April 19, 2001
Monterey Bay Aquarium

Angela G. Carpenter
Central Coast Regional Water Quality Control Board
81 Higuera Street, Suite 200
San Luis Obispo, CA 93401

Hi Angela,

Included is all the data we talked about, along with descriptions of the data, and some sample printouts. Hope this is of help to you. If you have any questions on any of the included information please see the contact information below.

Regards,

Eric Kingsley
Water Quality Specialist
Monterey Bay Aquarium

Data Included

Starting with the ZIP disk included, all files on there are in either Excel '97 or MS Word format. In the root directory of that disk you will find:

- The Excel file Microbiology Spot Measurements.xls, contains all of the total coliform, fecal coliform, and enterococcus bacteria measurements taken from our intakes and from the surface waters off the aquarium. A printout of both the surface data and the intake data is included.
- The Excel file Wet Chemistry Spot Measurements (RSW).xls, contains all of the once weekly wet chemistry measurements (total ammonia, nitrite, nitrate, and phosphate) along with the physical parameter measurements (dissolved oxygen, pH, and temperature). A printout of which is included.
- The MS Word file Summary.doc, contains this letter.
- A directory called In Situ Sensor Data, which has a series of subdirectories below it which contain all of our in situ sensor data (dissolved oxygen, sump height, and temperature) from our intakes. The subdirectories are organized as:
    - 30 min Averaged Daily Files – contains a series of subdirectories organized by year. Inside each of those subdirectories are a series of Excel files named in the format of Bay-03-2001.xls (printout of which is included) or Bay1299.xls. In every case, Bay refers to the sensor network name. The next two numbers refer to the month the data was collected. Lastly, the final two or four numbers refer to the year the data was collected.

- Daily Means – contains a series of subdirectories organized by year. Inside each of those subdirectories are a series of Excel files named in the format of Bay Daily 03-2001.xls (printout of which is included) or Bay Daily 12-99.xls. In every case, Bay refers to the sensor network name. The next two numbers refer to the month the data was collected. Lastly, the final two or four numbers refer to the year the data was collected.
- Monthly Means – contains the Excel file Bay Monthly Means.xls.

General Terms Used

Before I get into detailed descriptions of all of our data let me review a couple of terms that I will be referring to frequently throughout. As I mentioned above all of our data was collected either from the surface waters off the aquarium or from our intakes. Surface water collection was from one of two locations. The initial 2, microbiology samples were collected by dipping a bottle just below the surface just outside of our Great Tide Pool basin. All samples after that were collected from off of our back deck where it extends past the surf zone. Samples were collected from the waters just below the surface using either a sterilized sample bottle attached to a rope or a using a water sampler, then sub-sampled into a sterilized sample bottle.

As I mentioned on the phone, the water in our intakes comes from approximately 50-55 feet. As our aquarium is setup we have a pair of intakes anchored offshore at a depth of 50-55 feet. Water from these intakes is gravity fed into our sump house. From the sump house the water is pumped into the aquarium and used for all of our exhibits. The sampling location for all the microbiology, wet chemistry, and in situ dissolved oxygen data is downstream from these pumps. The in situ sump height and temperature data are generated from sensors located in the sump house. In both cases any of our intake data can be taken to represent conditions in the bay at a depth of 50-55 feet off of the aquarium. We usually refer to our intake water as raw seawater or RSW and you will find that name used throughout of data.

File Contents Descriptions

Now onto a description and explanation of all of our data. I'm going to start this off by just describing what is in the various columns of all the Excel files. Later on, I'll talk about quality assurance procedures, detection limits, and the methods used for collecting the data.

- Microbiology Spot Measurements.xls – both the offshore samples and raw seawater samples are organized with the same titles. For any title that spans two columns the left column is used to indicate samples above the detection limit (>) and the right column contains the results expressed as the most probable number (MPN) cells per 100mL. The titles starting from the left are:

Title	Contents
Date	Date sample collected
Time Sampled	Time sample collected
Time Analyzed	Time reagents added
Total Coliforms	The total coliform results expressed as MPN.
N	Number of samples collected for total coliforms
Fecal Coliforms	The fecal coliform results expressed as MPN.
N	Number of samples collected for fecal coliforms
Enterococcus Bacteria	The Enterococcus bacteria results expressed as MPN.
N	Number of samples collected for Enterococcus bacteria.
Notes	General sample notes including sample locations, false positives, weather conditions, and notices of sewage spills to name a few.

