A. Cruise Narrative

A.1. Highlights

A.1.a	WOCE Designation:	AR7W
A.1.b	EXPOCODE	18HU92014/1
A.1.c	Chief Scientist	John R.N. Lazier Bedford Institute of Oceanography Box 1006 Dartmouth, Nova Scotia Canada B2y-4a2 Phone: 902-426-2558 Telefax: 902-426-7827 Internet: J_lazier@bionet.bio.dfo.ca
A.1.d	Ship:	C.S.S. Hudson
A.1.e	Ports of call:	St. John's Nfld. to Halifax N.S.
A.1.f	Dates:	May 27 to June 14, 1992.

A.2. Cruise Summary

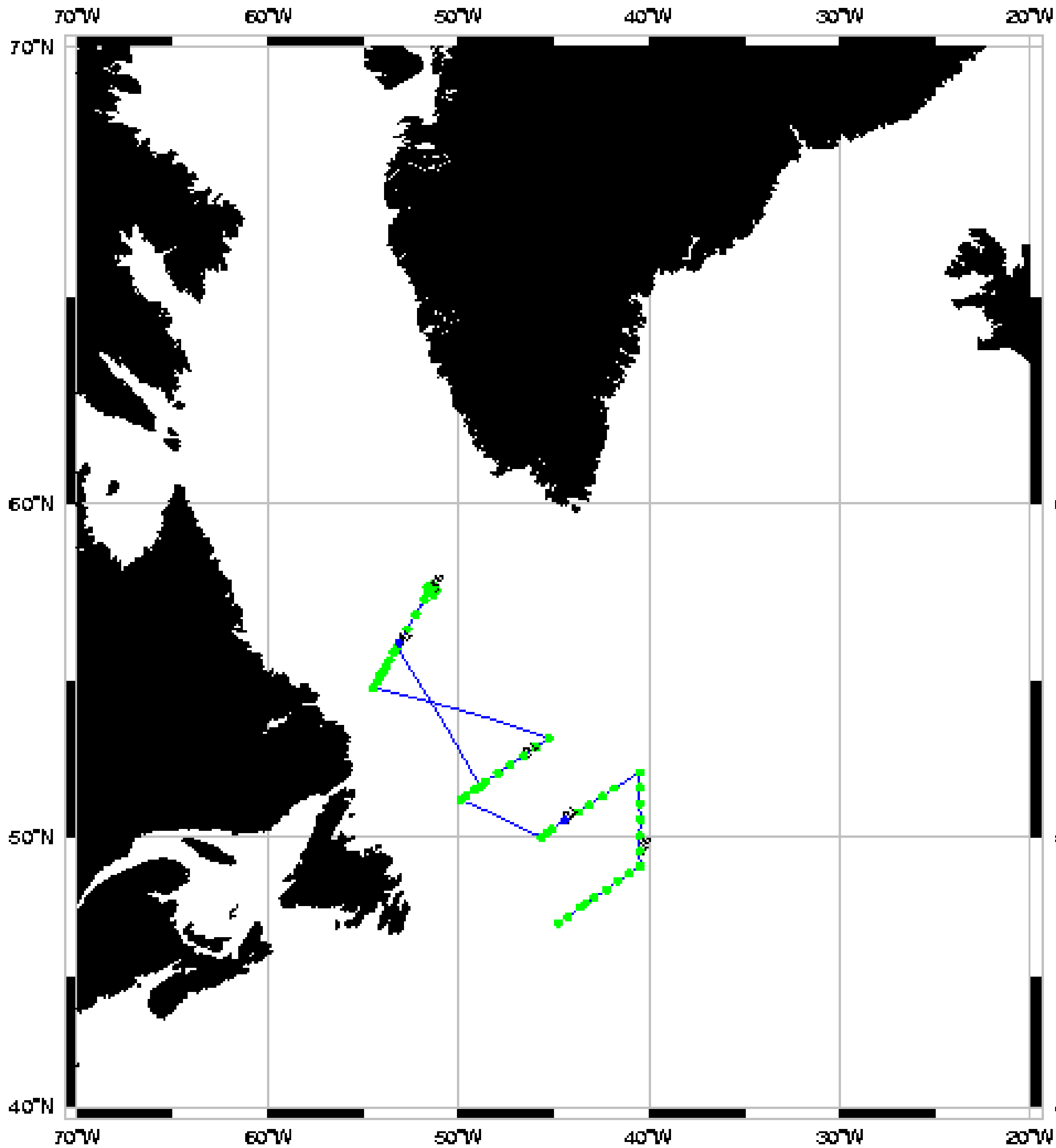
A.2.a Geographic Boundaries
A.2.b Total number of stations

