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Carbon Dioxide, Hydrographic, and Chemical Data Obtained During the R/V *John V. Vickers* Cruise in the Pacific Ocean

(WOCE Section P13, NOAA CGC92 Cruise, August 4 - October 21, 1992)

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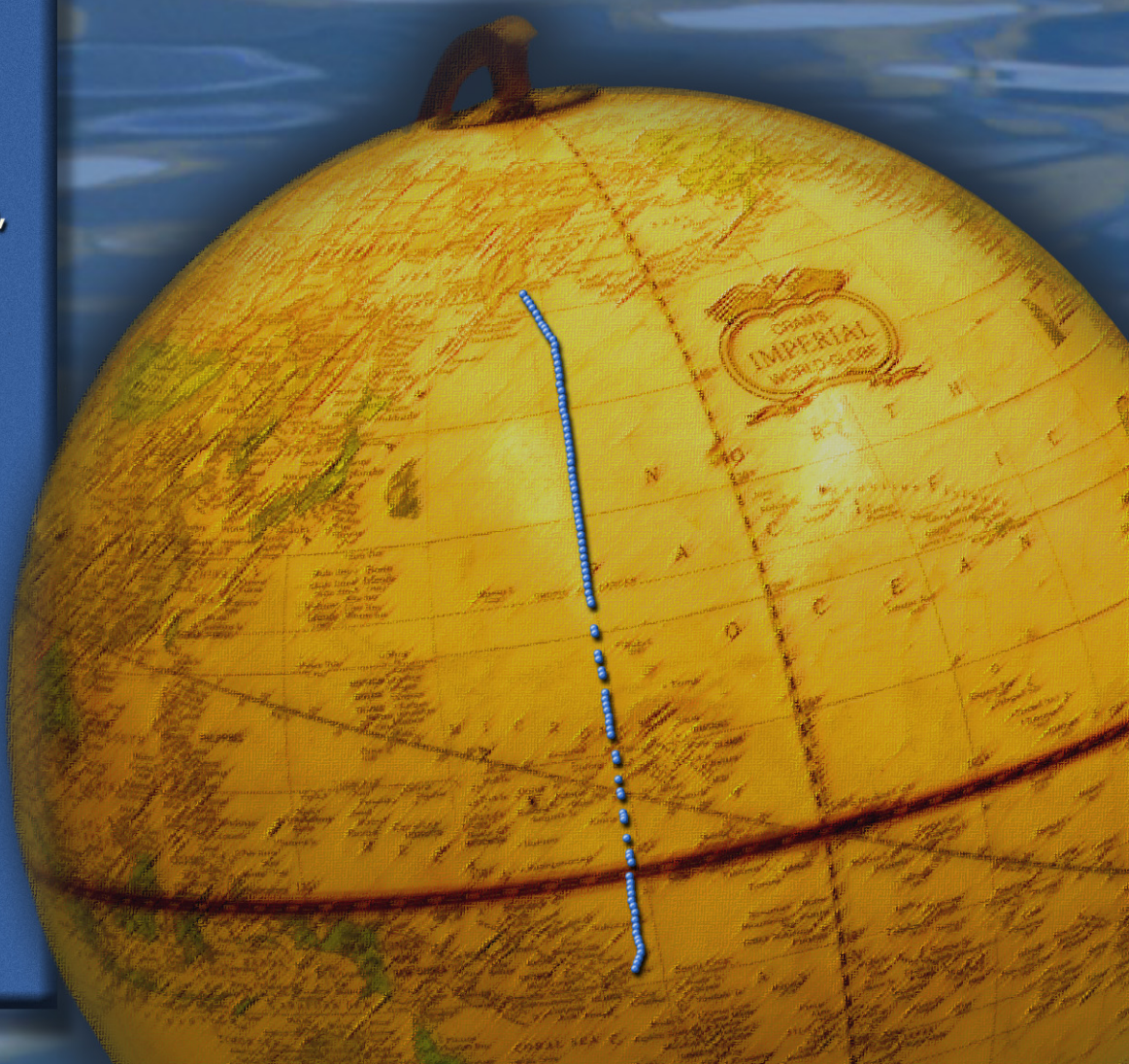

UNITED STATES DEPARTMENT OF ENERGY

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ACRONYMS

ADCP	acoustic Doppler current profiler
CDIAC	Carbon Dioxide Information Analysis Center
CFC	chlorofluorocarbon
CGC	Climate and Global Change
CO_2	carbon dioxide
COARE	Coupled Ocean-Atmosphere Response Experiment
CTD	conductivity, temperature, and depth sensor
DOE	U.S. Department of Energy
FTP	file transfer protocol
GMT	Greenwich mean time
GO	General Oceanics, Inc.
IAPSO	International Association for the Physical Sciences of the Ocean
nm	nautical mile
NBIS	Neil Brown Instrument System
NDP	numeric data package
NOAA	National Oceanic and Atmospheric Administration
pCO_2	partial pressure of CO_2
PMEL	Pacific Marine Environmental Laboratory
PSS	Practical Salinity Scale
QA	quality assurance
R/V	research vessel
SIO	Scripps Institution of Oceanography
SOMMA	Single-Operator Multiparameter Metabolic Analyzer
SOP	standard operating procedure
TALK	total alkalinity
TCO_2	total carbon dioxide
TOGA	Tropical Ocean Global Atmosphere
UH	University of Hawaii
USF	University of South Florida
UW	University of Washington
WHOI	Woods Hole Oceanographic Institution
WHPO	WOCE Hydrographic Program Office
WOCE	World Ocean Circulation Experiment

ABSTRACT

Dickson, A. G., C. D. Keeling, P. R. Guenther, and J. L. Bullister. 2000. Carbon Dioxide, Hydrographic, and Chemical Data Obtained During the R/V *John V. Vickers* Cruise in the Pacific Ocean (WOCE Section P13, NOAA CGC92 Cruise, August 4–October 21, 1992), A. Kozyr (ed.). ORNL/CDIAC-128, NDP-075. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee, 96 pp.

This data documentation discusses the procedures and methods used to measure total carbon dioxide (TCO_2) and total alkalinity (TALK) at hydrographic stations during the R/V *John V. Vickers* oceanographic cruise in the Pacific Ocean (Section P13). Conducted as part of the World Ocean Circulation Experiment (WOCE) and the National Oceanic and Atmospheric Administration's Climate and Global Change Program, the cruise began in Los Angeles, California, on August 4, 1992, with a transit line (Leg 0) to Dutch Harbor, Alaska. On August 16, the ship departed Dutch Harbor on Leg 1 of WOCE section P13. On September 15, the R/V *John V. Vickers* arrived in Kwajalein, Marshall Islands, for emergency repairs, and after 11 days in port departed for Leg 2 of Section P13 on September 26. The cruise ended on October 21 in Noumea, New Caledonia. Measurements made along WOCE Section P13 included pressure, temperature, salinity [measured by a conductivity, temperature, and depth sensor (CTD)], bottle salinity, bottle oxygen, phosphate, nitrate, nitrite, silicate, chlorofluorocarbons (CFC-11, CFC-12), TCO_2, and TALK.

The TCO_2 was measured by coulometry using a Single-Operator Multiparameter Metabolic Analyzer (SOMMA). The overall precision and accuracy of the analyses was ±2 µmol/kg. Samples collected for TALK were measured by potentiometric titration; precision was ±2 µmol/kg. The CO_2-related measurements aboard the R/V *John V. Vickers* were supported by the U.S. Department of Energy.

The WOCE Section P13 data set is available free of charge as a numeric data package (NDP) from the Carbon Dioxide Information Analysis Center. The NDP consists of two oceanographic data files, two FORTRAN 90 data-retrieval routine files, a documentation file, and this printed report, which describes the contents and format of all files as well as the procedures and methods used to obtain the data. Instructions on how to access the data are provided.

Keywords: carbon dioxide; TCO_2; coulometry; World Ocean Circulation Experiment; Pacific Ocean; hydrographic measurements; alkalinity; carbon cycle.

PART 1:

OVERVIEW

1. BACKGROUND INFORMATION

The World Ocean plays a dynamic role in the Earth's climate: It captures heat from the sun, transports it, and releases it thousands of miles away. These oceanic-solar-atmospheric interactions affect winds, rainfall patterns, and temperatures on a global scale. The oceans also play a major role in global carbon-cycle processes. Carbon is unevenly distributed in the oceans because of complex circulation patterns and biogeochemical cycles. The oceans are estimated to hold 38,000 gigatons of carbon, 50 times more than that in the atmosphere and 20 times more than that in plants, animals, and soil. If only 2% of the carbon stored in the oceans were released, the level of atmospheric carbon dioxide (CO_2) would double. Every year, the amount of CO_2 exchanged across the sea surface is more than 15 times that produced by the burning of fossil fuels, deforestation, and other human activities (Williams 1990).

To better understand the ocean's role in climate and climatic changes, several large experiments have been conducted, and others are under way. The largest oceanographic experiment ever attempted is the World Ocean Circulation Experiment (WOCE). A major component of the World Climate Research Program, WOCE brings together the expertise of scientists and technicians from more than 30 nations. In the United States, WOCE is supported by the federal government under the Global Change Research Program. The multiagency U.S. effort is led by the National Science Foundation and is supported by major contributions from the National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of Energy (DOE), the Office of Naval Research, and the National Aeronautics and Space Administration. Although total carbon dioxide (TCO_2) is not an official WOCE measurement, a coordinated effort, supported in the United States by DOE, was made on WOCE cruises to measure the global distributions of TCO_2 and other carbon-related parameters [total alkalinity (TALK), partial pressure of CO_2 (pCO_2), and pH]. The goal of the DOE's CO_2 survey includes estimation of the meridional transport of inorganic carbon in a manner analogous to the oceanic heat transport (Bryden and Hall 1980; Brewer et al. 1989; Roemmich and Wunsch 1985), evaluation of the exchange of CO_2 between the atmosphere and the ocean, and preparation of a database suitable for carbon-cycle modeling and subsequent assessment of anthropogenic CO_2 in the oceans. The final data set is expected to cover ~23,000 stations.

This report presents CO_2-related measurements obtained during the Research Vessel (R/V) *John V. Vickers* NOAA Climate and Global Change (CGC92) expedition along the WOCE meridional Section P13 (Fig. 1).

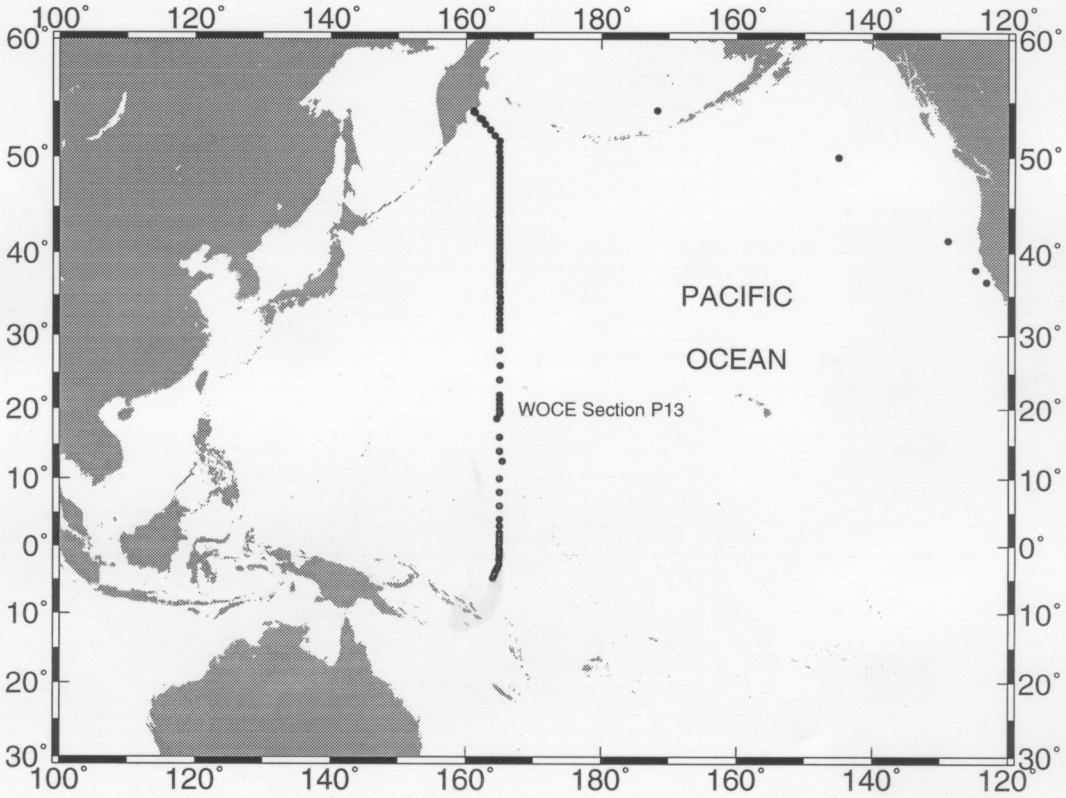

Fig. 1. The cruise track during the R/V *John V. Vickers* expedition in the Pacific Ocean along WOCE Section P13.

2. DESCRIPTION OF THE EXPEDITION

2.1 R/V *John V. Vickers* Cruise Information

R/V *John V. Vickers* cruise information follows:

Ship name	*John V. Vickers*
Expedition code	3220CGC92/0, 1, 2
WOCE Section	P13
Location	Los Angeles, California, U.S.A., to Noumea, New Caledonia
Dates	August 4–October 21, 1992
Chief Scientist	Legs 0 and 1, John Bullister, NOAA/PMEL Leg 2, Bruce Taft, NOAA/PMEL (retired)

Parameters measured	**Institution**	**Principal investigators**
CTD,[1] salinity	PMEL	B. Taft
Oxygen	PMEL	J. Bullister
Nutrients	USF	K. Fanning
Chlorofluorocarbons (CFCs)	PMEL	J. Bullister
Tritium and helium-3	WHOI	W. Jenkins
TCO_2	SIO	A. Dickson
TALK	SIO	C. Keeling
Radiocarbon (^{14}C)	UW	P. Quay
Underway ADCP[2]	SIO	R. Pinkel
Lowered ADCP	UH	P. Hacker

Participating Institutions

PMEL	Pacific Marine Environmental Laboratory
USF	University of South Florida
UW	University of Washington
WHOI	Woods Hole Oceanographic Institution
SIO	Scripps Institution of Oceanography
UH	University of Hawaii

[1]Conductivity, temperature, and depth sensor.
[2]Acoustic Doppler current profiler.

2.2 Brief Cruise Summary

The CGC92 expedition was carried out on the U.S. registered R/V *John V. Vickers*. This vessel was operated by the University of Southern California together with officers from the NOAA corps.

The goal of the cruise was to carry out a WOCE one-time hydrographic measurement along section P13 which runs along longitude 165E E from the Kamchatka peninsula to New Caledonia. The cruise was split into three legs for logistical regions.

2.2.1 Leg 0: Expedition Code 3220CGC92/0

Leg 0 of the CGC92 expedition consisted of a transit from Los Angeles, California, to Dutch Harbor, Alaska, with 4 stations occupied along the cruise track to test the CTD/rosette system (stations 1–4 are not included in the data set). One of these stations was a re-occupation of Station "P" (50E N, 145E W). Scientists from SIO tested an underway ADCP system along the cruise track.

2.2.2 Leg 1: Expedition Code 3220CGC92/1

The chief scientist for Leg 1 of the cruise was Dr. John Bullister of NOAA/PMEL. The R/V *John V. Vickers* left Dutch Harbor on August 16, 1992, to carry out the sampling along the cruise track, and arrived at Kwajalein, Marshall Islands, on September 15, 1992.

Leg 1 consisted of 51 stations (Nos. 5–55). The first station on this leg (No. 5) was a CTD/rosette cast test (not included in the data set) made in the Bering Sea, along the transit from Dutch Harbor to the start of the P13 line near the Kamchatka Peninsula. Sampling of the P13 section began with occupation of station No. 6 on August 21, 1992, near the 200-meter isobath off Kamchatka. A series of stations were occupied on a southeastward transit down the continental slope and across the Kamchatka trench. The section turned directly southward at about 51E 30' N and 165E 00' E and continued along the 165E E meridian for the remainder of Leg 1. Nominal station spacing was 30 nautical miles (nm) from the start of the section to about 40E N. Because of a series of delays during the first part of Leg 1, a decision was made to stretch nominal station spacing for the remainder of Leg 1 to 40 nm.

Because of concerns about possible structural deformation to the ship and concern over the failure of a watertight door to close properly, work on the P13 CTD/rosette section was halted on September 9, 1992, at about 30E N, and R/V *John V. Vickers* was ordered to steam directly to Kwajalein.

2.2.3 Leg 2: Expedition Code 3220CGC92/2

The chief scientist for the second leg of the cruise was Dr. Bruce Taft from NOAA/PMEL. The R/V *John V. Vickers* remained at the dock in Kwajalein for an extended period of time for evaluation of structural integrity by two marine architects and for repair. The ship left Kwajalein

on September 26, 1992, and began steaming back to the break-off point to continue work on the P13 section.

Despite the delay caused by these repairs, the R/V *John V. Vickers* had to arrive in Noumea, New Caledonia, in time for its subsequent use by Tropical Ocean Global Atmosphere/Coupled Ocean-Atmosphere Response Experiment (TOGA/COARE) investigators. This schedule did not allow enough time to complete the WOCE Section P13 to even minimum WOCE Hydrographic Program (WHPO) specifications.

With the remaining time, R/V *John V. Vickers* occupied CTD/rosette stations at a nominal spacing of about 60 nm from 28E N to 4E N, and closer spacing from 4E N to 4E 30' S. Lowered ADCP measurements were made on stations between 4E N and 4E S. The section was terminated on October 17, 1992, at 4E 45' S and 164E 00' E in order to arrive in Noumea by the October 21 deadline. A total of 32 stations (Nos. 56–88) were occupied during Leg 2 (station No. 60 was aborted and not included in the listings).

Throughout the cruise along WOCE Section P13, samples for shipboard analysis of TCO_2 and TALK were collected from 10-L Niskin bottles on the 36-position small-volume rosette water sampling system. Of the total of 88 stations on the three legs, CO_2 samples were collected from all Niskin bottles throughout the water column on 39 stations. On an additional 41 stations CO_2 samples were collected from surface bottles only (Fig. 2).

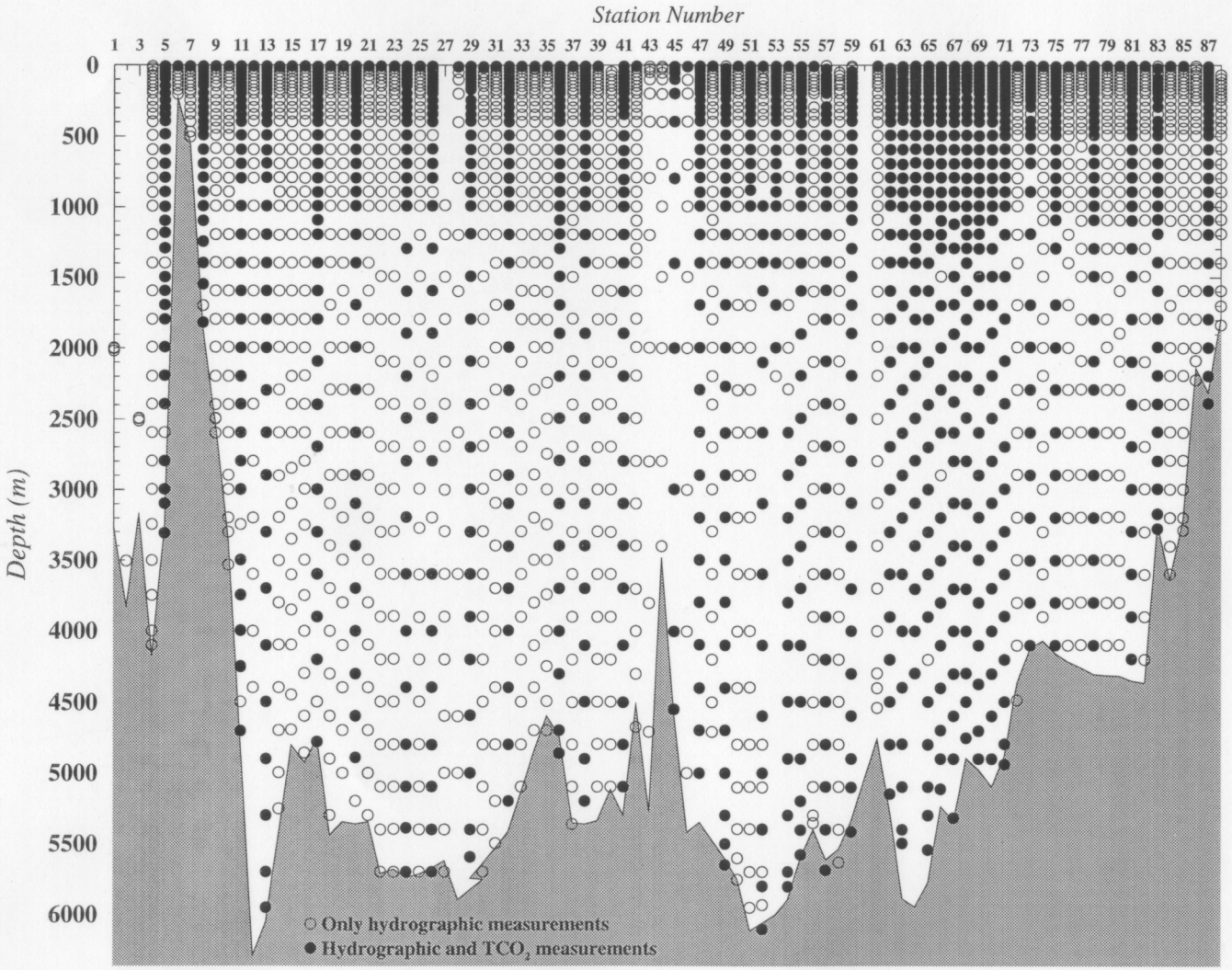

Fig. 2. Sampling depths at all hydrographic stations occupied during the R/V *John V. Vickers* expedition along WOCE Section P13.

3. DESCRIPTION OF VARIABLES AND METHODS

3.1 Hydrographic Measurements

A NOAA/PMEL-designed, 36-position, 10-L rosette frame was used at 84 of the 88 stations during the expedition. A smaller 12-position, 2.4-L rosette was used as a bad-weather backup system at several stations during the cruise. A General Oceanics (GO) 36 "Intelligent" underwater array (pylon) and deck unit was used with the PMEL 36-position system, along with a Neil Brown Instrument Systems (NBIS) MARK III CTD (serial # 1111). The CTD pressure, temperature, and conductivity data were processed and corrected according to laboratory calibrations. Pressure values are expected to be accurate to ±3 dbar, temperature values to ±0.002°C.

The salinity analysis aboard R/V *John Vickers* was determined exclusively with a Guildline 8400 Autosal. This instrument was located in a temperature-controlled room at 20.5 ± 1EC. The bath of the autosal was kept at 21EC and proved to be very stable throughout the cruise. Standardization of the autosal was carried out with International Association for the Physical Sciences of the Ocean (IAPSO) Standard Seawater batch P114.

Samples of dissolved oxygen were collected soon after the rosette sampler was brought on board and after CFC and helium samples were collected. Calibrated 125-mL nominal volume iodine determination flasks (Corning 5400-125) were used for sampling. Titration was performed by Carpenter's (1965) whole bottle technique with a modification of the system described by Friederich et al. (1991).

All analyses for nutrients were done with an Alpkem RFA/2 320 autoanalyzer. The methods used were modified from those recommended by the Alpkem Corporation. The working nutrient standards used were a mixture of phosphate, silica, nitrate, and nitrite in a low-nutrient natural seawater matrix. Simultaneous analyses were run on the RFA/2 for all of these nutrients.

For more detailed information on hydrographic measurements, please see the Chief Scientist report at http://whpo.ucsd.edu/data/onetime/pacific/p13/p13/index.htm .

3.2 Total Carbon Dioxide Measurements

The samples for TCO_2 were taken in 500-mL borosilicate glass bottles in accordance with the procedure specified in *Handbook of Methods for the Analysis of the Various Parameters of the Carbon Dioxide System in Sea Water* (DOE 1994), an earlier version of which was available at the time in manuscript version to the DOE Science Team. The samples were poisoned with mercuric chloride to minimize biological activity prior to analysis.

Two duplicate samples were taken and analyzed for each profile: one in surface water (near the top of the cast) and one in deep water (near the bottom of the cast). These are used to assist in the assessment of the measurement quality.

3.2.1 Analysis Technique

The samples were analyzed using a Single Operator Multiparameter Metabolic Analyzer (SOMMA) developed by K. Johnson (Johnson et al. 1985; 1987). The procedure using this specific instrument is described in detail in the SOMMA operating manual (Johnson 1991 - unpublished manuscript), and a description of the procedure is available in the DOE handbook (DOE 1994).

The principle behind this analysis is as follows: A known amount of seawater is dispensed into a stripping chamber where it is acidified and purged with an inert gas. The presence of solid carbonates, such as $CaCO_3$, thus constitutes an interference in the method. The amount of CO_2 in the resulting gas stream is determined by absorbing the CO_2 in an absorbent containing ethanolamine and titrating coulometrically the hydroxyethylcarbamic acid that is formed. The pH of the solution is monitored by measuring the transmittance of a thymolphthalein indicator at approximately 610 nm. Hydroxide ions are generated by the coulometer circuitry so as to maintain the transmittance of the solution at a constant value. The relevant chemical reactions occurring in the solution are:

$$CO_2 + HO(CH_2)_2NH_2 \div HO(CH_2)_2NHCOO^{!} + H^{+}$$

and

$$H^{+} + OH^{!} \div H_2O.$$

The hydroxide ions used are generated at the cathode by electrolyzing water:

$$H_2O + e^{!} \div ½H_2(g) + OH^{!},$$

while silver is dissolved at the anode:

$$Ag(s) \div Ag^{+} + e^{!} .$$

The overall efficiency of the coulometric procedure is calibrated using known amounts of CO_2 gas, either from gas loops or from seawater-based reference materials.

3.2.2 Order of Analyses

The samples were analyzed in the order surface-to-deep. This order allowed the cooler deep samples to come to room temperature before they were analyzed. However, this means that it is not possible to ascertain from the analytical measurements alone if there is a systematic variation in the calibration with the life of the coulometric cell (see Sect. 3.2.3 below).

3.2.3 Calibration of the Analyses

The calibration of the analyses reported here was problematic. The original plan was to use gas loops to calibrate the coulometer system and to check the performance of the analyses using certified reference materials (CRM Batch 13, certified TCO_2 value 2015.13 µmol/kg). Unfortunately, a post-cruise examination of the results showed that the calibration factor calculated for gas loops was unexpectedly variable; an examination of the calibration factor that would have been calculated from the analyses of the CRMs also showed similar variability (equivalent to a standard deviation of measurement of 2.4 µmol/kg).

A more detailed examination showed that the variability was restricted to those measurements that had been made in the early stages of a cell's lifetime; measurements on gas loops (Fig. 3) or on CRMs (Fig. 4) made later in the cell's lifetime were much more stable as well as being lower (counts/µmol) than the initial measurements.

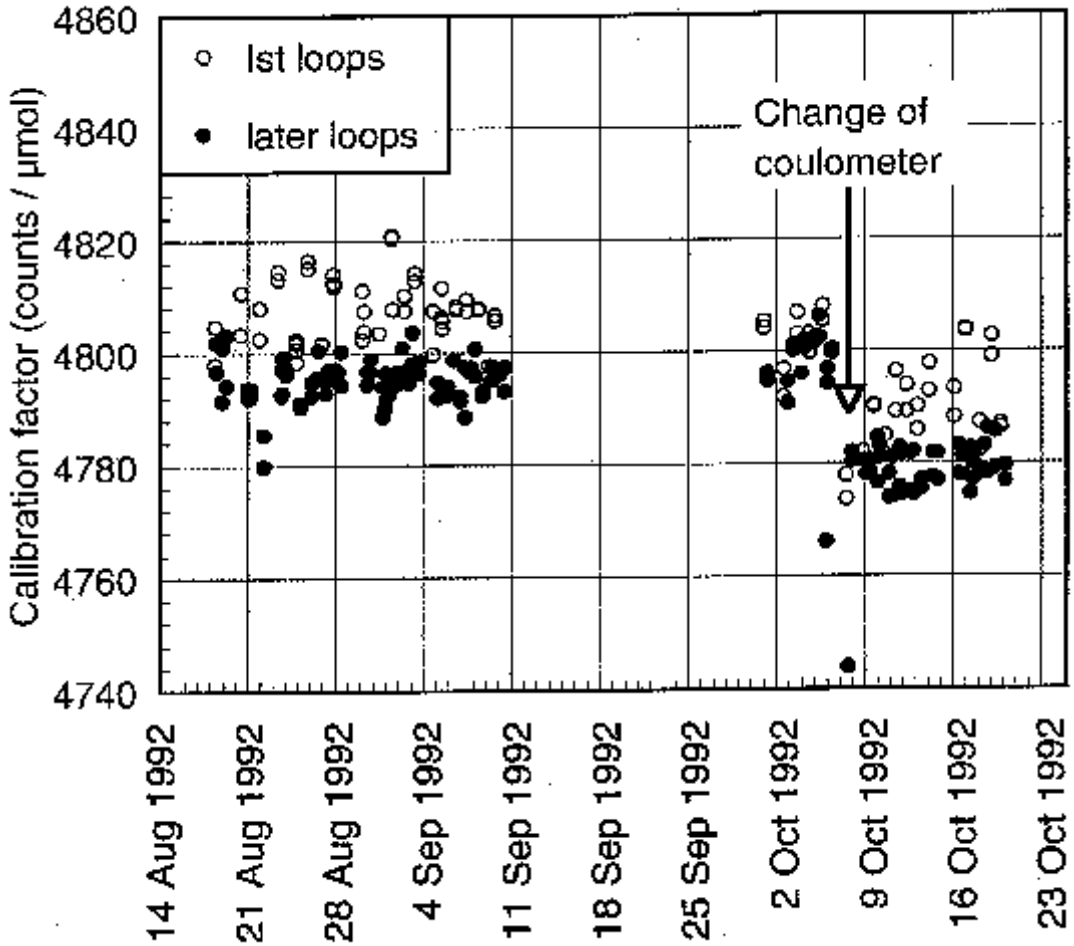

Fig. 3. Calibration factors from gas loops expressed as counts/Fmol.

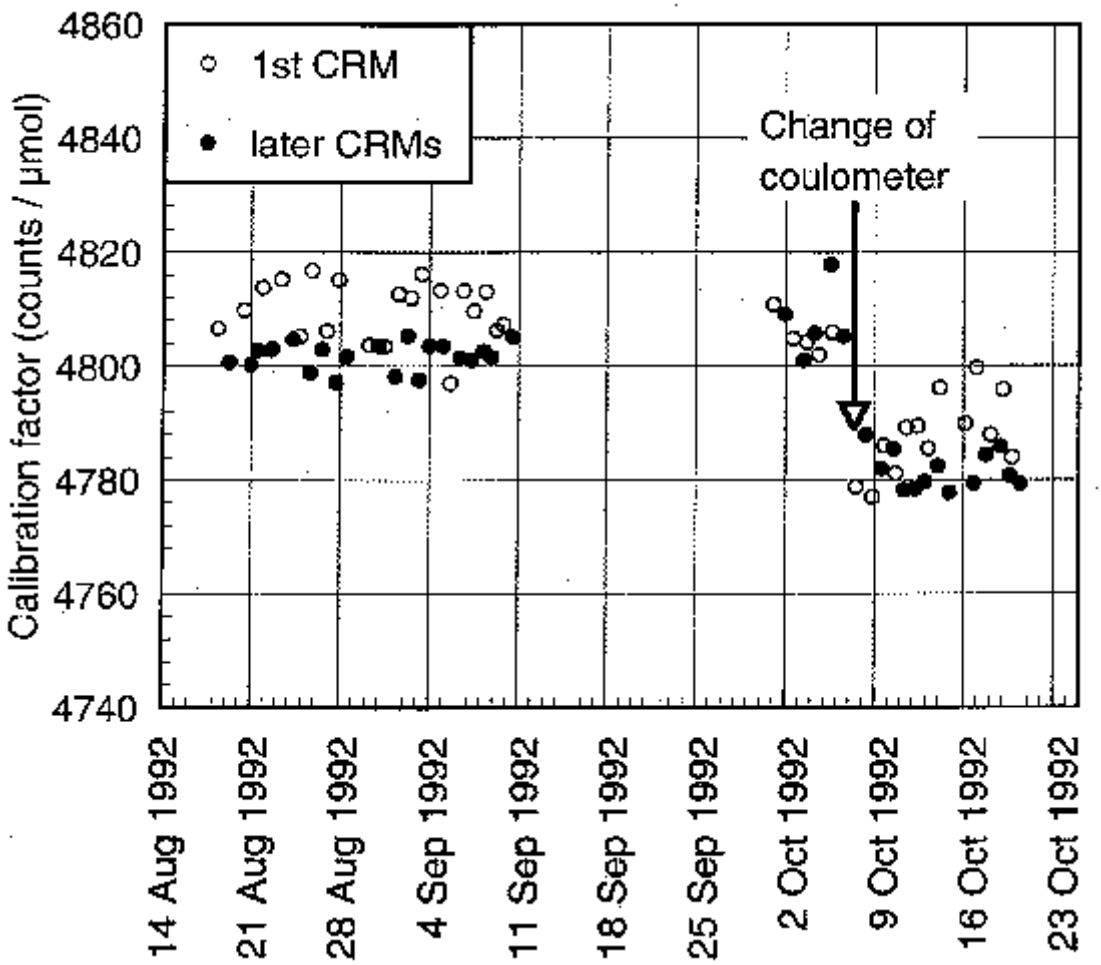

Fig. 4. Calibration factors from CRMs expressed as counts/µmol.

The reason for this variability appears to be that the cell was not adequately conditioned prior to being calibrated and used (Ken Johnson, BNL, personal communication). Consequently, measurements made early in the cell lifetime are suspect. These include all of the initial gas loop calibrations as well as the initial measurement of the reference material. The early measurements that were made on water from the upper ocean may also be somewhat degraded (see Sect. 3.2.4 below).

The calibration approach used to calculate the results presented here was as follows:

- The calibration of an individual coulometer was assumed to remain stable from day to day throughout its period of use. This assumption reflects the experience of most investigators (Dickson 1992) and is also borne out by the measurements from this cruise made later in the cell life (see Fig. 3 and Fig. 4). Note that a single coulometer unit was used throughout Leg 1 and for part of Leg 2; it was exchanged during Leg 2 on October 7, 1992, prior to measurement of samples from station 65.

- Thus the measurements on reference materials were divided into two groups: one prior to station 65, the other from station 65 to the end of the cruise, and a mean calibration factor was calculated separately for each group of analyses (based on the measurements made on reference materials later in the cell lifetime).

- This universal (coulometer dependent) calibration factor (i.e., based on the CRMs) was used to calibrate the measurements made on individual sea water samples.

3.2.4 Measurement Data Quality

Because of the difficulty in assigning a meaningful calibration to the analyses of total dissolved inorganic carbon made on this cruise, it is difficult to assess the data quality of the measurements presented here. Although it is apparent that analyses made later in the coulometric cell's lifetime are less variable (see Fig. 3 and Fig. 4), it is less clear when the measuring system settles down. Thus the measurements that are made early in the cell lifetime are also necessarily suspect (this is discussed in more detail below).

One indication of the potential accuracy of the measurement system is the degree of agreement between the calibration factors based on gas loops and those based on CRMs. The average difference is of the order of 0.1% (Leg 1: 0.14%, Leg 2: 0.06%), thus indicating that the gas loops had the potential of providing an accurate calibration if the cell had been adequately conditioned.

The precision of measurement is harder to assess. Duplicate samples were taken at each full station. These were typically a surface sample (in the top 10 m) and a deep sample (usually from one of the two deepest Niskin bottles). The duplicates were analyzed with the surface pair being analyzed at the beginning of a run and the deep pair being split between the beginning and end of a run.

The standard deviation of a single measurement calculated from these duplicates was 1.3 µmol /kg for the surface samples (analyzed together); and 2.0 µmol/kg for the deep samples (analyzed at the start and end of a run).

However, the standard deviation figures are somewhat misleading. The mean difference for the surface samples (first and second) is 0.4 µmol/kg; that for the deep samples is 1.2 µmol/kg. This suggests that even during the measurement of these duplicates the calibration of the cell is changing in the direction shown in Fig. 3 and Fig. 4. Hence, the measurements on the samples done in the first part of a run, those from the upper ocean, may, on occasion, be biased high by the use of a calibration factor more appropriate to the later measurements. An examination of the data on duplicates indicates that the extent of this bias is unlikely to exceed 4 µmol/kg and may on many occasions be less than that (see Section 3.4 for an evidence from the shore-based replicate measurements). The measurements on the later (deep) samples would be expected to

have a precision similar to that found for the later CRMs: a standard deviation of 1.1 µmol/kg (i.e., a similar magnitude to that found for those duplicate measurements that were run side-by-side at the beginning of the run).

3.3 Total Alkalinity Measurements

The TALK concentrations were determined by potentiometric titration of 1153 Niskin samples, 574 from Leg 1 and 579 from Leg 2. Samples from throughout the water column were measured on 39 stations (nominally 36 depths per station) and from surface Niskins only on 41 additional stations. The TALK was measured on an aliquot of seawater taken from the same 500-mL bottle previously analyzed for TCO_2. Calibration of the shipboard measurements of TALK reported in this numeric data package depends upon the standardization of the HCl titrants with titrations of primary standard sodium carbonate solutions at SIO. The titration system and its calibration are described in Guenther et al. (1994a), a reprint of which is provided in Appendix A of this report. Adjustments to the TALK calibration scale are likely to be made in the future.

Data quality was assessed at sea by titration of replicate seawater samples, secondary standard bicarbonate solutions prepared at SIO before expedition, and bottles of CRM batch number 13. Aliquots from the replicate seawater samples and the CRMs were titrated after aliquots had been removed for TCO_2 measurements.

The short-term repeatability was estimated by analyzing the agreement of pairs of replicate seawater samples titrated simultaneously, using equation (3) in Standard Operating Procedure (SOP) 23 of DOE (1994). One or two pairs usually were measured on each day of analysis. On Leg 1, for 33 pairs, the sample standard deviation, s_i, of a single measurement was estimated to be 1.56 µmol/kg. On Leg 2, for 30 pairs, s_i was estimated to be 2.13 µmol/kg.

Two batches of bicarbonate reference materials were titrated during the cruise. Usually four measurements were made per day. Analysis of the results using the normal equation for sample standard deviation yields an estimate of the reproducibility of the measurements over the entire cruise. The s_i was found to be 2.77 µmol/kg for 75 measurements of batch "A" and 2.03 µmol/kg for 90 measurements of batch "B."

Titrations of CRM samples provided an additional estimate of reproducibility and also an estimate of the accuracy through comparison of the at-sea results with the value certified by the laboratory of A. G. Dickson at SIO. The value for CRM batch 13, certified by titrations in 1996 on archived samples, was 2203.79 µmol/kg. During the cruise 84 titrations of CRM batch 13 were made. After 6 measurements were rejected, the s_i calculated for 78 measurements was 2.29 µmol/kg. The average TALK for the 78 measurements was 2201.26 µmol/kg, nearly within one standard deviation of the certified value. The TALK measurements of seawater reported here have not been adjusted by this difference. Figure 5 is a plot of the difference between the shipboard TALK of CRM batch 13 and the certified value versus time during both legs of the cruise.

For more detailed information on TALK measurements during the R/V *John V. Vickers* cruise along WOCE section P13 please see Appendix A in this report.

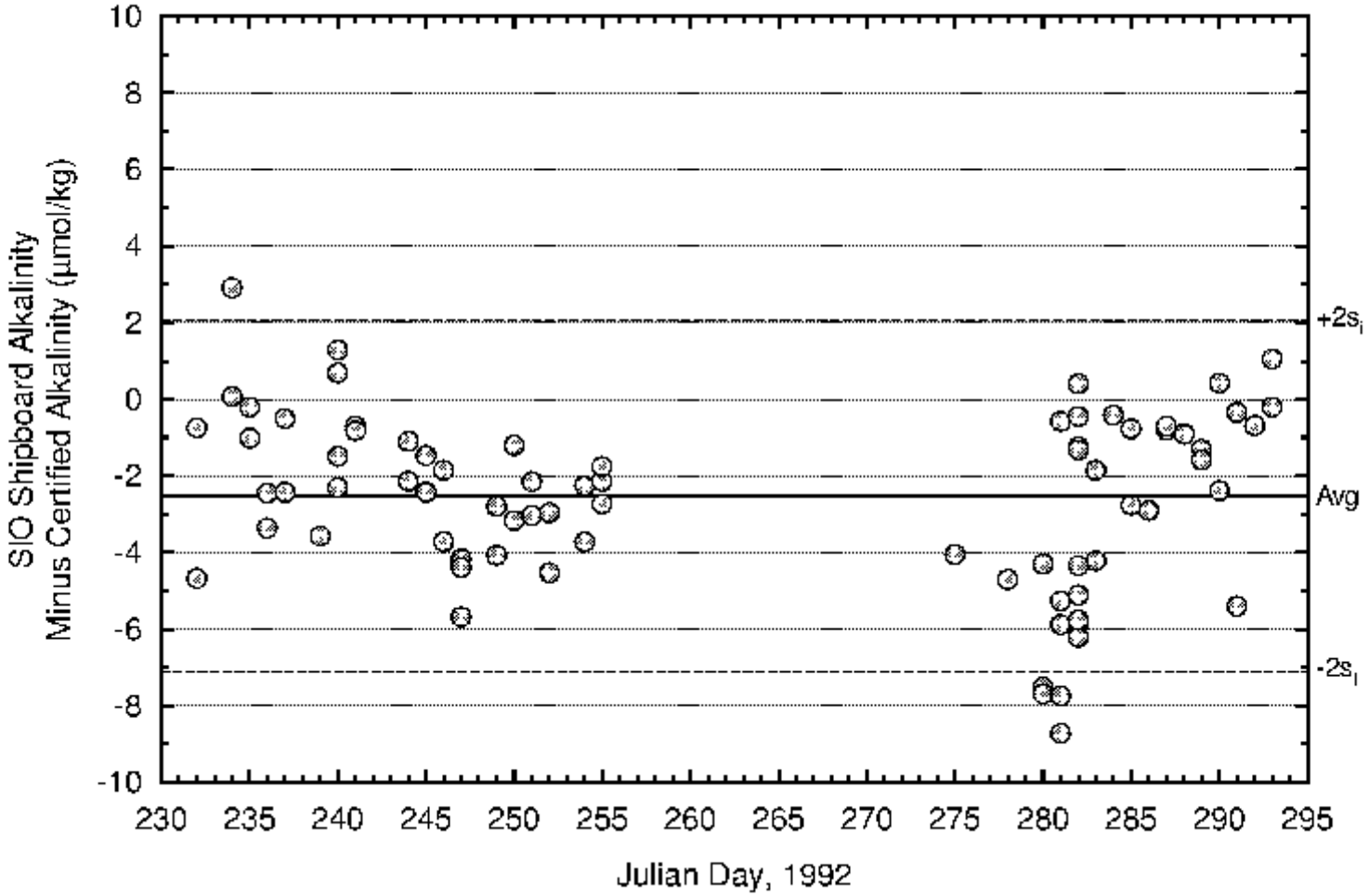

Fig. 5. Difference between SIO shipboard TALK of CRM batch 13 and the certified value vs time during WOCE Section P13. Solid line denotes the average SIO value and dotted lines denote plus/minus two times the standard deviation of an individual SIO value.

3.4 Shore-Based Replicate Measurements

During the expedition, 322 duplicate samples were collected and returned to SIO for shore-based measurements in the laboratory of C. D. Keeling. A total of 309 TCO_2 and 314 TALK measurements were performed on these samples. The $^{13}C/^{12}C$ isotopic ratio of the carbon comprising the TCO_2 was also measured (but not reported in this numeric data package). Comparisons between the shore-based measurements of TCO_2 and TALK and those made at sea on water from the same Niskin bottles provide further quality control information on the carbon data set for WOCE Section P13.

