029 2	11.40	1.18	19.80	2 2
151020 2	27.27	1.26	19.81	2 2	151029 2	11.57	1.24	19.43	2 2
151021 2	21.33	1.21	19.08	2 2	151030 2	11.25	1.22	20.19	2 2
151021 2	21.33	1.24	19.15	2 2	151030 2	11.62	1.21	19.91	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151031 2	12.81	1.31	21.79	2 2	151040 2	29.07	1.27	20.17	2 2
151031 2	12.59	1.33	21.81	2 2	151040 2	29.43	1.27	20.54	2 2
151032 2	13.82	1.42	23.50	2 2	151041 2	26.74	1.27	20.60	2 2
151032 2	13.93	1.43	23.68	2 2	151041 2	26.90	1.25	20.10	2 2
151033 2	2.89	0.48	7.87	2 2	151042 2	23.82	1.26	19.68	2 2
151033 2	3.00	0.43	8.06	2 2	151042 2	24.18	1.21	19.70	2 2
151034 2	1.69	0.25	4.22	2 2	151043 2	21.29	1.23	19.92	2 2
151034 2	1.72	0.27	4.28	2 2	151043 2	21.35	1.23	20.04	2 2
151035 2	1.40	0.19	2.53	2 2	151044 2	16.45	1.16	19.19	2 2
151035 2	1.42	0.19	2.50	2 2	151044 2	16.60	1.16	19.00	2 2
151036 2	1.17	0.08	0.00	2 2	151045 2	14.55	1.18	18.67	2 2
151036 2	1.22	0.08	0.00	2 2	151045 2	14.58	1.14	19.12	2 2
151037 2	38.45	1.39	21.95	2 2	151046 2	12.04	1.12	18.42	2 2
151037 2	39.02	1.46	21.72	2 2	151046 2	11.76	1.11	18.37	2 2
151038 2	37.28	1.37	21.46	2 2	151047 2	10.93	1.14	18.80	2 2
151038 2	37.01	1.39	21.91	2 2	151047 2	11.14	1.13	18.46	2 2
151039 2	35.65	1.33	21.23	2 2	151048 2	11.60	1.17	19.51	2 2
151039 2	35.85	1.33	21.34	2 2	151048 2	11.81	1.16	19.44	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151049	11.28	1.18	19.94	2	2	151058	33.15	1.28	20.80	2	2
151049	11.43	1.21	20.00	2	2	151058	34.12	1.27	21.37	2	2
151050	12.33	1.27	21.45	2	2	151059	23.74	1.18	19.05	2	2
151050	12.07	1.26	21.28	2	2	151059	23.75	1.17	19.24	2	2
151051	14.48	1.46	24.96	2	2	151060	22.37	1.18	19.63	2	2
151051	14.57	1.49	25.40	2	2	151060	22.46	1.17	19.15	2	2
151052	8.90	1.16	20.54	2	2	151061	20.69	1.15	19.16	2	2
151052	9.11	1.14	20.72	2	2	151061	20.79	1.24	18.87	2	2
151053	1.41	0.21	3.24	2	2	151062	20.19	1.16	19.12	2	2
151053	1.46	0.25	3.23	2	2	151062	20.85	1.16	19.49	2	2
151054	1.45	0.20	3.33	2	2	151063	14.61	1.09	18.26	2	2
151054	1.47	0.21	3.34	2	2	151063	14.68	1.09	18.09	2	2
151055	1.62	0.20	3.22	2	2	151064	14.51	1.11	18.34	2	2
151055	1.64	0.20	3.30	2	2	151064	14.21	1.13	18.54	2	2
151056	1.09	0.07	0.00	2	2	151065	13.94	1.14	18.84	2	2
151056	1.12	0.08	0.00	2	2	151065	14.18	1.14	19.13	2	2
151057	40.34	1.38	22.20	2	2	151066	13.83	1.18	19.29	2	2
151057	41.58	1.35	22.66	2	2	151066	13.90	1.15	19.44	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151067	12.89	1.15	19.20	2	2	151076	1.00	0.12	0.00	3	2
151067	13.13	1.16	19.37	2	2	151076	1.06	0.10	0.00	3	2
151068	12.24	1.14	18.85	2	2	151077	29.67	1.39	17.87	3	2
151068	12.56	1.15	19.40	2	2	151077	29.85	1.29	18.19	3	2
151069	11.06	1.13	19.00	2	2	151078	27.70	1.28	18.34	3	2
151069	11.27	1.16	18.50	2	2	151078	28.29	1.27	18.45	3	2
151070	11.13	1.16	19.39	2	2	151079	24.68	1.22	17.97	3	2
151070	11.28	1.16	19.38	2	2	151079	24.22	1.24	17.39	3	2
151071	11.20	1.17	19.66	2	2	151080	22.33	1.22	17.19	3	2
151071	11.16	1.17	19.50	2	2	151080	22.44	1.22	17.25	3	2
151072	11.54	1.20	20.33	2	2	151081	15.71	1.20	17.02	3	2
151072	11.55	1.22	20.34	2	2	151081	15.81	1.29	16.90	3	2
151073	13.22	1.46	22.64	3	2	151082	16.10	1.20	17.57	3	2
151073	13.40	1.58	22.69	3	2	151082	16.39	1.20	17.52	3	2
151074	12.90	1.47	22.57	3	2	151083	19.51	1.22	17.75	3	2
151074	12.98	1.47	22.94	3	2	151083	19.21	1.20	17.51	3	2
151075	2.60	0.50	7.08	3	2	151084	16.37	1.20	17.39	3	2
151075	2.75	0.40	7.25	3	2	151084	16.53	1.21	17.49	3	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151085 2	14.64	1.20	17.47	3 2	151094 2	1.56	0.28	3.78	3 2
151085 2	14.97	1.19	17.60	3 2	151094 2	1.56	0.25	3.79	3 2
151086 2	12.92	1.19	17.03	3 2	151095 2	1.15	0.20	2.23	3 2
151086 2	13.05	1.18	17.33	3 2	151095 2	1.09	0.19	2.22	3 2
151087 2	11.85	1.21	17.01	3 2	151096 2	0.94	0.11	0.00	3 2
151087 2	11.98	1.21	17.14	3 2	151096 2	0.94	0.07	0.00	3 2
151088 2	11.51	1.20	17.26	3 2	151097 2	20.99	1.26	16.63	3 2
151088 2	11.68	1.19	17.39	3 2	151097 2	21.40	1.18	16.95	3 2
151089 2	11.21	1.22	18.04	3 2	151098 2	23.62	1.22	17.64	3 2
151089 2	11.31	1.30	17.33	3 2	151098 2	23.67	1.22	17.67	3 2
151090 2	11.70	1.26	18.91	3 2	151099 2	21.08	1.20	17.01	3 2
151090 2	12.01	1.29	18.67	3 2	151099 2	20.91	1.21	17.17	3 2
151091 2	11.33	1.26	19.06	3 2	151100 2	21.45	1.21	17.38	3 2
151091 2	11.36	1.27	18.99	3 2	151100 2	21.04	1.22	17.43	3 2
151092 2	8.00	1.15	16.72	3 2	151101 2	15.94	1.18	17.20	3 2
151092 2	8.20	1.13	16.95	3 2	151101 2	16.45	1.19	17.26	3 2
151093 2	3.88	0.70	10.41	3 2	151102 2	14.26	1.20	16.75	3 2
151093 2	3.88	0.67	10.26	3 2	151102 2	14.48	1.19	16.58	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151103 2	12.91	1.18	16.51	3 2	151112 2	8.44	1.18	17.53	3 2
151103 2	13.30	1.17	16.93	3 2	151112 2	8.62	1.19	17.69	3 2
151104 2	12.83	1.17	17.14	3 2	151113 2	7.22	1.07	16.29	3 2
151104 2	13.10	1.17	16.99	3 2	151113 2	7.14	1.16	15.70	3 2
151105 2	13.12	1.26	16.77	3 2	151114 2	1.75	0.33	4.62	3 2
151105 2	12.89	1.19	17.03	3 2	151114 2	1.87	0.27	4.89	3 2
151106 2	11.69	1.22	16.83	3 2	151115 2	1.38	0.22	3.12	3 2
151106 2	12.02	1.20	17.04	3 2	151115 2	1.34	0.22	3.08	3 2
151107 2	11.25	1.19	17.59	3 2	151116 2	0.97	0.08	0.00	3 2
151107 2	11.15	1.20	17.22	3 2	151116 2	1.00	0.07	0.00	3 2
151108 2	11.65	1.23	18.02	3 2	151117 2	34.74	1.34	19.32	3 2
151108 2	11.42	1.23	17.89	3 2	151117 2	34.96	1.39	19.33	3 2
151109 2	11.68	1.27	18.69	3 2	151118 2	29.37	1.27	18.63	3 2
151109 2	11.82	1.28	18.71	3 2	151118 2	29.86	1.29	18.58	3 2
151110 2	12.41	1.34	20.55	3 2	151119 2	27.91	1.27	18.23	3 2
151110 2	12.50	1.34	20.20	3 2	151119 2	28.05	1.30	18.49	3 2
151111 2	10.15	1.26	18.95	3 2	151120 2	26.61	1.28	17.85	3 2
151111 2	10.27	1.25	19.17	3 2	151120 2	26.64	1.29	17.82	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151121 2	23.30	1.36	17.15	3 2	151130 2	11.62	1.27	18.81	3 2
151121 2	23.54	1.27	17.75	3 2	151130 2	11.65	1.31	18.54	3 2
151122 2	22.36	1.27	17.89	3 2	151131 2	11.66	1.34	19.59	3 2
151122 2	22.55	1.28	18.01	3 2	151131 2	11.81	1.34	19.56	3 2
151123 2	19.50	1.27	17.32	3 2	151132 2	9.79	1.27	18.55	3 2
151123 2	20.42	1.26	18.09	3 2	151132 2	10.03	1.27	18.62	3 2
151124 2	16.32	1.25	17.18	3 2	151133 2	6.14	0.95	14.07	3 2
151124 2	16.90	1.24	17.64	3 2	151133 2	6.21	0.98	14.11	3 2
151125 2	14.89	1.23	17.75	3 2	151134 2	3.32	0.58	8.73	3 2
151125 2	14.91	1.23	17.69	3 2	151134 2	3.35	0.59	8.75	3 2
151126 2	12.79	1.22	17.20	3 2	151135 2	1.48	0.24	3.60	3 2
151126 2	12.92	1.21	17.25	3 2	151135 2	1.53	0.27	3.48	3 2
151127 2	11.76	1.21	17.43	3 2	151136 2	0.65	0.07	0.00	3 2
151127 2	12.11	1.22	17.32	3 2	151136 2	0.62	0.07	0.00	3 2
151128 2	11.75	1.24	17.94	3 2	151137 2	31.26	1.40	18.19	3 2
151128 2	11.84	1.21	17.89	3 2	151137 2	31.94	1.34	18.86	3 2
151129 2	11.80	1.32	17.99	3 2	151138 2	29.02	1.28	18.09	3 2
151129 2	11.62	1.24	18.10	3 2	151138 2	29.27	1.29	18.43	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151139 2	27.08	1.29	17.95	3 2	151148 2	11.48	1.15	17.26	3 2
151139 2	27.21	1.28	17.88	3 2	151148 2	11.22	1.14	16.82	3 2
151140 2	25.02	1.26	17.61	3 2	151149 2	10.83	1.15	17.05	3 2
151140 2	25.24	1.27	17.61	3 2	151149 2	10.68	1.15	16.98	3 2
151141 2	21.73	1.26	17.04	3 2	151150 2	10.80	1.17	17.30	3 2
151141 2	21.90	1.26	17.55	3 2	151150 2	10.81	1.19	17.56	3 2
151142 2	18.36	1.22	16.89	3 2	151151 2	11.73	1.22	18.44	3 2
151142 2	18.50	1.23	17.08	3 2	151151 2	11.93	1.22	18.61	3 2
151143 2	16.00	1.22	16.69	3 2	151152 2	12.38	1.33	19.55	3 2
151143 2	16.11	1.22	16.77	3 2	151152 2	12.72	1.32	19.90	3 2
151144 2	15.36	1.24	17.02	3 2	151153 2	12.70	1.36	21.43	3 2
151144 2	15.22	1.23	16.61	3 2	151153 2	12.99	1.41	21.51	3 2
151145 2	12.08	1.10	16.75	3 2	151154 2	7.98	1.07	16.54	3 2
151145 2	12.21	1.16	16.81	3 2	151154 2	7.93	1.07	16.62	3 2
151146 2	10.21	1.09	16.07	3 2	151155 2	2.17	0.35	4.95	3 2
151146 2	10.56	1.09	16.09	3 2	151155 2	2.20	0.40	4.81	3 2
151147 2	10.50	1.11	16.52	3 2	151156 2	1.04	0.11	0.00	3 2
151147 2	10.75	1.11	16.83	3 2	151156 2	0.95	0.11	0.00	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151157 2	24.15	1.21	16.96	3 2	151166 2	11.67	1.16	16.66	3 2
151157 2	23.77	1.17	17.18	3 2	151166 2	12.00	1.15	16.77	3 2
151158 2	21.81	1.16	16.89	3 2	151167 2	11.05	1.16	17.02	3 2
151158 2	22.13	1.16	16.77	3 2	151167 2	11.05	1.18	17.20	3 2
151159 2	21.11	1.16	16.84	3 2	151168 2	10.41	1.17	17.55	3 2
151159 2	21.22	1.16	16.94	3 2	151168 2	10.48	1.19	17.36	3 2
151160 2	22.64	1.23	17.10	3 2	151169 2	11.42	1.26	17.70	3 2
151160 2	23.23	1.20	17.65	3 2	151169 2	11.27	1.28	17.82	3 2
151161 2	11.78	1.22	17.56	3 2	151170 2	11.43	1.07	18.06	3 2
151161 2	12.07	1.18	17.79	3 2	151170 2	11.50		18.11	3 4
151162 2	18.10	1.17	16.78	3 2	151171 2	11.90	1.34	18.95	3 2
151162 2	18.07	1.17	17.04	3 2	151171 2	12.10	1.34	19.12	3 2
151163 2	14.35	1.14	16.37	3 2	151172 2	11.54	1.44	19.07	3 2
151163 2	14.40	1.13	16.13	3 2	151172 2	11.61	1.36	19.74	3 2
151164 2	12.29	1.13	16.09	3 2	151173 2	12.13	1.42	20.84	3 2
151164 2	12.29	1.12	16.07	3 2	151173 2	12.54	1.36	20.30	3 2
151165 2	12.75	1.15	16.66	3 2	151174 2	4.31	0.72	10.51	3 2
151165 2	13.03	1.14	17.07	3 2	151174 2	4.38	0.72	11.06	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151175 2	2.15	0.38	5.54	3 2	151184 2	11.72	1.16	16.76	3 2
151175 2	2.28	0.40	5.60	3 2	151184 2	11.83	1.16	16.88	3 2
151176 2	0.96	0.15	0.00	3 2	151185 2	12.01	1.16	16.78	3 2
151176 2	0.97	0.12	0.00	3 2	151185 2	12.14	1.22	16.97	3 2
151177 2	31.87	1.30	18.41	3 2	151186 2	11.37	1.19	17.05	3 2
151177 2	31.84	1.35	18.31	3 2	151186 2	11.66	1.20	17.33	3 2
151178 2	27.50	1.24	18.08	3 2	151187 2	11.35	1.19	17.46	3 2
151178 2	28.70	1.27	18.00	3 2	151187 2	11.37	1.19	17.68	3 2
151179 2	24.77	1.22	18.07	3 2	151188 2	11.33	1.23	17.68	3 2
151179 2	24.84	1.25	18.10	3 2	151188 2	11.43	1.22	17.78	3 2
151180 2	23.00	1.20	17.22	3 2	151189 2	12.02	1.30	18.78	3 2
151180 2	23.47	1.20	17.48	3 2	151189 2	12.23	1.29	18.81	3 2
151181 2	16.55	1.20	17.44	3 2	151190 2	12.28	1.38	20.70	3 2
151181 2	16.17	1.18	17.14	3 2	151190 2	12.67	1.38	20.86	3 2
151182 2	15.87	1.20	17.66	3 2	151191 2	4.29	0.69	9.86	3 2
151182 2	16.15	1.20	17.32	3 2	151191 2	4.42	0.65	9.97	3 2
151183 2	13.62	1.17	16.93	3 2	151192 2	2.01	0.33	4.72	3 2
151183 2	13.93	1.17	17.16	3 2	151192 2	2.08	0.34	4.71	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151193 2	2.05	0.33	4.55	3 2	151202 2	20.18	1.22	16.97	3 2
151193 2	2.12	0.39	4.61	3 2	151202 2	20.06	1.22	16.81	3 2
151194 2	2.04	0.33	4.80	3 2	151203 2	17.87	1.20	16.73	3 2
151194 2	2.08	0.33	4.77	3 2	151203 2	18.18	1.19	16.73	3 2
151195 2	2.10	0.34	5.07	3 2	151204 2	15.47	1.18	16.49	3 2
151195 2	2.03	0.35	4.99	3 2	151204 2	15.98	1.18	16.64	3 2
151196 2	0.71	0.07	0.00	3 2	151205 2	13.85	1.21	16.69	3 2
151196 2	0.76	0.08	0.00	3 2	151205 2	13.93	1.19	16.35	3 2
151197 2	30.38	1.30	17.62	3 2	151206 2	12.53	1.20	16.87	3 2
151197 2	30.64	1.28	17.80	3 2	151206 2	12.58	1.18	16.82	3 2
151198 2	24.71	1.22	16.82	3 2	151207 2	11.62	1.20	16.78	3 2
151198 2	25.65	1.22	17.12	3 2	151207 2	12.03	1.20	17.06	3 2
151199 2	24.21	1.22	17.36	3 2	151208 2	11.01	1.21	16.75	3 2
151199 2	24.51	1.22	17.41	3 2	151208 2	11.02	1.20	16.83	3 2
151200 2	23.06	1.23	17.18	3 2	151209 2	11.81	1.30	17.23	3 2
151200 2	23.57	1.23	17.32	3 2	151209 2	11.94	1.22	17.35	3 2
151201 2	19.62	1.20	16.77	3 2	151210 2	12.60	1.33	19.14	3 2
151201 2	20.10	1.24	16.68	3 2	151210 2	12.49	1.30	18.85	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151211 2	8.13	1.11	15.88	3 2	151220 2	23.51	1.16	17.10	3 2
151211 2	8.43	1.09	16.15	3 2	151220 2	23.97	1.14	17.19	3 2
151212 2	2.41	0.43	5.47	3 2	151221 2	14.08	1.09	16.83	3 2
151212 2	2.43	0.38	5.53	3 2	151221 2	14.32	1.10	16.81	3 2
151213 2	2.20	0.37	4.93	3 2	151222 2	16.02	1.10	17.00	3 2
151213 2	2.29	0.36	4.81	3 2	151222 2	16.20	1.10	17.05	3 2
151214 2	2.21	0.36	4.98	3 2	151223 2	14.14	1.10	16.82	3 2
151214 2	2.14	0.34	4.95	3 2	151223 2	14.24	1.08	16.54	3 2
151215 2	1.98	0.35	5.10	3 2	151224 2	10.86	0.99	15.49	3 2
151215 2	2.00	0.37	5.04	3 2	151224 2	11.10	1.02	15.60	3 2
151216 2	0.74	0.09	0.00	3 2	151225 2	11.49	1.05	16.55	3 2
151216 2	0.74	0.07	0.00	3 2	151225 2	11.50	1.12	16.50	3 2
151217 2	30.93	1.23	17.97	3 2	151226 2	12.27	1.08	17.13	3 2
151217 2	31.26	1.28	17.59	3 2	151226 2	12.04	1.09	16.84	3 2
151218 2	24.31	1.15	16.91	3 2	151227 2	12.01	1.10	17.52	3 2
151218 2	24.32	1.16	16.75	3 2	151227 2	12.11	1.10	17.51	3 2
151219 2	22.13	1.12	16.85	3 2	151228 2	11.64	1.13	17.54	3 2
151219 2	22.26	1.13	16.79	3 2	151228 2	11.66	1.11	17.62	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151229 2	11.36	1.12	17.73	3 2	151238 2	20.36	1.09	17.05	3 2
151229 2	11.40	1.13	17.70	3 2	151238 2	19.89	1.04	16.52	3 2
151230 2	11.51	1.15	17.80	3 2	151239 2	20.73	1.08	17.06	3 2
151230 2	11.29	1.14	17.98	3 2	151239 2	20.45	1.09	17.01	3 2
151231 2	11.78	1.16	18.97	3 2	151240 2	19.58	1.09	16.46	3 2
151231 2	11.58	1.17	18.79	3 2	151240 2	19.91	1.07	16.56	3 2
151232 2	10.46	1.21	19.32	3 2	151241 2	13.67	1.16	17.10	3 2
151232 2	10.60	1.18	19.45	3 2	151241 2	14.53	1.10	17.22	3 2
151233 2	3.64	0.57	9.04	3 2	151242 2	17.07	1.09	17.00	3 2
151233 2	3.65	0.53	9.10	3 2	151242 2	17.33	1.09	16.83	3 2
151234 2	2.28	0.34	6.15	3 2	151243 2	14.54	1.08	16.28	3 2
151234 2	2.32	0.33	6.12	3 2	151243 2	14.69	1.07	16.49	3 2
151235 2	1.76	0.27	4.87	3 2	151244 2	12.57	1.06	16.38	3 2
151235 2	1.81	0.26	4.99	3 2	151244 2	12.45	1.09	16.48	3 2
151236 2	0.56	0.04	0.00	3 2	151245 2	11.55	1.08	16.30	3 2
151236 2	0.47	0.04	0.00	3 2	151245 2	11.68	1.08	16.55	3 2
151237 2	20.27	1.08	15.91	3 2	151246 2	12.29	1.10	16.58	3 2
151237 2	20.45	1.05	16.68	3 2	151246 2	12.28	1.10	16.63	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1512472	10.88	1.12	16.65	3 2	1512562	0.89	0.18	0.00	3 3
1512472	11.25	1.10	17.42	3 2	1512562	1.09	0.07	0.00	3 2
1512482	11.23	1.11	17.52	3 2	1512572	18.70	1.10	15.67	3 2
1512482	11.38	1.13	17.34	3 2	1512572	19.27	1.05	16.05	3 2
1512492	12.11	1.27	18.14	3 2	1512582	20.73	1.11	16.41	3 2
1512492	12.17	1.22	18.59	3 2	1512582	21.09	1.08	16.57	3 2
1512502	13.63	1.38	21.72	3 2	1512592	17.52	1.09	16.07	3 2
1512502	13.76	1.37	21.67	3 2	1512592	17.81	1.09	16.41	3 2
1512512	13.79	1.40	22.35	3 2	1512602	17.34	1.07	16.10	3 2
1512512	13.83	1.41	22.58	3 2	1512602	17.30	1.08	15.84	3 2
1512522	9.26	1.13	17.76	3 2	1512612	15.35	1.06	16.20	3 2
1512522	9.36	1.11	18.21	3 2	1512612	15.49	1.08	16.27	3 2
1512532	3.42	0.55	8.66	3 2	1512622	15.47	1.11	16.72	3 2
1512532	3.54	0.55	8.91	3 2	1512622	15.74	1.09	16.83	3 2
1512542	2.15	0.35	6.09	3 2	1512632	14.37	1.09	16.26	3 2
1512542	2.17	0.35	5.98	3 2	1512632	14.40	1.09	16.32	3 2
1512552	2.41	0.37	6.47	3 2	1512642	12.58	1.07	16.11	3 2
1512552	2.52	0.37	6.54	3 2	1512642	12.77	1.09	16.57	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151265 2	12.44	1.08	16.27	3 2	151274 2	5.95	0.86	13.51	3 2
151265 2	12.66	1.15	16.49	3 2	151274 2	6.02	0.83	13.74	3 2
151266 2	11.43	1.08	16.12	3 2	151275 2	1.80	0.25	4.66	3 2
151266 2	11.72	1.09	16.26	3 2	151275 2	1.78	0.28	4.59	3 2
151267 2	11.22	1.08	16.53	3 2	151276 2	0.75	0.08	0.00	3 2
151267 2	11.13	1.08	16.74	3 2	151276 2	0.85	0.08	0.00	3 2
151268 2	11.27	1.11	16.72	3 2	151277 2	18.44	1.10	15.57	3 2
151268 2	11.66	1.10	17.11	3 2	151277 2	18.64	1.06	15.75	3 2
151269 2	11.12	1.13	16.89	3 2	151278 2	20.26	1.10	16.15	3 2
151269 2	11.15	1.13	17.16	3 2	151278 2	20.73	1.10	16.24	3 2
151270 2	11.35	1.15	17.39	3 2	151279 2	18.37	1.09	15.91	3 2
151270 2	11.76	1.17	17.56	3 2	151279 2	18.30	1.06	15.88	3 2
151271 2	11.90	1.18	18.62	3 2	151280 2	16.59	1.08	15.31	3 2
151271 2	11.93	1.19	18.09	3 2	151280 2	17.14	1.08	16.02	3 2
151272 2	12.58	1.29	19.87	3 2	151281 2	14.21	1.06	15.76	3 2
151272 2	12.86	1.30	19.87	3 2	151281 2	14.59	1.10	15.73	3 2
151273 2	12.85	1.37	21.25	3 2	151282 2	13.43	1.07	15.90	3 2
151273 2	13.08	1.43	21.40	3 2	151282 2	13.82	1.07	15.68	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151283 2	13.24	1.06	15.90	3 2	151292 2	12.30	1.31	19.14	3 2
151283 2	13.32	1.06	15.74	3 2	151292 2	12.65	1.31	19.06	3 2
151284 2	11.33	1.07	15.77	3 2	151293 2	10.73	1.28	19.14	3 2
151284 2	11.49	1.08	16.30	3 2	151293 2	10.98	1.27	19.33	3 2
151285 2	10.93	1.05	15.60	3 2	151294 2	4.37	0.70	10.48	3 2
151285 2	11.30	1.07	16.20	3 2	151294 2	4.63	0.66	10.68	3 2
151286 2	10.98	1.08	16.18	3 2	151295 2	2.54	0.42	6.77	3 2
151286 2	11.05	1.07	16.16	3 2	151295 2	2.51	0.42	6.66	3 2
151287 2	11.44	1.08	16.36	3 2	151296 5				5 5
151287 2	11.75	1.09	16.61	3 2	151296 5				5 5
151288 2	11.79	1.11	16.73	3 2	151297 2	17.94	1.10	15.13	3 2
151288 2	12.24	1.11	16.41	3 2	151297 2	18.24	1.07	15.57	3 2
151289 2	11.07	1.11	16.38	3 2	151298 2	16.56	1.11	15.24	3 2
151289 2	11.49	1.15	16.59	3 2	151298 2	16.60	1.06	15.25	3 2
151290 2	10.58	1.11	16.59	3 2	151299 2	14.56	1.06	15.40	3 2
151290 2	10.67	1.13	16.55	3 2	151299 2	14.70	1.06	15.41	3 2
151291 2	11.91	1.20	17.83	3 2	151300 2	13.95	1.04	15.72	3 2
151291 2	11.67	1.26	17.50	3 2	151300 2	13.97	1.07	15.56	3 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1513012	12.67	1.10	15.98	3 2	1513102	11.44	1.19	17.49	3 2
1513012	12.64	1.10	15.79	3 2	1513102	11.61	1.17	17.64	3 2
1513022	12.54	1.07	15.80	3 2	1513112	13.03	1.33	19.45	3 2
1513022	12.66	1.07	15.71	3 2	1513112	13.15	1.34	19.46	3 2
1513032	14.09	1.11	16.34	3 2	1513122	10.96	1.28	19.12	3 2
1513032	13.82	1.11	16.32	3 2	1513122	11.26	1.27	19.17	3 2
1513042	10.64	1.07	15.80	3 2	1513132	8.51	1.03	14.43	3 2
1513042	10.59	1.05	15.75	3 2	1513132	8.40	1.07	14.92	3 2
1513052	11.29	1.09	16.06	3 2	1513142	5.73	0.83	12.80	2 2
1513052	11.51	1.08	16.02	3 2	1513142	5.79	0.80	13.18	2 2
1513062	10.49	1.15	15.69	3 2	1513152	2.29	0.37	4.79	2 2
1513062	10.57	1.07	15.84	3 2	1513152	2.40	0.37	4.99	2 2
1513072	11.28	1.12	16.48	3 2	1513162	0.88	0.10	0.00	2 2
1513072	11.30	1.13	16.61	3 2	1513162	0.97	0.10	0.00	2 2
1513082	11.35	1.16	16.63	3 2	1513172	15.66	1.05	15.38	2 2
1513082	11.42	1.15	16.60	3 2	1513172	15.81	1.03	15.29	2 2
1513092	11.73	1.16	17.32	3 2	1513182	14.50	1.05	15.80	2 2
1513092	11.51	1.15	17.33	3 2	1513182	14.56	1.07	15.83	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151319	14.30	1.05	15.93	2	2	151328	11.60	1.13	17.31	2	2
151319	14.24	1.05	16.05	2	2	151328	11.64	1.11	17.14	2	2
151320	13.47	1.07	16.26	2	2	151329	11.52	1.15	17.25	2	2
151320	13.46	1.08	15.97	2	2	151329	11.54	1.13	17.09	2	2
151321	13.07	1.08	16.17	2	2	151330	11.47	1.15	17.31	2	2
151321	13.21	1.10	16.34	2	2	151330	11.72	1.14	17.55	2	2
151322	12.19	1.09	16.07	2	2	151331	12.16	1.21	18.78	2	2
151322	12.30	1.06	16.49	2	2	151331	12.38	1.18	18.31	2	2
151323	12.78	1.08	16.56	2	2	151332	12.79	1.30	19.89	2	2
151323	12.78	1.08	16.60	2	2	151332	12.68	1.28	19.58	2	2
151324	12.14	1.11	16.42	2	2	151333	13.42	1.36	20.25	2	2
151324	12.20	1.10	16.39	2	2	151333	13.44	1.36	20.00	2	2
151325	12.10	1.10	16.65	2	2	151334	12.71	1.36	20.61	2	2
151325	12.01	1.09	16.39	2	2	151334	12.73	1.36	20.96	2	2
151326	11.66	1.10	16.30	2	2	151335	6.08	0.87	11.08	2	2
151326	11.67	1.09	16.68	2	2	151335	6.10	0.86	11.03	2	2
151327	11.55	1.11	16.95	2	2	151336	0.76	0.24	0.00	2	2
151327	11.70	1.12	17.11	2	2	151336	0.81	0.23	0.00	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1513372	11.21	1.09	15.94	2 2	1513462	11.24	1.17	16.79	2 2
1513372	11.29	1.08	15.98	2 2	1513462	11.66	1.15	16.80	2 2
1513382	11.67	1.08	16.21	2 2	1513472	12.76	1.26	18.55	2 2
1513382	11.67	1.10	16.02	2 2	1513472	12.85	1.29	18.85	2 2
1513392	11.39	1.10	16.51	2 2	1513482	12.55	1.27	19.17	2 2
1513392	11.71	1.08	16.16	2 2	1513482	12.61	1.29	19.26	2 2
1513402	11.12	1.09	16.38	2 2	1513492	7.98	0.96	11.08	2 2
1513402	10.95	1.10	16.37	2 2	1513492	8.07	0.99	10.85	2 2
1513412	10.88	1.11	16.61	2 2	1513502	0.72	0.26	0.00	2 2
1513412	10.92	1.10	16.69	2 2	1513502	0.77	0.24	0.00	2 2
1513422	10.98	1.12	16.98	2 2	1513512	10.28	1.09	16.00	2 2
1513422	11.53	1.11	16.79	2 2	1513512	10.37	1.09	15.86	2 2
1513432	11.20	1.15	17.46	2 2	1513522	10.05	1.08	16.03	2 2
1513432	11.20	1.14	17.05	2 2	1513522	10.16	1.11	15.74	2 2
1513442	10.89	1.14	16.87	2 2	1513532	10.07	1.08	15.58	2 2
1513442	10.71	1.14	16.85	2 2	1513532	10.22	1.10	15.63	2 2
1513452	11.60	1.17	17.95	2 2	1513542	10.27	1.11	15.83	2 2
1513452	11.96	1.18	17.62	2 2	1513542	10.34	1.11	15.70	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151355 2	10.92	1.12	15.28	2 2	151364 2	11.39	1.10	14.88	2 2
151355 2	11.10	1.10	15.47	2 2	151364 2	11.41	1.13	14.92	2 2
151356 2	11.93	1.09	14.63	2 2	151365 2	9.75	1.04	8.98	2 2
151356 2	11.41	1.12	14.92	2 2	151365 2	9.77	1.04	9.03	2 2
151357 2	10.89	1.04	12.95	2 2	151366 2	2.17	0.50	0.75	2 2
151357 2	11.08	1.07	12.89	2 2	151366 2	2.11	0.49	0.64	2 2
151358 2	9.99	1.05	9.07	2 2	151367 2	10.86	1.11	14.62	2 2
151358 2	10.01	1.05	9.20	2 2	151367 2	10.89	1.11	14.91	2 2
151359 2	1.36	0.40	0.00	2 2	151368 2	11.65	1.11	15.07	2 2
151359 2	1.37	0.40	0.00	2 2	151368 2	11.51	1.11	15.02	2 2
151360 2	10.35	1.11	15.38	2 2	151369 2	11.72	1.11	13.89	2 2
151360 2	10.30	1.11	15.88	2 2	151369 2	11.63	1.09	14.28	2 2
151361 2	10.29	1.10	15.90	2 2	151370 2	9.63	1.04	8.35	2 2
151361 2	10.25	1.11	15.93	2 2	151370 2	9.78	1.02	8.40	2 2
151362 2	10.16	1.10	15.68	2 2	151371 2	11.31	1.07	12.88	2 2
151362 2	10.18	1.10	15.28	2 2	151371 2	11.40	1.08	12.99	2 2
151363 2	10.87	1.11	15.48	2 2	151372 2	9.96	1.06	9.71	2 2
151363 2	10.89	1.09	15.70	2 2	151372 2	9.99	1.05	9.86	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151373	1.28	0.38	0.00	2	2	151382	10.88	1.05	9.47	2	2
151373	1.30	0.35	0.00	2	2	151382	11.05	1.07	9.23	2	2
151374	15.09	1.11	11.50	2	2	151383	13.17	1.08	15.00	2	2
151374	15.05	1.11	11.48	2	2	151383	13.21	1.10	15.29	2	2
151375	8.68	1.03	7.99	2	2	151384	12.68	1.05	14.42	2	2
151375	8.71	1.01	8.09	2	2	151384	12.35	1.06	14.22	2	2
151376	0.79	0.33	0.00	2	2	151385	7.93	0.94	9.74	2	2
151376	0.72	0.35	0.00	2	2	151385	8.00	0.94	9.94	2	2
151377	10.99	1.00	11.66	2	2	151386	1.92	0.42	0.78	2	2
151377	11.24	1.00	11.97	2	2	151386	2.04	0.40	0.98	2	2
151378	5.23	0.90	5.96	3	3	151387	9.78	1.06	15.47	2	2
151378	5.29	0.93	5.74	3	3	151387	9.89	1.06	16.01	2	2
151379	0.80	0.35	-0.06	3	3	151388	9.37	1.05	15.82	2	2
151379	0.80	0.34	0.04	3	3	151388	9.51	1.05	16.23	2	2
151380	10.28	0.98	11.97	2	2	151389	8.63	1.04	15.60	2	2
151380	10.37	0.98	11.67	2	2	151389	8.80	1.03	15.67	2	2
151381	10.63	1.01	10.87	2	2	151390	6.58	0.92	12.66	2	2
151381	10.77	1.01	10.79	2	2	151390	6.57	0.90	12.66	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151391	1.56	0.34	0.50	2	2	151400	10.41	1.05	16.26	2	2
151391	1.57	0.34	0.72	2	2	151400	10.52	1.07	16.09	2	2
151392	12.22	1.07	15.91	2	2	151401	10.29	1.07	16.12	2	2
151392	12.30	1.06	16.14	2	2	151401	10.33	1.06	16.08	2	2
151393	10.09	1.05	16.17	2	2	151402	10.15	1.06	16.38	2	2
151393	10.20	1.04	16.26	2	2	151402	10.30	1.15	16.48	2	2
151394	9.57	1.04	16.20	2	2	151403				5	5
151394	9.65	1.04	16.33	2	2	151403				5	5
151395	9.54	1.05	17.74	2	2	151404	10.83	1.14	17.41	2	2
151395	9.85	1.07	18.31	2	2	151404	10.85	1.15	17.61	2	2
151396	9.44	1.07	16.39	2	2	151405	11.19	1.15	17.75	2	2
151396	9.50	1.06	15.86	2	2	151405	10.89	1.16	17.62	2	2
151397	9.73	1.09	16.00	2	2	151406	11.92	1.20	17.76	2	2
151397	9.45	1.06	15.81	2	2	151406	12.05	1.21	18.12	2	2
151398	8.33	1.00	14.62	2	2	151407	10.98	1.13	16.75	3	3
151398	8.45	0.99	15.00	2	2	151407	11.01	1.10	17.19	3	3
151399	1.03	0.23	0.00	2	2	151408	11.16	1.16	18.14	2	2
151399	1.11	0.22	0.25	2	2	151408	11.23	1.15	18.18	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1514092	11.26	1.19	17.69	2 2	1514182	7.37	0.93	10.94	2 2
1514092	11.11	1.18	17.71	2 2	1514182	7.28	0.92	10.95	2 2
1514102	0.94	0.27	0.26	2 2	1514192	11.87	1.06	16.31	2 2
1514102	0.77	0.28	0.00	2 2	1514192	11.92	1.08	16.24	2 2
1514112	9.85	1.05	15.54	2 2	1514202	11.27	1.06	15.90	2 2
1514112	10.00	1.04	15.79	2 2	1514202	11.47	1.06	16.01	2 2
1514122	10.06	1.05	15.95	2 2	1514212	10.64	1.07	15.79	2 2
1514122	10.21	1.07	16.38	2 2	1514212	10.70	1.06	16.01	2 2
1514132	10.70	1.08	17.24	2 2	1514222	10.35	1.08	15.83	2 2
1514132	10.72	1.09	17.26	2 2	1514222	10.43	1.07	15.66	2 2
1514142	10.83	1.12	17.60	2 2	1514232	10.34	1.07	15.95	2 2
1514142	11.01	1.11	17.33	2 2	1514232	10.32	1.05	16.13	2 2
1514152	9.98	1.06	16.22	2 2	1514242	10.45	1.08	15.95	2 2
1514152	9.82	1.05	16.30	2 2	1514242	10.58	1.10	16.16	2 2
1514162	10.97	1.16	17.56	2 2	1514252	10.45	1.10	16.46	2 2
1514162	11.03	1.14	17.53	2 2	1514252	10.63	1.11	16.16	2 2
1514172	9.97	1.11	14.83	2 2	1514262	10.26	1.12	16.34	2 2
1514172	9.88	1.10	15.03	2 2	1514262	10.44	1.10	16.62	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151427 2	10.68	1.10	17.03	2 2	151436 2	14.71	1.06	15.90	2 2
151427 2	10.71	1.11	17.31	2 2	151436 2	14.85	1.07	15.90	2 2
151428 2	10.49	1.12	17.07	2 2	151437 2	13.65	1.07	15.65	2 2
151428 2	10.54	1.11	17.15	2 2	151437 2	13.75	1.08	15.88	2 2
151429 2	10.68	1.15	17.31	2 2	151438 2	13.00	1.07	15.88	2 2
151429 2	10.73	1.16	17.20	2 2	151438 2	12.98	1.07	15.77	2 2
151430 2	9.94	1.13	16.34	2 2	151439 2	12.57	1.08	16.02	2 2
151430 2	9.88	1.12	16.32	2 2	151439 2	12.68	1.09	15.88	2 2
151431 2	10.29	1.10	16.26	2 2	151440 2	11.56	1.09	16.04	2 2
151431 2	10.31	1.13	16.12	2 2	151440 2	11.61	1.08	15.94	2 2
151432 2	10.60	1.16	16.73	2 2	151441 2	10.91	1.08	15.72	2 2
151432 2	10.66	1.19	16.57	2 2	151441 2	10.94	1.09	15.97	2 2
151433 2	16.26	1.07	15.50	2 2	151442 2	10.49	1.08	15.66	2 2
151433 2	16.41	1.07	15.37	2 2	151442 2	10.40	1.08	15.82	2 2
151434 2	15.39	1.06	15.45	2 2	151443 2	10.35	1.08	15.68	2 2
151434 2	15.42	1.06	15.20	2 2	151443 2	10.47	1.09	15.96	2 2
151435 2	14.14	1.17	15.20	2 2	151444 2	10.16	1.11	16.18	2 2
151435 2	14.34	1.04	15.55	2 2	151444 2	10.23	1.08	15.95	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151445	10.27	1.09	16.04	2	2	151454	15.25	1.07	14.65	2	2
151445	10.35	1.11	16.28	2	2	151454	15.28	1.07	14.81	2	2
151446	10.63	1.10	16.09	2	2	151455	14.44	1.07	14.98	2	2
151446	10.63	1.11	16.16	2	2	151455	14.47	1.08	14.87	2	2
151447	10.37	1.11	16.16	2	2	151456	13.48	1.10	15.14	2	2
151447	10.57	1.11	16.30	2	2	151456	13.47	1.09	14.98	2	2
151448	10.72	1.14	16.66	2	2	151457	13.24	1.11	14.86	2	2
151448	10.93	1.16	16.65	2	2	151457	13.29	1.11	15.21	2	2
151449	9.99	1.14	15.97	2	2	151458	12.86	1.11	15.34	2	2
151449	10.09	1.15	15.96	2	2	151458	13.02	1.10	15.43	2	2
151450	11.24	1.23	16.76	2	2	151459	12.61	1.11	15.51	2	2
151450	11.25	1.22	16.47	2	2	151459	12.62	1.12	15.43	2	2
151451	8.39	1.07	13.05	2	2	151460	11.62	1.11	15.47	2	2
151451	8.55	1.08	13.20	2	2	151460	11.62	1.11	15.60	2	2
151452	0.67	0.30	0.00	2	2	151461	11.40	1.12	15.89	2	2
151452	0.73	0.30	0.00	2	2	151461	11.45	1.11	15.78	2	2
151453	18.43	1.11	15.29	2	2	151462	10.31	1.12	15.60	2	2
151453	18.54	1.11	15.30	2	2	151462	10.44	1.12	15.52	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1514632	10.49	1.12	15.67	2 2	1514722	0.82	0.27	0.00	2 2
1514632	10.41	1.11	15.54	2 2	1514722	0.85	0.26	0.00	2 2
1514642	10.92	1.15	16.05	2 2	1514732	15.52	1.06	14.59	2 2
1514642	11.02	1.15	15.99	2 2	1514732	15.62	1.06	14.77	2 2
1514652	10.27	1.14	15.93	2 2	1514742	15.30	1.07	14.63	2 2
1514652	10.31	1.15	16.07	2 2	1514742	15.59	1.08	14.86	2 2
1514662	10.47	1.16	16.12	2 2	1514752	15.04	1.08	14.93	2 2
1514662	10.47	1.16	16.13	2 2	1514752	14.98	1.08	14.85	2 2
1514672	10.46	1.16	16.17	2 2	1514762	19.21	1.16	15.89	2 2
1514672	10.47	1.16	16.37	2 2	1514762	19.29	1.15	15.84	2 2
1514682	10.84	1.20	17.17	2 2	1514772	16.14	1.15	15.92	2 2
1514682	10.95	1.20	17.21	2 2	1514772	16.18	1.14	15.62	2 2
1514692	11.08	1.21	17.72	2 2	1514782	15.62	1.16	16.03	2 2
1514692	11.23	1.25	17.86	2 2	1514782	15.72	1.14	16.14	2 2
1514702	11.87	1.28	17.95	2 2	1514792	13.65	1.12	16.16	2 2
1514702	11.93	1.29	18.19	2 2	1514792	13.85	1.14	16.07	2 2
1514712	10.67	1.22	16.58	2 2	1514802	12.82	1.15	16.15	2 2
1514712	10.52	1.21	16.26	2 2	1514802	12.95	1.16	16.03	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1514812	12.21	1.15	15.93	2 2	1514902	11.91	1.34	18.24	2 2
1514812	12.21	1.16	16.10	2 2	1514902	12.01	1.33	18.34	2 2
1514822	11.26	1.15	15.88	2 2	1514912	4.89	0.85	9.07	2 2
1514822	11.42	1.16	15.93	2 2	1514912	4.81	0.85	9.23	2 2
1514832	11.34	1.16	16.13	2 2	1514922	0.79	0.18	0.00	2 2
1514832	11.34	1.16	16.13	2 2	1514922	0.72	0.18	0.00	2 2
1514842	11.12	1.16	16.46	2 2	1514932	20.76	1.14	15.70	2 2
1514842	11.13	1.16	16.07	2 2	1514932	20.78	1.14	15.45	2 2
1514852	11.38	1.17	16.66	2 2	1514942	22.50	1.18	15.81	2 2
1514852	11.46	1.17	16.74	2 2	1514942	22.57	1.18	15.71	2 2
1514862	11.58	1.20	17.03	2 2	1514952	21.98	1.18	16.13	2 2
1514862	11.70	1.20	17.06	2 2	1514952	22.01	1.16	15.90	2 2
1514872	11.59	1.21	17.42	2 2	1514962	21.19	1.17	16.06	2 2
1514872	11.58	1.20	17.35	2 2	1514962	21.42	1.18	16.16	2 2
1514882	11.96	1.24	17.76	2 2	1514972	12.01	1.18	16.22	2 2
1514882	11.96	1.26	17.72	2 2	1514972	11.98	1.16	16.10	2 2
1514892	12.13	1.31	17.78	2 2	1514982	16.48	1.17	15.66	2 2
1514892	12.23	1.31	17.92	2 2	1514982	16.53	1.19	15.57	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151499	14.00	1.16	15.59	2	2	151508	12.29	1.25	17.64	2	2
151499	13.72	1.15	15.63	2	2	151508	12.31	1.23	17.72	2	2
151500	14.24	1.18	16.05	2	2	151509	13.83	1.42	19.37	2	2
151500	13.98	1.19	16.16	2	2	151509	13.99	1.41	19.09	2	2
151501	12.43	1.16	15.88	2	2	151510	12.13	1.35	17.99	2	2
151501	12.74	1.18	16.26	2	2	151510	12.28	1.37	18.37	2	2
151502	12.77	1.16	16.30	2	2	151511	5.58	0.86	11.09	2	2
151502	12.95	1.18	16.37	2	2	151511	5.63	0.87	10.99	2	2
151503	12.09	1.16	15.86	2	2	151512	0.68	0.17	0.00	2	2
151503	12.16	1.16	15.68	2	2	151512	0.73	0.17	0.00	2	2
151504	10.85	1.15	15.53	2	2	151513	21.09	1.18	15.43	2	2
151504	10.95	1.15	15.62	2	2	151513	21.46	1.19	15.90	2	2
151505	11.48	1.19	15.86	2	2	151514	22.58	1.21	16.08	2	2
151505	11.32	1.16	15.73	2	2	151514	23.06	1.21	16.44	2	2
151506	11.50	1.25	16.81	2	2	151515	21.87	1.21	16.31	2	2
151506	11.56	1.24	16.72	2	2	151515	22.05	1.20	16.19	2	2
151507	12.14	1.23	17.54	2	2	151516	16.87	1.15	15.35	2	2
151507	11.92	1.23	17.45	2	2	151516	17.08	1.16	15.54	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151517	16.50	1.17	15.85	2	2	151526	11.88	1.23	19.49	2	2
151517	16.65	1.21	15.76	2	2	151526	11.91	1.25	19.64	2	2
151518	15.93	1.18	15.38	2	2	151527	12.59	1.26	20.09	2	2
151518	15.98	1.20	15.38	2	2	151527	12.63	1.30	20.37	2	2
151519	13.78	1.10	17.07	2	2	151528	12.78	1.38	21.92	2	2
151519	13.81	1.11	17.13	2	2	151528	12.75	1.37	21.78	2	2
151520	13.29	1.12	17.34	2	2	151529	10.00	1.20	17.90	2	2
151520	13.35	1.12	17.40	2	2	151529	10.17	1.20	17.96	2	2
151521	12.57	1.13	17.41	2	2	151530	7.41	1.02	14.94	2	2
151521	12.40	1.12	17.45	2	2	151530	7.48	1.02	15.09	2	2
151522	11.69	1.13	17.38	2	2	151531	5.36	0.83	12.32	2	2
151522	11.72	1.11	17.49	2	2	151531	5.45	0.83	12.45	2	2
151523	11.27	1.15	17.64	2	2	151532	0.53	0.23	0.40	2	2
151523	11.28	1.14	17.62	2	2	151532	0.56	0.23	0.62	2	2
151524	11.20	1.16	17.78	2	2	151533	26.45	1.19	18.82	2	2
151524	11.35	1.17	17.97	2	2	151533	26.62	1.21	18.89	2	2
151525	11.47	1.19	18.79	2	2	151534	25.55	1.20	18.58	2	2
151525	11.55	1.20	18.82	2	2	151534	26.05	1.21	18.74	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151535 2	25.50	1.17	18.27	2 2	151544 2	11.92	1.14	18.14	2 2
151535 2	25.51	1.20	18.51	2 2	151544 2	12.14	1.15	18.17	2 2
151536 2	23.66	1.19	18.37	2 2	151545 2	11.46	1.15	18.20	2 2
151536 2	23.52	1.18	17.98	2 2	151545 2	11.58	1.15	18.14	2 2
151537 2	13.71	1.16	18.77	2 2	151546 2	11.24	1.15	18.15	2 2
151537 2	13.82	1.17	18.61	2 2	151546 2	11.26	1.16	18.41	2 2
151538 2	21.67	1.17	18.35	2 2	151547 2	11.07	1.15	18.61	2 2
151538 2	21.87	1.17	18.38	2 2	151547 2	11.20	1.16	18.46	2 2
151539 2	19.32	1.16	18.12	2 2	151548 2	11.32	1.16	19.98	2 2
151539 2	19.49	1.17	18.12	2 2	151548 2	11.35	1.19	19.26	2 2
151540 2	17.43	1.16	18.09	2 2	151549 2	11.47	1.25	19.98	2 2
151540 2	17.29	1.17	17.98	2 2	151549 2	11.66	1.26	20.03	2 2
151541 2	15.83	1.15	17.87	2 2	151550 2	12.89	1.39	21.86	2 2
151541 2	15.99	1.16	18.01	2 2	151550 2	13.02	1.39	22.06	2 2
151542 2	14.23	1.16	17.72	2 2	151551 2	5.79	0.88	14.72	2 2
151542 2	14.86	1.15	17.90	2 2	151551 2	5.80	0.88	14.72	2 2
151543 2	13.40	1.11	18.28	2 2	151552 2	0.65	0.22	0.00	2 2
151543 2	13.47	1.13	18.16	2 2	151552 2	0.58	0.22	0.00	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151553 2	23.35	1.17	18.31	2 2	151562 2	12.25	1.15	18.14	2 2
151553 2	23.36	1.17	18.53	2 2	151562 2	11.99	1.15	17.65	2 2
151554 2	18.79	1.15	17.81	2 2	151563 2	11.57	1.17	18.39	2 2
151554 2	18.96	1.17	17.76	2 2	151563 2	11.65	1.16	18.17	2 2
151555 2	22.25	1.20	18.21	2 2	151564 2	11.22	1.18	18.33	2 2
151555 2	22.34	1.21	18.31	2 2	151564 2	11.21	1.17	18.45	2 2
151556 2	19.55	1.17	17.73	2 2	151565 2	11.10	1.18	18.46	2 2
151556 2	19.53	1.16	17.61	2 2	151565 2	11.06	1.18	18.41	2 2
151557 2	12.02	1.16	18.04	2 2	151566 2	11.35	1.23	19.14	2 2
151557 2	11.85	1.18	18.24	2 2	151566 2	11.43	1.21	19.01	2 2
151558 2	17.53	1.18	17.88	2 2	151567 2	11.33	1.24	19.39	2 2
151558 2	17.75	1.18	18.19	2 2	151567 2	11.38	1.24	19.52	2 2
151559 2	15.65	1.13	17.66	2 2	151568 2	12.18	1.31	20.63	2 2
151559 2	15.80	1.15	17.97	2 2	151568 2	12.59	1.31	20.69	2 2
151560 2	12.71	1.11	17.19	2 2	151569 2	13.95	1.44	22.84	2 2
151560 2	12.78	1.12	17.29	2 2	151569 2	13.99	1.45	22.87	2 2
151561 2	12.93	1.15	17.82	2 2	151570 2	6.65	0.97	15.59	2 2
151561 2	13.01	1.15	17.85	2 2	151570 2	6.50	0.96	15.35	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151571 2	4.42	0.74	11.92	2 2	151580 2	13.76	1.16	17.13	2 2
151571 2	4.52	0.75	11.99	2 2	151580 2	13.69	1.14	16.96	2 2
151572 2	0.82	0.09	0.00	2 2	151581 2	13.77	1.21	17.73	2 2
151572 2	0.85	0.09	0.00	2 2	151581 2	13.68	1.18	17.87	2 2
151573 2	30.37	1.29	19.48	2 2	151582 2	12.08	1.17	17.36	2 2
151573 2	31.11	1.29	19.50	2 2	151582 2	12.17	1.18	17.35	2 2
151574 2	25.48	1.21	18.55	2 2	151583 2	11.49	1.17	17.95	2 2
151574 2	25.12	1.22	18.55	2 2	151583 2	11.49	1.15	17.58	2 2
151575 2	23.33	1.20	17.86	2 2	151584 2	11.67	1.18	18.09	2 2
151575 2	23.43	1.19	17.76	2 2	151584 2	11.73	1.19	17.90	2 2
151576 2	22.38	1.20	17.92	2 2	151585 2	11.74	1.21	18.34	2 2
151576 2	22.43	1.20	17.77	2 2	151585 2	11.68	1.21	18.23	2 2
151577 2	20.23	1.22	17.99	2 2	151586 2	11.27	1.22	18.61	2 2
151577 2	20.47	1.21	18.01	2 2	151586 2	11.29	1.21	18.64	2 2