- Wet Chemistry Spot Measurements (RSW).xls – the intake or raw seawater wet chemistry data is organized with the following titles starting from the left are:

Title	Contents
Date	Date sample was collected.
Time	Time sample was collected.
NH3	Total ammonia (ammonium + ammonia) concentration in mg/L.
NO2	Nitrite concentration in mg/L.
UV Nitrate	Nitrate concentration determined by UV Nitrate procedure in mg/L.
MLML-NO3	Nitrate concentration determined by multiple wavelength procedure developed at Moss Landing Marine Lab (MLML) in mg/L.
PO4	Phosphate concentration in mg/L.
O2 Sat	Dissolved oxygen concentration in % saturation.
O2 mg/l	Dissolved oxygen concentration in mg/L.
Temp	Temperature in °C.
pH	Sample pH.
Notes	General sample notes.

- As mentioned above the in situ sensor data is presented in three different formats: 30 min averaged data, daily averaged data, and monthly averaged data. The files in the 30 min Averaged Daily Files subdirectory have the following titles starting from the left:

Title	Contents
Date	Date of data point
Time	Time stamp for the start of the 30 minute interval the data was averaged for.
DO (% sat)	The 30 minute averaged dissolved oxygen concentration in % saturation calculated from probe measurements.
DO (ppm)	The 30 minute averaged dissolved oxygen concentration in mg/L as measured by the probe.
Sump Height (ft)	The 30 minute averaged height of the water in the sump house in feet. The peaks and valleys will be in phase with the surface tide but the absolute numbers will differ. Can be used to give a rough indication of high and low tides but in all likely hood you will probably not want to import this variable into your database.
Temp (oC)	The 30 minute averaged water temperature in °C as measured by the probe.
Temp (oF)	The 30 minute averaged water temperature in °F as calculated from the temperature in °C as measured by the probe.

- The files in the Daily Means subdirectory have the titles that are organized into groups. The group names match the titles used for the 30 minute averaged data and are described in the table above. The groups and titles starting from the left are:

Group	Title	Contents
Day	Day	Day of the month the results are calculated for.
DO (% sat)	Mean	The mean DO (% sat) calculated from all 30 minute averaged data points from each day.
	Std Error	The standard error of the mean DO (% sat) calculated from all 30 minute averaged data points from each day.
	Maximum	The maximum DO (% sat) observed each day.
	Minimum	The minimum DO (% sat) observed each day.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.
DO (ppm)	Mean	The mean DO (ppm) calculated from all 30 minute averaged data points from each day.
	Std Error	The standard error of the mean DO (ppm) calculated from all 30 minute averaged data points from each day.
	Maximum	The maximum DO (ppm) observed each day.
	Minimum	The minimum DO (ppm) observed each day.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.
Sump Height (ft)	Mean	The mean Sump Height (ft) calculated from all 30 minute averaged data points from each day.
	Std Error	The standard error of the mean Sump Height (ft) calculated from all 30 minute averaged data points from each day.
	Maximum	The maximum Sump Height (ft) observed each day.
	Minimum	The minimum Sump Height (ft) observed each day.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.
Temp (oC)	Mean	The Temp (^{o}C) calculated from all 30 minute averaged data points from each day.
	Std Error	The standard error of the mean Temp (^{o}C) calculated from all 30 minute averaged data points from each day.
	Maximum	The maximum Temp (^{o}C) observed each day.
	Minimum	The minimum Temp (^{o}C) observed each day.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.
Temp (oF)	Mean	The Temp (^{o}F) calculated from all 30 minute averaged data points from each day.
	Std Error	The standard error of the mean Temp (^{o}F) calculated from all 30 minute averaged data points from each day.
	Maximum	The maximum Temp (^{o}F) observed each day.
	Minimum	The minimum Temp (^{o}F) observed each day.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.