Shore-based measurements of TCO_2 were made by vacuum extraction/manometry using the procedures established for the DOE/WOCE ocean CO_2 program (Guenther et al. 1994b). Results are tabulated in Table B.1 in Appendix B. This table also lists the corresponding SOMMA TCO_2 values and the differences between the shipboard and shore-based values. Shipboard data are identified as "SIO" and shore-based as "S.I.O." The repeatability of the shore-based results themselves can be estimated from the agreement of the duplicate samples measured (DOE 1994). The sample standard deviation, s_i, of an individual shore-based result represents the short-term imprecision of the laboratory analysis, together with imprecision introduced by sampling and storage. The s_i calculated for the set of 140 pairs of data was 0.95 µmol/kg. Twelve pairs were rejected from this calculation, as shown by the flags in Table B.1. This "replicate imprecision" is approximately average for DOE/WOCE program cruises.

Of the 140 ship–shore differences corresponding to the "good" pairs of shore-based data, two were rejected for being more than $3s_i$ from the average (!17.17 and 20.21 µmol/kg). The average difference for the remaining 138 comparisons was 1.37 µmol/kg, with the shore-based being higher, and the s_i of an individual difference was 3.11 µmol/kg. The average difference was typical for DOE/WOCE cruises during the 1991–1994 period, but the s_i is rather large. A reason for the increased scatter is the presence of a depth-dependent bias between the ship!shore differences. The usual sampling depths for shore-based replicate samples on DOE/WOCE cruises were surface and deep (nominally 3000 m). Differences for WOCE Section P13 are plotted in Figure 6 for this subset of comparisons. "Surface" samples are the shallowest on a station, ranging from 10 to 75 m in depth, and "deep" samples are the deepest, ranging from 1000 to 3200 m. The average surface–deep bias for the subset of surface and deep samples in Figure 6 (18 differences between "good" replicate pairs) is 3.5 µmol/kg (s_i = 2.5 µmol/kg). A surface–deep bias has been evident for only a few other cruises and usually is smaller. On this cruise, shore-based replicate samples were also collected in profile from 9 to 12 Niskin bottles from the surface to nominally 3000 m on 10 stations. Ship!shore differences for the top several depths of these stations change toward the more negative deep differences. From 400 m down, the differences are relatively constant.

The surface-deep bias results agree fairly well with measurements made at sea. Shipboard measurements for surface comparisons between shore-based and shipboard measurements were made early in the measurement runs, while those for deep comparisons were made late in the runs. Use of the lower calibration factors measured late in the runs resulted in a high bias for measurements made early in the runs (see section 3.2.4). On average, CRM measurements made early in the runs were 2.6 µmol/kg higher than those made late in the runs. Also, deep samples measured early in the runs on Leg 1 on average were 2.3 µmol/kg higher than their duplicates measured late in the runs. However, this pattern was far less apparent for Leg 2.

Shore-based measurements of TALK were made by essentially the same potentiometric titration system as the measurements made at sea. The primary difference was that the

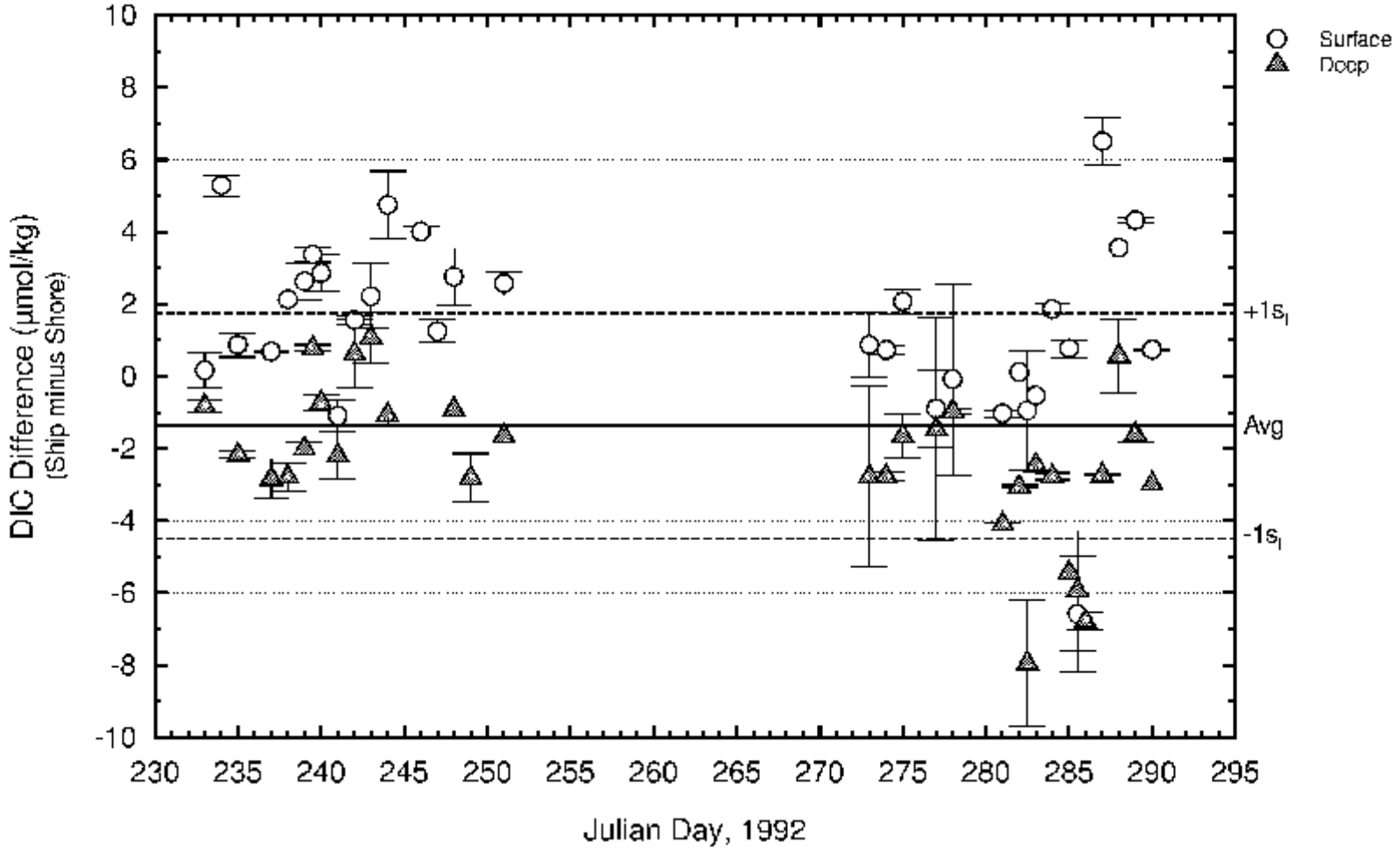

Fig. 6. Difference between shipboard and shore-based TCO_2 measurements vs date for surface and deep samples. Open circles represent near-surface samples; shaded triangles represent deep samples; and vertical bracketed lines represent replicate pair differences.

aliquots for shore-based titrations more often were dispensed gravimetrically into the titration cell, instead of volumetrically. The aliquots were removed from the sample bottles after those for shore-based TCO_2 had been removed. Results are tabulated in Table B.2. This table also lists the corresponding shipboard TALK values and the differences between shore-based and shipboard values. As described for the shore-based TCO_2, the replicate imprecision of the shore-based TALK measurements is estimated from the agreement of the duplicate measurements. For samples with analyses from both gravimetric and volumetric systems, analyses separated by more than a week of elapsed time were rejected. For one set of titrations made within a few days on both systems, the gravimetric data were chosen over the volumetric. The s_i was 1.90 µmol/kg for 154 pairs of measurements, with four pairs rejected as shown by the flags in Table B.2. The apparent imprecisions of the shipboard TALK results (see discussion in section 3.3) and the shore-based results are similar, ~2 µmol/kg.

The average ship!shore difference for TALK is calculated from 147 of the total of 150 comparisons of "good" shore-based duplicates with corresponding shipboard values. Three comparisons with differences of 18.78, 15.63, and 23.01 µmol/kg (greater than $3s_i$) were rejected. The average difference is 3.35 µmol/kg (shipboard higher). The s_i of an individual difference is 4.11 Fmol/kg. Both the average ship!shore difference and its imprecision are likely to change after the anticipated adjustments to the TALK calibration scale are made, so further analysis and plotting of the data will not be presented at this time.

3.5 Chlorofluorocarbon Measurements

CFCs were usually analyzed in the first water sample collected from the 10-L bottles. Care was taken to co-ordinate the sampling of CFCs with other gas samples to minimize the time between the initial opening of each bottle and the completion of sample drawing. In most cases, helium, tritium, dissolved oxygen, TCO_2, and TALK samples were collected within several minutes of the initial opening of each bottle. CFC samples were collected in 100-mL precision glass syringes and held immersed in a water bath until processing.

The CFC analytical system functioned relatively well during this expedition. The CFC system was installed in a specially designed laboratory van located on a deck and was isolated from possible contamination from the high levels of CFCs that are sometimes present in air inside the ship laboratories. Concentrations of CFCs in air inside this van were usually close to those of clean marine air.

Concentrations of CFC-11 and CFC-12 in air samples, seawater, and gas standards during the cruise were measured by shipboard electron capture gas chromatography, according to the methods described by Bullister and Weiss (1988). The concentrations of CFC-11 and CFC-12 in air samples, seawater samples, and gas standards are reported relative to the SIO 1986 calibration scale. CFC concentrations in air and standard gas are reported in units of mole fraction CFC in dry gas and are typically in parts-per-trillion (ppt) range. Dissolved CFC concentrations are given in unit of picomole CFC per kg seawater (pmol/kg). CFC concentrations in air and seawater samples were determined by fitting their chromatographic peak areas to multi-point calibration curves, generated by injecting known volumes of gas from a CFC working standard (PMEL cylinder 71489) into the analytical instrument. These concentrations of CFC-11 and CFC-12 in this working standard were calibrated versus a primary CFC standard (CC36743) before and after the cruise. No measurable drift in the working standard could be detected during this interval. Full range calibration curves were run at 1- to 2-day intervals. Single injections of a fixed volume of standard gas were run much more frequently

(at intervals of 1 to 2 hours) to monitor short-term changes in detector sensitivity. The estimated reproducibility of the calibrations is about 1.3% for CFC-11 and 0.5% for CFC-12. A precision (1 standard deviation) for dissolved CFC measurements was ~1%, or 0.005 pmol/kg, whichever is greater.

Sample loops filled with CFC-free gas and syringe samples of CFC-free water (degassed in a specially designed glass chamber) were run to check sampling and analytical blanks. CFC-11 and CFC-12 concentrations measured in deep samples along the section were typically in the range of 0 to 0.007 pmol/kg, near the detection limit of the analytical system (~0.004 pmol/kg). Previous studies (Warner et al. 1996) of time-dependent tracers in this region of the Pacific indicate that waters at densities $F_2 > 27.4$ should have CFC concentrations near zero at present. We attribute the low-level CFC signal in deep samples to the slow release of CFC from the walls and O-rings of the 10-L bottles into the seawater sample during storage and to contamination during the transfer and storage of the seawater samples in glass syringes prior to analysis. Based on the median concentrations observed in deep water samples along the section, the following blank corrections were applied to the seawater measurements:

CFC-11 blank corrections applied (in pmol/kg):

Stations 1–43:	0.010
Stations 44–88:	0.008

CFC-12 blank corrections applied (in pmol/kg):

Stations 1–4	0.000
Stations 5–23	0.021
Stations 24–27	0.034
Stations 28–52	0.018
Stations 53–88	0.009

As a result of these blank corrections, some concentrations reported for deep samples are less than zero.

A number of water samples had anomalously high CFC-11 and/or CFC-12 concentrations relative to adjacent samples. These high values appeared to occur more or less randomly and were not clearly associated with other features in the water column (e.g., elevated oxygen concentrations). In most cases, only one of the two CFCs measured showed these anomalous high levels. This suggests that the high values were the result of analytical variability or isolated low-level contamination events. These samples are included in this report and are flagged as either “3” (questionable) or “4” (bad) measurements. Approximately 181 analyses of CFC-11 and 76 analyses of CFC-12 were given these flags.

4. DATA CHECKS AND PROCESSING PERFORMED BY CDIAC

An important part of the numeric data packaging process at the Carbon Dioxide Information Analysis Center (CDIAC) involves the quality assurance (QA) of data before distribution. Data received at CDIAC are rarely in a condition that would permit immediate distribution, regardless of the source. To guarantee data of the highest possible quality, CDIAC conducts extensive QA reviews that involve examining the data for completeness, reasonableness, and accuracy. The QA process is a critical component in the value-added concept of supplying accurate, usable data for researchers.

The following information summarizes the data processing and QA checks performed by CDIAC on the data obtained during the R/V *John V. Vickers* cruise along WOCE Section P13 in the Pacific Ocean.

1. The final carbon-related data were provided to CDIAC by A. G. Dickson, P. R. Guenther, and C. D. Keeling of Scripps Institution of Oceanography. The final hydrographic and chemical measurements and the station information files were provided by the WOCE Hydrographic Program Office (WHPO) after quality evaluation. A FORTRAN 90 retrieval code was written and used to merge and reformat all data files.

2. To check for obvious outliers, all data were plotted by use of a PLOTNEST.C program written by Stewart C. Sutherland (Lamont-Doherty Earth Observatory). The program plots a series of nested profiles, using the station number as an offset; the first station is defined at the beginning, and subsequent stations are offset by a fixed interval (Figs. 7 and 8). Several outliers were identified and marked with the quality flags of “3” (questionable measurement) or “4” (bad measurement) (see File Descriptions in Part 2 of this documentation).

3. To identify “noisy” data and possible systematic, methodological errors, property-property plots for all parameters were generated (Fig. 9), carefully examined, and compared with plots from previous expeditions in the Pacific Ocean.

4. All variables were checked for values exceeding physical limits, such as sampling depth values that are greater than the given bottom depths.

5. Dates, times, and coordinates were checked for bogus values (e.g., values of MONTH < 1 or > 12; DAY < 1 or > 31; YEAR < or > 1992; TIME < 0000 or > 2400; LAT < !10.000 or > 60.000; and LONG < 160.000 or > 170.000).

6. Station locations (latitudes and longitudes) and sampling times were examined for consistency with maps and cruise information supplied by A. Dickson and C. Keeling of SIO.

7. The designation for missing values, given as !9.0 in the original files, was changed to !999.9 for the consistency with other oceanographic data sets.

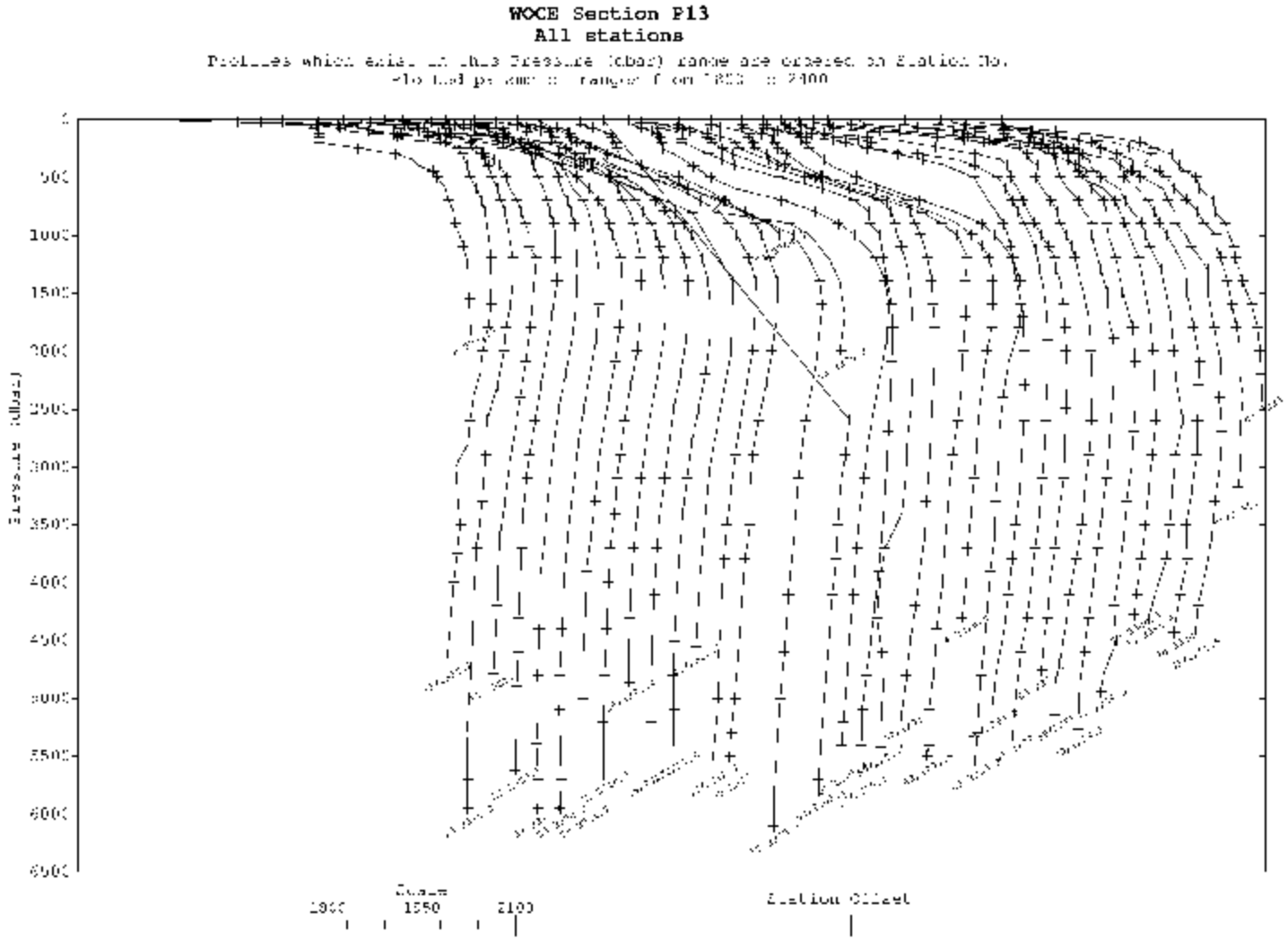

Fig. 7. Nested profiles: Total carbon dioxide (Fmol/kg) vs pressure (dbar) for all stations of WOCE Section P13.

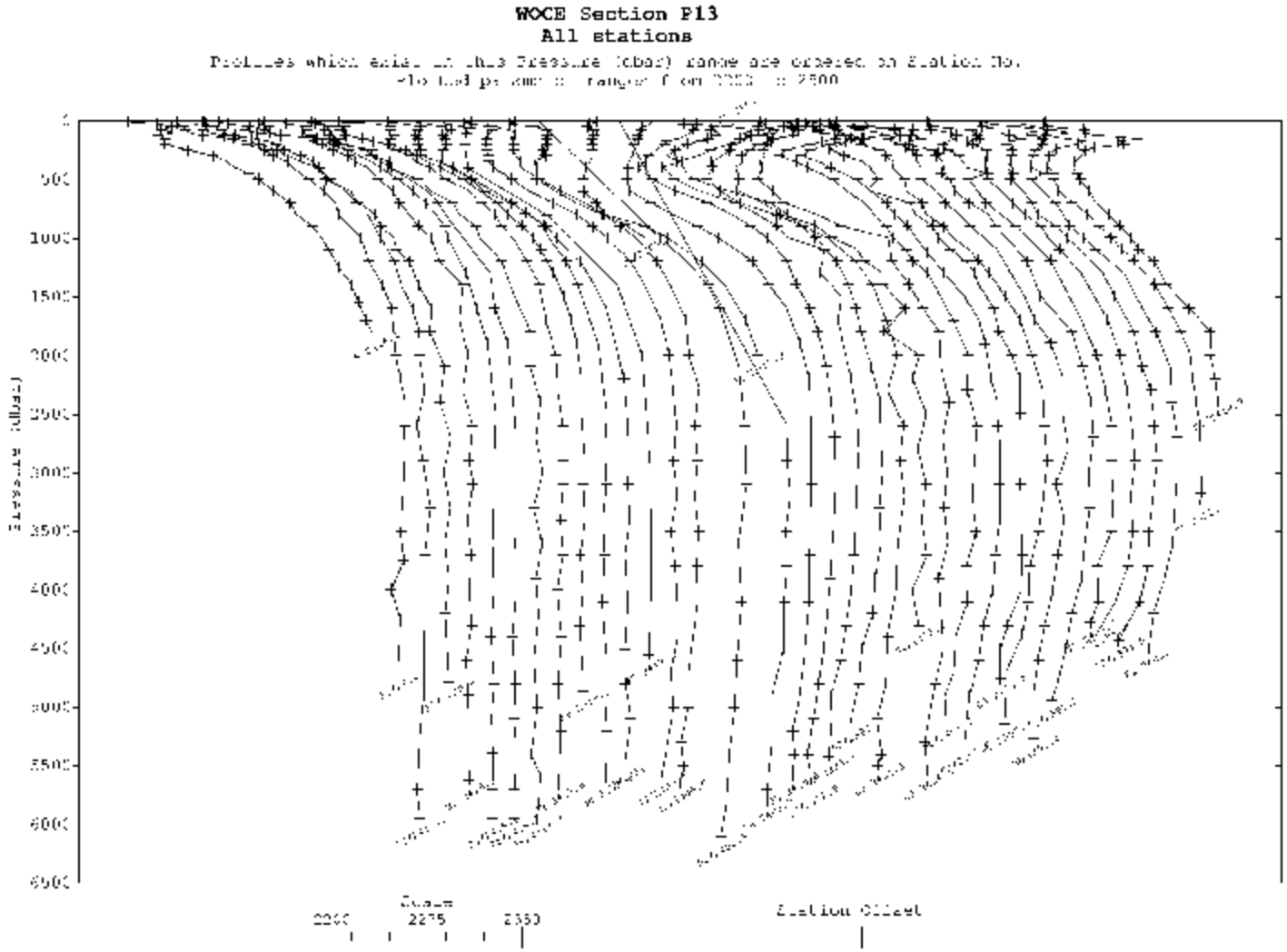

Fig. 8. Nested profiles: Total alkalinity (Fmol/kg) vs pressure (dbar) for all stations of WOCE Section P13.

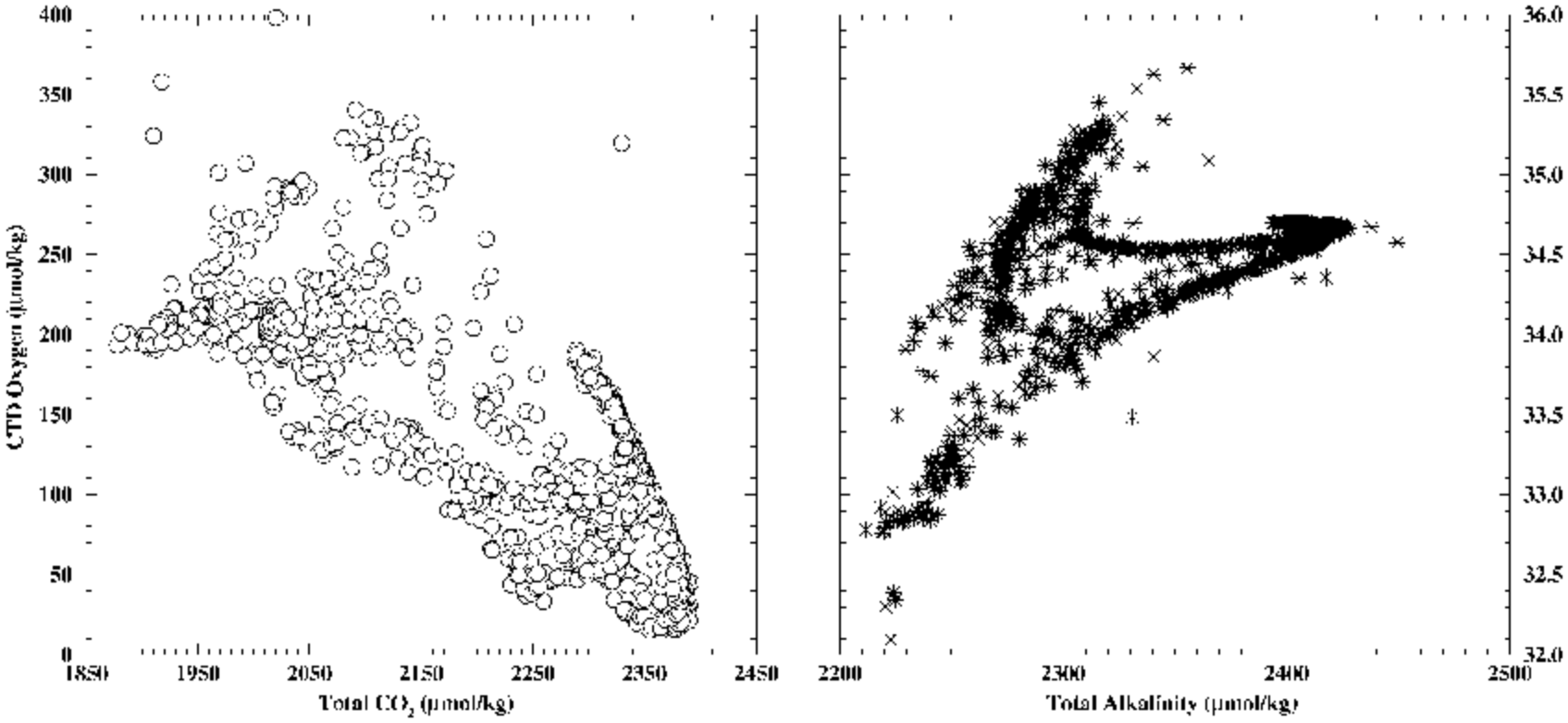

Fig. 9. Property-property plots for all stations occupied during the R/V *John V. Vickers* cruise along WOCE Section P13.

5. HOW TO OBTAIN THE DATA AND DOCUMENTATION

This database (NDP-075) is available free of charge from CDIAC. The complete documentation and data can be obtained from the CDIAC oceanographic Web site (http://cdiac.esd.ornl.gov/oceans/doc.html), through CDIAC's online ordering system (http://cdiac.esd.ornl.gov/pns/how_order.html), or by contacting CDIAC.

The data are also available from CDIAC's anonymous file transfer protocol (FTP) area via the Internet. Please note that your computer needs to have FTP software loaded on it (this is built in to most newer operating systems). Use the following commands to obtain the database.

```
ftp cdiac.esd.ornl.gov  or  >ftp 128.219.24.36
Login: "anonymous" or "ftp"
Password: your e-mail address
ftp> cd pub/ndp075/
ftp> dir
ftp> mget (files)
ftp> quit
```

Contact information:

Carbon Dioxide Information Analysis Center
Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, Tennessee 37831-6335
U.S.A.

Telephone: (865) 574-3645
Telefax: (865) 574-2232

E-mail: cdiac@ornl.gov
Internet: http://cdiac.esd.ornl.gov/

6. REFERENCES

Brewer, P. G., C. Goyet, and D. Dyrssen. 1989. Carbon dioxide transport by ocean currents at 25E N latitude in the Atlantic Ocean. *Science* 246:477–79.

Bryden, H. L., and M. M. Hall. 1980. Heat transport by ocean currents across 25E N latitude in the North Atlantic Ocean. *Science* 207:884.

Bullister, J. L., and R. F. Weiss. 1988. Determination of CCl_3F and CCl_2F_2 in seawater and air. *Deep-Sea Research* 35(5):839–53.

Carpenter, J. H. 1965. The Chesapeake Bay Institute technique for the Winkler dissolved oxygen method. *Limnology & Oceanography* 10:141–43.

Dickson A. G. 1992. The determination of total dissolved inorganic carbon in sea water using extraction/coulometry: The first stage of a collaborative study. DOE/RL/01830T-H14. U. S. Department of Energy.

DOE (U.S. Department of Energy). 1994. *Handbook of Methods for the Analysis of the Various Parameters of the Carbon Dioxide System in Sea Water*. Version 2. ORNL/CDIAC-74. A. G. Dickson and C. Goyet (eds.). Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Friederich, G. E., L. A. Codispoti, and C. M. Sakamoto. 1991. An Easy-to-Construct Automated Winkler Titration System. MBARI Technical Report 91-6. Monterey Bay Aquarium Research Institute, Monterey, Calif.

Guenther, P. R., G. Emanuele III, T. J. Lueker, D. J. Moss, E. F. Stewart, and C. D. Keeling. 1994a. Oceanic CO_2 measurements for the WOCE hydrographic survey in the Pacific Ocean: Shipboard alkalinity measurements on CGC92 legs 1 and 2, 1992. SIO Reference Series, Ref. No. 94-30. University of California, San Diego, Calif.

Guenther, P. R., C. D. Keeling, and G. Emanuele III. 1994b. Oceanic CO_2 measurements for the WOCE hydrographic survey in the Pacific Ocean, 1990–1991: Shore based measurements. SIO Reference Series, Ref. No. 94-28. University of California, San Diego, Calif.

Johnson, K. M., A. E. King, and J. McN. Sieburth. 1985. Coulometric TCO_2 analyses for marine studies: An introduction. *Marine Chemistry* 16:61–82.

Johnson, K. M., J. M. Sieburth, P. J. B. Williams, and L. Brändström. 1987. Coulometric TCO_2 analysis for marine studies: Automation and calibration. *Marine Chemistry* 21:117–33.

Roemmich, D., and C. Wunsch. 1985. Two transatlantic sections: Meridional circulation and heat flux in the subtropical North Atlantic Ocean. *Deep-Sea Research* 32:619–64.

Williams, P. J. 1990. *Oceans, Carbon, and Climate Change*. Scientific Committee on Oceanic Research (SCOR), Halifax, Canada.

Warner, M. W., J. L. Bullister, D. P. Wisegarver, R. H. Gammon, and R. F. Weiss. 1996. Basin-wide distributions of chlorofluorocarbons CFC-11 and CFC-12 in the North Pacific: 1985-1989. *Journal of Geophysical Research* 101:20525–20542.

PART 2:

CONTENT AND FORMAT OF DATA FILES

7. FILE DESCRIPTIONS

This section describes the content and format of each of the five files that comprise this NDP (see Table 1). Because CDIAC distributes the data set in several ways (via the Web, CDIAC's online ordering system, or anonymous FTP), each of the five files is referenced by both an ASCII file name, which is given in lower-case, bold-faced type (e.g., **ndp075.txt**), and a file number. The remainder of this section describes (or lists, where appropriate) the contents of each file.

Table 1. Content, size, and format of data files

File number, name, and description	Logical records	File size in bytes
1. **ndp075.txt**: a detailed description of the cruise network, the two FORTRAN 90 data-retrieval routines, and the two oceanographic data files	2,733	255,968
2. **stainv.for**: a FORTRAN 90 data-retrieval routine to read and print **p13sta.dat** (File 4)	47	1,440
3. **p13dat.for:** a FORTRAN 90 data-retrieval routine to read and print **p13.dat** (File 5)	57	2,186
4. **p13sta.dat**: a listing of the station locations, sampling dates, and sounding bottom depths for each of the 82 stations of WOCE Section P13	92	7,126
5. **p13.dat:** hydrographic, carbon dioxide, and chemical data from 82 stations occupied on WOCE Section P13	2,717	480,067
Total	5,646	746,787

7.1 ndp075.txt (File 1)

This file contains a detailed description of the data set, the two FORTRAN 90 data-retrieval routines, and the two oceanographic data files. It exists primarily for the benefit of individuals who acquire this database as machine-readable data files from CDIAC.

7.2 stainv.for (File 2)

This file contains a FORTRAN 90 data-retrieval routine to read and print **p13sta.dat** (File 4). The following is a listing of this program. For additional information regarding variable definitions, variable lengths, variable types, units, and codes, please see the description for **p13sta.dat** in Sect. 7.4.

```
c*********************************************************************
c* FORTRAN 90 data retrieval routine to read and print the file
c* named "p13sta.dat" (File 4).
c*********************************************************************

c*Defines variables*

       INTEGER  stat, cast, depth
       REAL latdcm, londcm
       CHARACTER expo*11, sect*3, date*10, time*4
       OPEN (unit=1, file='p13sta.dat')
       OPEN (unit=2, file='p13sta.txt')
       write (2, 5)

c*Writes out column labels*

 5     format (1X, 'STATION INVENTORY: R/V JOHN V. VICKERS',
     1 9X, 'CRUISE DATES 08/03-10/21/1992',/,
     2 1X,'EXPOCODE',5X,'SECT',1X,'STNBR',2X,'CAST',9X,
     3 'DATE',2X,'TIME',2X,'LATITUDE',2X,'LONGITUDE',2X,
     4 'DEPTH',/)

c*Sets up a loop to read and format all the data in the file*

       read (1, 6)
 6     format (////////)

 7     CONTINUE
       read (1, 10, end=999) expo, sect, stat, cast, date, time,
     1 latdcm, londcm, depth

 10    format (A11, 4X, A3, 4X, I2, 5X, I1, 3X, A10, 2X, A4, 3X,
     1 F7.3, 3X, F8.3, 3X, I4)

       write (2, 20) expo, sect, stat, cast, date, time,
     1 latdcm, londcm, depth

 20    format (A11, 4X, A3, 4X, I2, 5X, I1, 3X, A10, 2X, A4, 3X,
     1 F7.3, 3X, F8.3, 3X, I4)
```

```
      GOTO 7
 999  close(unit=5)
      close(unit=2)
      stop
      end
```

7.3 p13dat.for (File 3)

This file contains a FORTRAN 90 data-retrieval routine to read and print **p13.dat** (File 5). The following is a listing of this program. For additional information regarding variable definitions, variable lengths, variable types, units, and codes, please see the description for **p13.dat** in Sect. 7.5.

```
c*********************************************************************
c* FORTRAN 90 data retrieval routine to read and print the file
c* named "p13.dat" (File 5).
c*********************************************************************
cc*Defines variables*

      INTEGER sta, cast, samp, bot
      REAL pre, ctdtmp, ctdsal, ctdoxy, theta, sal, oxy, silca
      REAL nitrat, nitrit, phspht, cfc11, cfc12, tcarb, talk
      CHARACTER qualt*13
      OPEN (unit=1, file='p13.dat')
      OPEN (unit=2, file='p13.data')
      write (2, 5)

c*Writes out column labels*

 5    format (2X,'STNNBR',2X,'CASTNO',2X,'SAMPNO',2X,'BTLNBR',2X,
     1 'CTDPRS',4X,'CTDTMP',4X,'CTDSAL',2X,'CTDOXY',5X,'THETA',4X,
     2 'SALNTY',2X,'OXYGEN',2X,'SILCAT',2X,'NITRAT',2X,'NITRIT',2X,
     3 'PHSPHT',3X,'CFC-11',3X,'CFC-12',2X,'TCARBN',2X,
     4 'ALKALI',8X,'QUALT1',/,36X,'DBAR',4X,'ITS-90',4X,'PSS-78',
     5 1X,'UMOL/KG',4X,'ITS-90',4X,'PSS-78',1X,5('UMOL/KG',1X),1X,
     6 'PMOL/KG',2X,'PMOL/KG',1X,2('UMOL/KG',1X),12X,'*',/,
     7 25X,'*******',21X,2('*******',1X),12X,6('*******',1X),
     8 1X,'*******',2X,3('*******',1X),12X,'*')

      read (1, 6)
 6    format (//////////)

 7    CONTINUE
      read (1, 10, end=999) sta, cast, samp, bot, pre, ctdtmp,
     1 ctdsal, ctdoxy, theta, sal, oxy, silca, nitrat, nitrit,
```

```
     2 phspht, cfc11, cfc12, tcarb, talk, qualt

 10    format (5X, I3, 7X, I1, 5X, I3, 4X, I4, 1X, F7.1, 1X, F9.4,
     1 1X, F9.4, 1X, F7.1, 1X, F9.4, 1X, F9.4, 1X, F7.1, 1X, F7.2,
     2 1X, F7.2, 1X, F7.2, 1X, F7.2, 1X, F8.3, 1X, F8.3, 1X, F7.1,
     3 1X, F7.1, 1X, A13)

       write (2, 20) sta, cast, samp, bot, pre, ctdtmp,
     1 ctdsal, ctdoxy, theta, sal, oxy, silca, nitrat, nitrit,
     2 phspht, cfc11, cfc12, tcarb, talk, qualt

 20    format (5X, I3, 7X, I1, 5X, I3, 4X, I4, 1X, F7.1, 1X, F9.4,
     1 1X, F9.4, 1X, F7.1, 1X, F9.4, 1X, F9.4, 1X, F7.1, 1X, F7.2,
     2 1X, F7.2, 1X, F7.2, 1X, F7.2, 1X, F8.3, 1X, F8.3, 1X, F7.1,
     3 1X, F7.1, 1X, A13)

       GOTO 7
 999   close(unit=1)
       close(unit=2)
       stop
       end
```

7.4 p13sta.dat (File 4)

This file provides station inventory information for each of the 82 stations occupied during the R/V *John V. Vickers* cruise along WOCE Section P13. Each line of the file contains an expocode, section number, station number, cast number, sampling date (month/date/year), sampling time, latitude, longitude, and sounding depth. The file is sorted by station number and can be read by using the following FORTRAN 90 code (contained in **stainv.for**, File 2):

```
       INTEGER stat, cast, depth
       CHARACTER expo*11, sect*3, date*10, time*4
       REAL latdcm, londcm

       read (1, 10, end=999) expo, sect, stat, cast, date, time,
     1 latdcm, londcm, depth

 10    format (A11, 4X, A3, 4X, I2, 5X, I1, 3X, A10, 2X, A4, 3X,
     1 F7.3, 3X, F8.3, 3X, I4)
```

Stated in tabular form, the contents include the following:

Variable	Variable type	Variable width	Starting column	Ending column
expo	Character	11	1	11
sect	Character	3	16	18
stat	Numeric	2	23	24
cast	Numeric	1	30	30
date	Character	10	34	43
time	Character	4	46	49

latdcm	Numeric	7	53	59
londcm	Numeric	8	63	70
depth	Numeric	4	74	77

The variables are defined as follows:

expo is the expedition code of the cruise;

sect is the WOCE section number;

stat is the station number;

cast is the cast number;

date is the sampling date (month/day/year);

time is the sampling time [Greenwich mean time (GMT)];

latdcm is the latitude of the station (in decimal degrees; negative values indicate the Southern Hemisphere);

londcm is the longitude of the station (in decimal degrees; negative values indicate the Western Hemisphere);

depth is the sounding depth of the station (in meters).

7.5 p13.dat (File 5)

This file provides hydrographic, carbon dioxide, and chemical data for the 82 stations occupied during the R/V *John V. Vickers* cruise along WOCE Section P13. Each line consists of a station number, cast number, sample number, bottle number, CTD pressure, CTD temperature, CTD salinity, CTD oxygen, potential temperature, bottle salinity, bottle oxygen, silicate, nitrate, nitrite, phosphate, CFC-11, CFC-12, total CO_2, total alkalinity, and data-quality flags. The file is sorted by station number and pressure and can be read by using the following FORTRAN 90 code (contained in **p13dat.for,** File 3):

```
      CHARACTER qualt*13
      INTEGER sta, cast, samp, bot
      REAL pre, ctdtmp, ctdsal, ctdoxy, theta, sal, oxy, silca
      REAL nitrat, nitrit, phspht, cfc11, cfc12, tcarb, talk

      read (1, 10, end=999)sta, cast, samp, bot, pre, ctdtmp,
     1 ctdsal, ctdoxy, theta, sal, oxy, silca, nitrat, nitrit,
     2 phspht, cfc11, cfc12, tcarb, talk, qualt
```

```
10    format (5X, I3, 7X, I1, 5X, I3, 4X, I4, 1X, F7.1, 1X, F9.4,
     1 1X, F9.4, 1X, F7.1, 1X, F9.4, 1X, F9.4, 1X, F7.1, 1X, F7.2,
     2 1X, F7.2, 1X, F7.2, 1X, F7.2, 1X, F8.3, 1X, F8.3,1X, F7.1,
     3 1X, F7.1, 1X, A14)
```

Stated in tabular form, the contents include the following:

Variable	Variable type	Variable width	Starting column	Ending column
sta	Numeric	3	6	8
cast	Numeric	1	16	16
samp	Numeric	3	22	24
bot	Numeric	4	29	32
pre	Numeric	7	34	40
ctdtmp	Numeric	9	42	50
ctdsal	Numeric	9	52	60
ctdoxy	Numeric	7	62	68
theta	Numeric	9	70	78
sal	Numeric	9	80	88
oxy	Numeric	7	90	96
silca	Numeric	7	98	104
nitrat	Numeric	7	106	112
nitrit	Numeric	7	114	120
phspht	Numeric	7	122	128
cfc11	Numeric	8	130	137
cfc12	Numeric	8	139	146
tcarb	Numeric	7	148	154
talk	Numeric	7	156	162
qualt	Character	13	164	176

The variables are defined as follows:

sta is the station number;

cast is the cast number;

samp is the sample number;

bot[a] is the bottle number;

pre is the CTD pressure (dbar);

ctdtmp	is the CTD temperature (°C);
ctdsal[a]	is the CTD salinity [on the Practical Salinity Scale (PSS)];
ctdoxy[a]	is the CTD oxygen (Fmol/kg);
theta	is the potential temperature (°C);
sal[a]	is the bottle salinity (on the PSS);
oxy[a]	is the oxygen concentration (Fmol/kg);
silca[a]	is the silicate concentration (Fmol/kg);
nitrat[a]	is the nitrate concentration (Fmol/kg);
nitrit[a]	is the nitrite concentration (Fmol/kg);
phspht[a]	is the phosphate concentration (Fmol/kg);
cfc11[a]	is the chlorofluorocarbon 11 concentration (pmol/kg);
cfc12[a]	is the chlorofluorocarbon 12 concentration (pmol/kg);
tcarb[a]	is the total carbon dioxide concentration (Fmol/kg);
alkali[a]	is the total alkalinity concentration (Fmol/kg);
qualt	is a 13-digit character variable that contains data-quality flag codes for parameters underlined with asterisks (*******) in the file header.

---

[a]Variables that are underlined with asterisks in the data file's header indicate they have a data-quality flag. Data-quality flags are defined as follows:

1 = sample for this measurement was drawn from water bottle but analysis was not received;
2 = acceptable measurement;
3 = questionable measurement;
4 = bad measurement;
5 = not reported;
6 = mean of replicate measurements;
7 = manual chromatographic peak measurement;
8 = irregular digital chromatographic peak integration;
9 = sample not drawn for this measurement from this bottle.

APPENDIX A:

REPRINT OF PERTINENT LITERATURE

Oceanic CO_2 Measurements for the WOCE Hydrographic Survey in the Pacific Ocean: Shipboard Alkalinity Measurements on CGC92 Legs 1 and 2, 1992

Prepared for the U.S. Department of Energy
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1. Cruise Summary

Shipboard measurements of CO_2 system parameters in sea water were made on the Climate and Global Change 92 (CGC92) cruise of the Pacific Marine Environmental Laboratory (PMEL) of the National Oceanic and Atmospheric Administration (NOAA). The ship used for the cruise was the R/V *John Vickers* of the University of Southern California. The Chief Scientists were Dr. John Bullister on Leg 1 and Dr. Bruce Taft on Leg 2. Both are staff scientists at PMEL. The cruise, along approximately 165 ° E longitude between Dutch Harbor, Alaska and Noumea, New Caledonia, was designated Line P13 of the one - time survey of the World Ocean Circulation Experiment (WOCE). CO_2 system measurements on this cruise were carried out by the Carbon Dioxide Research Group (CDRG) of Scripps Institution of Oceanography (SIO) (Dr. Charles Keeling, Principal Investigator), with the assistance of Battelle NW Laboratory and of Dr. Andrew Dickson of SIO. Dr. Dickson and his group were responsible for measurements of Total Dissolved Inorganic Carbon (DIC) with a SOMMA coulometric titrator. The DIC analysts on Leg 1 were Mr. George Anderson of SIO and Mr. Ronald Citterman of Battelle NW and on Leg 2, Ms. Lori Bell of SIO and Mr. Citterman. The CDRG of SIO was responsible for measurements of Titration (or "Total") Alkalinity (ALK) with a potentiometric acid titration system. The ALK analysts on Leg 1 were Mr. Peter Guenther and Mr. Guy Emanuele, both of SIO, and on Leg 2, Dr. Andrew Dickson of SIO and Mr. Emanuele.

This report concerns only the ALK data. Dr. Dickson reports the DIC data in a separate report.