Station Numbers 34 to 45 are on the WOCE AR7/W line while 1 to 33 are part of a survey of the northern branch of the North Atlantic Current. Stations 45, 51 and 52 are detailed (40 bottle) rosette casts and numbers 45 to 50 comprise a small scale survey without rosette samples.

The Seabird CTD acquired temperature, salinity and oxygen profiles. Rosette water samples were analysed for salinity, oxygen, nutrients, CFC-11, CFC-12, CFC-113, total carbonate, alkalinity and halocarbons. No floats or moorings were set.

A.2.c Floats and drifters deployed
A.2.d Moorings deployed or recovered

Station locations for AR07WC : LAZIER



A.3 Principal Investigators

Table 1: Principal Investigators

Name	Responsibility	Affiliation
John Lazier	CTD, salinity	BIO
Peter Jones	CFC, O2, alkalinity,	BIO
	CO2, nutrients	
Katarina Abrahamsson	Halocarbons	U. of Goeteborg
Brenda Ekwurzel (Peter Schlosser)	Tritium, Helium	LDEO

Table 2: list of Institutions

Abbreviation	Name
BIO	Bedford Institute of Oceanography
	Box 1006
	Dartmouth, Nova Scotia
	Canada B2y-4a2
BDR	BDR Research
	P.O Box 652, Station M
	Halifax, Nova Scotia
	B3j-2T3 Canada
OSU	College of Oceanography
	Oregon State University
	Corvallis, OR
	97331-5503
LDEO	Lamont-Doherty Earth Observatory
	Columbia University
	Palisades, NY
	10964 USA

A.4 Scientific Programme and Methods

Two sampling programs were included on the cruise; a survey of the region northeast of Flemish Cap (stations 1 to 33) and the WOCE AR7/W line across the Labrador Sea (stations 34 to 45). The ship sailed from St. John's Newfoundland as scheduled on May 27 and arrived at station 1, on Flemish Cap, approximately 24 hours later. At this station all 20 rosette bottles were tripped at the same depth to test the analytical procedures and to check the rosette sampling bottles for leaks.

Throughout the cruise a Seabird CTD system was used with 8 litre PVC sampling bottles and a General Oceanics rosette. The frame carrying these items and the sampling bottles were designed at BIO by J. Desserault.

The cold upper water at stations 1 to 3 over Flemish Cap is derived from the cold southward flowing Labrador Current. In the first two sections (stations 1 to 15) the edge of the North Atlantic Current is revealed by the upper layer temperatures above 10 deg. C. The third section seems to be free of this warm current except for small patches at stations 20 and 21 in the top 200 db. This result is interesting because a well defined branch of the North Atlantic Current has often been observed, in float trajectories, to flow north past Flemish Cap over the 4000 m isobath toward the north. The current suddenly turns from north to east at 51 deg N in what L.V. Worthington called the Northwest Corner. At other times however this well defined flow does not seem to be present. Our section appears to have been obtained at one of these latter periods.

All the sections show, between 1000 and 2500 db, a minimum in the vertical gradient between 3.0 and 3.2 ◊C. This marks the Labrador Sea water renewed in the central Labrador Sea via convection to 2000 m. The higher gradient below this layer marks the North Atlantic Deep Water and at the bottom the Denmark Strait Overflow Water.

The temperature along the Labrador Sea AR7/W line (stations 34 to 45) shows the 5 features typical of such sections. Over the shelf is the sub-zero water brought south by the Labrador Current and over the shelf break is a strong horizontal gradient marking the main branch of this current. To seaward of the current in the upper 1800 m is a layer of low vertical gradient which isthe centre of the formation region of the Labrador Sea Water. Below this lies the North Atlantic Deep Water and the Denmark Strait Overflow Water at the bottom.Plots of temperature and salinity were done through the low gradient layer. An interesting feature of these is the temperature minimum < 2.8 C between 1200 and 1800 m. This feature is characteristic of recent convection which disappears if convection does not occur for a few winters.