- The only file in the Monthly Means subdirectory is the file Bay Monthly Means.xls. It is organized in a similar manner to the daily averaged data described above with the following groups and titles:

Group	Title	Contents
Month/Year	Month/Year	The month and year the data was calculated for.
RSW DO (% sat)	Mean	The mean DO (% sat) calculated from all 30 minute averaged data points from each month.
	Std Error	The standard error of the mean DO (% sat) calculated from all 30 minute averaged data points from each month.
	Maximum	The maximum DO (% sat) observed each month.
	Minimum	The minimum DO (% sat) observed each month.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.
RSW DO (ppm)	Mean	The mean DO (ppm) calculated from all 30 minute averaged data points from each month.
	Std Error	The standard error of the mean DO (ppm) calculated from all 30 minute averaged data points from each month.
	Maximum	The maximum DO (ppm) observed each month.
	Minimum	The minimum DO (ppm) observed each month.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.
Sump Height (ft)	Mean	The mean Sump Height (ft) calculated from all 30 minute averaged data points from each month.
	Std Error	The standard error of the mean Sump Height (ft) calculated from all 30 minute averaged data points from each month.
	Maximum	The maximum Sump Height (ft) observed each month.
	Minimum	The minimum Sump Height (ft) observed each month.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.
Temp (^{o}C)	Mean	The Temp (^{o}C) calculated from all 30 minute averaged data points from each month.
	Std Error	The standard error of the mean Temp (^{o}C) calculated from all 30 minute averaged data points from each month.
	Maximum	The maximum Temp (^{o}C) observed each month.
	Minimum	The minimum Temp (^{o}C) observed each month.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.
Temp (^{o}F)	Mean	The Temp (^{o}F) calculated from all 30 minute averaged data points from each month.
	Std Error	The standard error of the mean Temp (^{o}F) calculated from all 30 minute averaged data points from each month.
	Maximum	The maximum Temp (^{o}F) observed each month.
	Minimum	The minimum Temp (^{o}F) observed each month.
	N	The number of 30 minute averaged data points used in calculating the Mean and Std Error.

Methods of data collection

What follows in this section is a short description of the methods used to collect the data and where appropriate literature references for the sources our procedures where developed from.

- Microbiology measurements
  - Method summary
    The total and fecal coliforms are determined using Colilert 18 reagents from Idexx Laboratories after a 18 hour incubation at 37°C. The enterococcus bacteria are determined using Enterolert reagents from Idexx Laboratories after a 24 hour incubation at 42°C.
  - Literature references
    Idexx Laboratories, Colilert 18 and Enterolert users manuals.

- Wet Chemistry Measurements
  - Total Ammonia
    - Method summary
      Total ammonia (ammonia + ammonium) is oxidized to nitrite and then determined spectrophotometrically. A correction factor is applied to subtract out the contribution of the nitrite determined in the method below.
    - Literature reference
      Parsons, T. R., Maita, Y. Lalli, C. M. 1985. Determination of Ammonia (Oxidation Method). In: A Manual of Chemical and Biological Methods for Seawater Analysis. Pergamon Press, Oxford, England. 173 p.
  - Nitrite
    - Method summary
      Nitrite is determined spectrophotometrically.
    - Literature references:
      Parsons, T. R., Maita, Y. Lalli, C. M. 1985. Determination of Nitrite. In: A Manual of Chemical and Biological Methods for Seawater Analysis. Pergamon Press, Oxford, England. 173 p.
      Clesceri, L. S., A. E. Greenburg, A. D. Eaton. 1998. 4500-NO_2^- B. Colorimetric Method. In: Standard Methods For The Examination of Water and Wastewater, 20th Edition. American Public Health Association, Washington, D. C.

- Nitrate
  - Method summary

    Nitrate is determined directly using a single wavelength ultraviolet spectrophotometric method (UV-NO3). It is also determined using a multiple wavelength ultraviolet spectrophotometric procedure (MLML-NO3).
  - Literature references:

    Clesceri, L.S., A. E. Greenburg, A. D. Eaton. 1998. . 4500-NO_3^- B. Ultraviolet Spectrophotometric Screening Method. In: Standard Methods For the Examination of Water and Wastewater, 20th Edition. American Public Health Association, Washington, D. C.