151578 2	18.59	1.20	18.07	2 2	151587 2	10.90	1.26	19.17	2 2
151578 2	18.92	1.21	17.97	2 2	151587 2	11.01	1.27	19.71	2 2
151579 2	16.29	1.19	17.73	2 2	151588 2	11.92	1.39	21.56	2 2
151579 2	16.34	1.18	17.67	2 2	151588 2	12.13	1.38	21.75	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151589 2	5.94	0.89	13.73	2 2	151598 2	17.18	1.18	17.76	2 2
151589 2	5.91	0.92	13.85	2 2	151598 2	16.82	1.18	17.57	2 2
151590 2	2.46	0.42	6.17	2 2	151599 2	15.15	1.16	17.47	2 2
151590 2	2.45	0.42	6.28	2 2	151599 2	15.44	1.16	17.40	2 2
151591 2	1.85	0.30	4.82	2 2	151600 2	14.29	1.19	17.73	2 2
151591 2	1.87	0.32	4.84	2 2	151600 2	14.64	1.18	17.79	2 2
151592 2	0.73	0.07	0.00	2 2	151601 2	12.24	1.15	17.32	2 2
151592 2	0.76	0.06	0.00	2 2	151601 2	12.49	1.14	17.47	2 2
151593 2	28.66	1.24	18.50	2 2	151602 2	11.68	1.16	17.55	2 2
151593 2	29.12	1.26	18.52	2 2	151602 2	11.87	1.16	17.74	2 2
151594 2	30.48	1.27	18.77	2 2	151603 2	11.57	1.16	17.65	2 2
151594 2	30.56	1.26	18.70	2 2	151603 2	11.57	1.16	17.62	2 2
151595 2	25.04	1.23	17.86	2 2	151604 2	11.06	1.18	17.93	2 2
151595 2	24.85	1.21	17.87	2 2	151604 2	11.24	1.17	17.90	2 2
151596 2	22.56	1.20	17.80	2 2	151605 2	11.19	1.20	18.51	2 2
151596 2	23.06	1.20	18.00	2 2	151605 2	11.28	1.21	18.55	2 2
151597 2	18.38	1.18	17.76	2 2	151606 2	12.05	1.27	19.31	2 2
151597 2	18.26	1.18	17.69	2 2	151606 2	12.21	1.28	19.30	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151607 2	11.80	1.27	20.08	2 2	151616 2	27.69	1.27	18.79	2 2
151607 2	11.68	1.27	19.66	2 2	151616 2	27.75	1.26	18.77	2 2
151608 2	12.32	1.36	21.46	2 2	151617 2	23.39		17.72	2 4
151608 2	12.34	1.36	21.80	2 2	151617 2	23.58		18.17	2 4
151609 2	2.19	0.36	5.38	2 2	151618 2	22.21		18.24	2 4
151609 2	2.21	0.37	5.31	2 2	151618 2	22.39		18.34	2 4
151610 2	2.16	0.35	5.33	2 2	151619 2	18.63		18.04	2 4
151610 2	2.17	0.34	5.30	2 2	151619 2	18.23		18.03	2 4
151611 2	1.62	0.22	3.42	2 2	151620 2	15.71		17.97	2 4
151611 2	1.64	0.22	3.46	2 2	151620 2	15.83		17.81	2 4
151612 2	0.81	0.07	0.00	2 2	151621 2	11.57	1.21	17.11	2 2
151612 2	0.88	0.08	0.00	2 2	151621 2	11.84	1.20	17.07	2 2
151613 2	30.18	1.24	19.09	2 2	151622 2	11.32	1.19	17.26	2 2
151613 2	30.07	1.28	19.47	2 2	151622 2	11.44	1.19	17.15	2 2
151614 2	30.54	1.28	19.39	2 2	151623 2	11.38	1.19	17.41	2 2
151614 2	30.00	1.29	19.58	2 2	151623 2	11.58	1.18	17.26	2 2
151615 2	28.00	1.25	18.91	2 2	151624 2	11.51	1.21	17.63	2 2
151615 2	28.09	1.27	18.82	2 2	151624 2	11.72	1.22	17.83	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151625	11.42	1.21	17.90	2	2	151634	24.82	1.20	17.63	2	2
151625	11.44	1.19	17.79	2	2	151634	24.55	1.21	17.73	2	2
151626	11.63	1.23	18.28	2	2	151635	22.74	1.23	17.72	2	2
151626	11.38	1.23	18.23	2	2	151635	23.06	1.23	17.72	2	2
151627	11.52	1.27	19.05	2	2	151636	22.65	1.22	17.68	2	2
151627	11.62	1.28	18.98	2	2	151636	22.67	1.23	17.84	2	2
151628	12.70	1.36	20.40	2	2	151637	19.83	1.21	17.55	2	2
151628	12.72	1.36	20.49	2	2	151637	20.22	1.21	17.54	2	2
151629	11.71	1.35	20.90	2	2	151638	19.12	1.20	17.32	2	2
151629	11.82	1.35	20.93	2	2	151638	19.49	1.20	17.43	2	2
151630	4.40	0.72	10.56	2	2	151639	18.00	1.21	17.23	2	2
151630	4.46	0.73	10.64	2	2	151639	17.79	1.20	17.25	2	2
151631	2.05	0.33	4.76	2	2	151640	15.36	1.22	17.09	2	2
151631	2.07	0.34	4.82	2	2	151640	15.67	1.20	17.01	2	2
151632	1.03	0.08	0.00	2	2	151641	14.79	1.16	17.22	2	2
151632	1.10	0.09	0.00	2	2	151641	14.84	1.18	17.32	2	2
151633	30.22	1.25	18.34	2	2	151642	13.13	1.18	17.17	2	2
151633	30.42	1.27	18.65	2	2	151642	13.45	1.17	17.28	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151643 2	11.60	1.17	17.03	2 2	151652 2	0.92	0.06	0.00	2 2
151643 2	11.67	1.18	17.16	2 2	151652 2	0.95	0.08	0.00	2 2
151644 2	11.46	1.18	17.05	2 2	151653 2	29.63	1.24	18.04	2 2
151644 2	11.60	1.20	17.14	2 2	151653 2	29.65	1.22	18.36	2 2
151645 2	11.39	1.19	17.46	2 2	151654 2	29.32	1.22	18.30	2 2
151645 2	11.26	1.19	17.34	2 2	151654 2	29.30	1.22	18.19	2 2
151646 2	11.41	1.24	18.40	2 2	151655 2	23.05	1.15	17.14	2 2
151646 2	11.27	1.24	18.68	2 2	151655 2	22.87	1.14	17.23	2 2
151647 2	11.58	1.24	18.54	2 2	151656 2	22.47	1.15	17.45	2 2
151647 2	11.76	1.23	18.66	2 2	151656 2	22.59	1.16	17.87	2 2
151648 2	12.02	1.30	19.35	2 2	151657 2	15.79	1.13	17.57	2 2
151648 2	12.25	1.31	19.41	2 2	151657 2	15.82	1.13	17.61	2 2
151649 2	10.36	1.29	19.85	2 2	151658 2	16.71	1.11	17.17	2 2
151649 2	10.57	1.26	20.00	2 2	151658 2	16.81	1.11	17.18	2 2
151650 2	6.82	1.01	15.60	2 2	151659 2	14.94	1.11	17.11	2 2
151650 2	6.74	1.01	15.35	2 2	151659 2	15.03	1.09	16.95	2 2
151651 2	2.24	0.37	4.94	2 2	151660 2	13.43	1.12	17.23	2 2
151651 2	2.32	0.38	5.05	2 2	151660 2	13.39	1.11	17.31	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151661	12.11	1.11	17.15	2	2	151670	2.44	0.37	6.24	2	2
151661	12.20	1.11	17.34	2	2	151670	2.49	0.40	6.25	2	2
151662	12.04	1.12	17.56	2	2	151671	1.88	0.27	4.52	2	2
151662	11.99	1.12	17.72	2	2	151671	1.88	0.27	4.56	2	2
151663				5	5	151672	0.87	0.06	0.00	2	2
151663				5	5	151672	0.89	0.06	0.00	2	2
151664	11.89	1.16	18.57	2	2	151673	26.92	1.18	17.87	2	2
151664	12.11	1.16	18.53	2	2	151673	27.24	1.17	17.85	2	2
151665	12.09	1.19	19.01	2	2	151674	25.90	1.17	18.07	2	2
151665	12.10	1.19	19.03	2	2	151674	26.30	1.17	18.20	2	2
151666	11.55	1.18	19.17	2	2	151675	24.25	1.16	17.92	2	2
151666	11.60	1.17	19.04	2	2	151675	24.15	1.16	17.65	2	2
151667	10.05	1.17	18.68	2	2	151676	24.53	1.17	17.85	2	2
151667	10.08	1.14	18.83	2	2	151676	24.53	1.17	17.99	2	2
151668	7.29	0.95	15.33	2	2	151677	20.45	1.16	17.46	2	2
151668	7.21	0.94	15.36	2	2	151677	20.55	1.16	17.55	2	2
151669	3.56	0.53	8.60	2	2	151678	19.75	1.14	16.76	2	2
151669	3.62	0.53	8.76	2	2	151678	19.81	1.14	16.85	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151679 2	16.85	1.11	16.50	2 2	151688 2	12.41	1.25	18.96	2 2
151679 2	16.96	1.13	16.79	2 2	151688 2	12.26	1.26	18.93	2 2
151680 2	14.87	1.11	16.81	2 2	151689 2	13.98	1.46	22.52	2 2
151680 2	14.89	1.11	16.82	2 2	151689 2	14.10	1.47	22.89	2 2
151681 2	13.82	1.11	17.08	2 2	151690 2	12.11	1.36	20.76	2 2
151681 2	13.87	1.12	17.14	2 2	151690 2	12.19	1.35	20.95	2 2
151682 2	14.07	1.13	17.27	2 2	151691 2	3.03	0.47	7.23	2 2
151682 2	14.11	1.13	17.36	2 2	151691 2	3.05	0.46	7.25	2 2
151683 2	12.64	1.12	17.12	2 2	151692 2	1.79	0.24	3.92	2 2
151683 2	12.60	1.12	17.26	2 2	151692 2	1.83	0.24	3.91	2 2
151684 2	11.86	1.16	17.28	2 2	151693 2	23.39	1.18	17.21	2 2
151684 2	11.96	1.14	17.46	2 2	151693 2	23.28	1.20	17.19	2 2
151685 2	11.53	1.15	17.48	2 2	151694 2	21.64	1.14	16.89	2 2
151685 2	11.57	1.14	17.37	2 2	151694 2	21.65	1.14	16.83	2 2
151686 2	11.34	1.15	17.39	2 2	151695 2	22.26	1.16	17.35	2 2
151686 2	11.35	1.16	17.37	2 2	151695 2	22.22	1.17	17.31	2 2
151687 2	11.58	1.19	17.82	2 2	151696 2	21.83	1.17	17.32	2 2
151687 2	11.56	1.19	17.89	2 2	151696 2	21.82	1.16	17.31	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151697 2	18.92	1.15	17.09	2 2	151706 2	12.23	1.27	18.71	2 2
151697 2	18.95	1.17	17.14	2 2	151706 2	12.38	1.25	18.94	2 2
151698 2	16.30	1.15	16.87	2 2	151707 2	13.54	1.37	20.64	2 2
151698 2	16.31	1.14	16.78	2 2	151707 2	13.59	1.37	20.43	2 2
151699 2	15.73	1.14	17.15	2 2	151708 2	10.66	1.26	19.07	2 2
151699 2	15.75	1.17	17.15	2 2	151708 2	10.70	1.26	19.24	2 2
151700 2	13.77	1.17	17.10	2 2	151709 2	8.71	1.15	17.39	2 2
151700 2	13.84	1.18	17.07	2 2	151709 2	8.72	1.13	17.29	2 2
151701 2	12.04	1.15	17.02	2 2	151710 2	4.43	0.71	10.49	2 2
151701 2	12.03	1.15	17.10	2 2	151710 2	4.44	0.70	10.62	2 2
151702 2	11.42	1.16	16.93	2 2	151711 2	2.37	0.36	4.50	2 2
151702 2	11.50	1.17	17.03	2 2	151711 2	2.20	0.36	4.43	2 2
151703 2	11.53	1.18	17.38	2 2	151712 2	0.99	0.06	0.00	2 2
151703 2	11.63	1.19	17.52	2 2	151712 2	0.98	0.06	0.00	2 2
151704 2	10.95	1.19	17.27	2 2	151713 2	20.89	1.15	16.61	2 2
151704 2	11.12	1.19	17.40	2 2	151713 2	21.09	1.15	16.95	2 2
151705 2	11.85	1.23	18.34	2 2	151714 2	21.19	1.16	16.96	2 2
151705 2	11.67	1.23	18.26	2 2	151714 2	21.28	1.17	17.22	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151715	20.29	1.21	17.17	2	2	151725	11.71	1.16	18.63	2	2
151715	20.31	1.17	17.21	2	2	151725	11.72	1.17	18.62	2	2
151716	20.58	1.20	17.48	2	2	151726	11.90	1.23	19.50	2	2
151716	20.43	1.19	17.32	2	2	151726	12.02	1.25	19.32	2	2
151717	18.62	1.18	17.11	2	2	151727	12.65	1.24	19.99	2	2
151717	18.71	1.19	17.20	2	2	151727	12.22	1.24	19.83	2	2
151718	16.39	1.12	16.71	2	2	151728	13.45	1.38	22.92	2	2
151718	16.56	1.14	16.64	2	2	151728	13.53	1.38	23.26	2	2
151719	14.89	1.12	16.91	2	2	151729	7.94	1.00	17.06	2	2
151719	15.02	1.15	17.33	2	2	151729	7.80	1.00	16.86	2	2
151720	13.55	1.12	17.13	2	2	151730	5.04	0.73	12.05	2	2
151720	13.48	1.12	17.06	2	2	151730	4.97	0.72	12.17	2	2
151721	12.62	1.11	17.11	2	2	151731	0.99	0.07	0.00	2	2
151721	12.46	1.12	17.32	2	2	151731	1.07	0.06	0.28	2	2
151723	11.24	1.12	17.40	2	2	151732		0.05	0.00	4	2
151723	11.37	1.13	17.52	2	2	151732	1.09	0.04	0.00	2	2
151724	11.18	1.13	17.85	2	2	151733	24.79	1.14	17.99	2	2
151724	11.27	1.15	17.98	2	2	151733	24.87	1.12	18.02	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151734 2	24.63	1.16	18.22	2 2	151743 2	11.08	1.11	17.42	2 2
151734 2	24.83	1.15	17.99	2 2	151743 2	11.19	1.10	17.46	2 2
151735 2	21.62	1.14	17.60	2 2	151744 2	11.30	1.13	17.56	2 2
151735 2	21.42	1.12	17.05	2 2	151744 2	11.31	1.13	17.70	2 2
151736 2	22.45	1.15	18.21	2 2	151745 2	11.87	1.22	18.97	2 2
151736 2	22.79	1.14	17.94	2 2	151745 2	11.80	1.22	18.92	2 2
151737 2	16.20	1.12	17.71	2 2	151746 2	12.45	1.27	20.20	2 2
151737 2	16.31	1.14	17.62	2 2	151746 2	12.38	1.25	19.79	2 2
151738 2	18.76	1.13	17.33	2 2	151747 2	12.38	1.32	21.56	2 2
151738 2	19.08	1.14	17.28	2 2	151747 2	12.54	1.32	21.30	2 2
151739 2	15.79	1.11	16.98	2 2	151748 2	11.40	1.31	21.21	2 2
151739 2	15.58	1.11	16.69	2 2	151748 2	11.62	1.32	20.90	2 2
151740 2	14.41	1.11	16.97	2 2	151749 2	5.64	0.83	13.61	2 2
151740 2	14.61	1.15	17.47	2 2	151749 2	5.82	0.84	13.69	2 2
151741 2	13.23	1.10	17.41	2 2	151750 2	2.52	0.44	7.17	2 2
151741 2	13.28	1.12	17.78	2 2	151750 2	2.55	0.44	7.03	2 2
151742 2	11.69	1.11	17.20	2 2	151751 2	0.73	0.15	1.42	2 2
151742 2	11.85	1.11	17.31	2 2	151751 2	0.72	0.11	1.41	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151752 2		0.04	0.00	4 2	151761 2	14.19	1.14	17.27	2 2
151752 2	0.87	0.00	0.00	2 2	151761 2	14.43	1.17	17.50	2 2
151753 2	23.19	1.14	17.18	2 2	151762 2	13.19	1.16	17.73	2 2
151753 2	23.69	1.15	17.20	2 2	151762 2	13.23	1.16	17.42	2 2
151754 2	23.04	1.14	17.29	2 2	151763 2	11.33	1.15	17.39	2 2
151754 2	23.38	1.19	17.75	2 2	151763 2	11.67	1.15	17.53	2 2
151755 2	21.96	1.16	17.44	2 2	151764 2	10.90	1.16	17.60	2 2
151755 2	22.38	1.17	17.76	2 2	151764 2	11.01	1.16	17.50	2 2
151756 2	21.31	1.16	17.47	2 2	151765 2	11.12	1.16	17.72	2 2
151756 2	21.32	1.16	17.53	2 2	151765 2	11.23	1.18	17.79	2 2
151757 2	11.80	1.20	18.43	2 2	151766 2	11.41	1.20	18.21	2 2
151757 2	12.21	1.21	18.71	2 2	151766 2	11.31	1.19	17.97	2 2
151758 2	18.13	1.16	17.08	2 2	151767 2	11.32	1.20	18.58	2 2
151758 2	18.05	1.16	17.13	2 2	151767 2	11.72	1.21	18.70	2 2
151759 2	17.95	1.16	17.34	2 2	151768 2	11.74	1.28	19.72	2 2
151759 2	18.02	1.16	17.50	2 2	151768 2	11.75	1.27	19.81	2 2
151760 2	14.89	1.15	17.36	2 2	151769 2	12.62	1.39	21.21	2 2
151760 2	14.91	1.13	17.23	2 2	151769 2	13.16	1.40	21.50	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151770 2	7.07	0.98	15.35	2 2	151779 2	15.85	1.16	17.17	2 2
151770 2	7.10	0.98	15.44	2 2	151779 2	16.04	1.16	17.48	2 2
151771 2	3.00	0.51	8.29	2 2	151780 2	14.19	1.15	17.28	2 2
151771 2	2.94	0.50	8.14	2 2	151780 2	14.19	1.16	17.47	2 2
151772 2	0.63	0.05	0.00	2 2	151781 2	13.96	1.18	17.54	2 2
151772 2	0.68	0.04	0.00	2 2	151781 2	14.13	1.17	17.26	2 2
151773 2	19.81	1.16	16.90	2 2	151782 2	12.72	1.16	17.20	2 2
151773 2	20.24	1.13	16.76	2 2	151782 2	12.50	1.16	17.16	2 2
151774 2	23.05	1.17	17.41	2 2	151783 2	11.21	1.14	17.20	2 2
151774 2	23.26	1.17	17.48	2 2	151783 2	11.38	1.12	17.01	2 2
151775 2	22.36	1.16	17.29	2 2	151784 2	10.96	1.15	17.40	2 2
151775 2	23.06	1.18	17.38	2 2	151784 2	11.16	1.17	17.29	2 2
151776 2	20.83	1.16	17.41	2 2	151785 2	11.57	1.19	17.69	2 2
151776 2	21.52	1.19	17.43	2 2	151785 2	11.59	1.19	17.61	2 2
151777 2	11.62	1.18	17.53	2 2	151786 2	11.22	1.18	17.31	2 2
151777 2	11.58	1.17	17.53	2 2	151786 2	10.91	1.18	17.45	2 2
151778 2	17.89	1.16	17.48	2 2	151787 2	11.58	1.22	18.83	2 2
151778 2	17.68	1.16	17.41	2 2	151787 2	11.37	1.23	18.64	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151788	13.19	1.38	21.45	2	2	151797	12.35	1.15	17.23	2	2
151788	13.31	1.39	21.73	2	2	151797	12.57	1.18	17.29	2	2
151789	11.10	1.36	20.98	2	2	151798	16.65	1.15	16.82	2	2
151789	11.39	1.37	21.22	2	2	151798	16.83	1.16	17.11	2	2
151790	7.38	1.03	16.06	2	2	151799	14.26	1.14	16.57	2	2
151790	7.39	1.03	15.85	2	2	151799	14.49	1.13	16.98	2	2
151791	2.71	0.46	7.19	2	2	151800	13.00	1.15	16.92	2	2
151791	2.78	0.48	7.20	2	2	151800	12.91	1.23	17.11	2	2
151792	0.86	0.09	0.00	2	2	151801	11.80	1.15	17.36	2	2
151792	0.85	0.09	0.00	2	2	151801	11.86	1.15	17.36	2	2
151793	19.96	1.16	16.67	2	2	151802	11.13	1.16	17.55	2	2
151793	20.13	1.12	16.72	2	2	151802	11.29	1.17	17.45	2	2
151794	22.36	1.17	17.44	2	2	151803	10.94	1.17	17.98	2	2
151794	22.02	1.17	17.30	2	2	151803	11.15	1.20	17.91	2	2
151795	20.99	1.16	17.06	2	2	151804	11.28	1.21	18.16	2	2
151795	20.96	1.16	17.14	2	2	151804	11.27	1.18	18.21	2	2
151796	20.56	1.16	17.10	2	2	151805	11.29	1.21	18.51	2	2
151796	20.71	1.17	17.06	2	2	151805	11.34	1.20	18.39	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1518065				5 5	1518152	19.90	1.19	17.55	2 2
1518065				5 5	1518152	20.23	1.20	17.31	2 2
1518072	12.35	1.35	20.68	2 2	1518162	21.47	1.17	17.41	2 2
1518072	12.44	1.37	20.59	2 2	1518162	21.37	1.20	17.30	2 2
1518082	11.04	1.30	19.33	2 2	1518172	19.10	1.23	17.37	2 2
1518082	11.19	1.30	19.27	2 2	1518172	19.44	1.16	17.29	2 2
1518092	7.40	1.04	14.95	2 2	1518182	17.63	1.18	17.14	2 2
1518092	7.50	1.06	14.99	2 2	1518182	17.65	1.16	17.13	2 2
1518102	5.00	0.79	11.81	2 2	1518192	15.57	1.15	17.10	2 2
1518102	4.90	0.77	11.75	2 2	1518192	15.79	1.15	17.00	2 2
1518112	3.43	0.60	8.34	2 2	1518202	13.57	1.13	16.96	2 2
1518112	3.36	0.57	8.22	2 2	1518202	13.64	1.15	16.96	2 2
1518122	0.78	0.17	0.00	2 2	1518212	13.21	1.16	16.78	2 2
1518122	0.82	0.17	0.00	2 2	1518212	13.40	1.15	16.89	2 2
1518132	20.86	1.19	16.45	2 2	1518222	11.92	1.15	16.77	2 2
1518132	21.24	1.23	16.91	2 2	1518222	11.97	1.16	16.91	2 2
1518142	22.26	1.19	17.15	2 2	1518232	11.41	1.16	17.04	2 2
1518142	22.27	1.18	17.23	2 2	1518232	11.22	1.15	17.06	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151824	11.46	1.16	16.89	2	2	151833	23.10	1.18	17.06	2	2
151824	11.56	1.16	16.67	2	2	151833	23.49	1.17	17.13	2	2
151825	11.50	1.18	17.11	2	2	151834	21.76	1.18	17.04	2	2
151825	11.60	1.20	17.28	2	2	151834	21.85	1.20	17.18	2	2
151826	11.51	1.20	17.66	2	2	151835	22.95	1.20	17.10	2	2
151826	11.60	1.19	17.62	2	2	151835	22.84	1.19	16.94	2	2
151827	11.69	1.20	17.81	2	2	151836	22.34	1.25	17.07	2	2
151827	11.76	1.21	18.10	2	2	151836	22.41	1.20	17.23	2	2
151828	11.83	1.22	18.52	2	2	151837	16.21	1.18	16.98	2	2
151828	11.95	1.23	18.58	2	2	151837	16.42	1.16	16.89	2	2
151829	12.08	1.29	19.46	2	2	151838	18.26	1.18	16.85	2	2
151829	12.25	1.28	19.35	2	2	151838	18.28	1.16	16.66	2	2
151830	12.62	1.31	19.88	2	2	151839	16.11	1.17	16.74	2	2
151830	12.73	1.34	20.36	2	2	151839	16.21	1.16	16.66	2	2
151831	9.81	1.21	17.44	2	2	151840	14.24	1.13	16.88	2	2
151831	9.80	1.23	17.31	2	2	151840	14.42	1.14	16.67	2	2
151832	0.79	0.19	0.00	2	2	151841	13.66	1.15	16.78	2	2
151832	0.81	0.17	0.00	2	2	151841	13.89	1.15	17.14	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151842 2	11.80	1.14	16.98	2 2	151851 2	6.40	0.94	11.97	2 2
151842 2	11.85	1.13	16.87	2 2	151851 2	6.23	0.94	11.80	2 2
151843 2	11.52	1.15	17.24	2 2	151852 2	0.86	0.21	0.00	2 2
151843 2	11.58	1.15	17.08	2 2	151852 2	0.84	0.21	0.00	2 2
151844 2	11.02	1.15	17.21	2 2	151853 2	16.49	1.11	15.67	2 2
151844 2	11.07	1.15	17.02	2 2	151853 2	16.66	1.10	15.92	2 2
151845 2	10.96	1.18	17.29	2 2	151854 2	20.54	1.17	16.62	2 2
151845 2	11.14	1.18	17.44	2 2	151854 2	20.59	1.16	16.38	2 2
151846 2	11.35	1.20	17.71	2 2	151855 2	21.44	1.20	16.72	2 2
151846 2	11.37	1.20	17.78	2 2	151855 2	21.54	1.21	17.04	2 2
151847 2	11.93	1.24	18.68	2 2	151856 2	21.90	1.17	17.06	2 2
151847 2	11.87	1.24	18.55	2 2	151856 2	22.03	1.22	17.21	2 2
151848 2	12.14	1.27	18.67	2 2	151857 2	14.78	1.14	16.18	2 2
151848 2	12.19	1.27	18.81	2 2	151857 2	14.46	1.13	16.08	2 2
151849 2	12.44	1.34	19.73	2 2	151858 2	14.36	1.12	16.09	2 2
151849 2	12.53	1.34	19.77	2 2	151858 2	14.38	1.12	16.11	2 2
151850 2	10.72	1.26	18.38	2 2	151859 2	15.38	1.17	16.66	2 2
151850 2	10.73	1.27	18.26	2 2	151859 2	15.19	1.16	16.42	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
151860 2	13.12	1.15	16.58	2 2	151869 2	9.80	1.06	16.96	2 2
151860 2	13.04	1.15	16.48	2 2	151869 2	9.77	1.07	16.85	2 2
151861 2	11.63	1.18	16.25	2 2	151870 2	9.77	1.06	17.17	2 2
151861 2	11.66	1.16	16.31	2 2	151870 2	9.85	1.04	17.21	2 2
151862 2	12.31	1.14	16.58	2 2	151871 2	8.85	1.04	16.26	2 2
151862 2	12.37	1.15	16.63	2 2	151871 2	8.91	1.03	16.17	2 2
151863 2	11.61	1.16	16.54	2 2	151872 2	1.02	0.19	0.00	2 2
151863 2	11.71	1.16	16.66	2 2	151872 2	1.07	0.21	0.00	2 2
151864 2	10.77	1.04	16.85	2 2	151873 2	15.49	1.00	16.19	2 2
151864 2	10.82	1.05	16.83	2 2	151873 2	15.57	1.00	16.08	2 2
151865 2	10.37	1.05	16.89	2 2	151874 2	19.02	1.05	16.97	2 2
151865 2	10.26	1.07	16.95	2 2	151874 2	19.27	1.07	17.04	2 2
151866 2	9.94	1.04	16.90	2 2	151875 2	20.08	1.11	17.22	2 2
151866 2	9.99	1.05	16.76	2 2	151875 2	20.04	1.09	17.04	2 2
151867 2	9.94	1.04	16.65	2 2	151876 2	19.16	1.08	16.81	2 2
151867 2	9.99	1.04	16.68	2 2	151876 2	18.63	1.09	16.80	2 2
151868 2	9.70	1.06	16.79	2 2	151877 2	15.23	1.07	16.59	2 2
151868 2	9.71	1.06	16.64	2 2	151877 2	15.66	1.06	16.77	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151878	17.29	1.10	17.29	2	2	151887	10.09	1.06	17.23	2	2
151878	17.36	1.10	17.48	2	2	151887	10.10	1.05	17.04	2	2
151879	12.11	1.03	16.50	2	2	151888	10.39	1.03	16.95	2	2
151879	12.34	1.03	16.51	2	2	151888	10.16	1.04	17.10	2	2
151880	11.35	1.02	16.08	2	2	151889	9.70	1.06	17.06	2	2
151880	11.53	1.03	16.36	2	2	151889	9.87	1.06	17.00	2	2
151881	11.34	1.02	16.80	2	2	151890	9.98	1.08	17.22	2	2
151881	11.31	1.03	16.67	2	2	151890	9.98	1.09	17.28	2	2
151882	10.52	1.02	16.64	2	2	151891	9.79	1.09	16.92	2	2
151882	10.68	1.05	16.75	2	2	151891	9.82	1.09	16.79	2	2
151883	9.73	1.06	16.64	2	2	151892	1.34	0.23	0.49	2	2
151883	9.93	1.06	16.73	2	2	151892	1.41	0.23	0.67	2	2
151884	9.94	1.04	16.48	2	2	151893	12.94	1.00	15.66	2	2
151884	10.11	1.04	16.31	2	2	151893	13.24	1.00	16.12	2	2
151885	9.91	1.03	16.59	2	2	151894	12.67	1.02	16.14	2	2
151885	10.11	1.05	16.54	2	2	151894	12.94	1.03	16.19	2	2
151886	9.92	1.05	16.89	2	2	151895	12.49	1.02	16.27	2	2
151886	9.97	1.06	17.01	2	2	151895	12.77	1.01	16.08	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151896	12.93	1.00	15.79	2	2	151905	9.94	1.05	16.57	2	2
151896	12.78	1.00	15.57	2	2	151905	9.96	1.04	16.67	2	2
151897	12.66	1.03	16.14	2	2	151906	9.97	1.07	17.18	2	2
151897	12.74	1.01	16.11	2	2	151906	10.01	1.06	16.97	2	2
151898	11.76	1.05	16.55	2	2	151907	9.70	1.07	16.83	2	2
151898	11.84	1.05	16.57	2	2	151907	9.79	1.07	16.84	2	2
151899	11.21	1.04	16.37	2	2	151908	7.28	0.91	13.37	2	2
151899	11.32	1.04	16.58	2	2	151908	7.20	0.90	13.51	2	2
151900	10.78	1.04	16.43	2	2	151909	1.56	0.25	0.90	2	2
151900	11.00	1.04	16.44	2	2	151909	1.59	0.25	1.02	2	2
151901	10.98	1.03	16.26	2	2	151910	9.98	1.07	16.28	2	2
151901	10.61	1.03	16.40	2	2	151910	10.01	1.05	16.70	2	2
151902	10.32	1.04	16.41	2	2	151911	9.82	1.06	16.92	2	2
151902	10.44	1.05	16.40	2	2	151911	9.84	1.05	16.86	2	2
151903	9.92	1.04	16.57	2	2	151912	10.97	1.07	16.70	2	2
151903	10.16	1.04	16.74	2	2	151912	10.94	1.10	17.10	2	2
151904	10.13	1.03	16.32	2	2	151913	8.98	1.03	15.97	2	2
151904	10.16	1.02	16.35	2	2	151913	9.00	1.04	15.92	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151914	1.07	0.27	0.00	2	2	151923	12.47	1.10	17.07	2	2
151914	1.11	0.20	0.00	2	2	151923	12.49	1.09	17.18	2	2
151915	12.27	1.15	16.97	2	2	151924	9.44	1.03	15.83	2	2
151915	12.56	1.15	17.28	2	2	151924	9.39	1.06	15.82	2	2
151916	6.18	0.95	12.90	2	2	151925	3.85	0.74	7.57	2	2
151916	6.12	0.95	12.64	2	2	151925	3.75	0.76	7.61	2	2
151917	0.98	0.21	0.00	2	2	151926	1.43	0.23	0.44	2	2
151917	0.83	0.21	0.00	2	2	151926	1.48	0.24	0.52	2	2
151918	9.28	1.08	15.39	2	2	151927	9.66	1.05	16.36	2	2
151918	9.36	1.08	15.43	2	2	151927	9.83	1.04	16.24	2	2
151919	0.74	0.18	0.00	2	2	151928	9.68	1.13	16.41	2	2
151919	0.77	0.20	0.00	2	2	151928	9.86	1.04	16.71	2	2
151920	14.65	1.26	18.66	2	2	151929	9.74	1.06	16.75	2	2
151920	14.76	1.24	18.62	2	2	151929	9.82	1.07	16.62	2	2
151921	2.64	0.81	9.30	2	2	151930	9.34	1.05	16.35	2	2
151921	2.72	0.81	9.52	2	2	151930	9.23	1.08	16.46	2	2
151922	0.71	0.28	0.00	2	2	151931	1.51	0.28	0.98	2	2
151922	0.69	0.21	0.00	2	2	151931	1.56	0.27	1.21	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151932	9.56	1.04	16.10	2	2	151941	12.99	1.02	15.60	2	2
151932	9.63	1.04	16.38	2	2	151941	13.09	1.01	15.73	2	2
151933	9.88	1.04	16.47	2	2	151942	12.57	1.01	15.97	2	2
151933	9.91	1.05	16.61	2	2	151942	12.58	1.03	15.95	2	2
151934	9.66	1.05	16.46	2	2	151943	12.36	1.03	15.70	2	2
151934	9.72	1.06	16.44	2	2	151943	12.42	1.04	15.90	2	2
151935	9.84	1.05	16.52	2	2	151944	12.33	1.06	16.02	2	2
151935	9.87	1.06	16.54	2	2	151944	12.41	1.03	15.92	2	2
151936	9.97	1.05	16.68	2	2	151945	12.14	1.04	16.08	2	2
151936	10.05	1.06	16.85	2	2	151945	12.02	1.04	16.16	2	2
151937	9.48	1.06	16.68	2	2	151946	12.05	1.05	16.06	2	2
151937	9.31	1.05	16.68	2	2	151946	12.12	1.04	16.04	2	2
151938	9.45	1.05	16.66	3	3	151947	11.78	1.04	15.95	2	2
151938	9.46	1.05	16.43	3	3	151947	11.82	1.04	16.20	2	2
151939	8.70	1.04	15.54	3	3	151948	11.03	1.05	16.03	2	2
151939	8.70	1.02	15.55	3	3	151948	11.13	1.08	16.24	2	2
151940	0.90	0.21	0.18	3	3	151949	10.67	1.07	16.38	2	2
151940	0.93	0.20	0.07	3	3	151949	10.66	1.08	16.77	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151950	9.82	1.05	16.62	2	2	151959	11.85	1.25	18.91	2	2
151950	9.66	1.05	16.41	2	2	151959	11.86	1.21	19.02	2	2
151951	9.58	1.07	16.45	2	2	151960	4.09	0.90	11.27	2	2
151951	9.68	1.06	16.45	2	2	151960	4.15	0.99	11.23	2	2
151952	9.67	1.07	16.62	2	2	151961	14.43	1.00	15.18	2	2
151952	9.77	1.07	16.64	2	2	151961	14.53	0.99	15.56	2	2
151953	9.74	1.08	16.74	2	2	151962	15.93	1.02	15.80	2	2
151953	9.94	1.09	16.89	2	2	151962	16.18	1.01	15.91	2	2
151954	9.74	1.07	16.71	2	2	151963	17.30	1.03	16.66	2	2
151954	9.82	1.07	16.95	2	2	151963	17.21	1.02	16.57	2	2
151955	9.64	1.08	16.87	2	2	151964	13.99	1.00	16.29	2	2
151955	9.56	1.07	16.74	2	2	151964	14.06	1.00	16.03	2	2
151956	9.26	1.07	16.48	2	2	151965	16.75	1.06	16.93	2	2
151956	9.29	1.09	16.47	2	2	151965	16.81	1.11	17.09	2	2
151957	10.88	1.15	17.79	2	2	151966	15.13	1.06	16.84	2	2
151957	10.75	1.16	17.59	2	2	151966	15.27	1.06	16.83	2	2
151958	12.66	1.24	18.44	2	2	151967	14.68	1.04	16.71	2	2
151958	11.93	1.19	18.44	2	2	151967	14.64	1.04	17.04	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
151968	13.29	1.05	17.12	2	2	151977	10.92	1.06	17.71	2	2
151968	13.74	1.05	17.30	2	2	151977	10.99	1.07	17.76	2	2
151969	12.58	1.02	16.39	2	2	151978	12.47	1.12	18.84	2	2
151969	12.70	1.02	16.74	2	2	151978	12.15	1.12	18.87	2	2
151970	11.28	1.01	16.80	2	2	151979	10.04	1.04	16.73	2	2
151970	11.52	1.00	16.65	2	2	151979	10.13	1.05	16.92	2	2
151971	10.77	1.00	16.91	2	2	151980	0.98	0.18	0.00	2	2
151971	10.85	0.99	16.87	2	2	151980	1.41	0.16	0.00	2	2
151972	11.47	1.01	17.15	2	2	151981	13.98	0.92	15.39	2	2
151972	11.52	1.03	17.04	2	2	151981	14.34	0.92	15.54	2	2
151973	10.39	1.01	16.72	2	2	151982	17.72	0.98	16.25	2	2
151973	10.31	1.01	16.69	2	2	151982	17.56	0.97	16.20	2	2
151974	10.47	1.01	16.78	2	2	151983	15.72	0.96	15.88	2	2
151974	10.41	1.01	16.75	2	2	151983	15.65	0.98	15.92	2	2
151975	10.70	1.02	17.38	2	2	151984	13.71	0.98	16.39	2	2
151975	10.86	1.03	17.49	2	2	151984	13.72	1.00	16.50	2	2
151976	10.43	1.01	17.42	2	2	151985	13.90	1.00	16.78	2	2
151976	10.53	1.01	17.00	2	2	151985	13.94	0.99	16.84	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1519862	13.72	1.00	16.50	2 2	1519952	11.86	1.12	18.88	2 2
1519862	13.75	1.00	16.68	2 2	1519952	12.32	1.13	19.02	2 2
1519872	13.25	1.01	16.55	2 2	1519962	12.53	1.20	20.03	2 2
1519872	13.35	1.01	16.63	2 2	1519962	12.49	1.19	19.97	2 2
1519882	11.88	1.00	16.69	2 2	1519972	11.83	1.22	20.05	2 2
1519882	11.87	1.01	16.75	2 2	1519972	11.89	1.22	20.29	2 2
1519892	11.98	1.02	16.89	2 2	1519982	10.20	1.15	19.49	2 2
1519892	12.31	1.02	17.25	2 2	1519982	10.41	1.15	19.48	2 2
1519902	11.81	1.04	17.56	2 2	1519992	3.97	0.57	10.10	2 2
1519902	11.72	1.04	17.39	2 2	1519992	4.08	0.57	10.04	2 2
1519912	11.59	1.04	17.48	2 2	1520002	0.94	0.14	0.60	2 2
1519912	11.57	1.04	17.42	2 2	1520002	0.84	0.15	0.49	2 2
1519922	11.30	1.05	17.72	2 2	1520012	15.16	1.00	15.81	2 2
1519922	11.42	1.05	17.63	2 2	1520012	15.38	0.99	15.84	2 2
1519932	11.52	1.06	17.91	2 2	1520022	18.94	1.03	16.41	2 2
1519932	11.64	1.06	17.78	2 2	1520022	19.54	1.04	16.59	2 2
1519942	11.45	1.06	17.78	2 2	1520032	19.62	1.06	16.76	2 2
1519942	11.53	1.07	17.70	2 2	1520032	19.79	1.07	17.06	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
152004 2	15.27	1.03	16.07	2 2	152013 2	10.88	1.10	17.94	2 2
152004 2	15.28	1.02	16.18	2 2	152013 2	10.92	1.10	17.80	2 2
152005 2	12.70	1.02	16.30	2 2	152014 2	10.58	1.11	17.98	2 2
152005 2	12.75	1.03	16.33	2 2	152014 2	10.59	1.15	17.85	2 2
152006 2	14.48	1.05	16.68	2 2	152015 2	11.28	1.16	18.59	2 2
152006 2	14.32	1.05	16.72	2 2	152015 2	11.29	1.18	18.64	2 2
152007 2	13.69	1.06	16.94	2 2	152016 2	11.72	1.23	19.46	2 2
152007 2	13.59	1.05	16.89	2 2	152016 2	11.75	1.24	19.61	2 2
152008 2	12.31	1.08	16.96	2 2	152017 2	10.54	1.21	19.34	2 2
152008 2	12.45	1.07	17.05	2 2	152017 2	10.57	1.21	19.40	2 2
152009 2	11.40	1.08	17.02	2 2	152018 2	7.30	0.96	15.09	2 2
152009 2	11.42	1.07	17.26	2 2	152018 2	7.34	0.95	15.24	2 2
152010 2	11.46	1.06	17.17	2 2	152019 2	2.48	0.42	6.84	2 2
152010 2	11.49	1.07	17.34	2 2	152019 2	2.45	0.43	6.72	2 2
152011 2	10.75	1.08	17.17	2 2	152020 2	1.06	0.19	1.43	2 2
152011 2	10.79	1.07	17.01	2 2	152020 2	1.15	0.19	1.49	2 2
152012 2	11.09	1.10	17.71	2 2	152021 2	13.09	1.00	15.33	2 2
152012 2	11.02	1.10	17.52	2 2	152021 2	13.16	0.98	15.35	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
152022 2	15.08	1.05	16.08	2 2	152031 2	10.04	1.08	17.09	2 2
152022 2	15.09	1.03	16.06	2 2	152031 2	10.05	1.08	17.11	2 2
152023 2	15.56	1.04	16.23	2 2	152032 2	10.38	1.08	17.18	2 2
152023 2	15.68	1.05	16.28	2 2	152032 2	10.09	1.08	17.27	2 2
152024 2	17.41	1.09	16.92	2 2	152033 2	10.44	1.11	17.69	2 2
152024 2	17.52	1.07	16.90	2 2	152033 2	10.45	1.10	17.59	2 2
152025 2	16.00	1.06	16.85	2 2	152034 2	10.09	1.12	17.50	2 2
152025 2	16.04	1.07	16.86	2 2	152034 2	10.39	1.11	17.76	2 2
152026 2	14.53	1.06	16.64	2 2	152035 2	10.66	1.15	18.32	2 2
152026 2	14.71	1.06	16.53	2 2	152035 2	10.71	1.15	18.18	2 2
152027 2	12.51	1.06	16.71	2 2	152036 2	11.30	1.23	19.50	2 2
152027 2	12.49	1.06	16.78	2 2	152036 2	11.62	1.23	19.57	2 2
152028 2	11.30	1.05	16.81	2 2	152037 2	8.37	1.04	16.67	2 2
152028 2	11.35	1.06	16.69	2 2	152037 2	8.46	1.04	16.74	2 2
152029 2	10.29	1.06	16.76	2 2	152038 2	3.71	0.58	9.64	2 2
152029 2	10.31	1.06	16.96	2 2	152038 2	3.69	0.60	9.52	2 2
152030 2	9.99	1.07	16.95	2 2	152039 2	1.10	0.19	1.49	2 2
152030 2	10.12	1.07	16.87	2 2	152039 2	0.95	0.19	1.38	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
152040	1.04	0.19	1.18	2	2	152049	10.75	1.09	16.91	2	2
152040	1.07	0.19	1.19	2	2	152049	10.89	1.33	16.88	2	2
152041	13.72	1.00	15.37	2	2	152050	10.41	1.05	16.36	2	2
152041	13.84	0.99	15.65	2	2	152050	10.44	1.03	16.43	2	2
152042	13.79	0.99	15.65	2	2	152051	10.63	1.04	16.93	2	2
152042	13.86	1.02	15.40	2	2	152051	10.82	1.04	17.13	2	2
152043	17.28	1.08	16.59	2	2	152052	10.58	1.04	17.03	2	2
152043	17.16	1.07	16.57	2	2	152052	11.29	1.04	17.08	2	2
152044	14.99	1.05	16.64	2	2	152053	10.14	1.04	16.81	2	2
152044	15.05	1.06	16.63	2	2	152053	10.11	1.03	16.95	2	2
152045	14.31	1.08	16.80	2	2	152054	11.18	1.10	17.73	2	2
152045	14.34	1.07	16.76	2	2	152054	11.42	1.10	17.70	2	2
152046	12.97	1.08	16.85	2	2	152055	11.45	1.11	18.60	2	2
152046	13.03	1.08	16.79	2	2	152055	11.32	1.12	18.12	2	2
152047	11.74	1.10	16.91	2	2	152056	12.35	1.18	19.61	2	2
152047	11.56	1.06	16.92	2	2	152056	12.15	1.18	19.41	2	2
152048	10.16	1.07	16.60	2	2	152057	12.31	1.27	20.25	2	2
152048	10.10	1.17	16.68	2	2	152057	12.40	1.26	20.06	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
152058 2	5.91	0.75	13.50	2 2	152067 2	11.15	1.01	16.48	2 2
152058 2	6.02	0.75	13.72	2 2	152067 2	11.28	1.04	16.37	2 2
152059 2	3.69	0.53	9.77	2 2	152068 2	11.83	1.04	16.88	2 2
152059 2	3.73	0.52	9.75	2 2	152068 2	12.01	1.04	16.79	2 2
152060 2	0.93	0.10	0.00	2 2	152069 5				5 5
152060 2	0.96	0.10	0.00	2 2	152069 5				5 5
152061 2	18.28	1.00	16.32	2 2	152070 2	11.39	1.04	17.15	2 2
152061 3	18.11	1.01	18.08	2 2	152070 2	11.43	1.04	16.97	2 2
152062 2	18.25	1.01	16.50	2 2	152071 2	11.23	1.08	17.69	2 2
152062 2	18.47	1.02	16.74	2 2	152071 2	11.15	1.07	17.63	2 2
152063 5				5 5	152072 2	11.37	1.09	17.86	2 2
152063 2	19.40	1.05	17.00	2 2	152072 2	11.29	1.10	17.92	2 2
152064 2	17.94	1.04	16.73	2 2	152073 2	11.58	1.12	18.20	2 2
152064 2	18.08	1.03	16.89	2 2	152073 2	11.60	1.13	18.24	2 2
152065 2	11.80	1.04	17.36	2 2	152074 2	11.73	1.16	18.73	2 2
152065 2	11.68	1.04	17.31	2 2	152074 2	11.78	1.16	18.59	2 2
152066 2	13.64	1.04	16.72	2 2	152075 2	12.07	1.29	19.55	2 2
152066 2	13.70	1.02	16.98	2 2	152075 2	12.13	1.23	19.79	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
152076 2	11.46	1.20	19.47	2 2	152085 2	16.98	1.06	16.98	2 2
152076 2	11.48	1.20	19.57	2 2	152085 2	17.09	1.06	17.05	2 2
152077 2	5.85	0.74	12.42	2 2	152086 2	14.89	1.05	16.93	2 2
152077 2	5.85	0.76	12.36	2 2	152086 2	15.27	1.04	17.10	2 2
152078 2	3.96	0.55	9.58	2 2	152087 2	13.03	1.02	16.52	2 2
152078 2	3.98	0.56	9.61	2 2	152087 2	13.24	1.03	16.47	2 2
152079 2	1.57	0.23	3.60	2 2	152088 2	12.71	1.05	16.65	2 2
152079 2	1.60	0.23	3.73	2 2	152088 2	12.84	1.06	16.93	2 2
152080 2	0.95	0.09	0.00	2 2	152089 2	11.58	1.05	16.66	2 2
152080 2	0.95	0.09	0.00	2 2	152089 2	11.60	1.04	16.96	2 2
152081 2	17.14	0.99	15.88	2 2	152090 2	11.21	1.05	16.86	2 2
152081 2	17.47	1.00	15.64	2 2	152090 2	11.25	1.04	16.93	2 2
152082 2	19.36	1.03	16.76	2 2	152091 2	11.32	1.06	16.88	2 2
152082 2	19.38	1.04	16.51	2 2	152091 2	11.34	1.06	16.54	2 2
152083 2	19.04	1.03	16.39	2 2	152092 2	11.08	1.07	17.41	2 2
152083 2	19.49	1.05	16.44	2 2	152092 2	11.04	1.08	17.51	2 2
152084 2	18.26	1.03	16.41	2 2	152093 2	11.30	1.08	17.64	2 2
152084 2	18.24	1.05	16.54	2 2	152093 2	11.30	1.09	17.79	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1520942	11.80	1.15	18.75	2 2	1521032	17.66	1.06	16.88	2 2
1520942	12.19	1.16	18.76	2 2	1521032	17.87	1.08	16.97	2 2
1520952	12.18	1.20	19.29	2 2	1521042	15.75	1.05	16.83	2 2
1520952	12.25	1.17	19.24	2 2	1521042	15.84	1.06	16.86	2 2
1520962	12.06	1.30	20.72	2 2	1521052	13.95	1.06	16.81	2 2
1520962	11.93	1.27	21.03	2 2	1521052	14.05	1.06	16.66	2 2
1520972	8.15	0.98	16.16	2 2	1521062	13.19	1.06	16.69	2 2
1520972	8.16	0.98	16.14	2 2	1521062	13.22	1.06	16.84	2 2
1520982	5.12	0.71	11.84	2 2	1521072	11.48	1.05	16.63	2 2
1520982	5.15	0.71	11.97	2 2	1521072	11.62	1.05	16.72	2 2
1520992	2.91	0.42	7.23	2 2	1521082	10.61	1.05	16.49	2 2
1520992	2.97	0.44	7.18	2 2	1521082	10.75	1.06	16.63	2 2
1521002	1.23	0.16	1.86	2 2	1521092	11.05	1.08	16.97	2 2
1521002	1.24	0.16	1.80	2 2	1521092	11.14	1.07	16.76	2 2
1521012	19.23	1.03	16.43	2 2	1521102	11.10	1.07	17.25	2 2
1521012	19.44	1.06	16.76	2 2	1521102	11.03	1.08	17.33	2 2
1521022	18.84	1.07	16.68	2 2	1521115				5 5
1521022	18.98	1.09	16.81	2 2	1521112	11.05	1.08	17.59	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF		ID	SiO4	PO4	NO2+NO3	WOCE QF	
152112	11.14	1.11	17.71	2	2	152121	22.88	1.10	17.03	2	2
152112	11.25	1.11	17.69	2	2	152121	22.94	1.10	17.43	2	2
152113	11.58	1.18	18.02	2	2	152122	23.19	1.14	17.73	2	2
152113	11.69	1.14	18.18	2	2	152122	23.33	1.13	17.58	2	2
152114	11.84	1.18	18.53	2	2	152123	22.01	1.17	17.27	2	2
152114	11.92	1.17	18.84	2	2	152123	22.20	1.15	17.54	2	2
152115	12.07	1.22	18.69	2	2	152124	21.58	1.16	17.82	2	2
152115	12.21	1.22	18.95	2	2	152124	21.66	1.16	17.91	2	2
152116	9.70	1.13	18.06	2	2	152125	18.44	1.14	17.74	2	2
152116	9.78	1.12	18.06	2	2	152125	18.40	1.17	17.62	2	2
152117	5.54	0.74	12.03	2	2	152126	15.72	1.13	17.45	2	2
152117	5.52	0.76	12.11	2	2	152126	15.85	1.12	17.41	2	2
152118	3.26	0.51	8.30	2	2	152127	13.75	1.12	17.38	2	2
152118	3.32	0.50	8.32	2	2	152127	14.00	1.12	17.26	2	2
152119	2.09	0.37	5.59	2	2	152128	12.74	1.14	17.30	2	2
152119	2.09	0.35	5.70	2	2	152128	12.86	1.14	17.34	2	2
152120	0.79	0.11	0.00	2	2	152129	11.69	1.13	17.32	2	2
152120	0.84	0.11	0.00	2	2	152129	11.61	1.11	17.29	2	2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
152130 2	10.68	1.09	16.89	2 2	152139 2	4.58	0.71	11.15	2 2
152130 2	10.91	1.11	17.19	2 2	152139 2	4.71	0.71	11.35	2 2
152131 2	10.62	1.13	16.82	2 2	152140 2	2.11	0.42	6.45	2 2
152131 2	10.63	1.10	16.95	2 2	152140 2	2.14	0.41	6.44	2 2
152132 2	10.86	1.10	17.35	2 2	152141 2	18.42	1.06	16.27	2 2
152132 2	10.87	1.12	17.31	2 2	152141 2	18.34	1.08	16.36	2 2
152133 2	10.97	1.13	17.84	2 2	152142 2	24.21	1.15	17.61	2 2
152133 2	11.07	1.14	18.11	2 2	152142 2	24.26	1.15	17.58	2 2
152134 2	11.00	1.14	18.18	2 2	152143 2	20.22	1.11	17.33	2 2
152134 2	11.14	1.15	18.60	2 2	152143 2	20.47	1.11	16.92	2 2
152135 2	11.36	1.23	19.32	2 2	152144 2	20.45	1.12	17.14	2 2
152135 2	11.42	1.21	19.31	2 2	152144 2	20.62	1.14	17.57	2 2
152136 2	11.72	1.32	20.45	2 2	152145 2	18.45	1.13	17.53	2 2
152136 2	11.78	1.28	20.39	2 2	152145 2	18.09	1.14	17.23	2 2
152137 2	11.57	1.28	20.58	2 2	152146 2	17.89	1.12	17.37	2 2
152137 2	11.57	1.29	20.70	2 2	152146 2	17.82	1.12	17.58	2 2
152138 2	11.15	1.30	20.71	2 2	152147 2	15.28	1.10	17.07	2 2
152138 2	11.26	1.28	20.65	2 2	152147 2	15.50	1.12	17.45	2 2

