A13.5 Hydrographic Measurements Program

The distribution of bottle samples is illustrated in Figures 1-2 below.

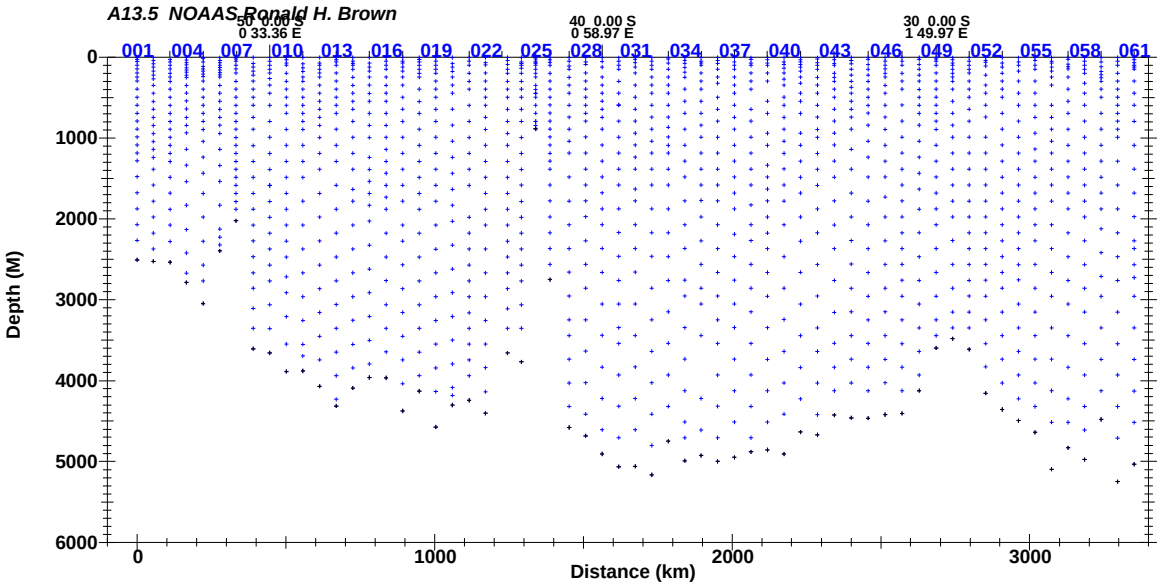

Figure 1 A13.5 Sample distribution, stations 1-61.

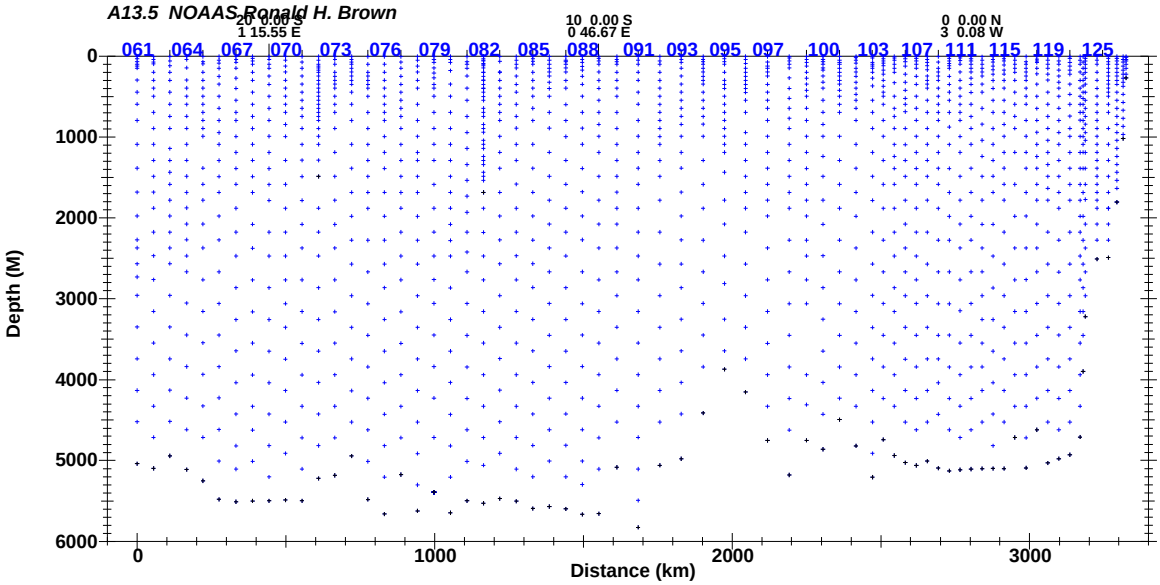

Figure 2 A13.5 Sample distribution, stations 61-129.

Bottle Sampling and Data Processing

Water Sampling

The NOAA Ship Ronald H. Brown has two Markey DESH-5 winches. The Aft winch was used for stations 998, 1-48 and 72/3-79/1. The Forward winch was used for stations 49-72/1 and 79/3-129. All but 5 rosette casts were lowered to within 3-20 meters of the bottom, using both the pinger and/or altimeter to determine distance.

Four sampling plans were used in rotation to choose standard sampling depths on each station throughout CLIVAR/Carbon A13.5.

Each bottle on the rosette had a unique serial number. This bottle identification was maintained independently of the bottle position on the rosette, which was used for sample identification. Three bottles (at trip positions 17, 22 and 23) were replaced on this cruise, and various parts of bottles were occasionally changed or repaired. Bottle 17 was changed out after station 8 due to repeated problems with leaking; bottle 23 apparently closed in air at the start of station 82/1 and later imploded, irreparably damaging bottle 22 in the process.

Rosette maintenance was performed on a regular basis. O-rings were changed and lanyards repaired as necessary. Bottle maintenance was performed each day to insure proper closure and sealing. Valves were inspected for leaks and repaired or replaced as needed.

The 36-place SBE32 carousel occasionally had problems releasing lanyards, causing mis-tripped bottles on multiple casts. Repair attempts and bottle height/lanyard adjustments were made as the cruise continued.

Bottle Sampling

At the end of each rosette deployment water samples were drawn from the bottles in the following order:

- Chlorofluorocarbons (CFCs)
- ^{3}He
- O_2
- pH
- pCO_2
- Dissolved Inorganic Carbon (DIC)
- Total Alkalinity (TAlk)
- ^{13}C and ^{14}C
- Dissolved Organic Carbon (DOC) / Total Dissolved Nitrogen (TDN)
- Tritium
- Nutrients
- Salinity

The correspondence between individual sample containers and the rosette bottle position (1-24) from which the sample was drawn was recorded on the sample log for the cast. This log also included any comments or anomalous conditions noted about the rosette and bottles. One member of the sampling team was designated the *sample cop*, whose sole responsibility was to maintain this log and insure that sampling progressed in the proper drawing order.

Normal sampling practice included opening the drain valve and then the air vent on the bottle, indicating an air leak if water escaped. This observation together with other diagnostic comments (e.g., "lanyard caught in lid", "valve left open") that might later prove useful in determining sample integrity were routinely noted on the sample log. Drawing oxygen samples also involved taking the sample draw temperature from the bottle. The temperature was noted on the sample log and was sometimes useful in determining leaking or mis-tripped bottles.

Once individual samples had been drawn and properly prepared, they were distributed for analysis. On-board analyses were performed on computer-assisted (PC) analytical equipment networked to the data processing computer for centralized data management.

Bottle Data Processing

Shipboard CTDO data were re-processed automatically at the end of each deployment using SIO/ODF CTD processing software v.5.1.5-4. The raw CTDO data and bottle trips acquired by SBE SeaSave on the Windows 2000 workstation were copied onto the Linux database and web server system. Pre-cruise calibration data were applied to CTD Pressure, Temperature and Conductivity sensor data, then the data were processed to a 0.5-second time series. A 2-decibar down-cast pressure series was created from the time series; CTDO data from downcasts were matched along isopycnals to upcast trips and extracted, then fit to bottle O_2 data at trips. The pressure series data were used by the web service for interactive plots, sections and on-board CTDO data distribution; the 0.5 second time series data were also available for distribution through the web service.

SIO/ODF CTDO data at bottle trips were extracted and added to the bottle database to use for CTD Pressure, Temperature and Salinity data in the preliminary bottle files. Downcast CTDO data, matched to upcast bottle trips along isopycnals, were used for preliminary bottle file CTDO data. When final CTDO data are submitted, the NOAA/PMEL final PTSO data will replace the preliminary SIO/ODF CTD data in the bottle files.

Water samples collected and properties analyzed shipboard were managed centrally in a relational database (PostgreSQL-8.1.18-2_el5_4.1) run on a Linux system. A web service (OpenACS-5.3.2-3 and AOLServer-4.5.1-1) front-end provided ship-wide access to CTD and water sample data. Web-based facilities included on-demand arbitrary property-property plots and vertical sections as well as data uploads and downloads.