A.5 Major Problems and Goals not Achieved

The only insurmountable problem was the fact that we did not receive permission to work within Greenland's 370 km economic zone. We were therefore not able to complete the eastward half of the WOCE AR7/W line.

A.6. Cruise Participants

Name	**Responsibility**	**Affiliation**
Abrahamsson, Katarina	Halocarbons	Univ. of Goeteborg
Bellefontaine, Larry	CTD watchkeeper	BIO
Carson, Bruce	CTD tech/watchkeeper/salts	BIO
Clement, Pierre	Nutrients	BIO
Dunphy, Paul	Computers/software	BIO
Ekdahl, Anja	Halocarbons	BIO
Ekwurzel, Brenda	Tritium-Helium	Univ. of Goeteborg
Gershey, Robert	CFC, Alk., Carb.	BDR Res. (BIO)
Hayden, Helen	Computer watchkeeper	BIO
Hingston, Michael	CFC, Alk., Carb.	BDR Res. (BIO)
Jones, Peter	Co-chief scientist	BIO
Jordan, Francis	CTD watchkeeper	BIO
Lazier, John	Chief scientist	BIO
Pierce, David	Computer watchkeeper	U of W, Seattle
Smith, Marion	Computer watchkeeper	BIO
Tcitcarin, Andrey	Oxygens	SOI, Moscow
Yashayaev, Igor	Data processing	SOI, Moscow
Zemlyak, Frank	CFC, Alk., Carb.	BIO

B. Underway Measurements

B.1. Navigation and bathymetry
B.2 Acoustic Doppler Current Profiler (ADCP)
B.3 Thermosalinograph and underway dissolved oxygen, florometer etc.
B.4 XBT and XCTD
B.5 Meteorological observations
B.6 Atmospheric chemistry

C. Hydrographic Measurements-Descriptions, Techniques and Calibrations

C.1. CTD

The arrangement of CTD components used throughout the cruise are tabulated below.

ARRANGEMENTS OF CTD COMPONENTS

Item/Variable	Serial Nos.	Stations	Dates
Sea Unit	9P5676-0248	1-11	May 28-30
Sea Unit	9P5676-0249	12-52	May 31-June 11
Deck Unit	11P5676-0242	1-52	May 28-June 11
Deck Unit	11P5676-0243	spare	
Temp sensor	SBE3-02F # 031247	1-52	May 28-June 11
Cond sensor	SBE4-02/0 #040954	1-52	May 28-June 11
Pres sensor	410K-105 #48361	1-52	May 28-June 11
Oxy sensor	SBE13-02 #130265	1-6	May 28-May 29
Oxy sensor	SBE13-02 #130267	7-15	May 29-June 1
Oxy sensor	SBE13-02 #130266	17-52	June 1-June 11

The pre-cruise calibration of the temperature, conductivity and pressure sensors was done at the BIO standards lab between April 7 and 15, 1992. Between -2 and +10 deg. C the temperature sensor agreed with the PRT standard to within +/- 0.001 deg. C. The salinity derived from the conductivity sensor agreed with determinations by the Guildline Autosal salinometer using Standard Seawater batch P112 to less than .002. Over the pressure range of 0-5000 db thedifference between the Paroscientific pressure transducer and the standard pressure balance were less than 1 db. During the cruise 730 salinity samples collected from the rosette casts were analysed on a Guildline Autosal salinometer with standard seawater batch P117. Due to cracked tops on some salinity sample bottles, partially filled bottles, miss-trips of rosette bottles and other assorted problems the absolute value of 52 of these comparisons are greater than 0.02. The histogram of the remaining 93% in shows a near normal distribution with a slight bias to higher values. The average and standard deviation of these 678 differences is 0.0045+/-0.005. No evidence was found to indicate a pressure dependence or a drift in time.

Temperature measurements were also obtained on each CTD cast using 5 electronicreversing thermometers. Three were placed on the first or bottom rosette bottle and two on the third rosette bottle. The average differences between thermometers on the same bottle are less than 0.002 deg C but the comparisons with the CTD are not as good. This is mainly because the thermometer racks often got hung up when the rosette bottles were tripped. Of the 69 comparisonsbetween the reversing thermometers (averaged for each thermometer rack) and theCTD only 37 were within the range +/- 0.02. The average and standard deviation of these is -.008+/-.006. Because of the large standard deviation of these results any correction to the CTD data will await the post cruise calibration.