    Moss Landing Marine Laboratories, Personal Communication. 1998.
- pH and Temperature
  - Method summary

    The pH and temperature are determined using a combination ion specific/automatic temperature compensation probe on a Corning Model 313 or 315 meter.
  - Literature references:

    Grasshoff, K. 1976. Determination the pH. In: Methods of Seawater Analysis, K. Grasshoff ed. Verlag Chemie, New York. 317p.Corning Model 313 pH/Temperature manual.

    Corning Model 313 or 315 pH/Temperature Manual.
- Dissolved Oxygen
  - Method summary

    The dissolved oxygen is determined using a galvanic membrane electrode on either a Oxyguard Handy Mark III or a Oxyguard Handy Gamma meters.
  - Literature references:

    Clesceri, L.S., A. E. Greenburg, A. D. Eaton. 1998. . 4500-O G. Membrane Electrode Method. In: Standard Methods For the Examination of Water and Wastewater, 20th Edition. American Public Health Association, Washington, D. C.

    Oxyguard Handy Mark III or Gamma manual.

- In Situ Sensor Data

  The in situ sensor data from our intakes is logged automatically by a computer in our control room that takes one reading of the sensors every 5 minutes. Every six measurements are taken together as a group to give a 30 minute averaged data point. The dissolved oxygen and temperature data also have unit conversions calculated at this time. Next, the 30 minute averaged data is checked for quality control (QC). Any dropouts in the recording of the in situ sensor data and obvious sensor calibrations are removed from the 30 minute averaged data file.

  All of the QC'd 30 minute averaged data for each day is also used to calculate a daily averaged, standard error, maximum, and minimum reading for each sensor. Similarly, a monthly average, standard error, maximum, and minimum is also calculated for each measurement. The number of measurements used in the calculations of the daily or monthly averaged data is also recorded in each of the data files.

  The current sensors in our intakes include

  - Dissolved oxygen
    Dissolved oxygen is determined using a galvanic electrode from Oxyguard. The data is measured in mg/L and later converted to % saturation using temperature data and an empirically derived equation.
  - Temperature
    Temperature is measured using a thermocouple and is recorded in °C.
  - Sump Height
    Sump height is determined by sonic level transducer and is recorded in ft.

Quality assurance procedures

- Microbiology

  Microbiology samples are collected using sterile techniques. Any questionable fluorescent cells are compared against a standard comparator supplied by Idexx Laboratories.

- Wet Chemistry

  Total Ammonia, Nitrite, Phosphate, Nitrate (220NO3 & Cd-red) have a quality control standard ran at the beginning of each analysis to check the status of the stored calibration curve.

  Nitrate (MLML-NO3) has a standard curve run each day.

  The pH meter is calibrated using NBS buffers monthly or as needed.

  The dissolved oxygen meter is calibrated daily.
- In Situ Sensors

  The in situ temperature is compared against spot measurements and calibrated as needed.

  The in situ dissolved oxygen meter is compared against spot measurements and serviced as needed.

Detection Limits

- Microbiology

  The detection limits as determined by Idexx Laboratories are dependent on the sample dilution and type of tray used. Here at MBA they are between 0 and 48,000 MPN.
- Wet Chemistry

  The spectrophotometric procedures for total ammonia, nitrite, nitrate (MLML-NO3), and phosphate all have an upper limit to the linear range above which the samples must be diluted. Estimates of the lower detection limits and the upper limits used in our procedures are:
  - Total Ammonia = 0.005-0.5ppm
  - Nitrite = 0.005-1.0ppm
  - Nitrate (MLML-NO3) = 0.005-20ppm
  - Phosphate = 0.005-2.5ppm

  The physical parameters measured have detection limits of:
  - pH = 4.00 – 10.00 (Range of buffers used for calibration)
  - Temperature = -5.0 – 105.0 °C
  - Dissolved Oxygen = 0 – 150% saturation

- In Situ Sensors

  The in situ temperature has detection limits similar to any commercially available thermister. The in situ dissolved oxygen probe has detection limits similar to that of the handheld sensors described above. The sump height sensor is physically limited by the level of water in the sump house.

