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RS-13-002

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-001

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: Response to Request for Additional Information Related to License Amendment Request to Technical Specification 3.7.3, "Ultimate Heat Sink"

References:

1) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Request for a License Amendment to LaSalle County Station, Units 1 and 2, Technical Specification 3.7.3, 'Ultimate Heat Sink,'" dated July 12, 2012

2) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Supplemental Information Related to License Amendment Request to LaSalle County Station, Units 1 and 2 Technical Specification 3.7.3, 'Ultimate Heat Sink,'" dated September 17, 2012

3) Letter from N. J. DiFrancesco (U. S. Nuclear Regulatory Commission) to M. J. Pacilio (Exelon Generation Company, LLC), "LaSalle County Station, Units 1 and 2 – Request for Additional Information Related to License Amendment Request to Technical Specification 3.7.3 Ultimate Heat Sink (TAC Nos. ME9076 and ME9077)," dated January 9, 2013

In Reference 1, Exelon Generation Company, LLC, (EGC) requested an amendment to the Technical Specifications (TS) of Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station, Units 1 and 2 (LSCS). The license amendment would allow the TS temperature limit of the cooling water supplied to the plant from the Ultimate Heat Sink (UHS) to vary with the observed diurnal cycle. EGC supplemented Reference 1 with a letter dated September 17, 2012 (Reference 2).

The U. S. Nuclear Regulatory Commission (NRC) requested additional information to complete its review of the proposed license amendment request in Reference 3. Attachments 1, 2 and 3 provide the requested information, with the exception of Questions 3 and 5 of Reference 3. As discussed with the NRC on January 17, 2013, it was agreed that EGC would provide the response for those questions in a separate submittal by February 11, 2013.

During the development of the response, a previously incorporated refinement was identified related to the computer program used to model the LSCS UHS, LAKET-PC. It was identified that the equation in Reference 1 associated with net solar radiation to the UHS had been revised to utilize a more detailed approach. This refinement is described in Attachment 2 of this submittal.

EGC has reviewed the information supporting a finding of no significant hazards consideration that was previously provided to the NRC in Attachment 1 of Reference 2. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendments do not involve a significant hazards consideration.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), a copy of this letter and its attachments are being provided to the designated State of Illinois official.

There are no regulatory commitments contained in this submittal.

Should you have any questions concerning this letter, please contact Ms. Lisa A. Simpson at (630) 657-2815.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 18th day of January 2013.

Respectfully,

Patrick R Simpson

Patrick R. Simpson
Manager – Licensing
Exelon Generation Company, LLC

Attachments:

1) Response to Request for Additional Information
2) Supporting Information – Response to NRC Question 1
3) Supporting Information – Requested Plant Data

cc: Illinois Emergency Management Agency – Division of Nuclear Safety

ATTACHMENT 1
Response to Request for Additional Information

By letter to the U. S. Nuclear Regulatory Commission (NRC) dated July 12, 2012, Exelon Generation Company, LLC, (EGC) requested an amendment to the Technical Specifications (TS) of Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station, Units 1 and 2 (LSCS). The license amendment would allow the TS temperature limit of the cooling water supplied to the plant from the Ultimate Heat Sink (UHS) to vary with the observed diurnal cycle. This letter was supplemented by EGC letter dated September 17, 2012. In a letter dated January 9, 2013, the NRC requested additional information to complete its review of the proposed license amendment request.

NRC Question 1:

Review of Inputs

Background: Section 4, item (1), "Surface Weather Observations" of Attachment K, pages K2 and K3 states:

> "Raw surface weather observations (Reference 2) from KPIA [weather station in Peoria, Illinois] covered the period of record from January 1, 1995 through December 31, 2004. NCDC [National Climatic Data Center] subjects meteorological data to rigorous quality control checks before archiving it. Nevertheless, meteorological databases still typically include gaps and data values outside of valid ranges. The archived data included most of the weather parameters required by Laket [LakeT-PC computer model] (Table 1), with the following exceptions: freezing precipitation code, solar radiation, atmospheric radiation, and partial pressure of water vapor. S&L [Sargent and Lundy] estimated those parameters using standard methods. To check the thermodynamic consistency of the input data, S&L estimated hourly wet bulb temperature, dew point temperature and humidity to ensure consistency between those parameters and the (on-site) dry-bulb temperature. In instances when the dew point temperature at KPIA exceeded the dry-bulb temperature at the on-site meteorological tower, the dew point temperature at KPIA was set equal to the dry-bulb temperature observed at the on-site tower. This ensured thermodynamic consistency between the relative humidity and the dry-bulb, wet-bulb temperature and dew point temperatures."

Requests: For each of the estimated parameters (particularly for solar radiation and atmospheric radiation), please provide a detailed description of the methodology, inputs, assumptions, and bases used to make the estimates. Additionally, provide an example calculation demonstrating how each type of estimate was generated.

EGC Response to Question 1:

The response to Question 1 is provided in Attachment 2 to this submittal.

NRC Question 2:

Background: The treatment of wind speed is an important consideration for UHS analysis heat transfer. Section M4.2 of Attachment M, states that the meteorological tower measurement height is 33 feet (ft) above ground level (or 752 ft. above mean sea level [MSL]) and the base of the meteorological tower is at 719 ft MSL. The 33-ft (10 meter) measurement height is used in the LakeT-PC model is not discussed. Thus, assuming: (1) the meteorological measurements

were made at 752 ft MSL, (2) the Ryan wind function is applicable at 2 meters (6.6 ft) above the water surface (Section 2.3, NUREG-0693, "Analysis of Ultimate Heat Sink Cooling Ponds," November 1980, (ADAMS Accession No. 8012120331)), and (3) the nominal lake surface level is 690 ft MSL during a UHS heatup event, please answer the following:

Requests:

a. How does the analysis account for the difference in heights between LSCS's meteorological measurements (752 ft MSL) and the nominal lake surface level (690 ft MSL) during a UHS heatup event?

b. How were the wind gradients modeled and why are they conservative for LSCS's site characteristics for UHS cooling performance?

c. Justify the applicability of the Hefner and Ryan wind function to the LSCS's site characteristics. Additionally, discuss the rational and effect of switching between the wind functions when the Ryan predicted lake temperature is within 2.5 °F of the natural lake temperature (as calculated by the Hefner function).

EGC Response to Question 2a:

Both the Ryan and Lake Hefner wind functions utilized within LAKET-PC are based on a wind speed 2 meters (6.56 ft) above the water level. The wind speed and the elevation (above ground level) at which it was measured are necessary inputs to LAKET-PC. The program then corrects the wind speed based on the measured elevation to a reference elevation of 2 meters above ground per the following equation:

$$WNDCOR = 1.15\left[\frac{mph}{knots}\right]\cdot\left(6.56/WINDZ\right)^{0.3} \qquad \text{(Reference 1)}$$

where,

WNDCOR = wind correction factor to 2m (6.56 ft) above ground level
WINDZ = measurement elevation above ground level (ft)
1.15 = Conversion factor from knots to mph

This equation, used to model the wind gradient, is discussed in further detail in the response to question 2b. The wind speed is corrected to 2 meters above the ground level at the location where it is measured. The UHS pond is located at a site other than where the wind is measured. The inherent assumption in using wind data not measured precisely at the location of the UHS pond is that the wind profile at the measured location is applicable to the location of the pond. This is a reasonable assumption for LSCS because 1) the wind speed is measured at LSCS, relatively close to the UHS pond and 2) the topography of the area is generally flat with no significant obstructions that would cause significant changes in the wind profile across this relatively small distance.

For these reasons, the differences in wind profiles at the wind measurement site and the UHS pond site are considered to be insignificant. The wind profile is a function of the relative height above the ground. Although the UHS pond is located at a lower elevation, the wind profile is

similar to the wind profile at the measurement site and thus, the measured wind speed corrected to 2 meters above the ground is a reasonable value for the wind speed at 2 meters above the nearby UHS pond water level.

EGC Response to Question 2b:

LAKET-PC models wind gradients (as a function of the elevation above ground level) per the following equation:

$$WNDCOR = 1.15\left[\frac{mph}{knots}\right] \cdot \left(6.56 / WINDZ\right)^{0.3}$$ (Reference 1)

where,

WNDCOR	= wind correction factor to 2m (6.56 ft) above ground level
WINDZ	= measurement elevation above ground level (ft)
1.15	= Conversion factor from knots to mph

The wind speed extrapolation is a power law equation correcting the wind speed to an elevation of 2 meters above the ground level (the reference wind speed elevation used for wind functions in MIT Report No. 161 (Reference 2)). There are a variety of exponential factors that have been used over the years in the power law equation, which are introduced in Section 2.2.4 of the structural engineering book, "Wind Effects on Structures" (Reference 1). The original LAKET-PC program was developed in 1971 – 1972, and the only reference for the power law exponent cited in the book pre-dating LAKET-PC recommends an exponent of 0.28 for suburban terrain, and 0.16 for open terrain. As the wind measurement height is always expected to be above 2 meters, a higher exponent is more conservative for extrapolating wind speeds to 2 meters since lower wind speeds are conservative for the UHS analysis. The two other (more recent) references for the exponent in "Wind Effects on Structures" (Reference 1) suggest even lower exponents for the suburban terrain. Thus, LAKET-PC uses a conservatively bounding value of 0.3 for the exponent.

EGC Response to Question 2c:

Attachment N of Calculation L-002457 (Reference 3) reviewed the methodology utilized in LAKET-PC and confirmed its acceptability when compared to NUREG-0693, "Analysis of Ultimate Heat Sink Cooling Ponds," (Reference 4). The attachment reviewed the LAKET-PC manual and source code and compared the LAKET-PC analysis approach to NUREG-0693. The use of the Ryan and Lake Hefner wind functions was discussed in detail.

LAKET-PC calculates evaporation based on both natural and forced evaporation rates. The natural lake temperature is defined as the temperature of the lake reacting purely to natural influences (no additional heat added to the lake). The natural evaporation is calculated as the evaporation from the total surface area of the lake at its natural temperature. Section 2.4.1 of MIT Report No. 161 (Reference 2) discusses evaporation from a free (natural) water surface. The MIT report notes that test data from several lakes (Lake Hefner, Lake Mead, and Lake Eucumene in Australia) confirms that the Lake Hefner evaporation wind function performed satisfactorily. Thus, LAKET-PC utilizes the Lake Hefner wind function when characterizing the natural evaporation.

The Lake Hefner wind function is presented below:

$$F_{LH}(w) = 17W \qquad \text{(Reference 2)}$$

where

$F_{LH}(w)$ = Lake Hefner wind function (BTU/ft^2 day/mmHg)
W = wind speed measured 2 meters above the water surface (mph)

Forced evaporation is defined in LAKET-PC as the increase over the natural evaporation caused by the influence of the plant. Only the portion of the lake deemed effective is used in calculating the forced evaporation. When considering the additional heat rejected from the water, the wind function must account for forced convection at the water / air surface layer in addition to the wind alone. The MIT report (Reference 2) introduces the Ryan wind function, which is dependent on the wind speed, the atmospheric pressure, dry bulb air temperature, water surface temperature, and relative humidity of the air. Section 2.4.2.6 of MIT Report No. 161 (Reference 2) presents field performance data compared to the wind function equations and shows that the proposed Ryan wind function fits the data quite well. NUREG-0693 also presents the Ryan wind function as an alternative to the simplified Brady wind function. For these reasons, LAKET-PC utilizes the Ryan wind function for calculating the forced evaporation. The explicit equation for the Ryan wind function is presented below:

$$F_R(w) = 22.4\left[\left(\frac{T_S + 460}{1-\frac{0.378e_s}{P}}\right) - \left(\frac{T_A + 460}{1-\frac{0.378e_a}{P}}\right)\right]^{1/3} + 14W \qquad \text{(Reference 2)}$$

where

$F_R(w)$ = Ryan wind function (BTU/ft^2 day/mmHg)
T_S = water surface temperature (°F)
T_A = dry bulb air temperature (°F)
e_S = saturated vapor pressure at T_S (mmHg)
e_a = partial vapor pressure at T_A and relative humidity (mmHg)
P = atmospheric pressure (mmHg)
W = wind speed measured 2 meters above the water surface (mph)

Note that since the Lake Hefner model is applied to the entire lake, the forced evaporation term is calculated only in the effective area of the lake as the forced evaporation (per the Ryan wind function) minus the natural evaporation (per the Lake Hefner wind function). Thus, the forced evaporation value presented in the output of LAKET-PC is the increase over the natural evaporation caused by the influence of the plant.

When the calculated lake temperature approaches the natural lake temperature, LAKET-PC switches to the Lake Hefner wind function for the entire lake and conservatively ignores the forced evaporation term. A review of the code shows that the forced evaporation term is dropped and the natural wind function (Lake Hefner function) is used when the calculated lake temperature is within 2.5°F of the natural lake temperature. Although there is no explicit criterion for the switch from forced to natural evaporation, 2.5°F is conservative as any water

temperature above the natural temperature will exhibit some forced evaporation. In neglecting the forced term for temperatures up to 2.5°F above the natural lake temperature, LAKET-PC is reducing the evaporative heat flux from the lake. This results in slightly higher calculated lake temperatures, which is conservative for the UHS analysis.

NRC Question 3:

Review of Weather Screening

Background: The purpose of the LakeT-PC model analysis is to ensure that the temperature of the UHS during the design basis event will not result in the UHS exceeding the design limit for the cooling water supplied to the plant safety systems. Attachment 1 to the proposed license amendment request (LAR) states that the transit time of the plant accident energy through the UHS is approximately 30 hours. Section 4.0 of the proposed LAR describes the selection of the worst-case meteorological conditions for 1-day and 30-day periods.

Request: Justify the selection and use of a 24-hour worst-case meteorological period when analyzing a 30-hour transit time.

EGC Response to Question 3:

The response to Question 3 will be provided in a separate submittal.

NRC Question 4:

Background: Attachment 3, L-002457 (L-002457), Revision 7, assumes a lake temperature and plant discharge of 100 °F for weather screening purposes. Attachment I, Figure I7.8, page I20, shows that during the first 24 hours, the LSCS UHS pond temperature varies from approximately 140 °F to 101 °F (UHS inlet to UHS outlet).

Section M3.1, "Initial Lake Temperature," of Attachment M states:

> "For the worst weather evaluation, the initial lake temperature is set at 100 °F. This is an arbitrary reference value for determining the relative weather severity and does not influence the results of this analysis."

Section M3.3, "Station Thermal Boundary Condition," of Attachment M states:

> "The plant discharge water temperature when determining the worst-weather day and month is assumed to be 100°F. Since the lake is modeled as open cycle, the lake starts at this temperature at the start of each 3 hour time interval. A constant initial temperature allows for isolation of the meteorological effects on the lake."

Requests:

a. Please justify how the current screening approach of assuming an initial lake temperature of 100 °F, as described in Sections M3.1 and M3.3, is appropriate for application to the LSCS UHS design given that the calculated lake inlet and outlet temperatures range from 101 °F to 140 °F during the first 24 hours after an accident. Also, please justify how the use of an initial lake temperature of 100°F identifies the worst meteorological conditions for the UHS critical time periods corresponding to minimum water cooling and the applicable conditions for maximum water evaporation.

b. If a different set of meteorological conditions is identified as limiting as a result of revising the screening approach, please confirm that the resultant cooling water temperatures (using the revised meteorological conditions) remain bounded by the proposed TS limits.

EGC Response to Question 4a:

For determining the worst 24-hour and 30-day weather, a specific UHS model was created in LAKET-PC with a transit time corresponding to the three hour time step period. The model is an open cycle, which means water exiting the lake is discarded and new water enters the lake at predetermined conditions independent of the existing lake conditions. The UHS is set to the same initial temperature at the beginning of each three hour time step. Since initial conditions are the same for each time step, there are no residual effects due to the weather from the preceding time step. The UHS outlet temperature for each 3 hour period corresponds to the environmental effects on the UHS during these three hours. From these results, it can be implied that higher UHS outlet temperatures represent worse (hotter) weather conditions.

Calculation L-002457 (Reference 3) Section M3.1 corresponds to the LAKET-PC input of the initial lake temperature for the first time step in the weather file (in this case January 1, 1995). L-002457 Section M3.3 corresponds to the LAKET-PC input of the plant discharge water temperature. Since the lake is modeled as an open cycle, this corresponds to the lake temperature at the start of a time step. A value of 100°F was chosen as the plant discharge water temperature for determining the worst weather conditions of the UHS since this temperature is approximately equal to the average lake temperature for the 30 days following an accident of 102.1°F.

Table 1 of Reference 3 Attachment 1 describes the heat load equations used in the LAKET-PC program. The net heat transfer to the UHS is:

$$Q = Q_{SN} + Q_{AN} - Q_{BR} - Q_E - Q_C + Q_{RJ}$$

where:
Q_{SN} = net incident short wave solar radiation
Q_{AN} = net incident long wave atmospheric radiation
Q_{BR} = net rate of long wave back radiation from the lake surface
Q_E = net rate of heat loss due to evaporation
Q_C = net rate of heat loss due to conduction and convection
Q_{RJ} = net rate of heat rejected to the lake by the plant

The terms of this equation that are affected by the assumed initial UHS temperature during environmental (weather) screening are Q_{BR}, Q_E, and Q_C. These terms determine the amount of energy rejected to the environment by the UHS. The environmental impacts on these terms are wind speed, dry-bulb temperature, and relative humidity. The back radiation term is increased as the UHS water temperature is increased. The evaporation and conduction/convection terms are increased as the difference between the UHS water temperature and the dry-bulb temperature/relative humidity is increased. The screening process evaluates the UHS model for each three-hour period as described in Attachment M of L-002457. The environmental conditions that would be evaluated as limiting (worst 24-hour or 30-day period) would be those that maximize the net heat transfer to the UHS water – create the maximum Q in the above equation. In order to maximize the net heat transfer to the UHS, Q_{BR}, Q_E, and Q_C must be minimized. For a given UHS water temperature, the environmental conditions with the highest dry-bulb temperature, the highest relative humidity, and the lowest wind speed would minimize the terms Q_{BR}, Q_E, and Q_C. The same environmental conditions would also minimize these terms when an initial UHS temperature of 110°F or 120°F is assumed. Therefore, the use of 100°F as the initial UHS water temperature is acceptable to screen environmental data.

<u>EGC Response to Question 4b:</u>

Because a different set of meteorological conditions was not identified during review of the screening approach, the resulting cooling water temperatures remain bounded by the proposed technical specification limits.

<u>NRC Question 5:</u>

Review of UHS Transient Heatup

<u>Background:</u> The licensee has stated that the transit time for core standby cooling system (CSCS) flow across the UHS pond during a design-basis accident loss-of-coolant accident (DBA-LOCA) is 30 hours with the UHS sediment level of 1.5 feet. In the DBA-LOCA analysis, the licensee considered the worst 24-hour period of meteorological conditions for controlling parameters in determining peak UHS temperature. By considering the worst 24-hour period, the licensee's analysis showed that the peak temperature of the UHS after a LOCA, which started at 6:00 a.m., would be approximately 12 hours after the LOCA, which occurs 18 hours before any of the UHS water that is affected by accident heat input enters the plant intake.

Attachments I [Figure I7.7] and L [Appendix L9.4] of Calculation L-002457, "LaSalle County Station Ultimate Heat Sink Analysis," show the effects of the heat added to the UHS by the DBA-LOCA, whose effects do not reach the UHS outlet to the plant until 30 hours after the DBA-LOCA. Figure I7.7 shows temperatures near 140 °F initially entering the UHS immediately after the DBA and shows the UHS inlet temperature to be well above 120 °F for most of the first day after the DBA–LOCA, yet, the UHS outlet to the plant has already peaked at 107 °F at about 3:00 p.m. on the first day. According to Figure 4 of the LAR, the maximum temperature of the UHS outlet temperature on the second day is below the maximum temperature on the first day, indicating that the heat added by the DBA-LOCA has little effect on the UHS outlet temperature. The seeming lack of influence upon peak UHS temperature by the accident heat and the meteorological conditions of second day after the accident could be attributed to a relatively cool, cloudy, or windy day after the first day following the DBA-LOCA, which is the first day of the 30-day critical period.

Issues: Heat waves where weather extremes have persisted for multiple consecutive days are not uncommon. Considering that a heat wave is in progress and the first critical time period of 24 hours as used by the licensee, the first day of the worst 30-day period may not be representative of the actual second day after an accident. Also, in a letter dated May 6, 2011, the licensee stated that high temperatures and humidity during the daytime, in conjunction with minimal cooling at night and little precipitation during the summer months, results in elevated water temperatures in the LSCS UHS.

The NRC staff is not certain that the licensee has chosen appropriate critical time periods unique to the specific design of the CSCS pond. According to Regulatory Position 1 of Regulatory Guide (RG) 1.27, "the meteorological conditions resulting in minimum water cooling should be the worst combination of controlling parameters, including diurnal variations where appropriate, for the critical time period(s) unique to the specific design of the sink," and "sufficient conservatism should be provided to ensure that a 30-day cooling supply is available and that design basis temperatures of safety related equipment are not exceeded." In RG 1.27 it also states that "meteorological conditions considered in the design of the UHS should be selected with respect to the controlling parameters (i.e., wind speed, humidity, dew point, air temperature, solar radiation, etc.)."

The licensee selected a first critical time period of 24 hours, independent of the time of the accident and the UHS transit time. However, the NRC staff believes that the first critical time period would be 30 hours or greater, dependent upon time of accident initiation and UHS transit time. Using these variable and first critical time periods would yield more limiting and accurate results. The staff also believes that the first critical time period should be verified by assuming greater first critical time periods and performing the analysis and comparing results. The staff also believes that the analysis for each assumed accident start time, i.e., 6:00 a.m. - 9 a.m., etc., would have its own set of worst-weather data for its particular critical time period.

Requests:

a. The NRC staff requests that the licensee justify their selection of weather data and critical time periods or propose new analysis that would address the NRC staff concerns presented in Issues above.

b. Justify the constant transit time across the UHS pond that is used in your analysis, since reduction in UHS volume over the 30-day recovery period would cause transit time to decrease. If the decrease in transit time is modeled, justify whether the effective UHS volumes, surfaces, and transit times predicted in Attachment J remain applicable.

EGC Response to Question 5:

The response to Question 5 will be provided in a separate submittal.

<u>NRC Question 6:</u>

<u>Background:</u> In the licensee's LAR submittal dated July 12, 2012, it states that,

> "The current TS temperature limit does not reflect the diurnal effect that weather conditions have upon the allowable UHS temperature. Since the UHS heats up during the day and cools off during the night, the allowable UHS temperature is dependent upon the time of day when the design basis event occurs."

Therefore, the licensee has proposed new TS temperature limits as shown in Figure 3.7.3, based on diurnal variations. Figures 4, 5, and 6, of the LAR show the calculated effects of the diurnal cycle and, particularly, the first 30 hours show the cycle before any heat from the postulated accident has an effect.

<u>Issue:</u> Although the diurnal effects of the weather on the temperature of the cooling water supplied to the plant from the CSCS pond, when the cooling lake is intact, would not be identical to the diurnal effects on the CSCS pond during a DBA, the licensee did not provide actual plant data that shows that diurnal variation would exist at LSCS.

<u>Request:</u> The NRC staff requests the following plant data - recordings of cooling water temperature supplied to the plant from the CSCS pond (from the same source that is used for Surveillance Requirement (SR) 3.7.3.1) every hour on the hour for every day in June, July, and August for 2012. For every recording also include reactor power for both units and ambient temperature. If available, also provide a measure of humidity with each recording (i.e., relative humidity, or dew point, or wet bulb temperature).

<u>EGC Response to Question 6:</u>

The data sets provided consist of onsite measured ambient temperature and windspeed, cooling water temperature used to meet SR 3.7.3.1 (average of both Units), and instantaneous core thermal power (CTP) data on an hourly basis for LSCS Units 1 and 2 for June, July, and August of 2012. The data sets are contained in Attachment 3. On site data for relative humidity, dew point, and wet bulb temperature are not available.

<u>NRC Question 7:</u>

Review of LaSalle Design Basis Capabilities

<u>Background:</u> The actual equipment temperature limit of the UHS was originally 100 °F. By reducing margin, the licensee subsequently increased the actual equipment temperature limit to 104 °F. The original design fouling factor for the residual heat removal (RHR) heat exchangers is 0.0025. The original design fouling factor for the diesel generators (DG) coolers is 0.00285. In the proposed LAR, the licensee has proposed new UHS TS limits which are based on an allowable actual equipment temperature limit of 107 °F. Attachment 5 of the LAR shows the licensee's calculated heat transfer capabilities of the heat exchangers cooled by CSCS at 107 °F.

Issues: The licensee used a design fouling factor of 0.00147 in order to qualify RHR heat exchanger (HX) for the design heat removal rate at 107 °F. Attachment 5 shows the required heat transfer rate of 165,564,000 Btu/hr for the DBA-LOCA. The calculated rate using a fouling factor of .00147 and cooling water at 107 °F is 166,468,480 BTU/hr, which provides a small heat transfer margin of 0.55 percent. The licensee states that the Generic Letter (GL) 89-13 testing verifies a lower fouling factor while using a 107 °F UHS temperature.

The licensee is using a design fouling factor of 0.0022 in order to qualify DG coolers for the design heat removal rate at 107 °F. Attachment 5 shows a heat transfer margin of 1.5 percent. The licensee states that the GL 89-13 testing verifies a lower fouling factor while using 107 °F UHS temperature.

Requests:

a. Describe the GL 89-13 testing for the RHR HXs and discuss the accuracy of the testing with respect to design conditions. With a low heat transfer margin for the RHR HXs, please justify your reliance of GL 89-13 testing as a means of assuring that the required heat transfer capability of the RHR heat exchangers is maintained.

b. Describe the GL 89-13 testing for the DG coolers and discuss the accuracy of the testing with respect to design conditions. With a low heat transfer margin for the DG coolers, please justify your reliance of GL 89-13 testing as a means of assuring that the required heat transfer capability of the DG coolers is maintained.

EGC Response to Question 7a:

GL 89-13 testing of the RHR HXs is completed in accordance with the LSCS Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," program, which utilizes the guidelines for the heat transfer test method established in EPRI Technical Report TR-107397 (Reference 6), Section 2.2. This test method allows testing at conditions far removed from limiting (design) conditions and is highly reliable. The testing apparatus includes multiple precision resistance temperature detectors (RTDs) evenly spaced around the circumference of the piping. The RTDs are installed with thermal paste and are also insulated during the test to minimize the effects of the surrounding environment.

The RHR HXs are tested in the safety related containment cooling mode of the RHR system. To complete the test, suppression pool water is pumped via the RHR system pumps through the shell side of the RHR HX while cooling water is pumped via the RHR Service Water System pumps through the tube side of the RHR HX. By procedure, test conditions are set to ensure sufficient heat load and proper flow conditions occur during the test. Fluid temperature stability is verified for a requisite amount of time prior to the commencement of the test. Process water and cooling water flow rates and temperatures are then recorded for a period of 30 minutes.

This test data is averaged and input to commercially available software (Proto-HX) that uses a heat exchanger model that has been benchmarked to the heat exchanger data sheet. The heat transfer capability and fouling factor of the heat exchanger is determined at the user input test conditions. Once this is complete, the same software then extrapolates the heat transfer capability of the heat exchanger utilizing user specified design conditions and standard heat transfer equations. The design conditions consist of the minimum required cooling water and

process water flow rates and the maximum cooling water and process water temperatures. Instrument uncertainties for flow and temperature measuring instruments are also input by the user.

Per EPRI document TR-107397, factors such as spatial bias are taken into account to statistically determine the uncertainty in the test results. The results previously reported in Attachment 5, Table A5-1 of the original submittal were the worst case heat transfer and worst case fouling factor when considering the worst case test uncertainty. Taking into account this worst case scenario, the GL 89-13 testing accurately predicts the performance of the RHR heat exchangers during design conditions. Additionally, the most recent worst case results for the GL 89-13 tests of the RHR HXs show approximately 10-19% thermal margin at design conditions.

EGC Response to Question 7b:

GL 89-13 testing of the DG jacket water coolers is completed in accordance with the LSCS Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," program, which utilizes the guidelines for the heat transfer test method established in EPRI document TR-107397, Section 2.2. This test method allows testing at conditions far removed from limiting (design) conditions and is highly reliable. The testing apparatus includes multiple precision RTDs evenly spaced around the circumference of the piping. The RTDs are installed with thermal paste and are also insulated during the test to minimize the effects of the surrounding environment. To complete the test, the Diesel Generator is started and fully loaded in accordance with station procedures. The jacket water is pumped via the jacket water pump through the shell side of the DG jacket water cooler while cooling water is pumped via the DG Cooling Water System pump through the tube side of the DG jacket water cooler. By procedure, test conditions are set to ensure sufficient heat load and proper flow conditions occur during the test. Fluid temperature stability is verified for a requisite amount of time prior to the commencement of the test. Process water and cooling water flow rates and temperatures are then recorded for a period of 30 minutes.

This test data is averaged and input to commercially available software (Proto-HX) that uses a heat exchanger model that has been benchmarked to the heat exchanger data sheet. The heat transfer capability and fouling factor of the heat exchanger is determined at the user input test conditions. Once this is complete, the same software then extrapolates the heat transfer capability of the heat exchanger utilizing user specified design conditions and standard heat transfer equations. The design conditions consist of the minimum required cooling water and process water flow rates and the maximum cooling water and process water temperatures. Instrument uncertainties for flow and temperature measuring instruments are also input by the user.

Instrument uncertainty is taken into account to determine the uncertainty in the test results. The results previously reported in Attachment 5, Table A5-1 of the original submittal were the worst case heat transfer and worst case fouling factor when considering the worst case instrument uncertainty. Taking into account this worst case scenario, the GL 89-13 testing accurately predicts the performance of the DG coolers during design conditions. Additionally, the most recent worst case results for the GL 89-13 tests of the DG jacket water coolers show approximately 37-78% thermal margin at design conditions.

NRC Question 8:

Background: The updated safety analysis report (UFSAR), Section 6.5.1.1.1, states that the standby gas treatment system (SGTS) is designed to automatically start in response to any one of the following signals: (1) high pressure in Unit 1 or Unit 2 drywell, (2) low-water level in Unit 1 or Unit 2 reactor, (3) high radiation in exhaust air from over the fuel handling pools in the reactor building for either Unit 1 or Unit 2, (4) high radiation in the ventilation exhaust plenum for reactor building for either Unit 1 or Unit 2, and (5) manual activation from the main control room.

Issue: The UHS model does not consider heat removal from the spent fuel pool (SFP) during abnormal events. No heat removal is modeled for SFP cooling through the available safety-related RHR system lineup. Safety-related makeup water is provided to maintain pool level during such events. Consider abnormal events listed above when the reactor building ventilation system is isolated with automatic start of SGTS, coincident with no heat removal from the SFP, and, therefore is allowed to boil, which takes place within a few hours (UFSAR Table 9.1-6).

Requests:

a. Please provide the results of evaluation of the capability of the operation SGTS during these events. Discuss whether the SGTS can meet its design basis functions for the entire 30-day period, e.g., draw down and maintain negative pressure of 0.25-inch water gage in the secondary containment, capture of radioactive gases and particles leaking from primary containment after a LOCA, limiting incoming saturated air-steam mixtures to less than 150 °F, and prevention of charcoal desorption.

b. Please confirm whether the safety-related RHR system lineup for SFP cooling is available following a loss of offsite power (LOOP) and/or seismic event. As appropriate, discuss whether the safety-related RHR alignment for SFP cooling can be accomplished for both units under design basis conditions (as LSCS Units 1 and 2 share a common reactor building floor).

EGC Response to Question 8a:

As stated in RG 1.27, Revision 1, the UHS should be able to dissipate the heat from an accident in one unit and to permit the concurrent safe shutdown and cooldown of the remaining unit. The total decay heat transmitted to the UHS from the plant includes the reactor decay heat and the fuel pool decay from each unit. If the reactor decay heat is maximized, then the fuel pool decay heat would not include any recent refuel decay heat – it would be the normal decay heat in the pools with available margin for batch offloads. Conversely, if the fuel pool decay heat is maximized by assuming recent batch offloads, then the reactor decay heat would be reduced by the new fuel batch load. The LSCS UHS heat load model assumes the maximum reactor decay heat load. In addition, the LSCS model assumes the fuel pool decay heat load is dissipated by pool boiling while maintaining fuel pool level with the fuel pool emergency makeup systems instead of transmitting the energy to the UHS through pool cooling.

It is not the intent of this model to alter the LSCS existing fuel pool design or licensing bases. The model assumes maximum reactor decay heat while removing a very conservative amount of UHS volume to provide for fuel pool makeup. The assumed makeup is 300 gpm for each

pool (600 gpm total) running continuously for the entire 31 day period while the actual amount of pool water loss due to boiling would be a small fraction of such. The purpose of assuming fuel pool makeup was to reduce the UHS inventory available for accident heat rejection. The fuel pool decay heat for the LSCS model would be approximately 6E6 Btu/hr for each pool (Reference 9). Over a 48 hour period of interest, the integrated fuel pool decay heat represents approximately 4.0% of the total integrated UHS heat load. Over this same period of interest, the UHS volume would be reduced by over 1.5% due to the loss of inventory from the assumed fuel pool makeup. It is EGC's conclusion that the impact of adding the fuel pool decay heat load to the UHS and eliminating fuel pool makeup, i.e, assuming the fuel pools remain cooled and do not boil, would have an insignificant effect on the limiting initial UHS temperature profile of TS Figure 3.7.3-1.