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1521482	13.76	1.11	17.44	2 2	1521572	10.72	1.23	19.43	2 2
1521482	13.78	1.14	17.51	2 2	1521572	10.78	1.24	19.52	2 2
1521492	12.24	1.11	17.38	2 2	1521582	5.89	0.84	13.35	2 2
1521492	12.34	1.10	17.30	2 2	1521582	5.99	0.82	13.40	2 2
1521502	12.61	1.11	17.46	2 2	1521592	1.91	0.34	5.67	2 2
1521502	12.72	1.12	17.48	2 2	1521592	1.89	0.35	5.58	2 2
1521512	11.72	1.11	17.38	2 2	1521602	0.83	0.13	0.48	2 2
1521512	11.51	1.10	17.29	2 2	1521602	0.98	0.13	0.42	2 2
1521522	11.44	1.11	17.52	2 2	1521612	31.92	1.28	19.15	2 2
1521522	11.53	1.15	17.64	2 2	1521612	31.41	1.26	18.99	2 2
1521532	11.30	1.14	17.78	2 2	1521622	27.66	1.25	18.36	2 2
1521532	11.23	1.16	17.88	2 2	1521622	28.10	1.24	18.46	2 2
1521542	11.44	1.18	18.70	2 2	1521632	23.50	1.18	17.55	2 2
1521542	11.33	1.16	18.23	2 2	1521632	23.74	1.20	17.69	2 2
1521552	11.70	1.21	19.06	2 2	1521642	22.33	1.20	18.02	2 2
1521552	12.02	1.22	18.77	2 2	1521642	22.96	1.20	18.05	2 2
1521562	11.97	1.30	20.47	2 2					
1521562	12.02	1.28	20.22	2 2					