ODF

The Sample Log information (and any diagnostic comments) were entered into the database once sampling was completed. Quality flags associated with sampled properties were set to indicate that the property had been sampled, and sample container identifications were noted where applicable (e.g., oxygen flask number).

Analytical results were provided on a regular basis by the various analytical groups and incorporated into the database. These results included a quality code associated with each measured value and followed the coding scheme developed for the World Ocean Circulation Experiment (WOCE) Hydrographic Programme (WHP) [Joyc94].

Various consistency checks and detailed examination of the data continued throughout the cruise.

Bottle Data Quality Code Summary and Comments

This section contains WOCE quality codes [Joyc94] used during this cruise, and remarks regarding bottle data.

Table 1 A13.5 Water Sample Quality Code Summary

Property	1	2	3	4	5	6	7	8	9	Total
Bottle	0	3035	8	49	0	0	0	0	42	3134
CFC-11	0	2524	16	35	40	0	0	0	21	2636
CFC-12	0	2518	21	36	40	0	0	0	21	2636
CCl_4	0	2193	12	34	376	0	0	0	21	2636
SF_6	0	2475	35	65	40	0	0	0	21	2636
^3He	488	0	0	0	0	0	0	0	0	488
O_2	0	2768	9	58	3	233	0	0	0	3071
pH	0	2536	21	21	6	462	0	0	31	3077
pCO_2	0	2592	4	12	3	182	0	0	14	2807
DIC	0	2675	17	15	14	321	0	0	23	3065
Total Alkalinity	0	2663	33	24	17	309	0	0	18	3064
$^{13}C/^{14}C$	681	0	0	0	0	0	0	0	0	681
DOC	1565	0	0	0	0	0	0	0	0	1565
TDN	1565	0	0	0	0	0	0	0	0	1565
Tritium	422	0	0	0	0	0	0	0	0	422
Nitrate	0	3002	1	45	0	0	0	0	22	3070
Nitrite	0	3026	1	21	0	0	0	0	22	3070
Phosphate	0	3020	6	21	1	0	0	0	22	3070
Silicic Acid	0	3001	25	22	0	0	0	0	22	3070
Salinity	0	3012	13	29	5	0	0	0	0	3059

Quality evaluation of data included comparison of SBE35RT temperature, bottle salinity and bottle oxygen data with CTDO data using plots of differences; and review of various property plots and vertical sections of the station profiles and adjoining stations. Comments from the Sample Logs and the results of investigations into bottle problems and anomalous sample values are included in this report. Sample number in this table is the cast number times 100 plus the bottle position number.

Table 2 A13.5 Bottle Quality Codes and Comments

Station /Cast	Sample Number	Property	Quality Code	Comment
1/1	ALL		-	boom did not retract, CTD/rosette in the air for some minutes, then put back in water until boom fixed, which took approximately half an hour.
1/1	101	Bottle	2	ran out of water for salt
1/1	103	Bottle	3	leaking at vent (no samples drawn except for nutrients/salt)
1/1	105	O2	4	outlier (high) compared to CTDO
1/1	109	Bottle	2	ran out of water for salt/nutrients/tritium
1/1	111	Bottle	3	leaking at vent (no samples drawn except for nutrients/salt)
1/1	113	O2	4	bottle o2 value high compared to CTDO, flask 13 calibration is suspect; flask removed from service after station 17. Code o2 bad.
1/1	117	Bottle	3	leaking at vent (no samples drawn except for nutrients/salt)
1/1	121	Bottle	2	ran out of water for salt/nutrients
1/1	121	Refc.Temp.	3	SBE35RT slightly low vs CTDT, unstable reading.
1/1	123	Bottle	2	ran out of water for salt
2/1	103	Bottle	3	leaking (possibly empty because of leaking); only salinity drawn.

Station /Cast	Sample Number	Property	Quality Code	Comment
2/1	113	O2	4	bottle o2 value high compared to CTDO, flask 13 calibration is suspect; flask removed from service after station 17. Code o2 bad.
2/1	120	Bottle	4	o2 draw temperature, o2, nuts, pH, dic, alkalinity are all similar to values for bottle 21, mis-trip.
2/1	120	CCl4	4	bottle mis-trip.
2/1	120	CFC-11	4	bottle mis-trip.
2/1	120	CFC-12	4	bottle mis-trip.
2/1	120	DIC	4	outlier, similar to values for bottle 21. mis-trip.
2/1	120	Nitrite	4	outlier, similar to values for bottle 21. mis-trip.
2/1	120	Nitrate	4	outlier, similar to values for bottle 21. mis-trip.
2/1	120	O2	4	outlier, similar to values for bottle 21. mis-trip.
2/1	120	pCO2	4	outlier, similar to values for bottle 21. mis-trip.
2/1	120	pH	4	outlier, similar to values for bottle 21. mis-trip.
2/1	120	Phosphate	4	outlier, similar to values for bottle 21. mis-trip.
2/1	120	Salinity	4	outlier, similar to values for bottle 21. mis-trip.
2/1	120	SF6	4	bottle mis-trip.
2/1	120	Silicate	4	outlier, similar to values for bottle 21. mis-trip.
2/1	120	TAlk	4	outlier, similar to values for bottle 21. mis-trip.
2/1	123	Bottle	3	leaking (no samples drawn except for nutrients)
3/1	ALL		-	bottle 124 not used
3/1	110	Bottle	2	all nutrients, talk, dic slightly low vs P; salinity, pH, sf6 slightly hi; small salinity/CTDS max at bottle 10, probably all values ok.
3/1	110	Nitrate	2	rmk: no3 a bit low vs P/T, mark 3. mcj: see bottle comment, no3 probably ok.
3/1	112	O2	4	bottle o2 value high compared to CTDO, flask 52 calibration is suspect; flask removed from service after station 17. Code o2 bad.
3/1	120	Bottle	2	possibly leaking (all samples drawn); all parameters look ok, bottle ok.
3/1	121	Refc.Temp.	3	SBE35RT high vs CTDT, unstable reading.
4/1	113	O2	4	bottle o2 value high compared to CTDO, flask 13 calibration is suspect; flask removed from service after station 17. Code o2 bad.
5/1	106	Bottle	9	not tripped (lanyard hang-up prevented both bottles from closing)
5/1	107	Bottle	9	not tripped (lanyard hang-up prevented both bottles from closing)
5/1	112	O2	4	bottle o2 value high compared to CTDO, flask 52 calibration is suspect; flask removed from service after station 17. Code o2 bad.
5/1	117	Bottle	2	leaking from vent (all samples drawn); all parameters look ok, bottle ok.
6/1	112	O2	4	bottle o2 value high compared to CTDO, flask 52 calibration is suspect; flask removed from service after station 17. Code o2 bad.
6/1	112	Phosphate	3	hi vs no3,ph,dic
6/1	115	Bottle	9	not tripped
6/1	116	Phosphate	3	hi vs no3,ph,dic
6/1	117	Bottle	2	leaking (all samples drawn); all parameters look ok, bottle ok.
7/1	105	Bottle	2	cap moved by lanyard (not in proper position), but bottle not leaking; no water for salt (did not run out of water as thought because vent had been closed again)
7/1	105	Phosphate	3	a bit lo vs P and T
7/1	112	O2	2	rmk: hi vs P and pH; ok compared to CTDO, code 3. mcj: looks ok vs all other parameters, code 2.
7/1	113	O2	4	bottle o2 value high compared to CTDO, flask 13 calibration is suspect; flask removed from service after station 17. Code o2 bad.
7/1	117	Bottle	3	leaking (no samples drawn except for salt; CFCs/Helium/Tritium sampled from 118 instead)
7/1	119	Bottle	2	ran out of water for salt
7/1	121	O2	4	very hi vs P; outlier (high) compared to CTDO data