Contact Information

- General Information and Overall Questions:
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- Microbiology and In Situ Sensor Maintenance Questions
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- Wet Chemistry and In Situ Sensor Data Record
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  Fax: (831) 648-4810
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Bay PLC Monthly Means

Variable Name	RSW DO (% sat)					RSW DO (ppm)					Sump Height (ft)					Temp (°C)					Temp (°F)				
Month/Year	Mean	Std Error	Maximum	Minimum	N	Mean	Std Error	Maximum	Minimum	N	Mean	Std Error	Maximum	Minimum	N	Mean	Std Error	Maximum	Minimum	N	Mean	Std Error	Maximum	Minimum	N
Jun-1995											6.97	0.07	11.17	3.46	505	10.29	0.04	13.81	8.82	505	50.53	0.08	56.85	47.88	505
Jul-1995											8.04	0.04	12.63	4.03	1354	11.83	0.03	15.99	9.71	1482	53.30	0.06	60.79	49.47	1482
Aug-1995											7.83	0.04	11.24	3.65	1354	11.98	0.03	14.80	10.06	1424	53.56	0.05	58.63	50.10	1424
Sep-1995											7.22	0.04	10.99	3.19	1215	12.54	0.04	14.89	9.94	1225	54.57	0.07	58.81	49.88	1225
Oct-1995											7.17	0.04	10.84	3.30	1328	12.59	0.02	14.15	10.79	1330	54.66	0.04	57.48	51.43	1330
Nov-1995											8.10	0.04	11.83	4.11	1321	12.20	0.01	13.75	10.66	1332	53.97	0.03	56.75	51.18	1332
Dec-1995											8.16	0.04	11.84	3.50	1453	12.21	0.01	13.19	10.98	1478	53.98	0.03	55.74	51.76	1478
Jan-1996											7.78	0.05	12.64	2.92	1393	12.24	0.01	12.94	10.72	1418	54.03	0.02	55.29	51.30	1418
Feb-1996											8.01	0.05	11.72	3.80	1146	12.74	0.02	13.54	11.60	1146	54.93	0.03	56.37	52.88	1146
Mar-1996											7.92	0.05	12.27	3.70	1349	12.35	0.02	14.59	10.22	1367	54.22	0.04	58.26	50.39	1367
Apr-1996											7.30	0.05	10.91	3.74	1280	11.58	0.03	13.85	8.81	1288	52.85	0.06	56.93	47.85	1288
May-1996											8.56	0.04	13.83	4.35	1399	11.08	0.04	13.87	9.11	1409	51.94	0.06	56.96	48.39	1409
Jun-1996											7.89	0.04	12.09	3.80	1363	10.45	0.02	13.44	8.93	1384	50.82	0.04	56.19	48.07	1384
Jul-1996											8.55	0.05	13.38	3.69	1436	11.26	0.02	14.35	9.49	1442	52.27	0.04	57.82	49.09	1442
Aug-1996											8.12	0.04	12.41	3.11	1399	11.46	0.02	13.94	9.77	1397	52.63	0.04	57.09	49.59	1397
Sep-1996											7.44	0.04	12.06	3.18	1391	12.22	0.03	14.38	10.17	1387	54.00	0.05	57.88	50.30	1387
Oct-1996											8.80	0.04	11.98	1.64	1491	11.95	0.02	14.70	9.13	1484	53.51	0.04	58.47	48.43	1484
Nov-1996											9.19	0.05	12.79	3.98	1386	11.69	0.01	12.39	9.77	1388	53.04	0.02	54.30	49.59	1388
Dec-1996											8.27	0.04	11.58	4.31	1263	11.89	0.02	12.96	10.04	1260	53.40	0.03	55.33	50.07	1260
Jan-1997											8.83	0.05	12.99	3.15	1392	12.46	0.01	13.27	11.21	1428	54.42	0.02	55.89	52.17	1428
Feb-1997											9.34	0.06	14.57	3.63	1244	11.43	0.03	12.99	9.38	1247	52.57	0.05	55.38	48.88	1247