The calibration of the CTD oxygen data will be done after the cruise via comparisons with the oxygen determinations from the rosette bottles. The CTD data was acquired using a SeaBird 911/Plus instrument. Data collection was controlled using a 33 MHz 80486DX based microcomputer with a 120 Mb hard disk and a SuperVGA color monitor. The data was analysed using SeaBird's SeaSoft suite of programs. Since we had a rather modest amount of PC disk storage, the data was transferred to a MicroVAX II over EtherNet soon after collection. The MicroVax was equipped with 1.8 Gb of disk storage and 13 Mb memory. The operating system was VMS 4.6. Since this was our first major cruise with the SeaBird software, we re-processed the raw CTD data on the MicroVAX II. We used the PIPE software package developed at the Bedford Institute of Oceanography. The PIPE analysis package, developed by John O'Neill et al., has been our standard processing software for CTD data for a number of years. Results from the PC based SeaBird software and PIPE compared well.

Order of Drawing Samples

The order of drawing samples from the rosette sampling bottles was first for chlorofluorocarbons followed by helium-tritium and oxygen, then total carbonate, total alkalinity, halocarbons, nutrients, salinity, tritium.

Salinity

The salinity of the rosette water samples was determined with the Guildline Autosal salinometer Model 8400 serial number 39870. Sixty-four vials of standard sea water batch P117 were used for the 817 determinations for a ratio of about 12 determinations per vial. The drift of the machine between standardizations was never more than 1 part in 20000 or 0.005%. No duplicate samples were obtained.

Nutrient Measurements

Samples were analyzed for silicate, phosphate, and total nitrate (nitrate plus nitrite) using an AutoAnalyzer-II with minor changes to their technique. Was water was 33 ppt (w/v) NaCl and no salt correction was made.

Samples were collected in duplicate from the rosette bottles into30 mL high density polyethylene screw-capped bottles. These were refrigerated until analysis, typically within 12 hours of collection. The water samples were transferred to 7 mL cups for analysis with the AutoAnalyzer.

Five mixed standards were run at the beginning and end of each run, with "check standards" interspersed every sixteen sample cups. Each batch of mixed standards are tested against Sagami CSK standards for nitrate and silicate before use. Precision was determined by the variance of the samples drawn fromthe same rosette bottle. The precisions were about 0.17% for silicate, 0.52% for phosphate, and 0.14% for total nitrate.

CFC Measurements

Analyses for Freon-11, Freon-12, Freon-113, and carbon tetrachloride were performed on all sample depths for about 75% of the stations. The number of analyses was constrained by analysis times which allow the analysis of up to fifty samples per day. Analyses were performed using an electron-capture gas chromatograph as part of an analytical system and procedure developed at the Bedford Institute of Oceanography.

CFC samples were the first drawn from the rosette bottle when it came on deck.Samples were collected with 100 mL glass syringes and stored under running seawater in a holding bath on deck until analysis, typically within 12 hours of collection. Blanks, air samples and standards were run at least once for each station. On stations with more than 20 sampling depths, blanks and standards were run an extra time. Blanks were run each time the drying trap was changed. The drying trap was changed after each station and also when a water peak showed up during a run. The precisions of the measurements were about 5% for Freon-12, 2.5% for Freon-113, and 2% for Freon-11 and carbon tetrachloride.

Contamination with Freon-12 was evident in samples from two or three stations after refrigeration systems on Hudson had been inspected and recharged. It is suspected that Freon-12 was adsorbed in the rosette bottles. The contamination dissipated after two days. Occasional contamination of Freon-113was found.

Total Carbonate and Total Alkalinity Measurements

Total carbonate and total alkalinity samples were collected on about half of the stations. The number of samples collected in both cases was limited by thetime available to perform the analyses. Duplicate samples for both total carbonate and total alkalinity analyses were typically collected from one rosette bottle on each cast. Samples were collected in 250 mL bottles, stored in a cooling bath, and analyzed typically within 12 hours ofcollection. Total carbonate samples were poisoned with mercuric chloride immediately after collection.