Station /Cast	Sample Number	Property	Quality Code	Comment
7/1	121	Refc.Temp.	3	SBE35RT high vs CTDT, unstable reading.
8/1	104	Silicate	3	lo vs P, code 3
8/1	111	Bottle	2	bottle at small salinity/CTDS maximum; o2, talk, pH, salinity, sf6 slightly hi; nutrients, dic, cfc11/12 low; probably all values ok.
8/1	111	Phosphate	2	rmk: po4 a bit low vs P, CTDO; mark 3. mcj: correlates with small salinity maximum, no3/sio3 also a bit low. value ok.
8/1	112	O2	4	bottle o2 value high compared to CTDO, flask 52 calibration is suspect; flask removed from service after station 17. Code o2 bad; rmk: o2 very high
8/1	117	Bottle	3	leaking (no samples drawn); bottle replaced after this cast due to repeated leaking.
9/1	102	Bottle	4	draw temperature high (O2), bottle possibly tripped at the surface; mcj: nutrients, oxygen low; salinity high - suspect mis-trip at shallower pressure. Code bottle as mis-trip.
9/1	102	CCl4	4	cfcs low, mis-trip.
9/1	102	CFC-11	4	cfcs low, mis-trip.
9/1	102	CFC-12	4	cfcs low, mis-trip.
9/1	102	DIC	4	dic low, mis-trip.
9/1	102	Nitrite	4	nutrients low, mis-trip.
9/1	102	Nitrate	4	nutrients low, mis-trip.
9/1	102	O2	4	o2 low, mis-trip.
9/1	102	pCO2	4	pco2 low, mis-trip.
9/1	102	pH	4	pH low, mis-trip.
9/1	102	Phosphate	4	nutrients low, mis-trip.
9/1	102	Salinity	4	salinity high, mis-trip.
9/1	102	SF6	4	bottle mis-trip.
9/1	102	Silicate	4	nutrients low, mis-trip.
9/1	102	TAlk	4	alk low, mis-trip.
9/1	104	TAlk	3	alk low vs P; other parameters ok. code alkalinity bad.
9/1	106	Bottle	4	oxygen, nutrients, dic, alkalinity slightly low; salinity, pH slightly high, probable mis-trip near/at bottle 7 pressure.
9/1	106	CCl4	3	slightly low, mis-trip.
9/1	106	CFC-11	3	slightly low, mis-trip.
9/1	106	CFC-12	3	slightly low, mis-trip.
9/1	106	DIC	3	slightly low, mis-trip.
9/1	106	Nitrite	3	bottle mis-trip.
9/1	106	Nitrate	3	slightly low, mis-trip.
9/1	106	O2	3	slightly low, mis-trip.
9/1	106	pCO2	3	bottle mis-trip.
9/1	106	pH	3	slightly hi, mis-trip.
9/1	106	Phosphate	3	slightly low, mis-trip.
9/1	106	Salinity	3	slightly hi, mis-trip.
9/1	106	SF6	3	bottle mis-trip.
9/1	106	Silicate	3	slightly low, mis-trip.
9/1	106	TAlk	3	slightly low, mis-trip.
9/1	112	Bottle	4	Draw temperature high (O2), bottle possibly tripped at the surface
9/1	112	O2	4	bottle o2 value high compared to CTDO, flask 52 calibration is suspect; flask removed from service after station 17. Code o2 bad.
9/1	117	Bottle	9	not tripped this cast (lanyard of the neighboring bottle got hung up and prevented closing)
10/1	113	O2	4	bottle o2 value high compared to CTDO, flask 13 calibration is suspect; flask removed from service after station 17. Code o2 bad.

Station /Cast	Sample Number	Property	Quality Code	Comment
11/1	102	O2	4	flier; outlier (low) compared to CTDO
11/1	104	Bottle	9	Not tripped
11/1	106	Bottle	4	nutrients, oxygen slightly low; salinity high - mis-trip at/near bottle 8 pressure.
11/1	106	CCl4	4	cfcs low, probable mis-trip.
11/1	106	CFC-11	4	cfcs low, probable mis-trip.
11/1	106	CFC-12	4	cfcs low, probable mis-trip.
11/1	106	DIC	4	dic low; mis-trip.
11/1	106	Nitrite	4	nutrients slightly low; mis-trip.
11/1	106	Nitrate	4	nutrients slightly low; mis-trip.
11/1	106	O2	4	oxygen slightly low compared to CTDO; mis-trip.
11/1	106	pCO2	4	pco2 low; mis-trip.
11/1	106	pH	4	ph high; mis-trip.
11/1	106	Phosphate	4	nutrients slightly low; mis-trip.
11/1	106	Salinity	4	salinity high compared to CTDS; mis-trip.
11/1	106	SF6	4	probable mis-trip.
11/1	106	Silicate	4	nutrients slightly low; mis-trip.
11/1	106	TAlk	4	talk low; mis-trip.
11/1	112	O2	4	bottle o2 value high compared to CTDO, flask 52 calibration is suspect; flask removed from service after station 17. Code o2 bad.
12/1	102	Bottle	2	ran out of water for nutrients/salt
12/1	113	O2	4	bottle o2 value high compared to CTDO, flask 13 calibration is suspect; flask removed from service after station 17. Code o2 bad.
13/1	113	O2	4	bottle o2 value high compared to CTDO, flask 13 calibration is suspect; flask removed from service after station 17. Code o2 bad.
13/1	119	Salinity	5	salt marked as sampled on sample log, but not reported.
13/1	120	pH	3	lo vs P, CTDS; code 3
14/1	104	Bottle	9	not tripped
14/1	106	Bottle	4	bad bottle based on multiple parameter values; code as mis-trip
14/1	106	DIC	4	outlier (low); mis-trip.
14/1	106	Nitrite	4	bottle mis-trip.
14/1	106	Nitrate	4	outlier (low); mis-trip.
14/1	106	O2	4	slightly low compared to CTDO; mis-trip.
14/1	106	pH	4	outlier (high); mis-trip.
14/1	106	Phosphate	4	outlier (low); mis-trip.
14/1	106	Salinity	4	outlier (high) compared to CTDS; mis-trip.
14/1	106	Silicate	4	outlier (low); mis-trip.
14/1	106	TAlk	4	outlier (low); mis-trip.
14/1	113	O2	4	bottle o2 value high compared to CTDO, flask 13 calibration is suspect; flask removed from service after station 17. Code o2 bad.
15/1	112	O2	4	bottle o2 value high compared to CTDO, flask 52 calibration is suspect; flask removed from service after station 17. Code o2 bad.
16/1	102	Bottle	9	not tripped
16/1	104	Bottle	9	not tripped
16/1	113	O2	4	bottle o2 value high compared to CTDO, flask 13 calibration is suspect; flask removed from service after station 17. Code o2 bad.
17/1	102	Bottle	4	lifted up by 3cm after previous cast to hopefully make it trip more reliably; draw temperature too high; mis-tripped (possibly tripped at surface)
17/1	102	CCl4	4	cfcs low, mis-tripped.
17/1	102	CFC-11	4	cfcs low, mis-tripped.
17/1	102	CFC-12	4	cfcs low, mis-tripped.
17/1	102	DIC	4	very low; mis-tripped.

Station /Cast	Sample Number	Property	Quality Code	Comment
17/1	102	Nitrite	4	very high; mis-tripped.
17/1	102	Nitrate	4	very low; mis-tripped.
17/1	102	O2	4	outlier (very high) compared to CTDO; mis-tripped.
17/1	102	pH	4	very high; mis-tripped.
17/1	102	Phosphate	4	very low; mis-tripped.
17/1	102	Salinity	4	outlier (very low) compared to CTDS; mis-tripped.
17/1	102	SF6	4	cfcs low, mis-tripped.
17/1	102	Silicate	4	very low; mis-tripped.
17/1	102	TAlk	4	very low; mis-tripped.
17/1	104	Bottle	2	lifted up by 3cm after the last cast to hopefully make it trip more reliably (repeated non-tripping before)
17/1	114	Bottle	2	ran out of water for salt
19/1	117	Bottle	4	o2 temp bit off, all parameters indicate mis-trip.
19/1	117	CFC-11	4	cfcs low, mis-trip.
19/1	117	CFC-12	4	cfcs low, mis-trip.
19/1	117	DIC	4	very hi vs P, mis-trip.
19/1	117	Nitrite	4	no2 low, mis-trip.
19/1	117	Nitrate	4	no3 high, mis-trip.
19/1	117	O2	4	very lo vs P,T; outlier (low) compared to CTDO, mis-trip.
19/1	117	pCO2	4	pCO2 high, mis-trip.
19/1	117	pH	4	very very lo vs P, mis-trip.
19/1	117	Phosphate	4	po4 high, mis-trip.
19/1	117	Salinity	4	outlier (high) compared to CTDS, mis-trip.
19/1	117	SF6	4	cfcs low, mis-trip.
19/1	117	Silicate	4	very hi vs P,S, mis-trip.
19/1	117	TAlk	4	very hi vs P,S, mis-trip.
20/1	106	Bottle	4	o2 temp a bit off and other parameters indicate mis-trip.
20/1	106	DIC	4	bottle mis-trip.
20/1	106	Nitrite	4	bottle mis-trip.
20/1	106	Nitrate	4	bottle mis-trip.
20/1	106	O2	4	outlier (low) compared to CTDO; mis-trip.
20/1	106	pCO2	4	bottle mis-trip.
20/1	106	pH	4	bottle mis-trip.
20/1	106	Phosphate	4	bottle mis-trip.
20/1	106	Salinity	4	outlier (low) compared to CTDS; mis-trip.
20/1	106	Silicate	4	bottle mis-trip.
20/1	106	TAlk	4	bottle mis-trip.
21/1	107	Bottle	2	rmk: probable mis-trip based on all parameters. mcj: see o2 comment, probably a real feature, code all parameters ok.
21/1	107	CCl4	2	outlier, probable mis-trip.
21/1	107	CFC-11	2	outlier, probable mis-trip.
21/1	107	CFC-12	2	outlier, probable mis-trip.
21/1	107	DIC	2	dic slightly high, see o2 comment.
21/1	107	Nitrite	2	nutrients slightly high, see o2 comment.
21/1	107	Nitrate	2	nutrients slightly high, see o2 comment.
21/1	107	O2	2	o2 seems low vs pressure, but correlates well with CTDO feature seen down and upcasts.
21/1	107	pCO2	2	pCO2 slightly high, see o2 comment.
21/1	107	pH	2	pH slightly low, see o2 comment.
21/1	107	Phosphate	2	nutrients slightly high, see o2 comment.
21/1	107	Salinity	2	salinity agrees well with CTDS.