The response of the SGTS to the UHS design event including the DBA LOCA with concurrent loss of offsite power remains unchanged as a result of this proposed license amendment. The ability of LSCS to maintain fuel pool cooling or to provide makeup to the fuel pools was a part of the LSCS original design and is unaffected by the proposed UHS temperature limit change. The LSCS UHS model evaluates a limiting condition of accident heat load and UHS inventory loss and does not alter the design or licensing bases of the LSCS response to postulated accidents.

EGC Response to Question 8b:

The RHR system, including all piping to and from the spent fuel pool, is independent of the spent fuel pool cooling system and is seismic Category I. The safety related RHR system is powered by the Division 2 onsite emergency diesel generator. Therefore, the safety related RHR system lineup for SFP cooling is available following a LOOP or seismic event.

The NRC has reviewed the design of the LSCS spent fuel pools (SFPs) and the fuel pool cooling system several times over the life of the plant. Brief descriptions and excerpts are provided from several of the NRC reviews and licensing correspondence that occurred during the following events:

- original licensing (OL) reviews
- modifications to the fuel pools to increase the capacity (high density rerack modifications)
- issuance of Information Notice (IN) 93-83
- power uprate of both units performed in 2000.

OL Reviews

The OL NRC reviews of the spent fuel cooling and cleanup systems (Reference 10) are described, in part, as follows:

> The spent fuel cooling and cleanup systems for each unit are designed to maintain the water quality and clarity of the pool water and to remove the decay heat generated by the stored spent fuel assemblies. The cooling system is designed nonseismic and consists of redundant 100 percent capacity systems. The cooling water for the secondary side of the spent fuel pool cooling system heat exchangers is provided by the nonseismic station service water system. RG 1.13, "Fuel Storage Facility Design Basis," and RG 1.29, "Seismic Design Classification," guidelines state that the spent fuel pool

> cooling system and its secondary cooling be designed to seismic Category I requirements. The applicant has provided an analysis to show that the results of a failure of the cooling system do not result in a dose release exceeding a small fraction of 10 CFR Part 100 guideline limits. We performed an independent analysis that verified the applicant's results. Based on our analysis, we conclude that the alternative to a seismic Category I designed spent fuel pool cooling system is acceptable.
>
> Note: The response to LSCS FSAR Question 010.29 (Reference 7) provided the analysis of the release occurring during loss of cooling to the spent fuel pool with subsequent boiling of the pool. Operation of the standby gas treatment system was modeled in the analysis. Humidity of the influent air was removed by a demister and electric heater in the standby gas train which is designed to process influent air with 100% relative humidity. The results indicate the calculated doses are many orders of magnitude below 10 CFR 100 limits and only a small fraction of 10 CFR 20 guideline limits.
>
> A permanently installed seismic Category 1 connection from the core standby cooling system-equipment cooling water system provides an alternate makeup water source to the pool.
>
> The residual heat removal system pumps can be cross connected to the fuel pool cooling system to use the residual heat removal system to cool the spent fuel, if necessary.
>
> Based on our review, we conclude that the design of the spent fuel pool cooling and cleanup system is in conformance with the requirements of Criteria 61 and 62 of the General Design Criteria, Branch Technical Position ASB 9-2 with respect to decay heat loads, and the positions in RG 1.13 and RG 1.29, including the positions on availability of assured makeup sources but excluding the position on seismic Category I classification which is justified by dose release analysis described above and is, therefore, acceptable.

The response to FSAR Question 010.19 (Reference 7) states, in part:

> The design of the LSCS fuel pool cooling system is in compliance with the requirements of Regulatory Guide 1.13 as stated at the time of the commission's granting of a construction permit for LSCS. The present design of the RHR system and parts of the fuel pool cooling system includes piping which is designed to ASME Section III, Quality Group C, Seismic Category I requirements. The RHR system is also to be used in the event that the fuel pool cooling system should be disabled as the result of a seismic event. All piping which provides the flow path within the fuel pool cooling system to the RHR system and back to the fuel pool has been designed to Seismic Category 1 requirements up to and including the isolation valve which provides the pressure boundary for this mode of operation. All electrical equipment for this mode of operation meet Class 1E requirements. We believe that the provision of this cross tie with the RHR system meets the guidance set forth in Regulatory Guide 1.29. Those portions of the fuel pool cooling system and the entire RHR system which act as the means of cooling the spent fuel pool meet all stated requirements. The use of the RHR system for

cooling the fuel pool during abnormal circumstances provides a safe and adequate means of maintaining the fuel pool at acceptable temperatures.

<u>High Density Rerack Modifications</u>
The LSCS Unit 2 rerack NRC SE (Reference 8) states, in part:

> The spent fuel pool cooling system (SFPCS) consists of two identical trains of equipment. Each train consists of one 3000 gpm centrifugal pump and one 14.6 MBtu/Hr tube-and-shell heat exchanger. After water from the spent fuel pool is cooled by the heat exchangers, it is purified by the spent fuel pool cleanup system. Neither the SFPCS nor the cleanup system is seismic Category I. In the event of an excessive heat load, the "B" loop of the Residual Heat Removal (RHR) system can be used to cool the spent fuel pool. The RHR system, including all piping to and from the spent fuel pool, is independent of the SFPCS and is seismic Category I.
>
> The SFPCS is not seismic Category I and it is not powered by a Class 1E source (i.e., on-site emergency diesel generator). Under such circumstances, SRP Section 9.1.3 identifies an alternative method for cooling of spent fuel following an earthquake.
>
> Specifically, the SRP discusses use of a seismic Category I spent fuel pool makeup water capability and a seismic Category I ventilation system to process potential radiological releases to the pool building resulting from pool boiling. The LaSalle FSAR identifies the emergency fuel pool makeup system (EFPMS) as the seismic Category I makeup water system for the spent fuel pool.
>
> The EFPMS includes two 300 gpm pumps and is part of the seismic Category I core standby cooling system-equipment cooling water system (CSCS-EWCS).
>
> With regard to qualified ventilation capability when seismic Category I spent fuel pool cooling is not provided, the LSCS FSAR identifies the SGTS as the qualified ventilation system. The SGTS is designed to seismic Category I criteria and consists of two redundant filter trains. This system is designed to remain operational during design basis events and is protected against natural phenomena.
>
> The staff further concludes that the seismic Category 1 EFPMS and SGTS meet the requirements of GDC 2 for ensuring adequate spent fuel pool cooling and prevention of unacceptable radiological releases following an earthquake.

The LSCS Unit 1 rerack NRC SE (Reference 11) discusses Spent Fuel Pool Time to Boil and shows that the NRC calculated a similar SFP Time to Boil to that shown in the current UFSAR Table 9.1-6. The NRC then concluded that the guidance of the Standard Review Plan were met and that the bulk coolant time to boil was acceptable since it provided a reasonable time to allow operators to use alternative methods to cool the SFP coolant, or to provide makeup coolant in the event that the SFP coolant begins to boil.

<u>Issuance of IN 93-83</u>
The NRC issued IN 93-83, "Potential Loss of Spent Fuel Pool Cooling Following a Loss of Coolant Accident (LOCA)," on October 7, 1993 (Reference 12). This document notified licensees of concerns regarding the potential effects of a loss of spent fuel pool (SPC) cooling coincident with a LOCA at Susquehanna Steam Electric Station (SSES) in 1992. The document identified the potential inability to align emergency methods of SFP cooling and makeup water addition under post-LOCA conditions.

Following issuance of IN 93-83, the NRC issued a letter to LSCS dated September 25, 1996, titled, "Resolution of Spent Fuel Storage Pool Safety Issues: Issuance of Final Staff Report and Notification of Staff Plans to Perform Plant Specific, Safety Enhancement Backfit Analyses – LaSalle Station," (Reference 13). The letter states, in part:

> The staff has found existing structures, systems, and components related to the storage of irradiated fuel provide adequate protection for the public health and safety. Protection has been provided by several layers of defenses that perform accident prevention functions, accident mitigation functions (e.g., multiple cooling systems and multiple makeup water paths), radiation protection functions, and emergency preparedness functions. Design features addressing each of these areas for spent fuel storage have been reviewed and approved by the staff. In addition, the limited risk analyses available for spent fuel storage suggest that current design features and operational constraints cause issues related to spent fuel pool storage to be a small fraction of the overall risk associated with an operating light water reactor.

The September 25, 1996, letter also identified LSCS as one of seven operating plants having three design characteristics similar to SSES requiring additional staff review:

- An open path from the area around the SFP to areas housing safety systems
- A short time for the SFP to reach an elevated temperature
- A reactor site with multiple operating units sharing structures and systems related to the SFP

The LSCS response to this issue was contained in a letter to the NRC dated November 18, 1996 (Reference 14), which states, in part:

> While LaSalle is a multi-unit site with shared systems and structures, an appreciable concern does not exist at this site. Taking into account the actual time to boil, the low probability of an initiating event, and the availability of reduced means to cool the SFP from onsite power, this concern does not warrant further consideration at this time.

The response described the reliability of SFP cooling as follows:

> Following a loss of offsite power, SFP cooling can be reestablished on onsite power by either restoring the fuel pool cooling system or through the FPC assist mode of RHR. While both methods would require alterations in their respective systems, either could be accomplished in the time frame allowed prior to bulk boiling. The availability of the relied upon systems is protected by the station's shutdown risk program, which specifically addresses risk margins for decay heat removal.

LSCS submitted supplemental information to the November 18, 1996, response regarding the ability to provide fuel pool cooling during a loss of offsite power event (Reference 15):

> During recent conversations with the NRC Staff a question was raised regarding how LaSalle would respond to a dual unit loss of offsite power (DLOOP). As shown in the attached calculation, the probability of a DLOOP of sufficient duration to allow sustained boiling in either unit's spent fuel storage pool is 2E-07 when the spent fuel storage pools are not connected and 8E-08 when the spent fuel storage pools are connected. Although the probability of a DLOOP is not risk significant, LaSalle will revise its procedures to provide sufficient guidance to align and operate either unit's spent fuel storage pool cooling system without reliance on offsite power. These procedure revisions will be completed prior to the next refuel outage on either unit.

<u>Power Uprate in 2000</u>
With the issuance of the SE for the power uprate of both units (Reference 16), the NRC reviewed the design of the LSCS spent fuel pool cooling system and stated that based on the fact that the plant has administrative controls and operating procedures in place to ensure that backup cooling capability is provided for all SFP cooling scenarios, the NRC found that the design and operation of the SFP cooling systems (SFP cooling system and RHR system in the SFP cooling assist mode) for the power uprate conditions at LSCS meet the intent of the guidance described in the SRP for SFPs.

<u>NRC Question 9:</u>

Review of Proposed Technical Specifications

<u>Background:</u> The current temperature limit for TS SR 3.7.3.1 is 101.25 °F. From the licensee's previous submittal, dated May 6, 2011, the limit was based on an actual equipment limit of 104 °F, reduced by 2 °F for UHS pond heat up during a DBA-LOCA and reduced by 0.75 °F for instrument uncertainty to yield the TS limit of 101.25 °F. The proposed limit of Figure 3.7.3-1 of the LAR submittal dated July 12, 2012, also has a maximum TS SR limit of 101.25 °F [at 6:00 a.m.], but it is based on an actual equipment limit of 107 °F. According to Table 2 of the LAR submittal, the maximum post-DBA heat up is 4.55 °F.

<u>Issues:</u> The current TS SR 3.7.3.1 limit, and the proposed TS SR 3.7.3.1 limit at 6:00 a.m., are identical and both are based on the LAKET-PC model. Yet, the current limit is based on an actual UHS temperature of 104 °F, while the proposed TS limit is based on an actual UHS temperature of 107 °F.

<u>Request:</u> Please explain how 101.25 °F is the maximum TS limit for the actual equipment limits of both 104 °F and 107 °F. In your explanation include what factors in the design inputs, methodology, and assumptions, have changed to make the 101.25 °F appropriate for the 107 °F limit, where 101.25 °F was already stated to be the limit for the actual equipment limit of 104 °F.

<u>EGC Response to Question 9:</u>

The current temperature limit for TS SR 3.7.3.1 is 101.25 °F based on an evaluated equipment limit of 104 °F reduced by 2 °F for UHS pond heat up during a DBA-LOCA and reduced by 0.75 °F for instrument uncertainty. Subsequent analyses determined that the required heat

removal rates could be achieved with a maximum cooling water supply temperature of 107 °F to the same equipment. Design input and assumption changes that affect UHS pond heat up include the use of more recent limiting weather data, increased decay heat load (EPU), fuel pool makeup flow and fire fighting reduction of UHS inventory, revised UHS effective volume, and additional margin. These changes are identified in Attachment 1 of the request submitted July 12, 2012 (Reference 5). Thus, even though the post-DBA UHS heat up is greater due to these changes, the proposed TS SR limit of 101.25 °F [at 6:00 AM] based on an evaluated equipment limit of 107 °F is equal to the current TS SR limit based on an equipment limit of 104 °F. The reduction by 0.75 °F for instrument uncertainty is incorporated in the proposed TS limit and has not changed. The methodology of LAKET-PC, excluding design inputs and assumptions, has not changed as the basis of determining the current TS temperature limit and the proposed TS temperature limit.

NRC Question 10:

Background: The proposed TS SR limits proposed in Figure 3.7.3-1 have maximum limits as a function of time of day (i.e., a diurnal cycle). Should the UHS temperature exceed or is projected to exceed Figure 3.7.3-1, Condition B of TS 3.7.3 requires the units be in Mode 3 within 12 hours.

Issue: In the "Unacceptable Operation" region of Figure 3.7.3-1, the UHS loses its safety function for a DBA-LOCA during the worst-weather conditions. During a heat wave it is conceivable that the UHS could enter the "Unacceptable Operation" region for consecutive days.

Request: If temperature of the UHS enters the "Unacceptable Operation" area of Figure 3.7.3-1 for two or more consecutive days, but Mode 3 has not been entered, what actions will the licensee take?

EGC Response to Question 10:

In accordance with the proposed TS markups provided in the request submitted July 12, 2012 (Reference 5), the Required Action for TS 3.7.3 Condition B requires performance of TS SR 3.7.3.1 on a frequency of once per hour when the cooling water temperature supplied to the plant from the CSCS pond ≥ 101 °F. With water temperature of UHS greater than 101°F, Required Action B.1 is provided to monitor the water temperature of the UHS and verify the temperature is within the limits of TS Figure 3.7.3-1 more frequently.

If the water temperature of the UHS exceeds the limits of TS Figure 3.7.3-1, Condition C must be entered immediately. TS 3.7.3 Required Actions C.1 and C.2 would be entered concurrently, requiring entry into MODE 3 within 12 hours and entry into MODE 4 within 36 hours.

Once entry into Condition C is made, it would continue until either the mode of applicability for LCO 3.7.3 (i.e., unit in MODE 4) was exited or the UHS water temperature returned to the Acceptable Operation region of TS Figure 3.7.3-1, whichever event occurred first. This is the proper application of TS independent of the number of times that the temperature of the UHS enters the Unacceptable Operation region of TS Figure 3.7.3-1. The application of TS in this manner is the same regardless of the TS limit (i.e., use of the proposed diurnal curve or use of

the existing single temperature value of 101.25°F).

NRC Question 11:

Background: If all DGs became inoperable, TS 3.8.1, "AC Sources-Operating," Condition H, requires entry into TS 3.0.3 immediately. In this condition, the units would not be able to mitigate a DBA-LOCA and would be vulnerable to LOOP and station blackout.

Issue: If the UHS temperature was above the limits proposed in new Figure 3.7.3-1 of proposed TS 3.7.3, "Ultimate Heat Sink," and UHS temperature was rising at a rate that could cause the DGs to become inoperable before TS 3.7.3 required the units to be in Mode 3, the units could be forced into Condition H of TS 3.8.1.

Request: What changes to Figure 3.7.3-1 would the licensee propose to ensure the units are placed in a safe shutdown condition in advance of possible inoperability of the DGs due to high UHS temperature and entry into Condition H of TS 3.8.1.

EGC Response to Question 11:

EGC does not propose any changes to TS Figure 3.7.3-1 as the scenario described in NRC Question 11 is addressed in TS Section 3.0, "LCO Applicability." Specifically, LCO 3.0.2 and 3.0.6 define the relationship between support and supported system and the application of TS Required Actions and Conditions.

Through the TS definition of OPERABLE - OPERABILITY, support systems that are not able to perform their support functions make the supported systems inoperable. LCO 3.0.2 requires meeting the Conditions and Required Actions any time an LCO is not met. However, LCO 3.0.6 provides an exception to LCO 3.0.2 for supported systems that have individual LCOs specified in TS.

As described in LCO 3.0.6, when a supported system LCO (e.g., emergency diesel generators) is not met solely due to a support system LCO (e.g., UHS) not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO actions are required to be entered. When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2.

As further described in LCO 3.0.6 Bases, when a support system is inoperable and there is an LCO specified for it in the TS, the supported systems are required to be declared inoperable if determined to be inoperable as a result of the support system inoperability. However, it is not necessary to enter into the supported systems' Conditions and Required Actions unless directed to do so by the support system's Required Actions.

NRC Question 12:

Review of Operator Actions

Request: Describe the required operator actions (other than those in the proposed TSs) that support implementation of the proposed AR.

EGC Response to Question 12:

LSCS utilizes a predictive lake thermal model during the summer to facilitate station and lake operations during extreme heat conditions. The UHS temperature is the same as the condenser water inlet temperature prior to the assumed event. The condenser water inlet temperature is measured by four temperature instrument loops as described in Reference 5. The thermal model uses plant operational inputs, lake makeup inputs (from the Illinois River), as well as current and predicted weather conditions to predict condenser water inlet temperatures after a 5.5 day travel time through the LSCS lake. LSCS procedure EN-LA-402-0005, "Extreme Heat Implementation Plan – LaSalle," is implemented at a predicted condenser water inlet temperature of ≥ 95°F.

- Predicted temperature ≥ 95°F: Operations raise lake level to 700.0 ft to provide maximum lake cooling (increase mass of cooling lake).
- Actual temperature ≥ 95°F: Operations perform daily lake inspections for impact on fish mortality.
- Actual temperature ≥ 97.5°F: Site Duty Team runs lake thermal model daily to predict condenser water inlet temperatures three days in advance.
- Actual temperature ≥ 99°F: Operations review staffing and stationing of operators to perform prestart checks on standby service water pumps and increased monitoring of circulating water and service water systems. Operations generate Issue Report (IR) for evaluation of impact of elevated cooling water temperature to Environmental Protection Program. Shift Manager initiates staffing the site Operational Control Center (OCC). OCC develops derate plan to reduce water temperature increase including reduction of circulating water flow rate.

  Operating Abnormal procedure LOA-CW-101/201 implements compensatory actions for elevated water inlet temperatures starting at 100°F. Monitoring of plant systems affected by the elevated temperature and Lake Screen House traveling screens operation is required at that time. Additional circulating water pumps are started if available while reactor power is reduced as required. As stated in Reference 5, Operating performs SR 3.7.3.1 hourly when the cooling water temperature is ≥ 101°F.
- Predicted temperature ≥ TS Figure 3.7.3-1: Site Duty Team staffed continuously to run thermal model as often as needed to predict condenser inlet temperatures.
- Actual temperature > TS Figure 3.7.3-1: Operating commence shutdown of both units in accordance with TS 3.7.3.

NRC Question 13:

Request: Are there any additions to, deletions, or changes to current operator actions required to support this LAR?

EGC Response to Question 13:

Operators will be required to compare the condenser water inlet temperature to the TS allowable water temperature of Figure 3.7.3-1 as opposed to the existing single limiting value of 101.25°F. Linear interpolation will be used to define the TS limit between identified points of the figure. The values of this interpolation will be included in an operating procedure to facilitate monitoring.

NRC Question 14:

Request: What are the changes, deletions, or additions to procedures associated with this LAR?

EGC Response to Question 14:

- LOS-AA-S101 (S201) Unit 1 (Unit 2) Shiftly Surveillance will be revised to refer to TS Figure 3.7.3-1 for UHS operability temperature limits as a function of time of day. A table will also be included providing five minute linear interpolation values of the TS limits. An attachment will also be provided to log TS 3.7.3 Action B results when required.
- LIP-CW-501(601) U1 (U2) Condenser Circulating Water Inlet Temperature (Line A and B) Calibration will be revised to initiate the process computer alarm at 101°F as described in LAR.
- EN-LA-402-0005, "Extreme Heat Implementation Plan – LaSalle," will be revised to refer to TS Figure 3.7.3-1 for UHS operability temperature limits as a function of time of day.

NRC Question 15:

Requests: Describe how operators will read and log the UHS temperatures. Will the required actions be performed by one operator or more than one? Will it require the coordination of an operator at each unit?

EGC Response to Question 15:

Operators will read and log the UHS temperatures in accordance with LOS-AA-S101(201). Each unit has two condenser water inlets (circulating water inlet pipes) monitored by a temperature loop. Each temperature loop provides the control room operator a digital reading of the temperature in the pipe on the process computer. The process computer calculates the average of each unit's two inputs and also calculates the average of the two units. The control room operator is required to log and compare the average inlet temperature from both units to the limits of TS Figure 3.7.3-1. If any of the individual temperature loops are inoperable, the procedure provides guidance to use only operable temperature indications to determine the inlet or UHS temperature.

Unit 1 and Unit 2 control room operators are currently both required to determine the condenser water inlet (UHS) temperature for their respective unit as part of their shiftly surveillance LOS-AA-S101 (201). As described in the response to Question 15, the inlet temperature is the average of each unit's inlet temperatures resulting in both units entering any required actions at the same time. If TS 3.7.3-1 limits are exceeded, both units would declare the UHS inoperable and follow the actions of TS 3.7.3 as currently required.

NRC Question 16:

Request: Are there any impacts to the time available for operators to complete manual actions credited in the UFSAR?

EGC Response to Question 16:

Monitoring of the condenser water inlet as required by TS 3.7.3 Action B is within the capability of the normal control room staffing. The design event is postulated to occur when the condenser water inlet or UHS temperature reaches the limit of TS Figure 3.7.3-1. There are no changes to the required manual actions for coping with the design event. For example, containment heat removal continues to be required to be manually initiated within 600 seconds of the event, consistent with the current assumed actions described in the UFSAR for the DBA LOCA.

References:

1) Simiu, Emil and Robert H. Scanlan, "Wind Effects on Structures: Fundamentals and Applications to Design," Third Edition, John Wiley & Sons, Inc., 1996

2) MIT Report 161, "An Analytical and Experimental Study of Transient Cooling Pond Behavior," Ryan and Harleman, Massachusetts Institute of Technology, Cambridge Massachusetts, 1973

3) Calculation L-002457, "LaSalle County Ultimate Heat Sink Analysis," Revision 7

4) NUREG-0693, "Analysis of Ultimate Heat Sink Cooling Ponds," Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission, November 1980

5) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Request for a License Amendment to LaSalle County Station, Units 1 and 2, Technical Specification 3.7.3, 'Ultimate Heat Sink,'" dated July 12, 2012

6) EPRI Technical Report TR-107397, "Service Water Heat Exchanger Testing Guidelines," dated March 1998

7) LaSalle FSAR Questions 010.19 and 010.29

8) Amendment 48 to Facility Operating License No. NPF-18, dated June 15, 1989

9) L-003735, GEH EPU Task T0603 – Fuel Pool Cooling and Cleanup System, Revision 0

10) NUREG-0519, Safety Evaluation Report related to the operation of LaSalle County Station Units 1 and 2 dated March 1981

11) Issuance of Amendment 90 to Facility Operating License No. NPF-11, dated February 24, 1993

12) NRC Information Notice 93-83, "Potential Loss of Spent Fuel Pool Cooling Following a Loss of Coolant Accident (LOCA)," dated October 7, 1993

13) Letter from USNRC to ComEd, "Resolution of Spent Fuel Storage Pool Safety Issues: Issuance of Final Staff Report and Notification of Staff Plans to Perform Plant Specific, Safety Enhancement Backfit Analyses – LaSalle Station," dated September 25, 1996

14) Letter from ComEd to USNRC, "Response to NRC Final Report on Spent Fuel Pool Storage Safety Issues," dated November 18, 1996

15) Letter from ComEd to USNRC, "Supplemental Response to NRC Final Report on Spent Fuel Pool Storage Safety Issues," dated November 12, 1999

16) Issuance of Amendments Regarding Power Uprate, dated May 9, 2000

ATTACHMENT 2
Supporting Information

Response to NRC Question 1

34 pages follow

Description of Solar Radiation, Atmospheric Radiation, Freezing Precipitation Code and Partial Pressure of Water Vapor Algorithms in the LakeT Program

Preparer: Paul N. Derezotes Date: 7 JANUARY 2013

Reviewer: Erwin T. Prater Date: January 7, 2013

Approver: Pawel Kut Date: 01-14-2013

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1 Introduction

This paper describes the formulation and validation of four algorithms in Sargent & Lundy's (S&L) LakeT lake temperature model (S&L (2004)):

- Solar Radiation
- Atmospheric Radiation
- Freezing Precipitation Code
- Partial Pressure of Water Vapor

The theoretical basis of each algorithm is discussed, followed by the results of validation tests.

2 Theoretical Basis for Software

2.1 Estimation of Solar Radiation Reaching the Ground Surface

The solar radiation equation used in LakeT model has changed during the existence of the model. When LakeT was initially developed, the model used the following equation:

$Q_{SN} = 0.94\ Q_{SC}\ (1.0 - 0.65C^2)$

Where:

Q_{SN} = net solar radiation
Q_{SC} = clear sky sunlight from an average insolation curve
C = fraction of cloud cover

This equation treats complex atmospheric radiation transfer phenomena (scattering, attenuation, absorption and reflection) using a highly parameterized and therefore, simplified, approach. However, when the LakeT program was updated in the 1990s, the solar radiation model was updated to incorporate a more detailed approach for modeling atmospheric radiation transfer phenomena. The methodology was developed by the Midwest Agricultural Weather Center of the Department of Agronomy at Purdue University (West Lafayette, Indiana). The methodology is described in Meyers and Dale (1983).

Meyers and Dale (1983) uses a semi-physical atmospheric radiation model that uses standard meteorological data. Their radiation model includes the effects of: Rayleigh scattering, absorption by water vapor and permanent gases, and absorption and scattering by aerosols and clouds. Cloud attenuation is accounted for by assigning transmission coefficients based on cloud height and amount. The model was tested by Meyers and Dale with independent data from West Lafayette and Indianapolis Indiana, Madison Wisconsin, Omaha Nebraska, Columbia Missouri, Nashville Tennessee, Seattle Washington, Los Angeles California, Phoenix Arizona, Lake Charles Louisiana, Miami Florida, and Sterling Virginia. Excellent agreement was obtained for all stations tested. The model's performance judged by relative error was found to be independent of season and cloud amount for all seasons tested.

From Meyers and Dale (1983):

$RAD = (I_o)\ (T_a)\ (T_R)\ (T_g)\ (T_w)\ [\ 1+(alb)\ (ca)\ (cov)]\ (\cos(Z))\ (221.13)\ [\ (1\text{-}cov) + (cov)\ (T_i)\ ]$

Where:

RAD = irradiance at the ground, including the effects of a cloud layer [$Btu/(ft^2\ hr)$]

I_o = extraterrestrial radiation flux at the top of the atmosphere on a surface normal to the incident radiation (W / m^2)
= $(1353)\ [\ 1+ (0.034)\ [\ \cos\ [\ (6.28318)\ (n\text{-}1) / 365\ ]\ ]$

1353 = conversion factor to produce results in numeric units of (W / m^2)

221.13 = conversion factor to convert radiation numeric units from (Langley/min) to $[Btu/(ft^2\ hr)]$

Transmission coefficients:
T_a = transmission coefficient after absorption and scattering by aerosols = 0.935^M

T_w = transmission coefficient after absorption by water vapor = $1 - (0.077)\,[\,(u)(M)\,]^{0.3}$

T_R = transmission coefficient after Rayleigh (air molecule) forward scattering

T_g = transmission coefficient after absorption by "permanent" gases

$(T_R)\,(T_g) = 1.021 - [\,(0.084)\,[\,(M)\,[\,(949)\,(p)\,(10^{-5}) + 0.051\,]\,]^{0.5}\,]$

T_i = transmission coefficient after absorption by clouds as follows:

Cloud height range (ft)	**Cloud layer coverage (tenths)**	**T_i**
>= 0 < 1000	0 < cov <= 9	.50
>= 0 < 1000	=10	.15
>= 1000 < 4000	0 < cov <= 9	,629
>= 1000 < 4000	=10	.312
>= 4000 < 10000	0 < cov <= 9	.525
>= 4000 < 10000	=10	.414
>= 10000 < 18000	0 < cov <= 9	.534
>= 10000 < 18000	=10	.455
>= 18000 < 30000	0 < cov <= 9	.746
>= 18000 < 30000	=10	.668
>= 30000	0 < cov <= 9	.90
>= 30000	=10	.85

Other parameters:

alb = ground surface albedo
= 0.2 with no snow cover
= 0.65 with snow cover

ca = cloud albedo
= 0.5 for cloud base < 5486 m (18000 ft)
= 0.0 for cloud base >= 5486 m (18000 ft)

Parameter, s, that is used to estimate precipitable water is defined as follows:

Site location latitude zone (degrees north)	**season**			
	winter	**spring**	**summer**	**autumn**
>00 and <=10	3.37	2.85	2.80	2.64
>10 and <=20	2.99	3.02	2.70	2.93
>20 and <=30	3.60	3.00	2.98	2.93
>30 and <=40	3.04	3.11	2.92	2.94
>40 and <=50	2.70	2.95	2.77	2.71
>50 and <=60	2.52	3.07	2.67	2.93
>60 and <=70	1.76	2.69	2.61	2.61
>70 and <=80	1.60	1.67	2.24	2.63
>80 and <=90	1.11	1.44	1.94	2.02

Season definitions as follows:

Julian day	**season**
> 80 and <= 173	spring
> 173 and <= 264	summer
> 264 and <= 355	autumn
> 0 and <= 80 or > 355 and <= 366	winter

n = Julian day (1 – 366)

p = surface atmospheric pressure (kPa)

Td = surface dew point temperature (°F)

y = site location latitude

d = declination angle of the sun (radians)

H = hour angle

M = optical air mass at a pressure of 101.3 kPa = $(35) / ((1224) (\cos^2 Z) + 1)^{0.5}$

u = precipitable water vapor = $\exp(0.1133 - \log_e(s+1) + (0.0393) (Td))$

ZEN = solar zenith angle = $90° - (\sin^{-1} (\sin(y) \sin(d) + \cos(y) \cos(d) \cos(H)))$

Z = solar zenith angle (in units of radians) = (ZEN) (6.28318/360)

(6.28318)(1/360) = multiplication factor to convert degrees to radians

cov = coverage of a cloud layer (0.0 - 1.0)

2.1.1 Estimation of Ground Snow Cover

It was necessary to include in the program an algorithm for estimating hourly snow cover, because the presence of snow cover is a component of the solar radiation algorithm. An algorithm was created to approximate snow accumulation. It was based on analysis of observations during four winters at Peoria, Illinois (NCDC 1989, 1990, 1991, 1992). A simple linear equation for snow depth was created from those data. Table 1 presents snow and temperature data from Peoria, Illinois that were used to construct a snow accumulation algorithm. Each row of data in Table 1 summarizes conditions during a snow event. Although the equation that was based on those data was intended to be applied to hourly weather conditions, the data used to construct the equation were based on the total snowfall on the

ground during the event, and the maximum air temperature observed during the event. This approach was taken because available data included only one daily observation of snow depth on the ground. It was expected that the slope of the equation would be approximately the same regardless of whether hourly data during an event or data summarizing the entire event were used to construct the equation.

The program tracks snow depth from hour to hour. The depth of snow on the ground is increased when snow is observed and it has a finite amount greater than zero or a "trace". When snow is observed, the rate of depth increase is based on the rate of water equivalent precipitation and the air temperature. After snowfall ends, the depth of snow is decreased on an hourly basis according to air temperature. When snow depth is non-zero, snow cover is present for purposes of input to the solar radiation algorithm.

Any of the following weather types are considered snow that affects the ground snow depth.

- Any type of snow (light, moderate, or heavy)
- Any type of snow pellets
- Any type of snow shower
- Any type of snow squall
- Any type of snow grains

For any hour reporting on of the above types of precipitation, the accumulation of snow depth on the ground during that hour is predicted with the following equation:

Hourly increase in snow depth (inches) = (A) (-B)

Where:

A = Hourly water equivalent precipitation (inches)
B = (C-44.4) / (1.39)
C = Hourly air temperature (°F)

A "negative" hourly snow depth increase is not allowed to occur. That is, no snow depth increase is predicted if the air temperature is greater than or equal to 44.4 °F.

Theory was found to indicate that the process of snow depth reduction involves a complex heat balance, and is a function of cloud cover, solar angle, air temperature, and humidity (Colbeck 1980; Geiger 1965). An existing snow depth reduction algorithm was not located.