Total carbonate samples were analyzed with a coulometric technique using a URI Somma extraction system. Total alkalinity was determined by potentiometric titration using an automated system developed at the Bedford Institute of Oceanography. The precisions obtained were about 0.06% for total carbonate and about 0.15% for total alkalinity.

Dissolved Oxygen

Dissolved oxygen measurements were performed at all depths for all stations on this cruise. At least two duplicate samples were taken from each cast. Samples were analyzed by a modified Winkler technique using an automated procedure developed at the Bedford Institute of Oceanography. The precision obtained on duplicate samples when obvious outliers were removed was about 0.25%.

Helium-Tritium

Samples for tritium and helium were collected at all sample depths for every station (except Station 42) along the WOCE AR7/W line. Helium samples were drawn after CFC samples. Water samples were stored in pinched-off copper tubes (~40 cm3) for measurement of helium isotopes. After all other samples were drawn from the rosette bottles, samples were drawn in 1 L glass bottles for tritium analysis.

Analyses will be performed at the Helium Isotope Laboratory of Lamont-Doherty Geological Observatory under the direction of Dr. Peter Schlosser. The water samples will be de-gassed in a vacuum extraction system and, after separating other gasses, the helium isotopes will be measured in a dedicated mass spectrometer. tritium will be measured using the He- ingrowth method. The precision of the 3He/4He measurement is about 1% or better.

Biogenic Halocarbons

Samples were collected for the measurement of a number of brominated and iodated volatile hydrocarbons1 in the top 1000 m and near the bottom on almost every station. The samples were collected in 100 mL glass bottles and analyzedtypically within a few hours of collection. The analyses were performed following procedures developed at the Department of Analytical and Marine Chemistry at the University of Gˆteborg, Sweden. The hydrocarbons were extracted with 1 mL of specially purified pentane, then analyzed with capillary gas chromatography and electron capture detection.

The samples were drawn 30 to 60 minutes after the rosette was on deck. Checks for contaminants were made continuously throughout the cruise. The pentane was checked frequently (blanks). Contamination from the rosette bottles was checked by drawing additional samples up to several hours after initial sampling. The presence of perchloroethylene severely influenced the determination of dibromochloromethane. Losses due to time elapsed in the rosette bottles were noted, especially for tribromomethane.

1 Dibromomethane, bromodichloromethane, dibromochloromethane, tribromomethane,1-iodopropane, 2-iodopropane, 1-iodobutane, 2-iodobutane, chloroiodomethane, diiodomethane

D. Acknowledgements

E. References

Unesco, 1983. International Oceanographic tables. Unesco Technical Papers in Marine Science, No. 44.

Unesco, 1991. Processing of Oceanographic Station Data, 1991. By JPOTSeditorial panel.

F. WHPO Summary

Several data files are associated with this report. They are the hu9214.sum, hu9214.hyd, hu9214.csl and *.wct files. The hu9214.sum file contains a summary ofthe location, time, type of parameters sampled, and other pertientinformation regarding each hydrographic station. The hu9214.hyd file contains thebottle data. The *.wct files are the ctd data for each station. The *.wct files are zipped into one file called hu9214.wct.zip. The hu9214.csl file is a listingof ctd and calculated values at standard levels.

The following is a description of how the standard levels andcalculated values were derived for the hu9214.csl file:

Salinity, Temperature and Pressure: These three values were smoothedfrom the individual CTD files over the N uniformly increasingpressure levels using the following binomial filter-

$$t(j) = 0.25ti(j-1) + 0.5ti(j) + 0.25ti(j+1) \quad j=2....N-1$$

When a pressure level is represented in the *.csl file that is notcontained within the ctd values, the value was linearly interpolatedto the desired level after applying the binomial filtering.

Sigma-theta(SIG-TH:KG/M3), Sigma-2 (SIG-2: KG/M3), and Sigma-4(SIG-4:KG/M3): These values are calculated using the practical salinity scale(PSS-78) and the international equation of state for seawater (EOS-80)as described in the Unesco publication 44 at reference pressures of thesurface for SIG-TH; 2000 dbars for Sigma-2; and 4000 dbars for Sigma-4.