Station /Cast	Sample Number	Property	Quality Code	Comment
21/1	107	SF6	2	outlier, probable mis-trip.
21/1	107	Silicate	2	nutrients slightly high, see o2 comment.
21/1	107	TAlk	2	talk ok, see o2 comment.
24/1	101	Salinity	5	salt marked as sampled on sample log, but not reported.
24/1	102	Bottle	9	not tripped (got stuck on a knot in the lanyard, CFCs took duplicate from 103 instead)
24/1	103	Salinity	5	salt marked as sampled on sample log, but not reported.
24/1	104	Bottle	9	not tripped (lanyard didn't come off hook)
24/1	109	Silicate	4	total flier
24/1	110	Bottle	9	not tripped (lanyard/hook got stuck on green part attached to frame that holds up transmissometer, CFCs took sample from 111 instead)
25/1	ALL		-	bottles 123-124 not used: very shallow cast.
25/1	102	Bottle	2	bottles 1/2 same trip depth, o2 drawn from bottle 1 only.
25/1	105	Bottle	2	bottles 4/5 same trip depth, o2 drawn from bottle 4 only.
25/1	109	O2	3	rmk: o2 low vs P, sio3; probable mis-trip or leak. mcj: bottles 9/10 tripped at same pressure, nuts, salt and ph from both bottles match: not a mis-trip.
25/1	110	Bottle	2	bottles 9/10 same trip depth, o2 drawn from bottle 9 only.
25/1	110	pH	2	rmk: pH low vs CTDS, flag 3. mcj: correlates with CTDO feature; bottles 9/10 salinity, nutrients, pH all agree (tripped at same pressure). value probably ok.
25/1	111	O2	4	rmk: o2 low vs P, sio3, probable mis-trip or leak. mcj: bottle data seem to align ok, not a mis-trip.
25/1	118	Bottle	2	bottles 17/18 same trip depth, o2 drawn from bottle 17 only.
25/1	122	Bottle	2	bottles 21/22 same trip depth, o2 drawn from bottle 21 only.
27/1	114	TAlk	3	alk low vs CTDS, P; other parameters ok. code alkalinity bad.
28/1	105	TAlk	3	alk low vs P; other parameters ok. code alkalinity bad.
28/1	121	O2	4	outlier (high) compared to CTDO as well as in an o2 section plot
31/1	107	O2	4	value extremely low vs other properties & compared to neighbors; outlier (low) compared to CTDO
31/1	110	O2	4	value very very low vs P,T,DIC, etc.; outlier (low) compared to CTDO
31/1	118	TAlk	3	value very hi vs S,T,no3,pH
31/1	123	Bottle	2	ran out of water for salt
33/1	104	Bottle	4	draw temperature too high, apparently tripped shallower; no samples drawn by pH/pCO2/DIC/Alk/C14/DOC
33/1	104	CCl4	4	cfcs slightly high, mis-trip.
33/1	104	CFC-11	4	cfcs slightly high, mis-trip.
33/1	104	CFC-12	4	cfcs slightly high, mis-trip.
33/1	104	Nitrite	4	nutrients low, mis-trip.
33/1	104	Nitrate	4	nutrients low, mis-trip.
33/1	104	O2	4	outlier (high) compared to CTDO. mis-trip.
33/1	104	Phosphate	4	nutrients low, mis-trip.
33/1	104	Salinity	4	outlier (high) compared to CTDS. mis-trip.
33/1	104	SF6	4	cfcs slightly high, mis-trip.
33/1	104	Silicate	4	nutrients low, mis-trip.
33/1	119	Bottle	9	lanyard did not release, no samples drawn
35/1	116	Bottle	2	upper hose clamp broke
36/1	104	Bottle	9	not tripped (hook came unlocked but did not release lanyard)
37/1	102	Bottle	2	upper hose clamp broke
37/1	106	Bottle	2	bubbles (helium)
37/1	112	Bottle	2	ran out of water for salt
37/1	114	Bottle	2	ran out of water for salt; bubbles (helium)
37/1	116	Bottle	2	ran out of water for salt

Station /Cast	Sample Number	Property	Quality Code	Comment
37/1	118	O2	2	ph accidentally sampled before o2
40/1	119	Bottle	2	o2, pH, CCl4 slightly low; cfcs, dic, pco2 slightly high vs P, theta; ok, correlates with CTDO feature on down/upcasts and neighboring casts; bottle ok.
40/1	119	Salinity	4	outlier (high) compared to CTDS; too big to correspond with feature seen in other parameters, possibly sampled from bottle 21 by mistake.
40/1	119	TAlk	2	TAlk low compared to neighboring casts vs P, theta; seems more out of line than other parameters in this CTDO feature. Re-check.
40/1	123	Refc.Temp.	3	SBE35RT high vs CTDT, unstable reading.
41/1	104	Bottle	9	lanyard did not release, no samples
41/1	109	Bottle	2	no water left for salt
41/1	118	O2	3	lo vs P,T,no3
42/1	122	Refc.Temp.	3	SBE35RT low vs CTDT, unstable reading.
43/1	117	O2	4	totally unrealistic; outlier (low) compared to CTDO as well as in an o2 section plot
44/1	106	Bottle	2	no water left for salt
44/1	120	Bottle	2	upper hose clamp broke on deck
45/1	102	Bottle	4	draw temperature could be ok or a bit hi. Bottle values indicate tripped about 300dbar shallower, near niskin 3.
45/1	102	CCl4	4	cfcs low, mis-trip.
45/1	102	CFC-11	4	cfcs low, mis-trip.
45/1	102	CFC-12	4	cfcs low, mis-trip.
45/1	102	DIC	4	dic low, mis-trip.
45/1	102	Nitrite	4	bottle mis-trip.
45/1	102	Nitrate	4	nutrients low, mis-trip.
45/1	102	O2	4	hi vs P,T; outlier (high) compared to CTDO, mis-trip.
45/1	102	pCO2	4	pco2 low, mis-trip.
45/1	102	pH	4	pH slightly hi, mis-trip.
45/1	102	Phosphate	4	nutrients low, mis-trip.
45/1	102	Salinity	4	hi vs P,T; outlier (high) compared to CTDS, mis-trip.
45/1	102	SF6	4	cfcs low, mis-trip.
45/1	102	Silicate	4	nutrients low, mis-trip.
45/1	102	TAlk	4	bottle mis-trip.
45/1	117	Bottle	2	lower hose clamp broken.
47/1	123	Refc.Temp.	3	SBE35RT slightly high vs CTDT, unstable reading.
48/1	105	Bottle	2	upper hose clamp broke
49/1	114	Bottle	2	ran out of water for salt
49/1	116	Bottle	2	ran out of water for salt
49/1	117	CFC-11	2	rmk: cfcs low vs P, T and/or CTDS. mcj: correlates with sharp o2/CTDO minimum, values ok.
49/1	117	CFC-12	2	rmk: cfcs low vs P, T and/or CTDS. mcj: correlates with sharp o2/CTDO minimum, values ok.
49/1	117	SF6	2	rmk: cfcs low vs P, T and/or CTDS. mcj: correlates with sharp o2/CTDO minimum, values ok.
49/1	121	Bottle	2	ran out of water for salt
50/1	102	Salinity	3	outlier (high) compared to CTDS
50/1	117	Bottle	4	draw temperature relatively high for 116 or relatively low for 117; bottle 117 identified as the mis-trip when compared to CTD data.
50/1	117	DIC	4	dic slightly high, mis-trip.
50/1	117	Nitrite	4	no2 slightly high, mis-trip.
50/1	117	Nitrate	4	no3 slightly low, mis-trip.