2. Shipboard Water Sampling Program

Samples for shipboard analysis of DIC and ALK were collected from 10 liter Niskin bottles on the 36 position small volume rosette water sampling system. Of the total of 84 stations on the two legs, CO_2 samples were collected from all Niskins throughout the water column on 39 stations (nominally 36 Niskins, but fewer depths were sampled on a number of stations). On an additional 41 stations CO_2 samples were collected from surface Niskins only. Stations sampled were located along about 165 ° E longitude between 54 ° N and 5 ° S latitude.

Samples were collected by established procedures (DOE,1994) in 500 ml borosilicate glass bottles equipped with greased ground glass joints held closed with rubber bands. Single samples were collected from most Niskins. On stations where CO_2 samples were collected throughout the water column, duplicate

samples were collected from two Niskins, one near the surface and one near the bottom, for quality assessment purposes. All samples were collected by the CO_2 analysts. Two persons worked as a team during sample collection. One analyst filled the bottles from the Niskins and the other adjusted the water volume, added the mercuric chloride poison and prepared and sealed the bottle joints. Additionally, replicate samples for shore based analyses of DIC and ALK were collected in duplicate from 161 Niskins on 34 stations.

Analyses of DIC and ALK were performed on aliquots of water subsampled from the same bottle of water. Single aliquots for DIC analysis were removed from the bottles first. Aliquots for ALK analysis were later removed from the same bottles. Enough water was available to perform at least two ALK titrations on each bottle.

3. Alkalinity Measurement Summary

Samples from a total of 1153 Niskins, 574 from Leg 1 and 579 from Leg 2, were titrated to determine ALK. Usually all 36 samples collected on a station were analyzed for ALK. A total of 72 duplicate samples, 36 on each leg, were also analyzed. For quality assessment purposes, 84 titrations were performed on 68 bottles of the natural sea water Certified DIC Reference Material Batch No. 13 and 182 more titrations were performed on 38 bottles of bicarbonate reference material solutions prepared at SIO. A total of 1636 individual titrations were performed during 44 days on the cruise, including all multiple trials on individual bottles of sea water and quality assessment samples.

4. Description of Analytical System and Procedures

4.1 *Overall system description*

The closed cell potentiometric acid titration system was designed and constructed at SIO by David Moss with the developmental and experimental assistance of Timothy Lueker. Figure 1 is a schematic diagram of the analytical system. It differs from other alkalinity titration systems in the method employed to define the volume of seawater to be titrated. This was accomplished by dispensing simultaneously constant volumes of water from two syringes into two titration cells so that two titrations could be run at the same time. Between titrations the cells were rinsed with purified water to remove all traces of acid or alkalinity from the cell. The cell volumes, after filling with water, were adjusted using a bladder to minimize the air space. This scheme eliminated the need to determine and

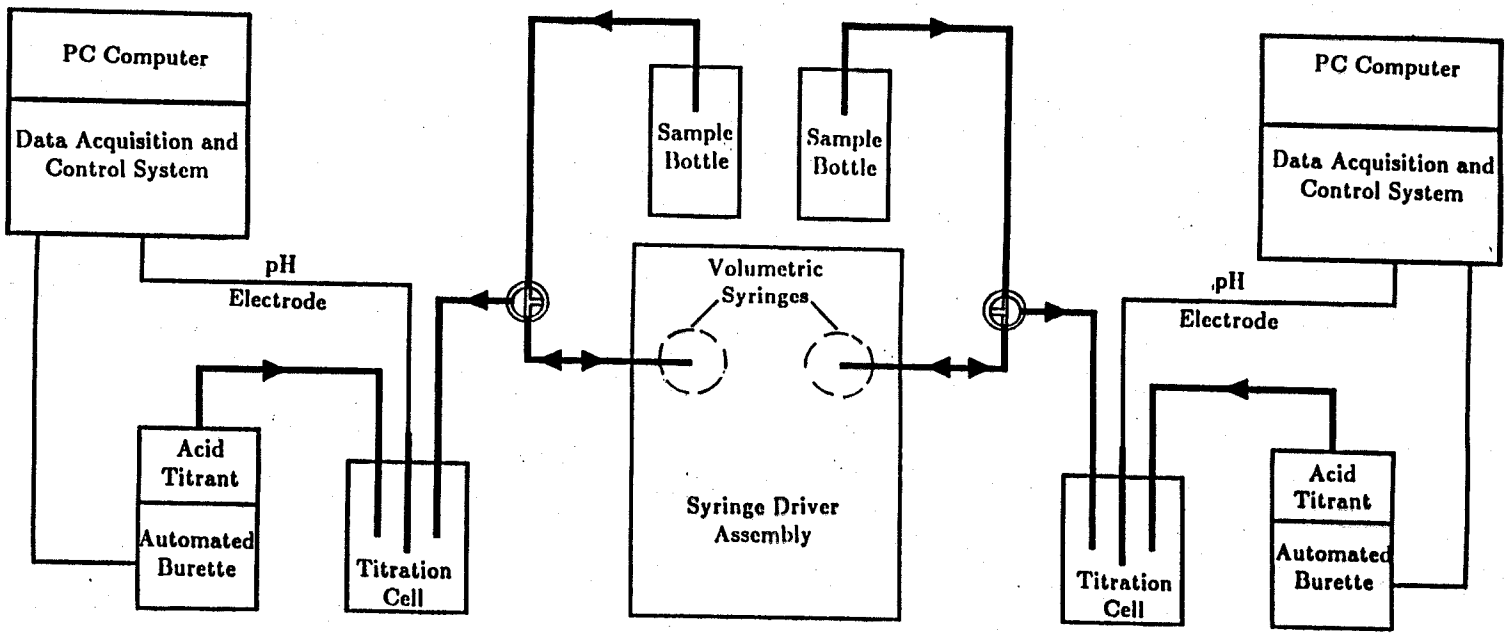

Figure 1. Schematic Diagram of the Dual Volumetric Alkalinity Titrator

control the cell volume. It added the requirement of calibrating and controlling the delivery of constant volumes by the syringe system. Calibration of the syringes was readily monitored at sea by delivering samples into pre - weighed septum bottles for later weighing at the shore laboratory.

The analytical system was modified in several ways after the TUNES Leg 3 cruise in 1991. Surface thermistor probes were attached to the outside surfaces of the glass syringes for measurement of the temperatures of the volumetric aliquots. A different type of glass electrode was used, and it was electrically shielded with a copper sleeve and a coaxial cable sleeve. A "bubble catcher" consisting of a section of glass tubing with a bulb was added in the plastic acid line to prevent air bubbles from injection into the titration cell. A plastic cage was erected around the system to reduce temperature fluctuations and a damping system built under the titrator to ameliorate expected vibration problems on the R/V *Vickers.*

After the titration cell had been filled and adjusted, the analytical procedures were typical of those used by other investigators. Acid doses were added using an automated burette and the resultant EMF recorded, all under computer control. All of the titration points were fit to a model of the system using a non - linear least squares approach. The alkalinity that minimized the residuals of this fit was found.

Details of the several main parts of the system and operating procedures follow.

4.2 *Titration cell*

Figure 2 is a schematic diagram of the titration cell. The cell bottom is a borosilicate glass Sybron/Brinkmann "90 ml" size water jacketed cell, modified by a glassblower to include a drain outlet equipped with a Teflon plug stopcock. The cell top was fabricated of plexiglass at SIO, and is attached to the bottom with an O - ring seal. The cell top has seven holes or ports with the following functions: 1) Combination glass pH electrode; 2) Glass sheathed temperature sensor (thermistor); 3) Water (sample) inlet (glass tube); 4) Glass capillary tip for acid delivery; 5) Glass vent tube for an approximately 5 ml capacity bladder made of a finger of a latex rubber surgical glove; 6) Valve made of glass rod bent to allow sealing of water inlet; 7) Glass cell vent tube with cap. All ports have O - ring seals.

The electrodes used were Radiometer combination glass pH electrodes (general use model GK2402C). This electrode, in comparison to the previously used Orion - Ross electrode, proved to be longer lasting, to have a significantly faster

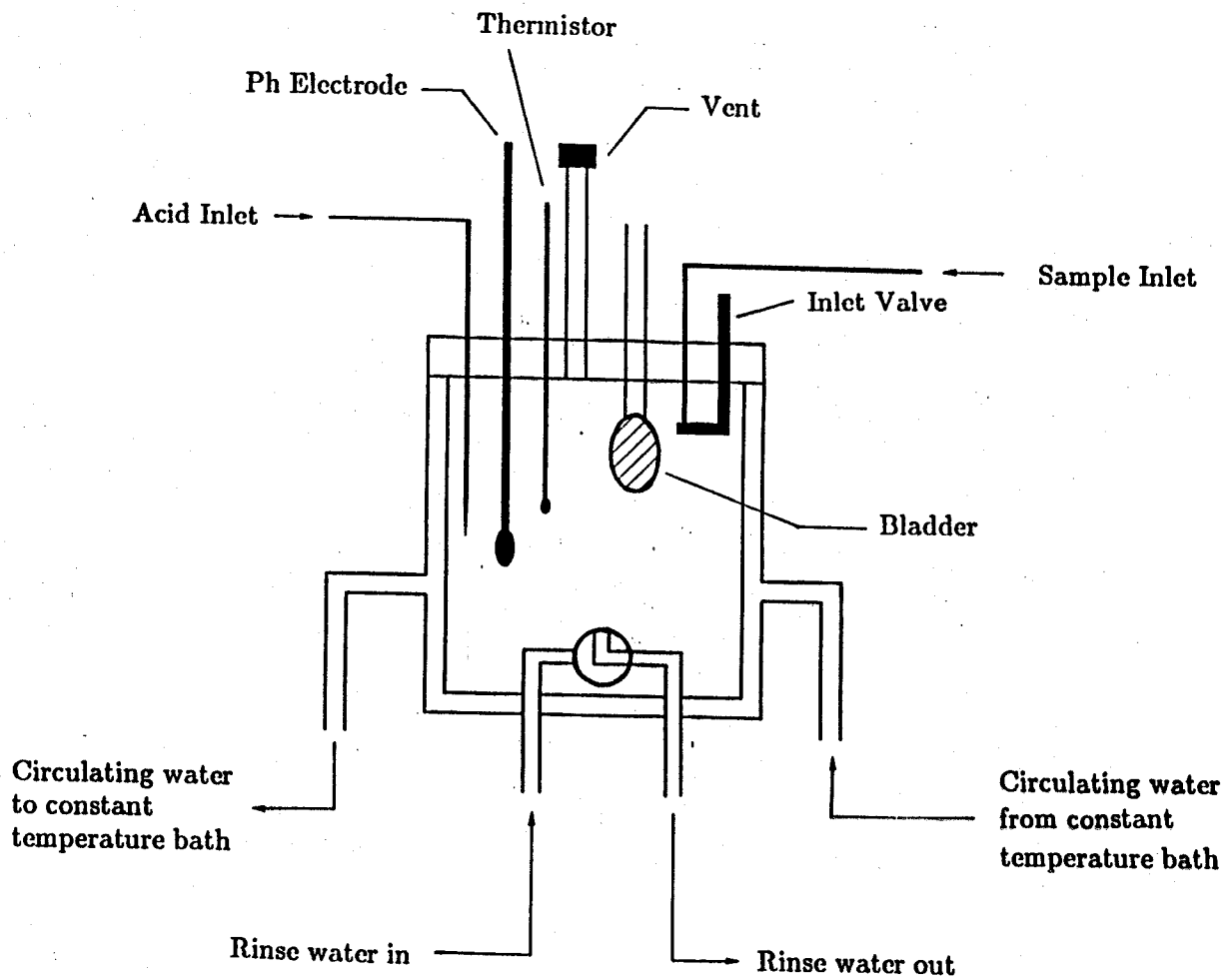

Figure 2. Schematic Diagram of Alkalinity Titration Cell

response and to be more stable. A pH meter was not used; instead, the electrode voltage output was connected to an isolation amplifier (voltage follower) that served as an impedance buffer between the electrode and a digital voltmeter.

4.3 *Sample aliquoting system and calibration*

Two 100 ml size glass syringes (of Japanese manufacture by "Star") were mounted on an optical bench and the syringe plungers were driven by a stepper motorized precision lead screw. Delivery of a constant volume of sample was accomplished by commanding the stepper motor to turn a preset number of counts.

Syringe volume calibrations were done by weighing deliveries of samples of known density (either pure water or sea water). The means of the pre - cruise laboratory calibrations of the syringe delivery volumes agreed with the means of the post - cruise calibrations to better than one part in 6000. Four sets of calibrations of both syringes were made at sea by delivering sea water samples of known salinity into pre - weighed bottles. The bottles were sealed with rubber septums and later weighed in the shore laboratory. Six deliveries were done for each calibration set; the sample standard deviation for each set was better than one part in 5000. All of the sets agreed with the laboratory calibrations to within one part in 1800. The sets on the left side agreed to better than one part in 3600; those on the right side, to one part in 2300 on average. The ALK data reported here were calculated using the pre - cruise volume calibrations for the syringes (91.151 ml for the left side syringe, serial number 7736; and 91.210 ml for the right side syringe, serial number 7754). The average for all shore calibrations (APR 91 to MAR 94) of the left side syringe is 91.150 ml (±1/10000 for 7 sets); for the right side syringe, the average is 91.181 ml (±1/2800 for 9 sets). A possible future small adjustment to the data would be to use the overall average volume for the right side, which agrees to one part in 7000 with the shipboard values. This change would raise the right side ALK's by one part in 3000. No significant change based on the calibration data would be possible for the left side results.

4.4 *Acid titrant delivery system and calibration*

The acid titrant was 0.1N hydrochloric acid in an aqueous sodium chloride matrix of approximately 0.7 ionic strength. Doses of acid were added to the titration cell under computer control from a Metrohm Dosimat 665 automatic burette. The plastic acid line from the Dosimat (5 ml size burette) was connected to a capillary glass tip for entrance into the titration cell.

A total of 26 doses were made during a titration, with a total of 3.4 ml of added acid titrant. Prior to and after the second (bicarbonate) equivalence point, the doses were of 200 microliters. Around the equivalence point, from 2.0 ml to 2.6 ml, the doses were of 50 microliters in order to weigh the titration curve fit to that region for total alkalinity determination.

The acid titrants were prepared in batches (designated batch numbers 9 and 11) of 20 liters and bottled in one liter reagent bottles with greased stoppers. During the cruise ten different bottles of acid were used. Bottles were changed when half empty. Three pairs of acid batch 11 bottles were used on Leg 1. After the first few days of Leg 2, two pairs of batch 9 bottles were used until the end of the cruise.

Acid densities were measured with a pycnometer at two different temperatures, 21 and 25 °C. A linear equation, using a universal slope of 0.28261, was used to calculate the acid density for a titration according to the temperature measured with a thermistor (surface probe) attached to the glass Dosimat burette.

The acid titrant concentration was determined by titration of sodium carbonate solutions. These were prepared by solution in purified water of primary standard sodium carbonate heated to constant weight at 270 °C. Titrations of standard carbonate were done on two bottles of acid batch 9, one prior to the cruise and one during the period of the cruise, and on one bottle of acid batch 11, during the cruise. These titrations were performed on the shore based gravimetric titration system in the CDRG laboratory at SIO (Guenther et al, 1994a). Results are summarized in the following table:

Date	STD Bottle-Trial	Acid Bottle No.	[HCl](eq/kg)
23 May 91	59-2	9D	0.09731
23 May 91	60-2	9D	0.09725
1 Sep 92	69-4	9B	0.09729
1 Sep 92	70-3	9B	0.09724
28 Aug 92	70-2	11C	0.09709
31 Aug 92	68-3	11C	0.09698
31 Aug 92	69-2	11C	0.09712

The average of the four determinations of acid batch 9 is 0.09727 ±0.00033 equivalents per kilogram (eq/kg). The value used to calculate the reported data is a preliminary value of 0.09724 eq/kg, representing about 0.75 microequivalents per kilogram (μeq/kg) difference in calculated alkalinity. Pending further retrospective analysis of the acid calibrations, it was not deemed worthwhile to adjust the tabulated data. The average of the three determinations of batch 11 is 0.09706 ±0.00007 eq/kg. The value used to calculate the reported data is a preliminary value of 0.09690 eq/kg, representing about 3.8 μeq/kg difference in calculated alkalinity. This latter value was determined before the cruise by titrating water from a number of bicarbonate quality assessment bottles (STD batch A) with both batch 9 and batch 11 acids, and then choosing an acid concentration for batch 11 that produced the same concentration for STD A as obtained with batch 9. If the average batch 11 value from the above table is used, an offset would appear in the quality assessment standards when batch 9 acid was substituted on Leg 2; the offset would be such that the quality assessment standards would agree less well with the shore based results on the gravimetric system. If the preliminary batch 11 value is used, no offset is discernible when the acids were changed. For that reason, pending further analysis, we have not used the sodium carbonate calibrations of acid batch 11 listed in the above table.

4.5 *Temperature measurement and calibration*

Several temperatures were measured in the titration procedure, using YSI thermistor probes. The aliquot temperature was measured with a surface probe attached to the outside surface of the syringe. This temperature was read and recorded in the data set when a key was pressed on the computer after the water had been in the syringe for at least ten minutes and just before injection of the aliquot into the titration cell. The acid temperature was measured with a surface probe attached to the Dosimat burette and recorded for every dose of titrant. The average temperature during the titration was used for calculation of the acid density. The cell temperature was measured with a glass sheathed immersion probe and recorded for every dose. The temperature at the midpoint of the titration was used in the calculation of alkalinity. The ambient air temperature was measured with an air probe during the titration and recorded, but not used in the calculations.

Thermistors were calibrated at the Oceanographic Data Facility of SIO by comparison to standard thermometers, with the assistance of Mr. Robert Williams. One set of calibrations was done prior to the cruise, in summer 1992. Calibration curves for the probes were very close to those done prior to the TUNES Leg 3 cruise, in summer 1991.

4.6 *Data acquisition system*

The titrator had two identical computerized data acquisition systems, one for each side of the titrator. The thermistor resistances and the electrode voltage (after passing through the isolation amplifier) were measured with a 5 1/2 digit Hewlett Packard digital multimeter. The electrode voltages were measured on the ±300 mv scale and recorded to 0.01 mv. A switching box and scanner allowed the multiple inputs to be recorded on hard disc under program control of a Zenith 286 lap top computer equipped with a data acquisition expansion chassis. The operating program also controlled the addition of acid titrant doses by the Dosimat burette.

At the end of a titration, recorded data were copied to a 3 1/2" HD diskette for archiving and later calculation of the alkalinity. One saved file contains one set of data for each titration point, i.e. the final stable electrode EMF's and associated temperatures. Another saved file contains 1/2 second averages of the electrode EMF's throughout the titration, allowing the electrode behavior and stability for every titration to be recreated.

4.7 *Calculation of titration alkalinity*

The titration alkalinity, ALK, was calculated from the titration data set using a non -linear least squares fit of the entire titration curve. A description of this procedure is given in the Department of Energy Handbook of Methods (DOE, 1994). In this procedure, the residuals of the fit are minimized by adjustment of four parameters: the bicarbonate equilibrium constant, K1; the ALK; the DIC; and f, related to the E0 of the system. Codes entered by the operator identified the sample as either sea water or bicarbonate in sodium chloride solution and the appropriate constants and densities were then selected by the program.

The sets of chemical equilibrium constants used in the fit routine to calculate the alkalinity were as follows:

For 0.7M NaCl:	K1 (bicarbonate)	: Dyrssen and Hansson	(1972)
	K2 (carbonate)	: Dyrssen and Hansson	(1972)
	Kw (water)	: Dyrssen and Hansson	(1972)
For sea water:	K1 (bicarbonate)	: Dickson and Millero	(1985)
	K2 (bicarbonate)	: Dickson and Millero	(1985)
	Kw (water)	: Dickson and Riley	(1979)
	Kb (borate)	: Johansson and Wedborg	(1981)
	Ks (sulfate)	: Khoo et. al.	(1977)
	Kf (fluoride)	: Dickson and Riley	(1979)
relation to SAL:	Total borate	: Uppstrom	(1974)
	Total sulfate	: Morris and Riley	(1966)
	Total fluoride	: Riley	(1965)

Phosphate and silica were assumed to be equal to zero. According to Dickson (DOE, 1994), this assumption has a negligible effect on the calculated alkalinity.

For every titration a graph was produced that displayed the residuals of the fit versus the actual data. Titration data files were copied into a master computer directory to allow refits of the titration data after final calibrations and adjustments to the data. All data, including the 1/2 second averages, have been archived at SIO.

4.8 *Titrator operating procedure*

Two bottles of water to be analyzed are placed in holders above the syringe driver assembly and allowed to adjust to ambient temperature. Residual prior samples are emptied from the syringes using the three way valves at the tips. The syringes and connective tubing are filled and emptied with small volumes of new samples, then the syringes are allowed to fill through a mostly glass (Tygon connection pieces) tubing system from the bottoms of the sample bottles.

The titration cells and water delivery tubing are prepared by a rinsing and flushing procedure. First the caps are removed from the cell vent tubes. The previous samples of acidified water are drained from the cells, then the cells are rinsed with purified water. The glass tubing leading from the syringes to the cells are flushed simultaneously with preset injections of 15 ml, using the syringe driver mechanism. The syringes are now set at a constant starting point. The valves at the sample inlets to the cells are closed. The cells are rinsed two more times and allowed to soak for a few minutes while stirring. The acid titrant tips in the cells are flushed with injections of 50 microliters; and the cells are drained then rinsed again to just below the acid tips. The cell drain stopcocks are closed and the

syringe delivery tubing again opened to the cells. The cells are now ready to be filled with samples. The computers are signaled to record the current temperatures of the surface thermistor probes attached to the outside surfaces of the syringes: these temperatures are used as the aliquot temperatures. The syringe driver motor is switched on to move the syringes a constant distance for simultaneous injection of aliquots into both cells. The sample entry tubes in the cells are closed with the valves. The submerged bladders are inflated using rubber pipette bulbs to reduce the cell air spaces to a minimum volume, one to two cc including the visible bubble and the volume of the cell vent tube. The cells are then closed by placing air tight plastic caps on the cell vent tubes. The bulbs are removed from the tubes leading to the bladders so that the insides of the bladders remain at atmospheric pressure during the titrations. The stirrers are turned on and the cells allowed to equilibrate to the operating temperature maintained by flowing water from a refrigerated constant temperature bath through the water jackets on the cells.

The computer data acquisition program prompts the operator to enter sample identification, sample type (sea water or bicarbonate in sodium chloride solution), and salinity. The "salinities" assigned to the bicarbonate reference materials were 39.39 for SIO STD batch A and 38.15 for SIO STD batch B. The salinity used for the natural sea water Certified DIC Reference Material, batch number 13, was 32.864 (A. Dickson, private communication). All of these apparent salinities were calculated from pycnometer density measurements using an equation of state for sea water (Fofonoff, 1985). When temperature stability has been reached, in about ten minutes, the titration programs are started and the first doses added. At each point on the titration curve, the program evaluates the electrode output stability according to a preset criterion. When stability is reached, the electrode EMF and the cell, acid burette and ambient air temperatures are recorded and the next dose of acid is injected.

The complete analysis cycle is about 30 minutes long; thus, about four titrations can be completed per hour, with dual titrators.

4.9 *Daily analysis schedule*

With two operators on board ship, the titrator was operated essentially around the clock during the cruise, interrupted by water sampling activities on station. An average of 37 titrations per analysis day were run. The usual analysis sequence was as follows. Before and after every eight sets of sea water samples (16

titrations), a set of reference materials for quality assessment were run. These reference materials were bicarbonate solutions prepared by the CDRG at SIO. These solutions were prepared in 50 liter batches by bubbling ambient air through solutions of sodium carbonate in 0.7 ionic strength sodium chloride until the pH reached stability. One liter borosilicate glass bottles were filled with solutions from two batches (designated STD batches A and B). Normally five titrations were performed on each bottle during the cruise. Each time these reference materials were titrated they were switched side to side on the system . Once a day, approximately every 40 titrations, a pair of bottles of Dr. Andrew Dickson's Certified DIC Reference Material Batch No. 13 were titrated. This batch was prepared from natural sea water. Normally one analysis was done on each CRM bottle after a DIC analysis had been made on the SOMMA coulometric system. Twice a day duplicate sea water samples collected on profile stations were titrated, one bottle of the pair on each side of the titrator. Samples were normally analyzed in order of depth, from shallow to deep. Thus on one day of 40 titrations there would be two pairs of STD's and one pair of CRM's in addition to 17 pairs of collected sea water samples, including two pairs of duplicate samples.

5. Summary of Results

5.1 *Data quality assessments*

5.1a Duplicate sea water samples

During each leg of the cruise thirty six pairs of duplicate samples were collected and analyzed, i.e. two sample bottles were filled with water from the same Niskin bottle. The bottle pairs were titrated together, one bottle on the right side of the titrator and the other on the left. The sample standard deviations calculated from the pair data, assuming the left and right sides were not systematically different, are summarized in the following table:

Leg	No. of duplicate pairs	s, μeq/kg
1	33	1.56
2	30	2.13

For Leg 1, one duplicate pair was flagged (identified malfunction or error) and one pair was omitted from consideration by the three sigma criterion (side to side delta of 11.7 μeq/kg). For leg 2, three pairs were flagged and the data record

was lost for one pair. Two pairs were omitted by the three sigma criterion (delta's of 12.5 and 9.9 μeq/kg).

5.1b SIO bicarbonate reference materials

A total of 86 titrations on bottles of STD batch A were done on both legs. Eleven were omitted from consideration due to operator error or titrator malfunction and by the three sigma criterion (one result: 11.2 μeq/kg low). For batch B, there were 92 total titrations, with two omissions (including one greater than three times sigma at 7.2 μeq/kg low). The results are summarized in the following table:

STD Batch	No. of analyses	Avg. ALK	Sample std dev (μeq/kg)
A	75	2304.24	2.77
B	90	2298.75	2.03

In comparison, analyses of samples of these batches of STD were made before and after the cruise in the shore laboratory on the gravimetric titration system, with the following results:

STD Batch	No. of analyses	Avg. ALK	Sample std dev (μeq/kg)
A	26	2307.03	1.59
B	26	2302.15	1.94

We have not determined the reason why the shore data are higher than the shipboard data.

Figures 3 and 4 are versions of control charts for the shipboard STD data. The individual results are plotted for each STD batch, with the overall mean and the two times and three times standard deviation levels shown. Six of the omitted data points are plotted on the STD A chart - the six points greater than the three times level. All of the other omitted data are off the scale of the chart. One of the omitted data points is plotted on the STD B chart - the only one below the three times level.

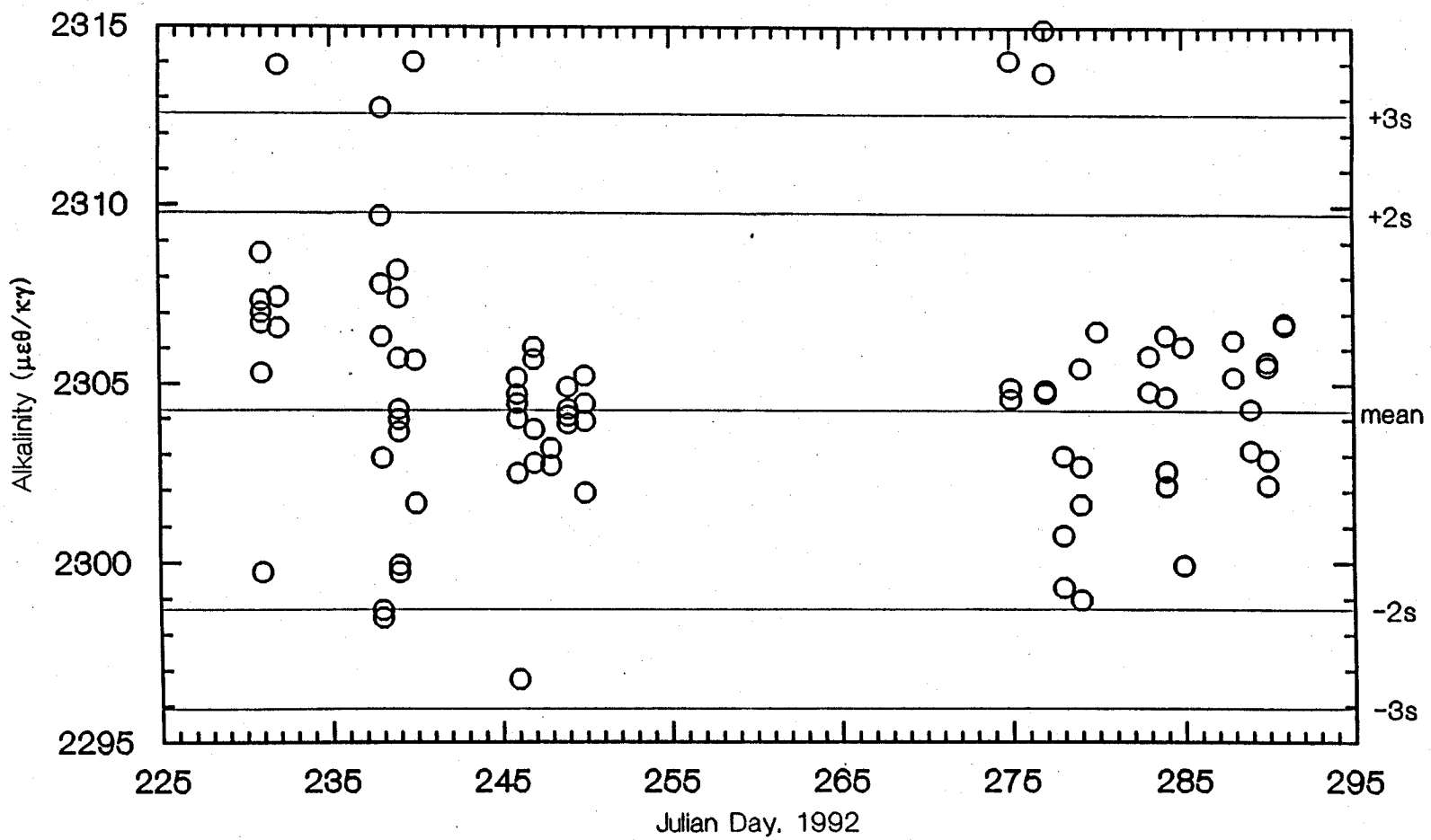

Figure 3: Control chart for CDRG Bicarbonate Reference Material Batch A shipboard alkalinity data from CGC92 Legs 1 and 2 (WOCE line P13). Average alkalinity for batch A: 2304.24 ± 2.77 μeq/kg for 75 analyses.

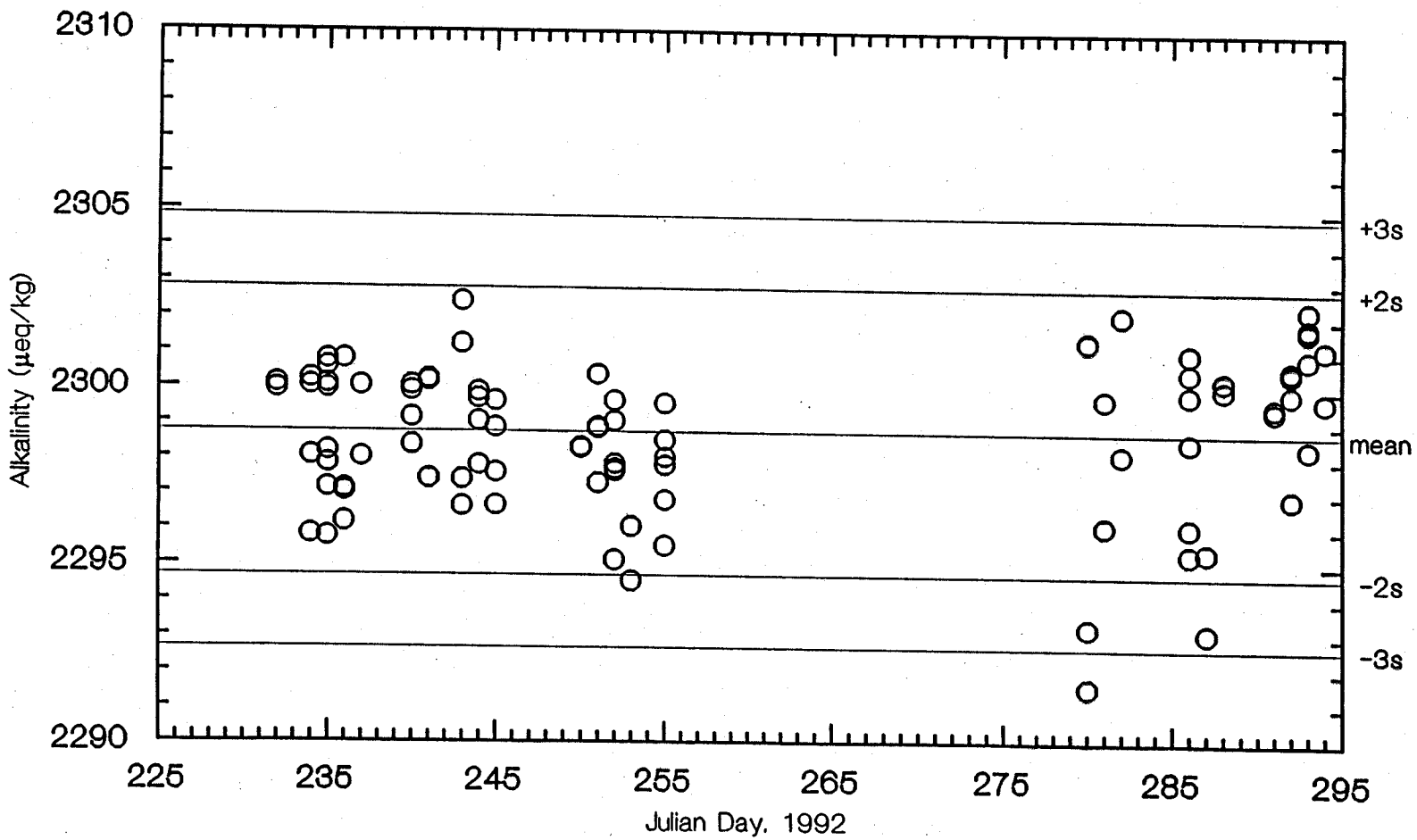

Figure 4: Control chart for CDRG Bicarbonate Reference Material Batch B shipboard alkalinity data from CGC92 Leg 1 and 2 (WOCE line P13). Average alkalinity for batch B: 2298.75 ± 2.03 µeq/kg for 90 analyses.

5.1c CRM sea water reference materials, batch 13

A total of 84 titrations of CRM batch 13 samples were done during the cruise. In most cases aliquots had previously been removed from the CRM bottles for coulometric DIC analysis. Six titrations were omitted from consideration due to operator error or instrument malfunction and by the three times sigma criterion (two results, at 15.0 μeq/kg high and 19.0 μeq/kg low). At the shore laboratory, 6 titrations were made on this batch of CRM on the gravimetric titration system. One was omitted. These results are shown in the following table:

Titrator	No. of analyses	Avg. ALK (μeq/kg)	Sample std dev (μeq/kg)
volumetric (sea)	78	2201.26	2.29
gravimetric(shore)	5	2198.67	3.87

Figure 5 is a control chart for the shipboard analyses of CRM batch 13 samples.

5.1d Discussion of data quality

Multiple titrations of duplicate sea water samples, CRM's and STD's during the cruise demonstrate that the imprecision of the shipboard titration system for the CGC92 cruise is at the level of approximately 2.5 microequivalents per kilogram (one standard deviation). The three types of quality assessment samples titrated actually give different results. The duplicate sea waters yield a standard deviation of a single measurement (s) of 1.6 μeq/kg on Leg 1 and 2.1 on Leg 2. The two bicarbonate STD reference materials do not agree well. Batch A has the highest standard deviation at 2.8 μeq/kg overall, but batch B is significantly lower at 2.0. Moreover, the scatter in STD A decreased on Leg 2 in comparison with Leg 1, while STD B increased, as did the other quality assessment samples. The primary reason for the general increase in scatter on this cruise, in comparison to the TUNES Leg 3 cruise the previous year, is the frequent appearance of significant bias between the two sides of the titrator. The bias varied to some extent, and fortuitously had a larger effect on the STD A set than the other quality assessment data sets. The side to side bias also became more severe on Leg 2, accounting for the general increase in scatter from Leg 1 to Leg 2. We have not been able to identify the cause of the side to side bias. On average it was about 1.8 $\pm$2.3 μeq/kg, right side being higher, as determined from 172 runs of the

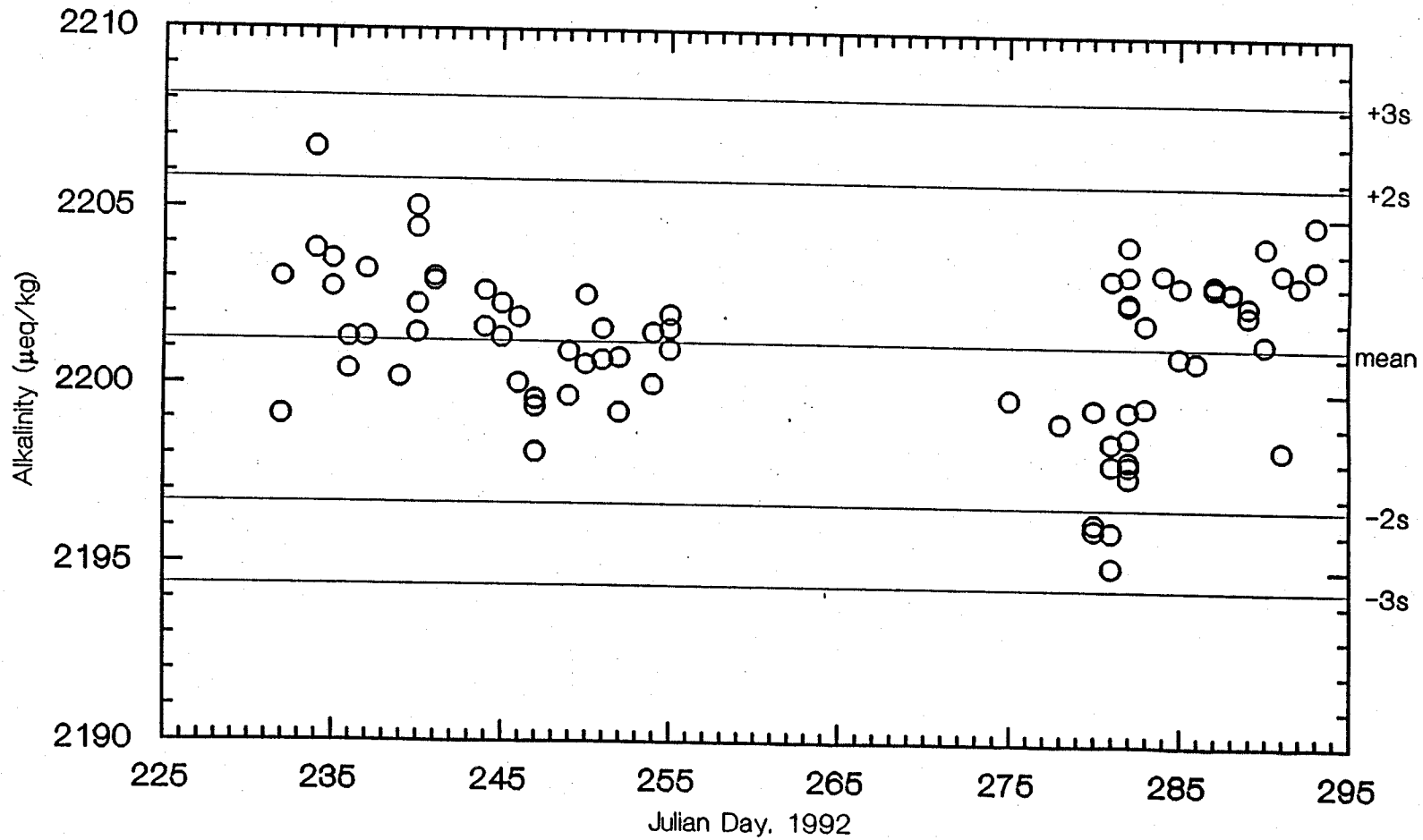

Figure 5: Control chart for SIO Certified DIC Reference Material Batch 13 shipboard alkalinity data from CGC92 Legs 1 and 2 (WOCE line P13). Average alkalinity for CRM 13: 2201.26 ± 2.29 µeq/kg for 78 analyses.

"same" water simultaneously on both sides of the titration system, i.e. for duplicate sea water samples run side by side, and also for CRM's and STD's run side by side.

Comparison of CRM and STD results at sea on the volumetric titrator to those in the shore laboratory obtained on the gravimetric titrator reveals an offset between the two systems. For STD A, the shore results are on average 2.8 μeq/kg higher than the shipboard results, and for STD B, the shore results are 3.5 higher. The side to side offset tends to be averaged out for these comparisons. For CRM 13, the few shore results are on average 2.6 μeq/kg lower than the shipboard results. The standard deviation for the shore CRM results is very high, however, with the data set split between low numbers and others higher than the shipboard result.

The lack of a definitive calibration of the acid titrant batch 11 (see section 4.4 above) implies another possible source of systematic error. As discussed above, the concentration of acid 11 was chosen to produce results for bicarbonate STD reference materials that agreed with those obtained using acid batch 9, for which the acid calibration is better and shows consistency with other results, as discussed in Guenther et al. (1994b). Some further scrutiny of the data may result in an improvement of the results in this area.

In conclusion, it can be stated that influences due to temperature, density and volume measurements on the accuracy of the results are likely to be small, close to the analytical imprecision, based on results reported here. The side to side bias in the titrator system seen in this cruise could lead to a systematic error of up to 2 μeq/kg in a single sea water result, although the sign of this possible error is as yet unknown. The offset between bicarbonate STD reference materials analyzed at sea and in the shore laboratory indicates that the shipboard results may be up to 3 μeq/kg low. The question of the accuracy of the acid calibration and indeed of the titration method overall is less clear due to the lack of a Certified Reference Material for ALK. Interlaboratory comparisons indicate that the accuracy level may be ± 10 μeq/kg or more.

5.2 *Data tabulations of shipboard alkalinity results*

5.2a Sea water sample data

The table lists results from all titrations in the data set. The seventh column, headed TRIAL, lists the sequential number of the titration on the same sample bottle of water. In most cases, only one was made. The "A" and "B" refer to

duplicate samples collected from the same Niskin bottle. The eighth column, headed FLAG, identifies with an "X" those calculated titrations that were affected by identified operator error or titrator system malfunctions. Such problems included: 1) Loss of water during filling of the titration cell (sometimes identified after the titration had been run); 2) problems with the pH electrodes or isolation amplifiers, often evidenced by poor residuals on the titration fit; 3) operator mistakes, such as forgetting to turn on the stir bar or to close the drain or inlet valves. The titrations identified with the flag "EX" refer to those titrations off by a large margin, usually 20 μeq/kg or more, presumably due to operator error or system malfunction, but not identified. The ninth column, headed TRIAL ALK, is the individual result for one titration trial. The tenth column, headed TRIAL DELTA, is the difference between good trials on aliquots from a single sample of water. The eleventh column, headed BOTTLE ALK, is the average of all the good trials made on water from one bottle. The twelfth column, headed BOTTLE DELTA, is the difference between analyses of water from duplicate sample bottles. The thirteenth column, headed "NISKIN" AVG is the average alkalinity obtained for a single Niskin bottle. In most cases, with a single titration per Niskin bottle, columns nine, eleven and thirteen are identical, and nothing appears in columns ten and twelve.

5.2b SIO bicarbonate reference material data

Two tables report the shipboard alkalinity results for the SIO bicarbonate reference materials, designated STD A and STD B. The tables are arranged in order of analysis date during the cruise. The individual bottles of each batch are identified by a number after the A or B. The third column, headed TRIAL, is the sequential number of the titration on the same bottle of water. The fourth column, headed FLAG, identifies with an "X" those calculated titrations that are affected by identified operator error or titrator system malfunctions (same examples as listed above). Bottle number A2, titrated on 1 and 3 Oct 92 was given an "X" flag on all five titrations because the bottle was a "bad" one, consistently high by 10 μeq/kg. The titrations identified with the flag "EX" refer to those titrations off by a large margin, 30 μeq/kg or more, presumably due to operator error or system malfunction, but not identified. The fifth, sixth and seventh columns list the individual trial alkalinities and the overall average and sample standard deviation of all the alkalinity titrations of the STD batch during the cruise.

5.2c CRM sea water reference material data

The last table reports the shipboard alkalinity results for Certified DIC Reference Materials, batch number 13. The columns have the same meaning as described above for the SIO reference materials. The letters following the CRM sample bottle number are used for internal accounting purposes.