Mar-1997											8.31	0.05	12.74	3.94	1260	10.59	0.02	12.50	8.97	1259	51.06	0.04	54.50	48.14	1259
Apr-1997											8.27	0.05	13.07	4.03	1299	10.85	0.02	12.21	9.03	1299	51.53	0.04	53.97	48.25	1299
May-1997											9.51	0.05	14.11	5.55	1337	11.41	0.03	14.90	9.20	1337	52.54	0.06	58.83	48.56	1337
Jun-1997											9.40	0.05	14.26	4.69	1439	11.74	0.03	14.65	9.68	1441	53.13	0.05	58.37	49.42	1441
Jul-1997											9.02	0.06	14.51	3.65	1422	12.33	0.03	15.05	9.42	1423	54.19	0.06	59.09	48.95	1423
Aug-1997											9.92	0.05	14.54	5.68	1393	14.48	0.05	18.57	10.88	1393	58.07	0.09	65.43	51.58	1393
Sep-1997											9.66	0.05	13.60	5.71	1391	14.29	0.03	18.24	11.96	1391	57.72	0.05	64.83	53.52	1391
Oct-1997											8.42	0.04	12.72	3.90	1372	15.83	0.03	17.73	12.82	1408	60.50	0.05	63.92	55.07	1408
Nov-1997											10.47	0.05	15.66	3.72	1370	16.47	0.01	17.34	14.33	1421	61.64	0.02	63.22	57.80	1421
Dec-1997											9.68	0.05	13.66	4.02	1475	15.44	0.02	16.53	14.22	1475	59.79	0.03	61.76	57.60	1475
Jan-1998											8.42	0.06	14.45	3.70	1434	14.87	0.01	15.40	14.48	1439	58.77	0.01	59.71	58.06	1439
Feb-1998											10.64	0.05	14.91	6.24	1249	14.53	0.01	15.00	13.86	1249	58.16	0.01	59.01	56.95	1249
Mar-1998											8.81	0.05	13.58	3.28	1485	13.77	0.01	14.65	11.53	1488	56.79	0.02	58.36	52.75	1488
Apr-1998											10.08	0.05	13.82	5.32	1344	12.62	0.03	14.81	9.54	1344	54.72	0.05	58.65	49.18	1344
May-1998											9.15	0.04	13.76	5.08	1487	12.75	0.03	15.16	9.67	1487	54.95	0.05	59.28	49.41	1487
Jun-1998											8.13	0.06	14.10	1.00	1334	13.08	0.04	16.10	10.50	1344	55.55	0.06	60.98	50.90	1344
Jul-1998											8.47	0.05	13.50	3.70	1487	12.27	0.04	15.20	9.70	1488	54.09	0.06	59.36	49.46	1488
Aug-1998											7.62	0.05	12.60	3.40	1454	13.46	0.03	15.90	11.20	1454	56.24	0.05	60.62	52.16	1454
Sep-1998											8.50	0.05	13.10	3.20	1424	14.24	0.03	16.20	11.70	1426	57.64	0.05	61.16	53.06	1426
Oct-1998											7.94	0.04	11.50	4.30	1371	12.96	0.03	16.10	10.60	1391	55.34	0.06	60.98	51.08	1391
Nov-1998											8.02	0.05	13.30	3.90	1396	12.00	0.01	13.60	10.60	1438	53.60	0.03	56.48	51.08	1438
Dec-1998											9.23	0.05	13.30	2.20	1343	11.29	0.02	12.50	9.90	1344	52.32	0.03	54.50	49.82	1344
Jan-1999											8.78	0.05	12.30	4.30	1147	11.34	0.02	12.50	10.20	1439	52.42	0.03	54.50	50.36	1439
Feb-1999											7.71	0.04	11.40	3.10	1344	11.27	0.01	12.20	10.40	1344	52.29	0.01	53.96	50.72	1344
Mar-1999											9.59	0.04	13.30	3.10	1488	10.86	0.02	12.40	9.50	1488	51.55	0.03	54.32	49.10	1488
Apr-1999											8.47	0.04	12.30	4.60	1342	10.11	0.02	12.60	8.80	1342	50.20	0.04	54.68	47.84	1342
May-1999											8.19	0.05	12.70	4.00	1440	10.21	0.02	11.90	8.50	1440	50.39	0.04	53.42	47.30	1440