Station /Cast	Sample Number	Property	Quality Code	Comment
50/1	117	O2	4	outlier (high) compared to CTDO as well as o2 section plot; draw temp low but o2 much further off than other parameters; suspect o2 problem in addition to mis-trip.
50/1	117	pCO2	4	pco2 slightly low, mis-trip.
50/1	117	pH	4	pH slightly high, mis-trip.
50/1	117	Phosphate	4	po4 slightly low, mis-trip.
50/1	117	Salinity	4	outlier (high) compared to CTDS, mis-trip.
50/1	117	Silicate	4	sio3 slightly high, mis-trip.
50/1	117	TAlk	4	bottle mis-trip.
51/1	123	Refc.Temp.	3	SBE35RT low vs CTDT, unstable reading.
52/1	102	Bottle	9	not tripped, latch ok, but lanyard not released
53/1	116	pH	4	very very hi vs no3 and others, flier
54/1	103	TAlk	3	very lo vs P,S
54/1	106	Bottle	9	not tripped
54/1	107	Bottle	2	spigot replaced before cast
54/1	116	Bottle	2	spigot replaced before cast
54/1	118	Bottle	2	spigot replaced before cast
54/1	123	Refc.Temp.	3	SBE35RT low vs CTDT, unstable reading.
54/1	124	Bottle	2	spigot replaced before cast; O-ring replaced after cast before samples were drawn
55/1	102	pH	4	unreasonable value
55/1	110	Bottle	9	lower niskin cap hung up on trans. frame
56/1	102	Bottle	4	draw temperature too high, mis-tripped near surface. cfc, pco2, dic, alk, nutrients not drawn.
56/1	102	O2	4	outlier (high) compared to CTDO, mis-trip.
56/1	102	pH	4	outlier (high), mis-trip.
56/1	102	Salinity	4	outlier (high) compared to CTDS, mis-trip.
56/1	113	TAlk	3	very hi vs P,S,pH, etc.
57/1	106	Bottle	2	bubbles (helium)
58/1	106	Bottle	4	draw temperature a bit high, all parameters indicate bottle mis-tripped near niskin 13 trip pressure.
58/1	106	CCl4	4	cfcs high, mis-trip.
58/1	106	CFC-11	4	cfcs high, mis-trip.
58/1	106	CFC-12	4	cfcs high, mis-trip.
58/1	106	DIC	4	dic high, mis-trip.
58/1	106	Nitrite	4	bottle mis-trip.
58/1	106	Nitrate	4	no3 high, mis-trip.
58/1	106	O2	4	outlier (low) compared to CTDO, mis-trip.
58/1	106	pCO2	4	pco2 high, mis-trip.
58/1	106	pH	4	pH low, mis-trip.
58/1	106	Phosphate	4	po4 high, mis-trip.
58/1	106	Salinity	4	outlier (low) compared to CTDS, mis-trip.
58/1	106	SF6	4	cfcs high, mis-trip.
58/1	106	Silicate	4	sio3 low, mis-trip.
59/1	111	SF6	4	extremely hi vs P, other gases
59/1	119	O2	4	o2 high, probably bubbles in o2 titrant: apparently started running out earlier than bottles 22-23.
59/1	120	O2	4	o2 high, probably bubbles in o2 titrant: apparently started running out earlier than bottles 22-23.
59/1	121	O2	4	o2 high, probably bubbles in o2 titrant: apparently started running out earlier than bottles 22-23.

Station /Cast	Sample Number	Property	Quality Code	Comment
59/1	122	O2	5	o2 100+ umol/kg high, burette ran low on titrant.
59/1	123	O2	5	o2 100+ umol/kg high, burette ran low on titrant.
60/1	106	Bottle	9	not tripped (although lanyard released)
60/1	113	SF6	3	sf6 low vs P (f11/f12 rise slightly with other parameters at this bottle); flag 3.
61/1	101	Bottle	2	rosette was lowered again after this bottle was closed (from 2100db back to 2773db) because of bad wraps of wire on drum
61/1	102	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins. Rosette was lowered again after this bottle was closed (from 2100db back to 2773db) because of bad wraps of wire on drum
61/1	103	Bottle	2	rosette was lowered again after this bottle was closed (from 2100db back to 2773db) because of bad wraps of wire on drum
61/1	104	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins. Rosette was lowered again after this bottle was closed (from 2100db back to 2773db) because of bad wraps of wire on drum
61/1	105	Bottle	2	rosette was lowered again after this bottle was closed (from 2100db back to 2773db) because of bad wraps of wire on drum
61/1	106	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins. Rosette was lowered again after this bottle was closed (from 2100db back to 2773db) because of bad wraps of wire on drum
61/1	107	Bottle	2	rosette was lowered again after this bottle was closed (from 2100db back to 2773db) because of bad wraps of wire on drum
61/1	108	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins. Rosette was lowered again after this bottle was closed (from 2100db back to 2773db) because of bad wraps of wire on drum
61/1	110	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins
61/1	111	SF6	3	sf6 hi vs P,T (other cfcs show no change at this bottle); flag 3.
61/1	112	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins
61/1	113	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins
61/1	114	Bottle	2	draw temperature too high, possibly delayed trip; mcj: all parameters look ok, o2 and salinity agree well with CTD. Code bottle ok.
61/1	115	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins
61/1	116	Bottle	2	difficult to push the spigot
61/1	117	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins
61/1	118	Bottle	2	difficult to push the spigot
61/1	119	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins
61/1	121	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins
61/1	123	Bottle	2	all inner row bottles moved higher to improve angle of lanyards to carousel pins
62/1	116	O2	4	outlier (low) compared to CTDO
62/1	119	Bottle	2	spigot replaced before cast
62/1	121	Phosphate	3	very low vs pressure and neighbors
63/1	106	Salinity	4	outlier (high) compared to CTDS
63/1	118	O2	3	hi in all prop-prop plots
63/1	119	pCO2	2	rmk: hi in several prop-prop plots, code 3. mcj: min/max in other parameters, possibly ok. coded 2.
64/1	109	DIC	3	hi in prop-prop plots
65/1	104	Bottle	4	hi compared to CTDO, also vi hi vs neighbors and pressure
65/1	104	CCl4	4	bottle mis-trip.
65/1	104	CFC-11	4	bottle mis-trip.
65/1	104	CFC-12	4	bottle mis-trip.
65/1	104	DIC	4	outlier (low), mis-trip.
65/1	104	Nitrite	4	bottle mis-trip.

Station /Cast	Sample Number	Property	Quality Code	Comment
65/1	104	Nitrate	4	bottle mis-trip.
65/1	104	O2	4	outlier (high) compared to CTDO, neighbors and pressure; mis-trip.
65/1	104	pCO2	4	slightly hi, mis-trip.
65/1	104	pH	4	slightly low, mis-trip.
65/1	104	Phosphate	4	bottle mis-trip.
65/1	104	Salinity	4	outlier (low) compared to CTDS, mis-trip.
65/1	104	SF6	4	bottle mis-trip.
65/1	104	Silicate	4	outlier (low), mis-trip.
65/1	104	TAlk	4	outlier (low), mis-trip.
65/1	112	Bottle	2	bubbles (helium)
65/1	122	ctds	2	CTDS1 offsets 185db upcast to surface; use CTDS2 for bottles 122-124. CTDS acceptable now.
65/1	122	CTDS1	4	not in agreement with CTDS2 and bottle salinity + abrupt shift at ˜195db
65/1	122	CTDS2	2	CTDS1 offsets 185db upcast to surface; use CTDS2 for bottles 122-124. CTDS acceptable now.
65/1	123	ctds	2	CTDS1 offsets 185db upcast to surface; use CTDS2 for bottles 122-124. CTDS acceptable now.
65/1	123	CTDS1	4	not in agreement with CTDS2 and bottle salinity + abrupt shift at ˜195db
65/1	123	CTDS2	2	CTDS1 offsets 185db upcast to surface; use CTDS2 for bottles 122-124. CTDS acceptable now.
65/1	124	ctds	2	CTDS1 offsets 185db upcast to surface; use CTDS2 for bottles 122-124. CTDS acceptable now.
65/1	124	CTDS1	4	not in agreement with CTDS2 and bottle salinity + abrupt shift at ˜195db
65/1	124	CTDS2	2	CTDS1 offsets 185db upcast to surface; use CTDS2 for bottles 122-124. CTDS acceptable now.
66/1	ALL		-	upcast took 3 hours (winch slowed down)
66/1	104	SF6	4	very very hi vs P, unreal
66/1	123	Refc.Temp.	3	SBE35RT low vs CTDT, unstable reading.
67/1	104	Bottle	2	rosette was lowered again after bottle 104 was closed (from 4335db back to 4430db) because of bad wraps of wire on drum
68/1	101	Salinity	3	outlier (high) compared to CTDS
68/1	112	TAlk	3	analysis low compared to other parameters and neighbors
68/1	122	Salinity	3	hi vs other parameters appears to be mis-sampled from bottle 23; outlier (high) compared to CTDS, agree that it appears to have been flipped with 123
68/1	123	Salinity	3	hi vs other parameters appears to be mis-sampled from bottle 22; outlier (low) compared to CTDS, agree that it appears to have been flipped with 122
70/1	113	Bottle	2	vent not closed during cast
70/1	114	Bottle	2	vent not closed during cast
70/1	115	Bottle	2	vent not closed during cast
70/1	116	Bottle	2	vent not closed during cast
70/1	117	Bottle	2	vent not closed during cast
70/1	118	Bottle	2	vent not closed during cast
70/1	119	Bottle	2	vent not closed during cast
70/1	120	Bottle	2	vent not closed during cast
70/1	121	Bottle	2	vent not closed during cast
70/1	122	Bottle	2	vent not closed during cast
70/1	123	Bottle	2	vent not closed during cast
70/1	123	TAlk	3	very very lo vs CTDS; other parameters ok. code alkalinity bad.
70/1	124	Bottle	2	vent not closed during cast