References

DOE, Handbook of methods for the analysis of the various parameters of the carbon dioxide system in sea water; version 2, A. G. Dickson and C. Goyet, eds. ORNL/CDIAC-74, 1994.

Fofonoff, N. P., Physical properties of sea water: a new salinity scale and equation of state of sea water, J. of Geophys. Res., 90, 3332-3342, 1985.

Guenther, P. R., Keeling, C. D. and Emanuele, G. Oceanic CO_2 measurements for the WOCE hydrographic survey in the Pacific Ocean, 1990-1991: Shore based analyses, SIO Reference Series, No. 94-28, 192 p., 1994a.

Guenther, P. R., Emanuele, G., Moss, D. J., Lueker, T. J. and Keeling, C. D. Oceanic CO_2 measurements for the WOCE hydrographic survey in the Pacific Ocean: Shipboard alkalinity measurements on TUNES Leg 3, 1991, SIO Reference Series, No. 94-29, 32 p., 1994b.

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY 14-OCT-94
CGC92 Legs 1 and 2 CDRG SHIPBOARD ALKALINITY REPORT

SUMMARY OF ALKALINITY DATA

STN	CAST NISK	DEPTH (dbar)	SAMPLE DATE	ANALYSIS DATE	SAMPLE BOTTLE	TRIAL	FLAG	TRIAL ALK	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG
								(UEQUIV/KG SW)				
5	1 36	9	17AUG92	18AUG92	&631 A	1		2240.76		2240.76		
5	1 36	9	17AUG92	18AUG92	&631 B	1		2241.01		2241.01	+0.25	2240.89
5	1 34	24	17AUG92	18AUG92	&630	1		2241.25		2241.25		2241.25
5	1 33	50	17AUG92	18AUG92	&629	1		2248.64		2248.64		2248.64
5	1 32	75	17AUG92	18AUG92	&628	1		2251.85		2251.85		2251.85
5	1 31	99	17AUG92	18AUG92	&627	1		2253.58		2253.58		2253.58
5	1 30	148	17AUG92	18AUG92	&626	1		2256.40		2256.40		2256.40
5	1 29	199	17AUG92	18AUG92	&625	1		2260.96		2260.96		2260.96
5	1 28	248	17AUG92	18AUG92	&624	1		2274.72		2274.72		2274.72
5	1 27	301	17AUG92	18AUG92	&623	1		2293.02		2293.02		2293.02
5	1 26	348	17AUG92	18AUG92	&622	1		2302.19		2302.19		2302.19
5	1 25	397	17AUG92	18AUG92	&621	1		2311.88		2311.88		2311.88
5	1 24	488	17AUG92	19AUG92	&620	1		2328.16		2328.16		2328.16
5	1 23	597	17AUG92	19AUG92	&619	1		2340.52		2340.52		2340.52
5	1 22	697	17AUG92	19AUG92	&618	1		2352.83		2352.83		2352.83
5	1 21	798	17AUG92	19MAY92	&617	1		2362.14		2362.14		2362.14
5	1 20	897	17AUG92	19AUG92	&616	1		2369.52		2369.52		2369.52
5	1 19	999	17AUG92	19AUG92	&615	1		2378.28		2378.28		2378.28
5	1 18	1099	17AUG92	19AUG92	&614	1		2383.53		2383.53		2383.53
5	1 17	1185	17AUG92	19AUG92	&613	1		2388.56		2388.56		2388.56
5	1 16	1296	17AUG92	19AUG92	&612	1		2395.52				
5	1 16	1296	17AUG92	19AUG92	&612	2		2393.71	-1.81	2394.61		2394.61
5	1 14	1498	17AUG92	19AUG92	&611	1		2405.92		2405.92		2405.92
5	1 13	1598	17AUG92	19AUG92	&610	1		2410.18		2410.18		2410.18
5	1 12	1697	17AUG92	19AUG92	&609	1		2413.01		2413.01		2413.01
5	1 11	1799	17AUG92	19AUG92	&608	1		2414.97		2414.97		2414.97
5	1 10	1997	17AUG92	19AUG92	&607	1		2419.55		2419.55		2419.55
5	1 09	2196	17AUG92	19AUG92	&606	1		2424.31		2424.31		2424.31
5	1 08	2399	17AUG92	19AUG92	&605	1		2427.75		2427.75		2427.75
5	1 06	2798	17AUG92	19AUG92	&604	1		2431.96		2431.96		2431.96
5	1 05	3000	17AUG92	19AUG92	&603 A	1		2436.43		2436.43		
5	1 05	3000	17AUG92	19AUG92	&603 B	1		2435.86		2435.86	-0.57	2436.15
5	1 03	3102	17AUG92	19AUG92	&602	1		2440.22		2440.22		2440.22
5	1 01	3310	17AUG92	19AUG92	&601	1		2438.66		2438.66		2438.66
6	1 09	10	21AUG92	21AUG92	&632	1		2224.14		2224.14		2224.14
7	1 15	10	21AUG92	21AUG92	&633	1		2225.12		2225.12		2225.12
8	1 25	9	21AUG92	21AUG92	&658	1		2220.51		2220.51		2220.51
8	1 24	24	21AUG92	21AUG92	&657 A	1		2244.43		2244.43		
8	1 24	24	21AUG92	21AUG92	&657 B	1		2244.43		2244.43	+0.00	2244.43
8	1 23	50	21AUG92	21AUG92	&656	1		2255.09		2255.09		2255.09
8	1 22	74	21AUG92	21AUG92	&655	1		2246.81		2246.81		2246.81
8	1 21	100	21AUG92	21AUG92	&654	1		2257.00		2257.00		2257.00
8	1 20	124	21AUG92	21AUG92	&653	1		2244.47		2244.47		2244.47
8	1 19	148	21AUG92	21AUG92	&652	1		2250.60		2250.60		2250.60
8	1 18	198	21AUG92	21AUG92	&651	1		2249.83		2249.83		2249.83
8	1 17	248	21AUG92	21AUG92	&650	1		2268.13		2268.13		2268.13
8	1 16	299	21AUG92	21AUG92	&649	1		2288.00		2288.00		2288.00
8	1 15	348	21AUG92	21AUG92	&648	1		2298.97		2298.97		2298.97
8	1 14	399	21AUG92	21AUG92	&647	1		2305.07		2305.07		2305.07
8	1 13	448	21AUG92	21AUG92	&646	1		2316.47		2316.47		2316.47
8	1 12	498	21AUG92	21AUG92	&645	1		2324.00		2324.00		2324.00

8	1	11	598	21AUG92	21AUG92	&644		1		2335.58		2335.58	2335.58
8	1	10	697	21AUG92	21AUG92	&643		1		2348.70		2348.70	2348.70
8	1	09	797	21AUG92	21AUG92	&642		1		2353.73		2353.73	2353.73
8	1	08	896	21AUG92	21AUG92	&641		1		2366.12		2366.12	2366.12
8	1	07	998	21AUG92	21AUG92	&640		1		2373.80		2373.80	2373.80
8	1	06	1099	21AUG92	21AUG92	&639		1		2379.21		2379.21	2379.21
8	1	05	1246	21AUG92	21AUG92	&638		1		2387.19		2387.19	2387.19
8	1	04	1398	21AUG92	21AUG92	&637		1		2397.12		2397.12	2397.12
8	1	03	1548	21AUG92	21AUG92	&636	A	1		2401.36		2401.36	
8	1	03	1548	21AUG92	21AUG92	&636	B	1		2404.32		2404.32	+2.96 2402.84
8	1	02	1698	21AUG92	22AUG92	&635		1		2408.67		2408.67	2408.67
8	1	01	1818	21AUG92	22AUG92	&634		1		2414.06		2414.06	2414.06
9	1	30	10	21AUG92	21AUG92	&659		1		2222.72		2222.72	2222.72
10	1	32	10	21AUG92	22AUG92	&660		1		2240.50		2240.50	2240.50
11	1	36	11	22AUG92	22AUG92	&693		1		2241.76		2241.76	2241.76
11	1	35	25	22AUG92	22AUG92	&692	A	1		2240.14		2240.14	
11	1	35	25	22AUG92	22AUG92	&692	B	1		2243.57		2243.57	+3.43 2241.85
11	1	34	50	22AUG92	22AUG92	&691		1		2246.46		2246.46	2246.46
11	1	33	75	22AUG92	22AUG92	&690		1		2247.83		2247.83	2247.83
11	1	32	100	22AUG92	22AUG92	&689		1		2252.00		2252.00	2252.00
11	1	31	125	22AUG92	22AUG92	&688		1		2261.80		2261.80	2261.80
11	1	30	151	22AUG92	22AUG92	&687		1		2285.74		2285.74	2285.74
11	1	29	174	22AUG92	22AUG92	&686		1		2297.32		2297.32	2297.32
11	1	28	198	22AUG92	22AUG92	&685		1		2297.20		2297.20	2297.20
11	1	27	249	22AUG92	22AUG92	&684		1		2310.91		2310.91	2310.91
11	1	26	299	22AUG92	22AUG92	&683		1		2317.83		2317.83	2317.83
11	1	25	348	22AUG92	22AUG92	&682		1		2329.11		2329.11	2329.11
11	1	24	399	22AUG92	22AUG92	&681		1		2332.97		2332.97	2332.97
11	1	23	499	22AUG92	22AUG92	&680		1		2345.83		2345.83	2345.83
11	1	22	599	22AUG92	22AUG92	&679		1		2357.79		2357.79	2357.79
11	1	21	692	22AUG92	22AUG92	&678		1		2367.09		2367.09	2367.09
11	1	20	799	22AUG92	22AUG92	&677		1		2369.15		2369.15	2369.15
11	1	19	998	22AUG92	22AUG92	&676		1		2386.66		2386.66	2386.66
11	1	18	1198	22AUG92	22AUG92	&675		1		2392.93		2392.93	2392.93
11	1	17	1399	22AUG92	22AUG92	&674		1		2403.81		2403.81	2403.81
11	1	16	1598	22AUG92	22AUG92	&673		1		2410.96		2410.96	2410.96
11	1	15	1798	22AUG92	22AUG92	&672		1	EX	2449.68			
11	1	14	1998	22AUG92	22AUG92	&671		1		2414.08		2414.08	2414.08
11	1	13	2198	22AUG92	22AUG92	&670		1		2418.06		2418.06	2418.06
11	1	12	2398	22AUG92	22AUG92	&669		1		2421.93		2421.93	2421.93
11	1	11	2600	22AUG92	22AUG92	&668		1		2421.46		2421.46	2421.46
11	1	10	2799	22AUG92	22AUG92	&667		1		2418.08			
11	1	10	2799	22AUG92	22AUG92	&667		2		2422.04	+3.96	2420.06	2420.06
11	1	09	2999	22AUG92	22AUG92	&666		1		2422.39			
11	1	09	2999	22AUG92	22AUG92	&666		2		2420.12	-2.27	2421.26	2421.26
11	1	07	3500	22AUG92	22AUG92	&665		1		2418.30		2418.30	2418.30
11	1	06	3749	22AUG92	22AUG92	&664		1		2420.81		2420.81	2420.81
11	1	05	4000	22AUG92	22AUG92	&663		1		2410.84		2410.84	2410.84
11	1	03	4251	22AUG92	22AUG92	&662	A	1	X	2410.82			
11	1	03	4251	22AUG92	23AUG92	&662	A	3		2417.29		2417.29	
11	1	03	4251	22AUG92	22AUG92	&662	B	1		2418.51			
11	1	03	4251	22AUG92	23AUG92	&662	B	2	EX	2450.82			
11	1	03	4251	22AUG92	23AUG92	&662	B	3		2418.99	+0.48	2418.75	+1.46 2418.02
11	1	01	4706	22AUG92	22AUG92	&661		1		2415.98		2415.98	2415.98
12	1	36	10	23AUG92	23AUG92	&694		1		2237.70		2237.70	2237.70
13	1	36	10	23AUG92	23AUG92	&728		1	EX	2262.21			
13	1	35	24	23AUG92	23AUG92	&727	A	1	X	2214.57			
13	1	35	24	23AUG92	23AUG92	&727	A	3		2237.26		2237.26	
13	1	35	24	23AUG92	23AUG92	&727	B	2	EX	2261.87			2237.26
13	1	34	49	23AUG92	23AUG92	&726		1		2247.29		2247.29	2247.29

13	1	33	74	23AUG92	23AUG92	&725		1		2244.53		2244.53	2244.53
13	1	32	99	23AUG92	23AUG92	&724		1		2250.14		2250.14	2250.14
13	1	31	126	23AUG92	23AUG92	&723		1		2260.82		2260.82	2260.82
13	1	30	146	23AUG92	23AUG92	&722		1		2282.76		2282.76	2282.76
13	1	29	174	23AUG92	23AUG92	&721		1		2296.15		2296.15	2296.15
13	1	28	200	23AUG92	23AUG92	&720		1		2302.27		2302.27	2302.27
13	1	27	248	23AUG92	23AUG92	&719		1		2308.82		2308.82	2308.82
13	1	26	298	23AUG92	23AUG92	&718		1		2321.51		2321.51	2321.51
13	1	25	348	23AUG92	23AUG92	&717		1		2331.33		2331.33	2331.33
13	1	24	403	23AUG92	23AUG92	&716		1		2336.03		2336.03	2336.03
13	1	23	499	23AUG92	23AUG92	&715		1		2344.63		2344.63	2344.63
13	1	22	600	23AUG92	23AUG92	&714		1		2356.73		2356.73	2356.73
13	1	21	696	23AUG92	23AUG92	&713		1		2365.34		2365.34	2365.34
13	1	20	797	23AUG92	23AUG92	&712		1		2374.09		2374.09	2374.09
13	1	19	996	23AUG92	23AUG92	&711		1		2384.57		2384.57	2384.57
13	1	18	1198	23AUG92	23AUG92	&710		1		2395.17		2395.17	2395.17
13	1	17	1398	23AUG92	24AUG92	&709		1		2400.79		2400.79	2400.79
13	1	16	1598	23AUG92	24AUG92	&708		1		2409.86		2409.86	2409.86
13	1	15	1799	23AUG92	24AUG92	&707		1		2414.84		2414.84	2414.84
13	1	14	1999	23AUG92	24AUG92	&706		1		2414.86		2414.86	2414.86
13	1	13	2300	23AUG92	24AUG92	&705		1		2419.29		2419.29	2419.29
13	1	12	2597	23AUG92	24AUG92	&704		1		2413.35		2413.35	2413.35
13	1	11	2900	23AUG92	24AUG92	&703		1		2418.00		2418.00	2418.00
13	1	10	3301	23AUG92	24AUG92	&702		1		2423.95		2423.95	2423.95
13	1	09	3701	23AUG92	24AUG92	&701		1		2419.08		2419.08	2419.08
13	1	08	4101	23AUG92	24AUG92	&700		1		2419.37		2419.37	2419.37
13	1	07	4502	23AUG92	24AUG92	&699		1		2418.97		2418.97	2418.97
13	1	06	4903	23AUG92	24AUG92	&698		1		2418.41		2418.41	2418.41
13	1	05	5301	23AUG92	24AUG92	&697		1		2415.12		2415.12	2415.12
13	1	03	5701	23AUG92	24AUG92	&696	A	1		2411.12		2411.12	
13	1	03	5701	23AUG92	24AUG92	&696	B	1		2415.41		2415.41	+4.29 2413.27
13	1	01	5951	23AUG92	24AUG92	&695		1		2415.32		2415.32	2415.32
14	1	36	11	23AUG92	24AUG92	&729		1		2238.81			
14	1	36	11	23AUG92	24AUG92	&729		2		2240.25	+1.44	2239.53	2239.53
15	1	36	10	24AUG92	24AUG92	&730		1		2226.98			
15	1	36	10	24AUG92	24AUG92	&730		2		2220.44	-6.54	2223.71	2223.71
16	1	36	10	24AUG92	26AUG92	&731		1		2224.38		2224.38	2224.38
17	1	35	11	25AUG92	25AUG92	&764		1		2227.76		2227.76	2227.76
17	1	36	11	25AUG92	25AUG92	&765	A	1		2225.25		2225.25	
17	1	36	11	25AUG92	25AUG92	&765	B	1		2226.03		2226.03	+0.78 2225.64
17	1	34	25	25AUG92	25AUG92	&763		1		2229.09		2229.09	2229.09
17	1	33	50	25AUG92	25AUG92	&762		1		2235.07		2235.07	2235.07
17	1	32	76	25AUG92	25AUG92	&761		1		2240.98		2240.98	2240.98
17	1	31	100	25AUG92	25AUG92	&760		1		2240.76		2240.76	2240.76
17	1	30	125	25AUG92	25AUG92	&759		1		2251.66		2251.66	2251.66
17	1	29	149	25AUG92	25AUG92	&758		1		2251.06		2251.06	2251.06
17	1	28	175	25AUG92	25AUG92	&757		1	X	2330.89			
17	1	27	200	25AUG92	25AUG92	&756		1		2270.84		2270.84	2270.84
17	1	26	249	25AUG92	25AUG92	&755		1		2284.49		2284.49	2284.49
17	1	25	298	25AUG92	25AUG92	&754		1	EX	2340.43			
17	1	24	349	25AUG92	25AUG92	&753		1		2304.02		2304.02	2304.02
17	1	23	399	25AUG92	25AUG92	&752		1		2317.38		2317.38	2317.38
17	1	22	499	25AUG92	25AUG92	&751		1		2323.40		2323.40	2323.40
17	1	21	599	25AUG92	25AUG92	&750		1		2342.82		2342.82	2342.82
17	1	20	698	25AUG92	25AUG92	&749		1		2348.99		2348.99	2348.99
17	1	19	798	25AUG92	25AUG92	&748		1		2362.53		2362.53	2362.53
17	1	18	898	25AUG92	25AUG92	&747		1		2366.74		2366.74	2366.74
17	1	17	998	25AUG92	25AUG92	&746		1		2376.98		2376.98	2376.98
17	1	16	1098	25AUG92	25AUG92	&745		1		2379.25		2379.25	2379.25
17	1	15	1198	25AUG92	25AUG92	&744		1		2389.36		2389.36	2389.36

17	1	14	1399	25AUG92	25AUG92	&743		1		2396.56		2396.56	2396.56
17	1	13	1598	25AUG92	25AUG92	&742		1		2407.01		2407.01	2407.01
17	1	12	1796	25AUG92	25AUG92	&741		1		2405.42		2405.42	2405.42
17	1	11	2098	25AUG92	25AUG92	&740		1		2416.86		2416.86	2416.86
17	1	10	2400	25AUG92	25AUG92	&739		1		2413.60		2413.60	2413.60
17	1	09	2700	25AUG92	25AUG92	&738		1		2421.82		2421.82	2421.82
17	1	08	2999	25AUG92	26AUG92	&737		1		2416.46		2416.46	2416.46
17	1	07	3302	25AUG92	26AUG92	&736		1		2421.37		2421.37	2421.37
17	1	06	3601	25AUG92	26AUG92	&735		1		2417.23		2417.23	2417.23
17	1	05	3902	25AUG92	26AUG92	&734		1		2420.54		2420.54	2420.54
17	1	03	4203	25AUG92	26AUG92	&733	A	1		2416.64		2416.64	
17	1	03	4203	25AUG92	26AUG92	&733	B	1		2418.94		2418.94	+2.30 2417.79
17	1	01	4784	25AUG92	26AUG92	&732		1		2420.45		2420.45	2420.45
18	1	36	10	25AUG92	26AUG92	&766		1		2211.70		2211.70	2211.70
19	1	36	10	25AUG92	26AUG92	&767		1		2228.97		2228.97	2228.97
20	1	36	10	26AUG92	26AUG92	&801		1		2220.84		2220.84	2220.84
20	1	34	24	26AUG92	26AUG92	&800	A	1		2227.29		2227.29	
20	1	34	24	26AUG92	25AUG92	&800	B	1		2228.68		2228.68	+1.39 2227.99
20	1	33	50	26AUG92	26AUG92	&799		1		2245.06		2245.06	2245.06
20	1	32	75	26AUG92	26AUG92	&798		1		2241.60		2241.60	2241.60
20	1	31	100	26AUG92	26AUG92	&797		1		2251.09		2251.09	2251.09
20	1	30	125	26AUG92	26AUG92	&796		1		2269.56		2269.56	2269.56
20	1	29	150	26AUG92	26AUG92	&795		1		2308.34		2308.34	2308.34
20	1	28	174	26AUG92	26AUG92	&794		1		2291.85		2291.85	2291.85
20	1	27	199	26AUG92	26AUG92	&793		1		2302.59		2302.59	2302.59
20	1	26	249	26AUG92	26AUG92	&792		1		2311.17		2311.17	2311.17
20	1	25	299	26AUG92	26AUG92	&791		1		2322.90		2322.90	2322.90
20	1	24	349	26AUG92	26AUG92	&790		1		2328.53		2328.53	2328.53
20	1	23	398	26AUG92	26AUG92	&789		1		2338.19		2338.19	2338.19
20	1	22	497	26AUG92	26AUG92	&788		1		2346.68		2346.68	2346.68
20	1	21	598	26AUG92	26AUG92	&787		1		2358.49		2358.49	2358.49
20	1	20	698	26AUG92	26AUG92	&786		1		2363.34		2363.34	2363.34
20	1	19	799	26AUG92	26AUG92	&785		1	EX	2405.78			
20	1	18	898	26AUG92	26AUG92	&784		1		2378.41		2378.41	2378.41
20	1	17	997	26AUG92	26AUG92	&783		1		2388.71		2388.71	2388.71
20	1	16	1198	26AUG92	26AUG92	&782		1		2395.30		2395.30	2395.30
20	1	15	1398	26AUG92	26AUG92	&781		1		2413.61		2413.61	2413.61
20	1	14	1699	26AUG92	26AUG92	&780		1		2410.93		2410.93	2410.93
20	1	13	1994	26AUG92	26AUG92	&779		1		2417.37		2417.37	2417.37
20	1	12	2297	26AUG92	26AUG92	&778		1		2413.49		2413.49	2413.49
20	1	11	2599	26AUG92	26AUG92	&777		1		2421.37		2421.37	2421.37
20	1	10	2899	26AUG92	26AUG92	&776		1		2418.84		2418.84	2418.84
20	1	09	3101	26AUG92	26AUG92	&775		1		2421.54		2421.54	2421.54
20	1	08	3401	26AUG92	26AUG92	&774		1		2417.16		2417.16	2417.16
20	1	07	3700	26AUG92	26AUG92	&773		1		2420.26		2420.26	2420.26
20	1	06	4002	26AUG92	26AUG92	&772		1		2418.76		2418.76	2418.76
20	1	05	4303	26AUG92	26AUG92	&771		1		2420.42		2420.42	2420.42
20	1	04	4602	26AUG92	26AUG92	&770		1		2416.09		2416.09	2416.09
20	1	03	4894	26AUG92	26AUG92	&769	A	1		2414.86		2414.86	
20	1	03	4894	26AUG92	26AUG92	&769	B	1		2420.41		2420.41	+5.55 2417.64
20	1	01	5621	26AUG92	26AUG92	&768		1		2420.47			
20	1	01	5621	26AUG92	26AUG92	&768		2		2417.35	-3.12	2418.91	2418.91
21	1	35	10	26AUG92	26AUG92	&802		1		2228.87		2228.87	2228.87
22	1	36	10	26AUG92	26AUG92	&803		1		2231.19		2231.19	2231.19
23	1	36	9	26AUG92	26AUG92	&804		1		2233.27		2233.27	2233.27
24	1	36	10	27AUG92	27AUG92	&837	A	1		2233.35		2233.35	
24	1	36	10	27AUG92	27AUG92	&837	B	1		2245.07		2245.07	+11.72 2239.21
24	1	34	24	27AUG92	27AUG92	&836		1		2233.58			
24	1	34	24	27AUG92	27AUG92	&836		2		2236.01	+2.43	2234.80	2234.80
24	1	33	48	27AUG92	27AUG92	&835		1		2242.89			

24	1	33	48	27AUG92	27AUG92	&835		2	2241.78	-1.11	2242.33	2242.33
24	1	32	75	27AUG92	27AUG92	&834		1	2239.33		2239.33	2239.33
24	1	31	100	27AUG92	27AUG92	&833		1	2242.96		2242.96	2242.96
24	1	30	125	27AUG92	27AUG92	&832		1	2255.32		2255.32	2255.32
24	1	29	149	27AUG92	27AUG92	&831		1	2280.33		2280.33	2280.33
24	1	27	200	27AUG92	27AUG92	&830		1	2293.50		2293.50	2293.50
24	1	26	249	27AUG92	27AUG92	&829		1	2305.36		2305.36	2305.36
24	1	25	299	27AUG92	27AUG92	&828		1	2314.35		2314.35	2314.35
24	1	24	349	27AUG92	27AUG92	&827		1	2323.83		2323.83	2323.83
24	1	23	400	27AUG92	27AUG92	&826		1	2330.38		2330.38	2330.38
24	1	22	499	27AUG92	27AUG92	&825		1	2344.60		2344.60	2344.60
24	1	21	599	27AUG92	27AUG92	&824		1	2356.08		2356.08	2356.08
24	1	20	699	27AUG92	27AUG92	&823		1	2366.36		2366.36	2366.36
24	1	19	799	27AUG92	27AUG92	&822		1	2374.50		2374.50	2374.50
24	1	18	898	27AUG92	27AUG92	&821		1	2381.13		2381.13	2381.13
24	1	17	998	27AUG92	27AUG92	&820		1	2383.87		2383.87	2383.87
24	1	16	1298	27AUG92	27AUG92	&819		1	2398.22		2398.22	2398.22
24	1	15	1601	27AUG92	27AUG92	&818		1	2406.49		2406.49	2406.49
24	1	14	1897	27AUG92	27AUG92	&817		1	2415.19		2415.19	2415.19
24	1	13	2199	27AUG92	27AUG92	&816		1	2418.42		2418.42	2418.42
24	1	12	2499	27AUG92	27AUG92	&815		1	2421.78		2421.78	2421.78
24	1	11	2800	27AUG92	27AUG92	&814		1	2420.80		2420.80	2420.80
24	1	10	3197	27AUG92	27AUG92	&813		1	2420.45		2420.45	2420.45
24	1	09	3600	27AUG92	27AUG92	&812		1	2419.17		2419.17	2419.17
24	1	08	4001	27AUG92	27AUG92	&811		1	2420.40		2420.40	2420.40
24	1	07	4402	27AUG92	28AUG92	&810		1	2418.04		2418.04	2418.04
24	1	06	4801	27AUG92	28AUG92	&809		1	2420.67		2420.67	2420.67
24	1	05	5102	27AUG92	28AUG92	&808		1	2418.25		2418.25	2418.25
24	1	04	5390	27AUG92	28AUG92	&807		1	2419.73		2419.73	2419.73
24	1	03	5701	27AUG92	28AUG92	&806	A	1	2419.14		2419.14	
24	1	03	5701	27AUG92	28AUG92	&806	B	1	2419.52		2419.52	+0.38 2419.33
24	1	01	5950	27AUG92	28AUG92	&805		1	2418.92		2418.92	2418.92
25	1	36	10	27AUG92	28AUG92	&838		1	2234.64		2234.64	2234.64
26	1	36	10	27AUG92	28AUG92	&867	A	1	2236.20		2236.20	
26	1	36	10	27AUG92	28AUG92	&867	B	1	2235.91		2235.91	-0.29 2236.05
26	1	34	24	27AUG92	28AUG92	&866		1	2237.93		2237.93	2237.93
26	1	33	50	27AUG92	28AUG92	&865		1	2254.22		2254.22	2254.22
26	1	32	74	27AUG92	28AUG92	&864		1	2254.15		2254.15	2254.15
26	1	31	100	27AUG92	28AUG92	&863		1	2251.02		2251.02	2251.02
26	1	30	123	27AUG92	28AUG92	&862		1	2257.65		2257.65	2257.65
26	1	29	149	27AUG92	28AUG92	&861		1	2263.32		2263.32	2263.32
26	1	28	173	27AUG92	28AUG92	&860		1	2277.02		2277.02	2277.02
26	1	27	199	27AUG92	28AUG92	&859		1	2279.93		2279.93	2279.93
26	1	26	248	27AUG92	28AUG92	&858		1	2306.15		2306.15	2306.15
26	1	25	299	27AUG92	28AUG92	&857		1	2304.65		2304.65	2304.65
26	1	24	347	27AUG92	28AUG92	&856		1	2313.27		2313.27	2313.27
26	1	23	399	27AUG92	28AUG92	&855		2	2321.18		2321.18	2321.18
26	1	21	595	27AUG92	28AUG92	&854		1	2349.20		2349.20	2349.20
26	1	20	698	27AUG92	28AUG92	&853		1	2358.20		2358.20	2358.20
26	1	19	798	27AUG92	28AUG92	&852		1	2363.95		2363.95	2363.95
26	1	16	1300	27AUG92	28AUG92	&851		1	2399.42		2399.42	2399.42
26	1	15	1597	27AUG92	28AUG92	&850		1	2403.32		2403.32	2403.32
26	1	14	1897	27AUG92	28AUG92	&849		1	2413.40		2413.40	2413.40
26	1	12	2498	27AUG92	28AUG92	&848		1	2418.39		2418.39	2418.39
26	1	11	2799	27AUG92	28AUG92	&847		1	2420.25		2420.25	2420.25
26	1	09	3600	27AUG92	28AUG92	&846		1	2419.09		2419.09	2419.09
26	1	08	4001	27AUG92	28AUG92	&845		1	2419.72		2419.72	2419.72
26	1	07	4401	27AUG92	28AUG92	&844		1	2416.94		2416.94	2416.94
26	1	06	4805	27AUG92	28AUG92	&843		1	2419.12		2419.12	2419.12
26	1	05	5100	27AUG92	29AUG92	&842		1	2418.12		2418.12	2418.12

26	1	04	5401	27AUG92	29AUG92	&841		1	2420.27		2420.27	2420.27
26	1	03	5700	27AUG92	29AUG92	&840	A	1	2417.02		2417.02	
26	1	03	5700	27AUG92	29AUG92	&840	B	1	2419.59		2419.59	+2.57 2418.31
26	1	01	5954	27AUG92	29AUG92	&839		1	2417.28			
26	1	01	5954	27AUG92	30AUG92	&839		2	2419.02	+1.74	2418.15	2418.15
28	1	12	9	28AUG92	29AUG92	&868		1	2251.38			
28	1	12	9	28AUG92	29AUG92	&868		2	2251.79	+0.41	2251.58	2251.58
29	1	36	9	30AUG92	30AUG92	&902		1	2240.51		2240.51	2240.51
29	1	35	19	30AUG92	30AUG92	&901	A	1	2243.02		2243.02	
29	1	35	19	30AUG92	30AUG92	&901	B	1	2244.01		2244.01	+0.99 2243.52
29	1	34	50	30AUG92	30AUG92	&900		1	2255.52		2255.52	2255.52
29	1	33	73	30AUG92	30AUG92	&899		1	2250.95		2250.95	2250.95
29	1	32	99	30AUG92	30AUG92	&898		1	2256.72		2256.72	2256.72
29	1	31	124	30AUG92	30AUG92	&897		1	2253.60		2253.60	2253.60
29	1	30	149	30AUG92	30AUG92	&896		1	2262.20		2262.20	2262.20
29	1	29	173	30AUG92	30AUG92	&895		1	2259.54		2259.54	2259.54
29	1	27	248	30AUG92	30AUG92	&894		1	2282.99		2282.99	2282.99
29	1	26	298	30AUG92	30AUG92	&893		1	2288.58		2288.58	2288.58
29	1	25	348	30AUG92	30AUG92	&892		1	2302.12		2302.12	2302.12
29	1	24	398	30AUG92	30AUG92	&891		1	2300.81		2300.81	2300.81
29	1	23	498	30AUG92	30AUG92	&890		1	2324.58		2324.58	2324.58
29	1	22	598	30AUG92	30AUG92	&889		1	2334.33		2334.33	2334.33
29	1	21	697	30AUG92	30AUG92	&888		1	2352.06		2352.06	2352.06
29	1	20	797	30AUG92	30AUG92	&887		1	2357.26		2357.26	2357.26
29	1	19	898	30AUG92	30AUG92	&886		1	2370.46		2370.46	2370.46
29	1	18	998	30AUG92	30AUG92	&885		1	2373.02		2373.02	2373.02
29	1	17	1196	30AUG92	30AUG92	&884		1	2390.48		2390.48	2390.48
29	1	16	1495	30AUG92	30AUG92	&883		1	2400.39		2400.39	2400.39
29	1	15	1798	30AUG92	30AUG92	&882		1	2413.36		2413.36	2413.36
29	1	14	2094	30AUG92	30AUG92	&881		1	2413.16		2413.16	2413.16
29	1	13	2398	30AUG92	30AUG92	&880		1	2421.22		2421.22	2421.22
29	1	12	2702	30AUG92	30AUG92	&879		1	2417.62		2417.62	2417.62
29	1	11	3000	30AUG92	30AUG92	&878		1	2423.21		2423.21	2423.21
29	1	10	3301	30AUG92	31AUG92	&877		1	2415.49			
29	1	10	3301	30AUG92	31AUG92	&877		2	2416.19	+0.70	2415.84	2415.84
29	1	09	3601	30AUG92	31AUG92	&876		1	2422.33			
29	1	09	3601	30AUG92	31AUG92	&876		2	2422.48	+0.15	2422.41	2422.41
29	1	08	3903	30AUG92	31AUG92	&875		1	2417.70		2417.70	2417.70
29	1	07	4203	30AUG92	31AUG92	&874		1	2419.79		2419.79	2419.79
29	1	06	4597	30AUG92	31AUG92	&873		1	2416.22		2416.22	2416.22
29	1	05	5007	30AUG92	31AUG92	&872		1	2418.62		2418.62	2418.62
29	1	04	5400	30AUG92	31AUG92	&871		1	2413.98		2413.98	2413.98
29	1	03	5595	30AUG92	31AUG92	&870		1	2421.40		2421.40	2421.40
29	1	02	5952	30AUG92	31AUG92	&869	A	1	2415.58		2415.58	
29	1	02	5952	30AUG92	31AUG92	&869	B	1	2421.81		2421.81	+6.23 2418.70
30	1	36	11	31AUG92	31AUG92	&903		1	2220.24		2220.24	2220.24
31	1	36	10	31AUG92	31AUG92	&904		1	2226.27		2226.27	2226.27
32	1	36	9	31AUG92	31AUG92	&938	A	1	2218.33		2218.33	
32	1	36	9	31AUG92	31AUG92	&938	B	1	2219.12		2219.12	+0.79 2218.73
32	1	34	25	31AUG92	31AUG92	&937		1	2223.66		2223.66	2223.66
32	1	33	49	31AUG92	31AUG92	&936		1	2249.25		2249.25	2249.25
32	1	32	74	31AUG92	31AUG92	&935		1	2244.32		2244.32	2244.32
32	1	31	99	31AUG92	31AUG92	&934		1	2248.35		2248.35	2248.35
32	1	30	124	31AUG92	31AUG92	&933		1	2249.62		2249.62	2249.62
32	1	29	149	31AUG92	31AUG92	&932		1	2262.84		2262.84	2262.84
32	1	27	172	31AUG92	31AUG92	&931		1	2271.13		2271.13	2271.13
32	1	26	198	31AUG92	31AUG92	&930		1	2283.04		2283.04	2283.04
32	1	25	249	31AUG92	31AUG92	&929		1	2289.01		2289.01	2289.01
32	1	24	298	31AUG92	31AUG92	&928		1	2301.24		2301.24	2301.24
32	1	23	349	31AUG92	31AUG92	&927		1	2305.12		2305.12	2305.12

32	1	22	399	31AUG92	31AUG92	&926		1	2315.85	2315.85		2315.85
32	1	21	497	31AUG92	31AUG92	&925		1	2328.12	2328.12		2328.12
32	1	20	594	31AUG92	31AUG92	&924		1	2346.84	2346.84		2346.84
32	1	19	698	31AUG92	31AUG92	&923		1	2356.51	2356.51		2356.51
32	1	18	799	31AUG92	31AUG92	&922		1	2367.58	2367.58		2367.58
32	1	17	897	31AUG92	31AUG92	&921		1	2372.64	2372.64		2372.64
32	1	16	997	31AUG92	31AUG92	&920		1	2381.20	2381.20		2381.20
32	1	15	1197	31AUG92	31AUG92	&919		1	2392.58	2392.58		2392.58
32	1	14	1397	31AUG92	31AUG92	&918		1	2402.33	2402.33		2402.33
32	1	13	1695	31AUG92	01SEP92	&917		1	2407.77	2407.77		2407.77
32	1	12	1996	31AUG92	01SEP92	&916		1	2415.40	2415.40		2415.40
32	1	11	2299	31AUG92	01SEP92	&915		1	2417.07	2417.07		2417.07
32	1	10	2599	31AUG92	01SEP92	&914		1	2420.72	2420.72		2420.72
32	1	09	2900	31AUG92	01SEP92	&913		1	2420.78	2420.78		2420.78
32	1	08	3100	31AUG92	01SEP92	&912		1	2421.33	2421.33		2421.33
32	1	07	3402	31AUG92	01SEP92	&911		1	2419.14	2419.14		2419.14
32	1	06	3701	31AUG92	01SEP92	&910		1	2421.09	2421.09		2421.09
32	1	05	3999	31AUG92	01SEP92	&909		1	2416.82	2416.82		2416.82
32	1	04	4402	31AUG92	01SEP92	&908		1	2419.69	2419.69		2419.69
32	1	03	4802	31AUG92	01SEP92	&907		1	2417.52	2417.52		2417.52
32	1	02	5201	31AUG92	01SEP92	&906		1	2419.55	2419.55		2419.55
32	1	01	5663	31AUG92	01SEP92	&905	A	1	2417.14	2417.14		
32	1	01	5663	31AUG92	01SEP92	&905	B	1	2418.14	2418.14	+1.00	2417.64
33	1	36	10	31AUG92	01SEP92	&939		1	2219.92	2219.92		2219.92
34	1	36	10	31AUG92	01SEP92	&940		1	2221.34	2221.34		2221.34
35	1	36	9	01SEP92	01SEP92	&941		1	2218.06	2218.06		2218.06
36	1	36	10	01SEP92	01SEP92	&976		1	2225.68	2225.68		2225.68
36	1	35	23	01SEP92	01SEP92	&975	A	1	2252.43	2252.43		
36	1	35	23	01SEP92	01SEP92	&975	B	1	2253.87	2253.87	+1.44	2253.15
36	1	34	50	01SEP92	01SEP92	&974		1	2267.06	2267.06		2267.06
36	1	33	75	01SEP92	01SEP92	&973		1	2267.15	2267.15		2267.15
36	1	32	99	01SEP92	01SEP92	&972		1	2265.70	2265.70		2265.70
36	1	31	125	01SEP92	01SEP92	&971		1	2269.75	2269.75		2269.75
36	1	30	149	01SEP92	01SEP92	&970		1	2266.75	2266.75		2266.75
36	1	29	174	01SEP92	01SEP92	&969		1	2265.92	2265.92		2265.92
36	1	27	201	01SEP92	01SEP92	&968		1	2266.44	2266.44		2266.44
36	1	26	249	01SEP92	01SEP92	&967		1	2279.02	2279.02		2279.02
36	1	25	297	01SEP92	01SEP92	&966		1	2288.12	2288.12		2288.12
36	1	24	350	01SEP92	01SEP92	&965		1	2297.19	2297.19		2297.19
36	1	23	398	01SEP92	01SEP92	&964		1	2306.30	2306.30		2306.30
36	1	22	497	01SEP92	01SEP92	&963		1	2324.22	2324.22		2324.22
36	1	21	598	01SEP92	01SEP92	&962		1	2337.42	2337.42		2337.42
36	1	20	697	01SEP92	01SEP92	&961		1	2351.13	2351.13		2351.13
36	1	19	797	01SEP92	02SEP92	&960		1	2359.60	2359.60		2359.60
36	1	18	897	01SEP92	02SEP92	&959		1	2370.70	2370.70		2370.70
36	1	17	997	01SEP92	02SEP92	&958		1	2379.38	2379.38		2379.38
36	1	16	1097	01SEP92	02SEP92	&957		1	2385.61	2385.61		2385.61
36	1	15	1196	01SEP92	02SEP92	&956		1	2390.51	2390.51		2390.51
36	1	14	1298	01SEP92	02SEP92	&955		1	2395.56	2395.56		2395.56
36	1	13	1496	01SEP92	02SEP92	&954		1	2404.15	2404.15		2404.15
36	1	12	1696	01SEP92	02SEP92	&953		1	2409.64	2409.64		2409.64
36	1	11	1898	01SEP92	02SEP92	&952		1	2414.04	2414.04		2414.04
36	1	10	2198	01SEP92	02SEP92	&951		1	2417.50	2417.50		2417.50
36	1	09	2500	01SEP92	02SEP92	&950		1	2417.51	2417.51		2417.51
36	1	08	2798	01SEP92	02SEP92	&949		1	2419.53	2419.53		2419.53
36	1	07	3100	01SEP92	02SEP92	&948		1	2419.22	2419.22		2419.22
36	1	06	3399	01SEP92	02SEP92	&947		1	2420.57	2420.57		2420.57
36	1	05	3701	01SEP92	02SEP92	&946		1	2416.70	2416.70		2416.70
36	1	04	4001	01SEP92	02SEP92	&945		1	2419.02	2419.02		2419.02
36	1	03	4302	01SEP92	02SEP92	&944		1	2416.60	2416.60		2416.60