ID	SiO4	PO4	NO2+NO3	WOCE QF	ID	SiO4	PO4	NO2+NO3	WOCE QF
1521652	20.16	1.18	17.79	2 2	1521742	12.81	1.34	20.08	2 2
1521652	20.25	1.16	17.74	2 2	1521742	12.72	1.31	20.25	2 2
15216625				5 5	1521752	14.01	1.45	23.13	2 2
1521662	16.37	1.14	16.87	2 2	1521752	13.75	1.49	22.93	2 2
1521672	14.54	1.12	17.08	2 2	1521762	8.57	1.11	16.49	2 2
1521672	14.65	1.18	17.50	2 2	1521762	8.59	1.09	16.62	2 2
1521682	13.77	1.20	17.77	2 2	1521772	4.58	0.70	11.24	2 2
1521682	13.99	1.15	17.78	2 2	1521772	4.58	0.70	11.51	2 2
1521692	11.69	1.12	17.43	2 2	1521782	1.99	0.31	5.15	2 2
1521692	11.70	1.08	16.98	2 2	1521782	2.03	0.32	5.13	2 2
1521702	11.15	1.13	17.46	2 2	1521792	1.82	0.27	4.50	2 2
1521702	11.19	1.13	17.24	2 2	1521792	1.88	0.27	4.43	2 2
1521712	10.74	1.13	17.30	2 2	1521802	0.94	0.09	0.00	2 2
1521712	10.82	1.13	17.29	2 2	1521802	0.93	0.15	0.00	2 2
1521722	11.36	1.17	17.76	2 2					
1521722	11.61	1.18	17.82	2 2					
1521732	11.69	1.21	18.94	2 2					
1521732	11.73	1.28	18.86	2 2					