A simple method was selected to construct an algorithm to simulate combined melting and sublimation of snow. It was based on examination of winter data from Madison, Wisconsin (NCDC 1988, 1989). Values for rates of snow depth reduction were derived from the 1988 Madison daily snow depth information by plotting temperature versus snow melt for periods during which there was still snow on the ground after melting. This was done for January, February, and December, 1988. Trends were subjectively identified, and amounts of melting were selected for each of several temperature ranges. Table 2 presents data that were used to construct the snow melt algorithm.

Reduction of snow depth uses as input hourly temperature data, and an indication whether there exists snow cover and its depth. The following table describes the snow depth decrease per hour predicted by the algorithm for each of six dry bulb temperature ranges. No reduction is predicted when the temperature is less than the lower end of the lowest range.

Snow Melt Rates Predicted by the Program

Dry Bulb Temperature Range (°F)	Snow Depth Decrease Per Hour (inches)
10 – 18	0.021
19 – 31	0.042
32 – 35	0.083
36 – 40	0.166
41 – 46	0.333
> 46	0.667

The snow depth and snow accumulation algorithms operate simultaneously in the program, as it advances through hourly meteorological data.

2.2 Estimation of Atmospheric Radiation Reaching the Ground Surface

Infrared radiation emitted by the Earth's surface is partially absorbed by the water vapor of the atmosphere, which re-emits it. A portion of that re-emitted radiation is in a downward direction. It is absorbed by the ground and re-emitted upwards (Huschke 1980). Therefore, atmospheric infrared radiation is an important component of the radiation balance of a cooling lake water surface. The equation used by the program to estimate atmospheric radiation reaching the ground is as follows (Jirka *et al.*, 1978):

$$R = [(1.16)(10)^{-13} / 24] [460 + T]^{6} [1 + ((0.17)(C^{2}))]$$

Where:

R = Atmospheric radiation (Btu/(ft^2 hr))
T = Air temperature (°F)
C = Cloud cover (tenths, *e.g.*, "0.8" represents 8/10)

2.3 Freezing Precipitation Code

LakeT requires input hourly meteorological data. The meteorological data are produced by the SURGEN program (S&L (1997)). SURGEN extracts meteorological parameters from raw hourly surface weather observations and writes the extracted parameters to a LakeT-compatible meteorological data file.

Lake-T performs solar radiation computations which require estimates of hourly ground snow cover, as described in section 2.1.1. Precipitation type (*e.g.*, rain, snow, freezing rain) is included in raw hourly surface weather observations. Precipitation type is represented by a numerical code in surface weather observations (NCDC (2005)). Numerical precipitation type codes corresponding to freezing or frozen precipitation are listed in Table 3.

SURGEN reads raw meteorological data files, which include the precipitation type, and writes a binary (0 or 1) precipitation code to the output LakeT-compatible meteorological file. SURGEN writes a binary precipitation code of one (1) when one of the precipitation codes in Table 3 is found in an input hourly weather observation. Otherwise, SURGEN writes a code of zero (0).

2.4 Partial Pressure of Water Vapor

LakeT requires the partial pressure of water vapor in some of its computations. The partial pressure of water vapor is related to relative humidity and the saturation vapor pressure of water (*e.g.*, Hess (1979)). The saturation vapor pressure of water is a function of atmospheric dry-bulb temperature (*e.g.*, Iribarne and Godson (1981)). The relative humidity and dry-bulb temperature are included in hourly surface weather observations (NCDC (2005)).

SURGEN (S&L (1997)) processes hourly surface weather observations and produces LakeT-compatible meteorological data input files which include the partial pressure of water vapor. SURGEN uses a FORTRAN subroutine "PVSF" (ASHRAE (1975); Figure 1) to compute the partial pressure of water vapor. The subroutine implements the approach described by List (1951). The logic of the subroutine is described below.

Input

The subroutine PVSF requires the dry-bulb temperature x in Fahrenheit

Output

The subroutine PVSF returns the partial pressure of water vapor at saturated conditions (in inches, Hg.), VAPPR

Description of the Algorithm

The vapor pressure of water in saturated air VAPPR (in inches, Hg.) is defined as:

$$\text{VAPPR} = 29.921 \times 10^{(P1+P2+P3+P4)} \qquad \text{(Eq. 1)}$$

where the parameters P1 through P4 depend on dry-bulb temperature x (in °F) as described below.

First, the constants A1 through A6 and B1 through B4 are defined according to Table 4.

Next, define T = (x+459.688)/1.8, which is the dry–bulb temperature in Kelvin.

If T < 273.16 K, then define Z = 273.16/T and determine the parameters P1 through P4 in Eq. 1 from Table 5.

If T >= 273.16 K, then define Z = 373.16/T and determine the parameters P1 through P4 in Eq. 1 according to Table 6.

The subroutine computes the vapor pressure of water vapor at saturation, VAPPR, using Eq. 1 and returns the computed value of VAPPR to the calling program.

The partial pressure of water vapor is found in SURGEN from the relative humidity (RH) and the vapor pressure of water in saturated air (VAPPR) using the following equation (*e.g.*, Hess (1979); page 60):

$$e = \text{VAPPR} \times (\text{RH}/100). \qquad \text{(Eq. 2)}$$

3 Validation of Software

Validation of the atmospheric radiation algorithm was accomplished by manual calculations. The original source reference for the method (Jirka *et al.* 1978) was relied on as a validation of the theoretical approach.

Performance of manual calculations versus computer calculations was expected to be very good in that case, within a couple of percent, because the calculations should not introduce significant uncertainty.

Validation of the integrated snow cover and solar radiation algorithms was accomplished via comparison of program predictions with randomly selected field observations of actual solar radiation phenomena. Performance in those cases was expected to be generally better than 70 percent. That expectation was based on the absolute errors reported by the authors of the theoretical basis in Table 3 of their technical paper (Meyers and Dale 1983).

Validation of the freezing precipitation code was performed by comparing program output with input raw surface weather observations. Validation of the partial pressure of water vapor was performed by comparing results from SURGEN with a manual computation and a published tabular value of vapor pressure.

3.1 Estimation of Solar Radiation Reaching the Ground Surface

The solar radiation algorithm was validated via comparison of program predictions with solar radiation observations made by the National Oceanic and Atmospheric Administration (NOAA).

Table 7 through Table 10 present lists of processed weather data created by the program, for Madison Wisconsin, for the following dates: 25 January 1988, 28 July 1988, 30 July 1988, and 15 September 1988. Column 13 of the lists contains data labeled "SWRAD", meaning shortwave solar radiation, in units of Btu/(ft^2 hr). Column 1 of the lists indicates hours of day (00-23 hour time convention in local standard time).

Table 11 through Table 13 present lists of NOAA Madison, Wisconsin solar radiation measurements at Madison Wisconsin for months January 1988, July 1988, and September 1988 (NREL 2012). Table rows identify days of month. Table columns identify hours of day.

Conversion of the NOAA solar radiation measurements from units of (Watt-hr m^{-2}) to (Btu/(ft^2 hr)) to match program output numeric units was accomplished manually as follows.

A Langley is a unit of energy per unit area
1 Langley = 11.622 Watt-hr m^{-2}
1 Langley = 3.687 Btu/ft^2

To convert NOAA radiation measurements to Btu/(ft^2 hr), a multiplication factor must be applied, as follows:

(Watt-hr m^{-2}) / 11.622 = (Langleys)
(Langleys) (3.687) = Btu/ft^2

Therefore,

(Watt-hr m^{-2}) (3.687 / 11.622) = Btu/ft^2
or:
(Watt-hr m^{-2}) (0.3172) = Btu/ft^2

The program assumes that the radiation energy flux is constant during the entire hour, so the final equation is as follows:

(Watt m^{-2}) (0.3172) = Btu/(ft^2 hr)

Figure 2 through Figure 5 present comparisons of program output predictions of solar radiation with NOAA measurements of solar radiation. Predictions and measurements are for Madison, Wisconsin during the following days: 25 January 1988, 28 July 1988, 30 July 1988, and 15 September 1988. The

NOAA measurements were converted to the same numerical units as the program predictions, using the conversion factor described above.

The comparisons of estimated with measured solar radiation in Figure 2 through Figure 5 demonstrated that the solar radiation algorithm performs reasonably well and results are consistent with expectations. Those results validate the solar radiation algorithm.

Radiation prediction performance levels indicated by Figure 3 for 28 July 1988 and Figure 4 for 30 July 1988 are particularly good. As shown by hourly meteorological observations listed in Table 8, 28 July 1988 was a perfectly clear day at Madison. Column 10, titled "CL COV", contains cloud cover information (tenths), and column 2, titled "CEIL", contains cloud ceiling height information (feet). In contrast, as shown by hourly meteorological data listed in Table 9, 30 July 1988 included marked variation of cloud cover (column 10 in Table 9) from 2 tenths to 9 tenths between 6 am and 6 pm at Madison. Therefore, the program predicted the peak daily radiation level well on both cloudy and clear days.

On 25 January 1988 (Figure 2), the program conservatively over-predicted peak solar radiation by about 17 percent. That was during a day with snow on the ground, variable ceilings heights (column 2 in Table 7) and overcast (10/10) sky cover (column 10 in Table 7). On 15 September 1988 (Figure 5), the program over-predicted peak solar radiation by about 10 percent. Conditions on 15 September 1988 featured total overcast between 7 am and 6 pm (column 10 in Table 10). It is not obvious why program predictions were slightly less accurate during 25 January and 15 September. A possible explanation is that during those two days the cloud cover observation at the "top" of each hour may not have accounted effectively for cloud variations during that hour. Predictions for 25 January 1988 were less accurate than for the other three days, but still remarkably good. It is possible that the snow cover algorithm (which is an approximation) added some finite uncertainty during that day only.

3.2 Estimation of Atmospheric Radiation Reaching the Ground Surface

To verify calculations of atmospheric longwave radiation, R, data for hour 5 of 25 March 1955 at Springfield Illinois were manually used in a calculation with the atmospheric radiation formula defined in section 2.2. Results were as follows.

$$R = [(1.16)(10)^{-13} / 24][460 + 29]^{6} [1 + ((0.17)(0.10^{2}))] = 77.32 \text{ Btu/(ft}^2 \text{ hr)}$$

Where:

Data for hour 5 of 25 March 1955 at Springfield, Illinois were as follows:

Dry bulb temperature = 29°F
Cloud cover = 10 (ten tenths)

Table 14 presents a list of processed weather data created by the program, for Springfield, Illinois, for 25 March 1955. Column 14 of the list contains data labeled "LWRAD", meaning longwave atmospheric radiation. Column 1 indicates hour of day. The manually calculated value of 77.32 Btu/(ft^2 hr) exactly matches the program-calculated value for hour 5, validating the atmospheric radiation algorithm.

3.3 Freezing Precipitation Code

Validation of the freezing precipitation code was performed by comparing program output with input raw surface weather observations. On December 3, 1996 the Peoria, Illinois National Weather Service recorded snow from 5 am until 9 am local standard time (LST). A portion of the raw meteorological data file (NCDC (2005)) containing weather observations from Peoria for December 3, 1996 is shown in Figure 6. The precipitation type observed at 5 and 6 am (precipitation type code 40, encoded as 04000 in the data file) is circled in the figure. Referring to precipitation type codes in Table 3, a precipitation type code 40 corresponds to light snow.

SURGEN processed the raw meteorological data (Figure 6) and produced a LakeT-compatible meteorological data input file which included binary freezing precipitation codes. As explained above, SURGEN sets the binary precipitation type variable to one (1) in a LakeT-compatible meteorological data

input file when one of the precipitation types in Table 3 is observed. A portion of the LakeT-compatible meteorological data input file from SURGEN corresponding to Figure 6 is shown in Figure 7. Binary freezing precipitation codes in the 5 and 6 am hourly records are circled in Figure 7. Figure 7 shows that the precipitation codes were set to one (1) in both records, which is consistent with the light snow (precipitation code 40 from Table 3) observed at those times. SURGEN recognized the occurrence of freezing precipitation in the raw weather observations and correctly set the binary freezing precipitation codes in the LakeT meteorological data input file to one (1), validating the freezing precipitation code algorithm.

3.4 Partial Pressure of Water Vapor

Validation of the partial pressure of water vapor algorithm was performed by comparing results from SURGEN with a manual computation and a published tabular value of vapor pressure. On July 30, 1996 at 2 am LST, the Peoria, Illinois National Weather Service recorded a dry-bulb temperature of 70°F and a relative humidity of 94%. The partial pressure of water vapor at those conditions is computed manually below using the logic of the PVSF subroutine described in section 2.4.

The dry bulb temperature, x , = 70°F so that T is defined as:

$$T = (70+459.688)/1.8 = 294.2711 \text{ K}$$

Since T >= 273.16 K compute z as follows:

$$z = 373.16/T = 373.16/294.2711 = 1.26808$$

Terms P1, P2, P3, and P4 are computed using their definitions in Table 6:

$$P1 = -7.90298\ (z-1) = -7.90298\ (1.26808 - 1) = -2.11865$$

$$P2 = 5.02808 \log_{10}(z) = 5.02808 \log_{10}(1.26808) = 0.51863$$

$$P3 = -1.3816 \times 10^{-7} \times (10^{(11.344\ (1-1/1.26808))}-1) = -0.00003$$

$$P4 = 8.1328 \times 10^{-3} \times (10^{(-3.49149\ (1.26808-1))}-1) = -0.00719$$

The partial pressure of water vapor at saturation (VAPPR) is computed using Eq. 1 and the above definitions of P1, P2, P3, and P4:

$$VAPPR = 29.921 \times 10^{(P1+P2+P3+P4)} = 0.73916 \text{ inches Hg.}$$

At a relative humidity of 94%, the partial pressure of water vapor (e) is computed using the partial pressure of water vapor in saturated air and Eq. 2 as follows:

$$e = VAPPR \times (RH/100) = 0.73916 \times (94/100) = 0.69 \text{ inches Hg.}$$

The results of the manual computation are compared with results from SURGEN as follows. A portion of the raw meteorological data file (NCDC (2005)) containing the observed dry-bulb temperature and humidity at 2 am July 30, 1996 (70°F and 94% relative humidity) is shown in Figure 8. SURGEN processed this raw meteorological data file and computed the partial pressure of water vapor using the subroutine "PVSF" (Figure 1). The computed value was included as part of the Lake-T meteorological data input file. A portion the Lake-T meteorological data input file showing the input dry-bulb temperature (70°F), relative humidity (94%) and computed partial pressure of water vapor is shown in Figure 9. Figure 9 shows that the partial pressure of water vapor computed by SURGEN (0.69 inches Hg.) matches the manually computed value above (0.69 inches Hg.).

The manually computed partial pressure of water vapor and the value from SURGEN are compared with the vapor pressure published in standard reference (List (1951)). Figure 10 shows a portion of the saturation vapor pressure table from List (1951, page 356) for a dry-bulb temperature of 70.0°F. The

value shown in Figure 10 (0.73916 inches Hg.) applies to saturated air (100% relative humidity), so the value in Figure 10 must be multiplied by the observed relative humidity (94%) to obtain the partial pressure of water vapor. Multiplying this value by 94% produces a partial vapor pressure of water of 0.69 inches Hg. (0.73916 x .94 = 0.69), which matches the manually computed value above and the value computed by the PVSF subroutine in SURGEN (Figure 9). Therefore, the subroutine PVSF, as implemented in SURGEN, correctly computed the partial pressure of water vapor in the LakeT meteorological data input file.

4 References

American Society of Heating, Refrigerating, and Air Conditioning Engineers, inc. (ASHRAE), "Subroutine Algorithms for Heating and Cooling Loads to Determine Building Energy Requirements", Atlanta, GA, 1975.

Colbeck, S.C., "Dynamics of Snow and Ice Masses", U.S. Army Cold Regions Research and Engineering Laboratory, pp. 349-390, Academic Press, New York City, New York, 1980.

Geiger, R., "The Climate Near the Ground", pp. 218-219, Harvard University Press, Cambridge Massachusetts, 1965.

Hess, S.L., 1979. "Introduction to Theoretical Meteorology." Reprint Edition. Robert E. Krieger Publishing Company, Malabar, FL.

Huschke, R.E. (Ed.), "Glossary of Meteorology", American Meteorological Society, Boston Massachusetts, 1980.

Iribarne, J.V. and Godson, W.L., 1981. "Atmospheric Thermodynamics. Second Edition. D. Reidel Publishing Company, Boston.

Jirka, G.H., M. Watanabe, K.H. Octavio, C.F. Cerco, D.R.F. Harleman, "Mathematical Predictive Models for Cooling Ponds and Cooling Lakes Part A: Model Development and Design Considerations", Department of Civil Engineering, School of Engineering, Massachusetts Institute of Technology, Cambridge Massachusetts, 1978.

List, R. J. , 1951. " Smithsonian Meteorological Tables." Sixth Revised Edition. Smithsonian Institution Press, Washington, D.C.

Meyers, T.P. and R.F. Dale, "Predicting Daily Insolation with Hourly Cloud Height and Coverage", American Meteorological Society, Boston Massachusetts, Journal of Climate and Applied Meteorology, Volume 22, pages 537-545, April 1983.

National Climatic Data Center (NCDC), "Local Climatological Data, Monthly Summary, Madison Wisconsin December, January, and February, 1988, published by NCDC, Asheville North Carolina, 1988, 1989.

National Climatic Data Center (NCDC), "Local Climatological Data, Monthly Summary, Greater Peoria Airport (Peoria Illinois), December, January, and February, winters of 1988-1989 through 1991-1992, published by NCDC, Asheville North Carolina, 1989, 1990, 1991, 1992.

National Climatic Data Center (NCDC), "Data Documentation for Data Set 3280 (DSI-3280)." May 4, 2005. Published by NCDC, Asheville, NC, 2005.

National Renewable Energy Laboratory (NREL), "National Solar Radiation Data Base 1961-1990, Hourly Solar Data, Madison Wisconsin, January July and September 1988", accessed at NREL Internet site at: http://rredc.nrel.gov, December 2012.

Sargent & Lundy (S&L), "User Manual SURGEN Program." S&L Program Number: 03.7.470-2.0, 1997.

Sargent & Lundy (S&L), "LAKET-PC, A One Dimensional Lake Thermal Prediction Program, S&L Program Number LAK 03.7.292-2.2, Revision 0, October 30, 2004, User Manual", S&L, Chicago IL, 2004.

Table 1

**Snow and Temperature Data from Peoria, Illinois
Used to Construct a Snow Accumulation Algorithm**

Maximum final snow depth on ground (inches)	Total period water equivalent precipitation (inches)	Date	Maximum air temperature during time of precipitation (°F)	Final snow depth to liquid water ratio
3	0.68	27 Dec 1988	29	4.4
4	0.17	4 Feb 1989	3	23.5
5	0.31	20 Feb 1989	31	16.1
6	0.36	10 Dec 1989	31	16.7
4	1.02	25 Jan 1990	36	3.3
3	1.06	22 Feb 1990	32	2.8
4	0.20	15 Jan 1992	22	20.0
5	0.64	5 Jan 1991	24	9.4

Table 2

Snow and Temperature Data from Madison Wisconsin Used to Construct a Snow Melt Algorithm

Air temp (°F)	Snow depth decrease (inches per hour)	Air temp (°F)	Snow depth increase (inches per hour)	Air temp (°F)	Snow depth decrease (inches per hour)
-2	0.000	16	0.021	35	0.083
-1	0.000	17	0.021	36	0.166
0	0.000	18	0.021	37	0.166
1	0.000	19	0.042	38	0.166
2	0.000	20	0.042	39	0.166
3	0.000	21	0.042	40	0.166
4	0.000	22	0.042	41	0.333
5	0.000	23	0.042	42	0.333
6	0.000	24	0.042	43	0.333
7	0.000	25	0.042	44	0.333
8	0.000	26	0.042	45	0.333
9	0.000	27	0.042	46	0.333
10	0.021	28	0.042	47	0.667
11	0.021	29	0.042	48	0.667
12	0.021	30	0.042	49	0.667
13	0.021	31	0.042	50	0.667
14	0.021	32	0.083	51	0.667
15	0.021	33	0.083	52	0.667
		34	0.083		

Table 3

Precipitation Type Codes Used in Surface Weather Observations (Source: NCDC 2005)

Precipitation code	Precipitation description	Precipitation code	Precipitation description
26	light freezing rain	54	moderate snow squall (Note 3)
27	moderate freezing rain	55	heavy snow squall (Note 3)
28	heavy freezing rain	56	light snow grains
36	light freezing drizzle	57	moderate snow grains
37	moderate freezing drizzle	58	heavy snow grains
38	heavy freezing drizzle	60	light ice pellet showers
40	light snow	61	moderate ice pellet showers
41	moderate snow	62	heavy ice pellet showers
42	heavy snow	63	light hail
43	light snow pellets (Note 1)	64	moderate hail (Note 4)
44	moderate snow pellets (Note 1)	65	heavy hail (Note 4)
45	heavy snow pellets (Note 1)	66	light small hail (Note 4)
46	light ice crystals (Note 2)	67	moderate small hail (Note 4)
47	moderate ice crystals	68	heavy small hail (Note 4)
48	heavy ice crystals (Note 2)	90	light ice pellets
50	light snow showers	91	moderate ice pellets
51	moderate snow showers	92	heavy ice pellets
52	heavy snow showers	93	hail showers (Note 5)
53	light snow squall (Note 3)	94	small hail/snow pellet showers (Note 5)

Note 1: Codes 43, 44, and 45 ended in June, 1996 and replaced with code 67.
Note 2: Code replaced with 47 in April, 1963.
Note 3: Code used through 1948.
Note 4: Prior to April, 1970 ice pellets were coded as sleet. Beginning April, 1970 sleet and small hail were redefined as ice pellets and are coded as 60, 61, or 62. Beginning in September, 1956 intensities of hail were no longer reported and all occurrences of hail were recorded as a 64. Beginning July, 1996 hail was defined as hailstones ¼ inch or larger in diameter; small hail and snow pellets are reported when less than ¼ inch in diameter and are coded as 64 and 67, respectively.
Note 5: Began July, 1996.

Table 4

**Constants used in vapor pressure equation
(Source: ASHRAE (1975))**

Constant	Value	Constant	Value
A1	-7.90298	B1	-9.09718
A2	5.02808	B2	-3.56654
A3	-1.3816×10^{-7}	B3	0.876793
A4	11.344	B4	0.0060273
A5	8.1328×10^{-3}		
A6	-3.49149		

Table 5

Constants used in vapor pressure equation (Source: ASHRAE (1975))

Parameter	Definition
P1	$B1\,(z-1)$
P2	$B2\,\log_{10}(z)$
P3	$B3\,(1-1/z)$
P4	$\log_{10}(B4)$

Table 6

Constants used in vapor pressure equation (Source: ASHRAE (1975))

Parameter	Definition
P1	$A1\,(z-1)$
P2	$A2\,\log_{10}(z)$
P3	$A3\times(10^{(A4\,(1-1/z))}-1)$
P4	$A5\times(10^{(A6\,(z-1))}-1)$

Table 7

Program Output Listing of Processed Meteorological Data from Madison, Wisconsin for 25 January 1988

YEAR 1988. MONTH 1. DAY 25.

HOUR	CEIL	WINDD	WINDSP	DBTEMP	WBTEMP	DPTEMP	RELHUM	PRESS	CL COV	AT CODE	RAIN	SWRAD	LWRAD	PPH2O
.00	1300.00	1.00	6.00	21.00	20.16	18.32	88.00	28.85	10.00	4000.00	2.00	.00	70.03	.10
1.00	800.00	1.00	5.00	21.00	20.16	18.32	88.00	28.83	10.00	4070.00	3.00	.00	70.03	.10
2.00	800.00	1.00	11.00	22.00	21.42	20.23	92.00	28.83	10.00	4070.00	1.00	.00	70.91	.10
3.00	800.00	1.00	14.00	16.00	15.30	13.38	88.00	28.84	10.00	4070.00	.00	.00	65.78	.08
4.00	800.00	1.00	15.00	15.00	13.93	10.72	81.00	28.84	10.00	4070.00	2.00	.00	64.95	.07
5.00	500.00	1.00	11.00	13.00	12.37	10.41	88.00	28.84	10.00	4070.00	1.00	.00	63.33	.07
6.00	500.00	1.00	12.00	13.00	12.16	9.49	84.00	28.84	10.00	4070.00	.00	.00	63.33	.06
7.00	2000.00	1.00	14.00	12.00	10.99	7.54	80.00	28.84	10.00	4000.00	.00	11.34	62.53	.06
8.00	4700.00	1.00	13.00	11.00	10.03	6.56	80.00	28.85	10.00	4000.00	.00	49.82	61.74	.05
9.00	5000.00	1.00	11.00	10.00	8.93	4.84	77.00	28.85	10.00	4000.00	.00	84.29	60.96	.05
10.00	5500.00	1.00	13.00	10.00	8.93	4.84	77.00	28.85	10.00	4000.00	1.00	107.67	60.96	.05
11.00	1000.00	1.00	10.00	10.00	9.07	5.59	80.00	28.84	10.00	4000.00	.00	117.33	60.96	.05
12.00	1000.00	1.00	13.00	12.00	10.84	6.78	77.00	28.82	10.00	4000.00	.00	112.08	62.53	.05
13.00	900.00	1.00	12.00	14.00	12.91	9.49	80.00	28.79	10.00	4000.00	1.00	92.69	64.14	.06
14.00	400.00	1.00	18.00	17.00	16.27	14.36	88.00	28.79	10.00	4000.00	3.00	61.22	66.61	.08
15.00	200.00	1.00	21.00	18.00	17.24	15.35	88.00	28.81	10.00	4000.00	4.00	17.94	67.45	.08
16.00	200.00	1.00	13.00	18.00	17.24	15.35	88.00	28.85	10.00	4100.00	2.00	.00	67.45	.08
17.00	200.00	1.00	17.00	18.00	16.99	14.40	84.00	28.88	10.00	4000.00	3.00	.00	67.45	.08
18.00	200.00	1.00	18.00	18.00	17.25	15.35	88.00	28.90	10.00	4000.00	2.00	.00	67.45	.08
19.00	300.00	1.00	21.00	18.00	17.25	15.35	88.00	28.93	10.00	4000.00	1.00	.00	67.45	.08
20.00	1500.00	1.00	19.00	17.00	16.27	14.36	88.00	28.96	10.00	4000.00	1.00	.00	66.61	.08
21.00	1500.00	1.00	20.00	16.00	15.30	13.38	88.00	28.97	10.00	4000.00	1.00	.00	65.78	.08
22.00	1500.00	1.00	20.00	15.00	14.32	12.39	88.00	28.98	10.00	4000.00	1.00	.00	64.95	.07
23.00	1500.00	1.00	19.00	14.00	13.57	12.30	92.00	28.99	10.00	4000.00	.00	.00	64.14	.07

Table 8

Program Output Listing of Processed Meteorological Data from Madison, Wisconsin for 28 July 1988

YEAR 1988. MONTH 7. DAY 28.

HOUR	CEIL	WINDD	WINDSP	DBTEMP	WBTEMP	DPTEMP	RELHUM	PRESS	CL COV	AT CODE	RAIN	SWRAD	LWRAD	PPH2O
.00	35000.00	1.00	.00	68.00	62.16	58.73	73.00	29.13	.00	.00	.00	.00	104.72	.51
1.00	35000.00	1.00	3.00	67.00	62.36	59.67	78.00	29.13	.00	.00	.00	.00	103.54	.52
2.00	35000.00	1.00	7.00	68.00	63.29	60.64	78.00	29.13	.00	.00	.00	.00	104.72	.54
3.00	35000.00	1.00	.00	69.00	63.77	60.86	76.00	29.13	.00	.00	.00	.00	105.92	.55
4.00	35000.00	1.00	.00	67.00	63.02	60.77	81.00	29.15	.00	.00	.00	.00	103.54	.54
5.00	35000.00	1.00	4.00	65.00	61.14	58.82	81.00	29.16	.00	.00	.00	43.64	101.21	.51
6.00	35000.00	1.00	.00	69.00	64.91	62.72	81.00	29.17	.00	.00	.00	104.59	105.92	.58
7.00	35000.00	1.00	8.00	78.00	67.15	61.52	58.00	29.18	.00	.00	.00	163.11	117.20	.56
8.00	35000.00	1.00	8.00	82.00	68.38	61.45	51.00	29.20	.00	.00	.00	215.36	122.53	.57
9.00	35000.00	1.00	9.00	85.00	68.10	59.17	43.00	29.20	.00	.00	.00	256.00	126.66	.52
10.00	35000.00	1.00	8.00	88.00	70.09	61.17	42.00	29.20	.00	.00	.00	281.29	130.90	.56
11.00	35000.00	1.00	10.00	90.00	70.48	60.76	39.00	29.20	.00	.00	.00	289.89	133.79	.56
12.00	35000.00	1.00	14.00	93.00	69.78	57.56	32.00	29.19	.00	.00	.00	279.95	138.23	.50
13.00	35000.00	1.00	12.00	94.00	69.59	56.52	30.00	29.18	.00	.00	.00	254.24	139.74	.49
14.00	35000.00	1.00	11.00	94.00	70.05	57.49	31.00	29.16	.00	.00	.00	214.16	139.74	.50
15.00	35000.00	1.00	8.00	94.00	70.94	59.33	33.00	29.15	.00	.00	.00	162.43	139.74	.53
16.00	35000.00	1.00	13.00	95.00	70.30	57.38	30.00	29.15	.00	.00	.00	103.49	141.26	.50
17.00	35000.00	1.00	12.00	94.00	69.58	56.52	30.00	29.14	.00	.00	.00	45.09	139.74	.49
18.00	35000.00	1.00	12.00	91.00	69.18	57.60	34.00	29.15	.00	.00	.00	.00	135.26	.50
19.00	35000.00	1.00	10.00	88.00	67.77	56.64	36.00	29.15	.00	.00	.00	.00	130.90	.48
20.00	35000.00	1.00	8.00	80.00	67.04	60.18	52.00	29.15	.00	.00	.00	.00	119.84	.54
21.00	35000.00	1.00	8.00	79.00	67.41	61.42	56.00	29.15	.00	.00	.00	.00	118.52	.56
22.00	35000.00	1.00	6.00	78.00	67.15	61.52	58.00	29.16	.00	.00	.00	.00	117.20	.56
23.00	35000.00	1.00	9.00	76.00	67.10	62.53	64.00	29.17	.00	.00	.00	.00	114.61	.58

Table 9

Program Output Listing of Processed Meteorological Data from Madison, Wisconsin for 30 July 1988

YEAR 1988. MONTH 7. DAY 30.

HOUR	CEIL	WINDD	WINDSP	DBTEMP	WBTEMP	DPTEMP	RELHUM	PRESS	CL COV	AT CODE	RAIN	SWRAD	LWRAD	PPH20
.00	35000.00	1.00	9.00	79.00	71.95	68.91	72.00	29.07	4.00	.00	.00	.00	121.74	.72
1.00	35000.00	1.00	7.00	77.00	71.94	69.78	79.00	29.06	4.00	.00	.00	.00	119.05	.74
2.00	35000.00	1.00	10.00	76.00	71.75	69.93	82.00	29.05	4.00	.00	.00	.00	117.73	.75
3.00	35000.00	1.00	8.00	75.00	70.80	68.95	82.00	29.05	7.00	.00	.00	.00	122.78	.72
4.00	35000.00	1.00	8.00	74.00	70.57	69.05	85.00	29.06	8.00	7000.00	.00	.00	124.26	.72
5.00	35000.00	1.00	9.00	74.00	70.57	69.05	85.00	29.05	6.00	7000.00	.00	38.43	118.93	.72
6.00	35000.00	1.00	7.00	74.00	70.57	69.05	85.00	29.05	6.00	.00	.00	95.56	118.93	.72
7.00	35000.00	1.00	7.00	77.00	71.94	69.78	79.00	29.06	4.00	.00	.00	155.35	119.05	.74
8.00	35000.00	1.00	8.00	79.00	73.29	70.94	77.00	29.07	5.00	.00	.00	204.43	123.55	.77
9.00	35000.00	1.00	5.00	83.00	74.16	70.56	67.00	29.07	9.00	.00	.00	232.60	140.95	.77
10.00	35000.00	1.00	5.00	85.00	75.95	72.47	67.00	29.08	5.00	.00	.00	267.57	132.04	.82
11.00	35000.00	1.00	7.00	87.00	75.85	71.48	61.00	29.08	7.00	.00	.00	270.01	140.26	.79
12.00	35000.00	1.00	11.00	89.00	75.57	70.19	55.00	29.08	8.00	.00	.00	258.53	146.74	.76
13.00	35000.00	1.00	10.00	91.00	75.09	68.51	49.00	29.07	5.00	.00	.00	241.77	141.00	.72
14.00	35000.00	1.00	11.00	91.00	72.41	63.86	42.00	29.06	5.00	.00	.00	203.39	141.00	.62
15.00	35000.00	1.00	11.00	91.00	72.41	63.86	42.00	29.06	3.00	.00	.00	157.11	137.33	.62
16.00	35000.00	1.00	8.00	91.00	71.21	61.65	39.00	29.06	3.00	.00	.00	99.84	137.33	.57
17.00	35000.00	1.00	12.00	90.00	70.45	60.76	39.00	29.05	2.00	.00	.00	43.10	134.70	.56
18.00	35000.00	1.00	9.00	88.00	71.18	63.22	45.00	29.07	2.00	.00	.00	.00	131.79	.60
19.00	35000.00	1.00	7.00	82.00	70.88	65.77	59.00	29.08	1.00	.00	.00	.00	122.74	.65
20.00	35000.00	1.00	6.00	77.00	68.79	64.84	67.00	29.08	.00	.00	.00	.00	115.90	.63
21.00	35000.00	1.00	8.00	75.00	68.05	64.65	71.00	29.10	.00	.00	.00	.00	113.34	.63
22.00	35000.00	1.00	6.00	73.00	65.73	61.88	69.00	29.10	.00	.00	.00	.00	110.82	.57
23.00	35000.00	1.00	6.00	71.00	63.68	59.55	68.00	29.12	.00	.00	.00	.00	108.35	.52

Table 10

Program Output Listing of Processed Meteorological Data from Madison, Wisconsin for 15 September 1988

YEAR 1988. MONTH 9. DAY 15.