36	1	02	4702	01SEP92	02SEP92	&943	1	2418.57		2418.57		2418.57
36	1	01	4866	01SEP92	02SEP92	&942 A	1	2418.27		2418.27		
36	1	01	4866	01SEP92	02SEP92	&942 B	1	2419.89		2419.89	+1.62	2419.08
37	1	36	10	02SEP92	02SEP92	&977	1	2241.04		2241.04		2241.04
38	1	36	10	02SEP92	02SEP92	&1010A	1	2246.38		2246.38		
38	1	36	10	02SEP92	02SEP92	&1010B	1	2248.29		2248.29	+1.91	2247.33
38	1	34	24	02SEP92	02SEP92	&1009	1	2259.10		2259.10		2259.10
38	1	33	50	02SEP92	02SEP92	&1008	1	2273.43		2273.43		2273.43
38	1	32	73	02SEP92	02SEP92	&1007	1	2270.67		2270.67		2270.67
38	1	31	99	02SEP92	02SEP92	&1006	1	2271.94		2271.94		2271.94
38	1	30	124	02SEP92	02SEP92	&1005	1	2268.70		2268.70		2268.70
38	1	29	148	02SEP92	02SEP92	&1004	1	2270.81		2270.81		2270.81
38	1	27	173	02SEP92	02SEP92	&1003	1	2271.03		2271.03		2271.03
38	1	26	200	02SEP92	02SEP92	&1002	1	2271.24		2271.24		2271.24
38	1	25	247	02SEP92	02SEP92	&1001	1	2272.80		2272.80		2272.80
38	1	24	299	02SEP92	02SEP92	&1000	1	2273.89		2273.89		2273.89
38	1	23	349	02SEP92	02SEP92	&999	1	2288.30		2288.30		2288.30
38	1	22	399	02SEP92	02SEP92	&998	1	2298.50		2298.50		2298.50
38	1	21	498	02SEP92	02SEP92	&997	1	2313.67		2313.67		2313.67
38	1	20	596	02SEP92	02SEP92	&996	1	2329.63		2329.63		2329.63
38	1	19	697	02SEP92	02SEP92	&995	1	2344.89		2344.89		2344.89
38	1	18	786	02SEP92	02SEP92	&994	1	2355.92		2355.92		2355.92
38	1	17	896	02SEP92	02SEP92	&993	1	2370.00		2370.00		2370.00
38	1	16	996	02SEP92	03SEP92	&992	1	2373.89		2373.89		2373.89
38	1	15	1197	02SEP92	03SEP92	&991	1	2387.88		2387.88		2387.88
38	1	14	1396	02SEP92	03SEP92	&990	1	2396.70		2396.70		2396.70
38	1	12	1898	02SEP92	03SEP92	&989	1	2412.76		2412.76		2412.76
38	1	11	2196	02SEP92	03SEP92	&988	1	2416.18		2416.18		2416.18
38	1	10	2498	02SEP92	03SEP92	&987	1	2419.65		2419.65		2419.65
38	1	09	2800	02SEP92	03SEP92	&986	1	2418.25		2418.25		2418.25
38	1	08	3101	02SEP92	03SEP92	&985	1	2419.28		2419.28		2419.28
38	1	07	3400	02SEP92	03SEP92	&984	1	2416.61		2416.61		2416.61
38	1	06	3701	02SEP92	03SEP92	&983	1	2417.95		2417.95		2417.95
38	1	05	4102	02SEP92	03SEP92	&982	1	2416.36		2416.36		2416.36
38	1	04	4501	02SEP92	03SEP92	&981	1	2418.66		2418.66		2418.66
38	1	03	4903	02SEP92	03SEP92	&980	1	2417.95		2417.95		2417.95
38	1	02	5201	02SEP92	03SEP92	&979	1	2419.82		2419.82		2419.82
38	1	01	5602	02SEP92	03SEP92	&978 A	1	2419.13		2419.13		
38	1	01	5602	02SEP92	03SEP92	&978 B	1	2419.33		2419.33	+0.20	2419.23
39	1	36	9	02SEP92	03SEP92	&1011	1	2236.94		2236.94		2236.94
40	1	36	10	03SEP92	03SEP92	&1012	1	2252.03		2252.03		2252.03
41	1	36	9	03SEP92	03SEP92	&1043A	1	2248.84		2248.84		
41	1	36	9	03SEP92	03SEP92	&1043B	1	2251.15		2251.15	+2.31	2250.00
41	1	33	49	03SEP92	03SEP92	&1042	1	2271.62		2271.62		2271.62
41	1	32	74	03SEP92	03SEP92	&1041	1	2279.32		2279.32		2279.32
41	1	30	102	03SEP92	03SEP92	&1040	1	2272.49		2272.49		2272.49
41	1	29	148	03SEP92	03SEP92	&1039	1	2274.80		2274.80		2274.80
41	1	27	174	03SEP92	03SEP92	&1038	1	2273.97		2273.97		2273.97
41	1	26	198	03SEP92	03SEP92	&1037	1	2275.06		2275.06		2275.06
41	1	25	249	03SEP92	03SEP92	&1036	1	2274.66				
41	1	25	249	03SEP92	03SEP92	&1036	2	2270.57	-4.09	2272.61		2272.61
41	1	24	300	03SEP92	03SEP92	&1035	1	2273.13				
41	1	24	300	03SEP92	03SEP92	&1035	2	2271.60	-1.53	2272.36		2272.36
41	1	23	351	03SEP92	03SEP92	&1034	1	2270.09		2270.09		2270.09
41	1	21	501	03SEP92	03SEP92	&1033	1	2295.18		2295.18		2295.18
41	1	20	605	03SEP92	03SEP92	&1032	1	2306.12		2306.12		2306.12
41	1	19	700	03SEP92	03SEP92	&1031	1	2326.64		2326.64		2326.64
41	1	18	811	03SEP92	03SEP92	&1030	1	2342.72		2342.72		2342.72
41	1	17	900	03SEP92	03SEP92	&1029	1	2353.92		2353.92		2353.92
41	1	16	1000	03SEP92	03SEP92	&1028	1	2362.41		2362.41		2362.41

41	1	15	1199	03SEP92	03SEP92	&1027	1	2381.13		2381.13	2381.13
41	1	14	1399	03SEP92	04SEP92	&1026	1	2392.18		2392.18	2392.18
41	1	13	1599	03SEP92	04SEP92	&1025	1	2401.49		2401.49	2401.49
41	1	12	1899	03SEP92	04SEP92	&1024	1	2408.81		2408.81	2408.81
41	1	11	2201	03SEP92	04SEP92	&1023	1	2415.48		2415.48	2415.48
41	1	10	2499	03SEP92	04SEP92	&1022	1	2417.77		2417.77	2417.77
41	1	09	2799	03SEP92	04SEP92	&1021	1	2419.28		2419.28	2419.28
41	1	08	3101	03SEP92	04SEP92	&1020	1	2418.57		2418.57	2418.57
41	1	07	3399	03SEP92	04SEP92	&1019	1	2419.93		2419.93	2419.93
41	1	06	3698	03SEP92	04SEP92	&1018	1	2416.28		2416.28	2416.28
41	1	05	4101	03SEP92	04SEP92	&1017	1	2418.71		2418.71	2418.71
41	1	04	4504	03SEP92	04SEP92	&1016	1	2416.42		2416.42	2416.42
41	1	03	4802	03SEP92	04SEP92	&1015	1	2416.80		2416.80	2416.80
41	1	02	5100	03SEP92	04SEP92	&1014A	1	2421.26		2421.26	
41	1	02	5100	03SEP92	04SEP92	&1014B	1	2420.64		2420.64	-0.62 2420.95
41	1	01	5492	03SEP92	04SEP92	&1013	1	2417.04			
41	1	01	5492	03SEP92	04SEP92	&1013	2	2414.95	-2.09	2416.00	2416.00
42	1	36	10	03SEP92	04SEP92	&1044	1	2263.66			
42	1	36	10	03SEP92	04SEP92	&1044	2	2263.35	-0.31	2263.51	2263.51
45	1	12	9	05SEP92	04SEP92	&1056	1	2254.70		2254.70	2254.70
45	1	11	24	05SEP92	04SEP92	&1055	1	2256.06		2256.06	2256.06
45	1	10	51	05SEP92	04SEP92	&1054	1	2276.39		2276.39	2276.39
45	1	09	100	05SEP92	04SEP92	&1053	1	2273.03		2273.03	2273.03
45	1	08	198	05SEP92	04SEP92	&1052	1	2271.77		2271.77	2271.77
45	1	07	398	05SEP92	04SEP92	&1051	1	2274.08		2274.08	2274.08
45	1	06	799	05SEP92	05SEP92	&1050	1	2336.27		2336.27	2336.27
45	1	05	1397	05SEP92	05SEP92	&1049	1	2392.30		2392.30	2392.30
45	1	04	2000	05SEP92	05SEP92	&1048	1	2412.08		2412.08	2412.08
45	1	03	2995	05SEP92	05SEP92	&1047	1	2418.84		2418.84	2418.84
45	1	02	4001	05SEP92	05SEP92	&1046	1	2419.19		2419.19	2419.19
45	1	01	4551	05SEP92	05SEP92	&1045	1	2417.54		2417.54	2417.54
46	1	12	9	05SEP92	06SEP92	&1057	1	2251.96		2251.96	2251.96
47	1	36	11	05SEP92	05SEP92	&1091A	1	2259.03		2259.03	
47	1	36	11	05SEP92	05SEP92	&1091B	1	2259.86		2259.86	+0.83 2259.45
47	1	34	23	05SEP92	05SEP92	&1090	1	2253.35		2253.35	2253.35
47	1	33	48	05SEP92	05SEP92	&1089	1	2275.42		2275.42	2275.42
47	1	32	74	05SEP92	05SEP92	&1088	1	2275.55		2275.55	2275.55
47	1	31	96	05SEP92	05SEP92	&1087	1	2273.95		2273.95	2273.95
47	1	30	121	05SEP92	05SEP92	&1086	1	2272.33		2272.33	2272.33
47	1	29	148	05SEP92	05SEP92	&1085	1	2271.37		2271.37	2271.37
47	1	27	172	05SEP92	05SEP92	&1084	1	2270.46		2270.46	2270.46
47	1	26	198	05SEP92	05SEP92	&1083	1	2271.42		2271.42	2271.42
47	1	25	249	05SEP92	05SEP92	&1082	1	2271.37		2271.37	2271.37
47	1	24	299	05SEP92	05SEP92	&1081	1	2273.03		2273.03	2273.03
47	1	23	344	05SEP92	05SEP92	&1080	1	2273.05		2273.05	2273.05
47	1	22	398	05SEP92	05SEP92	&1079	1	2276.66		2276.66	2276.66
47	1	21	497	05SEP92	05SEP92	&1078	1	2291.07		2291.07	2291.07
47	1	20	599	05SEP92	05SEP92	&1077	1	2304.66		2304.66	2304.66
47	1	19	699	05SEP92	06SEP92	&1076	1	2323.88		2323.88	2323.88
47	1	18	797	05SEP92	06SEP92	&1075	1	2342.53		2342.53	2342.53
47	1	17	898	05SEP92	06SEP92	&1074	1	2354.99		2354.99	2354.99
47	1	16	997	05SEP92	06SEP92	&1073	1	2366.74		2366.74	2366.74
47	1	15	1196	05SEP92	06SEP92	&1072	1	2384.72		2384.72	2384.72
47	1	14	1398	05SEP92	06SEP92	&1071	1	2395.82		2395.82	2395.82
47	1	13	1698	05SEP92	06SEP92	&1070	1	2408.93		2408.93	2408.93
47	1	12	1998	05SEP92	06SEP92	&1069	1	2415.32		2415.32	2415.32
47	1	11	2298	05SEP92	06SEP92	&1068	1	2418.54		2418.54	2418.54
47	1	10	2596	05SEP92	06SEP92	&1067	1	2420.98		2420.98	2420.98
47	1	09	2899	05SEP92	06SEP92	&1066	1	2418.72		2418.72	2418.72
47	1	08	3200	05SEP92	06SEP92	&1065	1	2421.72		2421.72	2421.72

47	1	07	3501	05SEP92	06SEP92	&1064	1	2416.90	2416.90		2416.90
47	1	06	3798	05SEP92	06SEP92	&1063	1	2420.25	2420.25		2420.25
47	1	05	4100	05SEP92	06SEP92	&1062	1	2421.50	2421.50		2421.50
47	1	04	4403	05SEP92	06SEP92	&1061	1	2421.79	2421.79		2421.79
47	1	03	4701	05SEP92	06SEP92	&1060	1	2416.81	2416.81		2416.81
47	1	02	5003	05SEP92	06SEP92	&1059	1	2418.66	2418.66		2418.66
47	1	01	5595	05SEP92	06SEP92	&1058A	1	2408.07	2408.07		
47	1	01	5595	05SEP92	06SEP92	&1058B	1	2410.49	2410.49	+2.42	2409.28
48	1	36	9	06SEP92	06SEP92	&1092	1	2254.34	2254.34		2254.34
49	1	35	24	06SEP92	06SEP92	&1126	1	2253.58	2253.58		2253.58
49	1	34	47	06SEP92	06SEP92	&1125	1	2258.22	2258.22		2258.22
49	1	33	70	06SEP92	06SEP92	&1124A	1	2269.25	2269.25		
49	1	33	70	06SEP92	06SEP92	&1124B	1	2269.19	2269.19	-0.06	2269.22
49	1	32	101	06SEP92	06SEP92	&1123	1	2276.85	2276.85		2276.85
49	1	31	120	06SEP92	06SEP92	&1122	1	2275.88	2275.88		2275.88
49	1	30	146	06SEP92	06SEP92	&1121	1	2271.81	2271.81		2271.81
49	1	29	171	06SEP92	06SEP92	&1120	1	2274.48	2274.48		2274.48
49	1	28	200	06SEP92	06SEP92	&1119	1	2274.36	2274.36		2274.36
49	1	27	243	06SEP92	06SEP92	&1118	1	2274.55	2274.55		2274.55
49	1	26	300	06SEP92	06SEP92	&1117	1	2276.67	2276.67		2276.67
49	1	25	348	06SEP92	06SEP92	&1116	1	2280.15	2280.15		2280.15
49	1	24	399	06SEP92	07SEP92	&1115	1	2280.64	2280.64		2280.64
49	1	23	498	06SEP92	07SEP92	&1114	1	2295.53	2295.53		2295.53
49	1	22	599	06SEP92	07SEP92	&1113	1	2311.81	2311.81		2311.81
49	1	21	700	06SEP92	07SEP92	&1112	1	2331.07	2331.07		2331.07
49	1	20	798	06SEP92	07SEP92	&1111	1	2345.64	2345.64		2345.64
49	1	19	898	06SEP92	07SEP92	&1110	1	2358.78	2358.78		2358.78
49	1	18	996	06SEP92	07SEP92	&1109	1	2371.14	2371.14		2371.14
49	1	17	1199	06SEP92	07SEP92	&1108	1	2387.76	2387.76		2387.76
49	1	16	1399	06SEP92	07SEP92	&1107	1	2398.17	2398.17		2398.17
49	1	15	1696	06SEP92	07SEP92	&1106	1	2410.83	2410.83		2410.83
49	1	14	2000	06SEP92	07SEP92	&1105	1	2413.05	2413.05		2413.05
49	1	13	2275	06SEP92	07SEP92	&1104	1	2421.24	2421.24		2421.24
49	1	12	2602	06SEP92	07SEP92	&1103	1	2418.07	2418.07		2418.07
49	1	11	2899	06SEP92	07SEP92	&1102	1	2420.15	2420.15		2420.15
49	1	10	3196	06SEP92	07SEP92	&1101	1	2417.60	2417.60		2417.60
49	1	09	3498	06SEP92	07SEP92	&1100	1	2420.75	2420.75		2420.75
49	1	08	3796	06SEP92	07SEP92	&1099	1	2419.53	2419.53		2419.53
49	1	07	4101	06SEP92	07SEP92	&1098	1	2420.02	2420.02		2420.02
49	1	05	4701	06SEP92	07SEP92	&1097	1	2412.85	2412.85		2412.85
49	1	04	5003	06SEP92	07SEP92	&1096	1	2412.27	2412.27		2412.27
49	1	03	5301	06SEP92	07SEP92	&1095	1	2406.88	2406.88		2406.88
49	1	02	5501	06SEP92	08SEP92	&1094	1	2409.10	2409.10		2409.10
49	1	01	5651	06SEP92	07SEP92	&1093A	1	2406.02	2406.02		
49	1	01	5651	06SEP92	07SEP92	&1093B	1	2407.10	2407.10	+1.08	2406.56
50	1	35	10	07SEP92	08SEP92	&1127	1	2251.64	2251.64		2251.64
51	1	36	9	07SEP92	07SEP92	&1146A	1	2256.90	2256.90		
51	1	36	9	07SEP92	07SEP92	&1146B	1	2258.48	2258.48	+1.58	2257.69
51	1	34	24	07SEP92	07SEP92	&1145	1	2253.71	2253.71		2253.71
51	1	33	48	07SEP92	07SEP92	&1144	1	2272.69	2272.69		2272.69
51	1	32	73	07SEP92	07SEP92	&1143	1	2282.99	2282.99		2282.99
51	1	31	99	07SEP92	07SEP92	&1142	1	2284.58	2284.58		2284.58
51	1	30	124	07SEP92	07SEP92	&1141	1	2283.35	2283.35		2283.35
51	1	29	150	07SEP92	07SEP92	&1140	1	2283.90	2283.90		2283.90
51	1	28	175	07SEP92	07SEP92	&1139	1	2282.24	2282.24		2282.24
51	1	27	199	07SEP92	07SEP92	&1138	1	2283.66	2283.66		2283.66
51	1	26	250	07SEP92	07SEP92	&1137	1	2279.72	2279.72		2279.72
51	1	25	298	07SEP92	07SEP92	&1136	1	2282.25	2282.25		2282.25
51	1	24	347	07SEP92	07SEP92	&1135	1	2272.86	2272.86		2272.86
51	1	23	399	07SEP92	07SEP92	&1134	1	2274.85	2274.85		2274.85

51	1	22	498	07SEP92	07SEP92	&1133	1	2275.08		2275.08		2275.08
51	1	21	598	07SEP92	07SEP92	&1132	1	2290.14		2290.14		2290.14
51	1	20	699	07SEP92	08SEP92	&1131	1	2306.36		2306.36		2306.36
51	1	19	798	07SEP92	08SEP92	&1130	1	2326.84		2326.84		2326.84
51	1	18	885	07SEP92	08SEP92	&1129A	1	2344.07		2344.07		
51	1	18	885	07SEP92	08SEP92	&1129B	1	2345.60		2345.60	+1.53	2344.84
51	1	17	998	07SEP92	08SEP92	&1128	1	2360.11		2360.11		2360.11
52	1	36	10	08SEP92	08SEP92	&1161	1	2259.47		2259.47		2259.47
52	1	19	999	08SEP92	08SEP92	&1160	1	2354.41		2354.41		2354.41
52	1	18	1199	08SEP92	08SEP92	&1159	1	2375.67		2375.67		2375.67
52	1	17	1396	08SEP92	08SEP92	&1158	1	2392.20		2392.20		2392.20
52	1	16	1596	08SEP92	08SEP92	&1157	1	2401.42		2401.42		2401.42
52	1	15	2105	08SEP92	08SEP92	&1156	1	2416.76		2416.76		2416.76
52	1	14	2600	08SEP92	08SEP92	&1155	1	2421.49		2421.49		2421.49
52	1	13	3100	08SEP92	08SEP92	&1154	1	2422.93		2422.93		2422.93
52	1	12	3600	08SEP92	08SEP92	&1153	1	2416.71		2416.71		2416.71
52	1	11	4103	08SEP92	08SEP92	&1152	1	2419.15		2419.15		2419.15
52	1	10	4601	08SEP92	08SEP92	&1151	1	2415.24		2415.24		2415.24
52	1	09	5002	08SEP92	08SEP92	&1150	1	2413.28		2413.28		2413.28
52	1	08	5400	08SEP92	08SEP92	&1149	1	2409.29		2409.29		2409.29
52	1	07	5800	08SEP92	08SEP92	&1148	1	2407.33		2407.33		2407.33
52	1	06	6104	08SEP92	08SEP92	&1147	1	2402.54		2402.54		2402.54
53	1	25	10	08SEP92	08SEP92	&1184A	1	2286.30		2286.30		
53	1	25	10	08SEP92	08SEP92	&1184B	1	2287.47		2287.47	+1.17	2286.89
53	1	23	24	08SEP92	08SEP92	&1183	1	2281.29		2281.29		2281.29
53	1	22	48	08SEP92	08SEP92	&1182	1	2279.07		2279.07		2279.07
53	1	21	75	08SEP92	08SEP92	&1181	1	2284.80		2284.80		2284.80
53	1	20	99	08SEP92	08SEP92	&1180	1	2287.27		2287.27		2287.27
53	1	19	123	08SEP92	08SEP92	&1179	1	2283.76		2283.76		2283.76
53	1	18	150	08SEP92	08SEP92	&1178	1	2283.06		2283.06		2283.06
53	1	17	174	08SEP92	08SEP92	&1177	1	2282.07		2282.07		2282.07
53	1	16	199	08SEP92	08SEP92	&1176	1	2283.45		2283.45		2283.45
53	1	15	249	08SEP92	08SEP92	&1175	1	2282.82		2282.82		2282.82
53	1	14	300	08SEP92	08SEP92	&1174	1	2282.95		2282.95		2282.95
53	1	13	346	08SEP92	08SEP92	&1173	1	2281.49		2281.49		2281.49
53	1	12	396	08SEP92	08SEP92	&1172	1	2277.98		2277.98		2277.98
53	1	11	498	08SEP92	08SEP92	&1171	1	2275.97		2275.97		2275.97
53	1	10	600	08SEP92	08SEP92	&1170	1	2276.43		2276.43		2276.43
53	1	09	697	08SEP92	08SEP92	&1169	1	2286.64		2286.64		2286.64
53	1	08	798	08SEP92	08SEP92	&1168	1	2292.77		2292.77		2292.77
53	1	07	895	08SEP92	08SEP92	&1167	1	2324.44		2324.44		2324.44
53	1	06	997	08SEP92	08SEP92	&1166	1	2342.46		2342.46		2342.46
53	1	05	1199	08SEP92	08SEP92	&1165	1	2369.46		2369.46		2369.46
53	1	04	1398	08SEP92	09SEP92	&1164	1	2387.35		2387.35		2387.35
53	1	03	1695	08SEP92	09SEP92	&1163A	1	2403.86		2403.86		
53	1	03	1695	08SEP92	09SEP92	&1163B	1	2404.44		2404.44	+0.58	2404.15
53	1	02	1996	08SEP92	09SEP92	&1162	1	2413.93		2413.93		2413.93
54	1	36	10	09SEP92	09SEP92	&1196	1	2287.01		2287.01		2287.01
54	1	13	2597	09SEP92	09SEP92	&1195	1	2419.05		2419.05		2419.05
54	1	12	2899	09SEP92	09SEP92	&1194	1	2419.26		2419.26		2419.26
54	1	11	3201	09SEP92	09SEP92	&1193	1	2421.67		2421.67		2421.67
54	1	10	3501	09SEP92	09SEP92	&1192	1	2417.80		2417.80		2417.80
54	1	09	3800	09SEP92	09SEP92	&1191	1	2418.91		2418.91		2418.91
54	1	08	4102	09SEP92	09SEP92	&1190	1	2416.61		2416.61		2416.61
54	1	07	4502	09SEP92	09SEP92	&1189	1	2416.01		2416.01		2416.01
54	1	06	4902	09SEP92	09SEP92	&1188	1	2407.11		2407.11		2407.11
54	1	05	5302	09SEP92	09SEP92	&1187	1	2407.04		2407.04		2407.04
54	1	04	5702	09SEP92	09SEP92	&1186	1	2403.36		2403.36		2403.36
54	1	03	5804	09SEP92	10SEP92	&1185	1	2401.89				
54	1	03	5804	09SEP92	10SEP92	&1185	2	2404.71	+2.82	2403.30		2403.30

55	1	35	11	10SEP92	09SEP92	&1231	1	2294.28		2294.28	2294.28
55	1	34	25	10SEP92	10SEP92	&1230A	1	2294.75		2294.75	
55	1	34	25	10SEP92	10SEP92	&1230B	1	2291.85		2291.85	-2.90 2293.30
55	1	33	52	10SEP92	10SEP92	&1229	1	2286.43		2286.43	2286.43
55	1	32	75	10SEP92	10SEP92	&1228	1	2286.13		2286.13	2286.13
55	1	31	101	10SEP92	10SEP92	&1227	1	2285.01		2285.01	2285.01
55	1	30	124	10SEP92	10SEP92	&1226	1	2283.45			
55	1	30	124	10SEP92	11SEP92	&1226	2	2282.29	-1.16	2282.87	2282.87
55	1	29	151	10SEP92	10SEP92	&1225	1	2284.16			
55	1	29	151	10SEP92	11SEP92	&1225	2	2283.01	-1.15	2283.58	2283.58
55	1	28	176	10SEP92	11SEP92	&1224	1	2280.16		2280.16	2280.16
55	1	27	201	10SEP92	11SEP92	&1223	1	2279.96		2279.96	2279.96
55	1	26	252	10SEP92	11SEP92	&1222	1	2279.67		2279.67	2279.67
55	1	25	301	10SEP92	11SEP92	&1221	1	2279.33		2279.33	2279.33
55	1	24	351	10SEP92	11SEP92	&1220	1	2275.62		2275.62	2275.62
55	1	23	408	10SEP92	11SEP92	&1219	1	2275.38		2275.38	2275.38
55	1	22	499	10SEP92	11SEP92	&1218	1	2274.90		2274.90	2274.90
55	1	21	599	10SEP92	11SEP92	&1217	1	2276.79		2276.79	2276.79
55	1	20	698	10SEP92	11SEP92	&1216	1	2293.44		2293.44	2293.44
55	1	19	798	10SEP92	11SEP92	&1215	1	2310.43		2310.43	2310.43
55	1	18	898	10SEP92	11SEP92	&1214	1	2330.19		2330.19	2330.19
55	1	17	998	10SEP92	11SEP92	&1213	1	2346.85		2346.85	2346.85
55	1	16	1198	10SEP92	11SEP92	&1212	1	2373.81		2373.81	2373.81
55	1	15	1398	10SEP92	11SEP92	&1211	1	2386.93		2386.93	2386.93
55	1	14	1598	10SEP92	11SEP92	&1210	1	2400.73		2400.73	2400.73
55	1	13	1902	10SEP92	11SEP92	&1209	1	2411.57		2411.57	2411.57
55	1	12	2197	10SEP92	11SEP92	&1208	1	2418.54		2418.54	2418.54
55	1	11	2497	10SEP92	11SEP92	&1207	1	2419.73		2419.73	2419.73
55	1	10	2798	10SEP92	11SEP92	&1206	1	2420.37		2420.37	2420.37
55	1	09	3101	10SEP92	11SEP92	&1205	1	2420.61		2420.61	2420.61
55	1	08	3402	10SEP92	11SEP92	&1204	1	2419.48		2419.48	2419.48
55	1	07	3702	10SEP92	11SEP92	&1203	1	2418.64		2418.64	2418.64
55	1	06	4103	10SEP92	11SEP92	&1202	1	2418.44		2418.44	2418.44
55	1	05	4501	10SEP92	11SEP92	&1201	1	2415.19		2415.19	2415.19
55	1	04	4902	10SEP92	11SEP92	&1200	1	2411.24		2411.24	2411.24
55	1	03	5200	10SEP92	11SEP92	&1199	1	2405.73		2405.73	2405.73
55	1	02	5405	10SEP92	11SEP92	&1198	1	2407.01		2407.01	2407.01
55	1	01	5582	10SEP92	11SEP92	&1197A	1	2405.44		2405.44	
55	1	01	5582	10SEP92	11SEP92	&1197B	1	2405.56		2405.56	+0.12 2405.50
56	1	36	10	30SEP92	02OCT92	&1232	1	2307.76		2307.76	2307.76
57	1	35	28	30SEP92	01OCT92	&1265	1	2301.40		2301.40	2301.40
57	1	34	31	30SEP92	01OCT92	&1264	1	2311.90		2311.90	2311.90
57	1	33	73	30SEP92	01OCT92	&1263A	1	2312.02		2312.02	
57	1	33	73	30SEP92	01OCT92	&1263B	1	2306.30		2306.30	-5.72 2309.16
57	1	31	121	30SEP92	01OCT92	&1262	1	2303.83		2303.83	2303.83
57	1	30	147	30SEP92	01OCT92	&1261	1	2299.64		2299.64	2299.64
57	1	29	170	30SEP92	01OCT92	&1260	2	2288.09		2288.09	2288.09
57	1	28	198	30SEP92	01OCT92	&1259	2	2286.63		2286.63	2286.63
57	1	26	297	30SEP92	01OCT92	&1258	1	2273.27		2273.27	2273.27
57	1	25	346	30SEP92	01OCT92	&1257	1	2271.22		2271.22	2271.22
57	1	24	398	30SEP92	01OCT92	&1256	1	2265.83		2265.83	2265.83
57	1	23	497	30SEP92	01OCT92	&1255	1	2276.99		2276.99	2276.99
57	1	22	600	30SEP92	01OCT92	&1254	1	2295.02		2295.02	2295.02
57	1	21	694	30SEP92	01OCT92	&1253	1	2320.04		2320.04	2320.04
57	1	20	796	30SEP92	01OCT92	&1252	1	2339.30		2339.30	2339.30
57	1	19	897	30SEP92	01OCT92	&1251	1	2354.24		2354.24	2354.24
57	1	18	997	30SEP92	01OCT92	&1250	1	2367.50		2367.50	2367.50
57	1	17	1198	30SEP92	01OCT92	&1249	1	2383.02		2383.02	2383.02
57	1	16	1391	30SEP92	01OCT92	&1248	1	2390.48		2390.48	2390.48
57	1	15	1594	30SEP92	01OCT92	&1247	1	2400.90		2400.90	2400.90

57	1	14	1799	30SEP92	01OCT92	&1246	1		2407.70	2407.70		2407.70
57	1	13	2098	30SEP92	01OCT92	&1245	1		2414.15	2414.15		2414.15
57	1	12	2394	30SEP92	01OCT92	&1244	1		2417.91	2417.91		2417.91
57	1	11	2696	30SEP92	01OCT92	&1243	1		2420.65	2420.65		2420.65
57	1	10	2993	30SEP92	01OCT92	&1242	1		2421.61	2421.61		2421.61
57	1	09	3301	30SEP92	01OCT92	&1241	1		2420.99	2420.99		2420.99
57	1	08	3600	30SEP92	02OCT92	&1240	1		2418.91	2418.91		2418.91
57	1	07	3902	30SEP92	02OCT92	&1239	1		2417.56	2417.56		2417.56
57	1	06	4203	30SEP92	02OCT92	&1238	1		2415.07	2415.07		2415.07
57	1	05	4500	30SEP92	02OCT92	&1237	1		2411.91	2411.91		2411.91
57	1	04	4803	30SEP92	02OCT92	&1236	1		2408.31	2408.31		2408.31
57	1	03	5101	30SEP92	02OCT92	&1235	1		2403.82	2403.82		2403.82
57	1	02	5404	30SEP92	02OCT92	&1234	1		2399.44	2399.44		2399.44
57	1	01	5689	30SEP92	03OCT92	&1233A	1		2401.89	2401.89		
57	1	01	5689	30SEP92	03OCT92	&1233B	1		2403.99	2403.99	+2.10	2402.94
59	1	34	49	01OCT92	03OCT92	&1299	1		2307.73	2307.73		2307.73
59	1	33	75	01OCT92	03OCT92	&1298A	1		2304.95	2304.95		
59	1	33	75	01OCT92	03OCT92	&1298B	1	X	2366.39			2304.95
59	1	32	100	01OCT92	03OCT92	&1297	1		2311.92	2311.92		2311.92
59	1	31	123	01OCT92	03OCT92	&1296	1		2309.29	2309.29		2309.29
59	1	30	149	01OCT92	03OCT92	&1295	1		2302.40	2302.40		2302.40
59	1	29	169	01OCT92	03OCT92	&1294	1		2297.36	2297.36		2297.36
59	1	28	198	01OCT92	03OCT92	&1293	1		2286.30	2286.30		2286.30
59	1	27	250	01OCT92	03OCT92	&1292	1		2276.98	2276.98		2276.98
59	1	26	300	01OCT92	03OCT92	&1291	1		2270.51	2270.51		2270.51
59	1	25	347	01OCT92	03OCT92	&1290	1		2282.41	2282.41		2282.41
59	1	24	397	01OCT92	03OCT92	&1289	1		2266.91	2266.91		2266.91
59	1	23	496	01OCT92	03OCT92	&1288	1		2276.17	2276.17		2276.17
59	1	22	598	01OCT92	03OCT92	&1287	1		2296.02	2296.02		2296.02
59	1	21	697	01OCT92	03OCT92	&1286	1		2325.02	2325.02		2325.02
59	1	20	798	01OCT92	03OCT92	&1285	1		2341.60	2341.60		2341.60
59	1	19	895	01OCT92	03OCT92	&1284	1		2357.35	2357.35		2357.35
59	1	18	998	01OCT92	03OCT92	&1283	1		2366.52	2366.52		2366.52
59	1	17	1099	01OCT92	03OCT92	&1282	1		2394.64	2394.64		2394.64
59	1	16	1298	01OCT92	03OCT92	&1281	1		2391.18	2391.18		2391.18
59	1	15	1498	01OCT92	03OCT92	&1280	1		2408.42	2408.42		2408.42
59	1	14	1698	01OCT92	03OCT92	&1279	1		2405.44	2405.44		2405.44
59	1	13	1898	01OCT92	03OCT92	&1278	1		2409.33	2409.33		2409.33
59	1	12	2195	01OCT92	03OCT92	&1277	1		2415.59	2415.59		2415.59
59	1	11	2500	01OCT92	03OCT92	&1276	1		2420.43	2420.43		2420.43
59	1	10	2800	01OCT92	03OCT92	&1275	1		2421.90	2421.90		2421.90
59	1	09	3096	01OCT92	03OCT92	&1274	1		2420.55	2420.55		2420.55
59	1	08	3402	01OCT92	03OCT92	&1273	1		2419.33	2419.33		2419.33
59	1	07	3704	01OCT92	03OCT92	&1272	1		2418.45	2418.45		2418.45
59	1	06	4000	01OCT92	03OCT92	&1271	1		2415.92	2415.92		2415.92
59	1	05	4303	01OCT92	03OCT92	&1270	1		2411.60	2411.60		2411.60
59	1	04	4602	01OCT92	03OCT92	&1269	1		2407.48	2407.48		2407.48
59	1	03	4903	01OCT92	04OCT92	&1268	1		2399.96	2399.96		2399.96
59	1	02	5104	01OCT92	04OCT92	&1267	1		2400.77	2400.77		2400.77
59	1	01	5418	01OCT92	04OCT92	&1266A	1		2398.22	2398.22		
59	1	01	5418	01OCT92	04OCT92	&1266B	1		2399.13	2399.13	+0.91	2398.68
61	1	34	10	02OCT92	04OCT92	&1300	1		2297.81	2297.81		2297.81
62	1	34	0	02OCT92	04OCT92	&1334A	1		2300.25	2300.25		
62	1	34	0	02OCT92	04OCT92	&1334B	1		2302.15	2302.15	+1.90	2301.20
62	1	35	0	02OCT92	04OCT92	&1335	1		2301.30	2301.30		2301.30
62	1	33	23	02OCT92	04OCT92	&1333	1		2307.01	2307.01		2307.01
62	1	32	49	02OCT92	04OCT92	&1332	1		2300.13	2300.13		2300.13
62	1	31	74	02OCT92	04OCT92	&1331	1		2324.98	2324.98		2324.98
62	1	30	99	02OCT92	04OCT92	&1330	1		2312.12	2312.12		2312.12
62	1	29	125	02OCT92	04OCT92	&1329	1		2318.85	2318.85		2318.85

62	1	28	148	020CT92	040CT92	&1328	1		2316.88	2316.88		2316.88
62	1	27	176	020CT92	040CT92	&1327	1	X	2335.42			
62	1	26	199	020CT92	040CT92	&1326	1	X	2308.04			
62	1	25	250	020CT92	040CT92	&1325	1		2286.74	2286.74		2286.74
62	1	24	299	020CT92	040CT92	&1324	1		2276.72	2276.72		2276.72
62	1	23	346	020CT92	040CT92	&1323	1		2260.22	2260.22		2260.22
62	1	22	398	020CT92	040CT92	&1322	1		2264.96	2264.96		2264.96
62	1	21	497	020CT92	040CT92	&1321	1		2273.74	2273.74		2273.74
62	1	20	598	020CT92	040CT92	&1320	1		2300.99	2300.99		2300.99
62	1	19	697	020CT92	040CT92	&1319	1		2333.96	2333.96		2333.96
62	1	18	797	020CT92	040CT92	&1318	1		2347.61	2347.61		2347.61
62	1	17	896	020CT92	040CT92	&1317	1		2358.80	2358.80		2358.80
62	1	16	994	020CT92	040CT92	&1316	1		2369.13	2369.13		2369.13
62	1	15	1199	020CT92	040CT92	&1315	1		2386.46	2386.46		2386.46
62	1	14	1395	020CT92	040CT92	&1314	1		2395.61	2395.61		2395.61
62	1	13	1596	020CT92	040CT92	&1313	1		2401.69	2401.69		2401.69
62	1	12	1794	020CT92	040CT92	&1312	1		2405.82	2405.82		2405.82
62	1	11	2099	020CT92	040CT92	&1311	1		2414.03	2414.03		2414.03
62	1	10	2398	020CT92	040CT92	&1310	1		2421.03	2421.03		2421.03
62	1	09	2700	020CT92	040CT92	&1309	1		2421.26	2421.26		2421.26
62	1	08	3000	020CT92	040CT92	&1308	1		2422.81	2422.81		2422.81
62	1	07	3301	020CT92	040CT92	&1307	1		2420.27	2420.27		2420.27
62	1	06	3602	020CT92	040CT92	&1306	1		2421.49	2421.49		2421.49
62	1	05	3901	020CT92	040CT92	&1305	1		2416.87	2416.87		2416.87
62	1	04	4202	020CT92	040CT92	&1304	1		2415.05	2415.05		2415.05
62	1	03	4502	020CT92	040CT92	&1303	1		2406.44	2406.44		2406.44
62	1	02	4802	020CT92	040CT92	&1302	1		2404.01	2404.01		2404.01
62	1	01	5151	020CT92	040CT92	&1301A	1		2395.46	2395.46		
62	1	01	5151	020CT92	040CT92	&1301B	1		2398.61	2398.61	+3.15	2397.04
63	1	36	11	040CT92	050CT92	&1371	1		2308.34	2308.34		2308.34
63	1	35	24	040CT92	050CT92	&1370A	1		2305.72	2305.72		
63	1	35	24	040CT92	050CT92	&1370B	1		2311.11	2311.11	+5.39	2308.42
63	1	34	48	040CT92	050CT92	&1369	1		2312.94	2312.94		2312.94
63	1	33	63	040CT92	050CT92	&1368	1		2306.96	2306.96		2306.96
63	1	32	100	040CT92	050CT92	&1367	1		2319.49	2319.49		2319.49
63	1	31	126	040CT92	050CT92	&1366	1		2314.93	2314.93		2314.93
63	1	30	150	040CT92	050CT92	&1365	1	EX	2365.28			
63	1	29	174	040CT92	050CT92	&1364	1		2292.23	2292.23		2292.23
63	1	28	200	040CT92	050CT92	&1363	1		2296.41	2296.41		2296.41
63	1	27	225	040CT92	050CT92	&1362	1		2285.97	2285.97		2285.97
63	1	26	249	040CT92	050CT92	&1361	1		2285.49	2285.49		2285.49
63	1	25	300	040CT92	050CT92	&1360	1		2283.77	2283.77		2283.77
63	1	24	351	040CT92	050CT92	&1359	1		2277.76	2277.76		2277.76
63	1	23	390	040CT92	050CT92	&1358	1		2269.68	2269.68		2269.68
63	1	22	498	040CT92	050CT92	&1357	1		2270.55	2270.55		2270.55
63	1	21	599	040CT92	050CT92	&1356	1		2266.43	2266.43		2266.43
63	1	20	702	040CT92	050CT92	&1355	1		2276.49	2276.49		2276.49
63	1	19	800	040CT92	050CT92	&1354	1		2292.73	2292.73		2292.73
63	1	18	901	040CT92	050CT92	&1353	1		2321.32	2321.32		2321.32
63	1	17	1002	040CT92	050CT92	&1352	1		2341.95	2341.95		2341.95
63	1	16	1196	040CT92	050CT92	&1351	1		2361.58	2361.58		2361.58
63	1	15	1396	040CT92	050CT92	&1350	1		2383.28	2383.28		2383.28
63	1	14	1700	040CT92	050CT92	&1349	1		2396.83	2396.83		2396.83
63	1	13	2000	040CT92	050CT92	&1348	1		2407.77	2407.77		2407.77
63	1	12	2298	040CT92	050CT92	&1347	1		2416.62	2416.62		2416.62
63	1	11	2601	040CT92	050CT92	&1346	1		2409.03	2409.03		2409.03
63	1	10	2900	040CT92	050CT92	&1345	1		2421.62	2421.62		2421.62
63	1	09	3201	040CT92	050CT92	&1344	1		2418.71	2418.71		2418.71
63	1	08	3600	040CT92	050CT92	&1343	1		2422.20	2422.20		2422.20
63	1	07	4001	040CT92	050CT92	&1342	1		2416.93	2416.93		2416.93

63	1	06	4402	04OCT92	05OCT92	&1341	1		2415.65		2415.65		2415.65
63	1	05	4799	04OCT92	06OCT92	&1340	1		2408.47		2408.47		2408.47
63	1	04	5099	04OCT92	06OCT92	&1339	1		2407.59		2407.59		2407.59
63	1	03	5404	04OCT92	06OCT92	&1338	1		2400.60		2400.60		2400.60
63	1	02	5500	04OCT92	06OCT92	&1337	1		2404.05		2404.05		2404.05
63	1	01	5703	04OCT92	06OCT92	&1336A	1		2399.06		2399.06		
63	1	01	5703	04OCT92	06OCT92	&1336B	1		2403.43		2403.43	+4.37	2401.25
64	1	01	0	05OCT92	07OCT92	&1372A	1		2408.77				
64	1	01	0	05OCT92	07OCT92	&1372A	2		2407.98				
64	1	01	0	05OCT92	07OCT92	&1372A	3	X	2405.55	-0.79	2408.38		
64	1	01	0	05OCT92	07OCT92	&1372B	1		2413.83				
64	1	01	0	05OCT92	07OCT92	&1372B	2	EX	2508.99				
64	1	01	0	05OCT92	07OCT92	&1372B	3	X	2412.28		2413.83	+5.45	2411.10
64	1	21	0	05OCT92	07OCT92	&1392	1		2271.93		2271.93		2271.93
64	1	36	10	05OCT92	06OCT92	&1407	1		2312.54		2312.54		2312.54
64	1	35	25	05OCT92	06OCT92	&1406A	1		2305.26		2305.26		
64	1	35	25	05OCT92	06OCT92	&1406B	1		2317.79		2317.79	+12.53	2311.53
64	1	34	49	05OCT92	06OCT92	&1405	1		2316.76		2316.76		2316.76
64	1	33	74	05OCT92	06OCT92	&1404	1		2308.78		2308.78		2308.78
64	1	32	98	05OCT92	06OCT92	&1403	1		2320.56		2320.56		2320.56
64	1	31	122	05OCT92	06OCT92	&1402	1		2316.36		2316.36		2316.36
64	1	30	148	05OCT92	06OCT92	&1401	1		2316.89		2316.89		2316.89
64	1	29	174	05OCT92	06OCT92	&1400	1		2304.01		2304.01		2304.01
64	1	28	198	05OCT92	06OCT92	&1399	1		2298.92		2298.92		2298.92
64	1	27	249	05OCT92	06OCT92	&1398	1		2288.19		2288.19		2288.19
64	1	26	297	05OCT92	06OCT92	&1397	1		2282.75		2282.75		2282.75
64	1	25	347	05OCT92	06OCT92	&1396	1		2275.90		2275.90		2275.90
64	1	24	399	05OCT92	06OCT92	&1395	1		2276.80		2276.80		2276.80
64	1	23	498	05OCT92	06OCT92	&1394	1		2270.91		2270.91		2270.91
64	1	22	593	05OCT92	06OCT92	&1393	1		2273.30		2273.30		2273.30
64	1	20	690	05OCT92	07OCT92	&1391	1		2290.96		2290.96		2290.96
64	1	19	795	05OCT92	07OCT92	&1390	1		2305.85		2305.85		2305.85
64	1	18	889	05OCT92	07OCT92	&1389	1		2333.19		2333.19		2333.19
64	1	17	996	05OCT92	07OCT92	&1388	1		2346.84		2346.84		2346.84
64	1	16	1096	05OCT92	07OCT92	&1387	1		2366.82		2366.82		2366.82
64	1	15	1198	05OCT92	07OCT92	&1386	1		2372.55		2372.55		2372.55
64	1	14	1297	05OCT92	07OCT92	&1385	1		2386.81		2386.81		2386.81
64	1	13	1397	05OCT92	07OCT92	&1384	1		2387.51		2387.51		2387.51
64	1	12	1598	05OCT92	07OCT92	&1383	1		2405.11		2405.11		2405.11
64	1	11	1796	05OCT92	07OCT92	&1382	1		2388.17		2388.17		2388.17
64	1	10	2000	05OCT92	07OCT92	&1381	1		2416.06		2416.06		2416.06
64	1	09	2197	05OCT92	07OCT92	&1380	1		2410.85		2410.85		2410.85
64	1	08	2499	05OCT92	07OCT92	&1379	1		2421.09		2421.09		2421.09
64	1	07	2797	05OCT92	07OCT92	&1378	1		2415.03		2415.03		2415.03
64	1	06	3099	05OCT92	07OCT92	&1377	1		2421.38		2421.38		2421.38
64	1	05	3401	05OCT92	07OCT92	&1376	1		2417.92		2417.92		2417.92
64	1	04	3704	05OCT92	07OCT92	&1375	1		2422.09		2422.09		2422.09
64	1	03	4002	05OCT92	07OCT92	&1374	1		2410.41		2410.41		2410.41
64	1	02	4301	05OCT92	07OCT92	&1373	1		2415.20		2415.20		2415.20
65	1	36	10	05OCT92	08OCT92	&1442	1		2301.78		2301.78		2301.78
65	1	35	25	05OCT92	08OCT92	&1441A	1		2300.07		2300.07		
65	1	35	25	05OCT92	08OCT92	&1441B	1		2304.58		2304.58	+4.51	2302.33
65	1	34	48	05OCT92	08OCT92	&1440	1		2305.90		2305.90		2305.90
65	1	33	74	05OCT92	08OCT92	&1439	1		2283.74		2283.74		2283.74
65	1	32	96	05OCT92	08OCT92	&1438	1		2286.53		2286.53		2286.53
65	1	31	125	05OCT92	08OCT92	&1437	1		2274.29		2274.29		2274.29
65	1	30	148	05OCT92	08OCT92	&1436	1		2282.55		2282.55		2282.55
65	1	29	173	05OCT92	08OCT92	&1435	1		2278.49		2278.49		2278.49
65	1	28	200	05OCT92	08OCT92	&1434	1		2277.78		2277.78		2277.78
65	1	27	247	05OCT92	08OCT92	&1433	1		2274.52		2274.52		2274.52