5. Dissolved Inorganic Carbon in Seawater — Bob Gershey

a. Description of Equipment and Technique

The total dissolved inorganic carbon content of seawater was defined as the total concentration of carbonate ion, bicarbonate ion and unionized species of carbon dioxide. Before analysis, the sample was treated with acid to convert all ionized species to the unionized form, which was then separated from the liquid phase and subsequently measured by the coulometric titration technique. This involved the reaction of carbon dioxide gas with a dimethysulfoxide solution of ethanoline to produce hydroxyethylcarbamic acid. The acidic solution was titrated with hydroxide ion formed by the electrolytic decomposition of water. The progress of the titration was followed through colorimetric measurement of the absorbance of a Ph indicator dye (thymolphthalein) in the ethanolamine solution.

A known volume of seawater was dispensed into a stripping chamber from a pipet of known volume and temperature controlled to within 0.4 °C. It was then acidified with ten percent of its volume with an eight percent solution of carbon dioxide-free phosphoric acid. The solution was stripped of carbon dioxide gas by bubbling with a stream of nitrogen gas directed through a glass frit. The carrier gas exiting the stripper passed through a magnesium perchlorate trap which removed water vapour and acidic water droplets.

The gas stream was then directed into the coulometric titrator where the total amount of carbon dioxide gas was quantified. The coulometer was calibrated in two ways. Calibration using gas loops was accomplished by filling stainless steel sample loops (1.5, 2.5 ml) with 99.995% carbon dioxide gas and injecting these into the coulometer. The temperature and pressure of the gas within the loops must be known to within 0.05 °C and 20 Pa respectively. Standard solutions of sodium carbonate were also used to calibrate the system. These samples were treated in the same manner as a seawater sample.

Values were reported in units of μmol/kg. The overall precision of the analysis should have been at least 1.5 μmol/kg for samples with concentrations in the range of 1800-2300 μmol/kg.

b. Sampling Procedure and Data Processing Technique

Water samples were initially collected using a Niskin bottle or similar sampler. Samples for analysis of total inorganic carbon were taken as soon as possible after recovery of the samples to minimize exchange of carbon dioxide gas with the head space in the sampler which would typically result in a loss of carbon dioxide. It was desirable that the samples be drawn before half the sampler was emptied and within ten minutes of recovery. Clean borosilicate glass bottles were rinsed twice with 30 - 50 ml of the sample. The bottle was then filled from the bottom using a

length of vinyl tubing attached to the spigot of the sampler. The sample was overflowed by at least one half of the volume of the bottle (typically 250 ml). A head space of one percent was left to allow for expansion without leakage. If samples were not to be analyzed within four to five hours, the samples were poisoned with 100 μl/250 ml of 50% saturated mercuric chloride solution. The bottle was tightly sealed and stored near the temperature of collection.

c. Replicate Analysis

In total, 105 replicate carbonate measurements were obtained for 99 sample id numbers. Six sample id numbers had two replicates, while the remaining 93 sample id numbers only had one replicate. The replicate for sample id number, 151847 (1 replicate), could not be obtained because of a system malfunction. Thus, only 98 sample id numbers were available to be used in calculating replicate difference statistics. The following is a statistical summary of the absolute value of the differences between replicates. Table C.4 lists all replicate measurements.

Number of Replicate Differences = 6 ids had two replicates * 3 possible differences + 92 ids had one replicate * 1 possible difference = 18 + 92 = 110

Statistic	Value
Number of Replicate Differences	110
Minimum (μmoles/kg)	0
Maximum (μmoles/kg)	290.2
Mean (μmoles/kg)	12.8
Median (μmoles/kg)	1.1
Standard Deviation (μmoles/kg)	46.8

Table C.4 Replicate water sample total carbon values in µmoles/kg.

Sample ID Number	Total Carbon	WOCE QF	Sample ID Number	Total Carbon	WOCE QF
150625	2158.7	2			
150625	2158.6	2	150839	2169.1	2
			150839	2169.4	2
150659	2165.7	2			
150659	2167.5	2	150862	2162.2	2
			150862	2164.0	2
150664	2123.6	2			
150664	2130.3	2			
150675	2161.6	2			
150675	2162.4	2			
150710	2156.5	2			
150710	2156.9	2			
150714	2165.2	2			
150714	2166.0	2			
150727	2162.0	2			
150727	2160.7	2			
150731	2138.2	2			
150731	2170.0	2			
150748	2157.2	2			
150748	2157.6	2			
150759	2184.6	2			
150759	2184.7	2			
150762	2166.1	2			
150762	2168.1	2			
150764	2153.1	2			
150764	2155.4	2			
150801	2181.3	2			
150801	2178.2	2			
150803	2170.4	2			
150803	2169.2	2			
150819	2183.9	2			
150819	2185.2	2			

Table C.4 Replicate water sample total carbon values in µmoles/kg.

Sample ID Number	Total Carbon	WOCE QF	Sample ID Number	Total Carbon	WOCE QF
150912	2172.8	2	151098	2164.9	2
150912	2174.3	2	151098	2166.3	2
150922	2165.4	2	151121	2166.8	2
150922	2165.5	2	151121	2165.7	2
150932	2177.8	2			
150932	2179.3	2			
150940	2175.2	2			
150940	2174.9	2			
150953	2140.9	2			
150953	2142.0	2			
150963	2160.5	2			
150963	2160.9	2			
150988	2157.3	2			
150988	2158.9	2			
150992	2176.3	2			
150992	2176.5	2			
150999	2179.2	2			
150999	2180.3	2			
151025	2158.2	2			
151025	2158.3	2			
151025	2159.4	2			
151039	2057.7	2			
151039	2178.2	2			
151039	2178.8	2			
151046	2152.4	2			
151046	2153.2	2			
151076	2022.5	2			
151076	2024.6	2			
151082	2158.4	2			
151082	2160.4	2			

Sample ID Number	Total Carbon	WOCE QF
151122	2136.7	2
151122	2157.9	2
151122	2163.0	2
151147	2149.3	2
151147	2150.6	2
151147	2157.9	2
151165	2154.5	2
151165	2154.9	2
151187	2154.4	2
151187	2157.8	2
151217	2174.3	2
151217	2174.4	2
151225	2153.0	2
151225	2154.1	2
151241	2158.1	2
151241	2158.7	2
151252	2161.7	2
151252	2161.9	2
151256	2025.7	2
151256	2027.3	2
151282	2152.2	2
151282	2151.5	2
151322	2149.4	2
151322	2152.1	2
151340	2151.6	2
151340	2152.8	2
151356	2148.8	2
151356	2149.3	2
151367	2149.2	2
151367	2149.4	2
151371	2133.7	2
151371	2134.8	2
151378	2108.5	2
151378	2107.2	2
151382	2130.5	2
151382	2130.3	2

Sample ID Number	Total Carbon	WOCE QF
151385	2116.5	2
151385	2117.9	2
151389	2147.5	2
151389	2148.0	2
151393	2151.1	2
151393	2151.6	2
151402	2150.9	2
151402	2152.2	2
151402	2153.0	2
151410	1998.4	2
151410	1998.3	2
151412	1912.2	2
151412	2151.7	2
151422	2149.6	2
151422	2150.4	2
151425	2152.7	2
151425	2153.0	2
151437	2152.2	2
151437	2152.5	2
151456	2150.5	2
151456	2151.7	2
151494	2161.3	2
151494	2161.7	2
151498	2154.6	2
151498	2156.2	2
151501	1939.5	2
151501	1954.1	2
151501	2150.4	2
151516	2155.2	2
151516	2156.3	2
151556	2157.6	2
151556	2159.0	2
151566	2158.9	2
151566	2159.7	2
151574	2162.9	2
151574	2163.9	2

Sample ID Number	Total Carbon	WOCE QF
151590	2098.5	2
151590	2099.3	2
151594	2171.4	2
151594	2167.1	2
151628	2171.1	2
151628	2172.0	2
151635	2161.0	2
151635	2162.0	2
151655	2121.6	2
151655	2124.2	2
151667	2078.9	2
151667	2082.8	2
151675	1879.5	2
151675	2169.7	2
151696	2167.6	2
151696	2168.3	2
151717	2161.9	2
151717	2162.0	2
151719	2157.8	2
151719	2159.8	2
151757	2168.0	2
151757	2169.9	2
151783	2151.2	2
151783	2153.9	2
151800	2154.5	2
151800	2156.0	2
151815	2162.7	2
151815	2163.9	2
151840	2158.3	2
151840	2157.6	2
151847		5
151847	2167.3	2

Sample ID Number	Total Carbon	WOCE QF	Sample ID Number	Total Carbon	WOCE QF
151856	2164.6	2	152164	2168.5	2
151856	2164.9	2	152164	2167.4	2
151874	2161.5	2			
151874	2162.0	2			
151897	2152.9	2			
151897	2154.8	2			
151933	2151.0	2			
151933	2151.0	2			
151936	2152.7	2			
151936	2153.3	2			
151952	2150.9	2			
151952	2151.0	2			
151981	2156.8	2			
151981	2157.1	2			
152023	2155.5	2			
152023	2156.4	2			
152042	2156.8	2			
152042	2158.9	2			
152065	2158.8	2			
152065	2158.6	2			
152082	2159.0	2			
152082	2160.4	2			
152105	2155.0	2			
152105	2156.0	2			
152116	2160.6	2			
152116	2161.3	2			
152132	2153.6	2			
152132	2154.1	2			
152155	2168.4	2			
152155	2172.5	2			

6. Alkalinity — Frank Zemlyak

a. Description of Equipment and Technique

Total alkalinity was determined using the Marine Chemistry automated titration system. A potentiometric titration of the sea water sample using hydrochloric acid was utilized to determine the total alkalinity. Once the sample was connected to the system, the operation proceeded automatically, from the glass reaction vessel being rinsed and filled with the sea water sample, to the final calculations at the conclusion of the titration.

When the reaction vessel was filled, the semi-micro combination Ross electrode senses when the sample had come to equilibrium and the initial relative mvolt reading was logged, at the same time, the cell temperature was also recorded. At this point, a rather large quantity of 0.2N hydrochloric acid, was added to the cell via a Metrohm E-655 Dosimat. The increase in volume was accommodated by the withdrawal, by a stepper motor via an ACME lead screw, of an internal glass piston. This large quantity of acid added titrated the sample beyond the carbonate endpoint. Next, smaller aliquots (0.040mL) of acid were added until the sample had been titrated to and beyond the second inflection point. With each addition of acid the sample was allowed to come to equilibrium and the mvolt reading was logged. Thus, with these relative changes in the voltage in the cell, the endpoint was calculated by using a modified Gran function. Corrections to the final total alkalinity result were made by using the sample salinity, sample temperature and the nutrients, silicate and phosphate.

b. Sampling Procedure and Data Processing Technique

The 500 ml samples used for alkalinity analysis were collected from eight litre Niskin bottles in much the same fashion as oxygen samples. The samples were stored in a cold water bath whilst awaiting analysis.