HOUR	CEIL	WINDD	WINDSP	DBTEMP	WBTEMP	DPTEMP	RELHUM	PRESS	CL COV	AT CODE	RAIN	SWRAD	LWRAD	PPH2O
.00	35000.00	1.00	.00	51.00	49.43	48.07	90.00	29.31	.00	.00	.00	.00	86.05	.34
1.00	35000.00	1.00	.00	49.00	47.49	46.11	90.00	29.33	.00	.00	.00	.00	84.05	.31
2.00	35000.00	1.00	.00	48.00	46.97	46.01	93.00	29.33	.00	.00	.00	.00	83.07	.31
3.00	35000.00	1.00	5.00	48.00	46.97	46.01	93.00	29.33	.00	.00	.00	.00	83.07	.31
4.00	35000.00	1.00	.00	47.00	45.99	45.03	93.00	29.35	.00	.00	.00	.00	82.09	.30
5.00	35000.00	1.00	5.00	46.00	45.01	44.05	93.00	29.36	1.00	.00	.00	.00	81.26	.29
6.00	35000.00	1.00	6.00	45.00	44.03	43.07	93.00	29.36	1.00	.00	.00	55.88	80.30	.28
7.00	35000.00	1.00	5.00	50.00	48.46	47.09	90.00	29.38	10.00	.00	.00	99.30	99.51	.33
8.00	35000.00	1.00	8.00	57.00	53.07	50.00	78.00	29.40	10.00	.00	.00	143.85	107.99	.37
9.00	35000.00	1.00	10.00	60.00	53.66	48.69	67.00	29.40	10.00	.00	.00	178.17	111.80	.35
10.00	25000.00	1.00	12.00	63.00	53.91	46.59	56.00	29.39	10.00	.00	.00	198.50	115.73	.33
11.00	25000.00	1.00	10.00	65.00	55.13	47.44	54.00	29.38	10.00	.00	.00	203.51	118.41	.34
12.00	35000.00	1.00	11.00	69.00	56.66	47.27	47.00	29.36	10.00	.00	.00	191.87	123.93	.34
13.00	35000.00	1.00	8.00	71.00	57.15	46.62	43.00	29.34	10.00	.00	.00	165.96	126.77	.33
14.00	25000.00	1.00	11.00	71.00	55.73	43.24	38.00	29.32	10.00	.00	.00	127.97	126.77	.29
15.00	25000.00	1.00	9.00	70.00	56.09	45.09	42.00	29.30	10.00	.00	.00	81.05	125.34	.31
16.00	14000.00	1.00	12.00	69.00	56.38	46.68	46.00	29.28	10.00	.00	.00	30.94	123.93	.33
17.00	14000.00	1.00	11.00	67.00	56.05	47.70	51.00	29.29	10.00	.00	.00	.00	121.14	.34
18.00	14000.00	1.00	10.00	64.00	55.88	49.86	61.00	29.29	10.00	.00	.00	.00	117.06	.37
19.00	14000.00	1.00	11.00	62.00	55.01	49.74	65.00	29.30	8.00	.00	.00	.00	108.42	.37
20.00	35000.00	1.00	9.00	59.00	52.76	47.74	67.00	29.31	7.00	.00	.00	.00	102.33	.34
21.00	35000.00	1.00	9.00	57.00	51.94	47.81	72.00	29.30	10.00	.00	.00	.00	107.99	.34
22.00	35000.00	1.00	5.00	55.00	51.02	47.72	77.00	29.29	10.00	.00	.00	.00	105.51	.34
23.00	35000.00	1.00	4.00	53.00	50.19	47.82	83.00	29.28	10.00	.00	.00	.00	103.07	.34

Table 11

NOAA January 1988 Madison, Wisconsin Solar Radiation Measurements

MADISON, WI
JANUARY 1988

STATION # 14837
N43.08 E089.20 TIME ZONE +06 ELEV (FT. MSL) *866

GLOBAL RADIATION (WATT-HOURS/M²)
MEASURED FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

DAY	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
01	0	0	0	0	0	0	0	14	120	257	363	423	418	354	246	110	11	0	0	0	0	0	0	0	2316
02	0	0	0	0	0	0	0	17	134	259	353	408	404	344	234	107	11	0	0	0	0	0	0	0	2271
03	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
04	0	0	0	0	0	0	0	9	116	215	283	366	365	358	244	120	14	0	0	0	0	0	0	0	2090
05	0	0	0	0	0	0	0	14	120	257	366	425	424	363	256	121	15	0	0	0	0	0	0	0	2361
06	0	0	0	0	0	0	0	16	129	257	369	432	428	367	260	125	15	1	0	0	0	0	0	0	2399
07	0	0	0	0	0	0	0	11	68	177	285	415	392	133	0	0	0	0	0	0	0	0	0	0	1481
08	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
09	0	0	0	0	0	0	0	15	125	264	371	432	431	372	267	132	18	1	0	0	0	0	0	0	2428
10	0	0	0	0	0	0	0	25	150	271	425	450	429	368	264	129	17	0	0	0	0	0	0	0	2528
11	0	0	0	0	0	0	0	4	42	95	144	145	146	149	121	43	6	0	0	0	0	0	0	0	895
12	0	0	0	0	0	0	0	3	20	50	74	72	104	165	172	86	15	0	0	0	0	0	0	0	761
13	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
14	0	0	0	0	0	0	0	11	54	150	213	281	301	263	155	78	15	0	0	0	0	0	0	0	1521
15	0	0	0	0	0	0	0	8	74	223	356	404	415	361	238	152	21	0	0	0	0	0	0	0	2252
16	0	0	0	0	0	0	0	12	60	125	222	177	171	117	117	68	8	0	0	0	0	0	0	0	1077
17	0	0	0	0	0	0	0	9	54	102	142	128	114	102	61	26	6	0	0	0	0	0	0	0	744
18	0	0	0	0	0	0	0	5	32	72	125	145	161	157	91	47	9	0	0	0	0	0	0	0	844
19	0	0	0	0	0	0	0	3	40	51	122	95	84	42	34	14	2	0	0	0	0	0	0	0	487
20	0	0	0	0	0	0	0	6	47	145	140	216	172	151	109	83	29	0	0	0	0	0	0	0	1098
21	0	0	0	0	0	0	0	20	141	271	400	457	473	135	308	166	34	2	0	0	0	0	0	0	2407
22	0	0	0	0	0	0	0	5	59	162	239	444	365	211	150	86	28	0	0	0	0	0	0	0	1749
23	0	0	0	0	0	0	0	22	118	213	288	369	337	220	170	66	16	1	0	0	0	0	0	0	1820
24	0	0	0	0	0	0	0	23	149	252	371	368	297	317	196	97	19	0	0	0	0	0	0	0	2089
25	0	0	0	0	0	0	0	18	104	166	204	316	252	168	144	72	21	0	0	0	0	0	0	0	1465
26	0	0	0	0	0	0	0	17	152	309	408	502	511	456	340	198	48	1	0	0	0	0	0	0	2942
27	0	0	0	0	0	0	0	53	206	300	425	515	491	353	207	117	32	1	0	0	0	0	0	0	2700
28	0	0	0	0	0	0	0	38	198	313	416	471	490	413	286	141	38	2	0	0	0	0	0	0	2806
29	0	0	0	0	0	0	0	24	151	286	413	399	396	375	260	141	31	0	0	0	0	0	0	0	2476
30	0	0	0	0	0	0	0	7	77	201	273	286	272	107	88	31	4	0	0	0	0	0	0	0	1346
31	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

MONTHLY STATISTICS

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MEAN	0	0	0	0	0	0	0	15	101	202	289	339	328	256	186	95	18	0	0	0	0	0	0	0	1828

TOTAL OBSERVED SUNSHINE (MINUTES) = 8812   PERCENT TOTAL POSSIBLE SUNSHINE = 50%

HEATING DEGREE DAYS = 1586   DEPARTURE FROM NORMAL = + 55   COOLING DEGREE DAYS = 0   DEPARTURE FROM NORMAL = 0

Table 12

NOAA July 1988 Madison, Wisconsin Solar Radiation Measurements

MADISON, WI
JULY 1988

N43.08 E089.20 TIME ZONE +06 ELEV (FT. MSL) 866 STATION # 14837

GLOBAL RADIATION (WATT-HOURS/M²)
MEASURED FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

	HOURS																								
DAY	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
01	0	0	0	0	25	144	309	500	661	806	924	912	865	888	642	459	514	290	121	14	1	0	0	0	8075
02	0	0	0	0	22	88	248	427	660	667	904	966	969	902	790	638	457	274	104	11	1	0	0	0	8128
03	0	0	0	0	19	121	283	461	634	759	877	960	935	822	759	582	439	257	99	12	0	0	0	0	8019
04	0	0	0	0	18	120	282	456	628	768	878	930	930	788	767	618	444	255	105	13	1	0	0	0	8001
05	0	0	0	0	16	115	270	444	612	751	852	906	910	850	735	582	405	232	92	12	0	0	0	0	7784
06	0	0	0	0	15	94	236	409	574	716	808	715	801	750	682	567	396	219	88	9	0	0	0	0	7079
07	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
08	0	0	0	0	10	81	220	421	602	742	842	905	878	825	594	509	386	236	92	11	0	0	0	0	7354
09	0	0	0	0	12	80	129	229	504	729	716	755	844	661	706	189	310	229	101	5	1	0	0	0	6200
10	0	0	0	0	6	26	66	161	111	128	641	276	636	625	612	534	389	292	107	11	1	0	0	0	4622
11	0	0	0	0	9	108	286	432	629	785	866	950	911	650	433	353	412	238	101	11	1	0	0	0	7175
12	0	0	0	0	15	73	119	159	287	696	850	905	961	673	731	626	451	266	102	9	1	0	0	0	6924
13	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
14	0	0	0	0	11	108	271	456	632	765	879	940	942	892	752	603	446	266	111	8	1	0	0	0	8083
15	0	0	0	0	1	3	24	157	255	440	584	864	901	644	821	591	409	238	92	12	1	0	0	0	6037
16	0	0	0	0	1	1	8	47	149	304	685	54	56	133	480	607	405	247	69	6	1	0	0	0	3253
17	0	0	0	0	6	44	97	247	575	693	835	755	897	850	745	600	378	110	36	5	1	0	0	0	6874
18	0	0	0	0	3	18	47	90	92	139	186	312	228	372	508	461	117	237	87	8	1	0	0	0	2906
19	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
20	0	0	0	0	5	54	230	413	437	396	499	239	256	127	126	212	299	122	70	3	1	0	0	0	3489
21	0	0	0	0	3	22	165	162	315	522	724	815	326	323	363	371	303	255	71	6	0	0	0	0	4746
22	0	0	0	0	8	86	244	427	602	747	845	919	787	793	720	573	420	245	90	7	0	0	0	0	7513
23	0	0	0	0	7	85	235	412	589	738	848	650	917	841	715	590	411	228	84	7	0	0	0	0	7357
24	0	0	0	0	7	75	205	405	577	655	----	----	----	----	----	----	----	4	4	1	0	0	0	0	-----
25	0	0	0	0	4	80	203	389	600	----	----	----	----	----	----	----	----	0	11	4	0	0	0	0	-----
26	0	0	0	0	6	81	235	414	599	744	804	910	913	860	746	592	410	230	75	1	0	0	0	0	7620
27	0	0	0	0	3	50	208	373	575	732	860	782	----	----	----	551	404	223	76	3	0	0	0	0	-----
28	0	0	0	0	4	73	222	317	574	718	821	867	891	843	728	577	402	219	71	4	0	0	0	0	7331
29	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
30	0	0	0	0	2	42	157	328	496	632	769	745	851	840	716	574	414	225	0	0	0	0	0	0	6791
31	0	0	0	0	5	51	212	333	496	629	653	662	781	656	674	525	383	200	63	3	0	0	0	0	6326
MONTHLY STATISTICS																									
MEAN	0	0	0	0	9	71	193	336	499	631	766	748	766	692	648	523	392	216	79	7	0	0	0	0	6570

TOTAL OBSERVED SUNSHINE (MINUTES) = 20045 PERCENT TOTAL POSSIBLE SUNSHINE = 72%
HEATING DEGREE DAYS = 4 DEPARTURE FROM NORMAL = -8 COOLING DEGREE DAYS = 296 DEPARTURE FROM NORMAL = + 111

Table 13

NOAA September 1988 Madison, Wisconsin Solar Radiation Measurements

MADISON, WI
SEPTEMBER 1988

N43.08 E089.20 TIME ZONE +06 STATION # 14837 ELEV (FT. MSL) 866

GLOBAL RADIATION (WATT-HOURS/M²)
MEASURED FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

DAY	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
02	0	0	0	0	0	0	----	----	128	489	577	668	596	592	596	310	203	18	0	2	0	0	0	0	-----
03	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
04	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
06	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
07	0	0	0	0	0	0	----	----	388	662	780	831	822	749	606	427	211	75	4	0	0	0	0	0	-----
08	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
09	0	0	0	0	0	0	----	175	503	649	751	815	806	722	597	409	227	65	2	0	0	0	0	0	-----
10	0	0	0	0	0	9	87	226	377	552	660	717	714	650	524	376	203	54	0	1	0	0	0	0	5150
11	0	0	0	0	0	8	88	235	405	556	660	678	593	658	446	317	194	60	1	0	0	0	0	0	4899
12	0	0	0	0	0	6	53	248	426	577	683	714	705	502	354	326	164	48	2	0	0	0	0	0	4808
13	0	0	0	0	0	9	113	293	472	622	730	789	786	709	580	413	227	50	1	0	0	0	0	0	5794
14	0	0	0	0	0	11	116	290	473	618	714	785	778	705	576	408	175	66	1	0	0	0	0	0	5716
15	0	0	0	0	0	8	94	241	322	435	422	590	702	495	307	177	108	19	1	0	0	0	0	0	3921
16	0	0	0	0	0	3	27	45	48	58	108	178	99	252	385	315	150	38	1	0	0	0	0	0	1707
17	0	0	0	0	0	7	80	240	417	574	691	732	721	653	528	370	190	38	1	0	0	0	0	0	5242
18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----
19	0	0	0	0	0	2	12	20	36	246	265	389	271	368	82	52	34	40	1	0	0	0	0	0	1818
20	0	0	0	0	0	1	28	60	132	169	232	245	257	161	149	100	81	11	1	0	0	0	0	0	1627
21	0	0	0	0	0	3	23	71	100	198	372	716	724	664	266	116	52	8	0	0	0	0	0	0	3313
22	0	0	0	0	0	1	2	11	54	187	366	426	46	125	162	84	59	22	1	0	0	0	0	0	1546
23	0	0	0	0	0	6	90	265	449	600	678	695	724	671	509	311	205	29	1	0	0	0	0	0	5233
24	0	0	0	0	0	5	86	256	435	586	692	741	727	652	521	353	160	22	1	0	0	0	0	0	5237
25	0	0	0	0	0	5	75	234	415	567	673	710	706	635	500	336	151	18	1	0	0	0	0	0	5026
26	0	0	0	0	0	4	50	140	281	487	669	491	619	615	489	329	148	20	0	0	0	0	0	0	4342
27	0	0	0	0	0	4	52	160	355	469	502	488	578	386	411	279	118	19	0	0	0	0	0	0	3821
28	0	0	0	0	0	2	29	45	39	49	58	98	86	91	87	39	23	7	0	0	0	0	0	0	653
29	0	0	0	0	0	2	37	137	312	447	536	597	573	559	353	131	70	10	2	0	0	0	0	0	3766
30	0	0	0	0	0	3	49	152	338	437	513	571	455	381	341	238	76	9	0	0	0	0	0	0	3563

MONTHLY STATISTICS

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MEAN	0	0	0	0	0	4	----	169	300	445	536	594	569	522	407	270	140	32	1	0	0	0	0	0	-----

TOTAL OBSERVED SUNSHINE (MINUTES) = 14699 PERCENT TOTAL POSSIBLE SUNSHINE = 65%
HEATING DEGREE DAYS = 107 DEPARTURE FROM NORMAL = -54 COOLING DEGREE DAYS = 54 DEPARTURE FROM NORMAL = + 40

Table 14

Program Output Listing of Processed Meteorological Data from Springfield, Illinois for 25 March 1955

YEAR 1955. MONTH 3. DAY 25.

HOUR	CEIL	WINDD	WINDSP	DBTEMP	WBTEMP	DPTEMP	RELHUM	PRESS	CL COV	AT CODE	RAIN	SWRAD	LWRAD	PPH2O
.00	6500.00	1.00	13.00	33.00	29.91	25.05	70.00	29.39	10.00	.00	.00	.00	81.19	.13
1.00	11000.00	2.00	11.00	31.00	28.81	25.29	77.00	29.39	10.00	.00	.00	.00	79.24	.13
2.00	2500.00	3.00	8.00	31.00	28.71	25.00	76.00	29.37	10.00	.00	.00	.00	79.24	.13
3.00	2700.00	2.00	14.00	31.00	29.19	26.38	81.00	29.37	10.00	4000.00	.00	.00	79.24	.14
4.00	900.00	2.00	11.00	30.00	28.99	27.45	89.00	29.36	10.00	4000.00	.00	.00	78.27	.14
5.00	700.00	2.00	15.00	29.00	28.20	26.94	91.00	29.35	10.00	4000.00	1.00	.00	77.32	.14
6.00	500.00	2.00	14.00	28.00	27.57	26.88	95.00	29.34	10.00	4000.00	1.00	37.99	76.38	.14
7.00	900.00	2.00	18.00	27.00	26.50	25.66	94.00	29.32	10.00	4000.00	.00	93.92	75.44	.13
8.00	700.00	1.00	17.00	26.00	25.19	23.73	90.00	29.32	10.00	4000.00	.00	145.37	74.52	.12
9.00	600.00	16.00	18.00	25.00	24.29	22.98	91.00	29.36	10.00	4000.00	2.00	186.29	73.60	.12
10.00	400.00	16.00	17.00	23.00	22.34	21.00	91.00	29.37	10.00	4000.00	1.00	213.19	71.80	.11
11.00	400.00	16.00	21.00	23.00	22.34	21.00	91.00	29.35	10.00	4000.00	1.00	223.22	71.80	.11
12.00	800.00	16.00	19.00	22.00	21.29	19.77	90.00	29.35	10.00	4084.00	.00	216.15	70.91	.10
13.00	700.00	1.00	19.00	22.00	21.07	19.07	87.00	29.33	10.00	4084.00	.00	192.15	70.91	.10
14.00	700.00	1.00	21.00	22.00	20.78	18.08	83.00	29.35	10.00	4084.00	1.00	153.39	70.91	.09
15.00	500.00	16.00	21.00	21.00	19.96	17.60	85.00	29.35	10.00	4084.00	2.00	103.43	70.03	.09
16.00	1000.00	16.00	22.00	20.00	19.20	17.33	88.00	29.35	10.00	4084.00	1.00	47.49	69.16	.09
17.00	1000.00	15.00	20.00	18.00	17.19	15.12	87.00	29.38	10.00	4084.00	.00	.00	67.45	.08
18.00	7000.00	15.00	17.00	16.00	14.73	10.93	78.00	29.41	10.00	4084.00	.00	.00	65.78	.07
19.00	1700.00	15.00	19.00	15.00	14.00	10.97	82.00	29.43	10.00	4084.00	.00	.00	64.95	.07
20.00	7000.00	15.00	16.00	14.00	13.09	10.23	83.00	29.44	7.00	4084.00	.00	.00	59.38	.06
21.00	2500.00	15.00	19.00	14.00	13.14	10.47	84.00	29.43	10.00	4084.00	.00	.00	64.14	.07
22.00	5500.00	15.00	18.00	13.00	11.40	5.60	69.00	29.43	10.00	.00	.00	.00	63.33	.05
23.00	35000.00	15.00	17.00	11.00	9.52	3.68	69.00	29.43	.00	.00	.00	.00	52.77	.05

Figure 1. The FORTRAN subroutine PVSF from ASHRAE (1975)

```
C##############################################################
C
C
      SUBROUTINE PVSF(X,VAPPR)
      DIMENSION A(6), P(4), B(4)
      DATA A/-7.90298, 5.02808,    -1.3816E-7,
     *       11.344,   8.1328E-3, -3.49149/
     1     B/-9.09718, -3.56654, 0.876793, 0.0060273/
      T =        (X+459.688)/1.8
      IF (T.LT.273.16) GO TO 3
      Z =        373.16/T
      P(1) =     A(1)*(Z-1)
      P(2) =     A(2)*LOG10(Z)
      Z1 =       A(4)*(1-1/Z)
      P(3) =     A(3)*(10**Z1-1)
      Z1 =       A(6)*(Z-1)
      P(4) =     A(5)*(10**Z1-1)
      GO TO 4
3     Z =        273.16/T
      P(1) =     B(1)*(Z-1)
      P(2) =     B(2)*LOG10(Z)
      P(3) =     B(3)*(1-1/Z)
      P(4) =     LOG10(B(4))
4     SUM =      0
      DO 5 I=1,4
5     SUM =      SUM+P(I)
      VAPPR =    29.921*10**SUM
      RETURN
      END
C
C
C############################################################
```

Figure 2
Comparison of Program Predicted Solar Radiation with Solar Radiation Measurements from Madison, Wisconsin during 25 January 1988

SOLAR RADIATION (BTU/FT²-HR)
MADISON, WI
25 JAN 1988

HOUR	OBSERVED	PREDICTED
1		
2		
3		
4		
5		
6		
7	5.7	11.3
8	33	49.8
9	52.7	84.3
10	64.7	107.7
11	100.2	117.3
12	79.9	112.1
13	53.2	92.7
14	45.7	61.2
15	22.8	17.9
16	6.7	0
17		
18		
19		
20		
21		
22		
23		
24		

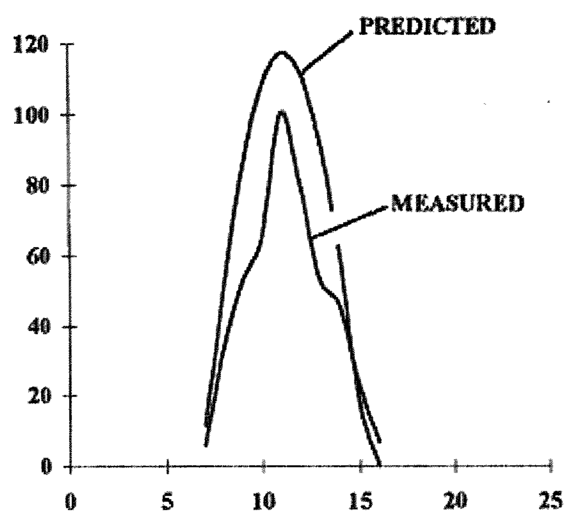


Figure 3
Comparison of Program Predicted Solar Radiation with Solar Radiation Measurements from Madison, Wisconsin during 28 July 1988

SOLAR RADIATION (BTU/FT²-HR)
MADISON, WI
28 JUL 1988

HOUR	OBSERVED	PREDICTED
1		
2		
3		
4	1.3	
5	23.2	43.6
6	70.4	104.6
7	100.6	163.1
8	182.1	215.4
9	227.7	256
10	260.4	281.3
11	275	289.9
12	282.6	280
13	267.4	254.2
14	230.9	214.2
15	183	162.4
16	127.5	103.5
17	69.5	45.1
18	22.5	
19	1.3	
20		
21		
22		
23		
24		

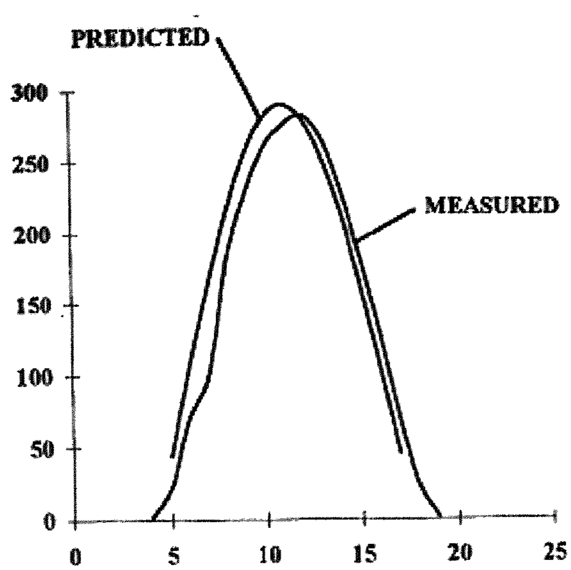


Figure 4
Comparison of Program Predicted Solar Radiation with Solar Radiation Measurements from Madison, Wisconsin during 30 July 1988

SOLAR RADIATION (BTU/FT²-HR)
MADISON, WI
30 JUL 1988

HOUR	OBSERVED	PREDICTED
1		
2		
3		
4	0.6	
5	13.3	38.4
6	49.8	95.6
7	104	155.4
8	157.3	204.4
9	200.5	232.6
10	243.9	267.6
11	236.3	270
12	270	258.5
13	266.4	241.8
14	227.1	203.4
15	182.1	157.1
16	131.3	99.8
17	71.4	43.1
18		
19		
20		
21		
22		
23		
24		

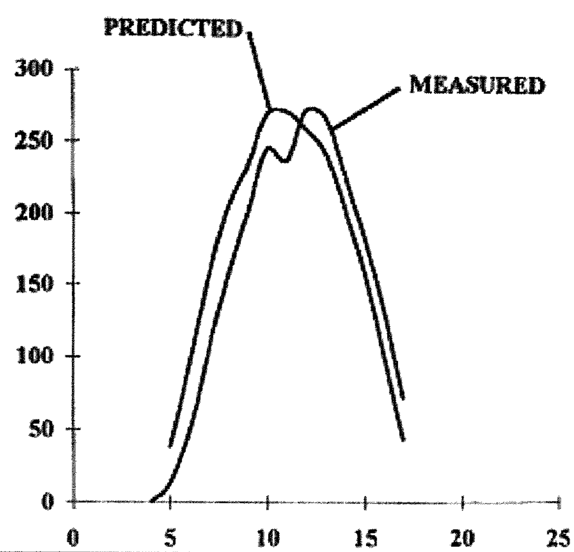
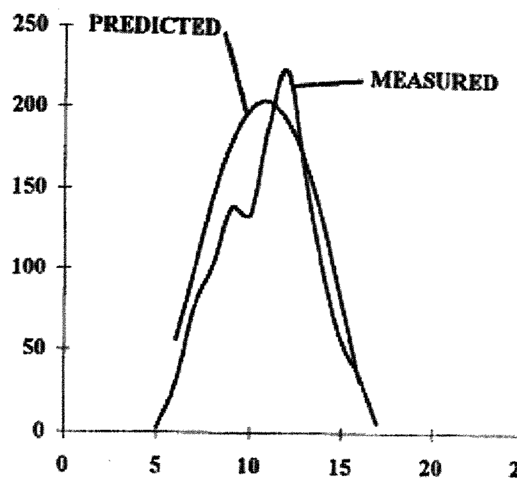


Figure 5
Comparison of Program Predicted Solar Radiation with
Solar Radiation Measurements from Madison, Wisconsin during 15 September 1988

SOLAR RADIATION (BTU/FT²-HR)
MADISON, WI
15 SEP 1988

HOUR	OBSERVED	PREDICTED
1		
2		
3		
4		
5	2.5	
6	29.8	55.9
7	76.4	99.3
8	102.1	143.9
9	138	178.2
10	133.9	198.5
11	187.1	203.5
12	222.7	191.9
13	157	166
14	97.4	128
15	56.1	81.1
16	34.3	30.9
17	6	
18		
19		
20		
21		
22		
23		
24		



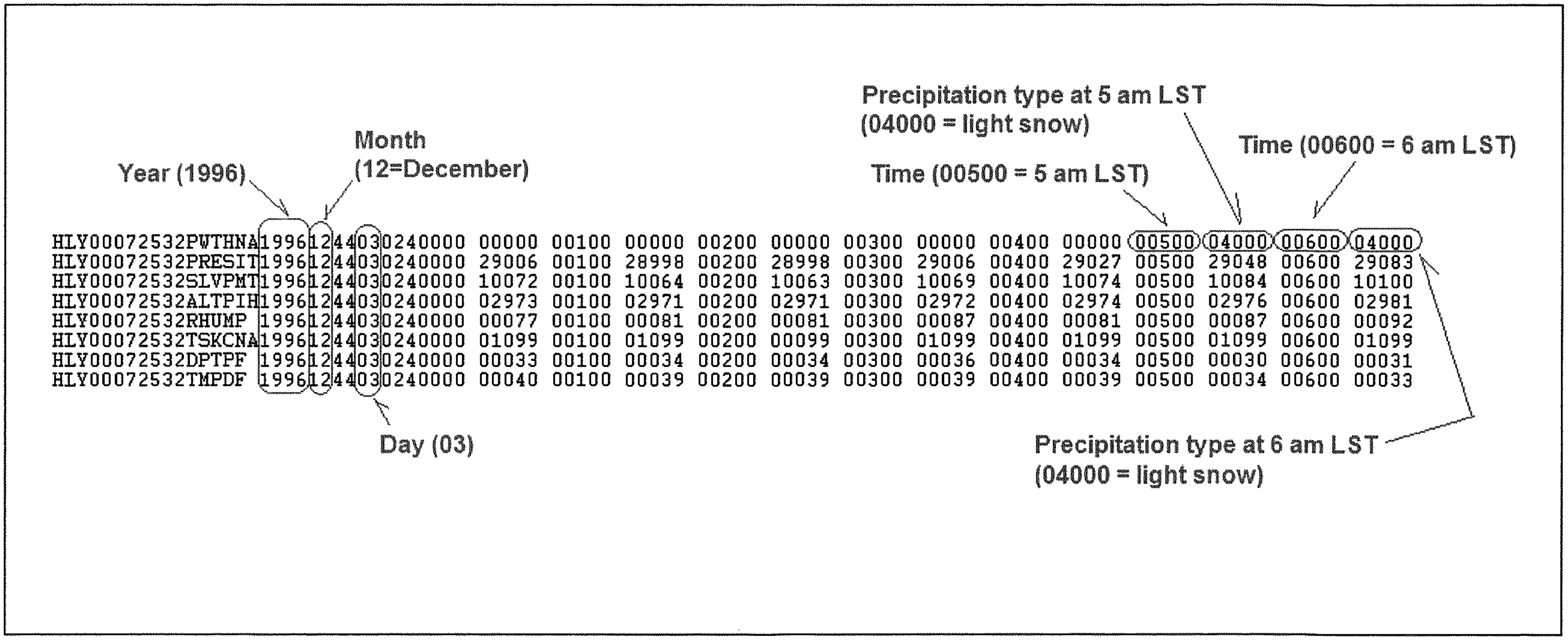


Figure 6. A portion of the meteorological weather record for Peoria, Illinois for December 3, 1996. Portions of the records for 5 and 6 am LST are annotated.

December 3, 1996

5 am LST

5 am precipitation code input into LakeT (1 = freezing)

72532.	1996.	12.	3.	5.00	700.00	13.00	12.00	34.00	32.59	30.66	87.00	29.05	10.00	1.00
72532.	1996.	12.	3.	6.00	500.00	14.00	14.00	33.00	32.16	31.02	92.00	29.08	10.00	1.00

6 am LST

6 am precipitation code input into LakeT (1 = freezing)

Figure 7. A portion of the LakeT input file for 5 and 6 am LST December 3, 1996.