Station /Cast	Sample Number	Property	Quality Code	Comment
72/1	ALL		-	bottles 11-12 triggered at 1600db: no confirmation from carousel; cast restarted as number 2, still no trips. bottles 13-24 not tripped: cast was taken back on deck after failed confirmations. merged 2 parts of cast 1 together after cast.
72/1	101	TAlk	3	rmk: bottles 1-10 TAlk low vs P, and vs nearby casts. mcj: theta-TAlk plot of stations 71-73 shows 1,4,10 low; 3,9 also somewhat low. flag 1, 4, 10 questionable.
72/1	103	TAlk	2	rmk: bottles 1-10 TAlk low vs P, and vs nearby casts. mcj: theta-TAlk plot of stations 71-73 shows 1,4,10 low; 3,9 also somewhat low. flag 1, 4, 10 questionable.
72/1	104	TAlk	3	rmk: bottles 1-10 TAlk low vs P, and vs nearby casts. mcj: theta-TAlk plot of stations 71-73 shows 1,4,10 low; 3,9 also somewhat low. flag 1, 4, 10 questionable.
72/1	107	Salinity	3	outlier (high) compared to CTDS
72/1	109	TAlk	2	rmk: bottles 1-10 TAlk low vs P, and vs nearby casts. mcj: theta-TAlk plot of stations 71-73 shows 1,4,10 low; 3,9 also somewhat low. flag 1, 4, 10 questionable.
72/1	110	TAlk	3	rmk: bottles 1-10 TAlk low vs P, and vs nearby casts. mcj: theta-TAlk plot of stations 71-73 shows 1,4,10 low; 3,9 also somewhat low. flag 1, 4, 10 questionable.
72/3	300	Bottle	2	another cast numbered 3 to cover the upper profile; CTD replaced (now #209)
72/3	301	Bottle	2	after 306 tripped rosette was taken from 780db back to 1500db because of wire problems
72/3	302	Bottle	2	after 306 tripped rosette was taken from 780db back to 1500db because of wire problems
72/3	303	Bottle	2	after 306 tripped rosette was taken from 780db back to 1500db because of wire problems
72/3	304	Bottle	2	after 306 tripped rosette was taken from 780db back to 1500db because of wire problems
72/3	305	Bottle	2	after 306 tripped rosette was taken from 780db back to 1500db because of wire problems
72/3	306	Bottle	2	after 306 tripped rosette was taken from 780db back to 1500db because of wire problems
73/1	114	Bottle	2	ran out of water for salt
73/1	116	Bottle	2	ran out of water for salt
73/1	118	Bottle	2	ran out of water for tritium/nutrients/salt
73/1	119	Bottle	2	ran out of water for nutrients/salt; bubbles (tritium)
74/1	103	O2	4	outlier vs pressure and vs CTD value
76/1	102	O2	3	outlier (low) vs pressure/CTDO
77/1	106	SF6	3	very high vs T, P
78/1	102	SF6	3	very high vs T, P
78/1	111	Bottle	9	spigot broke when CFCs started to sample, replaced right away. No samples drawn.
79/1	ALL		-	enter key was apparently left depressed after bottle 1 was tripped; all bottles apparently triggered at the bottom approximately 1 second apart. Restarted upcast as cast 2, later merged with downcast as cast 1.
79/1	101	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	101	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	101	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	101	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	101	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	101	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.

Station /Cast	Sample Number	Property	Quality Code	Comment
79/1	101	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	102	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	102	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	102	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	102	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	102	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	102	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	103	Bottle	4	o2 very low, salt very high vs CTD; niskin likely closed later than other bottles: mis-trip.
79/1	103	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	103	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	103	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	103	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	103	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	103	O2	4	o2 very low vs CTDO; niskin likely closed later than other bottles; mis-trip.
79/1	103	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	103	Salinity	4	salt very high vs CTDS; niskin likely closed later than other bottles; mis-trip.
79/1	103	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	103	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	104	Bottle	9	bottle 4 did not close.
79/1	105	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	105	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	105	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	105	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	105	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	105	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	105	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	105	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	105	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	105	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	105	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	106	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	106	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	107	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	pH	9	samples collected but not analyzed due to tripping uncertainty.

Station /Cast	Sample Number	Property	Quality Code	Comment
79/1	107	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	107	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	108	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	108	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	109	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	109	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	110	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	110	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	111	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	111	Silicate	9	samples collected but not analyzed due to tripping uncertainty.

Station /Cast	Sample Number	Property	Quality Code	Comment
79/1	111	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	112	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	112	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	113	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	113	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	114	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	114	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	115	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	115	Silicate	9	samples collected but not analyzed due to tripping uncertainty.

Station /Cast	Sample Number	Property	Quality Code	Comment
79/1	115	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	116	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	116	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	117	Bottle	4	ran out of water for nutrients/salt; most likely tripped at the bottom like other bottles.
79/1	117	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	117	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	117	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	117	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	117	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	117	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	117	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	117	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	118	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	118	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	119	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	119	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.

Station /Cast	Sample Number	Property	Quality Code	Comment
79/1	120	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	120	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	121	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	121	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	122	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	122	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	123	CCl4	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	123	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	Bottle	4	o2 and salt values indicate all bottles but 3 and 4 tripped at bottom of cast.
79/1	124	CCl4	9	samples collected but not analyzed due to tripping uncertainty.

Station /Cast	Sample Number	Property	Quality Code	Comment
79/1	124	CFC-11	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	CFC-12	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	DIC	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	Nitrite	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	Nitrate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	pCO2	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	pH	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	Phosphate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	SF6	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	Silicate	9	samples collected but not analyzed due to tripping uncertainty.
79/1	124	TAlk	9	samples collected but not analyzed due to tripping uncertainty.
79/3	300	Bottle	2	return to station 79 and do a full cast numbered 3; bottle 4 did not close.
79/3	304	Bottle	9	bottle 4 did not close
80/1	104	Bottle	2	raised by another 2.54 cm after last cast
81/1	109	SF6	3	outlier relative to adjacent samples
81/1	111	SF6	3	outlier relative to adjacent samples
82/1	103	Bottle	9	bottle 3 did not close, reason unknown.
82/1	105	Bottle	2	cfcs, o2, pH, DIC show local minimum at this bottle; pCO2, salinity slight maximum; nuts slightly off; possible mis-trip, or ok?
82/1	105	O2	3	bottle o2 slightly low compared to CTDO, down or upcast.
82/1	105	Salinity	3	salinity slightly high compared to CTDS, down or upcast.
82/1	113	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/1	114	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/1	115	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/1	116	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/1	117	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/1	118	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/1	119	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/1	120	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/1	121	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/1	122	Bottle	9	bottle 122 destroyed by bottle 23 implosion
82/1	123	Bottle	9	apparently tripped in air on the way in, imploded at depth (inner spring compressed): destroyed bottle 22, parts of bottle 23 prevented the other bottles from tripping; bottles 22/23 replaced after cast.
82/1	124	Bottle	9	bottles 13-24 did not close: piece of bottle 23 cap lodged under trip levers.
82/2	200	Bottle	2	second cast to cover the upper profile of station 82
82/2	205	Bottle	4	draw temperature too high, bottle mis-tripped based on o2, salt, other parameters. pco2, talk, dic not sampled.
82/2	205	CCl4	4	cfcs high, mis-trip.
82/2	205	CFC-11	4	cfcs high, mis-trip.
82/2	205	CFC-12	4	cfcs high, mis-trip.
82/2	205	Nitrite	4	bottle mis-trip.
82/2	205	Nitrate	4	no3 high, mis-trip.
82/2	205	O2	4	outlier (low) compared to CTDO, mis-trip.
82/2	205	pH	4	pH very low, mis-trip.
82/2	205	Phosphate	4	po4 high, mis-trip.
82/2	205	Salinity	4	outlier (high) compared to CTDS
82/2	205	SF6	4	cfcs high, mis-trip.
82/2	205	Silicate	4	sio3 low, mis-trip.
82/2	216	Bottle	2	draw temperature high but salt/o2 ok compared to CTDS/CTDO.
83/1	102	Bottle	9	pin did not fully release bottle