Note: The alkalinity data is currently under quality review.

c. Replicate Analysis

No replicate information is currently available.

7. CFC's — Mike Hingston

a. Description of Equipment and Technique

The analyses were carried out on two purge and trap systems developed at the Bedford Institute of Oceanography. The water samples were injected into the systems directly from the syringes. To ensure proper rinsing, at least two volumes of water were passed through the sample pipette before the actual sample volume. The samples were purged for four minutes with ultra high purity nitrogen at a flow rate of 60 ml/min. The components were trapped in Porapak-N trap which was cooled to a temperature of less than 10°C. They were then desorbed by heating the trap up to at least 170°C. The contents of the trap were then passed through a 75m DB-624 megabore column.

b. Sampling Procedure and Data Processing Technique

All samples were collected directly from the Niskin bottles using 100 ml syringes. The syringes were rinsed three times before they were filled. To prevent contamination, the CFC samples were the first samples collected from the Niskin bottles. The samples were then stored in a water bath of continuously flowing surface sea water until analysis. Air samples from the winch room were taken periodically to ensure that it had not become contaminated. The analysis of the samples was always completed within 24 hours after they had been drawn.

c. Replicate Analysis

A total of 81 sample id numbers had replicate CFC water samples drawn. In total, 13 sample id numbers had duplicate samples drawn and 68 sample id numbers had triplicate samples drawn. Replicates were taken at each station, with some of these being run on each system to ensure that the results were comparable. The following is a statistical summary, in pmoles/kg, of the absolute value of the replicate differences. Only acceptable sample values were used when calculating replicate differences. The sample id numbers having replicate measurements are listed in Table C.5.

Statistic	CFC11	CFC12	CFC113	Carbon Tet.	Methyl Chl.
Number of Replicate Differences	209	206	205	209	207
Minimum (pmoles/kg)	0.000	0.001	0	0.003	0.004
Maximum (pmoles/kg)	0.603	0.612	0.126	1.089	10.480
Mean (pmoles/kg)	0.076	0.095	0.025	0.161	2.660
Median (pmoles/kg)	0.039	0.077	0.019	0.100	2.170
Standard Deviation (pmoles/kg)	0.099	0.090	0.025	0.186	2.428

Detection Limits (pmoles/kg)	0.022	0.017	0.010	0.040	0.017

Table C.5 Replicate CFC samples in pmoles/kg.

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
150621	5.017	3.029	0.401	7.131	21.452	22222
150621	4.912	2.868	0.396	6.972	20.863	22222
150628	3.092	1.628	0.258	4.190	9.246	22222
150628	3.257	1.551	0.229	4.350	7.040	22222
150640	2.144		0.118	3.482	4.366	25222
150640	2.368	0.994	0.089	3.273	8.964	22222
150653	0.559	0.628	0.019	1.309	2.203	22222
150653	0.539	0.747	0.020	1.388	1.766	22222
150653	0.552	0.721	0.000	1.548	1.212	22222
150674	0.395	0.354	0.000	0.877	0.668	22222
150674	0.392	0.373	0.000	1.006	1.238	22222
150674	0.392	0.447	0.000	1.028	1.568	22222
150700	1.724	0.949	0.037	2.531	1.807	22222
150700	1.777	0.967	0.055	2.853	7.215	22222
150700	1.783	0.939	0.044	2.816	2.489	22222
150711	3.335	1.737	0.190	5.081	13.760	22222
150711	3.359	1.786	0.281	5.085	14.490	22222
150730	0.791	0.472	0.189	0.848	3.034	22222
150730	0.796	0.650	0.096	0.843	4.409	22222
150730	0.768	0.524	0.062	0.799	2.132	22222
150743	0.741	0.663	0.035	1.509	0.993	22222
150743	0.782	0.417	0.017	1.727	2.924	22222
150743	0.787	0.428	0.022	1.594	0.205	22222
150774	1.724	0.972	0.000	0.320	2.861	22222
150774	1.749	0.976	0.020	0.416	3.402	22222
150774	1.763	0.803	0.012	0.389	4.241	22222
150783	0.331	0.231	0.000	0.886	0.000	22222
150783	0.331	0.232	0.012	0.953	1.714	22222
150801	0.339	0.288	0.014	0.911	1.508	22222
150801	0.338	0.217	0.000	0.946	1.653	22222
150801	0.308	0.197	0.000	0.858	0.000	22222
150830	1.349	0.791	0.029	2.170	1.279	22222

Table C.5 Replicate CFC samples in pmoles/kg.

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
150830	1.317	0.710	0.035	2.294	5.234	22222
150844	0.938	0.458	0.051	2.066	2.881	22222
150844	0.956	0.560	0.045	1.936	3.259	22222
150844	0.969	0.654	0.043	1.976	3.187	22222

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
150869	1.232	0.701	0.051	2.264	4.899	22222
150869	1.143	0.624	0.074	2.117	2.256	22222
150869	1.160	0.641	0.046	2.017	1.164	22222
150891	1.330	0.643	0.077	2.012	6.851	22222
150891	1.276	0.573	0.056	1.944	4.829	22222
150891	1.278	0.690	0.044	1.963	5.319	22222
150904	0.330	0.219	0.028	1.019	2.764	22222
150904	0.269	0.227	0.000	0.899	1.636	22222
150904	0.316	0.109	0.042	0.933	2.147	22222
150924	0.477	0.223	0.000	0.847	1.072	22222
150924	0.444	0.251	0.014	0.785	1.701	22222
150924	0.451	0.226	0.013	0.781	1.698	22222
150945	0.299	0.169	0.018	0.000	1.157	22222
150945	0.315	0.284	0.020	0.781	0.143	22222
150945	0.321	0.158	0.000	0.882	1.308	22222
150964	0.349	0.231	0.000	0.895	1.288	22222
150964	0.357	0.278	0.000	0.905	1.530	22222
150964	0.366	0.356	0.000	0.774	0.000	22222
150985						55555
150985	0.204	0.144	0.000	0.697	0.859	22222
150985	0.213	0.068	0.012	0.842	0.575	22222
151010	1.123	0.516	0.044	1.792	0.943	22222
151010	1.177	0.646	0.057	1.890	4.489	22222
151010	1.214	0.703	0.065	1.877	4.785	22222
151033	1.784	1.088	0.089	1.143	3.655	22222
151033	1.808	1.255	0.061	0.898	1.484	22222
151033	2.049	1.220	0.126	0.946	6.272	22222
151047	1.869	0.935	0.060	3.322	1.646	22222
151047	1.881	0.994	0.178	3.221	8.329	22222
151047	1.895	0.972	0.182	3.280	8.533	22222
151063	1.042	0.544	0.061	2.019	4.679	22222
151063	1.056	0.607	0.024	2.349	2.344	22222
151063	1.065	0.596	0.030	2.243	1.049	22222
151083	0.379	0.149	0.000	1.076	0.560	22222
151083	0.418	0.266	0.015	1.056	1.609	22222

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
151083	0.426	0.280	0.016	1.069	1.518	22222
151100	0.726	0.409	0.045	1.578	3.103	22222
151100	0.689	0.402	0.000	1.981	0.820	22222
151100	0.623	0.286	0.000	1.392	0.000	22222

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
151131	1.010	0.551	0.031	1.070	3.861	22222
151131	1.016	0.564	0.035	1.072	3.956	22222
151131	0.886	0.481	0.028	0.820	0.000	22222
151145	1.447	0.720	0.048	3.095	1.102	22222
151145	1.502	0.808	0.065	3.649	3.659	22222
151145	1.636	0.827	0.089	2.958	6.633	22222
151171	1.218	0.781	0.027	1.766	0.529	22222
151171	1.259	0.687	0.050	1.595	4.467	22222
151171	1.277	0.750	0.036	1.600	4.484	22222
151189	1.323	0.931	0.030	1.759	4.815	22222
151189	1.265	0.791	0.065	1.774	2.578	22222
151189	1.267	0.624	0.052	1.631	2.222	22222
151203	0.609	0.356	0.000	1.366	2.550	22222
151203	0.599	0.323	0.023	1.334	2.624	22222
151203	0.547	0.258	0.024	1.243	0.213	22222
151246	0.843	0.597	0.038	2.188	0.915	22222
151246	0.904	0.600	0.040	1.988	3.631	22222
151246	1.176	1.209	0.152	2.725	3.762	22222
151263	0.728	0.511	0.041	1.618	3.084	22222
151263	0.739	0.464	0.052	1.680	3.061	22222
151263	0.746	0.479	0.010	1.698	0.457	22222
151283	1.083	0.409	0.017	2.060	0.087	22222
151283	1.106	0.693	0.046	2.040	4.567	22222
151313	1.972	0.988	0.095	1.930	1.965	22222
151313	2.152	1.124	0.121	1.976	7.476	22222
151313	2.165	1.038	0.132	1.966	7.830	22222
151336	2.512	1.527	0.213	3.753	3.963	22222
151336	2.711	1.448	0.226	4.307	9.336	22222
151357	4.660	2.484	0.410	6.422	7.908	22222
151357	4.705	2.249	0.466	6.369	17.318	22222
151357	4.568	2.602	0.654	6.339	17.892	22322
151364	4.145	2.001	0.324	4.726	9.435	22222
151364	4.147	2.143	0.304	5.811	15.376	22222
151364	4.157	1.942	0.330	4.722	10.700	22222

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
151373	3.877	1.965	0.329	4.713	12.737	22222
151373	3.953	1.879	0.336	4.775	11.516	22222
151375	5.356	2.758	0.418	6.105	18.463	22222
151375	4.765	2.642	0.441	6.681	14.336	22222
151375	5.368	2.640	0.413	6.131	18.592	22222
151386	4.264	3.232	0.405	6.294	8.061	22222
151386	4.644	3.076	0.379	5.762	14.312	22222
151389	3.629	1.946	0.319	4.965	6.252	22222
151389	3.707	2.230	0.319	5.244	5.820	22222
151396	3.275	1.925	0.241	4.494	3.533	22222
151396	3.454	1.924	0.254	4.754	3.004	22222
151396	3.724	2.019	0.251	4.767	13.483	22222
151406	2.811	1.508	0.182	3.336	10.557	22222
151406	2.839	1.421	0.162	3.289	10.414	22222
151406	2.537	1.391	0.160	3.230	1.828	22222
151407	2.605	1.224	0.120	3.472	9.473	22222
151407	2.285	1.119	0.109	3.729	6.702	22222
151416	2.194	1.041	0.133	2.970	5.103	22222
151416	2.235	1.112	0.136	2.950	4.169	22222
151416	2.521	1.324	0.124	3.063	9.177	22222
151423	2.483	1.114	0.107	3.850	3.734	22222
151423	2.530	1.147	0.130	3.953	4.583	22222
151423	2.706	1.343	0.113	3.881	11.291	22222
151440	1.612	0.710	0.051	2.750	2.205	22222
151440	1.720	0.911	0.069	2.765	7.011	22222
151440	1.723	0.910	0.039	2.719	6.623	22222
151466	2.329	1.392	0.091	3.593	3.305	22222
151466	2.344	1.511	0.105	3.982	4.953	22222
151466	2.546	1.393	0.147	3.535	10.831	22222
151483						55555
151483	1.848	0.992	0.118	3.377	7.878	22222
151483	1.865	1.001	0.119	3.224	7.628	22222
151496	1.023	0.409	0.094	2.193	3.460	22222
151496	0.678	0.308	0.019	1.504	2.687	22222

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
151496	0.723	0.417	0.029	1.543	2.962	22222
151522	1.421	0.728	0.102	2.686	6.372	22222
151522	1.413	0.675	0.046	2.559	1.683	22222
151522	1.407	0.732	0.113	2.586	6.012	22222
151552	2.114	1.338	0.134	3.112	1.889	22222
151552	2.135	1.198	0.187	3.169	8.680	22222
151552	2.225	1.527	0.175	3.706	4.998	22222
151563	1.369	0.775	0.042	2.533	1.344	22222
151563	1.411	0.684	0.070	2.596	6.529	22222
151563	1.458	0.760	0.064	2.740	6.971	22222

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
151585	1.274	0.611	0.157	2.179	6.235	22222
151585	1.294	0.607	0.059	2.256	3.545	22222
151585	1.295	0.589	0.040	1.971	0.973	22222
151606	1.408	0.751	0.053	1.847	0.879	22222
151606	1.473	0.685	0.126	1.907	5.703	22222
151606	1.479	0.729	0.107	1.928	5.783	22222
151629	1.004	0.804	0.026	0.765	0.000	22222
151629	1.021	0.603	0.066	0.956	0.832	22222
151629	1.073	0.657	0.083	0.807	3.934	22222
151640	0.744	0.395	0.011	1.572		22225
151640	0.776	0.402	0.016	1.725	3.280	22222
151640	0.777	0.419	0.011	1.673	3.163	22222
151670	1.854	1.167	0.040	0.785	1.248	22222
151670	1.905	1.039	0.066	0.833	2.267	22222
151670	1.982	1.159	0.062	0.876	4.865	22222
151679	0.776	0.536	0.000	1.810	1.106	22222
151679	0.780	0.452	0.048	1.625	3.239	22222
151679	0.789	0.437	0.051	1.699	3.375	22222
151709	1.222	0.426	0.000	0.660	4.568	22222
151709	1.278	0.737	0.000	0.717	4.304	22222
151709	1.168	0.700	0.034	0.785	3.855	22222
151721						55555
151721	1.379	0.696	0.048	2.707	5.636	22222
151721	1.386	0.780	0.045	2.591	5.517	22222
151748	1.158	0.837	0.031	0.978	0.833	22222
151748	1.191	0.728	0.070	1.125	2.503	22222
151748	1.235	0.685	0.093	1.045	4.576	22222
151758						55555
151758	0.625	0.319	0.028	1.384	2.351	22222
151758	0.636	0.404	0.011	1.803	0.976	22222
151786	1.790	0.857	0.061	3.386	4.361	22222
151786	1.821	1.048	0.067	3.567	5.551	22222
151786	1.944	1.007	0.094	3.321	8.157	22222
151797	1.512	0.815	0.058	2.593	6.252	22222
151797	1.552	0.757	0.072	2.671	6.350	22222

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
151797	1.411	0.653	0.000	2.696	1.810	22222
151828	1.371	0.674	0.062	2.064	2.894	22222
151828	1.439	0.752	0.103	2.088	5.500	22222
151828	1.361		0.101	2.288	4.145	25222

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
151838	0.715	0.366	0.060	1.325	0.079	22222
151838	0.735	0.417	0.024	1.660	3.313	22222
151838	0.744	0.398	0.027	1.574	3.290	22222
151865	2.535	1.278	0.102	4.318	3.512	22222
151865	2.541	1.289	0.121	4.623	7.347	22222
151865	2.680	1.265	0.058	4.276	11.085	22222
151892	3.446	1.594	0.213	5.292	4.518	22222
151892	3.542	1.634	0.267	5.338	13.812	22222
151892	3.543	1.662	0.270	5.107	13.111	22222
151899	1.949	0.914	0.127	3.778	5.052	22222
151899	2.137	0.938	0.124	3.581	8.955	22222
151899	1.958	0.998	0.112	3.732	4.499	22222
151954	3.056	1.675	0.199	5.151	9.905	22222
151954	3.146	1.909	0.162	4.895	3.184	22222
151954	3.308	1.721	0.212	5.018	12.295	22222
151984	1.415	0.902	0.127	2.688	0.057	22222
151984	1.476	0.737	0.106	2.632	5.697	22222
151984	1.482	0.797	0.078	2.769	5.991	22222
152008	1.424	0.771	0.069	2.579	3.953	22222
152008	1.471	0.761	0.042	2.711	5.820	22222
152008	1.498	0.764		2.652	5.657	22522
152066	0.935	0.590	0.043	1.931	0.305	22222
152066	0.973	0.458	0.030	2.113	2.382	22222
152066	1.009	0.532	0.000	1.994	3.794	22222
152099	2.073	1.118	0.092	0.969	0.466	22222
152099	2.165	1.219	0.089	1.222	6.945	22222
152099	2.186	1.065	0.128	1.073	6.605	22222
152107	2.097	0.875	0.071	3.111	1.557	22222
152107	2.109	1.140	0.086	3.454	6.383	22222
152125	0.637	0.305	0.026	1.469	2.735	22222
152125	0.660	0.240	0.010	1.510	0.000	22222
152125	0.662	0.305	0.022	1.485	2.574	22222
152147	0.754	0.449	0.028	1.636	3.041	22222
152147	0.767	0.428	0.033	1.661	3.372	22222
152147	0.787	0.540	0.033	1.779	2.418	22222

Sample ID Number	Freon 11	Freon 12	Freon 113	Carbon Tetrachloride	Methyl Chloroform	WOCE QF
152175	0.915	0.479	0.022	0.915	3.834	22222
152175	0.903	0.573	0.069	0.871	1.138	22222
152175	0.913	0.454	0.059	0.851	0.808	22222

d. Standards Used

Standardization was carried out using gas standards made up at Brookhaven National Laboratories. Standard volumes were corrected for lab temperature and pressure. Results were reported in units of pmol/kg of sea water. Clean air samples were also analyzed with each station, as a check on the standardization.

8. Reversing Thermometers — Anthony W. Isenor

a. Description of Equipment and Technique

Sensoren-Instrumente-Systeme digital reversing thermometers model RTM 4002 were used to verify CTD thermistor readings on most deep stations. The thermometers had a depth range of up to 10000 m. The pressure housing was made of a glass tube closed at the ends by metal stoppers. One end contained the platinum sensor and at the other end was the battery compartment. The thermometers were placed on bottles one and three on the rosette, thus, sampling the temperature at the deepest and third deepest bottle trips.

The thermometers were placed in standard reversing thermometer racks on the Niskin bottles. Before deployment, a magnet was passed over the thermometers to clear the display and place the thermometer in sample mode. A new temperature was then recorded upon reversal of the thermometer.

On the deepest stations, unprotected mercury in glass thermometers were also attached to the deepest and third deepest bottle trips. The following table lists the number of readings from each thermometer. Digital thermometers are indicated with a 'T' in the serial number.

Thermometer Ser. No.	Number of Readings
000T345	94
000T347	94
000T350	96
000T352	1
000T354	95
0010987	114
0010988	125

b. Sampling Procedure and Data Processing Technique

The thermometers indicated the temperature reading either via a digital display or column of mercury. The temperature was read and noted on log sheets. The readings were later digitized and calibrations applied using the water sample database system.

c. Calibration Data

The digital thermometers were calibrated at BIO in June 1994, while the mercury thermometers were last calibrated in January 1989.

d. Replicate Analysis

A total of 180 sample id numbers had one digital thermometer temperature replicate. The following is a statistical summary of the absolute value of the replicate differences. Only acceptable values were used in calculating the statistics.

Statistic	
Number of Replicate Differences	120
Minimum (°C)	0.002
Maximum (°C)	0.011
Mean (°C)	0.007
Median (°C)	0.007
Standard Deviation (°C)	0.002

All of the replicate reversing thermometer temperature values, along with the reversing thermometer pressure values are given in Table C.6.

Table C.6 Replicate Reversing Thermometer samples.
Temperature is in °C and ITS-90 scale. Pressure is in dbars.

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
150601	000T350	3.644		2 9
150601	000T352	3.646		2 9
150601	0010988			9 9
150603	000T345	3.639		2 9
150603	000T347	3.644		2 9
150603	0010987			9 9
150621	000T350	-0.849		3 9
150621	000T354	-0.850		3 9
150621	0010988			9 9
150623	000T345	9.211		3 9
150623	000T347	9.219		3 9
150623	0010987			9 9
150624	000T350	3.276		2 9
150624	000T354	3.283		2 9
150624	0010988			9 9
150626	000T345	3.374		2 9
150626	000T347	3.380		2 9
150626	0010987			9 9
150632	000T350	3.285		3 9
150632	000T354	3.279		3 9
150632	0010988			9 9
150634	000T345	3.103		2 9
150634	000T347	3.110		2 9
150634	0010987			9 9
150647	000T350	2.237		2 9
150647	000T354	2.245		2 9
150649	000T345	2.593		2 9
150649	000T347	2.598		2 9
150667	000T350	2.215		2 9
150667	000T354	2.223		2 9
150667	0010988		3575.7	9 2
150669	000T345	2.318		2 9
150669	000T347	2.324		2 9

Table C.6 Replicate Reversing Thermometer samples.
Temperature is in °C and ITS-90 scale. Pressure is in dbars.

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
150669	0010987			9 9
150687	000T350	2.239		2 9
150687	000T354	2.246		2 9
150687	0010988		3854.4	9 3