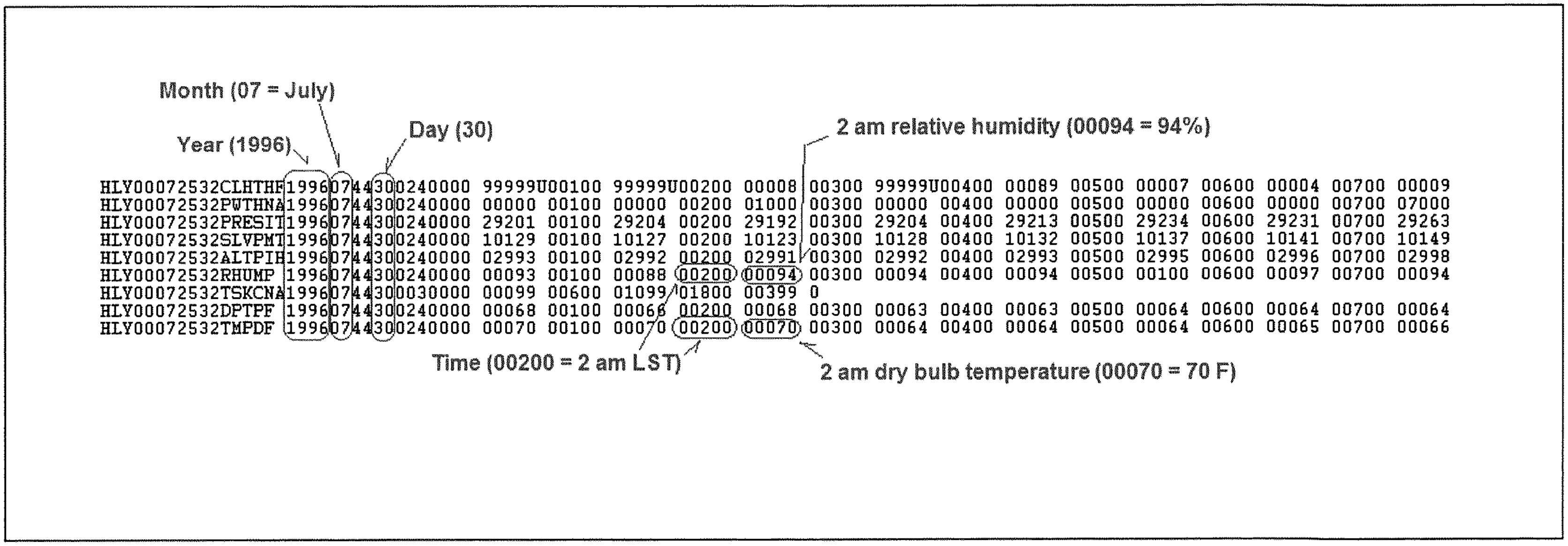


Figure 8. A portion of the meteorological weather record for Peoria, Illinois for July 30, 1996. Portions of the 2 am LST record are annotated.

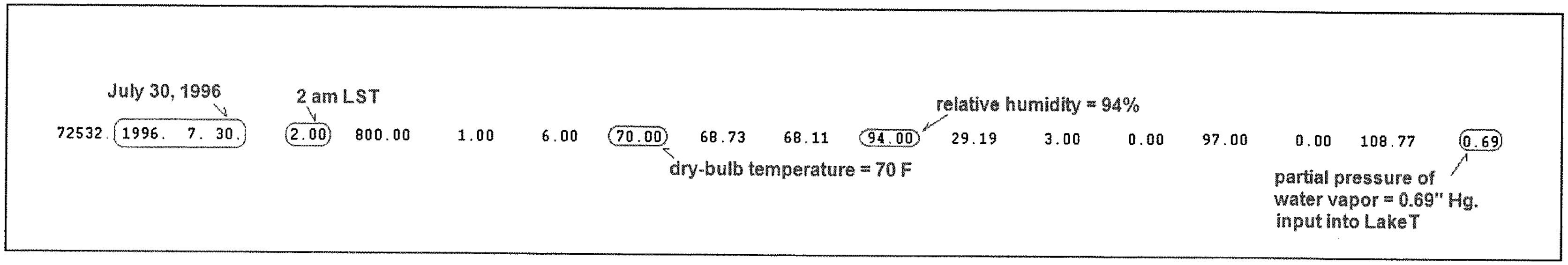


Figure 9. A portion of the LakeT input file for 2 am LST July 30, 1996.

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TABLE 95 (CONTINUED)

SATURATION VAPOR PRESSURE OVER WATER

English units

Temperature	.0	.1	.2	.3	.4	.5	.6	.7	.8
°F.	in. Hg.	in. Hg.	in. Hg.	in. Hg.	in. Hg.	in. Hg.	in. Hg.	in. Hg.	in. Hg.
50	0.36240	0.36375	0.36511	0.36646	0.36783	0.36920	0.37057	0.37195	0.37333
51	.37611	.37751	.37891	.38031	.38172	.38314	.38456	.38598	.38741
52	.39028	.39172	.39317	.39462	.39608	.39754	.39901	.40048	.40195
53	.40492	.40641	.40790	.40940	.41090	.41241	.41393	.41544	.41697
54	.42003	.42157	.42311	.42466	.42621	.42777	.42933	.43090	.43248
55	0.43564	0.43723	0.43882	0.44042	0.44203	0.44364	0.44525	0.44687	0.44849
56	.45176	.45340	.45504	.45670	.45835	.46001	.46168	.46335	.46503
57	.46840	.47009	.47179	.47350	.47521	.47692	.47864	.48037	.48210
58	.48558	.48733	.48908	.49084	.49260	.49437	.49614	.49792	.49971
59	.50330	.50510	.50691	.50873	.51055	.51238	.51421	.51605	.51789
60	0.52160	0.52346	0.52533	0.52720	0.52908	0.53096	0.53285	0.53475	0.53665
61	.54047	.54239	.54432	.54625	.54818	.55013	.55208	.55403	.55600
62	.55994	.56192	.56391	.56590	.56790	.56990	.57191	.57393	.57595
63	.58002	.58206	.58411	.58616	.58823	.59029	.59237	.59445	.59654
64	.60073	.60284	.60495	.60707	.60919	.61133	.61347	.61561	.61777
65	0.62209	0.62426	0.62644	0.62862	0.63082	0.63302	0.63522	0.63743	0.63965
66	.64411	.64635	.64859	.65085	.65311	.65537	.65765	.65993	.66221
67	.66681	.66912	.67143	.67376	.67608	.67842	.68076	.68312	.68547
68	.69021	.69259	.69497	.69737	.69977	.70217	.70459	.70701	.70944
69	.71432	.71677	.71923	.72169	.72416	.72664	.72913	.73163	.73413
70	0.73916	0.74169	0.74422	0.74676	0.74931	0.75186	0.75443	0.75700	0.75958
71	.76476	.76736	.76997	.77259	.77521	.77785	.78049	.78314	.78579
72	.79113	.79381	.79650	.79919	.80190	.80461	.80733	.81006	.81279
73	.81829	.82105	.82382	.82659	.82938	.83217	.83497	.83778	.84060
74	.84626	.84910	.85195	.85481	.85768	.86055	.86344	.86633	.86923

Dry bulb = 70.0 F

saturation vapor pressure at 70.0 F

Figure 10. A portion of the saturation vapor pressure table from List (1951, page 356). The entry corresponding to a dry-bulb temperature of 70.0°F is annotated.

ATTACHMENT 3
Supporting Information

Requested Plant Data

53 pages follow

	Process Computer tag
Column 1	LAS01v_C361
Column 2	LAS02v_C361
Column 3	(LAS01v_C361 + LAS02v_C361)/2
Column 4	LAS01v_C302
Column 5	LAS02v_C302
Column 6	LAS01v_A852
Column 7	LAS01v_A854

Officially licensed to 3546 megawatts thermal (MWT) for Unit 1 and Unit 2

Column	1	2	3	4	5	6	7
	Unit 1	Unit 2		Unit 1	Unit 2		
Date	Cooling Water Inlet Temp (°F)	Cooling Water Inlet Temp (°F)	Average Cooling Water Inlet Temp (°F)	Instaneous Core Thermal Power (MWT)	Instaneous Core Thermal Power (MWT)	Windspeed at 33 ft (MPH)	Ambient Air Temp (°F)
6/1/2012 0:00	76.7	77.0	76.9	3537	3546	12.4	47.8
6/1/2012 1:00	76.6	76.9	76.7	3546	3543	9.7	48.1
6/1/2012 2:00	76.4	76.8	76.6	3541	3537	10.2	48.4
6/1/2012 3:00	76.4	76.9	76.7	3540	3545	10.0	48.3
6/1/2012 4:00	76.6	77.0	76.8	3546	3546	16.1	48.2
6/1/2012 5:00	76.6	77.0	76.8	3540	3545	13.3	48.5
6/1/2012 6:00	76.7	77.1	76.9	3542	3544	10.4	49.1
6/1/2012 7:00	76.8	77.1	77.0	3538	3543	17.7	49.7
6/1/2012 8:00	76.9	77.3	77.1	3548	3542	10.5	50.2
6/1/2012 9:00	77.0	77.4	77.2	3547	3542	15.2	53.2
6/1/2012 10:00	77.1	77.5	77.3	3546	3544	16.9	55.6
6/1/2012 11:00	77.0	77.3	77.2	3552	3540	9.8	57.1
6/1/2012 12:00	76.9	77.3	77.1	3542	3540	10.1	58.3
6/1/2012 13:00	76.9	77.3	77.1	3544	3547	16.9	60.0
6/1/2012 14:00	77.1	77.4	77.2	3541	3542	15.2	61.8
6/1/2012 15:00	77.1	77.4	77.3	3543	3543	16.0	62.1
6/1/2012 16:00	77.2	77.5	77.3	3544	3538	9.6	62.8
6/1/2012 17:00	77.3	77.6	77.4	3547	3546	10.1	63.0
6/1/2012 18:00	77.3	77.7	77.5	3547	3547	13.2	62.2
6/1/2012 19:00	77.4	77.8	77.6	3538	3546	11.1	63.1
6/1/2012 20:00	77.4	77.8	77.6	3540	3547	6.0	61.3
6/1/2012 21:00	77.4	77.8	77.6	3539	3546	6.3	58.1
6/1/2012 22:00	77.3	77.7	77.5	3542	3539	7.5	56.1
6/1/2012 23:00	77.2	77.5	77.4	3546	3546	9.5	55.0
6/2/2012 0:00	77.0	77.3	77.2	3542	3547	9.9	55.0
6/2/2012 1:00	76.8	77.2	77.0	3539	3547	9.5	53.9
6/2/2012 2:00	76.7	77.0	76.9	3544	3549	11.5	53.5

6/2/2012 3:00	76.4	76.8	76.6	3539	3545	11.2	52.5
6/2/2012 4:00	76.3	76.6	76.5	3543	3543	8.7	52.3
6/2/2012 5:00	76.1	76.4	76.3	3551	3540	9.8	52.5
6/2/2012 6:00	76.0	76.3	76.1	3547	3542	12.0	53.9
6/2/2012 7:00	75.8	76.1	76.0	3542	3545	11.0	55.8
6/2/2012 8:00	75.7	76.1	75.9	3547	3542	10.8	59.1
6/2/2012 9:00	75.7	76.1	75.9	3540	3545	13.0	60.2
6/2/2012 10:00	75.9	76.2	76.1	3546	3546	11.5	63.8
6/2/2012 11:00	76.1	76.5	76.3	3540	3542	16.0	65.5
6/2/2012 12:00	76.4	76.8	76.6	3532	3541	17.3	67.1
6/2/2012 13:00	76.8	77.2	77.0	3538	3546	11.4	67.9
6/2/2012 14:00	77.0	77.5	77.2	3535	3541	14.2	67.6
6/2/2012 15:00	77.2	77.7	77.4	3537	3546	17.0	66.7
6/2/2012 16:00	77.4	77.8	77.6	3545	3545	15.7	68.7
6/2/2012 17:00	77.5	77.9	77.7	3540	3542	21.4	67.9
6/2/2012 18:00	77.6	77.9	77.8	3542	3546	13.3	66.1
6/2/2012 19:00	77.6	77.9	77.8	3540	3547	10.6	66.7
6/2/2012 20:00	77.5	77.9	77.7	3543	3547	7.2	65.1
6/2/2012 21:00	77.5	77.8	77.6	3547	3536	5.6	63.4
6/2/2012 22:00	77.5	77.8	77.6	3547	3544	7.2	61.7
6/2/2012 23:00	77.4	77.8	77.6	3541	3541	5.5	60.2
6/3/2012 0:00	77.3	77.7	77.5	3544	3548	6.2	58.8
6/3/2012 1:00	77.2	77.5	77.3	3537	3548	6.5	58.8
6/3/2012 2:00	76.9	77.3	77.1	3536	3544	8.5	58.7
6/3/2012 3:00	76.8	77.0	76.9	3541	3545	9.1	57.9
6/3/2012 4:00	76.7	77.0	76.8	3544	3547	7.2	56.6
6/3/2012 5:00	76.6	77.0	76.8	3539	3551	7.7	56.6
6/3/2012 6:00	76.6	77.0	76.8	3541	3544	6.0	56.4
6/3/2012 7:00	76.6	76.9	76.8	3549	3544	6.7	59.0
6/3/2012 8:00	76.6	77.0	76.8	3538	3546	8.2	62.8
6/3/2012 9:00	76.6	76.9	76.8	3546	3543	11.2	67.5
6/3/2012 10:00	76.8	77.0	76.9	3543	3547	16.8	71.2
6/3/2012 11:00	76.9	77.3	77.1	3532	3546	12.7	73.7
6/3/2012 12:00	77.1	77.5	77.3	3545	3545	16.5	74.6
6/3/2012 13:00	77.3	77.8	77.6	3540	3542	13.8	75.9
6/3/2012 14:00	77.6	78.1	77.8	3545	3543	11.1	76.6
6/3/2012 15:00	77.7	78.3	78.0	3548	3541	7.9	77.5
6/3/2012 16:00	77.8	78.4	78.1	3537	3540	11.9	78.4
6/3/2012 17:00	77.9	78.5	78.2	3537	3536	12.9	77.4
6/3/2012 18:00	78.0	78.4	78.2	3543	3550	12.4	77.1
6/3/2012 19:00	78.0	78.3	78.2	3561	3538	10.7	70.7
6/3/2012 20:00	77.9	78.3	78.1	3541	3543	5.2	70.0

6/3/2012 21:00	77.9	78.3	78.1	3543	3545	8.1	66.1
6/3/2012 22:00	77.9	78.2	78.1	3550	3549	8.8	62.6
6/3/2012 23:00	77.9	78.2	78.0	3545	3546	3.1	62.8
6/4/2012 0:00	77.9	78.3	78.1	3542	3548	3.0	62.6
6/4/2012 1:00	77.9	78.3	78.1	3543	3544	3.7	62.7
6/4/2012 2:00	78.1	78.4	78.3	3541	3545	4.7	63.8
6/4/2012 3:00	78.4	78.8	78.6	3539	3547	2.4	64.4
6/4/2012 4:00	78.7	79.1	78.9	3540	3546	5.5	62.8
6/4/2012 5:00	79.0	79.6	79.3	3545	3545	5.0	61.4
6/4/2012 6:00	79.3	79.8	79.5	3547	3544	2.3	62.3
6/4/2012 7:00	79.5	80.0	79.8	3542	3541	5.1	61.6
6/4/2012 8:00	79.8	80.3	80.0	3545	3543	9.4	62.8
6/4/2012 9:00	80.1	80.6	80.3	3545	3541	5.4	62.8
6/4/2012 10:00	80.2	80.7	80.4	3545	3544	2.5	63.8
6/4/2012 11:00	80.2	80.7	80.4	3541	3544	7.2	65.0
6/4/2012 12:00	80.2	80.8	80.5	3549	3544	4.8	67.7
6/4/2012 13:00	80.6	81.5	81.1	3542	3545	7.0	70.5
6/4/2012 14:00	81.3	82.7	82.0	3538	3541	4.3	73.2
6/4/2012 15:00	82.1	83.3	82.7	3552	3545	8.5	75.0
6/4/2012 16:00	82.9	83.8	83.3	3537	3541	9.7	76.3
6/4/2012 17:00	83.5	84.4	84.0	bad input	3535	11.0	76.5
6/4/2012 18:00	84.1	85.0	84.5	3546	3537	14.3	75.3
6/4/2012 19:00	84.5	85.2	84.8	3540	3551	12.6	73.5
6/4/2012 20:00	84.6	85.2	84.9	3544	3545	12.5	70.7
6/4/2012 21:00	84.8	85.2	85.0	3541	3544	12.1	69.0
6/4/2012 22:00	84.7	85.1	84.9	3544	3548	12.5	66.9
6/4/2012 23:00	84.6	84.9	84.8	3538	3536	12.9	65.4
6/5/2012 0:00	84.3	84.6	84.5	3556	3545	10.4	63.9
6/5/2012 1:00	83.9	84.3	84.1	3543	3546	12.8	62.6
6/5/2012 2:00	83.6	84.0	83.8	3536	3543	5.6	60.0
6/5/2012 3:00	83.3	83.7	83.5	3546	3545	4.3	58.8
6/5/2012 4:00	83.1	83.5	83.3	3539	3541	5.2	57.4
6/5/2012 5:00	82.8	83.2	83.0	3543	3542	3.8	56.3
6/5/2012 6:00	82.5	82.8	82.7	3544	3549	3.9	54.2
6/5/2012 7:00	82.2	82.6	82.4	3546	3546	3.7	57.0
6/5/2012 8:00	81.9	82.3	82.1	3542	3535	11.0	60.1
6/5/2012 9:00	81.7	82.1	81.9	bad input	3545	10.2	62.7
6/5/2012 10:00	81.6	82.1	81.9	3540	3543	0.8	66.1
6/5/2012 11:00	81.6	82.3	81.9	bad input	3542	12.4	69.0
6/5/2012 12:00	81.8	82.6	82.2	3521	3548	13.8	70.8
6/5/2012 13:00	82.4	83.2	82.8	3524	3540	12.8	71.4
6/5/2012 14:00	83.2	84.1	83.6	3533	3536	11.0	71.1

6/5/2012 15:00	83.7	84.4	84.1	3533	3544	14.3	71.0
6/5/2012 16:00	84.1	84.8	84.4	3544	3541	9.8	71.4
6/5/2012 17:00	84.4	84.8	84.6	3545	3540	12.0	71.0
6/5/2012 18:00	84.4	84.7	84.5	3537	3549	7.6	69.3
6/5/2012 19:00	84.1	84.5	84.3	3542	3546	7.7	68.0
6/5/2012 20:00	84.1	84.5	84.3	3540	3544	11.1	66.5
6/5/2012 21:00	84.1	84.5	84.3	3544	3544	14.4	64.8
6/5/2012 22:00	84.0	84.4	84.2	3548	3544	6.9	61.3
6/5/2012 23:00	83.8	84.2	84.0	3540	3545	9.1	61.6
6/6/2012 0:00	83.4	83.8	83.6	3538	3543	15.2	59.8
6/6/2012 1:00	83.2	83.5	83.4	3539	3545	8.3	58.3
6/6/2012 2:00	82.9	83.3	83.1	3539	3545	3.7	55.8
6/6/2012 3:00	82.6	83.0	82.8	3544	3544	4.8	55.0
6/6/2012 4:00	82.3	82.7	82.5	3546	3548	6.7	56.8
6/6/2012 5:00	82.1	82.5	82.3	3543	3537	5.5	54.5
6/6/2012 6:00	81.9	82.3	82.1	3537	3541	3.0	54.6
6/6/2012 7:00	81.8	82.2	82.0	3542	3543	8.8	58.4
6/6/2012 8:00	81.8	82.2	82.0	3534	3539	8.5	60.4
6/6/2012 9:00	81.8	82.2	82.0	3541	3540	4.5	63.4
6/6/2012 10:00	81.8	82.2	82.0	3551	3545	3.2	66.4
6/6/2012 11:00	82.0	82.6	82.3	3542	3548	8.1	68.8
6/6/2012 12:00	82.6	83.4	83.0	3544	3545	7.3	70.1
6/6/2012 13:00	83.3	84.3	83.8	3542	3550	10.0	70.9
6/6/2012 14:00	83.8	84.7	84.2	3543	3549	6.0	72.5
6/6/2012 15:00	84.3	85.4	84.8	3538	3541	8.7	73.5
6/6/2012 16:00	84.7	85.7	85.2	3545	3547	4.6	73.1
6/6/2012 17:00	84.9	85.9	85.4	3544	3546	3.3	73.7
6/6/2012 18:00	85.5	86.3	85.9	3544	3544	8.1	73.2
6/6/2012 19:00	85.9	86.7	86.3	3540	3540	8.3	72.4
6/6/2012 20:00	86.2	87.0	86.6	3538	3541	7.8	70.8
6/6/2012 21:00	86.4	87.1	86.7	3550	3543	8.0	68.9
6/6/2012 22:00	86.5	87.0	86.7	3541	3549	10.6	67.0
6/6/2012 23:00	86.4	86.8	86.6	3545	3541	9.3	65.6
6/7/2012 0:00	86.2	86.5	86.4	3537	3543	8.9	63.4
6/7/2012 1:00	85.8	86.2	86.0	3544	3546	7.1	59.4
6/7/2012 2:00	85.4	85.7	85.6	3542	3545	3.6	58.7
6/7/2012 3:00	85.1	85.5	85.3	3544	3539	3.5	58.6
6/7/2012 4:00	84.8	85.3	85.1	3546	3535	5.2	58.6
6/7/2012 5:00	84.7	85.1	84.9	3536	3552	3.4	57.6
6/7/2012 6:00	84.5	84.9	84.7	3539	3542	2.4	57.4
6/7/2012 7:00	84.5	84.9	84.7	3540	3545	1.2	60.2
6/7/2012 8:00	84.7	85.0	84.9	3539	3539	2.8	64.2

6/7/2012 9:00	84.7	85.1	84.9	3544	3538	1.2	66.4
6/7/2012 10:00	84.7	85.2	85.0	3548	3543	5.0	69.8
6/7/2012 11:00	84.8	85.3	85.0	3544	3543	6.1	71.6
6/7/2012 12:00	84.7	85.3	85.0	3542	3539	6.8	73.7
6/7/2012 13:00	84.9	85.7	85.3	3542	3545	3.9	75.7
6/7/2012 14:00	85.7	86.3	86.0	3549	3537	6.8	76.5
6/7/2012 15:00	85.9	87.0	86.5	3543	3543	6.8	77.9
6/7/2012 16:00	86.6	87.7	87.1	3548	3550	7.7	78.2
6/7/2012 17:00	87.0	87.9	87.4	3544	3547	3.2	79.1
6/7/2012 18:00	87.6	88.1	87.9	3543	3544	5.9	78.7
6/7/2012 19:00	88.1	88.5	88.3	3544	3547	3.5	78.3
6/7/2012 20:00	88.3	88.9	88.6	3540	3540	3.1	76.5
6/7/2012 21:00	88.7	89.3	89.0	3540	3542	4.2	72.5
6/7/2012 22:00	88.9	89.7	89.3	3544	3549	4.5	72.5
6/7/2012 23:00	89.3	90.0	89.6	3540	3544	5.8	68.2
6/8/2012 0:00	89.5	90.1	89.8	3560	3543	8.0	66.0
6/8/2012 1:00	89.6	90.2	89.9	3542	3545	7.1	66.2
6/8/2012 2:00	89.6	90.1	89.8	3548	3548	6.1	63.6
6/8/2012 3:00	89.5	89.9	89.7	3547	3542	6.9	64.4
6/8/2012 4:00	89.3	89.7	89.5	3543	3541	5.9	65.4
6/8/2012 5:00	88.9	89.3	89.1	3545	3540	3.9	62.3
6/8/2012 6:00	88.4	88.8	88.6	3548	3549	6.9	62.5
6/8/2012 7:00	87.7	88.2	87.9	3545	3543	5.6	65.6
6/8/2012 8:00	86.9	87.5	87.2	3540	3546	8.5	71.2
6/8/2012 9:00	86.5	87.0	86.7	3545	3552	8.8	75.6
6/8/2012 10:00	86.2	86.7	86.5	3543	3546	6.3	77.2
6/8/2012 11:00	86.2	86.7	86.4	3546	3549	9.3	78.7
6/8/2012 12:00	86.2	86.7	86.5	3541	3545	11.2	79.8
6/8/2012 13:00	86.2	86.9	86.5	3543	3540	8.5	80.2
6/8/2012 14:00	86.4	87.0	86.7	3549	3546	7.4	81.8
6/8/2012 15:00	86.6	87.1	86.8	3547	3539	9.2	82.5
6/8/2012 16:00	86.8	87.3	87.1	3554	3546	9.1	83.7
6/8/2012 17:00	87.1	87.5	87.3	3539	3541	16.2	83.6
6/8/2012 18:00	87.0	87.6	87.3	3541	3548	9.0	82.9
6/8/2012 19:00	87.2	87.8	87.5	3542	3545	8.4	81.3
6/8/2012 20:00	87.5	88.2	87.8	3542	3541	5.7	79.0
6/8/2012 21:00	87.8	88.4	88.1	3537	3544	7.8	76.2
6/8/2012 22:00	87.8	88.4	88.1	3545	3542	7.4	75.0
6/8/2012 23:00	87.8	88.2	88.0	3544	3538	6.2	71.6
6/9/2012 0:00	87.6	88.0	87.8	3542	3545	9.5	71.9
6/9/2012 1:00	87.4	87.8	87.6	3549	3544	8.7	71.2
6/9/2012 2:00	87.3	87.6	87.5	3545	3544	7.3	67.1

6/9/2012 3:00	87.5	87.9	87.7	3546	3547	6.9	66.9
6/9/2012 4:00	87.8	88.2	88.0	3535	3541	6.7	64.2
6/9/2012 5:00	87.9	88.3	88.1	3542	3540	7.7	65.1
6/9/2012 6:00	88.0	88.4	88.2	3542	3541	8.8	67.6
6/9/2012 7:00	87.9	88.2	88.0	3545	3547	9.2	70.5
6/9/2012 8:00	87.7	87.9	87.8	3537	3546	10.2	73.7
6/9/2012 9:00	87.4	87.7	87.6	3543	3544	13.4	76.0
6/9/2012 10:00	87.3	87.7	87.5	3540	3544	16.7	78.8
6/9/2012 11:00	87.3	87.7	87.5	3544	3538	11.8	81.6
6/9/2012 12:00	87.3	87.8	87.6	3539	3546	13.6	83.4
6/9/2012 13:00	87.1	87.5	87.3	3535	3542	9.8	83.8
6/9/2012 14:00	86.7	87.2	87.0	3536	3545	19.2	84.5
6/9/2012 15:00	86.6	87.0	86.8	3544	3545	11.7	85.2
6/9/2012 16:00	86.2	86.6	86.4	3545	3544	15.0	85.9
6/9/2012 17:00	85.9	86.5	86.2	3545	3541	11.2	86.6
6/9/2012 18:00	85.8	86.6	86.2	3542	3541	9.5	85.8
6/9/2012 19:00	86.1	86.9	86.5	3548	3549	16.8	84.3
6/9/2012 20:00	86.1	86.8	86.4	3541	3539	8.1	81.3
6/9/2012 21:00	86.2	86.6	86.4	3539	3550	7.7	77.4
6/9/2012 22:00	86.2	86.6	86.4	3544	3546	10.3	76.3
6/9/2012 23:00	86.1	86.3	86.2	3542	3541	9.3	75.4
6/10/2012 0:00	85.9	86.1	86.0	3549	3546	10.1	74.7
6/10/2012 1:00	85.7	86.0	85.9	3545	3545	10.7	74.2
6/10/2012 2:00	85.6	85.9	85.8	3542	3542	13.3	72.7
6/10/2012 3:00	85.6	85.9	85.7	3541	3547	12.4	71.1
6/10/2012 4:00	85.5	85.8	85.6	3547	3542	9.4	69.7
6/10/2012 5:00	85.4	85.7	85.6	3540	3545	12.2	68.9
6/10/2012 6:00	85.3	85.6	85.5	3543	3546	5.3	69.0
6/10/2012 7:00	85.2	85.5	85.3	3541	3539	8.5	71.5
6/10/2012 8:00	85.1	85.4	85.3	3547	3548	11.8	75.5
6/10/2012 9:00	85.1	85.4	85.3	3538	3539	12.0	78.8
6/10/2012 10:00	85.1	85.5	85.3	3542	3540	15.3	81.4
6/10/2012 11:00	85.1	85.5	85.3	3545	3544	17.1	83.7
6/10/2012 12:00	85.1	85.6	85.3	3544	3540	22.7	85.2
6/10/2012 13:00	85.2	85.7	85.5	3550	3547	15.9	85.3
6/10/2012 14:00	85.4	85.9	85.7	3545	3548	24.0	86.1
6/10/2012 15:00	85.6	86.0	85.8	3536	3541	15.9	86.9
6/10/2012 16:00	85.7	86.2	86.0	3546	3544	11.6	87.2
6/10/2012 17:00	85.9	86.3	86.1	3546	3548	18.6	86.6
6/10/2012 18:00	85.7	86.1	85.9	3540	3544	10.3	84.7
6/10/2012 19:00	85.2	85.5	85.4	3546	3542	13.9	83.1
6/10/2012 20:00	84.7	85.1	84.9	3535	3542	11.0	82.1

6/10/2012 21:00	84.5	84.9	84.7	3541	3538	10.9	80.5
6/10/2012 22:00	84.1	84.4	84.3	3544	3541	7.6	77.8
6/10/2012 23:00	83.9	84.2	84.0	3533	3541	10.0	76.8
6/11/2012 0:00	83.8	84.1	83.9	3544	3548	8.0	74.2
6/11/2012 1:00	83.7	84.1	83.9	3546	3545	10.2	72.7
6/11/2012 2:00	83.8	84.1	83.9	3546	3544	10.1	71.7
6/11/2012 3:00	83.8	84.1	84.0	3546	3540	8.8	70.3
6/11/2012 4:00	83.7	84.1	83.9	3541	3545	12.9	69.5
6/11/2012 5:00	83.5	83.9	83.7	3537	3549	9.6	68.5
6/11/2012 6:00	83.3	83.7	83.5	3539	3544	10.1	68.3
6/11/2012 7:00	83.3	83.6	83.4	3533	3542	16.8	69.9
6/11/2012 8:00	83.3	83.6	83.4	3542	3539	9.7	73.2
6/11/2012 9:00	83.3	83.8	83.5	3533	3544	8.8	75.1
6/11/2012 10:00	83.4	84.0	83.7	3540	3547	15.0	77.3
6/11/2012 11:00	83.7	84.2	84.0	3548	3538	17.8	79.5
6/11/2012 12:00	83.8	84.4	84.1	3537	3541	14.9	80.8
6/11/2012 13:00	84.0	84.6	84.3	3541	3543	14.9	81.9
6/11/2012 14:00	84.4	85.0	84.7	3541	3545	13.2	82.2
6/11/2012 15:00	84.8	85.3	85.1	3538	3543	12.9	82.6
6/11/2012 16:00	85.0	85.5	85.2	3544	3543	10.0	83.7
6/11/2012 17:00	85.1	85.6	85.3	3542	3536	13.6	85.0
6/11/2012 18:00	85.1	85.5	85.3	3548	3544	20.5	82.0
6/11/2012 19:00	85.0	85.4	85.2	3544	3544	11.8	81.4
6/11/2012 20:00	84.9	85.3	85.1	3540	3547	10.6	79.6
6/11/2012 21:00	84.8	85.1	84.9	3538	3546	10.4	77.7
6/11/2012 22:00	84.7	85.0	84.8	3541	3536	9.7	75.9
6/11/2012 23:00	84.5	84.9	84.7	3542	3544	9.7	74.8
6/12/2012 0:00	84.2	84.6	84.4	3551	3541	9.1	72.4
6/12/2012 1:00	83.9	84.3	84.1	3543	3541	11.6	70.2
6/12/2012 2:00	83.7	84.0	83.9	3542	3541	8.5	68.9
6/12/2012 3:00	83.4	83.8	83.6	3539	3542	14.6	67.1
6/12/2012 4:00	83.3	83.6	83.4	3543	3533	12.2	65.1
6/12/2012 5:00	83.1	83.5	83.3	3543	3544	14.4	63.1
6/12/2012 6:00	82.9	83.4	83.2	3547	3553	15.0	62.6
6/12/2012 7:00	82.8	83.2	83.0	3540	3546	9.8	62.5
6/12/2012 8:00	82.7	83.1	82.9	3544	3544	14.2	65.4
6/12/2012 9:00	82.8	83.2	83.0	3535	3545	11.9	66.7
6/12/2012 10:00	83.3	83.6	83.4	3561	3541	10.6	68.6
6/12/2012 11:00	83.4	84.0	83.7	3539	3539	17.2	70.0
6/12/2012 12:00	83.7	84.3	84.0	3543	3550	9.9	71.2
6/12/2012 13:00	83.8	84.4	84.1	3544	3539	14.0	71.4
6/12/2012 14:00	84.0	84.6	84.3	3539	3544	9.1	72.7