Station /Cast	Sample Number	Property	Quality Code	Comment
83/1	114	CFC-12	3	outlier vs T, P
83/1	119	Bottle	9	pin did not fully release bottle
83/1	122	Bottle	2	tripped the same depth as 121
84/1	105	Bottle	4	draw temperature too high; parameters indicate bottle mis-tripped. pH, pco2, talk, dic not sampled.
84/1	105	CCl4	4	cfcs high, mis-trip.
84/1	105	CFC-11	4	cfcs high, mis-trip.
84/1	105	CFC-12	4	cfcs high, mis-trip.
84/1	105	Nitrite	4	bottle mis-trip.
84/1	105	Nitrate	4	no3 high, mis-trip.
84/1	105	O2	4	outlier (very low) compared to CTDO, mis-trip.
84/1	105	Phosphate	4	po4 high, mis-trip.
84/1	105	Salinity	4	outlier (very low) compared to CTDS, mis-trip.
84/1	105	SF6	4	cfcs high, mis-trip.
84/1	105	Silicate	4	sio3 low, mis-trip.
84/1	114	SF6	4	very very high relative to neighbors
85/1	103	O2	3	outlier (high) compared to CTDO
85/1	109	Salinity	4	hi compared to CTDS and to neighboring stations
88/1	110	Bottle	2	adjusted (height/direction) to make spigot better accessible
89/1	111	SF6	3	hi vs pressure and cfc12
89/1	113	O2	4	outlier (high) compared to CTDO; rmk: hi vs NO3, Si, PO4, sigma
90/1	113	SF6	3	hi vs pressure and cfc12
91/1	122	DIC	3	rmk: dic anomalous vs P, CTDO, pH by a fair bit, flag 3. mcj: aligns with CTDO feature, other properties also unusual. rmk: but dic is a bit too far off. flagged questionable.
93/1	101	Bottle	2	vent was not closed, o2 sample not drawn
94/1	108	Bottle	3	draw temperature high
96/1	ALL		-	altimeter cleaned and reseated cable connector on altimeter
97/1	121	Bottle	2	raised to the same height as the inner bottles
98/1	103	O2	3	slightly high (4300db)
98/1	118	SF6	3	lo vs adjacent stations and in comparison to other cfc and ccl4
99/1	105	TAlk	4	flier - TAlk very, very low.
100/1	116	CCl4	3	hi vs neighbors and in ratio to other cfcs and sf6
101/1	101	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	102	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	103	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	104	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	105	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	106	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	107	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	108	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	109	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	110	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	111	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	111	SF6	3	sf6 high vs P (f11/f12 drop slightly with other parameters at this bottle); flag 3.
101/1	112	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	113	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	114	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	115	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	116	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	117	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)

Station /Cast	Sample Number	Property	Quality Code	Comment
101/1	118	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	119	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	120	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	121	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	122	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	123	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
101/1	124	Nitrate	4	chemistry problem with nuts. All nitrate bad (low)
103/1	105	Bottle	4	based on chem.evidence, bottle mis-tripped.
103/1	105	CCl4	4	bottle mis-trip.
103/1	105	CFC-11	4	bottle mis-trip.
103/1	105	CFC-12	4	bottle mis-trip.
103/1	105	DIC	4	outlier (low) vs pressure and others, mis-trip.
103/1	105	Nitrite	4	bottle mis-trip.
103/1	105	Nitrate	4	slightly low, mis-trip.
103/1	105	O2	4	outlier (low) compared to CTDO, mis-trip.
103/1	105	pCO2	4	slightly low, mis-trip.
103/1	105	pH	4	slightly low, mis-trip.
103/1	105	Phosphate	4	slightly low, mis-trip.
103/1	105	Salinity	4	outlier (high) compared to CTDS, mis-trip.
103/1	105	SF6	4	bottle mis-trip.
103/1	105	Silicate	4	outlier (low) vs pressure and others, mis-trip.
103/1	105	TAlk	4	outlier (low) vs pressure and others, mis-trip.
104/1	123	Refc.Temp.	3	SBE35RT high vs CTDT, unstable reading.
105/1	102	pH	3	hi compared to neighbors in pressure space
106/1	105	Bottle	4	draw temperature very high, mis-trip (surface trip); only cfc, helium, nuts, salinity sampled.
106/1	105	CCl4	4	outlier, mis-trip.
106/1	105	CFC-11	4	outlier, mis-trip.
106/1	105	CFC-12	4	outlier, mis-trip.
106/1	105	Nitrite	4	bottle mis-trip.
106/1	105	Nitrate	4	outlier vs p with neighbors, mis-trip.
106/1	105	Phosphate	4	outlier vs p with neighbors, mis-trip.
106/1	105	Salinity	4	outlier (high) compared to CTDS, mis-trip.
106/1	105	SF6	4	outlier, mis-trip.
106/1	105	Silicate	4	outlier vs p with neighbors, mis-trip.
106/1	119	Bottle	4	draw temperature high, o2 and salt high vs CTD, nuts low, cfcs hi; mis-trip.
106/1	119	CCl4	4	outlier, mis-trip.
106/1	119	CFC-11	4	outlier, mis-trip.
106/1	119	CFC-12	4	outlier, mis-trip.
106/1	119	DIC	4	outlier (low), mis-trip.
106/1	119	Nitrite	4	outlier (high), mis-trip.
106/1	119	Nitrate	4	outlier (low), mis-trip.
106/1	119	O2	4	outlier (high) compared to CTDO, mis-trip.
106/1	119	pCO2	4	outlier (low), mis-trip.
106/1	119	pH	4	outlier (high), mis-trip.
106/1	119	Phosphate	4	outlier (low), mis-trip.
106/1	119	Salinity	4	outlier (high) compared to CTDS, mis-trip.
106/1	119	SF6	4	outlier, mis-trip.
106/1	119	Silicate	4	outlier (low), mis-trip.
106/1	119	TAlk	4	outlier (high), mis-trip.
107/1	105	Bottle	2	raised before this cast

Station /Cast	Sample Number	Property	Quality Code	Comment
107/1	106	pH	3	hi vs pressure relative to neighboring samples and stations
107/1	111	Bottle	2	draw temperature high
107/1	114	Refc.Temp.	3	SBE35RT very high vs CTDT
107/1	121	Bottle	2	draw temperature very high. pH, pco2, dic, talk not sampled. o2, salinity agree well with CTD, other parameters also ok. code bottle ok.
108/1	102	Bottle	2	raised 1 inch before this cast
108/1	104	Bottle	9	not tripped (trigger released but lanyard not)
108/1	123	Refc.Temp.	3	SBE35RT high vs CTDT, unstable reading.
109/1	102	SF6	4	very very hi vs pressure and ccl4, unrealistic
110/1	104	Salinity	3	a bit high compared to CTDS, low vs pot T
111/1	104	Bottle	4	draw temperature high; cfcs, pH, pco2, dic, talk not sampled. o2, salinity, nutrients indicate mis-trip.
111/1	104	Nitrite	4	bottle mis-trip.
111/1	104	Nitrate	4	outlier (high), mis-trip.
111/1	104	O2	4	outlier (low) compared to CTDO, mis-trip.
111/1	104	Phosphate	4	outlier (high), mis-trip.
111/1	104	Salinity	4	outlier (low) compared to CTDS, mis-trip.
111/1	104	Silicate	4	outlier (low) vs pressure, bulls-eye on section plot; mis-trip.
112/1	103	CFC-12	4	very very hi and high in ratio
112/1	103	SF6	4	very very hi
112/1	105	TAlk	3	lo vs pressure and salt compared to adjacent and neighbors
112/1	106	CFC-12	4	very very hi and high in ratios
112/1	106	SF6	4	very very hi in profile
112/1	116	SF6	4	very very hi in profile
113/1	104	Bottle	4	all parameters indicate mis-trip.
113/1	104	DIC	4	outlier (low), mis-trip.
113/1	104	Nitrite	4	bottle mis-trip.
113/1	104	Nitrate	4	outlier (low), mis-trip.
113/1	104	O2	4	slightly low compared to CTDO; mis-trip.
113/1	104	pH	4	outlier (high), mis-trip.
113/1	104	Phosphate	4	outlier (low), mis-trip.
113/1	104	Salinity	4	outlier (high) compared to CTDS; mis-trip.
113/1	104	Silicate	4	very very low vs pressure, neighbors and section plot; mis-trip.
113/1	104	TAlk	4	outlier (low), mis-trip.
114/1	108	Salinity	4	lo vs CTD and pressure relative to other data
115/1	118	Bottle	2	no water left for salt sample.
115/1	118	CFC-11	4	unrealistic value (low)
116/1	ALL		-	no software confirmations at first three bottle stops, two trip attempts each; fired second try from deck unit for 2nd and 3rd levels from bottom, and ONLY from deck unit for next 18 bottles; bottles 21-24 did not close.
118/1	102	Salinity	3	low compared to CTDS
119/1	102	Salinity	3	high compared to CTDS
119/1	105	Phosphate	3	hi vs pressure and redfield off significantly. no3 ok
119/1	112	O2	4	very low (1350db)
120/1	101	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	102	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	103	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	104	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	105	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	106	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	107	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg