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
150689	000T345	2.272		3 9
150689	000T347	2.279		3 9
150689	0010987		3601.8	9 3
150707	000T350			9 9
150707	000T354			9 9
150707	0010988			9 9
150709	000T345			9 9
150709	000T347			9 9
150709	0010987			9 9
150717	000T350	2.547		2 9
150717	000T354	2.553		2 9
150717	0010988			9 9
150719	000T345	3.401		4 9
150719	000T347	3.406		4 9
150719	0010987			9 9
150737	000T350	2.250		2 9
150737	000T354	2.257		2 9
150737	0010988		4144.2	9 2
150737	0010988		4144.5	9 2
150739	000T345	2.327		3 9
150739	000T347	2.333		3 9
150739	0010987		3749.5	9 3
150739	0010987		3748.2	9 3
150757	000T350	2.269		2 9
150757	000T354	2.276		2 9
150757	0010988		5486.4	9 2
150757	0010988		5506.4	9 2
150759	000T345	2.255		2 9
150759	000T347	2.262		2 9
150759	0010987		5154.3	9 2
150759	0010987		5155.4	9 2
150777	000T350	2.267		2 9
150777	000T354	2.275		2 9
150777	0010988		5500.8	9 2
150779	000T345	2.274		2 9
150779	000T347	2.279		2 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
150779	0010987		5198.7	9 2
150797	000T350	2.266		2 9
150797	000T354	2.274		2 9
150797	0010988		5493.8	9 2
150797	0010988		5481.2	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
150799	000T345	2.262		2 9
150799	000T347	2.267		2 9
150799	0010987		5184.2	9 2
150799	0010987		5184.7	9 2
150817	000T350	2.278		2 9
150817	000T354	2.285		2 9
150817	0010988		5508.8	9 2
150817	0010988		5514.7	9 2
150819	000T345	2.259		2 9
150819	000T347	2.265		2 9
150819	0010987		5186.1	9 2
150819	0010987		5186.1	9 2
150837	000T350	2.356		2 9
150837	000T354	2.362		2 9
150837	0010988		4126.5	9 2
150837	0010988		4126.8	9 2
150839	000T345	2.658		2 9
150839	000T347	2.663		2 9
150839	0010987		3520.0	9 2
150839	0010987		3516.1	9 2
150857	000T350	2.229		2 9
150857	000T354	2.237		2 9
150857	0010988		5486.2	9 2
150857	0010988		5498.3	9 2
150859	000T345	2.274		2 9
150859	000T347	2.280		2 9
150859	0010987		4992.8	9 2
150859	0010987		5006.4	9 2
150877	000T350	2.243		2 9
150877	000T354	2.251		2 9
150877	0010988		5437.0	9 2
150877	0010988		5450.1	9 2
150879	000T345	2.269		2 9
150879	000T347	2.274		2 9
150879	0010987		4917.1	9 3
150879	0010987		4917.6	9 3
150897	000T350	2.302		2 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
150897	000T354	2.310		2 9
150897	0010988		5443.5	9 2
150897	0010988		5444.9	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
150899	000T345	2.280		2 9
150899	000T347	2.285		2 9
150899	0010987		5134.5	9 2
150899	0010987		5141.5	9 2
150917	000T350	2.302		2 9
150917	000T354	2.308		2 9
150917	0010988		5382.7	9 2
150919	000T345	2.264		2 9
150919	000T347	2.271		2 9
150919	0010987		4751.0	9 3
150937	000T350	2.277		2 9
150937	000T354	2.286		2 9
150937	0010988		5325.6	9 2
150939	000T345	2.259		2 9
150939	000T347	2.264		2 9
150939	0010987		4966.5	9 2
150939	0010987		4991.1	9 2
150957	000T350	2.270		2 9
150957	000T354	2.277		2 9
150957	0010988		5313.3	9 2
150959	000T345	2.263		3 9
150959	000T347	2.190		3 9
150959	0010987		4997.2	9 3
150977	000T350	2.284		2 9
150977	000T354	2.292		2 9
150977	0010988		5241.6	9 2
150977	0010988		5254.7	9 2
150979	000T345	2.258		2 9
150979	000T347	2.264		2 9
150979	0010987		4718.6	9 2
150997	000T350	2.281		2 9
150997	000T354	2.288		2 9
150997	0010988		5225.9	9 2
150997	0010988		5230.4	9 2
150999	000T345	2.258		2 9
150999	000T347	2.263		2 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
150999	0010987		4897.6	9 2
150999	0010987		4885.6	9 2
151017	000T350			9 9
151017	000T354			9 9
151017	0010988			9 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151019	000T345	2.219		2 9
151019	000T347	2.225		2 9
151019	0010987		4492.2	9 2
151019	0010987		4504.8	9 2
151037	000T350	2.172		2 9
151037	000T354	2.179		2 9
151037	0010988		4679.3	9 2
151039	000T345	2.185		2 9
151039	000T347	2.191		2 9
151039	0010987		4375.4	9 2
151057	000T350	2.157		2 9
151057	000T354	2.165		2 9
151057	0010988		4739.7	9 2
151059	000T345	2.253		2 9
151059	000T347	2.259		2 9
151059	0010987		4401.9	9 2
151059	0010987		4389.3	9 2
151077	000T350	2.263		2 9
151077	000T354	2.270		2 9
151077	0010988		4873.0	9 2
151077	0010988		4874.0	9 2
151079	000T345	2.281		2 9
151079	000T347	2.288		2 9
151079	0010987		4576.4	9 2
151079	0010987		4572.8	9 2
151097	000T350	2.303		2 9
151097	000T354	2.310		2 9
151097	0010988		4898.5	9 3
151097	0010988		4911.1	9 3
151099	000T345	2.322		2 9
151099	000T347	2.328		2 9
151099	0010987		4425.4	9 2
151099	0010987		4432.3	9 2
151117	000T350			9 9
151117	000T354			9 9
151117	0010988			9 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151119	000T345	2.302		3 9
151119	000T347	2.307		3 9
151119	0010987		4268.6	9 4
151137	000T350	2.287		2 9
151137	000T354	2.296		2 9
151137	0010988		4982.7	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151139	000T345	2.298		2 9
151139	000T347	2.304		2 9
151139	0010987		4408.4	9 2
151139	0010987	4421.0		9 2
151157	000T350	2.300		2 9
151157	000T354	2.307		2 9
151157	0010988		4990.8	9 2
151157	0010988		4992.8	9 2
151159	000T345	3.210		4 9
151159	000T347	3.215		4 9
151159	0010987			9 9
151177	000T350	2.272		2 9
151177	000T354	2.280		2 9
151177	0010988		4854.4	9 3
151177	0010988		4854.9	9 3
151179	000T345	3.998		4 9
151179	000T347	4.004		4 9
151179	0010987			9 9
151197	000T350	2.266		2 9
151197	000T354	2.274		2 9
151197	0010988		4935.5	9 4
151197	0010988		4935.2	9 4
151199	000T345			9 9
151199	000T347			9 9
151199	0010987			9 9
151217	000T350	2.253		2 9
151217	000T354	2.260		2 9
151217	0010988		4361.1	9 3
151217	0010988		4379.5	9 3
151219	000T345	3.993		4 9
151219	000T347	3.995		4 9
151219	0010987			9 9
151237	000T350	2.303		2 9
151237	000T354	2.311		2 9
151237	0010988		4613.0	9 3
151239	000T345			9 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151239	000T347			9 9
151239	0010987			9 9
151257	000T350	2.223		2 9
151257	000T354	2.231		2 9
151257	0010988		4223.9	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151259	000T345	3.016		4 9
151259	000T347	3.022		4 9
151259	0010987			9 9
151277	000T350	2.209		2 9
151277	000T354	2.216		2 9
151277	0010988		4032.0	9 2
151277	0010988		4032.8	9 2
151279	000T345	2.855		4 9
151279	000T347	2.861		4 9
151279	0010987			9 9
151297	000T350	2.167		2 9
151297	000T354	2.173		3 9
151297	0010988		3703.3	9 3
151297	0010988		3704.5	9 3
151299	000T345	2.952		2 9
151299	000T347	2.959		2 9
151299	0010987			9 9
151317	000T350	15.295		4 9
151317	000T354	15.193		4 9
151317	0010988			9 9
151319	000T345	3.119		4 9
151319	000T347	3.125		4 9
151319	0010987			9 9
151337	000T350	3.104		2 9
151337	000T354	3.112		2 9
151337	0010988			9 9
151339	000T345	3.101		2 9
151339	000T347	3.106		2 9
151339	0010987			9 9
151351	000T350	3.372		2 9
151351	000T354	3.379		2 9
151351	0010988			9 9
151353	000T345	3.489		4 9
151353	000T347	3.492		4 9
151353	0010987			9 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151360	000T350	3.477		2 9
151360	000T354	3.484		2 9
151360	0010988			9 9
151362	000T345	-0.858		4 9
151362	000T347	-0.856		4 9
151362	0010988			9 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151367	000T350	3.142		2 9
151367	000T354	3.150		2 9
151367	0010988			9 9
151369	000T345			9 9
151369	000T347			9 9
151369	0010987			9 9
151371	000T350	0.905		3 9
151371	000T354	0.916		3 9
151371	0010988			9 9
151373	000T345	9.579		3 9
151373	000T347	9.503		3 9
151373	0010987			9 9
151374	000T350	-0.858		3 9
151374	000T354	-0.850		3 9
151377	000T350	-0.462		3 9
151377	000T354	-0.453		3 9
151378	000T345			9 9
151378	000T347			9 9
151380	000T350	-0.122		2 9
151380	000T354	-0.113		2 9
151380	0010988			9 9
151382	000T345			9 9
151382	000T347			9 9
151382	0010987			9 9
151383	000T350	2.003		2 9
151383	000T354	2.012		2 9
151383	0010988			9 9
151385	000T345	5.266		4 9
151385	000T347	5.290		4 9
151385	0010987			9 9
151387	000T350	3.101		4 9
151387	000T354	3.109		4 9
151387	0010988			9 9
151389	000T345	2.499		4 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151389	000T347	2.504		4 9
151389	0010987			9 9
151392	000T350	2.946		4 9
151392	000T354	2.956		4 9
151392	0010988			9 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151394	000T345	3.461		4 9
151394	000T347	3.468		4 9
151394	0010987			9 9
151400	000T350	3.188		2 9
151400	000T354	3.197		2 9
151402	000T345	4.439		4 9
151402	000T347	4.444		4 9
151407	000T350	3.725		2 9
151407	000T354	3.733		2 9
151409	000T345			9 9
151409	000T347			9 9
151411	000T350	2.986		2 9
151411	000T354	2.995		2 9
151411	0010988			9 9
151413	000T345	3.402		2 9
151413	000T347	3.407		2 9
151413	0010987			9 9
151419	000T350	3.068		2 9
151419	000T354	11.046		4 9
151419	0010988			9 9
151421	000T345	3.032		3 9
151421	000T347	3.037		3 9
151421	0010987			9 9
151433	000T350	2.233		2 9
151433	000T354	10.672		4 9
151433	0010988		3000.2	9 2
151435	000T345	2.246		4 9
151435	000T347	10.722		4 9
151435	0010987			9 9
151453	000T350	2.190		2 9
151453	000T354	2.199		2 9
151453	0010988		3635.0	9 2
151453	0010988		3640.8	9 2
151455	000T345	3.140		4 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151455	000T347	3.128		4 9
151455	0010987			9 9
151473	000T350	2.192		3 9
151473	000T354	2.181		3 9
151473	0010988		3801.0	9 3
151473	0010988		3801.1	9 3

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151475	000T345	2.428		4 9
151475	000T347	2.436		4 9
151475	0010987		3483.8	9 4
151475	0010987	3485.7		9 4
151493	000T350	2.223		2 9
151493	000T354	2.231		2 9
151493	0010988		4303.2	9 2
151495	000T345	3.385		4 9
151495	000T347	3.389		4 9
151495	0010987			9 9
151513	000T350	2.282		2 9
151513	000T354	2.288		2 9
151513	0010988		4498.9	9 2
151515	000T345	2.597		4 9
151515	000T347	2.601		4 9
151515	0010987			9 9
151533	000T350	2.289		2 9
151533	000T354	2.297		2 9
151533	0010988		4881.4	9 2
151533	0010988		4882.7	9 2
151535	000T345	2.318		4 9
151535	000T347	2.322		4 9
151535	0010987		4138.3	9 4
151535	0010987		4138.8	9 4
151553	000T350	2.270		2 9
151553	000T354	2.278		2 9
151553	0010988		4949.3	9 4
151555	000T345	2.401		4 9
151555	000T347	2.405		4 9
151555	0010987		4275.6	9 4
151573	000T350	2.266		4 9
151573	000T354	2.274		2 9
151573	0010988		4953.1	9 2
151573	0010988		4950.0	9 2
151575	000T345	2.307		2 9
151575	000T347	2.311		2 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151575	0010987		4415.8	9 3
151575	0010987		4416.2	9 3
151593	000T350	2.293		2 9
151593	000T354	2.300		2 9
151593	0010988		4945.8	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151595	000T345	2.359		4 9
151595	000T347	2.363		4 9
151595	0010987		4210.5	9 4
151613	000T350	2.285		3 9
151613	000T354	2.294		3 9
151613	0010988		4908.3	9 3
151613	0010988		4909.6	9 3
151615	000T345	2.289		2 9
151615	000T347	2.293		2 9
151615	0010987		4699.5	9 2
151615	0010987		4700.1	9 2
151633	000T350	2.293		2 9
151633	000T354	2.301		2 9
151633	0010988		5005.3	9 2
151633	0010988		4993.3	9 2
151635	000T345	2.347		2 9
151635	000T347	2.351		2 9
151635	0010987		4243.8	9 2
151635	0010987		4249.2	9 2
151653	000T350	2.289		2 9
151653	000T354	2.298		2 9
151653	0010988		4968.4	9 2
151653	0010988		4964.7	9 2
151655	000T345	2.314		2 9
151655	000T347	2.318		2 9
151655	0010987		4659.5	9 2
151673	000T350	2.300		2 9
151673	000T354	2.309		2 9
151673	0010988		4933.9	9 2
151673	0010988		4935.2	9 2
151675	000T345	2.309		2 9
151675	000T347	2.313		2 9
151675	0010987		4544.3	9 2
151693	000T350	2.305		2 9
151693	000T354	2.315		2 9
151693	0010988		4914.7	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151695	000T345	2.344		2 9
151695	000T347	2.349		2 9
151695	0010987		4654.8	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151713	000T350	2.297		2 9
151713	000T354	2.305		2 9
151713	0010988		4888.8	9 2
151713	0010988		4887.5	9 2
151715	000T345	2.462		4 9
151715	000T347	2.467		4 9
151715	0010987		4179.7	9 4
151715	0010987		4180.4	9 4
151733	000T350	2.294		3 9
151733	000T354	2.300		3 9
151733	0010988			9 9
151735	000T345	3.186		4 9
151735	000T347	3.192		4 9
151735	0010987			9 9
151753	000T350	2.284		2 9
151753	000T354	2.293		2 9
151753	0010988		4832.9	9 2
151753	0010988		4834.2	9 2
151755	000T345	16.140		4 9
151755	000T347	15.815		4 9
151755	0010987			9 9
151773	000T350	2.285		2 9
151773	000T354	2.294		2 9
151773	0010988		4831.5	9 2
151773	0010988		4840.5	9 2
151775	000T345	16.935		9 9
151775	000T347	16.458		9 9
151813	000T350	2.286		2 9
151813	000T354	2.295		2 9
151813	0010988		4748.3	9 2
151815	000T345	2.300		2 9
151815	000T347	2.305		2 9
151815	0010987		4309.6	9 2
151833	000T350	2.277		2 9
151833	000T354	2.284		2 9
151833	0010988		4651.1	9 3

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151835	000T345	2.282		2 9
151835	000T347	2.285		2 9
151835	0010987		4415.0	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151853	000T350	2.177		2 9
151853	000T354	2.186		2 9
151853	0010988		4166.0	9 2
151855	000T345	2.200		2 9
151855	000T347	2.206		2 9
151855	0010987		3972.9	9 2
151873	000T350	2.164		2 9
151873	000T354	2.174		2 9
151873	0010988		3952.0	9 2
151875	000T345	2.233		2 9
151875	000T347	2.237		2 9
151875	0010987		3624.5	9 2
151893	000T350	2.590		2 9
151893	000T354	2.599		2 9
151893	0010988			9 9
151895	000T345	9.271		9 9
151895	000T347	9.243		9 9
151895	0010987			9 9
151910	000T350	2.979		2 9
151910	000T354	2.990		2 9
151912	000T345	3.409		2 9
151912	000T347	3.412		2 9
151915	000T350	2.170		2 9
151915	000T354	2.178		2 9
151915	0010988			9 9
151917	000T345	10.065		3 9
151917	000T347	10.066		3 9
151917	0010987			9 9
151918	000T350	1.529		3 9
151918	000T354	1.537		3 9
151918	0010988			9 9
151920	000T350	2.695		2 9
151920	000T354	2.706		2 9
151920	0010988			9 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151922	000T345	9.393		2 9
151922	000T347	9.397		2 9
151922	0010987			9 9
151923	000T350	3.434		2 9
151923	000T354	3.445		2 9
151923	0010988			9 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
151925	000T345	1.895		3 9
151925	000T347	1.898		3 9
151925	0010987			9 9
151927	000T350	2.836		2 9
151927	000T354	2.843		2 9
151929	000T345	3.336		4 9
151929	000T347	3.338		4 9
151932	000T350	2.830		2 9
151932	000T354	2.840		2 9
151932	0010988			9 9
151934	000T345	2.833		3 9
151934	000T347	2.838		3 9
151934	0010987			9 9
151941	000T350	2.318		2 9
151941	000T354	2.329		2 9
151941	0010988			9 9
151943	000T345	2.613		2 9
151943	000T347	2.618		2 9
151943	0010987			9 9
151961	000T350	2.060		2 9
151961	000T354	2.070		2 9
151961	0010988		3580.7	9 2
151963	000T345	2.289		2 9
151963	000T347	2.294		2 9
151963	0010987			9 9
151981	000T350	2.079		2 9
151981	000T354	2.088		2 9
151981	0010988		3977.7	9 2
151981	0010988		3978.2	9 2
151983	000T345	2.210		3 9
151983	000T347	2.214		3 9
151983	0010987		3701.7	9 3
151983	0010987		3700.6	9 3
152001	000T350	2.186		2 9
152001	000T354	2.196		2 9

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
152001	0010988		4262.7	9 2
152003	000T345	2.287		2 9
152003	000T347	2.291		2 9
152003	0010987		3781.6	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
152021	000T350	2.133		2 9
152021	000T354	2.143		2 9
152021	0010988		4385.3	9 2
152023	000T345	2.297		3 9
152023	000T347	2.302		3 9
152023	0010987		3985.4	9 3
152041	000T350	2.156		2 9
152041	000T354	2.165		2 9
152041	0010988		4611.6	9 2
152043	000T345	2.319		2 9
152043	000T347	2.321		2 9
152043	0010987		4244.5	9 2
152061	000T350	2.286		2 9
152061	000T354	2.296		2 9
152061	0010988		4572.8	9 2
152063	000T345	2.329		2 9
152063	000T347	2.331		2 9
152063	0010987		4280.2	9 2
152081	000T350	2.256		2 9
152081	000T354	2.265		2 9
152081	0010988		4665.4	9 2
152081	0010988		4665.9	9 2
152083	000T345	2.475		4 9
152083	000T347	2.479		4 9
152083	0010987		4009.2	9 4
152083	0010987		4009.5	9 4
152101	000T350	2.399		3 9
152101	000T354	2.400		3 9
152101	0010988			9 9
152103	000T345	2.820		4 9
152103	000T347	2.824		4 9
152103	0010987			9 9
152121	000T350	2.293		2 9
152121	000T354	2.301		2 9
152121	0010988		4193.1	9 2
152121	0010988		4193.8	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
152123	000T345	2.336		2 9
152123	000T347	2.340		2 9
152123	0010987		3755.7	9 2
152123	0010987		3754.7	9 2

Sample ID Number	Thermometer Serial Number	Main Corrected	Thermometer Pressure	WOCE QF
152141	000T350	2.281		2 9
152141	000T354	2.292		2 9
152141	0010988		4854.2	9 2
152141	0010988		4873.1	9 2
152143	000T345	2.308		2 9
152143	000T347	2.314		2 9
152143	0010987		4493.8	9 2
152143	0010987		4481.7	9 2
152161	000T350	15.277		4 9
152161	000T354	15.057		4 9
152161	0010988		3821.8	9 4
152161	0010988		3822.1	9 4
152163	000T345	15.355		4 9
152163	000T347	15.133		4 9
152163	0010987		3420.2	9 4
152163	0010987		3419.0	9 4

D. ACKNOWLEDGEMENTS

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Clarke, R. Allyn, Jean-Guy Dessureault and Geoff Lebans. 1995. Upper-ocean Profiling from Vessels Underway, Sea Technology, February 1995.

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Levy, E.M., C.C. Cunningham, C.D.W. Conrad and J.D. Moffatt. 1977. The Determination of Dissolved Oxygen in Sea Water, Bedford Institute of Oceanography Report Series, BI-R-77-9, August 1977.

Appendix 1 94030 Reversed Pump Investigation

March 13, 1995
Adam Rostis

A.1 INTRODUCTION

On cruise 94030, it was found that for stations 1 through 14 inclusive, the pump on the CTD was hooked up in reverse. This caused water to flow past the CTD sensors opposite to the normal flow direction as shown in Figure A1. (See also the document *94030 Reversed Pump Problem*, January 16, 1995).

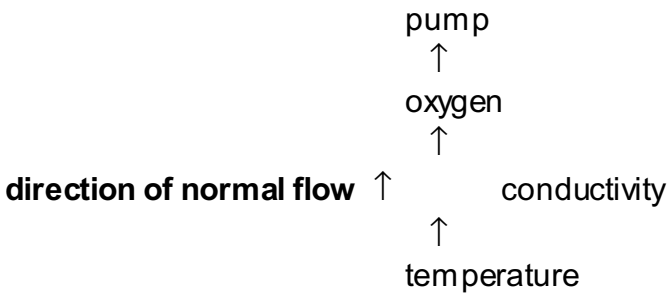

Figure A1: Relative location of sensors on CTD showing normal direction of water flow.

A.2 CONDUCTIVITY AND TEMPERATURE ALIGNMENT

In either the normal or reversed case, the physical distance between sensors results in a finite time for a parcel of water to move between sensors. In turn, this produces a time delay between the sensor signals that result by exposing the sensors to the particular parcel of water (i.e. in the normal flow case the signal produced by the conductivity sensor refers to a parcel of water which arrived at the temperature sensor Δt seconds earlier). It is necessary to align the signals in time so that they refer to the same parcel of water. The SEASOFT module ALIGNCTD allows for time alignment of the conductivity and temperature signals by specifying values for Δt (where Δt is the time advance of conductivity relative to temperature).

The Seabird manual *CTD Data Acquisition Software SEASOFT Version 4.201* (pg. 18) states that: "the best diagnostic of proper alignment is the elimination of salinity spikes that coincide with very sharp temperature steps." Graphs of salinity, density and potential temperature were produced using various values of Δt to determine which Δt would minimize salinity spiking.

A.2.1 Determining an Initial Guess for Δt

The Seabird manual titled *The Temperature and Conductivity Duct: Installation, Use and Data Processing Steps to Minimize Salinity Spiking Error* gave an indication of the direction to change Δt based on the observed direction of salinity spikes on a salinity vs. pressure curve. "If salinity spikes are negative, conductivity must be lagged (negative advance). If salinity spikes are positive, conductivity must be advanced." (p.12). Figure A2 was taken from the above manual and illustrates the 2 possible situations[1]. The magnitude of the change to Δt was determined by subjectively evaluating the effect of various Δt's on the salinity spiking.

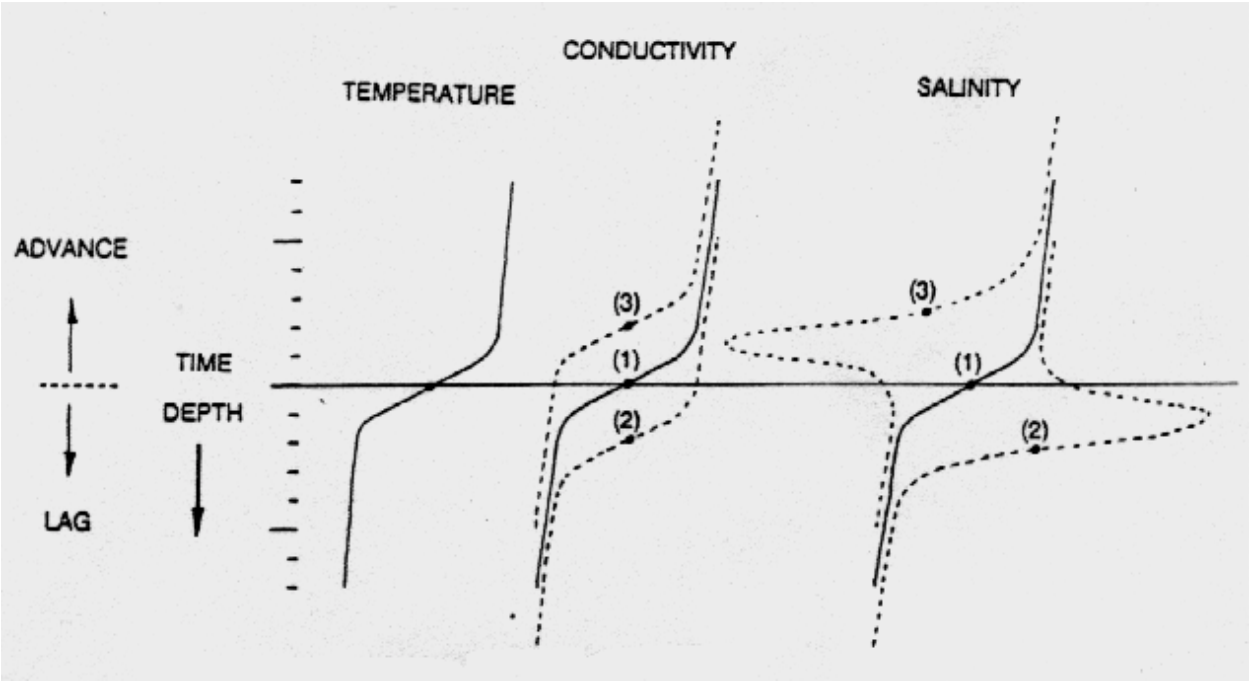

Figure A2: The shift of conductivity data relative to temperature.

A.2.2 Procedure to Determine a Δt Value (stations 1 to 14):

• download the .odf, .dat and .con file for a station in the reversed-pump range. Station 6 was chosen. The filenames were d030a006_1dbar.odf, 030a006.dat and 030a006.con. The files are located on the Fundy VAX under the directory digby$dka200:[data.seabird].

[1] An analogy can be used to help clarify the meaning of "advance" and "lag" as they apply to conductivity and temperature signals. Think of a meeting occurring on some date. To "advance" the meeting means to move it in time a negative number of days or hours. To postpone or "lag" the meeting would mean to move it in time a positive number of days or hours.

• using the SigmaPlot plotting software, plot Salinity, Density and Potential Temperature vs. Pressure from the archived .odf file, and select a region of pressure where there is a large temperature gradient.

• make an initial guess for Δt in ALIGNCTD and run station 6 using the process.bat file (see Appendix B for processing sequence).

• import the resulting .cnv file into SigmaPlot and plot Salinity, Density and Potential Temperature vs. Pressure

• based on the direction of salinity spiking (see under Introduction, Determining an Initial Guess for Δt) repeat the above 2 steps until salinity spiking is minimized.

• for 2 other stations in the reversed-pump range, create .cnv files using the Δt value determined above. This is to ensure that the Δt value chosen will apply to other stations.

A.2.3 Results of Δt Investigation

As expected, large salinity spikes were noted for the reversed-pump stations with a standard Δt value. For station 6, it was found that the coefficient that produced salinity curves with the least amount of spiking was $\Delta t = -0.270$. For the 2 other stations (10 and 14), $\Delta t = -0.270$ also produced salinity curves with minimal spiking. Figure A3 is a plot created from station 6 data after processing with ALIGNCTD using -0.270 for Δt.