Jun-1999											10.05	0.05	14.10	2.80	1337	11.13	0.02	13.40	9.10	1337	52.04	0.04	56.12	48.38	1337
Jul-1999											9.09	0.04	13.80	4.10	1392	12.38	0.03	16.00	9.50	1392	54.28	0.06	60.80	49.10	1392
Aug-1999											9.68	0.06	14.40	3.20	1487	11.76	0.03	15.20	10.10	1487	53.17	0.05	59.36	50.18	1487
Sep-1999											9.15	0.04	12.60	4.70	1329	12.58	0.02	14.70	10.10	1391	54.65	0.04	58.46	50.18	1391
Oct-1999											9.31	0.05	12.40	0.10	921	12.91	0.03	15.70	10.60	1440	55.24	0.05	60.26	51.08	1440
Nov-1999											9.46	0.04	13.30	5.50	1440	13.05	0.02	14.20	10.50	1440	55.48	0.04	57.56	50.90	1440
Dec-1999											9.44	0.04	13.60	4.50	1481	11.47	0.02	13.00	10.10	1481	52.65	0.03	55.40	50.18	1481
Jan-2000											11.30	0.08	17.20	5.50	915	12.08	0.01	12.55	11.40	912	53.75	0.02	54.59	52.52	912
Feb-2000											11.16	0.06	17.42	5.50	1368	12.46	0.00	12.85	12.22	1362	54.44	0.01	55.13	54.00	1362
Mar-2000											12.57	0.05	16.88	8.00	1490	11.61	0.03	13.79	8.41	1486	52.91	0.05	56.82	47.14	1486
Apr-2000	86.23	0.51	116.86	3.58	1407	7.50	0.04	10.16	0.33	1407	10.60	0.05	17.10	6.45	1407	11.76	0.03	14.28	8.95	1407	53.17	0.05	57.70	48.11	1407
May-2000	82.36	0.67	122.17	6.83	1489	7.22	0.06	10.16	0.60	1489	9.77	0.05	14.05	4.95	1487	11.33	0.03	14.37	7.55	1489	52.40	0.05	57.87	45.59	1489
Jun-2000	87.82	0.62	122.07	27.90	1408	7.63	0.05	10.16	2.60	1408	12.49	0.05	17.20	4.98	1408	11.73	0.04	14.59	8.20	1406	53.11	0.06	58.26	46.76	1406
Jul-2000	74.17	0.50	113.92	26.97	1406	6.43	0.04	9.37	2.37	1406	11.13	0.05	16.50	5.50	1408	11.84	0.03	14.98	9.57	1408	53.32	0.06	58.96	49.23	1408
Aug-2000	77.86	0.46	121.77	22.36	1484	6.80	0.04	10.16	1.90	1484	9.80	0.06	18.50	4.40	1487	11.63	0.02	14.31	8.66	1487	52.94	0.04	57.76	47.59	1487
Sep-2000	80.86	0.43	116.04	30.42	1417	6.84	0.03	9.78	2.59	1417	12.75	0.05	16.30	7.80	1430	13.12	0.04	16.50	10.17	1430	55.62	0.07	61.70	50.31	1430
Oct-2000	76.36	0.33	105.68	46.18	1444	6.46	0.03	8.64	4.16	1444	13.87	0.06	18.23	6.83	1488	13.17	0.03	15.54	10.21	1487	55.71	0.06	59.97	50.38	1487
Nov-2000	85.04	0.23	105.99	62.44	1214	7.46	0.02	9.30	5.66	1214	13.94	0.05	17.90	8.47	1440	11.45	0.02	14.28	9.93	1440	52.62	0.04	57.70	49.87	1440
Dec-2000	85.97	0.27	99.79	63.05	576	7.48	0.02	8.55	5.60	576	12.60	0.05	17.40	7.67	1480	12.11	0.01	13.02	10.12	1479	53.80	0.02	55.44	50.22	1479
Jan-2001	96.48	0.14	108.43	69.54	1444	8.37	0.01	9.38	6.30	1444	11.21	0.08	19.60	4.65	1450	12.08	0.00	12.38	11.53	1448	53.75	0.01	54.28	52.75	1448
Feb-2001	90.28	0.25	104.39	51.72	1343	7.96	0.02	9.18	4.67	1343	12.08	0.09	17.37	1.80	1343	11.29	0.02	12.21	9.04	1343	52.31	0.03	53.98	48.27	1343
Mar-2001	92.30	0.37	119.52	47.71	1370	8.02	0.03	10.16	4.35	1370	12.83	0.06	18.05	5.63	1485	11.90	0.02	13.69	9.74	1485	53.41	0.03	56.64	49.53	1485

Monthly means