65	1	26	299	05OCT92	08OCT92	&1432	1		2276.10	2276.10		2276.10
65	1	25	349	05OCT92	08OCT92	&1431	1		2271.99	2271.99		2271.99
65	1	24	397	05OCT92	08OCT92	&1430	1		2273.71	2273.71		2273.71
65	1	23	498	05OCT92	08OCT92	&1429	1		2270.71	2270.71		2270.71
65	1	22	598	05OCT92	08OCT92	&1428	1		2282.16	2282.16		2282.16
65	1	21	698	05OCT92	08OCT92	&1427	1		2290.08	2290.08		2290.08
65	1	20	797	05OCT92	08OCT92	&1426	1		2317.32	2317.32		2317.32
65	1	19	898	05OCT92	08OCT92	&1425	1		2336.57	2336.57		2336.57
65	1	18	999	05OCT92	08OCT92	&1424	1		2373.84	2373.84		2373.84
65	1	17	1198	05OCT92	08OCT92	&1423	1		2376.10	2376.10		2376.10
65	1	16	1398	05OCT92	08OCT92	&1422	1		2389.84	2389.84		2389.84
65	1	15	1597	05OCT92	08OCT92	&1421	1		2400.84	2400.84		2400.84
65	1	14	1800	05OCT92	08OCT92	&1420	1		2413.95	2413.95		2413.95
65	1	13	2100	05OCT92	08OCT92	&1419	1		2415.01	2415.01		2415.01
65	1	12	2400	05OCT92	08OCT92	&1418	1		2421.90	2421.90		2421.90
65	1	11	2702	05OCT92	08OCT92	&1417	1		2416.58	2416.58		2416.58
65	1	10	3002	05OCT92	08OCT92	&1416	1		2419.92	2419.92		2419.92
65	1	09	3301	05OCT92	08OCT92	&1415	1		2417.47	2417.47		2417.47
65	1	08	3601	05OCT92	08OCT92	&1414	1		2420.59	2420.59		2420.59
65	1	07	3902	05OCT92	08OCT92	&1413	1		2413.42	2413.42		2413.42
65	1	05	4502	05OCT92	08OCT92	&1412	1		2416.93	2416.93		2416.93
65	1	04	4802	05OCT92	09OCT92	&1411	1		2410.52	2410.52		2410.52
65	1	03	5102	05OCT92	09OCT92	&1410	1		2405.46	2405.46		2405.46
65	1	02	5300	05OCT92	09OCT92	&1409	1		2402.47	2402.47		2402.47
65	1	01	5544	05OCT92	09OCT92	&1408A	1		2403.12	2403.12		
65	1	01	5544	05OCT92	09OCT92	&1408B	1		2405.85	2405.85	+2.73	2404.49
66	1	36	11	08OCT92	09OCT92	&1476	1	EX	2331.46			
66	1	35	24	08OCT92	09OCT92	&1475A	1		2278.40	2278.40		
66	1	35	24	08OCT92	09OCT92	&1475B	1		2288.29	2288.29	+9.89	2283.34
66	1	34	50	08OCT92	09OCT92	&1474	1		2279.80	2279.80		2279.80
66	1	33	73	08OCT92	09OCT92	&1473	1		2282.35	2282.35		2282.35
66	1	32	98	08OCT92	09OCT92	&1472	1		2305.54	2305.54		2305.54
66	1	31	126	08OCT92	09OCT92	&1471	1		2316.57	2316.57		2316.57
66	1	30	150	08OCT92	09OCT92	&1470	1		2313.65	2313.65		2313.65
66	1	29	176	08OCT92	09OCT92	&1469	1		2303.13	2303.13		2303.13
66	1	28	200	08OCT92	09OCT92	&1468	1		2294.12	2294.12		2294.12
66	1	27	249	08OCT92	09OCT92	&1467	1		2275.36	2275.36		2275.36
66	1	26	299	08OCT92	09OCT92	&1466	1		2269.51	2269.51		2269.51
66	1	25	349	08OCT92	09OCT92	&1465	1		2282.98	2282.98		2282.98
66	1	24	400	08OCT92	09OCT92	&1464	1		2291.99	2291.99		2291.99
66	1	23	500	08OCT92	09OCT92	&1463	1		2312.41	2312.41		2312.41
66	1	22	598	08OCT92	09OCT92	&1462	1		2322.53	2322.53		2322.53
66	1	21	699	08OCT92	09OCT92	&1461	1		2337.08	2337.08		2337.08
66	1	20	796	08OCT92	09OCT92	&1460	1		2344.35	2344.35		2344.35
66	1	19	899	08OCT92	09OCT92	&1459	1		2354.26	2354.26		2354.26
66	1	18	997	08OCT92	09OCT92	&1458	1		2358.88	2358.88		2358.88
66	1	17	1100	08OCT92	09OCT92	&1457	1		2369.94	2369.94		2369.94
66	1	16	1197	08OCT92	09OCT92	&1456	1		2375.02	2375.02		2375.02
66	1	15	1297	08OCT92	09OCT92	&1455	1		2386.93	2386.93		2386.93
66	1	13	1699	08OCT92	09OCT92	&1454	1		2407.09	2407.09		2407.09
66	1	12	2000	08OCT92	09OCT92	&1453	1		2419.13	2419.13		2419.13
66	1	11	2297	08OCT92	09OCT92	&1452	1		2418.15	2418.15		2418.15
66	1	10	2599	08OCT92	09OCT92	&1451	1		2425.69	2425.69		2425.69
66	1	08	3200	08OCT92	09OCT92	&1450	1		2421.91	2421.91		2421.91
66	1	07	3502	08OCT92	09OCT92	&1449	1		2424.92	2424.92		2424.92
66	1	06	3801	08OCT92	10OCT92	&1448	1		2417.31	2417.31		2417.31
66	1	05	4102	08OCT92	10OCT92	&1447	1		2418.23	2418.23		2418.23
66	1	04	4403	08OCT92	10OCT92	&1446	1		2408.56	2408.56		2408.56
66	1	03	4702	08OCT92	10OCT92	&1445	1		2407.31	2407.31		2407.31
66	1	02	4903	08OCT92	10OCT92	&1444	1		2400.42	2400.42		2400.42

66	1	01	5117	08OCT92	10OCT92	&1443A	1	2399.68	2399.68		
66	1	01	5117	08OCT92	10OCT92	&1443B	1	2402.97	2402.97	+3.29	2401.32
67	1	36	10	09OCT92	10OCT92	&1512	1	2275.78	2275.78		2275.78
67	1	35	25	09OCT92	10OCT92	&1511A	1	2272.50	2272.50		
67	1	35	25	09OCT92	10OCT92	&1511B	1	2273.28	2273.28	+0.78	2272.89
67	1	34	49	09OCT92	10OCT92	&1510	1	2278.43	2278.43		2278.43
67	1	33	74	09OCT92	10OCT92	&1509	1	2283.47	2283.47		2283.47
67	1	32	99	09OCT92	10OCT92	&1508	1	2282.05	2282.05		2282.05
67	1	31	125	09OCT92	10OCT92	&1507	1	2306.21	2306.21		2306.21
67	1	30	149	09OCT92	10OCT92	&1506	1	2308.55	2308.55		2308.55
67	1	29	173	09OCT92	10OCT92	&1505	1	2303.90	2303.90		2303.90
67	1	28	198	09OCT92	10OCT92	&1504	1	2291.77	2291.77		2291.77
67	1	27	247	09OCT92	10OCT92	&1503	1	2276.16	2276.16		2276.16
67	1	26	299	09OCT92	10OCT92	&1502	1	2269.13	2269.13		2269.13
67	1	25	348	09OCT92	10OCT92	&1501	1	2283.56	2283.56		2283.56
67	1	24	404	09OCT92	10OCT92	&1500	1	2292.50	2292.50		2292.50
67	1	23	499	09OCT92	10OCT92	&1499	1	2313.08	2313.08		2313.08
67	1	22	597	09OCT92	10OCT92	&1498	1	2323.76	2323.76		2323.76
67	1	21	697	09OCT92	10OCT92	&1497	1	2336.50	2336.50		2336.50
67	1	20	797	09OCT92	10OCT92	&1496	1	2342.37	2342.37		2342.37
67	1	19	898	09OCT92	10OCT92	&1495	1	2352.96	2352.96		2352.96
67	1	18	997	09OCT92	10OCT92	&1494	1	2359.66	2359.66		2359.66
67	1	17	1126	09OCT92	10OCT92	&1493	1	2368.48	2368.48		2368.48
67	1	16	1296	09OCT92	10OCT92	&1492	1	2381.80	2381.80		2381.80
67	1	15	1496	09OCT92	10OCT92	&1491	1	2397.67	2397.67		2397.67
67	1	14	1694	09OCT92	10OCT92	&1490	1	2409.13	2409.13		2409.13
67	1	13	1904	09OCT92	10OCT92	&1489	1	2414.29	2414.29		2414.29
67	1	12	2198	09OCT92	10OCT92	&1488	1	2419.01	2419.01		2419.01
67	1	11	2384	09OCT92	10OCT92	&1487	1	2423.61	2423.61		2423.61
67	1	10	2600	09OCT92	10OCT92	&1486	1	2424.62	2424.62		2424.62
67	1	09	2799	09OCT92	10OCT92	&1485	1	2426.24	2426.24		2426.24
67	1	08	3098	09OCT92	10OCT92	&1484	1	2425.76	2425.76		2425.76
67	1	07	3399	09OCT92	10OCT92	&1483	1	2425.76	2425.76		2425.76
67	1	06	3702	09OCT92	10OCT92	&1482	1	2422.46	2422.46		2422.46
67	1	05	4003	09OCT92	10OCT92	&1481	1	2420.16	2420.16		2420.16
67	1	04	4302	09OCT92	11OCT92	&1480	1	2412.93	2412.93		2412.93
67	1	03	4601	09OCT92	11OCT92	&1479	1	2409.31	2409.31		2409.31
67	1	02	4902	09OCT92	11OCT92	&1478	1	2401.92	2401.92		2401.92
67	1	01	5322	09OCT92	11OCT92	&1477A	1	2397.36	2397.36		
67	1	01	5322	09OCT92	11OCT92	&1477B	1	2397.74	2397.74	+0.38	2397.55
68	1	36	9	09OCT92	11OCT92	&1548	1	2260.92	2260.92		2260.92
68	1	35	9	09OCT92	11OCT92	&1547A	1	2259.38	2259.38		
68	1	35	9	09OCT92	11OCT92	&1547B	1	2259.81	2259.81	+0.43	2259.59
68	1	34	25	09OCT92	11OCT92	&1546	1	2265.88	2265.88		2265.88
68	1	33	48	09OCT92	11OCT92	&1545	1	2272.17	2272.17		2272.17
68	1	32	74	09OCT92	11OCT92	&1544	1	2280.07	2280.07		2280.07
68	1	31	98	09OCT92	11OCT92	&1543	1	2282.58	2282.58		2282.58
68	1	30	123	09OCT92	11OCT92	&1542	1	2287.24	2287.24		2287.24
68	1	29	150	09OCT92	11OCT92	&1541	1	2300.79	2300.79		2300.79
68	1	28	179	09OCT92	11OCT92	&1540	1	2287.11	2287.11		2287.11
68	1	27	236	09OCT92	11OCT92	&1539	1	2273.50	2273.50		2273.50
68	1	26	298	09OCT92	11OCT92	&1538	1	2284.98	2284.98		2284.98
68	1	25	346	09OCT92	11OCT92	&1537	1	2299.46	2299.46		2299.46
68	1	24	397	09OCT92	11OCT92	&1536	1	2305.48	2305.48		2305.48
68	1	23	497	09OCT92	11OCT92	&1535	1	2311.32	2311.32		2311.32
68	1	22	596	09OCT92	11OCT92	&1534	1	2304.15	2304.15		2304.15
68	1	21	696	09OCT92	11OCT92	&1533	1	2336.74	2336.74		2336.74
68	1	20	798	09OCT92	11OCT92	&1532	1	2341.38	2341.38		2341.38
68	1	19	897	09OCT92	11OCT92	&1531	1	2354.89	2354.89		2354.89
68	1	18	996	09OCT92	11OCT92	&1530	1	2359.62	2359.62		2359.62

68	1	17	1098	09OCT92	11OCT92	&1529	1	2368.79	2368.79		2368.79
68	1	16	1197	09OCT92	11OCT92	&1528	1	2381.16	2381.16		2381.16
68	1	15	1295	09OCT92	11OCT92	&1527	1	2388.00	2388.00		2388.00
68	1	14	1398	09OCT92	11OCT92	&1526	1	2391.21	2391.21		2391.21
68	1	13	1598	09OCT92	11OCT92	&1525	1	2403.22	2403.22		2403.22
68	1	12	1797	09OCT92	11OCT92	&1524	1	2407.00	2407.00		2407.00
68	1	11	1997	09OCT92	11OCT92	&1523	1	2417.21	2417.21		2417.21
68	1	10	2199	09OCT92	11OCT92	&1522	1	2424.10	2424.10		2424.10
68	1	09	2496	09OCT92	11OCT92	&1521	1	2423.97	2423.97		2423.97
68	1	08	2800	09OCT92	11OCT92	&1520	1	2425.10	2425.10		2425.10
68	1	07	3100	09OCT92	11OCT92	&1519	1	2423.99	2423.99		2423.99
68	1	06	3400	09OCT92	11OCT92	&1518	1	2424.75	2424.75		2424.75
68	1	05	3702	09OCT92	11OCT92	&1517	1	2425.70	2425.70		2425.70
68	1	04	4001	09OCT92	11OCT92	&1516	1	2424.50	2424.50		2424.50
68	1	03	4301	09OCT92	11OCT92	&1515	1	2413.90	2413.90		2413.90
68	1	02	4501	09OCT92	12OCT92	&1514	1	2408.44	2408.44		2408.44
68	1	01	4756	09OCT92	11OCT92	&1513A	1	2407.63	2407.63		
68	1	01	4756	09OCT92	11OCT92	&1513B	1	2408.71	2408.71	+1.08	2408.17
69	1	36	9	10OCT92	12OCT92	&1584	1	2257.29	2257.29		2257.29
69	1	35	24	10OCT92	12OCT92	&1583	1	2255.38	2255.38		2255.38
69	1	34	50	10OCT92	12OCT92	&1582A	1	2275.03	2275.03		
69	1	34	50	10OCT92	12OCT92	&1582B	1	2275.10	2275.10	+0.07	2275.07
69	1	33	73	10OCT92	12OCT92	&1581	1	2279.32	2279.32		2279.32
69	1	32	100	10OCT92	12OCT92	&1580	1	2296.26	2296.26		2296.26
69	1	31	124	10OCT92	12OCT92	&1579	1	2299.04	2299.04		2299.04
69	1	30	148	10OCT92	12OCT92	&1578	1	2280.98	2280.98		2280.98
69	1	29	175	10OCT92	12OCT92	&1577	1	2279.24	2279.24		2279.24
69	1	28	200	10OCT92	12OCT92	&1576	1	2280.27	2280.27		2280.27
69	1	27	248	10OCT92	12OCT92	&1575	1	2294.74	2294.74		2294.74
69	1	26	297	10OCT92	12OCT92	&1574	1	2300.12	2300.12		2300.12
69	1	25	349	10OCT92	12OCT92	&1573	1	2306.48	2306.48		2306.48
69	1	24	399	10OCT92	12OCT92	&1572	1	2305.09	2305.09		2305.09
69	1	23	500	10OCT92	12OCT92	&1571	1	2314.75	2314.75		2314.75
69	1	22	598	10OCT92	12OCT92	&1570	1	2316.65	2316.65		2316.65
69	1	21	697	10OCT92	12OCT92	&1569	1	2328.53	2328.53		2328.53
69	1	20	799	10OCT92	12OCT92	&1568	1	2332.16	2332.16		2332.16
69	1	19	898	10OCT92	12OCT92	&1567	1	2345.58	2345.58		2345.58
69	1	18	998	10OCT92	12OCT92	&1566	1	2353.73	2353.73		2353.73
69	1	17	1096	10OCT92	12OCT92	&1565	1	2365.15	2365.15		2365.15
69	1	16	1194	10OCT92	12OCT92	&1564	1	2372.80	2372.80		2372.80
69	1	15	1299	10OCT92	12OCT92	&1563	1	2381.76	2381.76		2381.76
69	1	14	1496	10OCT92	12OCT92	&1562	1	2394.07	2394.07		2394.07
69	1	13	1698	10OCT92	12OCT92	&1561	1	2405.88	2405.88		2405.88
69	1	12	1999	10OCT92	12OCT92	&1560	1	2415.56	2415.56		2415.56
69	1	11	2298	10OCT92	11OCT92	&1559	1	2423.68	2423.68		2423.68
69	1	10	2600	10OCT92	12OCT92	&1558	1	2425.03	2425.03		2425.03
69	1	09	2899	10OCT92	11OCT92	&1557	1	2427.65	2427.65		2427.65
69	1	08	3199	10OCT92	12OCT92	&1556	2	2424.72	2424.72		2424.72
69	1	07	3501	10OCT92	12OCT92	&1555	1	2420.74	2420.74		2420.74
69	1	06	3800	10OCT92	12OCT92	&1554	2	2413.61	2413.61		2413.61
69	1	05	4102	10OCT92	12OCT92	&1553	1	2412.77	2412.77		2412.77
69	1	04	4378	10OCT92	12OCT92	&1552	1	2407.82	2407.82		2407.82
69	1	03	4704	10OCT92	12OCT92	&1551	1	2395.03	2395.03		2395.03
69	1	02	4902	10OCT92	12OCT92	&1550	1	2394.80	2394.80		2394.80
69	1	01	5151	10OCT92	12OCT92	&1549A	1	2394.08	2394.08		
69	1	01	5151	10OCT92	12OCT92	&1549B	1	2393.74	2393.74	-0.34	2393.91
70	1	36	9	11OCT92	12OCT92	&1620	1	2242.95	2242.95		2242.95
70	1	35	24	11OCT92	13OCT92	&1619A	1	2242.43	2242.43		
70	1	35	24	11OCT92	13OCT92	&1619B	1	2243.39	2243.39	+0.96	2242.91
70	1	34	50	11OCT92	13OCT92	&1618	1	2241.60	2241.60		2241.60

70	1	33	75	110CT92	130CT92	&1617	1		2288.67	2288.67	2288.67
70	1	32	99	110CT92	130CT92	&1616	1		2290.30	2290.30	2290.30
70	1	31	125	110CT92	130CT92	&1615	1		2293.30	2293.30	2293.30
70	1	30	149	110CT92	130CT92	&1614	1		2283.81	2283.81	2283.81
70	1	29	175	110CT92	130CT92	&1613	1		2286.60	2286.60	2286.60
70	1	28	199	110CT92	130CT92	&1612	1		2292.62	2292.62	2292.62
70	1	27	223	110CT92	130CT92	&1611	1		2297.90	2297.90	2297.90
70	1	26	248	110CT92	130CT92	&1610	1		2303.48	2303.48	2303.48
70	1	25	298	110CT92	130CT92	&1609	1		2306.67	2306.67	2306.67
70	1	24	348	110CT92	130CT92	&1608	1		2307.15	2307.15	2307.15
70	1	23	399	110CT92	130CT92	&1607	1		2309.68	2309.68	2309.68
70	1	22	499	110CT92	130CT92	&1606	1		2309.88	2309.88	2309.88
70	1	21	599	110CT92	130CT92	&1605	1		2322.48	2322.48	2322.48
70	1	20	697	110CT92	130CT92	&1604	1		2329.29	2329.29	2329.29
70	1	19	799	110CT92	130CT92	&1603	1		2340.27	2340.27	2340.27
70	1	18	897	110CT92	130CT92	&1602	1		2348.64	2348.64	2348.64
70	1	17	997	110CT92	130CT92	&1601	1		2359.82	2359.82	2359.82
70	1	16	1097	110CT92	130CT92	&1600	1		2369.71	2369.71	2369.71
70	1	15	1297	110CT92	130CT92	&1599	1	X	2396.25		
70	1	14	1497	110CT92	130CT92	&1598	1		2391.55	2391.55	2391.55
70	1	13	1696	110CT92	130CT92	&1597	1		2399.60	2399.60	2399.60
70	1	12	1895	110CT92	130CT92	&1596	1		2412.57	2412.57	2412.57
70	1	11	2196	110CT92	130CT92	&1595	1		2421.85	2421.85	2421.85
70	1	10	2498	110CT92	130CT92	&1594	1		2421.92	2421.92	2421.92
70	1	09	2799	110CT92	130CT92	&1593	1		2426.52	2426.52	2426.52
70	1	08	3099	110CT92	130CT92	&1592	1		2416.78	2416.78	2416.78
70	1	07	3400	110CT92	130CT92	&1591	1		2422.81	2422.81	2422.81
70	1	06	3701	110CT92	130CT92	&1590	1		2417.91	2417.91	2417.91
70	1	05	4001	110CT92	130CT92	&1589	1		2413.67	2413.67	2413.67
70	1	04	4302	110CT92	130CT92	&1588	1		2407.55	2407.55	2407.55
70	1	03	4601	110CT92	130CT92	&1587	1		2402.26	2402.26	2402.26
70	1	02	4902	110CT92	130CT92	&1586	1		2398.64	2398.64	2398.64
70	1	01	5265	110CT92	130CT92	&1585B	1		2398.44	2398.44	2398.44
71	1	36	10	120CT92	130CT92	&1656	1		2236.33	2236.33	2236.33
71	1	35	23	120CT92	130CT92	&1655A	1		2235.64	2235.64	
71	1	35	23	120CT92	130CT92	&1655B	1		2236.22	2236.22	+0.58 2235.93
71	1	34	49	120CT92	130CT92	&1654	1		2245.91	2245.91	2245.91
71	1	33	74	120CT92	130CT92	&1653	1		2285.79	2285.79	2285.79
71	1	32	98	120CT92	130CT92	&1652	1		2284.48	2284.48	2284.48
71	1	31	123	120CT92	130CT92	&1651	1		2284.14	2284.14	2284.14
71	1	30	148	120CT92	130CT92	&1650	1		2292.15	2292.15	2292.15
71	1	29	173	120CT92	130CT92	&1649	1		2282.86	2282.86	2282.86
71	1	28	199	120CT92	130CT92	&1648	1		2282.41	2282.41	2282.41
71	1	27	224	120CT92	140CT92	&1647	1		2289.93	2289.93	2289.93
71	1	26	247	120CT92	140CT92	&1646	1		2300.84	2300.84	2300.84
71	1	25	272	120CT92	140CT92	&1645	1		2306.00	2306.00	2306.00
71	1	24	299	120CT92	140CT92	&1644	1		2304.10	2304.10	2304.10
71	1	23	347	120CT92	140CT92	&1643	1		2308.68	2308.68	2308.68
71	1	22	398	120CT92	140CT92	&1642	1		2310.40	2310.40	2310.40
71	1	21	448	120CT92	140CT92	&1641	1		2308.11	2308.11	2308.11
71	1	20	496	120CT92	140CT92	&1640	1		2315.00	2315.00	2315.00
71	1	19	595	120CT92	140CT92	&1639	1		2318.53	2318.53	2318.53
71	1	18	695	120CT92	140CT92	&1638	1		2330.11	2330.11	2330.11
71	1	17	797	120CT92	140CT92	&1637	1		2345.22	2345.22	2345.22
71	1	16	897	120CT92	140CT92	&1636	1		2350.66	2350.66	2350.66
71	1	15	996	120CT92	140CT92	&1635	1		2359.48	2359.48	2359.48
71	1	14	1197	120CT92	140CT92	&1634	1		2375.70	2375.70	2375.70
71	1	13	1494	120CT92	140CT92	&1633	1		2386.24	2386.24	2386.24
71	1	12	1794	120CT92	140CT92	&1632	1		2410.82	2410.82	2410.82
71	1	11	2094	120CT92	140CT92	&1631	1		2419.64	2419.64	2419.64

71	1	10	2395	12OCT92	14OCT92	&1630	1		2426.16	2426.16		2426.16
71	1	09	2697	12OCT92	14OCT92	&1629	1		2428.01	2428.01		2428.01
71	1	08	2996	12OCT92	14OCT92	&1628	1		2424.58	2424.58		2424.58
71	1	07	3298	12OCT92	14OCT92	&1627	1		2425.64	2425.64		2425.64
71	1	06	3599	12OCT92	14OCT92	&1626	1		2421.33	2421.33		2421.33
71	1	05	3898	12OCT92	14OCT92	&1625	1		2418.80	2418.80		2418.80
71	1	04	4201	12OCT92	14OCT92	&1624	1		2411.12	2411.12		2411.12
71	1	03	4500	12OCT92	14OCT92	&1623	1		2406.48	2406.48		2406.48
71	1	02	4799	12OCT92	14OCT92	&1622	1		2399.75	2399.75		2399.75
71	1	01	4944	12OCT92	14OCT92	&1621A	1		2395.78	2395.78		
71	1	01	4944	12OCT92	14OCT92	&1621B	1		2394.58	2394.58	-1.20	2395.18
72	1	36	10	12OCT92	13OCT92	&1657	1		2233.17	2233.17		2233.17
73	1	33	9	12OCT92	14OCT92	&1685	1		2229.65	2229.65		2229.65
73	1	31	48	12OCT92	14OCT92	&1684	1		2233.79	2233.79		2233.79
73	1	30	73	12OCT92	14OCT92	&1683A	1		2282.98	2282.98		
73	1	30	73	12OCT92	14OCT92	&1683B	1		2280.94	2280.94	-2.04	2281.96
73	1	29	99	12OCT92	14OCT92	&1682	1		2297.53	2297.53		2297.53
73	1	28	123	12OCT92	14OCT92	&1681	1		2302.42	2302.42		2302.42
73	1	27	147	12OCT92	14OCT92	&1680	1		2301.80	2301.80		2301.80
73	1	26	173	12OCT92	14OCT92	&1679	1		2295.29	2295.29		2295.29
73	1	25	200	12OCT92	14OCT92	&1678	1		2291.22	2291.22		2291.22
73	1	24	223	12OCT92	14OCT92	&1677	1		2291.95	2291.95		2291.95
73	1	23	247	12OCT92	15OCT92	&1676	1		2296.24	2296.24		2296.24
73	1	22	297	12OCT92	15OCT92	&1675	1		2304.06	2304.06		2304.06
73	1	20	398	12OCT92	15OCT92	&1674	1		2310.36	2310.36		2310.36
73	1	19	446	12OCT92	15OCT92	&1673	1		2326.82	2326.82		2326.82
73	1	18	495	12OCT92	15OCT92	&1672	1		2311.64	2311.64		2311.64
73	1	17	594	12OCT92	15OCT92	&1671	1		2318.55	2318.55		2318.55
73	1	16	695	12OCT92	15OCT92	&1670	1		2325.31	2325.31		2325.31
73	1	14	894	12OCT92	15OCT92	&1669	1		2348.72	2348.72		2348.72
73	1	12	1195	12OCT92	15OCT92	&1668	1		2376.58	2376.58		2376.58
73	1	10	1696	12OCT92	15OCT92	&1667	1		2400.53	2400.53		2400.53
73	1	09	1997	12OCT92	15OCT92	&1666	1		2412.91	2412.91		2412.91
73	1	08	2298	12OCT92	15OCT92	&1665	1		2420.18	2420.18		2420.18
73	1	07	2598	12OCT92	15OCT92	&1664	1		2424.46	2424.46		2424.46
73	1	06	2899	12OCT92	15OCT92	&1663	1		2424.44	2424.44		2424.44
73	1	05	3200	12OCT92	15OCT92	&1662	1		2425.81	2425.81		2425.81
73	1	04	3501	12OCT92	15OCT92	&1661	1		2424.64	2424.64		2424.64
73	1	03	3800	12OCT92	15OCT92	&1660	1		2413.21	2413.21		2413.21
73	1	02	4102	12OCT92	15OCT92	&1659	1		2414.21	2414.21		2414.21
73	1	01	4281	12OCT92	15OCT92	&1658A	1		2407.86	2407.86		
73	1	01	4281	12OCT92	15OCT92	&1658B	1	X	2450.77			2407.86
74	1	36	10	13OCT92	14OCT92	&1686	1		2250.44	2250.44		2250.44
75	1	36	11	13OCT92	15OCT92	&1718	1		2261.55	2261.55		2261.55
75	1	35	26	13OCT92	15OCT92	&1717A	1		2262.51	2262.51		
75	1	35	26	13OCT92	15OCT92	&1717B	1		2262.74	2262.74	+0.23	2262.63
75	1	34	51	13OCT92	15OCT92	&1716	1		2265.94	2265.94		2265.94
75	1	33	75	13OCT92	15OCT92	&1715	1		2295.32	2295.32		2295.32
75	1	32	101	13OCT92	15OCT92	&1714	1		2297.52	2297.52		2297.52
75	1	31	124	13OCT92	15OCT92	&1713	1		2299.98	2299.98		2299.98
75	1	30	151	13OCT92	15OCT92	&1712	1		2302.81	2302.81		2302.81
75	1	29	180	13OCT92	15OCT92	&1711	1		2292.71	2292.71		2292.71
75	1	28	200	13OCT92	15OCT92	&1710	1		2296.87	2296.87		2296.87
75	1	27	248	13OCT92	15OCT92	&1709	1		2307.63	2307.63		2307.63
75	1	26	300	13OCT92	15OCT92	&1708	1		2308.49	2308.49		2308.49
75	1	25	349	13OCT92	15OCT92	&1707	1		2307.45	2307.45		2307.45
75	1	24	399	13OCT92	15OCT92	&1706	1		2306.90	2306.90		2306.90
75	1	23	449	13OCT92	15OCT92	&1705	1		2308.58	2308.58		2308.58
75	1	22	499	13OCT92	16OCT92	&1704	1		2309.50	2309.50		2309.50
75	1	21	598	13OCT92	16OCT92	&1703	1		2319.13	2319.13		2319.13

75	1	20	699	13OCT92	16OCT92	&1702	1	2328.90		2328.90		2328.90
75	1	19	799	13OCT92	16OCT92	&1701	1	2338.32		2338.32		2338.32
75	1	18	896	13OCT92	16OCT92	&1700	1	2350.80		2350.80		2350.80
75	1	17	997	13OCT92	16OCT92	&1699	1	2356.64		2356.64		2356.64
75	1	16	1098	13OCT92	16OCT92	&1698	1	2365.60		2365.60		2365.60
75	1	12	1498	13OCT92	16OCT92	&1697	1	2382.26		2382.26		2382.26
75	1	10	1697	13OCT92	16OCT92	&1696	1	2403.42		2403.42		2403.42
75	1	09	1998	13OCT92	16OCT92	&1695	1	2413.42		2413.42		2413.42
75	1	08	2297	13OCT92	16OCT92	&1694	1	2419.03		2419.03		2419.03
75	1	07	2597	13OCT92	16OCT92	&1693	1	2422.55		2422.55		2422.55
75	1	06	2899	13OCT92	16OCT92	&1692	1	2425.16		2425.16		2425.16
75	1	05	3201	13OCT92	16OCT92	&1691	1	2422.13		2422.13		2422.13
75	1	04	3502	13OCT92	16OCT92	&1690	1	2423.45		2423.45		2423.45
75	1	03	3799	13OCT92	16OCT92	&1689	1	2419.48		2419.48		2419.48
75	1	02	4101	13OCT92	16OCT92	&1688	1	2409.68		2409.68		2409.68
75	1	01	4311	13OCT92	16OCT92	&1687A	1	2399.19		2399.19		
75	1	01	4311	13OCT92	16OCT92	&1687B	1	2397.77		2397.77	-1.42	2398.48
76	1	36	11	13OCT92	14OCT92	&1719	1	2270.81		2270.81		2270.81
77	1	36	9	14OCT92	15OCT92	&1720	1	2277.06		2277.06		2277.06
78	1	36	9	14OCT92	16OCT92	&1753	1	2285.54		2285.54		2285.54
78	1	35	24	14OCT92	16OCT92	&1752A	1	2282.36		2282.36		
78	1	35	24	14OCT92	16OCT92	&1752B	1	2286.16		2286.16	+3.80	2284.26
78	1	34	49	14OCT92	16OCT92	&1751	1	2286.32		2286.32		2286.32
78	1	33	72	14OCT92	16OCT92	&1750	1	2300.06		2300.06		2300.06
78	1	32	98	14OCT92	16OCT92	&1749	1	2299.82		2299.82		2299.82
78	1	31	124	14OCT92	16OCT92	&1748	1	2308.16		2308.16		2308.16
78	1	30	149	14OCT92	16OCT92	&1747	1	2317.15		2317.15		2317.15
78	1	29	174	14OCT92	16OCT92	&1746	1	2308.62		2308.62		2308.62
78	1	28	198	14OCT92	16OCT92	&1745	1	2305.36		2305.36		2305.36
78	1	27	249	14OCT92	16OCT92	&1744	1	2310.53		2310.53		2310.53
78	1	26	298	14OCT92	16OCT92	&1743	1	2310.01		2310.01		2310.01
78	1	25	348	14OCT92	16OCT92	&1742	1	2309.39		2309.39		2309.39
78	1	24	398	14OCT92	16OCT92	&1741	1	2306.82		2306.82		2306.82
78	1	23	448	14OCT92	16OCT92	&1740	1	2311.09		2311.09		2311.09
78	1	22	497	14OCT92	16OCT92	&1739	1	2309.36		2309.36		2309.36
78	1	21	596	14OCT92	16OCT92	&1738	1	2318.62		2318.62		2318.62
78	1	20	695	14OCT92	16OCT92	&1737	1	2325.66		2325.66		2325.66
78	1	19	798	14OCT92	17OCT92	&1736	1	2330.46		2330.46		2330.46
78	1	18	895	14OCT92	17OCT92	&1735	1	2344.18		2344.18		2344.18
78	1	17	998	14OCT92	17OCT92	&1734	1	2353.61		2353.61		2353.61
78	1	16	1097	14OCT92	17OCT92	&1733	1	2362.64		2362.64		2362.64
78	1	14	1298	14OCT92	17OCT92	&1732	1	2382.04		2382.04		2382.04
78	1	12	1496	14OCT92	17OCT92	&1731	1	2391.25		2391.25		2391.25
78	1	10	1796	14OCT92	17OCT92	&1730	1	2406.28		2406.28		2406.28
78	1	09	2097	14OCT92	17OCT92	&1729	1	2412.67		2412.67		2412.67
78	1	08	2296	14OCT92	17OCT92	&1728	1	2419.84		2419.84		2419.84
78	1	07	2599	14OCT92	17OCT92	&1727	1	2422.39		2422.39		2422.39
78	1	06	2899	14OCT92	17OCT92	&1726	1	2424.93		2424.93		2424.93
78	1	05	3200	14OCT92	17OCT92	&1725	1	2421.41		2421.41		2421.41
78	1	04	3501	14OCT92	17OCT92	&1724	1	2418.29		2418.29		2418.29
78	1	03	3801	14OCT92	17OCT92	&1723	1	2417.52		2417.52		2417.52
78	1	02	4103	14OCT92	17OCT92	&1722	1	2410.86		2410.86		2410.86
78	1	01	4432	14OCT92	17OCT92	&1721A	1	2397.48				
78	1	01	4432	14OCT92	17OCT92	&1721A	2	2399.46	+1.98	2398.47		
78	1	01	4432	14OCT92	17OCT92	&1721B	1	2390.56		2390.56	-7.91	2394.52
79	1	36	10	14OCT92	16OCT92	&1754	1	2286.42		2286.42		2286.42
80	1	36	10	15OCT92	16OCT92	&1755	1	2272.70		2272.70		2272.70
81	1	36	9	15OCT92	17OCT92	&1788	1	2270.35		2270.35		2270.35
81	1	35	25	15OCT92	17OCT92	&1787A	1	2274.53		2274.53		
81	1	35	25	15OCT92	17OCT92	&1787B	1	2275.77		2275.77	+1.24	2275.15

81	1	34	49	15OCT92	17OCT92	&1786	1		2294.75	2294.75		2294.75
81	1	33	74	15OCT92	17OCT92	&1785	1		2320.16	2320.16		2320.16
81	1	32	99	15OCT92	17OCT92	&1784	1		2303.55	2303.55		2303.55
81	1	31	124	15OCT92	17OCT92	&1783	1		2308.09	2308.09		2308.09
81	1	30	150	15OCT92	17OCT92	&1782	1		2316.86	2316.86		2316.86
81	1	29	173	15OCT92	17OCT92	&1781	1		2317.57	2317.57		2317.57
81	1	28	199	15OCT92	17OCT92	&1780	1		2315.87	2315.87		2315.87
81	1	27	247	15OCT92	17OCT92	&1779	1		2310.48	2310.48		2310.48
81	1	26	298	15OCT92	17OCT92	&1778	1		2309.21	2309.21		2309.21
81	1	25	351	15OCT92	17OCT92	&1777	1		2306.60	2306.60		2306.60
81	1	24	397	15OCT92	17OCT92	&1776	1		2307.46	2307.46		2307.46
81	1	23	447	15OCT92	18OCT92	&1775	1		2317.80	2317.80		2317.80
81	1	22	496	15OCT92	18OCT92	&1774	1		2307.60	2307.60		2307.60
81	1	21	597	15OCT92	18OCT92	&1773	1		2316.57	2316.57		2316.57
81	1	20	696	15OCT92	18OCT92	&1772	1		2326.49	2326.49		2326.49
81	1	19	797	15OCT92	18OCT92	&1771	1		2332.56	2332.56		2332.56
81	1	18	897	15OCT92	18OCT92	&1770	1		2337.74	2337.74		2337.74
81	1	17	999	15OCT92	18OCT92	&1769	1		2348.85	2348.85		2348.85
81	1	16	1100	15OCT92	18OCT92	&1768	1		2358.40	2358.40		2358.40
81	1	14	1297	15OCT92	18OCT02	&1767	1		2380.75	2380.75		2380.75
81	1	12	1497	15OCT92	18OCT92	&1766	1		2390.11	2390.11		2390.11
81	1	10	1797	15OCT92	18OCT92	&1765	1		2405.78	2405.78		2405.78
81	1	09	2100	15OCT92	18OCT92	&1764	1		2416.90	2416.90		2416.90
81	1	08	2399	15OCT92	18OCT92	&1763	1		2418.35	2418.35		2418.35
81	1	07	2700	15OCT92	18OCT92	&1762	1		2422.95	2422.95		2422.95
81	1	06	3001	15OCT92	18OCT92	&1761	1		2422.57	2422.57		2422.57
81	1	05	3299	15OCT92	18OCT92	&1760	1	EX	2438.24			
81	1	04	3601	15OCT92	18OCT92	&1759	1		2419.22	2419.22		2419.22
81	1	03	3901	15OCT92	18OCT92	&1758	1		2412.79	2412.79		2412.79
81	1	02	4200	15OCT92	18OCT92	&1757	1		2403.88	2403.88		2403.88
81	1	01	4501	15OCT92	18OCT92	&1756A	1		2399.41	2399.41		
81	1	01	4501	15OCT92	18OCT92	&1756B	1		2401.33	2401.33	+1.92	2400.37
82	1	36	10	15OCT92	16OCT92	&1789	1		2280.80	2280.80		2280.80
83	1	35	24	16OCT92	18OCT92	&1818A	1		2281.53	2281.53		
83	1	35	24	16OCT92	18OCT92	&1818B	1		2281.49	2281.49	-0.04	2281.51
83	1	32	99	16OCT92	18OCT92	&1817	1		2319.99	2319.99		2319.99
83	1	31	122	16OCT92	18OCT92	&1816	1		2300.85	2300.85		2300.85
83	1	30	148	16OCT92	18OCT92	&1815	1		2313.01	2313.01		2313.01
83	1	29	173	16OCT92	18OCT92	&1814	1		2333.23	2333.23		2333.23
83	1	28	197	16OCT92	18OCT92	&1813	1		2326.48	2326.48		2326.48
83	1	27	239	16OCT92	18OCT92	&1812	1		2308.85	2308.85		2308.85
83	1	26	296	16OCT92	18OCT92	&1811	1		2303.69	2303.69		2303.69
83	1	24	396	16OCT92	18OCT92	&1810	1		2302.22	2302.22		2302.22
83	1	23	446	16OCT92	18OCT92	&1809	1		2307.35	2307.35		2307.35
83	1	22	496	16OCT92	18OCT92	&1808	1		2307.37	2307.37		2307.37
83	1	21	594	16OCT92	18OCT92	&1807	1		2310.89	2310.89		2310.89
83	1	20	693	16OCT92	18OCT92	&1806	1		2321.92	2321.92		2321.92
83	1	19	796	16OCT92	18OCT92	&1805	1		2333.93	2333.93		2333.93
83	1	18	895	16OCT92	18OCT92	&1804	1		2342.50	2342.50		2342.50
83	1	17	995	16OCT92	18OCT92	&1803	1		2352.23	2352.23		2352.23
83	1	16	1094	16OCT92	18OCT92	&1802	1		2361.10	2361.10		2361.10
83	1	14	1194	16OCT92	19OCT92	&1801	1		2370.71	2370.71		2370.71
83	1	12	1396	16OCT92	19OCT92	&1800	1		2387.08	2387.08		2387.08
83	1	10	1596	16OCT92	19OCT92	&1799	1		2397.55	2397.55		2397.55
83	1	09	1794	16OCT92	19OCT92	&1798	1		2407.38	2407.38		2407.38
83	1	08	1995	16OCT92	19OCT92	&1797	1		2415.05	2415.05		2415.05
83	1	07	2194	16OCT92	19OCT92	&1796	1		2416.97	2416.97		2416.97
83	1	06	2398	16OCT92	19OCT92	&1795	1		2419.90	2419.90		2419.90
83	1	05	2595	16OCT92	19OCT92	&1794	1		2422.29	2422.29		2422.29
83	1	04	2798	16OCT92	19OCT92	&1793	1		2422.97	2422.97		2422.97

83	1	03	2997	16OCT92	19OCT92	&1792	1		2423.81	2423.81		2423.81
83	1	02	3174	16OCT92	19OCT92	&1791	1		2424.03	2424.03		2424.03
83	1	01	3277	16OCT92	19OCT92	&1790A	1		2422.52	2422.52		
83	1	01	3277	16OCT92	19OCT92	&1790B	1		2421.82	2421.82	-0.70	2422.17
84	1	36	11	16OCT92	18OCT92	&1819	1		2286.63	2286.63		2286.63
85	1	36	10	16OCT92	18OCT92	&1820	1		2281.62	2281.62		2281.62
86	1	32	10	16OCT92	18OCT92	&1821	1		2286.56	2286.56		2286.56
87	1	32	11	16OCT92	19OCT92	&1850	1		2282.94	2282.94		2282.94
87	1	31	25	16OCT92	19OCT92	&1849A	1		2279.89	2279.89		
87	1	31	25	16OCT92	19OCT92	&1849B	1		2282.98	2282.98	+3.09	2281.44
87	1	30	50	16OCT92	19OCT92	&1848	1		2285.04	2285.04		2285.04
87	1	29	75	16OCT92	19OCT92	&1847	1		2313.27	2313.27		2313.27
87	1	28	100	16OCT92	19OCT92	&1846	1		2314.34	2314.34		2314.34
87	1	27	124	16OCT92	19OCT92	&1845	1		2324.08	2324.08		2324.08
87	1	26	149	16OCT92	19OCT92	&1844	1		2355.44	2355.44		2355.44
87	1	25	174	16OCT92	19OCT92	&1843	1		2340.51	2340.51		2340.51
87	1	24	198	16OCT92	19OCT92	&1842	1		2344.66	2344.66		2344.66
87	1	23	224	16OCT92	19OCT92	&1841	1		2321.76	2321.76		2321.76
87	1	22	249	16OCT92	19OCT92	&1840	1		2314.25	2314.25		2314.25
87	1	21	299	16OCT92	19OCT92	&1839	1		2310.87	2310.87		2310.87
87	1	20	350	16OCT92	19OCT92	&1838	1		2305.96	2305.96		2305.96
87	1	19	399	16OCT92	19OCT92	&1837	1		2304.99	2304.99		2304.99
87	1	18	450	16OCT92	19OCT92	&1836	1		2307.50	2307.50		2307.50
87	1	17	499	16OCT92	19OCT92	&1835	1		2310.25	2310.25		2310.25
87	1	16	598	16OCT92	19OCT92	&1834	1		2317.47	2317.47		2317.47
87	1	14	699	16OCT92	19OCT92	&1833	1		2322.63	2322.63		2322.63
87	1	12	798	16OCT92	19OCT92	&1832	1		2332.52	2332.52		2332.52
87	1	10	897	16OCT92	19OCT92	&1831	1		2341.40	2341.40		2341.40
87	1	09	998	16OCT92	19OCT92	&1830	1		2350.39	2350.39		2350.39
87	1	08	1097	16OCT92	19OCT92	&1829	1		2356.39	2356.39		2356.39
87	1	07	1198	16OCT92	19OCT92	&1828	1		2368.76	2368.76		2368.76
87	1	06	1397	16OCT92	19OCT92	&1827	1		2378.61	2378.61		2378.61
87	1	05	1595	16OCT92	20OCT92	&1826	1		2396.27	2396.27		2396.27
87	1	04	1797	16OCT92	20OCT92	&1825	1		2413.22	2413.22		2413.22
87	1	03	1999	16OCT92	20OCT92	&1824	1		2412.77	2412.77		2412.77
87	1	02	2198	16OCT92	20OCT92	&1823	1		2417.09	2417.09		2417.09
87	1	01	2390	16OCT92	20OCT92	&1822A	1	X	2426.36			
87	1	01	2390	16OCT92	20OCT92	&1822B	1		2418.71	2418.71		2418.71
88	1	33	8	17OCT92	18OCT92	&1851	1		2269.52	2269.52		2269.52

Flags: X: Observed titrator malfunction or operator error
EX: Data exluded from analysis
NOTE: Dilution factor of 1.000170 has been applied.