A.3 PRESSURE SPIKING PROBLEM

In addition to the reversed-pump problem, it was found that large pressure spikes were occurring on the first 10 stations. At the time of data collection, the problem was thought to be related to electronic interference from the deck unit. It was later determined to be a pressure sensor problem.

A pressure spike removal program was created which marked bad any points included in these spikes. During processing using SEASOFT, these bad points were excluded from processing. See Appendix A for additional information on the pressure spike removal program.

A.4 HEATING EFFECT

The reversed pump situation appeared to introduce a thermal signal in the water passing through the duct system. Comparison of CTD and thermometer data from stations 1-14 with stations 15 onward indicate an increase in CTD temperature of 0.015°C (see report by C.K. Ross) for the reversed pump situation. Thus, the 0.015°C signal is removed from the temperature data for stations 1-14.

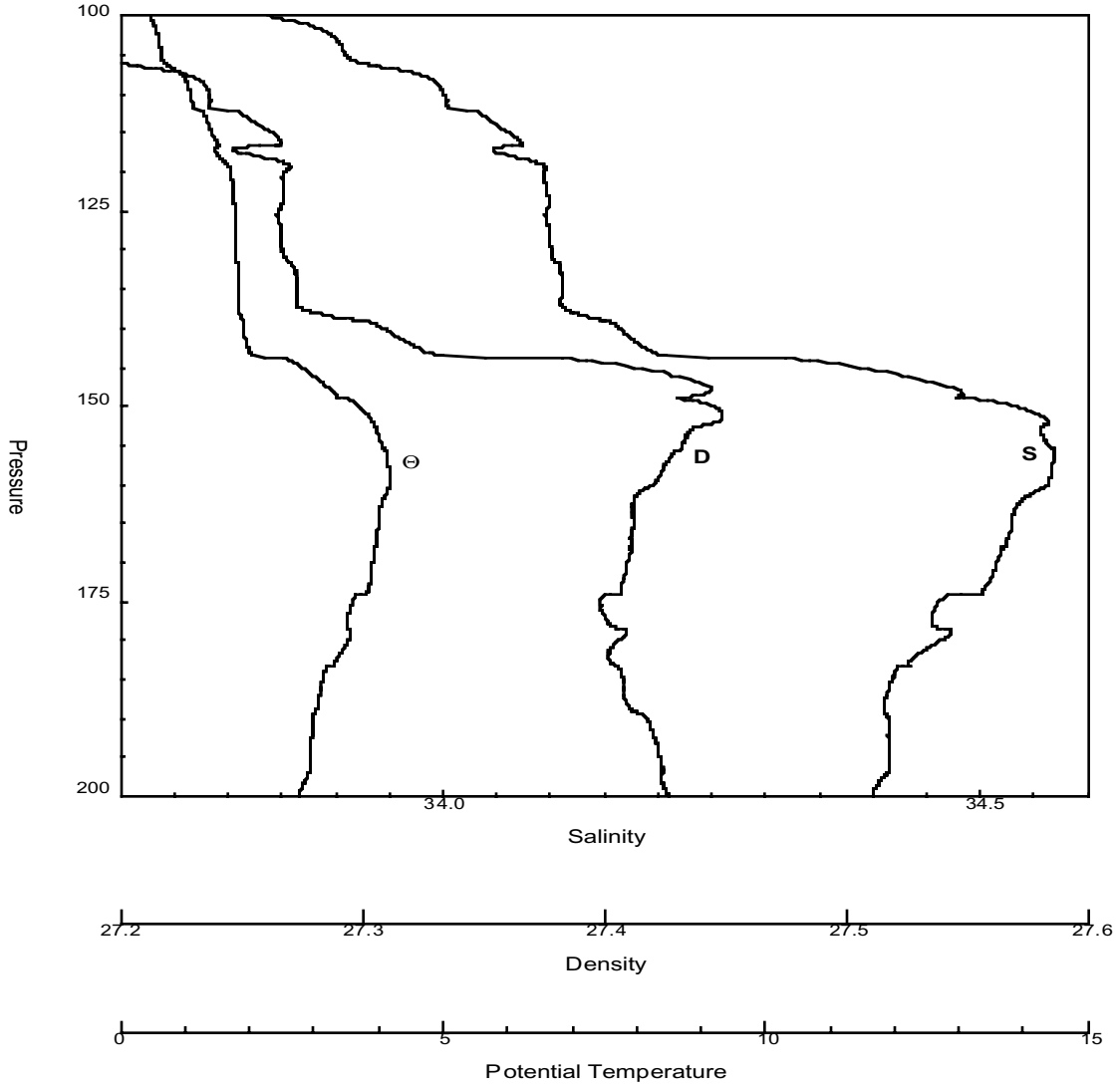

Figure A3. Station 6, Cruise 94030, 24 Hz .cnv data, Zoomed Pressure and Δt = -0.270

A.5 PRESSURE OFFSET

A diagram of the CTD (Figure A4) shows that water in the reversed-flow case travels a large distance (92 inches) before reaching the sensors at point **A**. The time lag associated with travelling this distance resulted in the pressure associated with the conductivity and temperature measurements being offset. This lag is important for associating the conductivity and temperature signals with the correct pressure from which the water parcel originated.

This time lag was estimated using two methods.

Method 1: Approximate the diameter of the tube over the entire circuit and then using the pump specification of 30 ml/s compute the time required to complete the circuit.

The distance-weighted tube diameter was:

$$(0.6\ \text{cm}) \bullet \frac{12}{92} + (1.12\ \text{cm}) \bullet \frac{35}{92} + (0.97\ \text{cm}) \bullet \frac{45}{92} \approx 1.0\ \text{cm} \qquad (1)$$

and so the time required for the water to flow through the entire circuit was

$$\frac{\text{Volume}}{\text{Flowrate}} = \frac{(92'')(2.54\ \text{cm/in})\pi(0.5\ \text{cm})^2}{30\ \text{ml/s}} \approx 6.1\ \text{seconds} \qquad (2)$$

Using the data shown in Figure A5, we estimated dp/dt at Station 4 using the scan number and the 24 Hz sampling rate. Station 4 was chosen because of the large salinity gradient near the bottom of the cast. The large gradient provides the signal required to estimate the pressure offset, while the proximity to the bottom implies minimal time between the up and down cast. The following estimate of dp/dt was obtained from station 4 data.

Direction	**Scan Range**	**dp/dt (dbar/s)**
Down	63244-68184	0.97
Up	83467-78912	1.05

Applying these vertical CTD velocities, we obtained the Δp associated with this estimate of the flow. Table 2 summarizes these results for both the up and down motion of the CTD.

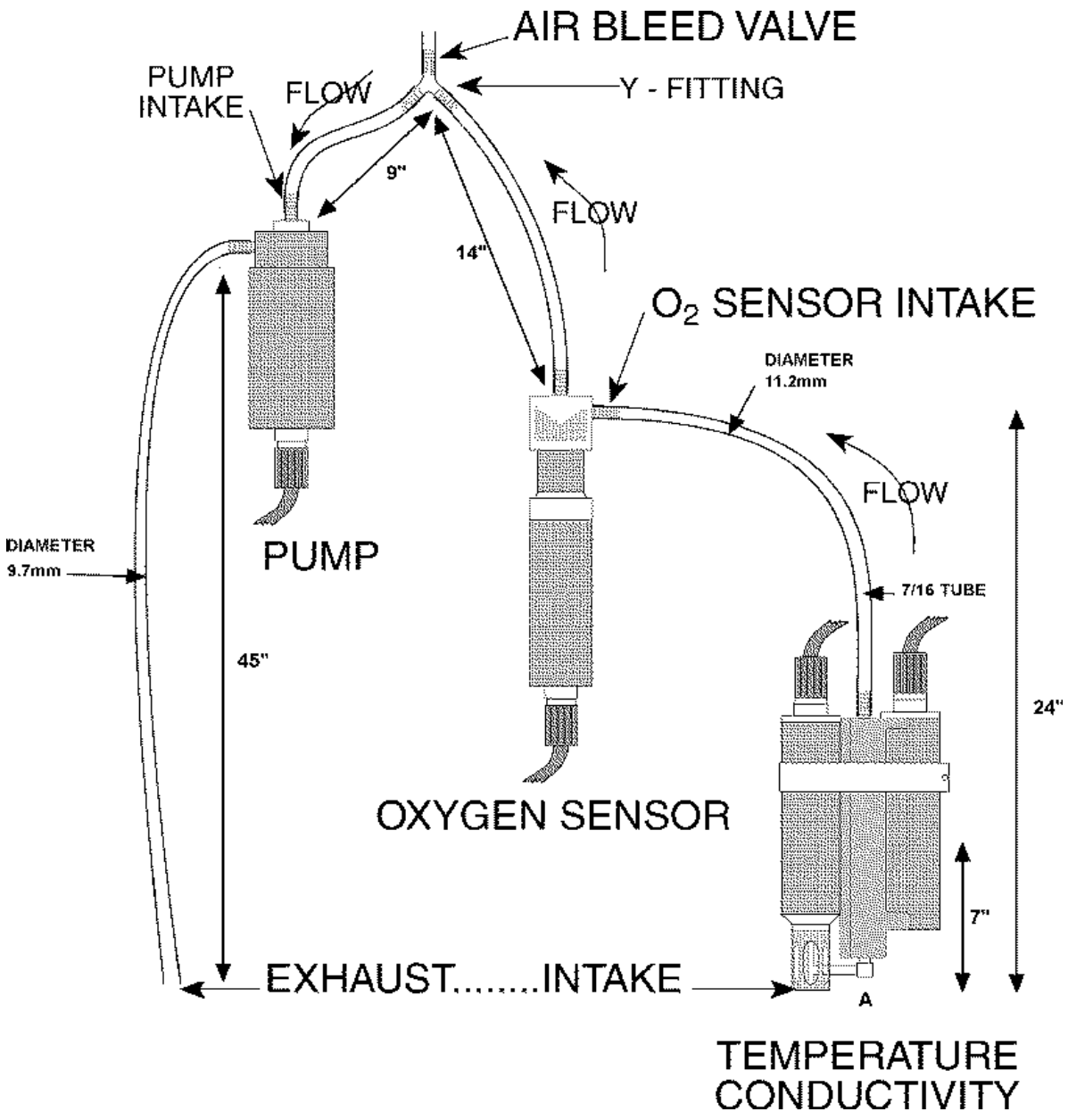

Figure A4: Exhaust Path of Temperature/Conductivity Duct Water

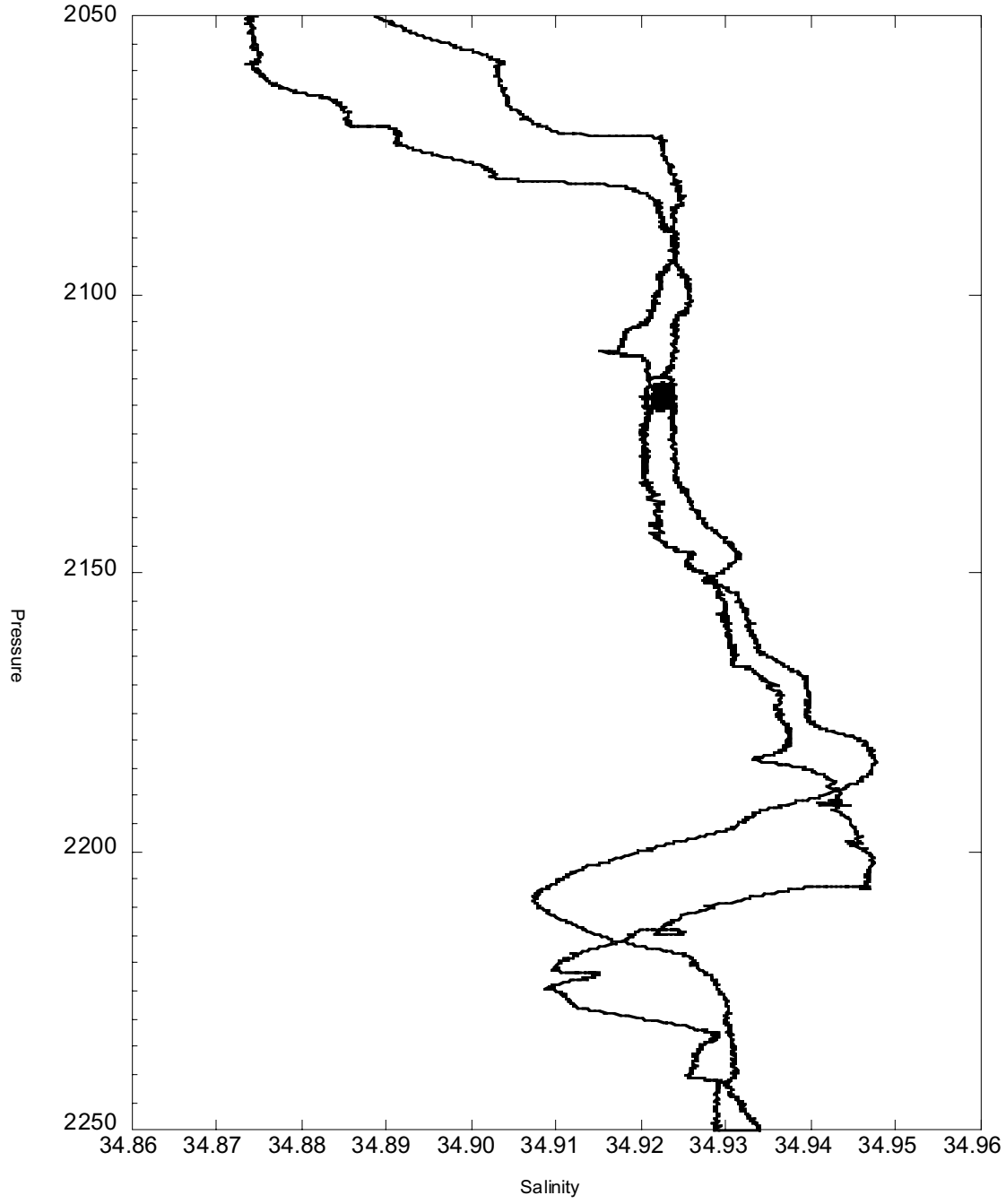

Figure A5: Upcast and Downcast for station 4.

Table 2A: Δp associated with method 1 calculation.

CTD Motion	Δp
down cast	5.9 dbars
up cast	6.4 dbars
Total	12.3 dbars

Method 2: This method is based on the Δt value used for ALIGNCTD. We know that it takes ~ 0.2 s for water to travel between the temperature and conductivity sensors, a distance of ~18 cm. (Note: a 0.07 s offset was applied in the deck unit. To correct this, a value of -0.07 s must be applied in ALIGNCTD. Thus, 0.27 - 0.07 = 0.2. A value of 0.2 actually indicates the lag between the two sensors.) So the velocity in this section was:

$$\frac{18\ \text{cm}}{0.2\ \text{s}} = 90\ \frac{\text{cm}}{\text{s}} \tag{3}$$

To estimate the velocity in the larger tubing, scale the velocity in eqn. (3) by the tube area:

$$\frac{(0.3)^2}{(0.5)^2} \bullet 90\ \frac{\text{cm}}{\text{s}} = 32\ \frac{\text{cm}}{\text{s}} \tag{4}$$

This gave a travel time in the larger tubing of:

$$\frac{(92'')(2.54\ \text{cm/in}) - 18\ \text{cm}}{32\ \text{cm/s}} = 6.7\ \text{s} \tag{5}$$

for a total travel time of:

$$6.7 + 0.2 \approx 7\ \text{s} \tag{6}$$

Again, using the above estimates of vertical CTD velocity we obtained Table A3 which estimated these results for both the up and down motion of the CTD.

Table A3: Δp associated with method 2 calculation.

CTD Motion	Δp
down cast	6.8 dbars
up cast	7.4 dbars
Total	14.2 dbars

So, an overall estimate based on the results of these two calculations gave a total pressure offset between 12.3 and 14.2 dbars.

Station 4 was then analyzed to determine whether this estimate agreed with an observed pressure offset. This station was chosen because of a salinity jump near the end of the cast which would allow the pressure offset to be detected (see Figure A5). The 24 Hz salinity data for the up and down casts was used to produce a 0.5 dbar dataset. Pressure, downcast salinity and upcast salinity were imported into Quattro Pro for Windows. The upcast salinity was adjusted or "lagged" relative to the downcast salinity using pressures between 10 to 20 dbars. For each lag used, a correlation coefficient (r-value) was computed between the upcast and downcast salinity. High correlation coefficients would indicate that the downcast and upcast data were correlated for that region. The overall goal here was to determine by how much the upcast and downcast pressures were offset and to see if this offset agreed with the estimated offset.

It was found that the best r-value ($r = 0.971$) for the correlation was obtained when the upcast salinity was lagged by 14.5 dbars over the pressure range 2050 - 2250 dbars. The entire range of correlation coefficients calculated are given in Table A4. The are also displayed in Figure A6.

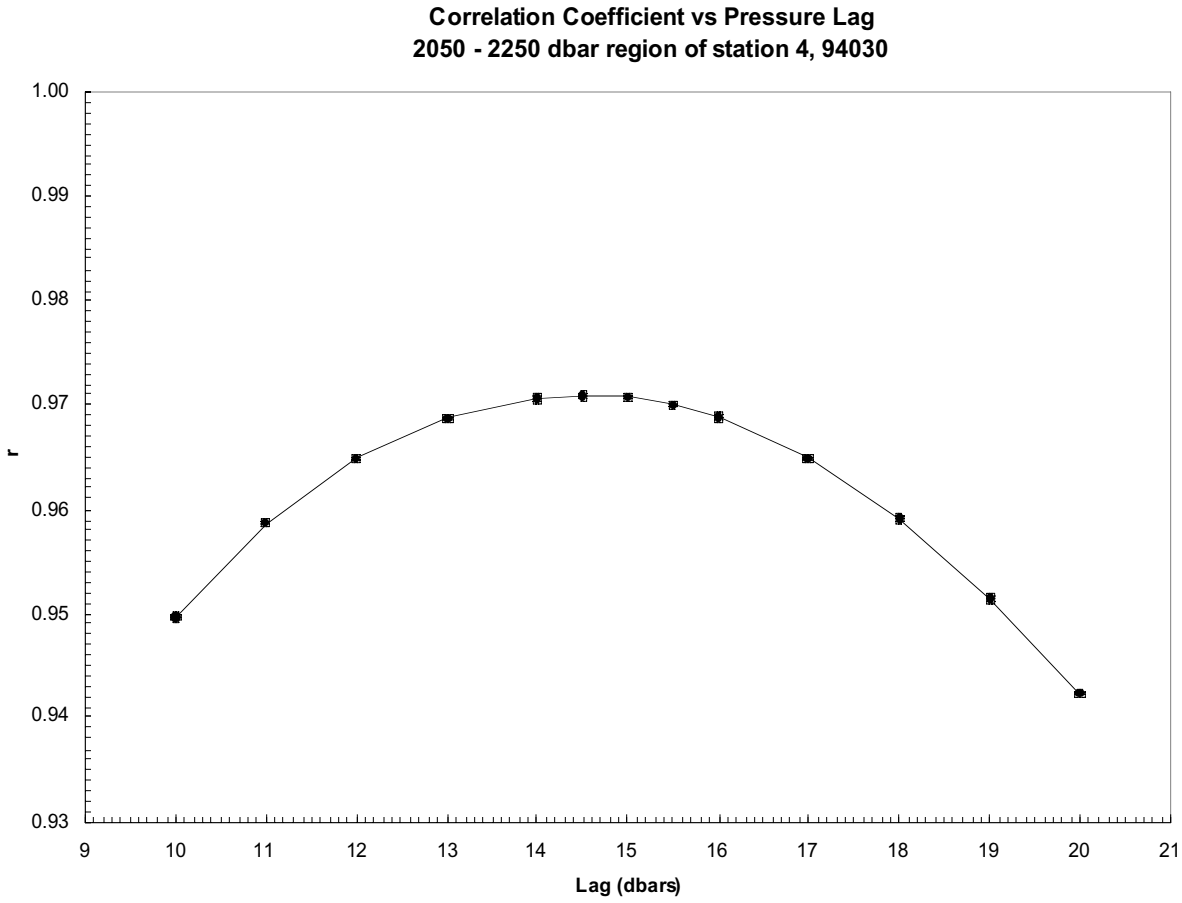

Figure A6: Results of the correlation between upcast and downcast salinity for various offsets in upcast salinity.

Table A4: Results of the correlation between upcast and downcast salinity for various offsets in upcast salinity.

Lag value (dbars)	r-value
10	0.949664
11	0.958635
12	0.964828
13	0.968735
14	0.970667
14.5	0.970952
15	0.970732
15.5	0.970011
16	0.968781
17	0.964893
18	0.959119
19	0.951483
20	0.942292

CONCLUSION

To correct the reversed pump situation for stations 1-14 the following procedure was followed to produce the 1 dbar and 2 dbar datasets from the raw 24 Hz data:

- Conductivity was shifted by -0.27 s relative to temperature. Consider a parcel of water, W_1, at the exit of the tubing (what would normally be the entrance). Suppose this parcel has conductivity and temperature of $C_{1+\Delta t}$, and T_1 respectively ($C_{1+\Delta t}$ represents the time shifted conductivity).

- Salinity is computed based on P_1, $C_{1+\Delta t}$, and T_1, where P_1 represents the pressure at the time W_1 is at the temperature sensor..

- remove the 0.015°C heating effect from the temperature signal
- offset the pressure and scan number channels from all other parameter channels by lagging scan number and pressure by 7 seconds, or 168 scans.
- compute the 1 and 2 dbar averages
- compute theta and sigma parameters

The following procedure was followed for the discrete CTD data found in the SEA file:

- salinity was computed within the DATCNV module and 10 seconds of data was output to the ROS file.
- remove the 0.015°C heating effect from the temperature signal
- offset the pressure and scan number channels from all other parameter channels by lagging scan number and pressure by 7 seconds, or 168 scans.
- compute a 72 scan average for the discrete CTD values

INCONSISTENCIES

1. The 72 scan average for the discrete CTD values should have been a 73 scan average to be consistent the shipboard processing.
2. The 168 scan offset represents a shift of 6.9583 seconds, not truly 7 seconds.
3. The produced QAT files for stations 1-14 will not contain a conductivity channel because of the different processing method
4. The CTD oxygen calculated for stations 1-14 during the reversed pump correction will be incorrect. The problem results from the in-situ temperature and pressure in the expression for oxygen. The in-situ temperature would have been high by 0.015 while the pressure would not have been offset by the required 7 seconds. We expect these problems would have been rectified during subsequent oxygen calibration steps.

Appendix A

Description of the spike removal program ctd_prsp.exe
(Program was created by Igor Yashayaev)

The spike removal program takes an ASCII input data file (which is the .cnv file produced by the SEASOFT module DATCNV, running in ASCII-output mode) and marks as "bad" any regions where there are large pressure spikes. It does this by putting a small value (-9.99e-29) across all columns of the dat file where the pressure is spiking. It also writes out the values in this spiked pressure region to the file called "garbage". ctd_prsp also places a comment '* Pressure Spikes Removal Date <date> <time>' in the header of the .cnv file being processed. The command line for the program is:

ctd_prsp [input .cnv file] [output file name]

Appendix B

Processing sequence for this investigation:

datcnv -c94030 -i030a*xxx*[1]
ctd_prsp 030a*xxx* nospikes.cnv[2]
move nospikes.cnv 030a*xxx*.cnv
trans 030a*xxx*[3]
wildedit -i030a*xxx*
filter -i030a*xxx*
alignctd -i030a*xxx* -oa030a*xxx*[4]
celltm -ia030a*xxx*
binavg -ia030a*xxx*[5]
derive -ia030a*xxx*
asciiout -ia030a*xxx*[6]

[1]datcnv.cfg was set up to produce ASCII output, as the input file to ctd_prsp must be in ASCII (not binary)

[2]see Appendix A for a description of how to use the spike removal program

[3]converted data back to binary to run the rest of the programs (binary files run faster ASCII files)

[4]the file was given a new name so that it would not be necessary to run all the programs previous to alignctd everytime Δt was changed

[5]BINAVG was run only when the number of scan lines was greater than 68000 (the maximum number of lines allowed by SigmaPlot is approximately 68000). In the most extreme case, BINAVG was used to reduce the data from 24 to 8 Hz.

[6]ASCIIOUT was used instead of TRANS because ASCIIOUT removed the scans marked as bad by ctd_prsp