6/12/2012 15:00	84.3	84.9	84.6	3544	3545	19.4	72.8
6/12/2012 16:00	84.5	85.2	84.8	3544	3548	14.1	73.7
6/12/2012 17:00	84.6	85.3	84.9	3547	3548	10.8	73.2
6/12/2012 18:00	84.7	85.3	85.0	3544	3541	11.7	72.3
6/12/2012 19:00	84.6	84.9	84.8	3546	3540	8.9	71.2
6/12/2012 20:00	84.2	84.6	84.4	3545	3542	6.6	69.3
6/12/2012 21:00	84.3	84.7	84.5	3540	3547	6.8	66.7
6/12/2012 22:00	84.2	84.6	84.4	3544	3551	8.8	63.4
6/12/2012 23:00	83.9	84.3	84.1	3540	3545	8.0	60.4
6/13/2012 0:00	83.8	84.2	84.0	3542	3547	8.4	60.4
6/13/2012 1:00	83.5	83.9	83.7	3543	3547	7.8	58.5
6/13/2012 2:00	83.3	83.7	83.5	3545	3548	3.8	57.7
6/13/2012 3:00	83.2	83.6	83.4	3545	3543	3.6	57.5
6/13/2012 4:00	83.1	83.5	83.3	3542	3549	5.6	56.1
6/13/2012 5:00	83.2	83.5	83.4	3538	3539	5.5	55.8
6/13/2012 6:00	83.3	83.7	83.5	3544	3546	8.0	58.0
6/13/2012 7:00	83.5	83.9	83.7	3539	3541	10.4	58.1
6/13/2012 8:00	83.7	84.1	83.9	3546	3540	16.8	61.0
6/13/2012 9:00	83.9	84.2	84.0	3554	3544	12.1	63.8
6/13/2012 10:00	84.0	84.4	84.2	3547	3549	13.6	65.4
6/13/2012 11:00	84.1	84.5	84.3	3544	3538	9.3	67.3
6/13/2012 12:00	84.3	84.8	84.6	3540	3539	7.9	68.8
6/13/2012 13:00	84.5	85.0	84.7	3545	3542	9.7	69.4
6/13/2012 14:00	84.7	85.1	84.9	3538	3547	15.0	70.7
6/13/2012 15:00	84.8	85.3	85.0	3549	3539	5.8	71.3
6/13/2012 16:00	84.8	85.3	85.1	3540	3542	12.2	72.9
6/13/2012 17:00	85.0	85.5	85.3	3541	3549	12.7	71.9
6/13/2012 18:00	85.2	85.6	85.4	3544	3543	13.2	73.0
6/13/2012 19:00	85.3	85.6	85.4	3542	3538	16.1	70.8
6/13/2012 20:00	85.0	85.3	85.1	3540	3547	12.3	68.2
6/13/2012 21:00	84.5	84.8	84.7	3542	3541	12.2	65.6
6/13/2012 22:00	84.0	84.4	84.2	3542	3542	9.9	62.9
6/13/2012 23:00	83.8	84.1	84.0	3548	3545	9.2	61.2
6/14/2012 0:00	83.8	84.1	84.0	3542	3541	10.4	60.8
6/14/2012 1:00	83.8	84.2	84.0	3542	3537	6.7	57.4
6/14/2012 2:00	83.8	84.2	84.0	3541	3544	8.0	56.7
6/14/2012 3:00	83.6	84.0	83.8	3547	3546	10.4	57.3
6/14/2012 4:00	83.5	83.8	83.6	3550	3546	9.0	57.0
6/14/2012 5:00	83.3	83.6	83.4	3546	3541	6.7	54.6
6/14/2012 6:00	83.0	83.4	83.2	3543	3549	8.2	54.1
6/14/2012 7:00	82.7	83.0	82.9	3534	3541	10.7	60.3
6/14/2012 8:00	82.7	83.1	82.9	3541	3543	10.0	64.2

6/14/2012 9:00	82.8	83.2	83.0	3539	3541	10.3	70.1
6/14/2012 10:00	83.1	83.5	83.3	3543	3534	12.5	73.9
6/14/2012 11:00	83.3	83.9	83.6	3545	3541	12.0	76.7
6/14/2012 12:00	83.7	84.2	83.9	3542	3537	12.2	78.7
6/14/2012 13:00	84.0	84.6	84.3	3547	3541	14.0	82.1
6/14/2012 14:00	84.3	84.9	84.6	3543	3544	20.6	82.5
6/14/2012 15:00	84.7	85.3	85.0	3545	3542	15.2	83.2
6/14/2012 16:00	84.9	85.5	85.2	3545	3544	14.0	84.1
6/14/2012 17:00	85.1	85.7	85.4	3545	3543	8.6	84.8
6/14/2012 18:00	85.1	85.5	85.3	3545	3547	10.3	84.5
6/14/2012 19:00	85.0	85.3	85.1	3547	3541	14.5	82.8
6/14/2012 20:00	84.7	85.0	84.8	3542	3542	10.4	80.0
6/14/2012 21:00	84.4	84.7	84.5	3540	3545	8.4	75.5
6/14/2012 22:00	84.2	84.5	84.4	3542	3547	6.9	72.2
6/14/2012 23:00	84.0	84.4	84.2	3544	3546	4.5	72.2
6/15/2012 0:00	83.9	84.2	84.0	3542	3541	6.0	66.3
6/15/2012 1:00	83.7	84.0	83.9	3537	3547	7.4	64.2
6/15/2012 2:00	83.5	83.9	83.7	3543	3546	7.1	65.2
6/15/2012 3:00	83.9	84.4	84.1	3540	3547	6.3	66.7
6/15/2012 4:00	84.0	84.4	84.2	3547	3545	7.2	65.3
6/15/2012 5:00	83.9	84.3	84.1	3546	3548	6.5	63.4
6/15/2012 6:00	83.6	84.0	83.8	3547	3543	9.0	62.7
6/15/2012 7:00	83.5	83.9	83.7	3543	3542	8.3	67.2
6/15/2012 8:00	83.5	83.8	83.7	3546	3547	10.1	73.3
6/15/2012 9:00	83.6	84.1	83.8	3545	3540	14.1	77.4
6/15/2012 10:00	83.7	84.2	84.0	3544	3546	6.6	81.0
6/15/2012 11:00	83.9	84.4	84.2	3545	3539	7.4	82.9
6/15/2012 12:00	84.0	84.6	84.3	3544	3533	6.4	83.8
6/15/2012 13:00	84.0	84.8	84.4	3545	3544	11.5	86.5
6/15/2012 14:00	84.2	84.9	84.6	3545	3537	8.5	88.0
6/15/2012 15:00	84.5	85.2	84.8	3553	3543	13.3	90.5
6/15/2012 16:00	84.8	85.5	85.2	3544	3547	16.6	90.0
6/15/2012 17:00	85.1	85.7	85.4	3544	3545	13.9	90.0
6/15/2012 18:00	85.3	85.8	85.6	3543	3548	17.5	89.5
6/15/2012 19:00	85.4	85.8	85.6	3548	3543	14.4	87.2
6/15/2012 20:00	85.3	85.6	85.4	3542	3546	13.2	83.0
6/15/2012 21:00	85.3	85.8	85.5	3544	3537	11.4	78.5
6/15/2012 22:00	85.5	85.9	85.7	3540	3539	8.8	76.1
6/15/2012 23:00	85.4	85.9	85.7	3541	3543	6.3	73.6
6/16/2012 0:00	85.3	85.9	85.6	3544	3547	6.1	71.5
6/16/2012 1:00	85.1	85.7	85.4	3533	3548	6.6	69.5
6/16/2012 2:00	85.0	85.6	85.3	3542	3542	6.8	71.8

6/16/2012 3:00	85.1	85.6	85.3	3545	3549	9.8	75.1
6/16/2012 4:00	85.0	85.4	85.2	3543	3538	6.9	73.7
6/16/2012 5:00	84.8	85.2	85.0	3543	3541	8.6	71.7
6/16/2012 6:00	84.7	85.0	84.9	3536	3543	7.1	71.7
6/16/2012 7:00	84.6	85.1	84.9	3539	3544	8.2	73.5
6/16/2012 8:00	84.8	85.3	85.1	3541	3545	8.7	76.2
6/16/2012 9:00	85.0	85.5	85.3	3554	3537	13.1	79.9
6/16/2012 10:00	85.1	85.7	85.4	3547	3546	10.0	82.7
6/16/2012 11:00	85.2	85.7	85.5	3549	3545	11.8	85.4
6/16/2012 12:00	85.2	85.8	85.5	3545	3546	15.3	86.7
6/16/2012 13:00	85.3	85.9	85.6	3539	3544	15.1	87.2
6/16/2012 14:00	85.5	86.1	85.8	3543	3542	13.7	88.5
6/16/2012 15:00	85.7	86.2	85.9	3539	3545	12.6	88.9
6/16/2012 16:00	85.8	86.3	86.1	3547	3540	16.3	89.6
6/16/2012 17:00	85.9	86.3	86.1	3542	3537	14.4	89.7
6/16/2012 18:00	85.9	86.3	86.1	3543	3544	5.0	84.9
6/16/2012 19:00	85.7	86.1	85.9	3545	3543	6.8	72.8
6/16/2012 20:00	85.5	85.8	85.6	3540	3539	11.5	69.7
6/16/2012 21:00	85.1	85.5	85.3	3545	3537	21.7	72.4
6/16/2012 22:00	84.7	85.0	84.8	3542	3541	16.0	67.3
6/16/2012 23:00	84.3	84.7	84.5	3546	3539	6.7	67.0
6/17/2012 0:00	84.0	84.4	84.2	3554	3544	3.3	67.1
6/17/2012 1:00	83.9	84.2	84.1	3536	3540	6.8	67.2
6/17/2012 2:00	83.8	84.1	84.0	3540	3543	5.2	67.2
6/17/2012 3:00	83.8	84.1	84.0	3547	3546	8.3	67.1
6/17/2012 4:00	83.7	84.1	83.9	3542	3540	2.3	67.5
6/17/2012 5:00	83.7	84.0	83.9	3546	3551	9.4	67.7
6/17/2012 6:00	83.5	83.9	83.7	3542	3548	13.8	67.6
6/17/2012 7:00	83.4	83.8	83.6	3543	3544	9.7	67.9
6/17/2012 8:00	83.4	83.8	83.6	3541	3548	13.8	69.1
6/17/2012 9:00	83.3	83.7	83.5	3543	3550	13.9	71.0
6/17/2012 10:00	83.4	83.8	83.6	3544	3535	10.2	72.8
6/17/2012 11:00	83.7	84.3	84.0	3549	3543	6.2	75.2
6/17/2012 12:00	84.1	84.8	84.5	3541	3548	7.7	77.0
6/17/2012 13:00	84.5	85.5	85.0	3548	3548	0.8	79.6
6/17/2012 14:00	85.4	85.7	85.6	3543	3544	7.1	80.3
6/17/2012 15:00	85.5	86.1	85.8	3545	3540	0.8	80.4
6/17/2012 16:00	85.7	86.3	86.0	3545	3544	5.5	81.3
6/17/2012 17:00	85.8	86.3	86.1	3535	3538	5.5	81.5
6/17/2012 18:00	85.8	86.5	86.1	3543	3545	9.4	81.5
6/17/2012 19:00	86.2	86.8	86.5	3543	3542	4.8	80.5
6/17/2012 20:00	86.5	87.2	86.8	3536	3545	4.8	77.3

6/17/2012 21:00	86.8	87.6	87.2	3542	3543	6.1	75.5
6/17/2012 22:00	86.9	87.6	87.3	3545	3549	6.6	72.4
6/17/2012 23:00	87.1	87.6	87.4	3545	3536	7.7	70.2
6/18/2012 0:00	87.2	87.7	87.5	3542	3545	5.8	70.8
6/18/2012 1:00	87.2	87.6	87.4	3548	3544	6.7	70.8
6/18/2012 2:00	87.3	87.7	87.5	3547	3548	8.5	71.4
6/18/2012 3:00	87.6	88.0	87.8	3542	3551	8.5	71.7
6/18/2012 4:00	87.7	88.3	88.0	3536	3547	12.4	72.4
6/18/2012 5:00	87.8	88.3	88.1	3539	3540	1.0	73.4
6/18/2012 6:00	87.9	88.3	88.1	3542	3541	0.8	73.5
6/18/2012 7:00	87.9	88.3	88.1	3541	3541	0.8	74.7
6/18/2012 8:00	87.9	88.2	88.1	3545	3545	0.8	75.8
6/18/2012 9:00	87.8	88.1	87.9	3548	3551	0.8	78.8
6/18/2012 10:00	87.6	88.1	87.9	3544	3541	0.9	81.7
6/18/2012 11:00	87.6	88.1	87.8	3546	3551	0.8	83.3
6/18/2012 12:00	87.5	88.0	87.7	3543	3549	22.4	84.5
6/18/2012 13:00	87.4	87.9	87.7	3545	3545	0.8	85.9
6/18/2012 14:00	87.4	87.9	87.7	3543	3546	0.7	87.3
6/18/2012 15:00	87.4	87.9	87.6	3545	3541	0.8	87.5
6/18/2012 16:00	87.3	87.7	87.5	3541	3547	0.8	87.5
6/18/2012 17:00	87.1	87.5	87.3	3547	3542	0.8	87.6
6/18/2012 18:00	86.7	87.0	86.9	3546	3550	22.4	87.0
6/18/2012 19:00	86.5	86.7	86.6	3545	3541	11.4	85.8
6/18/2012 20:00	86.3	86.6	86.4	3552	3552	12.1	83.5
6/18/2012 21:00	86.1	86.5	86.3	3545	3550	14.0	81.8
6/18/2012 22:00	86.0	86.3	86.1	3542	3541	11.3	79.9
6/18/2012 23:00	86.0	86.3	86.1	3550	3545	12.7	78.1
6/19/2012 0:00	85.8	86.1	85.9	3540	3550	13.1	78.0
6/19/2012 1:00	85.8	86.1	86.0	3543	3553	9.6	77.1
6/19/2012 2:00	85.7	86.1	85.9	3544	3539	12.1	76.1
6/19/2012 3:00	85.8	86.1	85.9	3554	3548	17.6	75.8
6/19/2012 4:00	85.7	86.0	85.8	3540	3543	9.3	74.7
6/19/2012 5:00	85.5	85.8	85.7	3538	3543	17.2	74.1
6/19/2012 6:00	85.4	85.7	85.6	3544	3549	11.0	74.1
6/19/2012 7:00	85.4	85.7	85.6	3545	3533	12.0	75.1
6/19/2012 8:00	85.2	85.5	85.4	3535	3542	15.3	76.9
6/19/2012 9:00	85.2	85.5	85.3	3549	3544	15.4	79.5
6/19/2012 10:00	85.3	85.7	85.5	3544	3543	11.1	81.5
6/19/2012 11:00	85.6	86.1	85.8	3540	3540	12.9	83.6
6/19/2012 12:00	85.9	86.4	86.2	3545	3546	8.7	84.8
6/19/2012 13:00	86.3	86.8	86.5	3541	3541	15.9	87.2
6/19/2012 14:00	86.5	87.2	86.8	3551	3540	12.9	88.4

6/19/2012 15:00	86.8	87.4	87.1	3540	3545	15.1	88.5
6/19/2012 16:00	87.2	87.7	87.4	3545	3548	23.1	89.4
6/19/2012 17:00	87.3	87.8	87.5	3543	3547	18.1	89.3
6/19/2012 18:00	87.2	87.6	87.4	3539	3544	10.1	88.3
6/19/2012 19:00	87.0	87.4	87.2	3548	3533	17.0	86.7
6/19/2012 20:00	86.8	87.1	86.9	3546	3539	12.2	84.0
6/19/2012 21:00	86.5	86.8	86.7	3549	3544	6.4	81.3
6/19/2012 22:00	86.1	86.5	86.3	3544	3544	7.8	79.4
6/19/2012 23:00	85.9	86.2	86.1	3544	3547	6.9	78.2
6/20/2012 0:00	85.8	86.1	85.9	3540	3537	14.6	77.9
6/20/2012 1:00	85.7	86.1	85.9	3542	3540	13.0	77.1
6/20/2012 2:00	85.7	86.0	85.9	3546	3547	9.1	75.8
6/20/2012 3:00	85.7	86.0	85.9	3549	3545	11.3	73.8
6/20/2012 4:00	85.6	85.9	85.8	3546	3540	9.8	72.5
6/20/2012 5:00	85.5	85.8	85.6	3540	3549	10.9	71.6
6/20/2012 6:00	85.3	85.6	85.5	3541	3542	13.9	72.1
6/20/2012 7:00	85.3	85.6	85.4	3547	3544	11.7	74.7
6/20/2012 8:00	85.3	85.6	85.4	3540	3549	15.1	77.5
6/20/2012 9:00	85.2	85.6	85.4	3540	3545	13.2	80.0
6/20/2012 10:00	85.2	85.6	85.4	3544	3537	14.3	82.2
6/20/2012 11:00	85.2	85.7	85.4	3540	3542	17.6	83.8
6/20/2012 12:00	85.4	85.9	85.6	3542	3545	20.0	86.2
6/20/2012 13:00	85.7	86.2	85.9	3538	3549	15.1	86.7
6/20/2012 14:00	86.0	86.5	86.2	3550	3545	11.9	88.0
6/20/2012 15:00	86.1	86.7	86.4	3542	3540	20.7	88.1
6/20/2012 16:00	86.4	87.0	86.7	3542	3549	16.5	88.2
6/20/2012 17:00	86.7	87.1	86.9	3547	3544	10.4	88.2
6/20/2012 18:00	86.9	87.3	87.1	3545	3549	12.8	87.6
6/20/2012 19:00	86.8	87.2	87.0	3548	3543	11.7	86.2
6/20/2012 20:00	86.6	86.9	86.8	3539	3534	12.4	83.4
6/20/2012 21:00	86.3	86.6	86.5	3547	3544	9.3	80.7
6/20/2012 22:00	86.1	86.4	86.3	3543	3541	9.0	79.8
6/20/2012 23:00	85.8	86.2	86.0	3538	3543	9.5	78.9
6/21/2012 0:00	85.5	85.9	85.7	3546	3541	11.5	77.2
6/21/2012 1:00	85.4	85.7	85.6	3541	3545	14.6	77.0
6/21/2012 2:00	85.4	85.7	85.5	3541	3545	16.8	78.2
6/21/2012 3:00	85.3	85.7	85.5	3539	3541	22.2	78.5
6/21/2012 4:00	85.2	85.5	85.4	3543	3542	15.5	77.5
6/21/2012 5:00	85.1	85.4	85.2	3551	3544	13.8	74.7
6/21/2012 6:00	84.9	85.2	85.0	3539	3542	11.7	73.9
6/21/2012 7:00	84.7	85.0	84.9	3539	3532	12.1	74.4
6/21/2012 8:00	84.5	84.9	84.7	3540	3536	13.5	75.8

6/21/2012 9:00	84.4	84.8	84.6	3540	3545	9.7	74.6
6/21/2012 10:00	84.5	84.9	84.7	3543	3536	12.2	74.2
6/21/2012 11:00	84.6	85.0	84.8	3545	3538	12.4	73.8
6/21/2012 12:00	84.8	85.2	85.0	3537	3536	9.7	72.6
6/21/2012 13:00	84.8	85.2	85.0	3544	3550	6.1	71.7
6/21/2012 14:00	84.8	85.2	85.0	3541	3544	12.8	73.0
6/21/2012 15:00	84.8	85.2	85.0	3542	3548	8.9	74.6
6/21/2012 16:00	85.0	85.3	85.1	3542	3539	8.3	76.1
6/21/2012 17:00	84.9	85.5	85.2	3543	3546	10.7	79.2
6/21/2012 18:00	85.0	85.6	85.3	3534	3534	7.1	80.6
6/21/2012 19:00	85.1	85.6	85.4	3541	3542	11.6	80.4
6/21/2012 20:00	85.2	85.7	85.4	3540	3543	8.7	77.3
6/21/2012 21:00	85.2	85.7	85.4	3547	3544	6.7	73.6
6/21/2012 22:00	85.3	85.7	85.5	3542	3535	8.4	71.9
6/21/2012 23:00	85.4	85.8	85.6	3547	3548	8.8	70.4
6/22/2012 0:00	85.5	85.9	85.7	3547	3546	9.0	69.5
6/22/2012 1:00	85.7	86.0	85.8	3544	3542	8.0	68.7
6/22/2012 2:00	85.8	86.2	86.0	3543	3550	6.1	67.1
6/22/2012 3:00	85.9	86.2	86.1	3550	3544	9.2	66.1
6/22/2012 4:00	85.9	86.3	86.1	3542	3545	5.8	64.6
6/22/2012 5:00	85.8	86.2	86.0	3548	3542	5.9	62.0
6/22/2012 6:00	85.6	86.0	85.8	3537	3546	5.8	61.9
6/22/2012 7:00	85.7	86.0	85.8	3545	3543	6.3	65.0
6/22/2012 8:00	85.8	86.2	86.0	3538	3534	7.4	68.6
6/22/2012 9:00	85.8	86.2	86.0	3546	3545	6.1	71.8
6/22/2012 10:00	86.1	86.6	86.3	3545	3543	5.4	72.5
6/22/2012 11:00	86.5	87.2	86.9	3545	3544	7.7	74.9
6/22/2012 12:00	87.1	88.0	87.6	3542	3551	5.7	75.4
6/22/2012 13:00	87.7	88.5	88.1	3546	3538	10.5	78.2
6/22/2012 14:00	88.0	88.8	88.4	3537	3545	7.1	78.1
6/22/2012 15:00	88.4	89.2	88.8	3542	3538	12.4	79.8
6/22/2012 16:00	88.6	89.6	89.1	3542	3552	9.4	80.5
6/22/2012 17:00	88.9	90.0	89.5	3546	3548	8.7	80.7
6/22/2012 18:00	89.2	90.2	89.7	3545	3552	5.4	80.5
6/22/2012 19:00	89.6	90.3	89.9	3541	3544	5.4	80.1
6/22/2012 20:00	89.7	90.5	90.1	3544	3543	5.6	78.0
6/22/2012 21:00	89.9	90.6	90.2	3546	3554	4.7	74.3
6/22/2012 22:00	89.9	90.5	90.2	3548	3542	5.9	73.5
6/22/2012 23:00	90.0	90.5	90.2	3540	3548	6.3	72.1
6/23/2012 0:00	89.9	90.4	90.2	3535	3543	5.7	69.3
6/23/2012 1:00	89.9	90.3	90.1	3541	3537	6.4	69.0
6/23/2012 2:00	89.8	90.2	90.0	3542	3537	7.6	67.6

6/23/2012 3:00	89.7	90.1	89.9	3538	3545	4.1	65.4
6/23/2012 4:00	89.6	89.9	89.7	3544	3539	6.2	67.2
6/23/2012 5:00	89.4	89.7	89.6	3541	3545	4.8	67.1
6/23/2012 6:00	89.2	89.5	89.3	3543	3545	5.9	65.9
6/23/2012 7:00	88.8	89.2	89.0	3539	3543	5.3	66.0
6/23/2012 8:00	88.6	88.9	88.8	3558	3541	5.6	70.2
6/23/2012 9:00	88.5	88.8	88.6	3536	3548	5.9	75.0
6/23/2012 10:00	88.6	89.0	88.8	3540	3544	4.0	77.7
6/23/2012 11:00	88.9	89.5	89.2	3549	3539	8.1	79.6
6/23/2012 12:00	89.5	89.9	89.7	3543	3543	2.8	79.8
6/23/2012 13:00	89.5	90.4	90.0	3545	3547	3.1	81.0
6/23/2012 14:00	89.7	90.6	90.2	3550	3537	4.9	81.0
6/23/2012 15:00	89.9	90.7	90.3	3545	3549	4.7	80.4
6/23/2012 16:00	90.1	90.7	90.4	3531	3533	7.7	80.5
6/23/2012 17:00	90.3	91.0	90.6	3548	3539	3.6	80.3
6/23/2012 18:00	90.2	91.0	90.6	3542	3546	5.2	79.0
6/23/2012 19:00	90.3	91.0	90.7	3538	3547	5.8	77.7
6/23/2012 20:00	90.5	91.0	90.8	3541	3535	5.2	76.3
6/23/2012 21:00	90.6	91.0	90.8	3540	3541	6.2	74.7
6/23/2012 22:00	90.6	91.0	90.8	3547	3540	4.9	74.4
6/23/2012 23:00	90.6	91.0	90.8	3543	3544	2.2	74.7
6/24/2012 0:00	90.6	91.0	90.8	3548	3542	3.6	73.7
6/24/2012 1:00	90.5	90.9	90.7	3540	3536	4.8	72.1
6/24/2012 2:00	90.5	90.9	90.7	3539	3538	5.7	70.8
6/24/2012 3:00	90.5	91.0	90.8	3536	3548	5.8	71.1
6/24/2012 4:00	90.6	91.0	90.8	3537	3544	7.1	70.6
6/24/2012 5:00	90.6	90.9	90.8	3540	3551	4.4	70.8
6/24/2012 6:00	90.5	90.8	90.7	3545	3550	4.0	70.3
6/24/2012 7:00	90.4	90.7	90.6	3540	3538	6.8	71.2
6/24/2012 8:00	90.3	90.6	90.5	3544	3540	9.4	74.5
6/24/2012 9:00	90.2	90.5	90.3	3540	3537	3.6	75.2
6/24/2012 10:00	90.1	90.5	90.3	3545	3541	5.6	75.9
6/24/2012 11:00	90.0	90.4	90.2	3536	3538	8.6	77.5
6/24/2012 12:00	90.1	90.4	90.2	3544	3548	13.1	77.0
6/24/2012 13:00	90.2	90.5	90.4	3536	3541	12.3	79.4
6/24/2012 14:00	90.3	90.8	90.6	3544	3548	10.8	80.8
6/24/2012 15:00	90.5	91.1	90.8	3539	3541	8.7	82.6
6/24/2012 16:00	90.7	91.4	91.1	3539	3544	1.9	84.2
6/24/2012 17:00	90.9	91.5	91.2	3541	3540	6.8	84.8
6/24/2012 18:00	90.9	91.5	91.2	3544	3534	4.9	84.2
6/24/2012 19:00	90.9	91.4	91.2	3541	3548	7.1	81.3
6/24/2012 20:00	90.9	91.4	91.1	3542	3550	6.2	80.2

6/24/2012 21:00	90.8	91.4	91.1	3551	3544	7.3	78.3
6/24/2012 22:00	90.9	91.4	91.1	3545	3547	5.6	78.7
6/24/2012 23:00	91.0	91.5	91.3	3555	3544	14.1	77.7
6/25/2012 0:00	91.0	91.4	91.2	3548	3553	11.5	75.3
6/25/2012 1:00	90.9	91.2	91.0	3538	3536	12.1	73.3
6/25/2012 2:00	90.6	90.9	90.7	3544	3541	12.5	70.8
6/25/2012 3:00	90.2	90.5	90.3	3549	3543	13.3	69.4
6/25/2012 4:00	89.7	90.0	89.8	3537	3540	10.8	68.4
6/25/2012 5:00	89.4	89.8	89.6	3538	3542	13.5	67.7
6/25/2012 6:00	89.4	89.8	89.6	3552	3544	10.6	66.0
6/25/2012 7:00	89.4	89.7	89.5	3539	3534	15.0	65.4
6/25/2012 8:00	89.1	89.4	89.3	3545	3549	10.8	65.6
6/25/2012 9:00	88.9	89.3	89.1	3540	3542	14.0	67.2
6/25/2012 10:00	88.9	89.3	89.1	3536	3536	16.6	69.4
6/25/2012 11:00	88.7	89.2	88.9	3543	3546	10.2	71.3
6/25/2012 12:00	88.7	89.2	88.9	3543	3547	18.6	73.2
6/25/2012 13:00	88.9	89.4	89.2	3554	3556	9.9	73.7
6/25/2012 14:00	89.2	89.7	89.4	3546	3540	17.7	74.9
6/25/2012 15:00	89.4	89.8	89.6	3549	3548	13.6	74.1
6/25/2012 16:00	89.5	89.9	89.7	3544	3545	12.3	74.9
6/25/2012 17:00	89.5	89.9	89.7	3538	3532	14.0	74.2
6/25/2012 18:00	89.5	89.9	89.7	3537	3551	14.1	73.1
6/25/2012 19:00	89.3	89.7	89.5	3557	3543	9.6	71.2
6/25/2012 20:00	89.1	89.5	89.3	3546	3539	5.7	68.9
6/25/2012 21:00	88.7	89.2	88.9	3529	3544	7.4	66.6
6/25/2012 22:00	88.3	88.7	88.5	3533	3544	10.2	64.3
6/25/2012 23:00	88.0	88.3	88.2	3542	3546	6.1	62.2
6/26/2012 0:00	87.7	88.0	87.8	3534	3541	11.2	61.4
6/26/2012 1:00	87.4	87.7	87.6	3538	3543	7.6	61.6
6/26/2012 2:00	87.1	87.4	87.2	3544	3548	6.0	59.0
6/26/2012 3:00	86.9	87.3	87.1	3543	3545	10.6	61.2
6/26/2012 4:00	86.8	87.2	87.0	3543	3542	8.9	60.8
6/26/2012 5:00	86.7	87.1	86.9	3542	3545	8.0	58.4
6/26/2012 6:00	86.4	86.8	86.6	3534	3545	9.1	59.3
6/26/2012 7:00	86.3	86.6	86.4	3540	3543	7.0	60.5
6/26/2012 8:00	86.1	86.5	86.3	3541	3547	8.7	62.5
6/26/2012 9:00	86.1	86.4	86.2	3541	3548	7.2	67.0
6/26/2012 10:00	86.2	86.7	86.5	3536	3546	8.8	70.1
6/26/2012 11:00	86.5	87.1	86.8	3537	3542	5.2	72.0
6/26/2012 12:00	86.7	87.4	87.0	3546	3548	10.3	74.2
6/26/2012 13:00	86.9	87.8	87.3	3534	3541	5.3	75.0
6/26/2012 14:00	87.3	88.2	87.8	3545	3541	7.6	76.7

6/26/2012 15:00	87.7	88.8	88.2	3548	3538	7.4	76.9
6/26/2012 16:00	88.1	89.2	88.6	3540	3547	7.4	78.6
6/26/2012 17:00	88.5	89.4	88.9	3541	3543	4.6	78.2
6/26/2012 18:00	88.8	89.6	89.2	3547	3543	9.0	78.5
6/26/2012 19:00	89.0	89.7	89.4	3553	3535	9.9	77.2
6/26/2012 20:00	89.2	89.8	89.5	3546	3539	5.8	74.1
6/26/2012 21:00	89.3	89.8	89.6	3543	3546	7.3	69.9
6/26/2012 22:00	89.2	89.6	89.4	3544	3538	7.0	67.8
6/26/2012 23:00	89.0	89.3	89.2	3544	3543	6.7	66.4
6/27/2012 0:00	88.9	89.2	89.1	3540	3549	6.4	64.9
6/27/2012 1:00	88.8	89.2	89.0	3538	3536	7.8	63.3
6/27/2012 2:00	88.8	89.2	89.0	3549	3541	8.9	61.8
6/27/2012 3:00	88.7	89.0	88.9	3542	3542	8.9	62.2
6/27/2012 4:00	88.6	88.9	88.8	3534	3546	9.3	61.5
6/27/2012 5:00	88.5	88.8	88.6	3534	3549	8.2	60.8
6/27/2012 6:00	88.4	88.8	88.6	3548	3543	7.0	61.9
6/27/2012 7:00	88.3	88.7	88.5	3551	3538	9.6	65.7
6/27/2012 8:00	88.2	88.6	88.4	3545	3552	11.6	69.4
6/27/2012 9:00	88.1	88.4	88.2	3545	3543	8.6	73.5
6/27/2012 10:00	87.9	88.2	88.1	3546	3543	15.9	77.0
6/27/2012 11:00	87.8	88.1	88.0	3551	3541	11.6	79.2
6/27/2012 12:00	87.7	88.0	87.9	3554	3550	15.9	81.9
6/27/2012 13:00	87.6	87.9	87.8	3543	3539	11.9	84.1
6/27/2012 14:00	87.3	87.8	87.6	3544	3545	10.2	85.8
6/27/2012 15:00	87.2	87.6	87.4	3539	3541	15.5	86.7
6/27/2012 16:00	87.1	87.6	87.4	3547	3540	17.7	87.9
6/27/2012 17:00	87.2	87.6	87.4	3548	3550	12.9	88.7
6/27/2012 18:00	87.3	87.6	87.5	3545	3546	13.3	88.0
6/27/2012 19:00	87.3	87.6	87.5	3543	3550	10.0	86.3
6/27/2012 20:00	87.2	87.5	87.4	3537	3552	7.6	84.1
6/27/2012 21:00	87.1	87.4	87.2	3545	3546	9.0	80.8
6/27/2012 22:00	86.8	87.2	87.0	3546	3546	7.5	77.3
6/27/2012 23:00	86.6	87.0	86.8	3535	3546	5.5	76.1
6/28/2012 0:00	86.5	86.9	86.7	3545	3554	8.0	76.0
6/28/2012 1:00	86.5	86.8	86.6	3547	3542	5.4	71.3
6/28/2012 2:00	86.4	86.7	86.6	3544	3541	6.7	72.4
6/28/2012 3:00	86.3	86.6	86.5	3542	3550	8.5	74.3
6/28/2012 4:00	86.2	86.6	86.4	3533	3540	7.4	73.9
6/28/2012 5:00	86.1	86.4	86.3	3548	3543	7.9	72.1
6/28/2012 6:00	85.8	86.1	86.0	3544	3541	10.1	71.3
6/28/2012 7:00	85.7	86.0	85.9	3540	3548	9.5	73.4
6/28/2012 8:00	85.9	86.4	86.2	3541	3550	13.0	78.6