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
GC92 CDRG SHIPBOARD ALK 5-OCT-94
Bicarbonate Reference Material (STD A) Titration Data

ANALYSIS DATE	SAMPLE BOTTLE	TRIAL	FLAG	ALK (UEQUIV/KG)	AVG ALK	STD DEV
18AUG92	A34	1		2308.68		
18AUG92	A34	2		2299.75		
18AUG92	A34	3		2306.72		
18AUG92	A42	1		2307.36		
18AUG92	A42	2		2305.31		
18AUG92	A42	3		2307.02		
19AUG92	A42	4	X	2313.92		
19AUG92	A42	5		2306.59		
19AUG92	A34	4	X	2319.77		
19AUG92	A34	5		2307.45		
25AUG92	A25	1		2306.34		
25AUG92	A25	2		2302.91		
25AUG92	A25	3		2298.68		
25AUG92	A25	4		2309.70		
25AUG92	A40	2		2312.72		
25AUG92	A40	3		2307.81		
25AUG92	A40	4		2298.47		
26AUG92	A44	1		2299.94		
26AUG92	A44	2		2308.20		
26AUG92	A44	3		2304.27		
26AUG92	A25	5		2299.74		
26AUG92	A30	1		2303.98		
26AUG92	A30	2		2303.64		
26AUG92	A30	3		2305.73		
26AUG92	A40	5		2307.43		
27AUG92	A30	4	X	2331.80		
27AUG92	A30	5	X	2314.02		
27AUG92	A44	4		2305.67		
27AUG92	A44	5		2301.64		
02SEP92	A5	1		2304.70		
02SEP92	A5	2		2296.75		
02SEP92	A5	3		2305.17		
02SEP92	A47	1		2304.01		
02SEP92	A47	2		2302.48		
02SEP92	A47	3		2304.44		
03SEP92	A47	4		2306.04		
03SEP92	A47	5		2302.76		
03SEP92	A5	4		2303.71		
03SEP92	A5	5		2305.69		
04SEP92	A17	1		2303.18		
04SEP92	A6	1		2302.70		
05SEP92	A17	2		2304.28		
05SEP92	A17	3		2304.09		
05SEP92	A6	2		2303.87		
05SEP92	A6	3		2304.91		
06SEP92	A17	4		2303.94		
06SEP92	A17	5		2304.44		
06SEP92	A6	4		2305.23		
06SEP92	A6	5		2301.94		
01OCT92	A2	1	X	2314.08		
01OCT92	A2	2	X	2315.84		
01OCT92	A45	1		2304.56		
01OCT92	A45	2		2304.88		

03OCT92	A2	3	X	2313.74		
03OCT92	A2	4	X	2378.68		
03OCT92	A2	5	X	2314.95		
03OCT92	A45	3		2304.74		
03OCT92	A45	5		2304.83		
04OCT92	A46	1	EX	2379.80		
04OCT92	A46	2		2299.31		
04OCT92	A1	1		2300.76		
04OCT92	A1	2		2302.97		
05OCT92	A1	3		2302.68		
05OCT92	A1	4		2301.61		
05OCT92	A46	3		2298.96		
05OCT92	A46	4		2305.45		
06OCT92	A46	5		2306.50		
06OCT92	A1	5		2293.04		
09OCT92	A23	1		2305.80		
09OCT92	A48	1		2304.79		
10OCT92	A48	2		2306.38		
10OCT92	A48	3		2302.55		
10OCT92	A23	2		2302.13		
10OCT92	A23	3		2304.64		
11OCT92	A48	4		2306.07		
11OCT92	A23	4		2299.93		
14OCT92	A10	1		2305.20		
14OCT92	A38	1		2306.25		
15OCT92	A10	2		2303.13		
15OCT92	A38	2		2304.30		
16OCT92	A10	3		2302.17		
16OCT92	A10	4		2305.50		
16OCT92	A38	3		2305.63		
16OCT92	A38	4		2302.87		
17OCT92	A38	5		2306.74		
17OCT92	A10	5		2306.67	2304.24	2.77

FLAGS: X: Observed titrator malfunction or operator error
EX: Data excluded from analysis
NOTE: Dilution factor of 1.000170 has been applied.

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
GC92 CDRG SHIPBOARD ALK 5-OCT-94
Bicarbonate Reference Material (STD B) Titration Data

ANALYSIS DATE	SAMPLE BOTTLE	TRIAL	FLAG	ALK (UEQUIV/KG)	AVG ALK	STD DEV
19AUG92	B2	1		2299.95		
19AUG92	B22	1		2300.10		
21AUG92	B22	2		2300.05		
21AUG92	B22	3		2295.82		
21AUG92	B2	2		2298.05		
21AUG92	B2	3		2300.24		
22AUG92	B22	4		2300.58		
22AUG92	B22	5		2300.78		
22AUG92	B2	4		2295.76		
22AUG92	B2	5		2298.19		
22AUG92	B26	1		2297.83		
22AUG92	B26	2		2297.14		
22AUG92	B44	1		2300.09		
22AUG92	B44	2		2299.96		
23AUG92	B44	3		2297.11		
23AUG92	B44	4		2297.03		
23AUG92	B26	3		2300.80		
23AUG92	B26	4		2296.17		
24AUG92	B26	5		2300.04		
24AUG92	B44	5		2298.01		
27AUG92	B7	1		2299.15		
27AUG92	B7	2		2299.91		
27AUG92	B25	1		2298.37		
27AUG92	B25	2		2300.06		
28AUG92	B25	3		2300.24		
28AUG92	B25	4		2300.18		
28AUG92	B7	3		2300.24		
28AUG92	B7	4		2297.40		
30AUG92	B7	5		2301.23		
30AUG92	B13	1		2302.43		
30AUG92	B25	5		2296.62		
30AUG92	B45	1		2297.38		
31AUG92	B45	2		2299.88		
31AUG92	B45	3		2299.05		
31AUG92	B13	2		2297.79		
31AUG92	B13	3		2299.69		
01SEP92	B13	4		2297.58		
01SEP92	B13	5		2298.87		
01SEP92	B45	4		2299.62		
01SEP92	B45	5		2296.65		
06SEP92	B9	1		2298.32		
06SEP92	B28	1		2298.29		
07SEP92	B28	2		2300.38		
07SEP92	B28	3		2297.29		
07SEP92	B9	2		2298.90		
07SEP92	B9	3		2298.86		
08SEP92	B9	4		2297.63		
08SEP92	B9	5		2299.64		
08SEP92	B19	1		2297.70		
08SEP92	B28	4		2299.06		
08SEP92	B28	5		2297.84		
08SEP92	B39	1		2295.12		
09SEP92	B39	2		2296.06		

09SEP92	B19	2		2294.54		
11SEP92	B19	3		2298.03		
11SEP92	B19	4		2298.52		
11SEP92	B19	5		2299.57		
11SEP92	B39	3		2296.81		
11SEP92	B39	4		2297.80		
11SEP92	B39	5		2295.52		
06OCT92	B20	1		2293.25		
06OCT92	B20	2		2291.57		
06OCT92	B34	1	EX	2346.30		
06OCT92	B34	2		2301.37		
07OCT92	B34	4		2296.11		
07OCT92	B20	4		2299.73		
08OCT92	B34	5		2302.11		
08OCT92	B20	5		2298.16		
12OCT92	B4	1		2298.53		
12OCT92	B4	2		2295.34		
12OCT92	B4	3		2301.05		
12OCT92	B46	1		2296.09		
12OCT92	B46	2		2300.50		
12OCT92	B46	3		2299.88		
13OCT92	B46	4		2295.40		
13OCT92	B4	4		2293.13		
14OCT92	B4	5		2300.29		
14OCT92	B46	5		2300.04		
17OCT92	B10	1		2299.56		
17OCT92	B16	1		2299.45		
18OCT92	B16	2		2299.93		
18OCT92	B16	3		2300.62		
18OCT92	B10	2		2296.95		
18OCT92	B10	3		2300.52		
19OCT92	B10	4		2300.93		
19OCT92	B10	5		2298.38		
19OCT92	B16	4		2301.71		
19OCT92	B16	5		2301.83		
19OCT92	B36	1		2301.80		
19OCT92	B40	1		2302.32		
20OCT92	B36	2		2299.73		
20OCT92	B40	2		2301.21	2298.68	2.15

FLAGS: X: Observed titrator malfunction or operator error
EX: Data excluded from analysis
NOTE: Dilution factor of 1.000170 has been applied.

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
GC92 CDRG SHIPBOARD ALK 5-OCT-94
Certified DIC Reference Material (No. 13) Titration Data

ANALYSIS DATE	SAMPLE BOTTLE	TRIAL	FLAG	ALK (UEQUIV/KG)	AVG ALK	STD DEV
19AUG92	1PM	1		2203.05		
19AUG92	220PM	1		2199.12		
21AUG92	13PM	1		2203.86		
21AUG92	33PM	1		2206.70		
22AUG92	231PM	1		2203.58		
22AUG92	436PM	1		2202.77		
23AUG92	4PM	1		2201.34		
23AUG92	170PM	1		2200.43		
24AUG92	486PM	1		2203.29		
24AUG92	478PM	1		2201.36		
26AUG92	9PM	1		2200.22		
26AUG92	52PM	1		2216.25		
27AUG92	356PM	1		2201.48		
27AUG92	356PM	2		2205.08		
27AUG92	443PM	1		2204.48		
27AUG92	443PM	2		2202.30		
28AUG92	452PM	1		2203.09		
28AUG92	487PM	1		2202.97		
31AUG92	121PM	1		2201.65		
31AUG92	320PM	1		2202.69		
01SEP92	44PM	1		2202.32		
01SEP92	380PM	1		2201.37		
02SEP92	165PM	1		2200.07		
02SEP92	209PM	1		2201.94		
03SEP92	122PM	2		2199.62		
03SEP92	274PM	1		2199.40		
03SEP92	274PM	2		2198.11		
05SEP92	438PM	1		2199.71		
05SEP92	425PM	1		2200.99		
06SEP92	97PM	1		2202.59		
06SEP92	472PM	1		2200.62		
07SEP92	182PM	1		2201.64		
07SEP92	193PM	1		2200.76		
08SEP92	298PM	1		2199.26		
08SEP92	226PM	1		2200.83		
10SEP92	7PM	1		2200.06		
10SEP92	150PM	1		2201.54		
11SEP92	232PM	1		2201.65		
11SEP92	232PM	2		2202.04		
11SEP92	445PM	1		2201.06		
01OCT92	294PM	1		2199.74		
03OCT92	353PM	1	X	2270.76		
04OCT92	148PM	1		2199.09		
04OCT92	290PM	1	EX	2279.33		
06OCT92	240PM	1	EX	2261.49		
06OCT92	250PM	2		2196.27		
06OCT92	296PM	2		2199.49		
06OCT92	407PM	1		2196.10		
07OCT92	264PM	1		2197.91		
07OCT92	264PM	2		2195.06		
07OCT92	264PM	3		2196.05		
07OCT92	387PM	1		2203.21		
07OCT92	387PM	2	EX	2237.63		

07OCT92	387PM	3	2198.53		
08OCT92	67PM	1	2198.68		
08OCT92	80PM	1	2203.34		
08OCT92	80PM	2	2197.89		
08OCT92	366PM	1	2199.45		
08OCT92	366PM	2	2202.55		
08OCT92	195PM	1	2197.57		
08OCT92	195PM	2	2204.20		
08OCT92	421PM	1	2202.55		
08OCT92	421PM	2	2198.02		
08OCT92	484PM	1	2202.47		
09OCT92	281PM	1	2199.57		
09OCT92	348PM	1	2201.94		
10OCT92	253PM	1	2182.30		
10OCT92	418PM	1	2203.38		
11OCT92	107PM	1	2201.02		
11OCT92	499PM	1	2203.02		
12OCT92	64PM	1	2200.89		
13OCT92	423PM	1	2202.98		
13OCT92	446PM	1	2203.09		
14OCT92	235PM	1	2202.90		
14OCT92	385PM	1	2202.88		
15OCT92	230PM	1	2202.48		
15OCT92	317PM	1	2202.21		
16OCT92	475PM	1	2201.40		
16OCT92	500PM	1	2204.22		
17OCT92	333PM	1	2198.38		
17OCT92	360PM	1	2203.45		
18OCT92	222PM	1	2203.10		
19OCT92	54PM	1	2204.84		
19OCT92	318PM	1	2203.58	2201.26	2.29

FLAGS: X: Observed titrator malfunction or operator error
EX: Data excluded from analysis
NOTE: Dilution factor of 1.000170 has been applied.

APPENDIX B:

SUMMARY OF SHORE-BASED TCO_2 AND TALK REPLICATE MEASUREMENTS

Table B.1 Summary of Shore-Based TCO_2 Replicate Measurements

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
1	54- 8N	1 25	10	21AUG92	17NOV92	19NOV92	M	R5288	001		1917.06		1917.06				
8	161-10E				17NOV92	19NOV92	M	R5289	001		1917.99		1917.99	+0.93	1917.53	1917.70	0.17
		1 1	1820		17NOV92	18NOV92	M	R5286	001		2392.69		2392.69				
					17NOV92	19NOV92	M	R5287	001		2392.36		2392.36	-0.33	2392.53	2391.70	-0.83
1	53-29N	1 36	10	22AUG92	02DEC92	03DEC92	M	R5292	001		2014.12		2014.12				
11	162-10E				02DEC92	03DEC92	M	R5293	001		2014.69		2014.69	+0.57	2014.41	2019.70	5.29
		1 9	3000		02DEC92	03DEC92	M	R5290	001		2350.18		2350.18				
					02DEC92	03DEC92	M	R5291	001		2347.96		2347.96	-2.22	2349.07	2331.90	-17.17
1	53- 1N	1 36	10	23AUG92	08APR93	09APR93	E	R5296	001		2018.77		2018.77				
13	162-52E				08APR93	09APR93	E	R5297	001		2018.09		2018.09	-0.68	2018.43	2019.30	0.87
		1 11	2900		07APR93	09APR93	E	R5294	001		2346.07		2346.07				
					07APR93	09APR93	E	R5295	001		2346.25		2346.25	+0.18	2346.16	2344.00	-2.16
1	50-59N	1 36	10	25AUG92	19NOV92	20NOV92	M	P5708	001		2039.55		2039.55				
17	164-58E				19NOV92	20NOV92	M	P5709	001		2039.48		2039.48	-0.07	2039.52	2040.20	0.68
		1 8	3000		18NOV92	19NOV92	M	P5706	001		2348.98		2348.98				
					18NOV92	20NOV92	M	P5707	001		2350.07		2350.07	+1.09	2349.53	2346.70	-2.83
1	49-30N	1 36	10	26AUG92	30NOV93	03DEC93	E	R5320	001	X	2058.24						
20	165- 1E				30NOV93	03DEC93	E	R5321	001		2043.07		2043.07		2043.07	2045.20	2.13
		1 33	50		01APR94	05APR94	E	R5318	A001		2113.45						
					01APR94	05APR94	E	R5318	B001		2113.04	-0.41	2113.25				
					30MAR94	05APR94	E	R5319	001		2112.83		2112.83	-0.42	2113.04	2121.00	7.96
		1 31	100		01APR94	22APR94	E	R5316	001		2166.11		2166.11				
					01APR94	22APR94	E	R5317	001		2165.39		2165.39	-0.72	2165.75	2165.70	-0.05
		1 27	200		04APR94	22APR94	E	R5314	001		2326.65		2326.65				
					05APR94	22APR94	E	R5315	001		2326.62		2326.62	-0.03	2326.64	2322.90	-3.74
		1 25	300		04APR94	22APR94	E	R5312	001		2347.01		2347.01				
					04APR94	22APR94	E	R5313	001		2349.76		2349.76	+2.75	2348.39	2343.30	-5.09
		1 23	400		05APR94	22APR94	E	R5310	001		2354.59		2354.59				
					05APR94	22APR94	E	R5311	001		2354.07		2354.07	-0.52	2354.33	2350.10	-4.23

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
		1 21	600		08APR94	22APR94	E	R5308	001		2371.79		2371.79				
					05APR94	22APR94	E	R5309	001		2368.54		2368.54	-3.25	2370.17	2365.10	-5.07
		1 18	900		06APR94	03MAY94	E	R5306	001		2381.73		2381.73				
					06APR94	03MAY94	E	R5307	001		2382.17		2382.17	+0.44	2381.95	2381.30	-0.65
		1 16	1200		06APR94	22APR94	E	R5304	001		2391.44		2391.44				
					06APR94	22APR94	E	R5305	001		2392.94		2392.94	+1.50	2392.19	2384.40	-7.79
		1 14	1700		08APR94	03MAY94	E	R5302	001		2381.13		2381.13				
					08APR94	03MAY94	E	R5303	001		2380.60		2380.60	-0.53	2380.86	2379.30	-1.56
		1 13	2000		12APR94	03MAY94	E	R5300	001		2373.26		2373.26				
					12APR94	03MAY94	E	R5301	001		2372.99		2372.99	-0.27	2373.13	2370.90	-2.23
		1 10	2900		11APR94	03MAY94	E	R5298	001		2346.26		2346.26				
					11APR94	03MAY94	E	R5299	001		2345.50		2345.50	-0.76	2345.88	2343.10	-2.78
1	47-30N	1 36	10	27AUG92	08DEC92	10DEC92	M	P5712	001		2034.32		2034.32				
24	165- 0E				08DEC92	10DEC92	M	P5713	001		2033.32		2033.32	-1.00	2033.82	2036.45	2.63
		1 11	2800		08DEC92	09DEC92	M	P5710	001		2348.11		2348.11				
					08DEC92	10DEC92	M	P5711	001		2348.48		2348.48	+0.37	2348.30	2346.30	-2.00
1	46-30N	1 36	10	27AUG92	30NOV93	03DEC93	E	P5772	001		2011.57		2011.57				
26	165- 1E				30NOV93	03DEC93	E	P5773	001		2011.98		2011.98	+0.41	2011.78	2015.15	3.37
		1 11	2800		12MAY94	16MAY94	E	P5770	001		2348.43		2348.43				
					12MAY94	16MAY94	E	P5771	001		2348.61		2348.61	+0.18	2348.52	2349.30	0.78
1	44-58N	1 36	10	30AUG92	02DEC93	03DEC93	E	R5323	001		2029.63		2029.63				
29	164-59E				02DEC93	03DEC93	E	R5324	001		2030.64		2030.64	+1.01	2030.14	2033.00	2.86
		1 11	3000		12MAY94	26MAY94	E	R5322	001		2345.82		2345.82				
					12MAY94	26MAY94	E	R5325	001		2346.23		2346.23	+0.41	2346.03	2345.30	-0.73
1	43-30N	1 36	10	31AUG92	02DEC93	03DEC93	E	P5776	001		1970.46		1970.46				
32	165- 1E				02DEC93	03DEC93	E	P5777	001		1969.61		1969.61	-0.85	1970.04	1968.95	-1.09
		1 8	3100		13MAY94	26MAY94	E	P5774	001		2342.34		2342.34				
					13MAY94	26MAY94	E	P5775	001		2341.03		2341.03	-1.31	2341.69	2339.50	-2.19

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX, P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
1	41-30N	1 36	10	01SEP92	03DEC93	03DEC93	E	R5348	001		1949.24		1949.24				
36	165- 0E				03DEC93	03DEC93	E	R5349	001		1949.03		1949.03	-0.21	1949.14	1950.70	1.56
		1 34	50		25APR94	16MAY94	E	R5346	001		2070.01		2070.01				
					25APR94	16MAY94	E	R5347	001		2070.51		2070.51	+0.50	2070.26	2070.80	0.54
		1 32	100		25APR94	16MAY94	E	R5344	001		2097.39		2097.39		2097.39	2099.10	1.71
		1 27	200		22APR94	10MAY94	E	R5342	001		2120.51		2120.51				
					22APR94	10MAY94	E	R5343	001		2120.42		2120.42	-0.09	2120.47	2121.00	0.53
		1 25	300		21APR94	10MAY94	E	R5340	001		2212.17		2212.17				
					21APR94	10MAY94	E	R5341	001		2212.04		2212.04	-0.13	2212.10	2211.00	-1.10
		1 23	400		19APR94	10MAY94	E	R5338	001		2262.33		2262.33				
					19APR94	10MAY94	E	R5339	001		2262.37		2262.37	+0.04	2262.35	2261.90	-0.45
		1 21	600		18APR94	10MAY94	E	R5336	001		2318.92		2318.92				
					18APR94	10MAY94	E	R5337	001		2318.05		2318.05	-0.87	2318.49	2316.00	-2.49
		1 18	900		18APR94	10MAY94	E	R5334	001		2362.09		2362.09				
					18APR94	10MAY94	E	R5335	001		2361.13		2361.13	-0.96	2361.61	2358.20	-3.41
		1 15	1200		15APR94	10MAY94	E	R5332	001		2381.15		2381.15				
					15APR94	10MAY94	E	R5333	001		2379.55		2379.55	-1.60	2380.35	2377.90	-2.45
		1 13	1500		15APR94	10MAY94	E	R5330	001		2385.50		2385.50				
					15APR94	10MAY94	E	R5331	001		2385.88		2385.88	+0.38	2385.69	2382.00	-3.69
		1 11	1900		14APR94	03MAY94	E	R5328	001		2380.09		2380.09				
					14APR94	03MAY94	E	R5329	001		2383.57		2383.57	+3.48	2381.83	2377.90	-3.93
		1 7	3100		13APR94	03MAY94	E	R5326	001		2341.33		2341.33				
					13APR94	03MAY94	E	R5327	001		2343.21		2343.21	+1.88	2342.27	2342.90	0.63
1	40-30N	1 36	10	02SEP92	09DEC92	11DEC92	M	P5716	001		1959.48		1959.48				
38	165- 1E				09DEC92	11DEC92	M	P5717	001		1957.68		1957.68	-1.80	1958.58	1960.80	2.22
		1 8	3100		09DEC92	10DEC92	M	P5714	001		2343.71		2343.71				
					09DEC92	10DEC92	M	P5715	001		2342.32		2342.32	-1.39	2343.02	2344.10	1.08

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
1	39- 1N	1 36	10	03SEP92	03DEC93	20DEC93	E	P5720	001		1954.82		1954.82				
41	165- 1E				03DEC93	20DEC93	E	P5721	001		1952.97		1952.97	-1.85	1953.90	1958.65	4.75
		1 8	3100		13MAY94	26MAY94	E	P5718	001		2345.91		2345.91				
					13MAY94	26MAY94	E	P5719	001		2345.23		2345.23	-0.68	2345.57	2344.50	-1.07
1	36- 1N	1 36	10	05SEP92	10DEC93	20DEC93	E	P5780	001		1964.57		1964.57				
47	165- 1E				10DEC93	20DEC93	E	P5781	001		1964.82		1964.82	+0.25	1964.69	1968.70	4.01
1	34-42N	1 35	25	06SEP92	25AUG93	27AUG93	E	R5372	001		1948.63		1948.63				
49	165- 3E				25AUG93	27AUG93	E	R5373	001		1949.26		1949.26	+0.63	1948.95	1950.20	1.25
		1 34	50		24AUG93	27AUG93	E	R5370	001		1964.84		1964.84				
					24AUG93	27AUG93	E	R5371	001		1964.86		1964.86	+0.02	1964.85	1966.60	1.75
		1 32	100		24AUG93	27AUG93	E	R5368	001		2005.90		2005.90				
					24AUG93	27AUG93	E	R5369	001		2005.57		2005.57	-0.33	2005.73	2003.70	-2.03
		1 28	200		10AUG93	11AUG93	E	R5366	001		2075.47		2075.47				
					10AUG93	11AUG93	E	R5367	001		2076.15		2076.15	+0.68	2075.81	2075.70	-0.11
		1 26	300		09AUG93	11AUG93	E	R5364	001		2108.77		2108.77				
					09AUG93	11AUG93	E	R5365	001		2109.15		2109.15	+0.38	2108.96	2107.80	-1.16
		1 24	400		09AUG93	11AUG93	E	R5362	001		2165.81		2165.81				
					09AUG93	11AUG93	E	R5363	001		2165.58		2165.58	-0.23	2165.70	2163.30	-2.40
		1 22	600		06AUG93	11AUG93	E	R5360	001		2269.06		2269.06				
					06AUG93	11AUG93	E	R5361	001		2269.22		2269.22	+0.16	2269.14	2265.00	-4.14
		1 19	900		06AUG93	11AUG93	E	R5358	001		2348.55		2348.55				
					06AUG93	11AUG93	E	R5359	001		2348.49		2348.49	-0.06	2348.52	2346.10	-2.42
		1 17	1200		13JUL93	14JUL93	E	R5356	001		2372.53		2372.53				
					13JUL93	14JUL93	E	R5357	001		2374.13		2374.13	+1.60	2373.33	2368.50	-4.83
		1 15	1700		13JUL93	14JUL93	E	R5354	001		2382.55		2382.55				
					13JUL93	14JUL93	E	R5355	001		2383.49		2383.49	+0.94	2383.02	2381.10	-1.92
		1 14	2000		12JUL93	14JUL93	E	R5352	001		2373.91		2373.91				
					12JUL93	14JUL93	E	R5353	001		2373.96		2373.96	+0.05	2373.94	2372.80	-1.14

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
		1 11	2900		16JUN93	17JUN93	E	R5350	001		2361.09		2361.09				
					16JUN93	17JUN93	E	R5351	001		2362.73		2362.73	+1.64	2361.91	2341.70	-20.21
1	33-23N	1 36	10	07SEP92	10DEC93	20DEC93	E	P5784	001		1926.31		1926.31				
51	165- 1E				10DEC93	20DEC93	E	P5785	001		1927.77		1927.77	+1.46	1927.04	1929.80	2.76
		1 17	1000		10OCT94	30NOV94	E	P5782	001		2349.51		2349.51				
					10OCT94	30NOV94	E	P5783	001	X	2363.37				2349.51	2348.60	-0.91
1	32- 0N	1 2	2000	08SEP92	10OCT94	30NOV94	E	R5374	001		2377.44		2377.44				
53	165- 0E				10OCT94	30NOV94	E	R5375	001		2378.77		2378.77	+1.33	2378.10	2375.30	-2.80
1	30-41N	1 35	10	10SEP92	15DEC93	20DEC93	E	P5724	001		1961.59		1961.59				
55	164-58E				15DEC93	20DEC93	E	P5725	001		1962.26		1962.26	+0.67	1961.93	1964.50	2.57
		1 9	3100		07OCT94	30NOV94	E	P5722	001		2342.45		2342.45				
					07OCT94	30NOV94	E	P5723	001	X	2353.66				2342.45	2340.80	-1.65
2	21-19N	1 35	25	30SEP92	05JAN94	07JAN94	E	R5400	001		1947.12		1947.12				
57	165- 0E				05JAN94	07JAN94	E	R5401	001		1948.94		1948.94	+1.82	1948.03	1948.90	0.87
		1 34	50		01NOV94	07DEC94	E	R5398	001		1965.21		1965.21				
					01NOV94	07DEC94	E	R5399	001		1963.66		1963.66	-1.55	1964.44	1966.80	2.36
		1 31	125		31OCT94	07DEC94	E	R5396	001		2011.95		2011.95				
					31OCT94	07DEC94	E	R5397	001		2013.32		2013.32	+1.37	2012.64	2014.80	2.16
		1 28	200		28OCT94	07DEC94	E	R5394	001		2020.60		2020.60				
					28OCT94	07DEC94	E	R5395	001	EX	2031.25				2020.60	2014.50	-6.10
		1 26	300		21OCT94	07DEC94	E	R5392	001		2057.15		2057.15				
					21OCT94	07DEC94	E	R5393	001		2054.16		2054.16	-2.99	2055.66	2056.80	1.14
		1 24	400		20OCT94	07DEC94	E	R5390	001		2100.98		2100.98				
					20OCT94	07DEC94	E	R5391	001		2099.80		2099.80	-1.18	2100.39	2097.40	-2.99
		1 22	600		19OCT94	07DEC94	E	R5388	001		2245.97		2245.97				
					19OCT94	07DEC94	E	R5389	001		2244.35		2244.35	-1.62	2245.16	2238.30	-6.86
		1 19	900		18OCT94	07DEC94	E	R5386	001		2318.60		2318.60				
					18OCT94	07DEC94	E	R5387	001		2321.65		2321.65	+3.05	2320.13	2314.20	-5.93

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
		1 17	1200		27APR95	08MAY95	E	R5384	001		2342.22		2342.22				
					27APR95	08MAY95	E	R5404	001	EX	2353.76				2342.22	2335.90	-6.22
		1 15	1600		17OCT94	07DEC94	E	R5382	001		2349.31		2349.31				
					17OCT94	07DEC94	E	R5383	001		2346.88		2346.88	-2.43	2348.09	2348.60	0.51
		1 13	2100		14OCT94	07DEC94	E	R5380	001		2348.45		2348.45				
					14OCT94	07DEC94	E	R5381	001		2347.81		2347.81	-0.64	2348.13	2349.60	1.47
		1 10	3000		14OCT94	30NOV94	E	R5378	001		2346.78		2346.78				
					14OCT94	30NOV94	E	R5379	001	3s	2341.75		2341.75	-5.03	2344.27	2341.50	-2.77
2	19-59N	1 33	75	01OCT92	04FEB93	13APR93	E	R5405	001		1969.91		1969.91				
59	165- 0E				04FEB93	13APR93	E	R5406	001		1970.12		1970.12	+0.21	1970.02	1970.75	0.73
		1 9	3100		04FEB93	05APR93	E	R5402	001		2338.54		2338.54				
					04FEB93	05APR93	E	R5403	001		2338.78		2338.78	+0.24	2338.66	2335.90	-2.76
2	18-40N	1 35	10	02OCT92	02FEB93	05APR93	E	P5728	001		1937.27		1937.27				
62	164-36E				02FEB93	05APR93	E	P5729	001		1936.59		1936.59	-0.68	1936.93	1939.00	2.07
		1 8	3000		02FEB93	05APR93	E	P5726	001		2338.84		2338.84				
					02FEB93	05APR93	E	P5727	001		2340.05		2340.05	+1.21	2339.45	2337.80	-1.65
2	24- 3N	1 36	10	04OCT92	16DEC93	07JAN94	E	R5409	001		1955.46		1955.46				
63	164-59E				16DEC93	07JAN94	E	R5410	001		1953.33		1953.33	-2.13	1954.40	1953.50	-0.90
		1 10	2900		11OCT94	30NOV94	E	R5407	001		2352.14		2352.14				
					11OCT94	30NOV94	E	R5408	001	3s	2345.97		2345.97	-6.17	2349.05	2347.60	-1.45
2	26- 2N	1 36	10	05OCT92	16DEC93	20DEC93	E	R5433	001		1964.75		1964.75				
64	165- 4E				16DEC93	20DEC93	E	R5434	001	3s	1970.02		1970.02	+5.27	1967.39	1967.30	-0.09
		1 34	50		09NOV94	04JAN95	E	R5431	001		1966.99		1966.99				
					09NOV94	04JAN95	E	R5432	001		1967.39		1967.39	+0.40	1967.19	1966.60	-0.59
		1 32	100		09NOV94	04JAN95	E	R5429	001		1971.36		1971.36				
					09NOV94	04JAN95	E	R5430	001		1971.14		1971.14	-0.22	1971.25	1971.00	-0.25
		1 27	250		08NOV94	04JAN95	E	R5425	001		2021.27		2021.27				
					08NOV94	04JAN95	E	R5426	001		2021.88		2021.88	+0.61	2021.58	2019.80	-1.78

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
		1 23	500		08NOV94	04JAN95	E	R5423	001		2065.11		2065.11				
					08NOV94	04JAN95	E	R5424	001		2065.88		2065.88	+0.77	2065.50	2063.60	-1.90
		1 21	650		07NOV94	04JAN95	E	R5421	001		2144.07		2144.07				
					07NOV94	04JAN95	E	R5435	001		2145.96		2145.96	+1.89	2145.02	2141.60	-3.42
		1 19	800		07NOV94	04JAN95	E	R5419	001		2270.45		2270.45				
					07NOV94	04JAN95	E	R5420	001		2269.73		2269.73	-0.72	2270.09	2266.30	-3.79
		1 17	1000		04NOV94	04JAN95	E	R5417	001		2341.80		2341.80				
					04NOV94	04JAN95	E	R5418	001		2345.52		2345.52	+3.72	2343.66	2333.80	-9.86
		1 15	1200		04NOV94	04JAN95	E	R5415	001		2366.48		2366.48				
					04NOV94	04JAN95	E	R5416	001		2365.61		2365.61	-0.87	2366.05	2362.20	-3.85
		1 12	1600		03NOV94	07DEC94	E	R5413	001		2371.79		2371.79				
					03NOV94	07DEC94	E	R5414	001		2369.47		2369.47	-2.32	2370.63	2367.30	-3.33
		1 9	2200		03NOV94	07DEC94	E	R5411	001		2354.20		2354.20				
					03NOV94	07DEC94	E	R5412	001		2354.32		2354.32	+0.12	2354.26	2353.30	-0.96
2	16- 0N	1 36	10	08OCT92	10FEB93	13APR93	E	R5438	001		1930.12		1930.12				
66	166- 0E				10FEB93	13APR93	E	R5439	001		1929.93		1929.93	-0.19	1930.03	1929.00	-1.03
		1 8	3200		08FEB93	13APR93	E	R5436	001		2342.83		2342.83				
					08FEB93	13APR93	E	R5437	001		2342.75		2342.75	-0.08	2342.79	2338.70	-4.09
2	14- 0N	1 36	10	09OCT92	17FEB93	20APR93	E	R5442	001		1922.68		1922.68		1922.68	1922.80	0.12
67	165- 0E																
		1 8	3100		10FEB93	16APR93	E	R5440	001		2342.21		2342.21				
					10FEB93	16APR93	E	R5441	001		2342.28		2342.28	+0.07	2342.25	2339.20	-3.05
2	12-35N	1 36	10	09OCT92	17DEC93	20DEC93	E	R5466	001		1907.10		1907.10				
68	165-22E				17DEC93	20DEC93	E	R5467	001		1910.40		1910.40	+3.30	1908.75	1907.80	-0.95
		1 34	25		14DEC94	17JAN95	E	R5464	001		1916.69		1916.69				
					14DEC94	17JAN95	E	R5465	001		1916.56		1916.56	-0.13	1916.63	1914.70	-1.93
		1 32	75		14DEC94	17JAN95	E	R5462	001		1936.41		1936.41		1936.41	1933.30	-3.11
		1 29	150		12DEC94	17JAN95	E	R5460	001		2029.01		2029.01				

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
					12DEC94	17JAN95	E	R5461	001		2028.74		2028.74	-0.27	2028.88	2023.80	-5.08
		1 26	300		09DEC94	17JAN95	E	R5458	001		2200.71		2200.71				
					09DEC94	17JAN95	E	R5459	001		2202.86		2202.86	+2.15	2201.79	2196.10	-5.69
		1 24	400		09DEC94	17JAN95	E	R5456	001		2260.67		2260.67				
					09DEC94	17JAN95	E	R5457	001	3s	2255.33		2255.33	-5.34	2258.00	2248.10	-9.90
		1 22	600		08DEC94	17JAN95	E	R5455	001		2269.69		2269.69		2269.69	2263.80	-5.89
		1 19	900		07DEC94	17JAN95	E	R5452	001		2299.98		2299.98				
					07DEC94	17JAN95	E	R5468	001		2300.10		2300.10	+0.12	2300.04	2291.20	-8.84
		1 16	1200		06DEC94	17JAN95	E	R5450	001		2329.43		2329.43				
					06DEC94	17JAN95	E	R5451	001		2329.34		2329.34	-0.09	2329.39	2324.10	-5.29
		1 13	1600		05DEC94	17JAN95	E	R5448	001		2344.66		2344.66				
					05DEC94	17JAN95	E	R5449	001		2344.99		2344.99	+0.33	2344.82	2337.30	-7.52
		1 11	2000		05DEC94	17JAN95	E	R5446	001		2349.58		2349.58				
					05DEC94	17JAN95	E	R5447	001		2350.82		2350.82	+1.24	2350.20	2341.90	-8.30
		1 7	3100		02DEC94	12JAN95	E	R5444	001		2347.60		2347.60				
					02DEC94	12JAN95	E	R5445	001		2344.08		2344.08	-3.52	2345.84	2337.90	-7.94
2	10- 0N	1 36	10	10OCT92	18FEB93	20APR93	E	R5471	001		1902.93		1902.93		1902.93	1902.40	-0.53
69	165- 0E																
		1 9	2900		17FEB93	20APR93	E	R5469	001		2345.32		2345.32				
					17FEB93	20APR93	E	R5470	001		2344.98		2344.98	-0.34	2345.15	2342.70	-2.45
2	8- 8N	1 36	10	11OCT92	25FEB93	07MAY93	E	R5476	001		1886.50		1886.50				
70	165- 1E				25FEB93	07MAY93	E	R5477	001		1886.77		1886.77	+0.27	1886.64	1888.50	1.86
		1 8	3100		18FEB93	23APR93	E	R5474	001		2337.57		2337.57				
					18FEB93	23APR93	E	R5475	001		2337.77		2337.77	+0.20	2337.67	2334.90	-2.77
2	6- 0N	1 36	10	12OCT92	24MAR93	07MAY93	E	R5480	001		1882.59		1882.59				
71	165- 1E				24MAR93	07MAY93	E	R5481	001		1883.08		1883.08	+0.49	1882.83	1883.60	0.77
		1 8	3100		23MAR93	07MAY93	E	R5478	001	X	2340.23						
					23MAR93	07MAY93	E	R5479	001		2344.23		2344.23		2344.23	2338.80	-5.43

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(µMOLES/KG SW)						
2	3- 0N	1 33	10	12OCT92	17DEC93	07JAN94	E	R5500	001		1875.28		1875.28				
73	165- 0E				17DEC93	07JAN94	E	R5501	001		1872.08		1872.08	-3.20	1873.68	1867.10	-6.58
		1 31	50		11JAN95	26JAN95	E	R5498	001		1880.54		1880.54				
					11JAN95	26JAN95	E	R5499	001		1880.87		1880.87	+0.33	1880.71	1881.70	0.99
		1 29	100		10JAN95	26JAN95	E	R5496	001		2018.06		2018.06				
					10JAN95	26JAN95	E	R5497	001		2017.37		2017.37	-0.69	2017.72	2017.80	0.08
		1 23	250		09JAN95	26JAN95	E	R5494	001		2151.50		2151.50				
					09JAN95	26JAN95	E	R5495	001		2151.70		2151.70	+0.20	2151.60	2151.20	-0.40
		1 20	400		06JAN95	26JAN95	E	R5492	001		2224.78		2224.78				
					06JAN95	26JAN95	E	R5493	001		2225.41		2225.41	+0.63	2225.09	2219.00	-6.09
		1 16	700		04JAN95	26JAN95	E	R5490	001		2278.62		2278.62				
					04JAN95	26JAN95	E	R5491	001		2279.69		2279.69	+1.07	2279.16	2277.00	-2.16
		1 14	900		04JAN95	23JAN95	E	R5488	001		2294.96		2294.96				
					04JAN95	23JAN95	E	R5489	001		2293.66		2293.66	-1.30	2294.31	2291.80	-2.51
		1 10	1700		03JAN95	23JAN95	E	R5486	001		2334.56		2334.56				
					03JAN95	23JAN95	E	R5487	001		2332.15		2332.15	-2.41	2333.35	2332.20	-1.15
		1 9	2000		03JAN95	23JAN95	E	R5484	001		2344.95		2344.95				
					03JAN95	23JAN95	E	R5485	001		2341.63		2341.63	-3.32	2343.29	2337.60	-5.69
		1 6	2900		29DEC94	23JAN95	E	R5482	001		2342.66		2342.66				
					29DEC94	23JAN95	E	R5483	001		2342.20		2342.20	-0.46	2342.43	2336.50	-5.93
2	1-30N	1 6	2900	13OCT92	12OCT94	30NOV94	E	R5502	001		2343.45		2343.45				
75	164-59E				12OCT94	30NOV94	E	R5503	001		2344.90		2344.90	+1.45	2344.18	2337.40	-6.78
2	0- 0N	1 36	10	14OCT92	11OCT93	12OCT93	E	R5528	001		1918.75		1918.75				
78	165- 0E				11OCT93	12OCT93	E	R5529	001		1920.03		1920.03	+1.28	1919.39	1925.90	6.51
		1 34	50		06OCT93	12OCT93	E	R5526	001		1919.50		1919.50				
					06OCT93	12OCT93	E	R5527	001		1919.84		1919.84	+0.34	1919.67	1922.80	3.13
		1 31	125		06OCT93	12OCT93	E	R5524	001		2060.64		2060.64				
					06OCT93	12OCT93	E	R5525	001		2062.08		2062.08	+1.44	2061.36	2062.30	0.94

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
		1 27	250		05OCT93	12OCT93	E	R5522	001		2145.54		2145.54				
					05OCT93	12OCT93	E	R5523	001		2142.09		2142.09	-3.45	2143.82	2139.60	-4.22
		1 23	450		05OCT93	12OCT93	E	R5520	001		2232.04		2232.04				
					05OCT93	12OCT93	E	R5521	001		2232.26		2232.26	+0.22	2232.15	2230.10	-2.05
		1 21	600		27SEP93	04OCT93	E	R5518	001		2241.28		2241.28				
					27SEP93	04OCT93	E	R5519	001		2241.90		2241.90	+0.62	2241.59	2239.80	-1.79
		1 19	800		27SEP93	04OCT93	E	R5516	001		2268.71		2268.71				
					27SEP93	04OCT93	E	R5517	001		2268.94		2268.94	+0.23	2268.82	2267.60	-1.22
		1 16	1100		24SEP93	04OCT93	E	R5514	001		2298.49		2298.49				
					24SEP93	04OCT93	E	R5515	001		2299.04		2299.04	+0.55	2298.77	2298.60	-0.17
		1 12	1500		24SEP93	04OCT93	E	R5512	001		2321.50		2321.50				
					24SEP93	04OCT93	E	R5513	001		2322.19		2322.19	+0.69	2321.84	2320.80	-1.04
		1 9	2100		23SEP93	04OCT93	E	R5510	001		2340.74		2340.74				
					23SEP93	04OCT93	E	R5511	001		2341.21		2341.21	+0.47	2340.98	2341.00	0.02
		1 7	2600		23SEP93	04OCT93	E	R5508	001		2340.71		2340.71				
					23SEP93	04OCT93	E	R5509	001		2341.36		2341.36	+0.65	2341.04	2337.30	-3.74
		1 5	3200		26AUG93	27AUG93	E	R5506	001		2330.91		2330.91				
					26AUG93	27AUG93	E	R5507	001		2330.95		2330.95	+0.04	2330.93	2328.20	-2.73
2	1-30S	1 36	10	15OCT92	24MAR93	11MAY93	E	R5532	001		1902.74		1902.74				
81	164-59E				25MAR93	11MAY93	E	R5533	001	X	1912.50				1902.74	1906.30	3.56
		1 6	3000		24MAR93	11MAY93	E	R5530	001		2335.10		2335.10				
					29MAR93	11MAY93	E	R5534	001		2337.15		2337.15	+2.05	2336.13	2336.70	0.57
2	2-48S	1 35	25	16OCT92	05JAN94	07JAN94	E	R5551	001		1913.02		1913.02				
83	164-55E				05JAN94	07JAN94	E	R5552	001		1913.13		1913.13	+0.11	1913.08	1917.40	4.32
		1 32	100		08FEB95	21FEB95	E	R5549	001		1998.98		1998.98				
					08FEB95	21FEB95	E	R5550	001		1998.07		1998.07	-0.91	1998.53	2000.80	2.27
		1 27	250		07FEB95	21FEB95	E	R5547	001		2155.75		2155.75				
					07FEB95	21FEB95	E	R5548	001		2153.52		2153.52	-2.23	2154.64	2155.70	1.06

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
		1 24	400		06FEB95	21FEB95	E	R5545	001		2180.55		2180.55				
					06FEB95	21FEB95	E	R5546	001		2179.02		2179.02	-1.53	2179.79	2180.50	0.71
		1 21	600		02FEB95	21FEB95	E	R5543	001		2227.04		2227.04				
					02FEB95	21FEB95	E	R5544	001		2227.63		2227.63	+0.59	2227.33	2228.30	0.97
		1 17	1000		26JAN95	21FEB95	E	R5541	001		2289.69		2289.69				
					26JAN95	21FEB95	E	R5542	001		2290.60		2290.60	+0.91	2290.15	2294.90	4.75
		1 12	1400		26JAN95	21FEB95	E	R5540	001		2314.29		2314.29				
					26JAN95	21FEB95	E	R5555	001		2315.34		2315.34	+1.05	2314.82	2313.40	-1.42
		1 8	2000		25JAN95	21FEB95	E	R5537	001		2335.59		2335.59				
					25JAN95	21FEB95	E	R5538	001		2337.15		2337.15	+1.56	2336.37	2333.70	-2.67
		1 4	2800		25JAN95	15FEB95	E	R5535	001		2335.11		2335.11				
					25JAN95	15FEB95	E	R5536	001		2334.68		2334.68	-0.43	2334.90	2333.30	-1.60
2	4-22S	1 32	10	17OCT92	06JAN94	07JAN94	E	R5572	001		1916.24		1916.24				
87	164-11E				06JAN94	07JAN94	E	R5573	001		1916.27		1916.27	+0.03	1916.26	1917.00	0.74
		1 30	50		17FEB95	01MAR95	E	R5570	001		1916.64		1916.64				
					17FEB95	01MAR95	E	R5571	001		1916.60		1916.60	-0.04	1916.62	1915.70	-0.92
		1 28	100		15FEB95	01MAR95	E	R5568	001		2005.43		2005.43				
					15FEB95	01MAR95	E	R5569	001		2004.42		2004.42	-1.01	2004.93	2003.80	-1.13
		1 24	200		15FEB95	01MAR95	E	R5566	001		2140.25		2140.25				
					15FEB95	01MAR95	E	R5567	001		2140.22		2140.22	-0.03	2140.24	2138.30	-1.94
		1 19	400		14FEB95	01MAR95	E	R5564	001		2204.31		2204.31				
					14FEB95	01MAR95	E	R5565	001		2201.73		2201.73	-2.58	2203.02	2200.80	-2.22
		1 16	600		13FEB95	01MAR95	E	R5562	001		2234.62		2234.62				
					13FEB95	01MAR95	E	R5563	001		2234.48		2234.48	-0.14	2234.55	2232.40	-2.15
		1 10	900		10FEB95	01MAR95	E	R5560	001		2276.45		2276.45				
					10FEB95	01MAR95	E	R5574	001		2276.06		2276.06	-0.39	2276.26	2274.00	-2.26
		1 7	1200		10FEB95	21FEB95	E	R5558	001		2293.33		2293.33				
					10FEB95	21FEB95	E	R5559	001		2293.39		2293.39	+0.06	2293.36	2290.50	-2.86

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.1 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF DISSOLVED INORGANIC CARBON DATA (cont)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	EXTRAC DATE	ANALYSIS DATE	MANO TYPE	SAMPLE BOTTLE	RUN	FLAG	S.I.O. RUN	RUN DELTA	BOTTLE DIC	BOTTLE DELTA	"NISKIN" AVG	SIO DIC	SIO -S.I.O.
											(μMOLES/KG SW)						
		1	5	1600	09FEB95	21FEB95	E	R5556	001		2318.45		2318.45				
					09FEB95	21FEB95	E	R5557	001		2318.15		2318.15	-0.30	2318.30	2315.70	-2.60
		1	3	2000	08FEB95	21FEB95	E	R5553	001		2332.78		2332.78				
					08FEB95	21FEB95	E	R5554	001	EX	2274.19				2332.78	2329.80	-2.98

MANOMETER TYPE:
M = CONSTANT VOLUME MERCURY MANOMETER DATUM
E = ELECTRONIC CONSTANT-VOLUME MANOMETER DATUM
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

NOTE: Dilution factor of 1.000170 has been applied.