Station /Cast	Sample Number	Property	Quality Code	Comment
120/1	108	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	109	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	110	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	111	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	112	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	113	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	114	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	115	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	116	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	117	Bottle	2	o-ring replaced before sampling
120/1	117	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	118	Bottle	2	rmk: bad bottle? anomalous in various property-property plots, including pressure. mcj: bottle is in a distinct feature/rise (down-/up-cast CTDO maximum from approx. 400-460dbar). o2 agrees with CTDO. Re-code sio3, cfcs from 3 to 2.
120/1	118	CCl4	2	CTDO shows a distinct feature/rise here, cfcs are probably ok.
120/1	118	CFC-11	2	CTDO shows a distinct feature/rise here, cfcs are probably ok.
120/1	118	CFC-12	2	CTDO shows a distinct feature/rise here, cfcs are probably ok.
120/1	118	O2	2	o2 agrees with down-/up-cast CTDO, bottle taken in middle of a distinct CTDO feature/rise.
120/1	118	pH	2	rmk: pH for 18 a bit hi vs CTDS, pH for 19 a bit low vs CTDS; looks as if samples collected backward, flag 3. mcj: bottle 18 aligns with CTDO feature, flag both ok.
120/1	118	SF6	2	CTDO shows a distinct feature/rise here, cfcs are probably ok.
120/1	118	Silicate	2	CTDO shows a distinct feature/rise here, sio3 is probably ok.
120/1	119	pH	2	rmk: pH for 18 a bit hi vs CTDS, pH for 19 a bit low vs CTDS; looks as if samples collected backward, flag 3. mcj: bottle 18 aligns with CTDO feature, flag both ok.
120/1	119	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	120	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	121	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	122	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	123	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
120/1	124	Silicate	3	entire cast high by about 4% (deep water) or 2 umol/kg
121/1	102	Bottle	4	draw temperature high; pco2, dic, talk, nuts not sampled.
121/1	102	CCl4	4	cfcs high, mis-trip.
121/1	102	CFC-11	4	cfcs high, mis-trip.
121/1	102	CFC-12	4	cfcs high, mis-trip.
121/1	102	O2	4	outlier (very low) compared to CTDO; mis-trip.
121/1	102	pH	4	outlier (very low), mis-trip.
121/1	102	Salinity	4	outlier (high) compared to CTDS; mis-trip.
121/1	102	SF6	4	cfcs high, mis-trip.
121/1	111	Bottle	2	dripping, possibly leaking; all parameters seem ok, bottle ok.
122/1	102	Bottle	2	raised by 1.5 inches prior to cast
122/1	104	Bottle	9	not tripped
123/1	104	Bottle	4	draw temperature high; only o2, cfcs sampled. o2 indicates bottle mis-tripped.
123/1	104	O2	4	outlier (low) compared to CTDO; mis-trip.
123/1	110	Bottle	2	draw temperature a little bit high
124/1	108	O2	4	outlier (low) compared to CTDO
124/1	109	O2	4	outlier (low) compared to CTDO
124/1	123	Salinity	3	salt hi vs CTDS; high gradient

Station /Cast	Sample Number	Property	Quality Code	Comment
125/1	102	Bottle	4	multiple parameters slightly off, similar to bottle 3 values. probable mis-trip.
125/1	102	CCl4	4	bottle mis-trip.
125/1	102	CFC-11	4	bottle mis-trip.
125/1	102	CFC-12	4	bottle mis-trip.
125/1	102	DIC	4	dic slightly low, similar to niskin 3 value; mis-trip.
125/1	102	Nitrite	4	bottle mis-trip.
125/1	102	Nitrate	4	nutrients slightly low, similar to niskin 3 value; mis-trip.
125/1	102	O2	4	o2 similar to niskin 3 value; mis-trip.
125/1	102	pH	4	similar to niskin 3 value; mis-trip.
125/1	102	Phosphate	4	nutrients slightly low, similar to niskin 3 value; mis-trip.
125/1	102	Salinity	4	salinity slightly high vs CTDS, similar to niskin 3 value; mis-trip.
125/1	102	SF6	4	bottle mis-trip.
125/1	102	Silicate	4	nutrients slightly low similar to niskin 3 value; mis-trip.
125/1	102	TAlk	4	alk low, lower than bottle 3; mis-trip.
126/1	102	Bottle	2	spigot fixed
126/1	104	Bottle	4	multiple outliers, most parameters similar to bottle 6 values instead of bottle 5 (tripped at same pressure); mis-trip.
126/1	104	Nitrite	4	bottle mis-trip.
126/1	104	Nitrate	4	outlier (high), mis-trip.
126/1	104	O2	4	outlier (low) compared to CTDO, mis-trip.
126/1	104	pH	4	outlier (low), mis-trip.
126/1	104	Phosphate	4	outlier (high), mis-trip.
126/1	104	Salinity	4	outlier (low) compared to CTDS, mis-trip.
126/1	104	Silicate	4	outlier (low), mis-trip.
126/1	104	TAlk	4	outlier (low), mis-trip.
126/1	114	O2	4	outlier (low) compared to CTDO
126/1	123	Salinity	3	salt hi vs CTDS; high gradient
126/1	123	TAlk	3	hi vs P, CTDS
127/1	118	Refc.Temp.	3	SBE35RT slightly low vs CTDT, unstable reading.
127/1	123	Salinity	4	salt very hi vs CTDS
129/1	117	Bottle	2	rmk: nutrient data apparently assigned to niskins backwards. mcj: data re-assigned to correct bottles by analyst, silicate now increases with depth; ok now.
129/1	118	Bottle	2	rmk: nutrient data apparently assigned to niskins backwards. mcj: data re-assigned to correct bottles by analyst, silicate now increases with depth; ok now.
129/1	119	Bottle	2	rmk: nutrient data apparently assigned to niskins backwards. mcj: data re-assigned to correct bottles by analyst, silicate now increases with depth; ok now.
129/1	119	Refc.Temp.	3	SBE35RT very low vs CTDT
129/1	120	Bottle	2	rmk: nutrient data apparently assigned to niskins backwards. mcj: data re-assigned to correct bottles by analyst, silicate now increases with depth; ok now.
129/1	121	Bottle	2	rmk: nutrient data apparently assigned to niskins backwards. mcj: data re-assigned to correct bottles by analyst, silicate now increases with depth; ok now.
129/1	122	Bottle	2	rmk: nutrient data apparently assigned to niskins backwards. mcj: data re-assigned to correct bottles by analyst, silicate now increases with depth; ok now.
129/1	123	Bottle	2	rmk: nutrient data apparently assigned to niskins backwards. mcj: data re-assigned to correct bottles by analyst, silicate now increases with depth; ok now.
129/1	123	Salinity	3	salt hi vs CTDS; high gradient
129/1	124	Bottle	2	rmk: nutrient data apparently assigned to niskins backwards. mcj: data re-assigned to correct bottles by analyst, silicate now increases with depth; ok now.

References

Joyc94.

Joyce, T., ed. and Corry, C., ed., “Requirements for WOCE Hydrographic Programme Data Reporting,” Report WHPO 90-1, WOCE Report No. 67/91 ., pp. 52-55, WOCE Hydrographic Programme Office, Woods Hole, MA, USA (May 1994, Rev. 2).