Gradient Potential Temperature (GRD-PT: C/DB 10-3) is calculated as theleast squares slope between two levels, where the standard level is thecenter of the interval. The interval being the smallest of the twodifferences between the standard level and the two closest values.The slope is first determined using CTD temperature and then theadiabatic lapse rate is subtracted to obtain the gradient potentialtemperature. Equations and Fortran routines are described in Unescopublication 44.

Gradient Salinity (GRD-S: 1/DB 10-3) is calculated as the least squaresslope between two levels, where the standard level is the center of thestandard level and the two closes values. Equations and Fortranroutines are described in Unesco publication 44.

Potential Vorticity (POT-V: 1/ms 10-11) is calculated as the verticalcomponent ignoring contributions due to relative vorticity, i.e.pv=fN2/g, where f is the coriolius parameter, N is the bouyancyfrequency (data expressed as radius/sec), and g is the localacceleration of gravity.

Bouyancy Frequency (B-V: cph) is calculated using the adiabaticleveling method, Fofonoff (1985) and Millard, Owens and Fofonoff(1990). Equations and Fortran routines are described in Unescopublication 44.

Potential Energy (PE: J/M2: 10-5) and Dynamic Height (DYN-HT: M) arecalculated by integrating from 0 to the level of interest. Equations and Fortran routines are described in Unesco publication, Processing of Oceanographic station data.

Neutral Density (GAMMA-N: KG/M3) is calculated with the program GAMMA-N(Jackett and McDougall) version 1.3 Nov. 94.

G. Data Quality Evaulation

DQE of CTD data for the 92014/1 1992 cruise of the r/v "Hudson",WOCE section A7W in the Northern Atlantic. Eugene Morozov

Data quality of 1-db CTD temperature and salinity profiles and reference rosette samples were examined. Vertical distributionsand theta-salinity curves were compared for individual stations using the data of up and down CTD casts and rosette probes. Data of several neighboring stations were compared. The data were compared with the 90/12 cruise of the r/v "Dawson" carried out in the same region.

It is a pity but very often bad salinities are measured fromwater samples taken with the same bottles. I give the numbers ofrepeated bad probes taken with the same botles.

Questionable data in *.hy2 file were marked in QUALT2 word.   The CTD oxygen data were flagged not calibrated by originators. CTDOXY data should be calibrated. No bottle OXYGEN data is yetavailable.

Listing of results from the comparison of salinity data. Only thosestations and pressures are listed which have data remarks.Data quality evaluation was made only for the data that are concerned with the WOCE AR7W section.

Stat	Pressure	Remarks
36	402 db	SALNTY is low 34.813 compared with upcast CTDSAL 34.828
		and downcast CTDSAL 34.823
		bottle OC4
		flag 4.
37	1611 db	SALNTY is low 34.843 compared with upcast CTDSAL 34.850
		and downcast CTDSAL 34.852
		flag 4.
38	1614 db	SALNTY is high 34.921 compared with upcast CTDSAL 34.913
		and downcast CTDSAL 34.912
		flag 4.
39	55 db	SALNTY is high 34.815 compared with upcast CTDSAL 34.796
		and downcast CTDSAL 34.792
		flag 4.
	2183 db	SALNTY is low 34.907 compared with upcast CTDSAL 34.916
		and downcast CTDSAL 34.916
		bottle OC4
		flag 4.
	2772 db	SALNTY is low 34.891 compared with upcast CTDSAL 34.900
		and downcast CTDSAL 34.901
		bottle OC27
		flag 4.
	2961 db	SALNTY is low 34.888 compared with upcast CTDSAL 34.892
		and downcast CTDSAL 34.892
		bottle OC3
		flag 4.
40	2395 db	SALNTY is low 34.908 compared with upcast CTDSAL 34.914.
		and downcast CTDSAL 34.915
		bottle OC4
		flag 4.
	2807 db	SALNTY is high 34.912 compared with upcast CTDSAL 34.906
		and downcast CTDSAL 34.907
		flag 4.