Table B.2 Summary of Shore-Based TALK Replicate Measurements

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
1	54- 8N	1 25	10	21AUG92	09MAR93	V	R5288	1		2212.95						
8	161-10E				09MAR93	V	R5288	2		2215.06	+2.11	2214.01				
					09MAR93	V	R5289	1		2216.69						
					09MAR93	V	R5289	2		2217.83	+1.14	2217.26	+3.25	2215.64	2220.51	4.87
		1 1	1820		09MAR93	V	R5286	1		2409.93						
					09MAR93	V	R5286	2		2412.20	+2.27	2411.06				
					09MAR93	V	R5287	1		2410.96						
					09MAR93	V	R5287	2		2413.60	+2.64	2412.28	+1.22	2411.67	2414.06	2.39
1	53-29N	1 36	10	22AUG92	10MAR93	V	R5292	1		2239.54						
11	162-10E				10MAR93	V	R5292	2		2240.35	+0.81	2239.95				
					10MAR93	V	R5293	1		2238.97						
					10MAR93	V	R5293	2		2241.40	+2.43	2240.19	+0.24	2240.07	2241.76	1.69
		1 9	3000		10MAR93	V	R5290	1		2419.25						
					10MAR93	V	R5290	2		2420.58	+1.33	2419.92				
					10MAR93	V	R5291	1		2420.16						
					10MAR93	V	R5291	2		2420.29	+0.13	2420.23	+0.31	2420.07	2421.26	1.19
1	53- 1N	1 36	10	23AUG92	30APR93	V	R5296	1		2226.28						
13	162-52E				30APR93	V	R5296	2		2227.76	+1.48	2227.02				
					30APR93	V	R5297	1		2225.83						
					30APR93	V	R5297	2		2224.96	-0.87	2225.40	-1.62	2226.21		
		1 11	2900		30APR93	V	R5294	1		2415.61						
					30APR93	V	R5294	2		2416.65	+1.04	2416.13				
					30APR93	V	R5295	1		2416.88						
					30APR93	V	R5295	2		2418.40	+1.52	2417.64	+1.51	2416.89	2418.00	1.11
1	50-59N	1 36	10	25AUG92	05MAR93	V	P5708	1		2218.12						
17	164-58E				05MAR93	V	P5708	2		2222.03						
					17MAR93	G	P5708	3	X	2223.37	+3.91	2220.08				
					05MAR93	V	P5709	1		2219.01						
					05MAR93	V	P5709	2		2220.13						
					18MAR93	G	P5709	3	X	2223.59	+1.12	2219.57	-0.51	2219.82	2225.64	5.82
		1 8	3000		05MAR93	V	P5706	1		2418.09						
					05MAR93	V	P5706	2	EX	2481.15						
					17MAR93	G	P5706	3	X	2399.76						
					17MAR93	G	P5706	4	X	2423.05		2418.09				
					05MAR93	V	P5707	1		2419.29						
					05MAR93	V	P5707	2		2421.19						

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
					17MAR93	G	P5707	3	X	2421.94	+1.90	2420.24	+2.15	2419.17	2416.46	-2.70
1 20	49-30N 165- 1E	1 36	10	26AUG92	10JUN94	G	R5320	1		2217.78		2217.78				
					05JUL94	G2	R5320	2	X	2200.23						
					10JUN94	G	R5321	1		2219.22		2219.22				
					05JUL94	G2	R5321	2	X	2201.67			+1.44	2218.50	2220.84	2.34
		1 33	50		21SEP94	G2	R5318	1		2233.69		2233.69				
					21SEP94	G2	R5319	1		2236.58		2236.58	+2.89	2235.14	2245.06	9.92
		1 31	100		27SEP94	G2	R5316	1		2247.29		2247.29				
					27SEP94	G2	R5317	1		2249.01		2249.01	+1.72	2248.15	2251.09	2.94
		1 27	200		09SEP94	G2	R5314	1		2298.90		2298.90				
					12SEP94	G2	R5315	1		2296.29		2296.29	-2.61	2297.59	2302.59	5.00
		1 25	300		08NOV94	G2	R5312	1		2320.54		2320.54				
					08NOV94	G2	R5313	1		2314.38		2314.38	-6.16	2317.46	2322.90	5.44
		1 23	400		15AUG94	G2	R5310	1		2335.94		2335.94				
					15AUG94	G2	R5311	1		2331.82		2331.82	-4.12	2333.88	2338.19	4.31
		1 21	600		12AUG94	G2	R5308	1		2357.24		2357.24				
					12AUG94	G2	R5309	1		2359.36		2359.36	+2.12	2358.30	2358.49	0.19
		1 18	900		11AUG94	G2	R5306	1		2382.51		2382.51				
					11AUG94	G2	R5307	1		2382.00		2382.00	-0.51	2382.26	2378.41	-3.85
		1 16	1200		10AUG94	G2	R5304	1		2397.56		2397.56				
					10AUG94	G2	R5305	1		2396.93		2396.93	-0.63	2397.25	2395.30	-1.95
		1 14	1700		10AUG94	G2	R5302	1		2414.19		2414.19				
					10AUG94	G2	R5303	1		2415.00		2415.00	+0.81	2414.59	2410.93	-3.66
		1 13	2000		05AUG94	G2	R5300	1		2415.35		2415.35				
					08AUG94	G2	R5301	1		2416.65		2416.65	+1.30	2416.00	2417.37	1.37
		1 10	2900		04AUG94	G2	R5298	1		2420.67		2420.67				
					04AUG94	G2	R5299	1		2418.91		2418.91	-1.76	2419.79	2418.84	-0.95
1 24	47-30N 165- 0E	1 36	10	27AUG92	11MAR93	V	P5712	1		2230.56						
					11MAR93	V	P5712	2		2230.02						
					18MAR93	G	P5712	3	X	2233.73	-0.54	2230.29				

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
					11MAR93	V	P5713	1		2227.19						
					18MAR93	G	P5713	3		2228.58						
					12MAR93	V	P5713	4	X	2226.94	-0.25	2227.07	-3.23	2228.68	2239.21	10.53
		1 11	2800		11MAR93	V	P5710	1		2416.67						
					11MAR93	V	P5710	2		2417.32						
					18MAR93	G	P5710	3	X	2421.00	+0.65	2417.00				
					11MAR93	V	P5711	1		2417.36						
					11MAR93	V	P5711	2		2417.95						
					18MAR93	G	P5711	3	X	2421.06	+0.59	2417.66	+0.66	2417.33	2420.80	3.47
1	46-30N	1 36	10	27AUG92	24JUN94	G	P5772	1		2225.80		2225.80				
26	165- 1E				29JUN94	G2	P5772	2	X	2221.63						
					30JUN94	G2	P5772	3	X	2220.50						
					24JUN94	G	P5773	1		2225.80		2225.80				
					30JUN94	G2	P5773	2	X	2223.49			+0.00	2225.80	2236.05	10.25
		1 11	2800		14SEP94	G2	P5770	1		2418.15		2418.15				
					14SEP94	G2	P5771	1		2417.60		2417.60	-0.55	2417.88	2420.25	2.37
1	44-58N	1 36	10	30AUG92	09JUN94	G	R5323	1		2236.01		2236.01				
29	164-59E				09JUN94	G	R5324	1		2235.20		2235.20	-0.81	2235.60	2240.51	4.91
		1 11	3000		08SEP94	G2	R5322	1		2419.70		2419.70				
					07SEP94	G2	R5325	1		2420.17		2420.17	+0.47	2419.94	2423.21	3.27
1	43-30N	1 36	10	31AUG92	24JUN94	G	P5776	1		2209.04		2209.04				
32	165- 1E				01JUL94	G2	P5776	2	X	2206.22						
					06JUL94	G2	P5776	3	X	2209.20						
					01JUL94	G	P5777	1		2207.13		2207.13				
					05JUL94	G2	P5777	2	X	2202.95						
					06JUL94	G2	P5777	3	X	2204.13			-1.91	2208.08	2218.73	10.65
		1 8	3100		12SEP94	G2	P5774	1		2417.19		2417.19				
					13SEP94	G2	P5775	1		2417.05		2417.05	-0.14	2417.12	2421.33	4.21
1	41-30N	1 36	10	01SEP92	26APR94	G	R5348	1		2218.74		2218.74				
36	165- 0E				26MAY94	G	R5349	1		2215.27		2215.27	-3.47	2217.01	2225.68	8.67
		1 34	50		17AUG94	G2	R5346	1		2266.13		2266.13				
					17AUG94	G2	R5347	1		2263.28		2263.28	-2.85	2264.71	2267.06	2.35
		1 32	100		07DEC94	G2	R5344	1		2266.89		2266.89				

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
					07DEC94	G2	R5345	1		2265.36		2265.36	-1.53	2266.13	2265.70	-0.43
		1 27	200		12DEC94	G2	R5342	1		2269.38		2269.38				
					12DEC94	G2	R5343	1		2268.19		2268.19	-1.19	2268.78	2266.44	-2.34
		1 25	300		06DEC94	G2	R5340	1		2288.66		2288.66				
					06DEC94	G2	R5341	1		2288.83		2288.83	+0.17	2288.75	2288.12	-0.63
		1 23	400		01DEC94	G2	R5338	1		2305.75		2305.75				
					02DEC94	G2	R5339	1		2303.03		2303.03	-2.72	2304.39	2306.30	1.91
		1 21	600		13DEC94	G2	R5336	1		2340.93		2340.93				
					13DEC94	G2	R5337	1		2338.87		2338.87	-2.06	2339.90	2337.42	-2.48
		1 18	900		08DEC94	G2	R5334	1		2366.28		2366.28				
					07DEC94	G2	R5335	1		2369.89		2369.89	+3.61	2368.08	2370.70	2.62
		1 15	1200		09DEC94	G2	R5332	1		2385.44		2385.44				
					12DEC94	G2	R5333	1		2389.75		2389.75	+4.31	2387.59	2390.51	2.92
		1 13	1500		09DEC94	G2	R5330	1		2403.33		2403.33				
					09DEC94	G2	R5331	1		2400.38		2400.38	-2.95	2401.85	2404.15	2.30
		1 11	1900		01SEP94	G2	R5328	1		2407.00						
					02SEP94	G2	R5328	2		2408.20	+1.20	2407.60				
					01SEP94	G2	R5329	1		2413.75						
					02SEP94	G2	R5329	2		2411.08	-2.67	2412.42	+4.82	2410.01	2414.04	4.03
		1 7	3100		17AUG94	G2	R5326	1		2417.15		2417.15				
					17AUG94	G2	R5327	1		2418.08		2418.08	+0.93	2417.61	2419.22	1.61
1	40-30N	1 36	10	02SEP92	12MAR93	V	P5716	1		2242.20						
38	165- 1E				12MAR93	V	P5716	2		2243.28						
					19MAR93	G	P5716	3	X	2244.90						
					24MAR93	G	P5716	4	X	2248.31	+1.08	2242.74				
					12MAR93	V	P5717	1		2243.52						
					12MAR93	V	P5717	2		2243.84						
					19MAR93	G	P5717	3	X	2252.15						
					24MAR93	G	P5717	4	X	2249.22	+0.32	2243.68	+0.94	2243.21	2247.33	4.12
		1 8	3100		12MAR93	V	P5714	1		2414.12						
					12MAR93	V	P5714	2		2416.56						
					19MAR93	G	P5714	3	X	2418.01	+2.44	2415.34				

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
					12MAR93	V	P5715	1		2416.09						
					12MAR93	V	P5715	2		2416.48						
					19MAR93	G	P5715	3	X	2420.82	+0.39	2416.29	+0.95	2415.81	2419.28	3.47
1 41	39- 1N 165- 1E	1 36	10	03SEP92	17JUN94	G	P5720	1		2247.64		2247.64				
					30JUN94	G2	P5720	2	X	2245.61						
					24JUN94	G	P5721	1		2251.02		2251.02				
					30JUN94	G2	P5721	2	X	2251.67			+3.38	2249.33	2250.00	0.67
		1 8	3100		13SEP94	G2	P5718	1		2423.00		2423.00				
					13SEP94	G2	P5719	1		2418.96		2418.96	-4.04	2420.98	2418.57	-2.41
1 47	36- 1N 165- 1E	1 36	10	05SEP92	25JUL94	G2	P5780	1		2257.91		2257.91				
					25JUL94	G2	P5781	1		2257.50		2257.50	-0.41	2257.71	2259.45	1.74
1 49	34-42N 165- 3E	1 35	25	06SEP92	20SEP93	V	R5372	1		2248.52						
					20SEP93	V	R5372	2		2251.11	+2.59	2249.82				
					20SEP93	V	R5373	1		2250.28						
					20SEP93	V	R5373	2		2248.45	-1.83	2249.36	-0.46	2249.59	2253.58	3.99
		1 34	50		20SEP93	V	R5370	1		2246.73						
					20SEP93	V	R5370	2		2247.89	+1.16	2247.31				
					20SEP93	V	R5371	1		2248.39						
					20SEP93	V	R5371	2		2245.75	-2.64	2247.07	-0.24	2247.19	2258.22	11.03
		1 32	100		03SEP93	V	R5368	1		2271.43						
					03SEP93	V	R5368	2		2270.37	-1.06	2270.90				
					03SEP93	V	R5369	1		2273.45						
					03SEP93	V	R5369	2		2271.35	-2.10	2272.40	+1.50	2271.65	2276.85	5.20
		1 28	200		03SEP93	V	R5366	1		2266.80						
					03SEP93	V	R5366	2		2266.34	-0.46	2266.57				
					03SEP93	V	R5367	1		2265.36						
					03SEP93	V	R5367	2		2262.81	-2.55	2264.09	-2.48	2265.33	2274.36	9.03
		1 26	300		03SEP93	V	R5364	1		2270.23						
					03SEP93	V	R5364	2		2270.49	+0.26	2270.36				
					03SEP93	V	R5365	1		2272.27						
					03SEP93	V	R5365	2		2270.93	-1.34	2271.60	+1.24	2270.98	2276.67	5.69
		1 24	400		02SEP93	V	R5362	1		2276.76						
					02SEP93	V	R5362	2		2275.03	-1.73	2275.90				
					02SEP93	V	R5363	1		2275.99						

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
					02SEP93	V	R5363	2		2275.91	-0.08	2275.95	+0.05	2275.93	2280.64	4.71
		1 22	600		02SEP93	V	R5360	1		2305.03						
					02SEP93	V	R5360	2		2304.59	-0.44	2304.81				
					02SEP93	V	R5361	1		2306.05						
					02SEP93	V	R5361	2		2304.62	-1.43	2305.34	+0.53	2305.08	2311.81	6.73
		1 19	900		02SEP93	V	R5358	1		2352.58						
					02SEP93	V	R5358	2		2351.99	-0.59	2352.29				
					02SEP93	V	R5359	1		2355.34						
					02SEP93	V	R5359	2		2353.90	-1.44	2354.62	+2.33	2353.46	2358.78	5.32
		1 17	1200		23JUL93	V	R5356	1		2381.38						
					23JUL93	V	R5356	2		2384.66	+3.28	2383.02				
					23JUL93	V	R5357	1		2377.59						
					23JUL93	V	R5357	2		2380.81	+3.22	2379.20	-3.82	2381.11	2387.76	6.65
		1 15	1700		26JUL93	V	R5354	1		2406.45						
					26JUL93	V	R5354	2		2406.45	+0.00	2406.45				
					26JUL93	V	R5355	1		2407.55						
					26JUL93	V	R5355	2		2408.99	+1.44	2408.27	+1.82	2407.36	2410.83	3.47
		1 14	2000		23JUL93	V	R5352	1		2412.30						
					23JUL93	V	R5352	2		2414.95	+2.65	2413.63				
					23JUL93	V	R5353	1		2415.14						
					23JUL93	V	R5353	2		2416.79	+1.65	2415.97	+2.34	2414.80	2413.05	-1.75
		1 11	2900		27JUL93	V	R5350	1		2424.30						
					27JUL93	V	R5350	2		2428.83	+4.53	2426.57				
					27JUL93	V	R5351	1		2417.55						
					72FEB93	V	R5351	2		2423.33	+5.78	2420.44	-6.13	2423.51	2420.15	-3.36
1	33-23N	1 36	10	07SEP92	09JUN94	G2	P5784	2	EX	2251.55						
51	165- 1E				09JUN94	G2	P5784	3	X	2235.69						
					10JUN94	G2	P5784	4		2255.97		2255.97				
					03JUN94	G	P5785	1		2257.23						
					10JUN94	G2	P5785	2	X	2249.08						
					10JUN94	G2	P5785	3	X	2256.00		2257.23	+0.03	2255.99	2257.69	1.71
		1 17	1000		18OCT94	G2	P5782	1		2360.47		2360.47				
					18OCT94	G2	P5783	1		2358.09		2358.09	-2.38	2359.28	2360.11	0.83
1	32- 0N	1 2	2000	08SEP92	13DEC94	G2	R5374	1		2412.26		2412.26				

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
53	165- 0E				13DEC94	G2	R5375	1		2411.36		2411.36	-0.90	2411.81	2413.93	2.12
1	30-41N	1 35	10	10SEP92	17JUN94	G	P5724	1		2293.77		2293.77				
55	164-58E				17JUN94	G	P5725	2	EX	2306.99						
					17JUN94	G	P5725	3	EX	2279.61						
					23JUN94	G	P5725	4		2290.23		2290.23	-3.54	2292.00	2294.28	2.28
		1 9	3100		20OCT94	G2	P5722	1		2418.70		2418.70				
					20OCT94	G2	P5723	1		2415.67		2415.67	-3.03	2417.19	2420.61	3.42
2	21-19N	1 35	25	30SEP92	02AUG94	G2	R5400	1		2306.92		2306.92				
57	165- 0E				02AUG94	G2	R5401	1		2305.96		2305.96	-0.96	2306.44	2301.40	-5.04
		1 34	50		19JAN95	G2	R5398	1		2305.70		2305.70				
					19JAN95	G2	R5399	1		2309.16		2309.16	+3.46	2307.43	2311.90	4.47
		1 31	125		08FEB95	G2	R5396	1		2298.21		2298.21				
					08FEB95	G2	R5397	1		2302.98		2302.98	+4.77	2300.59	2303.83	3.24
		1 28	200		23JAN95	G2	R5394	1		2284.18		2284.18				
					23JAN95	G2	R5395	1	EX	2248.68				2284.18	2286.63	2.45
		1 26	300		02MAR95	G2	R5392	1		2275.96		2275.96				
					02MAR95	G2	R5393	1		2279.58		2279.58	+3.62	2277.77	2273.27	-4.50
		1 24	400		23JAN95	G2	R5390	1		2263.92		2263.92				
					23JAN95	G2	R5391	1		2262.22		2262.22	-1.70	2263.07	2265.83	2.76
		1 22	600		11JAN95	G2	R5388	1		2286.04		2286.04				
					11JAN95	G2	R5389	1		2285.75		2285.75	-0.29	2285.90	2295.02	9.12
		1 19	900		10JAN95	G2	R5386	1		2355.79		2355.79				
					10JAN95	G2	R5387	1		2356.07		2356.07	+0.28	2355.93	2354.24	-1.69
		1 17	1200		13MAY96	G2	R5384	1		2363.02		2363.02				
					13MAY96	G2	R5404	1	EX	2337.70				2363.02	2383.02	20.00
		1 15	1600		18JAN95	G2	R5382	1		2396.04		2396.04				
					18JAN95	G2	R5383	1		2389.36		2389.36	-6.68	2392.70	2400.90	8.20
		1 13	2100		23JAN95	G2	R5380	1		2414.56						
					24JAN95	G2	R5380	2		2416.79	+2.23	2415.68				
					24JAN95	G2	R5381	1		2414.76		2414.76	-0.92	2415.22	2414.15	-1.07

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
		1 10	3000		27JAN95	G2	R5378	1		2418.66		2418.66				
					27JAN95	G2	R5379	1		2418.51		2418.51	-0.15	2418.58	2421.61	3.03
2	19-59N	1 33	75	01OCT92	03MAY93	V	R5405	1		2302.28						
59	165- 0E				03MAY93	V	R5405	2		2304.36	+2.08	2303.32				
					03MAY93	V	R5406	1		2300.97						
					03MAY93	V	R5406	2		2303.00	+2.03	2301.99	-1.33	2302.66	2304.95	2.29
		1 9	3100		03MAY93	V	R5402	1		2412.37						
					03MAY93	V	R5402	2		2413.05	+0.68	2412.71				
					03MAY93	V	R5403	1		2411.02						
					03MAY93	V	R5403	2		2411.63	+0.61	2411.32	-1.39	2412.02	2420.55	8.53
2	18-40N	1 35	10	02OCT92	03MAY93	V	P5728	1		2292.48						
62	164-36E				03MAY93	V	P5728	2		2293.18	+0.70	2292.83				
					03MAY93	V	P5729	1		2296.86						
					03MAY93	V	P5729	2		2297.57	+0.71	2297.22	+4.39	2295.03	2301.30	6.27
		1 8	3000		22FEB93	G	P5726	1		2422.80						
					19FEB93	V	P5726	2	EX	2419.59		2422.80				
					22FEB93	G	P5727	1		2419.99						
					19FEB93	V	P5727	2	EX	2410.66		2419.99	-2.81	2421.40	2422.81	1.41
2	24- 3N	1 36	10	04OCT92	25JUL94	G2	R5409	1		2310.33		2310.33				
63	164-59E				26JUL94	G2	R5410	1		2305.62		2305.62	-4.71	2307.98	2308.34	0.36
		1 10	2900		07FEB95	G2	R5407	1		2422.48		2422.48				
					07FEB95	G2	R5408	1		2418.67		2418.67	-3.81	2420.57	2421.62	1.05
2	26- 2N	1 36	10	05OCT92	15AUG94	G2	R5433	1		2313.04		2313.04				
64	165- 4E				15AUG94	G2	R5434	1		2316.99		2316.99	+3.95	2315.02	2312.54	-2.48
		1 34	50		31JAN95	G2	R5431	1		2316.04		2316.04				
					01FEB95	G2	R5432	1		2316.39		2316.39	+0.35	2316.22	2316.76	0.54
		1 32	100		31JAN96	G2	R5429	1		2318.51		2318.51				
					31JAN96	G2	R5430	1		2316.29		2316.29	-2.22	2317.40	2320.56	3.16
		1 27	250		14MAR95	G2	R5425	1		2285.93		2285.93				
					15MAR95	G2	R5426	1		2284.16		2284.16	-1.77	2285.04	2288.19	3.15
		1 23	500		03APR95	G2	R5423	1		2273.72		2273.72				

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
					31MAR95	G2	R5424	1		2269.69		2269.69	-4.03	2271.71	2270.91	-0.80
		1 21	650		11JAN95	G2	R5421	1		2278.06		2278.06				
					12JAN95	G2	R5435	1		2275.98		2275.98	-2.08	2277.02	2271.93	-5.09
		1 19	800		12JAN95	G2	R5419	1		2312.45		2312.45				
					11JAN95	G2	R5420	1		2313.29		2313.29	+0.84	2312.87	2305.85	-7.02
		1 17	1000		17JAN95	G2	R5417	1		2346.90		2346.90				
					17JAN95	G2	R5418	1		2342.83		2342.83	-4.07	2344.86	2346.84	1.98
		1 15	1200		16MAR95	G2	R5415	1		2375.26		2375.26				
					16MAR95	G2	R5416	1		2376.02		2376.02	+0.76	2375.64	2372.55	-3.09
		1 12	1600		31MAR95	G2	R5413	1		2402.56		2402.56				
					31MAR95	G2	R5414	1		2402.02		2402.02	-0.54	2402.29	2405.11	2.82
		1 9	2200		13MAR95	G2	R5411	1		2415.10		2415.10				
					14MAR95	G2	R5412	1		2413.31		2413.31	-1.79	2414.21	2410.85	-3.36
2	16- 0N	1 36	10	08OCT92	04MAY93	V	R5438	1		2274.97						
66	166- 0E				04MAY93	V	R5438	2		2278.79	+3.82	2276.88				
					04MAY93	V	R5439	1		2273.21						
					04MAY93	V	R5439	2		2276.47	+3.26	2274.84	-2.04	2275.86		
		1 8	3200		03MAY93	V	R5436	1		2411.88						
					03MAY93	V	R5436	2		2412.90	+1.02	2412.39				
					03MAY93	V	R5437	1		2410.64						
					03MAY93	V	R5437	2		2411.62	+0.98	2411.13	-1.26	2411.76	2421.91	10.15
2	14- 0N	1 36	10	09OCT92	04MAY93	V	R5442	1		2261.53						
67	165- 0E				04MAY93	V	R5442	2		2264.40	+2.87	2262.97				
					04MAY93	V	R5443	1		2264.30						
					04MAY93	V	R5443	2		2267.69	+3.39	2266.00	+3.03	2264.49	2275.78	11.29
		1 8	3100		04MAY93	V	R5440	1		2404.10						
					04MAY93	V	R5440	2		2405.67	+1.57	2404.89				
					04MAY93	V	R5441	1		2408.01						
					04MAY93	V	R5441	2		2410.11	+2.10	2409.06	+4.17	2406.98	2425.76	18.78
2	12-35N	1 36	10	09OCT92	27JUL94	G2	R5466	1		2257.63		2257.63				
68	165-22E				27JUL94	G2	R5467	1		2260.25		2260.25	+2.62	2258.94	2260.92	1.98

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
		1 34	25		08FEB95	G2	R5464	1		2266.97		2266.97				
					08FEB95	G2	R5465	1		2265.67		2265.67	-1.30	2266.32	2265.88	-0.44
		1 32	75		15FEB95	G2	R5462	1		2274.03		2274.03				
					15FEB95	G2	R5463	1		2279.51		2279.51	+5.48	2276.77	2280.07	3.30
		1 29	150		10FEB95	G2	R5460	1		2292.35		2292.35				
					10FEB95	G2	R5461	1		2291.77		2291.77	-0.58	2292.06	2300.79	8.73
		1 26	300		09FEB95	G2	R5458	1		2283.47		2283.47				
					09FEB95	G2	R5459	1		2285.07		2285.07	+1.60	2284.27	2284.98	0.71
		1 24	400		09FEB95	G2	R5456	1		2307.81		2307.81				
					09FEB95	G2	R5457	1	3s	2298.78		2298.78	-9.03	2303.30	2305.48	2.18
		1 22	600		08FEB95	G2	R5454	1		2322.10		2322.10				
					09FEB95	G2	R5455	1		2317.46		2317.46	-4.64	2319.78	2304.15	-15.63
		1 19	900		14DEC94	G2	R5452	1		2351.70		2351.70				
					14DEC94	G2	R5468	1		2353.49		2353.49	+1.79	2352.59	2354.89	2.30
		1 16	1200		16FEB95	G2	R5450	1		2374.83		2374.83				
					16FEB95	G2	R5451	1		2378.54		2378.54	+3.71	2376.69	2381.16	4.47
		1 13	1600		17JAN95	G2	R5448	1		2401.11		2401.11				
					18JAN95	G2	R5449	1		2403.38		2403.38	+2.27	2402.25	2403.22	0.97
		1 11	2000		01FEB95	G2	R5446	1		2415.71		2415.71				
					01FEB95	G2	R5447	1		2416.65		2416.65	+0.94	2416.18	2417.21	1.03
		1 7	3100		17FEB95	G2	R5444	1		2426.36		2426.36				
					17FEB95	G2	R5445	1	3s	2417.25		2417.25	-9.11	2421.81	2423.99	2.18
2	10- 0N	1 36	10	10OCT92	04MAY93	V	R5471	1		2247.21						
69	165- 0E				04MAY93	V	R5471	2		2249.39	+2.18	2248.30				
					04MAY93	V	R5473	1		2250.93						
					04MAY93	V	R5473	2		2252.83	+1.90	2251.88	+3.58	2250.09	2257.29	7.20
		1 9	2900		04MAY93	V	R5469	1		2417.01						
					04MAY93	V	R5469	2		2420.16	+3.15	2418.58				
					04MAY93	V	R5470	1		2417.31						
					04MAY93	V	R5470	2		2418.72	+1.41	2418.02	-0.56	2418.30	2427.65	9.35

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
2	8- 8N	1 36	10	11OCT92	05MAY93	V	R5476	1		2234.97						
70	165- 1E				05MAY93	V	R5476	2		2238.48	+3.51	2236.73				
					05MAY93	V	R5477	1		2232.64						
					05MAY93	V	R5477	2		2235.23	+2.59	2233.94	-2.79	2235.33	2242.95	7.62
		1 8	3100		04MAY93	V	R5474	1		2416.23						
					04MAY93	V	R5474	2		2416.98	+0.75	2416.60				
					04MAY93	V	R5475	1		2408.28						
					04MAY93	V	R5475	2		2410.83	+2.55	2409.56	-7.04	2413.08	2416.78	3.70
2	6- 0N	1 36	10	12OCT92	05MAY93	V	R5480	1		2229.68						
71	165- 1E				05MAY93	V	R5480	2		2233.52	+3.84	2231.60				
					05MAY93	V	R5481	1		2229.73						
					05MAY93	V	R5481	2		2230.99	+1.26	2230.36	-1.24	2230.98	2236.33	5.35
		1 8	3100		05MAY93	V	R5478	1		2410.01						
					05MAY93	V	R5478	2		2412.93	+2.92	2411.47				
					05MAY93	V	R5479	1		2410.62						
					05MAY93	V	R5479	2		2413.04	+2.42	2411.83	+0.36	2411.65	2424.58	12.93
2	3- 0N	1 33	10	12OCT92	09JUN94	G	R5500	1		2226.65		2226.65				
73	165- 0E				10JUN94	G	R5501	1		2226.36		2226.36	-0.29	2226.51	2229.65	3.14
		1 31	50		05APR95	G2	R5498	1		2236.28		2236.28				
					07APR95	G2	R5499	1		2235.12		2235.12	-1.16	2235.70	2233.79	-1.91
		1 29	100		27FEB95	G2	R5496	1		2291.25		2291.25				
					27FEB95	G2	R5497	1		2292.54		2292.54	+1.29	2291.90	2297.53	5.63
		1 23	250		27FEB95	G2	R5494	1		2291.68		2291.68				
					27FEB95	G2	R5495	1		2295.86		2295.86	+4.18	2293.77	2296.24	2.47
		1 20	400		24FEB95	G2	R5492	1		2306.83		2306.83				
					24FEB95	G2	R5493	1		2307.51		2307.51	+0.68	2307.17	2310.36	3.19
		1 16	700		01MAR95	G2	R5490	1		2326.36		2326.36				
					02MAR95	G2	R5491	1		2325.15		2325.15	-1.21	2325.76	2325.31	-0.45
		1 14	900		01MAR95	G2	R5488	1	EX	2342.71						
					02MAR95	G2	R5488	2		2347.65		2347.65				
					01MAR95	G2	R5489	1		2349.49		2349.49	+1.84	2348.57	2348.72	0.15
		1 10	1700		30MAR95	G2	R5486	1		2401.26		2401.26				

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
					30MAR95	G2	R5487	1		2397.76		2397.76	-3.50	2399.51	2400.53	1.02
		1	9	2000	06APR95	G2	R5484	1		2416.51		2416.51				
					07APR95	G2	R5485	1		2408.22		2408.22	-8.29	2412.36	2412.91	0.55
		1	6	2900	04APR95	G2	R5482	1		2419.91		2419.91				
					04APR95	G2	R5483	1		2421.17		2421.17	+1.26	2420.54	2424.44	3.90
2	1-30N	1	6	2900 13OCT92	19JAN95	G2	R5502	1		2420.88		2420.88				
75	164-59E				19JAN95	G2	R5503	1		2421.66		2421.66	+0.78	2421.27	2425.16	3.89
2	0- 0N	1	36	10 14OCT92	20MAY94	G	R5528	1		2284.15		2284.15				
78	165- 0E				20MAY94	G	R5529	1		2280.59		2280.59	-3.56	2282.37	2285.54	3.17
		1	34	50	09FEB94	V	R5526	1		2275.65		2275.65				
					09FEB94	V	R5527	1		2273.88		2273.88	-1.77	2274.76	2286.32	11.56
		1	31	125	09FEB94	V	R5524	1		2295.81		2295.81				
					09FEB94	V	R5525	1		2294.41		2294.41	-1.40	2295.11	2308.16	13.05
		1	27	250	09FEB94	V	R5522	1		2290.72		2290.72				
					09FEB94	V	R5523	1		2284.32		2284.32	-6.40	2287.52	2310.53	23.01
		1	23	450	09FEB94	V	R5520	1		2300.61		2300.61				
					09FEB94	V	R5521	1		2298.22		2298.22	-2.39	2299.42	2311.09	11.67
		1	21	600	08FEB94	V	R5518	1		2302.07		2302.07				
					08FEB94	V	R5519	1		2307.80		2307.80	+5.73	2304.94	2318.62	13.68
		1	19	800	08FEB94	V	R5516	1		2325.34		2325.34				
					08FEB94	V	R5517	1		2323.65		2323.65	-1.69	2324.50	2330.46	5.96
		1	16	1100	08FEB94	V	R5514	1		2352.75		2352.75				
					08FEB94	V	R5515	1		2350.51		2350.51	-2.24	2351.63	2362.64	11.01
		1	12	1500	01FEB94	V	R5512	1		2381.60		2381.60				
					01FEB94	V	R5513	1		2379.40		2379.40	-2.20	2380.50	2391.25	10.75
		1	9	2100	01FEB94	V	R5510	1		2406.59		2406.59				
					01FEB94	V	R5511	1		2410.56		2410.56	+3.97	2408.58	2412.67	4.09
		1	7	2600	01FEB94	V	R5508	1		2410.89		2410.89				
					01FEB94	V	R5509	1		2411.44		2411.44	+0.55	2411.17	2422.39	11.22

TITRATION SYSTEM:
G = GRAVIMETRIC
V = VOLUMETRIC
BOTTLE TYPE:
R = 0.5 LITER PYREX P = 1 LITER PYREX

FLAGS:
X: Analytical flag
EX: Data excluded from statistical analysis
3s: Bottle delta larger than 3s criteria

Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
		1 5	3200		21SEP93	V	R5506	1		2414.62						
					21SEP93	V	R5506	2		2415.82	+1.20	2415.22				
					21SEP93	V	R5507	1		2413.43						
					21SEP93	V	R5507	2		2413.97	+0.54	2413.70	-1.52	2414.46	2421.41	6.95
2	1-30S	1 36	10	15OCT92	05MAY93	V	R5532	1		2265.80						
81	164-59E				05MAY93	V	R5532	2		2269.24	+2.44	2267.02				
					05MAY93	V	R5533	1		2265.03						
					05MAY93	V	R5533	2		2267.98	+2.95	2266.51	-0.51	2266.77	2270.35	3.58
		1 6	3000		05MAY93	V	R5530	1		2414.24						
					05MAY93	V	R5530	2		2417.78	+3.54	2416.01				
					05MAY93	V	R5534	1		2421.18						
					05MAY93	V	R5534	2		2422.74	+1.56	2421.96	+5.95	2418.99	2422.57	3.58
2	2-48S	1 35	25	16OCT92	16JUN94	G	R5551	1		2279.10		2279.10				
83	164-55E				01JUL94	G2	R5551	2	X	2275.15						
					16JUN94	G	R5552	1		2280.36		2280.36				
					01JUL94	G2	R5552	2	X	2273.66			+1.26	2279.73	2281.51	1.78
		1 32	100		20MAR95	G2	R5549	1		2317.15		2317.15				
					20MAR95	G2	R5550	1		2316.31		2316.31	-0.84	2316.73	2319.99	3.26
		1 27	250		13MAR95	G2	R5547	1		2307.04		2307.04				
					13MAR95	G2	R5548	1		2306.37		2306.37	-0.67	2306.71	2308.85	2.14
		1 24	400		10MAR95	G2	R5545	1		2301.13		2301.13				
					13MAR95	G2	R5546	1		2299.86		2299.86	-1.27	2300.50	2302.22	1.72
		1 21	600		10MAR95	G2	R5543	1		2308.01		2308.01				
					10MAR95	G2	R5544	1		2309.80		2309.80	+1.79	2308.91	2310.89	1.98
		1 17	1000		07FEB95	G2	R5541	1		2351.36		2351.36				
					07FEB95	G2	R5542	1		2348.76		2348.76	-2.60	2350.06	2352.23	2.17
		1 12	1400		06FEB95	G2	R5540	1		2384.74		2384.74				
					06FEB95	G2	R5555	1		2387.47		2387.47	+2.73	2386.10	2387.08	0.98
		1 8	2000		06MAR95	G2	R5537	1		2412.49		2412.49				
					06MAR95	G2	R5538	1		2412.81		2412.81	+0.32	2412.65	2415.05	2.40
		1 4	2800		06MAR95	G2	R5535	1		2419.16		2419.16				

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Table B.2 (continued)

THE CARBON DIOXIDE PROJECT OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
CGC92 Legs 1 & 2 WOCE Line P13C

SUMMARY OF ALKALINITY DATA (cont.)

LEG STN	LAT. LONG.	CAST NISK	DEPTH (M)	SAMPLE DATE	ANALYSIS DATE	TITR SYST	SAMPLE BOTTLE	TRIAL	FLAG	S.I.O. TRIAL	TRIAL DELTA	BOTTLE ALK	BOTTLE DELTA	"NISKIN" AVG	SIO ALK	SIO -S.I.O.
										(μEQUIV/KG SW)						
					07MAR95	G2	R5536	1		2419.26		2419.26	+0.10	2419.21	2422.97	3.76
2	4-22S	1 32	10	17OCT92	02NOV94	G2	R5572	1		2285.43		2285.43				
87	164-11E				02NOV94	G2	R5573	1		2283.04		2283.04	-2.39	2284.24	2282.94	-1.30
		1 30	50		29MAR95	G2	R5570	1		2282.00		2282.00				
					30MAR95	G2	R5571	1		2281.18		2281.18	-0.82	2281.59	2285.04	3.45
		1 28	100		21MAR95	G2	R5568	1		2310.84		2310.84				
					21MAR95	G2	R5569	1		2311.69		2311.69	+0.85	2311.27	2314.34	3.07
		1 24	200		17MAR95	G2	R5566	1		2340.45		2340.45				
					20MAR95	G2	R5567	1		2339.63		2339.63	-0.82	2340.04	2344.66	4.62
		1 19	400		17MAR95	G2	R5564	1		2301.95		2301.95				
					17MAR95	G2	R5565	1		2302.85		2302.85	+0.90	2302.40	2304.99	2.59
		1 16	600		06APR95	G2	R5562	1		2317.10		2317.10				
					06APR95	G2	R5563	1		2311.52		2311.52	-5.58	2314.31	2317.47	3.16
		1 10	900		20MAR95	G2	R5560	1		2339.24		2339.24				
					21MAR95	G2	R5574	1		2338.53		2338.53	-0.71	2338.89	2341.40	2.51
		1 7	1200		01MAR95	G2	R5558	1		2361.45		2361.45				
					01MAR95	G2	R5559	1		2362.46		2362.46	+1.01	2361.96	2368.76	6.80
		1 5	1600		28FEB95	G2	R5556	1		2389.61		2389.61				
					28FEB95	G2	R5557	1		2390.10		2390.10	+0.49	2389.86	2396.27	6.41
		1 3	2000		16MAR95	G2	R5553	1		2404.14		2404.14				
					17MAR95	G2	R5554	1		2402.40		2402.40	-1.74	2403.27	2412.77	9.50

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NOTE: Dilution factor of 1.000170 has been applied.