6/28/2012 9:00	86.1	86.6	86.4	3542	3546	16.1	83.2
6/28/2012 10:00	86.1	86.6	86.3	3546	3546	16.1	87.1
6/28/2012 11:00	86.1	86.5	86.3	3541	3542	16.8	88.2
6/28/2012 12:00	86.3	86.7	86.5	3549	3544	12.5	90.6
6/28/2012 13:00	86.4	87.1	86.7	3557	3542	16.4	92.4
6/28/2012 14:00	86.6	87.3	86.9	3540	3549	15.8	93.9
6/28/2012 15:00	87.0	87.5	87.3	3543	3547	11.3	95.1
6/28/2012 16:00	87.3	87.8	87.5	3545	3546	13.7	95.1
6/28/2012 17:00	87.5	88.0	87.7	3547	3547	13.3	94.9
6/28/2012 18:00	87.7	88.2	87.9	3556	3540	12.5	94.3
6/28/2012 19:00	87.8	88.3	88.1	3551	3546	8.9	92.9
6/28/2012 20:00	87.9	88.3	88.1	3548	3543	7.5	89.7
6/28/2012 21:00	87.8	88.3	88.1	3547	3546	7.9	88.3
6/28/2012 22:00	87.8	88.2	88.0	3545	3551	8.7	87.2
6/28/2012 23:00	87.8	88.2	88.0	3540	3546	8.7	86.7
6/29/2012 0:00	87.8	88.2	88.0	3561	3542	8.2	84.6
6/29/2012 1:00	87.8	88.1	88.0	3538	3544	6.7	83.6
6/29/2012 2:00	87.8	88.1	87.9	3549	3538	6.6	83.2
6/29/2012 3:00	87.9	88.2	88.0	3535	3543	6.6	82.8
6/29/2012 4:00	88.2	88.6	88.4	3545	3536	6.9	79.9
6/29/2012 5:00	88.4	88.9	88.7	3537	3550	7.1	78.1
6/29/2012 6:00	88.9	89.4	89.2	3547	3542	7.9	76.4
6/29/2012 7:00	89.1	89.6	89.4	3533	3545	6.4	76.8
6/29/2012 8:00	89.2	89.7	89.4	3539	3544	8.7	78.3
6/29/2012 9:00	89.3	89.7	89.5	3548	3538	6.5	80.5
6/29/2012 10:00	89.4	89.9	89.7	3544	3543	8.2	81.5
6/29/2012 11:00	89.4	89.9	89.7	3546	3549	15.7	80.2
6/29/2012 12:00	89.7	90.1	89.9	3540	3542	4.4	75.0
6/29/2012 13:00	89.8	90.2	90.0	3543	3539	5.9	76.3
6/29/2012 14:00	89.9	90.5	90.2	3547	3546	10.4	80.0
6/29/2012 15:00	90.1	90.7	90.4	3543	3545	13.6	84.7
6/29/2012 16:00	90.5	91.2	90.8	3543	3550	5.9	88.7
6/29/2012 17:00	90.8	91.5	91.1	3535	3547	8.2	90.2
6/29/2012 18:00	90.8	91.6	91.2	3536	3543	7.4	89.3
6/29/2012 19:00	91.1	91.9	91.5	3543	3542	2.1	88.1
6/29/2012 20:00	91.5	92.2	91.8	3544	3544	6.2	84.1
6/29/2012 21:00	91.6	92.2	91.9	3549	3543	13.4	82.3
6/29/2012 22:00	91.5	92.1	91.8	3540	3547	12.6	73.8
6/29/2012 23:00	91.3	91.7	91.5	3548	bad input	10.9	68.6
6/30/2012 0:00	90.8	91.2	91.0	3334	2858	8.8	71.0
6/30/2012 1:00	90.3	90.7	90.5	3324	2843	7.8	68.3
6/30/2012 2:00	90.0	90.2	90.1	3319	2845	10.2	67.8

6/30/2012 3:00	89.8	90.2	90.0	3328	2850	5.5	68.3
6/30/2012 4:00	89.7	90.1	89.9	3320	2853	5.0	68.0
6/30/2012 5:00	89.9	90.3	90.1	3326	2853	5.7	68.2
6/30/2012 6:00	90.1	90.6	90.4	3327	2854	8.2	68.5
6/30/2012 7:00	90.3	90.8	90.6	3328	2952	0.9	70.3
6/30/2012 8:00	90.4	90.9	90.6	3322	3276	7.5	73.0
6/30/2012 9:00	90.5	91.0	90.7	3337	3468	14.6	75.7
6/30/2012 10:00	90.5	91.0	90.7	3336	3487	9.9	75.4
6/30/2012 11:00	90.4	90.8	90.6	3331	3506	7.1	76.1
6/30/2012 12:00	90.4	90.9	90.7	3341	3538	5.0	78.0
6/30/2012 13:00	90.5	91.0	90.8	3337	3546	11.3	78.6
6/30/2012 14:00	90.6	91.0	90.8	3536	3551	12.8	80.2
6/30/2012 15:00	90.6	91.0	90.8	3542	3538	10.8	81.2
6/30/2012 16:00	90.5	91.0	90.7	3546	3536	7.3	80.8
6/30/2012 17:00	90.5	90.9	90.7	3549	3530	11.2	80.4
6/30/2012 18:00	90.5	90.9	90.7	3526	3533	6.5	81.8
6/30/2012 19:00	90.5	90.9	90.7	3534	3544	6.4	81.6
6/30/2012 20:00	90.4	90.7	90.5	3538	3533	2.9	78.9
6/30/2012 21:00	90.2	90.6	90.4	3530	3543	6.5	76.8
6/30/2012 22:00	90.1	90.5	90.3	3534	3537	6.3	75.4
6/30/2012 23:00	90.1	90.4	90.2	3536	3536	5.4	74.3
7/1/2012 0:00	89.9	90.3	90.1	3538	3536	3.4	77.6
7/1/2012 1:00	89.8	90.2	90.0	3536	3543	5.4	75.9
7/1/2012 2:00	89.8	90.1	90.0	3528	3536	1.7	74.6
7/1/2012 3:00	89.8	90.1	89.9	3541	3544	3.5	76.0
7/1/2012 4:00	89.8	90.2	90.0	3550	3533	3.3	76.3
7/1/2012 5:00	89.7	90.1	89.9	3543	3541	3.0	73.8
7/1/2012 6:00	89.8	90.1	89.9	3545	3553	3.8	72.5
7/1/2012 7:00	89.8	90.2	90.0	3537	3537	2.9	73.2
7/1/2012 8:00	89.9	90.3	90.1	3550	3531	4.9	76.4
7/1/2012 9:00	90.0	90.4	90.2	3540	3548	9.4	78.9
7/1/2012 10:00	90.5	91.1	90.8	3545	3522	7.3	81.6
7/1/2012 11:00	91.0	91.7	91.4	3538	3541	5.1	82.4
7/1/2012 12:00	91.2	92.0	91.6	3545	3533	9.0	78.5
7/1/2012 13:00	91.5	92.2	91.8	3541	3536	4.2	73.8
7/1/2012 14:00	91.6	92.2	91.9	3548	3539	8.6	76.1
7/1/2012 15:00	91.8	92.4	92.1	3543	3534	5.3	82.2
7/1/2012 16:00	92.0	92.7	92.3	3531	3537	4.5	85.3
7/1/2012 17:00	92.3	92.9	92.6	3542	3499	5.1	86.3
7/1/2012 18:00	92.5	93.1	92.8	3544	3540	5.8	85.5
7/1/2012 19:00	93.0	93.9	93.5	3540	3538	5.5	83.5
7/1/2012 20:00	93.6	94.3	93.9	3536	3539	4.3	82.4

7/1/2012 21:00	93.7	94.3	94.0	3543	3539	6.5	80.8
7/1/2012 22:00	93.6	94.2	93.9	3537	3546	6.4	78.2
7/1/2012 23:00	93.6	94.1	93.9	3536	3544	4.9	76.5
7/2/2012 0:00	93.6	94.0	93.8	3532	3541	7.1	75.5
7/2/2012 1:00	93.4	93.8	93.6	3544	3536	6.0	74.1
7/2/2012 2:00	93.2	93.6	93.4	3544	3535	5.4	73.9
7/2/2012 3:00	93.1	93.4	93.3	3548	3542	5.2	73.4
7/2/2012 4:00	92.9	93.3	93.1	3547	3548	5.5	73.1
7/2/2012 5:00	92.7	93.1	92.9	3534	3542	2.1	76.9
7/2/2012 6:00	92.6	92.9	92.7	3541	3542	4.6	71.9
7/2/2012 7:00	92.6	93.0	92.8	3552	3545	5.7	72.6
7/2/2012 8:00	92.7	93.1	92.9	3546	3539	4.5	76.8
7/2/2012 9:00	92.7	93.2	93.0	3539	3538	5.5	81.7
7/2/2012 10:00	92.7	93.3	93.0	3544	3543	6.0	83.5
7/2/2012 11:00	92.8	93.5	93.2	3541	3545	4.1	87.3
7/2/2012 12:00	93.1	93.8	93.5	3538	3537	4.1	88.7
7/2/2012 13:00	93.6	94.3	94.0	3540	3541	7.4	90.2
7/2/2012 14:00	94.2	94.6	94.4	3550	3546	5.5	91.7
7/2/2012 15:00	94.6	95.1	94.8	3548	3539	5.7	92.3
7/2/2012 16:00	95.0	95.6	95.3	3535	3539	7.2	92.9
7/2/2012 17:00	95.3	96.0	95.7	3550	3550	6.5	93.8
7/2/2012 18:00	95.8	96.2	96.0	3546	3547	5.6	92.5
7/2/2012 19:00	95.8	96.3	96.0	3549	3544	4.4	90.7
7/2/2012 20:00	95.8	96.3	96.0	3548	3543	5.4	88.7
7/2/2012 21:00	95.5	96.4	95.9	3543	3548	5.0	88.0
7/2/2012 22:00	95.6	96.4	96.0	3540	3547	18.1	84.0
7/2/2012 23:00	95.6	96.1	95.8	3543	3552	11.8	80.7
7/3/2012 0:00	95.5	96.1	95.8	3538	3541	10.0	78.6
7/3/2012 1:00	95.7	96.1	95.9	3544	3553	11.1	76.7
7/3/2012 2:00	96.0	96.4	96.2	3537	3547	8.4	76.1
7/3/2012 3:00	95.8	96.2	96.0	3545	3546	9.8	75.1
7/3/2012 4:00	95.4	95.7	95.6	3533	3546	9.3	75.6
7/3/2012 5:00	94.3	94.7	94.5	3539	3539	8.2	74.9
7/3/2012 6:00	93.2	93.6	93.4	3542	3544	8.6	71.8
7/3/2012 7:00	92.5	92.9	92.7	3539	3546	11.4	73.9
7/3/2012 8:00	92.4	92.8	92.6	3539	3547	10.0	76.6
7/3/2012 9:00	92.3	92.6	92.5	3543	3538	13.4	79.4
7/3/2012 10:00	bad input	bad input	bad input	3537	bad input	bad input	bad input
7/3/2012 11:00	92.6	93.1	92.8	3543	3540	7.7	83.7
7/3/2012 12:00	92.6	93.1	92.9	3545	3540	5.9	85.7
7/3/2012 13:00	92.6	93.2	92.9	3542	3540	9.0	89.3
7/3/2012 14:00	92.8	93.3	93.0	3549	3548	9.6	91.0

7/3/2012 15:00	93.0	93.4	93.2	3548	3553	21.5	92.4
7/3/2012 16:00	93.1	93.7	93.4	3546	3540	9.6	93.3
7/3/2012 17:00	93.3	94.0	93.7	3547	3543	9.5	93.4
7/3/2012 18:00	93.5	94.0	93.7	3544	3553	9.9	92.2
7/3/2012 19:00	93.6	94.0	93.8	3550	3542	7.2	90.8
7/3/2012 20:00	93.6	94.1	93.8	3552	3546	5.2	88.3
7/3/2012 21:00	93.6	93.9	93.8	3547	3549	6.0	85.4
7/3/2012 22:00	93.5	93.8	93.7	3536	3535	6.8	82.1
7/3/2012 23:00	93.4	93.7	93.6	3534	3536	5.1	81.5
7/4/2012 0:00	93.2	93.5	93.4	3543	3549	5.6	79.0
7/4/2012 1:00	93.0	93.4	93.2	3546	3540	7.2	79.7
7/4/2012 2:00	92.9	93.3	93.1	3547	3541	8.5	80.3
7/4/2012 3:00	92.8	93.1	92.9	3542	3547	9.1	79.6
7/4/2012 4:00	92.7	93.0	92.9	3548	3542	7.6	79.3
7/4/2012 5:00	92.7	93.1	92.9	3541	3546	9.0	78.3
7/4/2012 6:00	92.6	93.0	92.8	3544	3542	13.1	78.1
7/4/2012 7:00	92.6	93.0	92.8	3544	3542	8.6	79.7
7/4/2012 8:00	92.6	93.0	92.8	3541	3545	9.9	82.0
7/4/2012 9:00	92.6	93.0	92.8	3542	3548	10.1	85.6
7/4/2012 10:00	92.7	93.0	92.8	3536	3543	9.7	88.1
7/4/2012 11:00	92.7	93.1	92.9	3540	3544	10.3	90.2
7/4/2012 12:00	92.9	93.4	93.1	3542	3545	8.4	92.3
7/4/2012 13:00	93.3	93.6	93.5	3548	3543	10.3	94.1
7/4/2012 14:00	93.4	93.8	93.6	3547	3545	13.2	95.9
7/4/2012 15:00	93.6	93.7	93.6	3549	3547	12.8	96.5
7/4/2012 16:00	93.6	93.8	93.7	3547	3544	11.0	96.5
7/4/2012 17:00	93.6	94.0	93.8	3537	3544	11.6	95.5
7/4/2012 18:00	94.0	94.4	94.2	3547	3541	11.2	94.2
7/4/2012 19:00	94.2	94.7	94.4	3545	3549	8.0	91.9
7/4/2012 20:00	94.2	94.7	94.5	3535	3539	8.4	88.8
7/4/2012 21:00	94.2	94.7	94.5	3548	3546	5.9	86.9
7/4/2012 22:00	94.2	94.5	94.3	3541	3530	7.1	85.7
7/4/2012 23:00	94.1	94.4	94.2	3542	3540	6.9	82.1
7/5/2012 0:00	94.2	94.6	94.4	3538	3544	8.3	82.3
7/5/2012 1:00	94.6	95.0	94.8	3547	3539	5.6	80.4
7/5/2012 2:00	94.7	95.1	94.9	3528	3532	7.4	80.3
7/5/2012 3:00	94.8	95.2	95.0	3539	3544	5.7	77.8
7/5/2012 4:00	94.9	95.3	95.1	3541	3542	8.9	77.1
7/5/2012 5:00	94.8	95.2	95.0	3538	3543	7.0	78.2
7/5/2012 6:00	94.6	95.0	94.8	3546	3539	8.1	78.3
7/5/2012 7:00	94.4	94.7	94.5	3544	3543	8.1	79.2
7/5/2012 8:00	94.2	94.5	94.3	3554	3544	6.7	82.0

7/5/2012 9:00	94.0	94.3	94.2	3537	3544	8.5	85.7
7/5/2012 10:00	94.1	94.5	94.3	3540	3541	10.4	90.3
7/5/2012 11:00	94.1	94.6	94.4	3540	3544	12.5	91.8
7/5/2012 12:00	94.3	94.7	94.5	3544	3546	8.6	93.4
7/5/2012 13:00	94.4	94.9	94.7	3539	3544	8.2	94.8
7/5/2012 14:00	94.6	95.1	94.8	3539	3548	9.8	95.8
7/5/2012 15:00	94.8	95.2	95.0	3548	3541	10.8	97.0
7/5/2012 16:00	94.9	95.2	95.0	3535	3539	9.8	97.2
7/5/2012 17:00	94.9	95.3	95.1	3534	3549	13.5	97.3
7/5/2012 18:00	94.8	95.2	95.0	3539	3546	11.8	95.0
7/5/2012 19:00	94.9	95.3	95.1	3544	3537	7.3	92.0
7/5/2012 20:00	94.9	95.4	95.2	3546	3539	7.9	89.4
7/5/2012 21:00	94.9	95.3	95.1	3544	3544	6.8	87.1
7/5/2012 22:00	94.9	95.2	95.0	3544	3537	9.6	85.0
7/5/2012 23:00	94.7	95.1	94.9	3544	3543	7.5	83.9
7/6/2012 0:00	94.6	95.0	94.8	3548	3544	8.4	82.7
7/6/2012 1:00	94.7	95.0	94.8	3537	3543	8.8	82.2
7/6/2012 2:00	94.8	95.1	94.9	3538	3542	5.0	81.9
7/6/2012 3:00	94.8	95.1	95.0	3540	3542	3.5	80.6
7/6/2012 4:00	94.7	95.1	94.9	3539	3547	5.1	80.4
7/6/2012 5:00	94.5	94.9	94.7	3544	3541	6.6	77.6
7/6/2012 6:00	94.3	94.7	94.5	3532	3548	6.2	78.7
7/6/2012 7:00	94.1	94.5	94.3	3537	3547	6.1	80.9
7/6/2012 8:00	94.0	94.4	94.2	3537	3538	10.4	83.4
7/6/2012 9:00	94.1	94.5	94.3	3544	3545	6.5	86.0
7/6/2012 10:00	94.3	94.7	94.5	3541	3549	9.7	88.5
7/6/2012 11:00	94.5	95.1	94.8	3541	3544	8.5	91.9
7/6/2012 12:00	94.9	95.3	95.1	3547	3550	6.1	95.2
7/6/2012 13:00	95.2	95.6	95.4	3534	3537	7.1	96.0
7/6/2012 14:00	95.4	95.7	95.5	3546	3539	10.8	97.2
7/6/2012 15:00	95.5	95.9	95.7	3538	3540	10.6	98.7
7/6/2012 16:00	95.8	96.3	96.1	3547	3544	8.9	97.7
7/6/2012 17:00	96.1	96.6	96.3	3536	3550	7.2	98.2
7/6/2012 18:00	96.2	96.8	96.5	3546	3541	7.3	97.2
7/6/2012 19:00	96.4	96.9	96.6	3541	3540	5.5	95.4
7/6/2012 20:00	96.5	97.1	96.8	3533	3535	6.0	92.3
7/6/2012 21:00	96.7	97.3	97.0	3539	3536	4.5	88.8
7/6/2012 22:00	96.7	97.3	97.0	3540	3547	4.5	86.5
7/6/2012 23:00	96.8	97.3	97.0	3541	3545	5.7	84.6
7/7/2012 0:00	96.8	97.3	97.0	3543	3544	8.0	83.3
7/7/2012 1:00	96.9	97.3	97.1	3545	3544	5.0	83.1
7/7/2012 2:00	96.9	97.2	97.1	3543	3548	6.0	82.5

7/7/2012 3:00	96.8	97.2	97.0	3546	3549	7.0	82.1
7/7/2012 4:00	96.8	97.1	96.9	3546	3550	7.2	80.4
7/7/2012 5:00	96.7	97.0	96.9	3550	3543	6.6	80.7
7/7/2012 6:00	96.6	97.0	96.8	3548	3545	6.8	81.1
7/7/2012 7:00	96.6	96.9	96.7	3538	3547	6.2	82.6
7/7/2012 8:00	96.5	96.8	96.7	3546	3549	8.1	86.6
7/7/2012 9:00	96.5	96.9	96.7	3545	3547	7.9	89.3
7/7/2012 10:00	96.6	97.0	96.8	3544	3538	7.3	91.8
7/7/2012 11:00	96.8	97.2	97.0	3542	3538	6.7	94.8
7/7/2012 12:00	97.0	97.4	97.2	3543	3547	8.1	94.9
7/7/2012 13:00	97.1	97.7	97.4	3548	3544	7.0	96.4
7/7/2012 14:00	97.3	97.8	97.6	3536	3539	5.9	97.4
7/7/2012 15:00	97.5	97.9	97.7	3544	3546	7.0	98.9
7/7/2012 16:00	97.8	98.1	97.9	3543	3539	2.4	99.6
7/7/2012 17:00	97.9	98.3	98.1	3536	3547	4.6	99.9
7/7/2012 18:00	98.0	98.6	98.3	3540	3541	6.7	98.3
7/7/2012 19:00	98.1	98.7	98.4	3544	3550	14.7	87.5
7/7/2012 20:00	98.1	98.7	98.4	3541	3547	17.1	81.1
7/7/2012 21:00	98.0	98.4	98.2	3545	3550	15.9	78.6
7/7/2012 22:00	97.7	98.0	97.8	3538	3547	10.8	75.8
7/7/2012 23:00	97.3	97.6	97.5	3542	3543	12.9	73.7
7/8/2012 0:00	96.9	97.2	97.0	3540	3537	11.0	72.6
7/8/2012 1:00	96.5	96.9	96.7	3558	3543	13.6	72.5
7/8/2012 2:00	96.2	96.6	96.4	3535	3542	7.9	72.8
7/8/2012 3:00	96.0	96.4	96.2	3544	3543	4.8	72.1
7/8/2012 4:00	95.8	96.2	96.0	3548	3547	5.1	72.0
7/8/2012 5:00	95.8	96.3	96.0	3546	3543	5.0	72.2
7/8/2012 6:00	95.9	96.3	96.1	3553	3546	8.2	72.4
7/8/2012 7:00	95.7	96.1	95.9	3539	3546	6.8	73.5
7/8/2012 8:00	95.6	96.0	95.8	3554	3539	15.0	74.8
7/8/2012 9:00	95.3	95.7	95.5	3541	3537	15.0	76.8
7/8/2012 10:00	95.1	95.5	95.3	3541	3550	17.3	78.8
7/8/2012 11:00	94.9	95.3	95.1	3540	3547	12.4	79.3
7/8/2012 12:00	94.9	95.3	95.1	3552	3551	13.4	81.6
7/8/2012 13:00	94.9	95.3	95.1	3549	3546	15.5	83.6
7/8/2012 14:00	95.0	95.5	95.3	3547	3536	11.0	83.5
7/8/2012 15:00	95.2	95.8	95.5	3537	3545	15.2	83.6
7/8/2012 16:00	95.3	95.8	95.6	3543	3545	6.8	83.8
7/8/2012 17:00	95.3	95.7	95.5	3544	3544	10.7	84.0
7/8/2012 18:00	95.1	95.5	95.3	3532	3546	13.1	82.9
7/8/2012 19:00	94.9	95.3	95.1	3545	3541	11.5	81.7
7/8/2012 20:00	94.6	95.0	94.8	3545	3544	9.7	79.4

7/8/2012 21:00	94.4	94.8	94.6	3546	3543	11.8	77.7
7/8/2012 22:00	94.0	94.4	94.2	3537	3548	8.1	74.9
7/8/2012 23:00	93.7	94.0	93.9	3545	3535	3.1	71.3
7/9/2012 0:00	93.4	93.8	93.6	3540	3537	3.7	71.4
7/9/2012 1:00	93.3	93.6	93.4	3540	3540	4.7	70.7
7/9/2012 2:00	93.2	93.5	93.4	3542	3543	6.2	72.2
7/9/2012 3:00	93.1	93.4	93.2	3547	3552	5.0	71.8
7/9/2012 4:00	93.0	93.4	93.2	3540	3544	5.7	66.6
7/9/2012 5:00	93.0	93.4	93.2	3554	3546	5.6	68.7
7/9/2012 6:00	93.0	93.4	93.2	3548	3548	5.4	68.2
7/9/2012 7:00	92.9	93.3	93.1	3541	3536	2.5	70.5
7/9/2012 8:00	92.9	93.3	93.1	3539	3546	7.7	74.2
7/9/2012 9:00	92.9	93.3	93.1	3536	3545	2.8	78.0
7/9/2012 10:00	93.1	93.4	93.2	3538	3551	1.2	80.3
7/9/2012 11:00	93.3	93.7	93.5	3539	3548	3.7	81.7
7/9/2012 12:00	93.4	94.2	93.8	3533	3543	5.2	83.2
7/9/2012 13:00	93.8	94.4	94.1	3557	3539	3.8	86.1
7/9/2012 14:00	93.8	94.7	94.3	3542	3546	3.7	85.7
7/9/2012 15:00	94.2	94.8	94.5	3535	3535	7.2	87.4
7/9/2012 16:00	94.8	95.4	95.1	3536	3545	6.5	87.8
7/9/2012 17:00	95.2	95.8	95.5	3543	3542	7.4	89.1
7/9/2012 18:00	95.3	96.0	95.6	3545	3542	5.6	81.0
7/9/2012 19:00	95.3	95.9	95.6	3533	3544	19.3	78.8
7/9/2012 20:00	95.2	95.6	95.4	3537	3547	13.5	76.1
7/9/2012 21:00	95.0	95.4	95.2	3541	3544	8.5	73.0
7/9/2012 22:00	94.9	95.2	95.0	3541	3549	9.2	72.4
7/9/2012 23:00	94.6	95.0	94.8	3537	3541	8.2	70.9
7/10/2012 0:00	94.2	94.6	94.4	3539	3544	7.9	73.4
7/10/2012 1:00	93.9	94.2	94.0	3542	3540	12.3	73.4
7/10/2012 2:00	93.7	94.1	93.9	3543	3540	7.2	71.4
7/10/2012 3:00	93.8	94.2	94.0	3532	3546	9.6	73.1
7/10/2012 4:00	94.0	94.4	94.2	3550	3541	7.3	71.3
7/10/2012 5:00	94.0	94.4	94.2	3549	3547	5.5	70.0
7/10/2012 6:00	93.9	94.2	94.1	3538	3541	8.5	70.0
7/10/2012 7:00	93.6	94.0	93.8	3542	3539	8.3	71.5
7/10/2012 8:00	93.4	93.7	93.6	3531	3541	8.1	72.4
7/10/2012 9:00	93.2	93.6	93.4	3539	3543	10.9	73.8
7/10/2012 10:00	93.1	93.4	93.3	3550	3543	12.4	74.9
7/10/2012 11:00	93.0	93.4	93.2	3543	3544	11.9	77.9
7/10/2012 12:00	92.9	93.3	93.1	3542	3541	12.9	79.3
7/10/2012 13:00	93.0	93.4	93.2	3540	3535	11.2	80.6
7/10/2012 14:00	93.2	93.6	93.4	3545	3543	7.5	80.5

7/10/2012 15:00	93.3	93.7	93.5	3534	3544	8.6	80.6
7/10/2012 16:00	93.2	93.6	93.4	3540	3545	8.4	79.1
7/10/2012 17:00	93.2	93.6	93.4	3539	3548	9.2	79.4
7/10/2012 18:00	93.3	93.6	93.4	3544	3542	8.1	79.7
7/10/2012 19:00	93.1	93.5	93.3	3546	3546	11.9	79.0
7/10/2012 20:00	93.0	93.3	93.2	3543	3540	8.2	77.7
7/10/2012 21:00	92.9	93.2	93.0	3548	3548	11.3	77.7
7/10/2012 22:00	92.6	92.9	92.8	3539	3542	10.3	76.1
7/10/2012 23:00	92.3	92.7	92.5	3540	3535	8.0	74.3
7/11/2012 0:00	92.0	92.3	92.1	3542	3541	12.5	72.5
7/11/2012 1:00	91.6	92.0	91.8	3546	3551	9.9	70.9
7/11/2012 2:00	91.5	91.8	91.7	3542	3550	4.6	68.3
7/11/2012 3:00	91.6	91.9	91.7	3536	3542	15.2	67.5
7/11/2012 4:00	91.4	91.9	91.6	3544	3545	4.7	65.7
7/11/2012 5:00	91.2	91.7	91.4	3542	3551	9.8	64.8
7/11/2012 6:00	91.0	91.5	91.2	3541	3551	6.4	67.2
7/11/2012 7:00	90.8	91.2	91.0	3551	3548	12.8	69.0
7/11/2012 8:00	90.6	91.0	90.8	3538	3538	10.1	70.4
7/11/2012 9:00	90.6	91.0	90.8	3532	3545	10.4	72.5
7/11/2012 10:00	90.7	91.1	90.9	3537	3547	8.2	76.2
7/11/2012 11:00	90.9	91.5	91.2	3542	3547	4.6	80.3
7/11/2012 12:00	91.1	91.8	91.4	3541	3547	4.0	81.3
7/11/2012 13:00	91.5	92.1	91.8	3536	3543	6.7	83.4
7/11/2012 14:00	91.8	92.8	92.3	3539	3547	5.4	83.3
7/11/2012 15:00	93.0	93.7	93.4	3545	3549	7.5	84.8
7/11/2012 16:00	93.6	94.2	93.9	3538	3542	3.8	85.1
7/11/2012 17:00	93.9	94.7	94.3	3535	3546	6.2	85.4
7/11/2012 18:00	94.0	94.9	94.4	3541	3542	5.0	85.9
7/11/2012 19:00	94.3	95.0	94.6	3534	3544	3.5	84.1
7/11/2012 20:00	94.5	95.1	94.8	3553	3548	2.1	83.1
7/11/2012 21:00	94.6	95.3	95.0	3538	3541	4.0	81.5
7/11/2012 22:00	94.7	95.2	94.9	3543	3548	7.1	74.4
7/11/2012 23:00	94.5	94.9	94.7	3541	3544	4.6	71.3
7/12/2012 0:00	94.3	94.6	94.4	3556	3545	5.4	69.9
7/12/2012 1:00	93.8	94.2	94.0	3553	3544	7.9	70.5
7/12/2012 2:00	93.5	93.9	93.7	3542	3551	7.3	70.3
7/12/2012 3:00	93.5	93.9	93.7	3543	3542	7.3	70.3
7/12/2012 4:00	93.6	93.9	93.7	3537	3551	7.7	67.7
7/12/2012 5:00	93.6	93.9	93.8	3548	3546	6.1	66.3
7/12/2012 6:00	93.4	93.8	93.6	3537	3541	5.3	65.5
7/12/2012 7:00	93.5	93.8	93.6	3542	3537	5.7	65.8
7/12/2012 8:00	93.4	93.7	93.5	3547	3548	7.1	71.1

7/12/2012 9:00	93.2	93.6	93.4	3546	3545	10.6	75.5
7/12/2012 10:00	93.2	93.6	93.4	3534	3540	9.0	80.3
7/12/2012 11:00	93.2	93.6	93.4	3537	3551	8.8	83.6
7/12/2012 12:00	93.2	93.7	93.4	3542	3545	11.9	85.2
7/12/2012 13:00	93.4	93.9	93.6	3547	3550	7.8	85.4
7/12/2012 14:00	93.6	94.1	93.9	3543	3543	8.6	87.0
7/12/2012 15:00	93.8	94.4	94.1	3542	3545	11.4	88.2
7/12/2012 16:00	93.9	94.5	94.2	3547	3542	5.4	88.0
7/12/2012 17:00	94.0	94.6	94.3	3546	3550	8.5	87.6
7/12/2012 18:00	94.1	94.5	94.3	3550	3537	12.8	87.9
7/12/2012 19:00	94.0	94.4	94.2	3544	3544	5.7	84.6
7/12/2012 20:00	94.1	94.5	94.3	3540	3552	4.8	82.3
7/12/2012 21:00	94.1	94.4	94.2	3550	3538	5.0	80.6
7/12/2012 22:00	93.8	94.1	94.0	3546	3547	5.9	77.8
7/12/2012 23:00	93.5	93.8	93.7	3544	3540	5.2	76.3
7/13/2012 0:00	93.4	93.7	93.6	3541	3543	5.5	75.8
7/13/2012 1:00	93.4	93.7	93.5	3542	3542	5.1	74.3
7/13/2012 2:00	93.4	93.7	93.5	3543	3542	6.4	74.2
7/13/2012 3:00	93.4	93.8	93.6	3542	3536	7.7	71.8
7/13/2012 4:00	93.4	93.8	93.6	3541	3538	6.1	68.8
7/13/2012 5:00	93.4	93.8	93.6	3542	3533	6.8	68.4
7/13/2012 6:00	93.4	93.7	93.5	3548	3542	7.0	68.4
7/13/2012 7:00	93.3	93.6	93.4	3546	3540	6.3	69.9
7/13/2012 8:00	93.2	93.5	93.4	3542	3542	6.7	75.0
7/13/2012 9:00	93.2	93.5	93.3	3541	3539	9.9	78.9
7/13/2012 10:00	93.2	93.6	93.4	3545	3538	6.9	82.7
7/13/2012 11:00	93.2	93.7	93.5	3563	3536	4.8	85.1
7/13/2012 12:00	93.4	94.0	93.7	3538	3529	2.3	86.3
7/13/2012 13:00	93.7	94.2	94.0	3538	3545	5.4	87.1
7/13/2012 14:00	93.7	94.5	94.1	3537	3537	19.3	82.4
7/13/2012 15:00	93.8	94.5	94.2	3534	3542	9.9	89.4
7/13/2012 16:00	93.9	94.7	94.3	3544	3541	6.1	87.4
7/13/2012 17:00	93.9	94.4	94.2	3536	3550	6.4	85.2
7/13/2012 18:00	93.8	94.1	94.0	3550	3543	10.4	75.4
7/13/2012 19:00	93.9	94.2	94.1	3535	3545	2.7	76.1
7/13/2012 20:00	93.9	94.2	94.1	3544	3544	9.4	73.7
7/13/2012 21:00	93.8	94.1	93.9	3533	3546	4.4	72.2
7/13/2012 22:00	93.6	94.0	93.8	3540	3541	4.4	72.7
7/13/2012 23:00	93.5	93.8	93.6	3551	3539	7.6	72.5
7/14/2012 0:00	93.3	93.7	93.5	3545	3538	4.4	73.2
7/14/2012 1:00	93.2	93.5	93.3	3540	3546	2.4	74.2
7/14/2012 2:00	93.0	93.4	93.2	3536	3544	3.8	71.6