Stat	Pressure	Remarks
40	2999 db	SALNTY is high 34.906 compared with upcast CTDSAL 34.893
		and downcast CTDSAL 34.893
		bottle OC27
		flag 4.
	3159 db	SALNTY is high 34.892 compared with upcast CTDSAL 34.887
		and downcast CTDSAL 34.887
		bottle OC3
		flag 4.
41	605 db	SALNTY is high 34.842 compared with upcast CTDSAL 34.833.
		and downcast CTDSAL 34.834
		flag 4.
	3035 db	SALNTY is high 34.925 compared with upcast CTDSAL 34.913
		and downcast CTDSAL 34.913
		bottle OC11
		flag 4.
	3202 db	SALNTY is high 34.913 compared with upcast CTDSAL 34.895
		and downcast CTDSAL 34.895
		bottle OC27
		flag 4.
	3370 db	SALNTY is low 34.879 compared with upcast CTDSAL 34.883
		and downcast CTDSAL 34.884
		bottle OC3
		flag 4.
42	811 db	SALNTY is low 34.823 compared with upcast CTDSAL 34.834.
		and downcast CTDSAL 34.832
		flag 4.
	2195 db	SALNTY is low 34.846 compared with upcast CTDSAL 34.865
		and downcast CTDSAL 34.870
		flag 4.
	2597 db	SALNTY is low 34.914 compared with upcast CTDSAL 34.920
		and downcast CTDSAL 34.921
		flag 4.

Stat	Pressure	Remarks
42	3215 db	SALNTY is high 34.915 compared with upcast CTDSAL 34.904
		and downcast CTDSAL 34.904
		bottle OC11
		flag 4.
	3365 db	SALNTY is high 34.905 compared with upcast CTDSAL 34.892
		and downcast CTDSAL 34.892
		bottle OC27
		flag 4.
43	6 db	SALNTY is high 34.819 compared with upcast CTDSAL 34.785.
		and downcast CTDSAL 34.791
		where did you get so much salt added to the sample, the level is only 6 meters, or you did not flush the salinometer?
		flag 4.
	106 db	SALNTY is high 34.839 compared with upcast CTDSAL 34.819
		and downcast CTDSAL 34.819
		flag 4.
	1006 db	SALNTY is low 34.841 compared with upcast CTDSAL 34.832
		and downcast CTDSAL 34.834
		flag 4.
	2016 db	SALNTY is high 34.860 compared with upcast CTDSAL 34.841
		and downcast CTDSAL 34.844
		bottle OC18
		flag 4.
	2424 db	SALNTY is high 34.919 compared with upcast CTDSAL 34.909
		and downcast CTDSAL 34.910
		flag 4.
	3240 db	SALNTY is low 34.888 compared with upcast CTDSAL 34.905
		and downcast CTDSAL 34.906
		bottle OC11
		flag 4.
44	2819 db	SALNTY is low 34.919 compared with upcast CTDSAL 34.926.
		and downcast CTDSAL 34.925
		flag 4.
		Originators flag this bottle 3-leaking, but they flag SALNITY 2.

Stat	Pressure	Remarks
	3026 db	SALNTY is high 34.923 compared with upcast CTDSAL 34.917
		and downcast CTDSAL 34.918
		flag 4.
	3234 db	SALNTY is high 34.918 compared with upcast CTDSAL 34.911
		and downcast CTDSAL 34.911
		bottle OC11
		flag 4.
	3436 db	SALNTY is high 34.911 compared with upcast CTDSAL 34.891
		and downcast CTDSAL 34.891
		bottle OC27
		flag 4.
	3580 db	SALNTY is low 34.858 compared with upcast CTDSAL 34.887
		and downcast CTDSAL 34.887
		bottle OC3
		flag 4.
		There is a cold freshwater layer between 2463 and 2607 db, measured by CTD and not supported by bottles. The densities are close to unstable, nevertheless I consider it real. It must be a small horizontal scale feature, because bottles were fired away from it.
45	2216 db	SALNTY is low 34.845 compared with upcast CTDSAL 34.856.
		and downcast CTDSAL 34.851
		flag 4.
	2315 db	SALNTY is low 34.856 compared with upcast CTDSAL 34.887
		and downcast CTDSAL 34.893,
		flag 4.
	2917 db	SALNTY is low 34.907 compared with upcast CTDSAL 34.921
		and downcast CTDSAL 34.921
		bottle OC18
		flag 4.
	3329 db	SALNTY is low 34.867 compared with upcast CTDSAL 34.899
		and downcast CTDSAL 34.900
		flag 4.