7/14/2012 3:00	92.9	93.3	93.1	3535	3544	4.7	70.7
7/14/2012 4:00	92.8	93.2	93.0	3545	3538	6.4	71.1
7/14/2012 5:00	93.1	93.5	93.3	3543	3544	3.1	71.2
7/14/2012 6:00	93.2	93.5	93.3	3540	3544	3.1	71.9
7/14/2012 7:00	93.1	93.4	93.3	3541	3543	7.3	71.6
7/14/2012 8:00	93.0	93.4	93.2	3538	3546	12.9	71.1
7/14/2012 9:00	93.0	93.4	93.2	3550	3546	5.8	73.2
7/14/2012 10:00	93.0	93.3	93.1	3545	3545	2.3	73.6
7/14/2012 11:00	93.0	93.3	93.1	3540	3537	5.4	76.1
7/14/2012 12:00	93.1	93.7	93.4	3537	3544	7.5	80.6
7/14/2012 13:00	93.4	94.0	93.7	3541	3543	5.9	82.1
7/14/2012 14:00	93.9	94.4	94.2	3543	3544	6.3	84.6
7/14/2012 15:00	94.5	94.8	94.6	3545	3542	12.1	85.8
7/14/2012 16:00	94.7	95.0	94.8	3543	3546	8.4	85.9
7/14/2012 17:00	94.9	95.3	95.1	3548	3545	7.7	85.9
7/14/2012 18:00	95.4	96.1	95.7	3536	3546	16.6	80.5
7/14/2012 19:00	95.9	96.4	96.2	3538	3542	13.0	75.7
7/14/2012 20:00	96.0	96.5	96.2	3545	3547	8.8	75.2
7/14/2012 21:00	95.6	96.1	95.8	3540	3545	8.7	73.0
7/14/2012 22:00	95.2	95.6	95.4	3545	3539	7.2	72.4
7/14/2012 23:00	94.9	95.2	95.1	3546	3539	5.8	70.7
7/15/2012 0:00	94.6	94.8	94.7	3546	3541	8.0	70.7
7/15/2012 1:00	94.2	94.5	94.3	3542	3541	6.9	69.0
7/15/2012 2:00	93.9	94.2	94.1	3548	3545	6.6	69.5
7/15/2012 3:00	93.6	93.9	93.8	3538	3546	7.6	69.1
7/15/2012 4:00	93.3	93.7	93.5	3532	3538	7.5	68.6
7/15/2012 5:00	93.1	93.5	93.3	3536	3548	8.2	69.5
7/15/2012 6:00	93.1	93.4	93.2	3544	3549	8.6	69.8
7/15/2012 7:00	92.9	93.2	93.0	3544	3537	7.3	71.6
7/15/2012 8:00	92.6	93.0	92.8	3543	3543	7.7	73.8
7/15/2012 9:00	92.5	92.8	92.6	3561	3541	6.8	76.9
7/15/2012 10:00	92.5	92.9	92.7	3536	3541	4.5	81.0
7/15/2012 11:00	92.8	93.3	93.0	3547	3544	3.8	84.2
7/15/2012 12:00	93.2	93.8	93.5	3545	3551	11.8	86.6
7/15/2012 13:00	93.6	94.1	93.9	3539	3543	7.0	88.0
7/15/2012 14:00	93.8	94.2	94.0	3535	3539	13.7	88.8
7/15/2012 15:00	93.9	94.3	94.1	3533	3539	3.9	89.0
7/15/2012 16:00	94.1	94.6	94.4	3547	3546	7.5	90.0
7/15/2012 17:00	94.5	94.9	94.7	3539	3542	9.1	90.9
7/15/2012 18:00	94.5	95.2	94.9	3542	3545	4.5	89.6
7/15/2012 19:00	94.7	95.4	95.1	3549	3550	7.3	88.9
7/15/2012 20:00	94.8	95.5	95.2	3543	3549	3.0	87.2

7/15/2012 21:00	94.9	95.5	95.2	3547	3548	2.7	85.4
7/15/2012 22:00	95.0	95.5	95.2	3541	3544	8.7	81.3
7/15/2012 23:00	95.0	95.5	95.3	3556	3548	7.6	79.9
7/16/2012 0:00	95.1	95.6	95.4	3544	3539	5.8	77.8
7/16/2012 1:00	95.2	95.6	95.4	3547	3535	5.3	77.5
7/16/2012 2:00	95.2	95.6	95.4	3543	3541	5.8	77.5
7/16/2012 3:00	95.3	95.7	95.5	3532	3546	5.1	76.4
7/16/2012 4:00	95.4	95.7	95.6	3536	3540	6.8	76.3
7/16/2012 5:00	95.4	95.7	95.5	3542	3537	5.1	73.0
7/16/2012 6:00	95.2	95.5	95.4	3543	3540	6.8	74.4
7/16/2012 7:00	95.0	95.4	95.2	3547	3545	8.3	77.3
7/16/2012 8:00	95.0	95.3	95.2	3541	3542	9.0	80.0
7/16/2012 9:00	95.0	95.3	95.1	3544	3533	8.2	82.5
7/16/2012 10:00	95.0	95.3	95.2	3542	3540	7.0	85.2
7/16/2012 11:00	95.0	95.5	95.2	3545	3545	6.9	88.6
7/16/2012 12:00	95.1	95.6	95.4	3545	3551	9.7	89.3
7/16/2012 13:00	95.3	95.8	95.5	3538	3551	5.3	91.4
7/16/2012 14:00	95.5	95.8	95.6	3550	3549	10.0	91.7
7/16/2012 15:00	95.5	96.0	95.8	3544	3542	10.0	91.9
7/16/2012 16:00	95.7	96.1	95.9	3547	3542	6.2	92.4
7/16/2012 17:00	95.7	96.3	96.0	3537	3539	13.2	92.2
7/16/2012 18:00	95.8	96.2	96.0	3543	3543	10.7	91.9
7/16/2012 19:00	95.8	96.2	96.0	3552	3549	5.7	90.3
7/16/2012 20:00	95.7	96.0	95.9	3545	3546	5.8	87.3
7/16/2012 21:00	95.5	95.9	95.7	3549	3547	7.9	84.5
7/16/2012 22:00	95.4	95.7	95.5	3553	3538	8.0	82.9
7/16/2012 23:00	95.2	95.5	95.4	3547	3544	5.1	81.0
7/17/2012 0:00	95.0	95.3	95.1	3543	3540	8.1	80.0
7/17/2012 1:00	94.8	95.2	95.0	3540	3550	6.4	79.3
7/17/2012 2:00	94.7	95.0	94.8	3546	3552	6.1	77.7
7/17/2012 3:00	94.6	94.9	94.7	3546	3538	7.2	80.2
7/17/2012 4:00	94.7	95.0	94.8	3537	3541	11.4	79.7
7/17/2012 5:00	94.7	95.1	94.9	3542	3533	7.7	77.9
7/17/2012 6:00	94.7	95.0	94.9	3546	3546	10.2	77.7
7/17/2012 7:00	94.6	94.9	94.7	3540	3550	7.8	79.0
7/17/2012 8:00	94.4	94.7	94.6	3539	3552	6.7	81.8
7/17/2012 9:00	94.3	94.6	94.5	3540	3544	9.6	85.6
7/17/2012 10:00	94.2	94.5	94.4	3533	3548	10.8	89.7
7/17/2012 11:00	94.4	94.7	94.6	3545	3547	10.7	91.2
7/17/2012 12:00	94.5	95.0	94.7	3540	3546	13.0	92.7
7/17/2012 13:00	94.7	95.1	94.9	3550	3547	13.9	93.2
7/17/2012 14:00	94.8	95.2	95.0	3541	3534	16.0	94.7

7/17/2012 15:00	94.9	95.4	95.1	3541	3538	14.8	94.6
7/17/2012 16:00	95.1	95.6	95.3	3545	3543	13.2	95.2
7/17/2012 17:00	95.2	95.7	95.5	3538	3542	17.3	95.0
7/17/2012 18:00	95.4	95.8	95.6	3546	3535	13.6	94.0
7/17/2012 19:00	95.4	95.8	95.6	3539	3536	9.2	92.9
7/17/2012 20:00	95.3	95.7	95.5	3544	3543	4.3	89.9
7/17/2012 21:00	95.3	95.6	95.4	3544	3540	4.1	87.5
7/17/2012 22:00	95.2	95.5	95.3	3542	3544	6.3	85.5
7/17/2012 23:00	95.0	95.3	95.2	3545	3546	5.0	82.3
7/18/2012 0:00	94.8	95.1	95.0	3544	3541	4.7	81.2
7/18/2012 1:00	94.7	95.1	94.9	3547	3545	5.9	79.8
7/18/2012 2:00	94.7	95.1	94.9	3536	3551	4.9	78.2
7/18/2012 3:00	94.7	95.1	94.9	3536	3539	5.3	78.2
7/18/2012 4:00	94.7	95.1	94.9	3551	3543	6.3	78.2
7/18/2012 5:00	94.6	95.0	94.8	3541	3542	4.8	76.5
7/18/2012 6:00	94.4	94.8	94.6	3549	3545	5.1	76.4
7/18/2012 7:00	94.4	94.8	94.6	3543	3548	3.4	79.9
7/18/2012 8:00	94.6	94.9	94.7	3538	3546	3.2	82.8
7/18/2012 9:00	94.7	95.0	94.8	3546	3539	5.2	85.2
7/18/2012 10:00	94.8	95.1	94.9	3544	3511	8.2	89.0
7/18/2012 11:00	94.8	95.2	95.0	3539	3540	4.0	92.3
7/18/2012 12:00	94.9	95.4	95.2	3535	3550	8.5	93.8
7/18/2012 13:00	95.0	95.6	95.3	3538	3549	2.3	94.9
7/18/2012 14:00	95.3	95.7	95.5	3548	3554	10.7	95.9
7/18/2012 15:00	95.5	96.0	95.8	3541	3550	13.4	97.5
7/18/2012 16:00	95.7	96.3	96.0	3538	3552	13.3	97.8
7/18/2012 17:00	96.0	96.5	96.3	3547	3538	8.5	97.7
7/18/2012 18:00	96.3	96.8	96.5	3543	3549	10.2	96.9
7/18/2012 19:00	96.4	96.9	96.7	3555	3556	6.1	95.2
7/18/2012 20:00	96.5	97.0	96.7	3545	3542	5.4	92.1
7/18/2012 21:00	96.5	97.0	96.7	3535	3536	6.5	83.9
7/18/2012 22:00	96.5	96.8	96.7	3541	3548	16.4	83.0
7/18/2012 23:00	96.8	97.2	97.0	3542	3543	18.9	78.0
7/19/2012 0:00	96.8	97.1	97.0	3537	3540	10.8	75.6
7/19/2012 1:00	96.5	96.8	96.7	3543	3547	6.6	74.3
7/19/2012 2:00	96.4	96.7	96.5	3535	3533	12.4	71.8
7/19/2012 3:00	96.2	96.5	96.3	3549	3537	13.5	70.7
7/19/2012 4:00	96.0	96.3	96.1	3536	3549	6.5	70.8
7/19/2012 5:00	95.7	96.0	95.8	3543	3543	7.4	71.4
7/19/2012 6:00	95.4	95.8	95.6	3543	3539	8.8	72.0
7/19/2012 7:00	95.1	95.5	95.3	3551	3546	7.6	71.8
7/19/2012 8:00	94.8	95.2	95.0	3543	3543	6.8	72.5

7/19/2012 9:00	94.6	95.0	94.8	3543	3540	10.5	75.8
7/19/2012 10:00	94.9	95.4	95.1	3547	3545	8.9	81.1
7/19/2012 11:00	95.2	95.7	95.5	3537	3540	9.0	82.8
7/19/2012 12:00	95.5	95.9	95.7	3548	3535	8.8	84.7
7/19/2012 13:00	95.5	96.1	95.8	3539	3536	14.5	84.3
7/19/2012 14:00	95.6	96.2	95.9	3537	3550	17.2	83.0
7/19/2012 15:00	95.7	96.2	96.0	3543	3541	12.9	83.7
7/19/2012 16:00	95.7	96.3	96.0	3552	3543	9.3	85.0
7/19/2012 17:00	95.8	96.2	96.0	3542	3542	13.6	84.1
7/19/2012 18:00	95.7	96.1	95.9	3538	3544	17.0	84.4
7/19/2012 19:00	95.5	95.8	95.6	3534	3543	16.7	81.2
7/19/2012 20:00	95.2	95.5	95.4	3541	3543	21.1	77.7
7/19/2012 21:00	94.8	95.2	95.0	3540	3541	6.7	72.9
7/19/2012 22:00	94.4	94.8	94.6	3539	3542	13.9	71.7
7/19/2012 23:00	94.1	94.5	94.3	3539	3541	13.4	71.4
7/20/2012 0:00	93.9	94.2	94.0	3544	3544	10.3	70.6
7/20/2012 1:00	93.5	93.9	93.7	3544	3548	10.6	70.4
7/20/2012 2:00	93.3	93.7	93.5	3544	3533	15.9	69.9
7/20/2012 3:00	93.2	93.5	93.3	3545	3547	6.2	69.7
7/20/2012 4:00	93.0	93.3	93.1	3544	3541	3.9	68.5
7/20/2012 5:00	92.6	93.0	92.8	3537	3540	13.2	67.9
7/20/2012 6:00	92.4	92.7	92.5	3539	3552	8.2	67.7
7/20/2012 7:00	92.1	92.5	92.3	3541	3545	15.2	68.3
7/20/2012 8:00	91.8	92.1	91.9	3546	3542	9.4	69.1
7/20/2012 9:00	91.6	91.9	91.8	3541	3540	9.1	71.7
7/20/2012 10:00	91.5	91.9	91.7	3547	3539	9.4	73.0
7/20/2012 11:00	91.4	91.8	91.6	3541	3537	8.0	74.7
7/20/2012 12:00	91.6	92.0	91.8	3533	3542	7.3	76.7
7/20/2012 13:00	91.9	92.4	92.1	3542	3533	14.8	79.6
7/20/2012 14:00	92.0	92.6	92.3	3549	3539	6.2	81.5
7/20/2012 15:00	92.2	92.8	92.5	3543	3539	7.7	81.4
7/20/2012 16:00	92.4	93.0	92.7	3534	3534	9.6	82.5
7/20/2012 17:00	92.7	93.3	93.0	3540	3539	12.4	82.3
7/20/2012 18:00	93.0	93.5	93.3	3537	3541	12.0	81.5
7/20/2012 19:00	93.1	93.6	93.3	3545	3535	9.9	80.1
7/20/2012 20:00	93.0	93.4	93.2	3539	3541	11.3	78.5
7/20/2012 21:00	92.9	93.3	93.1	3539	3547	7.4	73.3
7/20/2012 22:00	92.7	93.1	92.9	3542	3546	5.4	69.8
7/20/2012 23:00	92.6	93.0	92.8	3542	3540	3.9	68.4
7/21/2012 0:00	92.6	92.9	92.7	3543	3535	4.3	67.4
7/21/2012 1:00	92.5	92.9	92.7	3547	3547	3.8	66.7
7/21/2012 2:00	92.6	92.9	92.7	3545	3537	2.3	66.4

7/21/2012 3:00	92.6	93.0	92.8	3547	3542	3.2	66.8
7/21/2012 4:00	92.6	93.0	92.8	3539	3543	5.5	64.7
7/21/2012 5:00	92.6	92.9	92.7	3543	3546	4.1	66.8
7/21/2012 6:00	92.6	93.0	92.8	3550	3542	4.0	62.4
7/21/2012 7:00	92.6	93.0	92.8	3543	3543	6.9	64.8
7/21/2012 8:00	92.7	93.0	92.9	3541	3544	2.8	69.0
7/21/2012 9:00	92.7	93.1	92.9	3538	3537	4.9	71.7
7/21/2012 10:00	92.8	93.2	93.0	3545	3551	5.5	75.8
7/21/2012 11:00	92.8	93.3	93.1	3544	3545	5.5	78.1
7/21/2012 12:00	93.0	93.5	93.2	3545	3542	4.4	81.0
7/21/2012 13:00	93.1	93.6	93.3	3544	3540	9.9	83.3
7/21/2012 14:00	93.1	93.8	93.5	3545	3541	3.4	84.5
7/21/2012 15:00	93.3	93.7	93.5	3541	3547	12.5	84.1
7/21/2012 16:00	93.3	93.8	93.5	3539	3551	8.5	85.0
7/21/2012 17:00	93.3	93.7	93.5	3543	3539	7.3	84.5
7/21/2012 18:00	93.4	93.8	93.6	3536	3546	6.3	83.3
7/21/2012 19:00	93.5	94.0	93.7	3546	3540	3.4	81.9
7/21/2012 20:00	93.5	93.9	93.7	3548	3534	4.5	79.9
7/21/2012 21:00	93.6	93.9	93.7	3532	3548	4.5	79.7
7/21/2012 22:00	93.6	93.9	93.7	3538	3542	3.1	78.9
7/21/2012 23:00	93.6	93.9	93.8	3537	3542	5.2	78.8
7/22/2012 0:00	93.7	94.1	93.9	3541	3543	5.5	76.6
7/22/2012 1:00	93.9	94.3	94.1	3546	3545	4.9	73.2
7/22/2012 2:00	93.9	94.3	94.1	3537	3542	5.2	75.9
7/22/2012 3:00	93.9	94.2	94.0	3549	3541	5.6	74.7
7/22/2012 4:00	93.9	94.2	94.1	3539	3545	4.1	73.5
7/22/2012 5:00	93.9	94.2	94.1	3540	3542	3.9	71.8
7/22/2012 6:00	94.0	94.3	94.1	3548	3545	6.9	70.0
7/22/2012 7:00	94.0	94.4	94.2	3541	3544	5.7	72.9
7/22/2012 8:00	94.1	94.4	94.2	3544	3551	5.9	75.3
7/22/2012 9:00	94.1	94.4	94.2	3535	3537	11.3	80.0
7/22/2012 10:00	94.1	94.5	94.3	3556	3536	7.8	81.3
7/22/2012 11:00	94.1	94.5	94.3	3544	3539	7.3	82.0
7/22/2012 12:00	94.1	94.5	94.3	3546	3539	6.3	85.0
7/22/2012 13:00	94.2	94.6	94.4	3547	3532	9.1	86.7
7/22/2012 14:00	94.3	94.8	94.6	3541	3547	5.3	85.9
7/22/2012 15:00	94.4	94.9	94.6	3540	3544	5.5	86.6
7/22/2012 16:00	94.4	94.8	94.6	3538	3547	5.9	87.7
7/22/2012 17:00	94.4	94.9	94.6	3547	3542	6.2	89.0
7/22/2012 18:00	94.4	94.8	94.6	3539	3536	8.6	89.5
7/22/2012 19:00	94.4	94.7	94.5	3547	3551	3.9	87.5
7/22/2012 20:00	94.3	94.6	94.5	3546	3547	4.7	84.8

7/22/2012 21:00	94.3	94.6	94.4	3536	3541	6.3	80.0
7/22/2012 22:00	94.4	94.7	94.5	3536	3536	7.2	79.0
7/22/2012 23:00	94.3	94.6	94.4	3545	3537	7.7	80.4
7/23/2012 0:00	94.0	94.3	94.2	3547	3540	11.9	80.4
7/23/2012 1:00	93.7	94.1	93.9	3537	3544	10.6	80.4
7/23/2012 2:00	93.6	93.9	93.8	3545	3537	9.3	79.8
7/23/2012 3:00	93.4	93.7	93.5	3535	3539	9.2	79.6
7/23/2012 4:00	93.1	93.3	93.2	3545	3543	14.2	79.0
7/23/2012 5:00	92.8	93.1	93.0	3544	3535	13.2	78.6
7/23/2012 6:00	92.8	93.1	92.9	3550	3544	11.0	78.2
7/23/2012 7:00	92.7	93.1	92.9	3546	3549	12.2	78.2
7/23/2012 8:00	92.6	92.9	92.8	3551	3538	16.7	81.1
7/23/2012 9:00	92.6	92.9	92.7	3542	3538	14.0	82.9
7/23/2012 10:00	92.4	92.8	92.6	3546	3539	17.6	85.8
7/23/2012 11:00	92.3	92.6	92.4	3553	3547	11.1	83.6
7/23/2012 12:00	92.2	92.5	92.3	3538	3547	14.6	89.3
7/23/2012 13:00	92.2	92.5	92.3	3537	3537	12.3	89.8
7/23/2012 14:00	92.2	92.5	92.3	3546	3533	12.3	88.2
7/23/2012 15:00	92.1	92.5	92.3	3534	3538	11.4	90.0
7/23/2012 16:00	92.2	92.6	92.4	3542	3543	14.4	94.0
7/23/2012 17:00	92.4	92.8	92.6	3537	3549	14.0	94.4
7/23/2012 18:00	92.6	93.0	92.8	3541	3543	9.4	95.3
7/23/2012 19:00	92.7	93.1	92.9	3547	3544	6.8	91.9
7/23/2012 20:00	92.8	93.2	93.0	3545	3543	6.8	90.0
7/23/2012 21:00	92.8	93.1	93.0	3542	3546	6.3	89.3
7/23/2012 22:00	92.8	93.2	93.0	3541	3549	4.5	89.1
7/23/2012 23:00	92.8	93.1	92.9	3545	3542	6.6	85.3
7/24/2012 0:00	92.7	93.1	92.9	3541	3536	5.7	86.1
7/24/2012 1:00	92.6	92.9	92.7	3548	3542	8.1	85.0
7/24/2012 2:00	92.4	92.7	92.6	3549	3542	10.1	83.7
7/24/2012 3:00	92.3	92.6	92.4	3542	3545	11.8	84.1
7/24/2012 4:00	92.2	92.6	92.4	3542	3537	6.5	82.9
7/24/2012 5:00	92.1	92.5	92.3	3536	3537	7.2	80.4
7/24/2012 6:00	92.0	92.4	92.2	3544	3535	5.9	77.7
7/24/2012 7:00	91.9	92.3	92.1	3540	3540	14.4	76.8
7/24/2012 8:00	91.7	92.1	91.9	3537	3544	10.9	73.8
7/24/2012 9:00	91.6	91.9	91.7	3534	3539	6.8	75.0
7/24/2012 10:00	91.3	91.6	91.4	3543	3540	4.8	77.0
7/24/2012 11:00	91.2	91.6	91.4	3540	3544	4.0	78.4
7/24/2012 12:00	91.3	91.8	91.5	3533	3540	5.3	82.5
7/24/2012 13:00	91.4	91.9	91.6	3540	3535	4.7	83.6
7/24/2012 14:00	91.6	92.3	91.9	3545	3532	7.3	85.4

7/24/2012 15:00	92.6	93.3	93.0	3544	3537	6.8	84.6
7/24/2012 16:00	93.5	94.3	93.9	3545	3548	6.9	85.0
7/24/2012 17:00	93.9	94.6	94.2	3541	3539	6.0	85.1
7/24/2012 18:00	94.0	94.7	94.3	3542	3534	7.3	84.6
7/24/2012 19:00	94.1	94.8	94.5	3547	3541	10.4	83.2
7/24/2012 20:00	94.3	95.0	94.6	3542	3547	8.5	80.6
7/24/2012 21:00	94.4	95.0	94.7	3543	3545	11.2	77.4
7/24/2012 22:00	94.3	94.8	94.6	3544	3545	8.7	74.1
7/24/2012 23:00	94.2	94.6	94.4	3541	3546	7.7	72.2
7/25/2012 0:00	94.0	94.3	94.2	3541	3538	9.3	69.9
7/25/2012 1:00	93.8	94.1	94.0	3542	3531	6.2	68.0
7/25/2012 2:00	93.7	94.0	93.8	3543	3539	5.3	68.2
7/25/2012 3:00	93.8	94.2	94.0	3542	3541	7.0	67.8
7/25/2012 4:00	93.9	94.2	94.1	3541	3541	8.8	67.9
7/25/2012 5:00	93.8	94.1	93.9	3543	3540	6.1	66.9
7/25/2012 6:00	93.6	93.9	93.8	3540	3542	10.6	67.7
7/25/2012 7:00	93.3	93.7	93.5	3545	3548	8.7	70.2
7/25/2012 8:00	93.1	93.4	93.2	3540	3540	12.4	75.2
7/25/2012 9:00	93.0	93.3	93.1	3537	3542	15.9	79.4
7/25/2012 10:00	93.0	93.5	93.3	3543	3534	9.8	84.3
7/25/2012 11:00	93.1	93.6	93.3	3543	3542	10.0	88.5
7/25/2012 12:00	93.1	93.6	93.3	3541	3535	10.4	92.9
7/25/2012 13:00	93.2	93.3	93.3	3544	3541	15.5	95.0
7/25/2012 14:00	93.1	93.4	93.2	3543	3546	22.3	97.3
7/25/2012 15:00	93.1	93.5	93.3	3543	3544	20.8	97.4
7/25/2012 16:00	93.2	93.7	93.5	3548	3546	22.5	98.1
7/25/2012 17:00	93.3	93.7	93.5	3547	3539	15.1	98.2
7/25/2012 18:00	93.3	93.7	93.5	3551	3545	16.2	97.1
7/25/2012 19:00	93.2	93.6	93.4	3548	3539	11.4	95.0
7/25/2012 20:00	93.1	93.4	93.2	3544	3533	9.9	92.2
7/25/2012 21:00	92.8	93.1	93.0	3539	3541	7.2	89.8
7/25/2012 22:00	92.5	92.9	92.7	3543	3542	10.1	86.1
7/25/2012 23:00	92.2	92.5	92.4	3546	3531	12.3	86.5
7/26/2012 0:00	91.8	92.1	92.0	3545	3535	15.1	87.8
7/26/2012 1:00	91.4	91.7	91.6	3540	3547	12.8	87.9
7/26/2012 2:00	91.1	91.4	91.3	3540	3540	17.0	84.0
7/26/2012 3:00	91.0	91.3	91.1	3549	3542	6.3	77.9
7/26/2012 4:00	90.9	91.3	91.1	3540	3542	9.9	77.3
7/26/2012 5:00	90.8	91.1	90.9	3545	3545	4.2	76.4
7/26/2012 6:00	90.7	91.0	90.8	3546	3523	5.8	73.1
7/26/2012 7:00	90.5	90.9	90.7	3538	3545	9.6	74.2
7/26/2012 8:00	90.4	90.8	90.6	3540	3546	9.2	74.9

7/26/2012 9:00	90.3	90.7	90.5	3544	3541	10.6	75.2
7/26/2012 10:00	90.3	90.6	90.4	3538	3542	15.3	75.2
7/26/2012 11:00	90.2	90.5	90.4	3545	3542	17.7	77.1
7/26/2012 12:00	90.2	90.5	90.4	3540	3547	11.5	77.5
7/26/2012 13:00	90.2	90.6	90.4	3534	3538	10.9	78.7
7/26/2012 14:00	90.1	90.5	90.3	3534	3548	8.1	78.1
7/26/2012 15:00	90.2	90.5	90.4	3535	3539	13.8	81.7
7/26/2012 16:00	90.3	90.7	90.5	3549	3539	13.9	83.9
7/26/2012 17:00	90.5	90.9	90.7	3544	3535	13.9	85.5
7/26/2012 18:00	90.6	91.0	90.8	3547	3542	2.3	70.9
7/26/2012 19:00	90.7	91.1	90.9	3542	3543	8.7	72.2
7/26/2012 20:00	90.8	91.2	91.0	3542	3539	8.8	72.4
7/26/2012 21:00	90.9	91.3	91.1	3541	3540	6.9	72.1
7/26/2012 22:00	90.9	91.3	91.1	3537	3539	5.9	70.1
7/26/2012 23:00	90.7	91.1	90.9	3541	3530	7.1	69.3
7/27/2012 0:00	90.5	90.9	90.7	3540	3542	5.8	69.1
7/27/2012 1:00	90.4	90.8	90.6	3531	3542	9.7	68.6
7/27/2012 2:00	90.2	90.6	90.4	3540	3537	5.7	67.9
7/27/2012 3:00	90.1	90.5	90.3	3551	3539	9.4	68.3
7/27/2012 4:00	89.9	90.3	90.1	3543	3536	14.5	69.1
7/27/2012 5:00	89.8	90.2	90.0	3543	3539	9.3	69.2
7/27/2012 6:00	89.7	90.1	89.9	3545	3532	8.3	69.4
7/27/2012 7:00	89.6	90.0	89.8	3546	3535	8.2	69.6
7/27/2012 8:00	89.7	90.1	89.9	3546	3545	10.7	70.9
7/27/2012 9:00	89.7	90.1	89.9	3546	3530	7.2	73.2
7/27/2012 10:00	89.9	90.2	90.0	3537	3539	8.2	76.7
7/27/2012 11:00	90.0	90.3	90.2	3543	3536	9.7	78.5
7/27/2012 12:00	90.1	90.5	90.3	3543	3539	15.1	79.9
7/27/2012 13:00	90.2	90.7	90.4	3543	3505	10.7	80.7
7/27/2012 14:00	90.3	90.8	90.5	3543	3537	20.5	81.4
7/27/2012 15:00	90.3	90.9	90.6	3547	3541	18.4	82.6
7/27/2012 16:00	90.4	90.9	90.7	3540	3543	11.9	82.1
7/27/2012 17:00	90.4	90.7	90.5	3542	3545	16.4	80.5
7/27/2012 18:00	90.2	90.6	90.4	3544	3542	11.7	80.1
7/27/2012 19:00	90.1	90.5	90.3	3545	3543	14.5	79.1
7/27/2012 20:00	89.8	90.3	90.1	3539	3546	5.5	77.3
7/27/2012 21:00	89.7	90.1	89.9	3540	3543	7.5	75.6
7/27/2012 22:00	89.6	90.0	89.8	3544	3540	6.2	73.6
7/27/2012 23:00	89.5	89.9	89.7	3535	3543	7.2	71.5
7/28/2012 0:00	89.3	89.7	89.5	3538	3547	7.9	69.4
7/28/2012 1:00	89.2	89.6	89.4	3542	3540	7.3	68.2
7/28/2012 2:00	89.0	89.4	89.2	3546	3546	7.9	67.6

7/28/2012 3:00	88.8	89.1	89.0	3536	3537	9.4	66.9
7/28/2012 4:00	88.5	88.8	88.7	3535	3544	6.4	65.4
7/28/2012 5:00	88.3	88.7	88.5	3547	3543	8.2	64.9
7/28/2012 6:00	88.2	88.5	88.4	3540	3537	8.6	64.5
7/28/2012 7:00	88.2	88.6	88.4	3539	3545	8.4	66.0
7/28/2012 8:00	88.4	88.8	88.6	3541	3548	5.3	69.4
7/28/2012 9:00	88.5	88.9	88.7	3547	3541	8.2	73.1
7/28/2012 10:00	88.7	89.2	88.9	3543	3533	11.9	75.2
7/28/2012 11:00	88.9	89.3	89.1	3541	3543	14.5	77.0
7/28/2012 12:00	89.2	89.6	89.4	3539	3550	5.7	78.3
7/28/2012 13:00	89.6	90.2	89.9	3533	3545	11.5	79.7
7/28/2012 14:00	90.0	90.6	90.3	3533	3544	7.0	81.3
7/28/2012 15:00	90.6	91.4	91.0	3544	3540	5.3	82.1
7/28/2012 16:00	91.5	92.1	91.8	3545	3544	1.1	82.0
7/28/2012 17:00	91.9	92.6	92.2	3545	3542	7.3	82.1
7/28/2012 18:00	92.2	92.7	92.5	3547	3543	9.5	81.5
7/28/2012 19:00	92.5	93.0	92.8	3547	3548	6.4	80.6
7/28/2012 20:00	92.7	93.3	93.0	3544	3546	4.2	77.6
7/28/2012 21:00	92.8	93.4	93.1	3544	3543	2.9	74.9
7/28/2012 22:00	92.8	93.4	93.1	3541	3544	7.1	71.8
7/28/2012 23:00	92.6	93.1	92.9	3543	3548	7.6	69.2
7/29/2012 0:00	92.4	92.7	92.6	3532	3547	6.9	67.2
7/29/2012 1:00	92.1	92.4	92.2	3548	3544	6.8	64.7
7/29/2012 2:00	91.8	92.2	92.0	3542	3542	5.9	64.9
7/29/2012 3:00	91.7	92.1	91.9	3539	3541	4.9	64.3
7/29/2012 4:00	91.8	92.2	92.0	3543	3536	5.0	64.8
7/29/2012 5:00	91.8	92.1	91.9	3549	3538	6.0	64.3
7/29/2012 6:00	91.7	92.0	91.8	3549	3542	7.2	62.9
7/29/2012 7:00	91.5	91.9	91.7	3548	3544	5.7	63.3
7/29/2012 8:00	91.4	91.8	91.6	3539	3537	7.3	68.1
7/29/2012 9:00	91.3	91.7	91.5	3544	3541	4.5	73.3
7/29/2012 10:00	91.2	91.5	91.4	3538	3546	7.9	78.1
7/29/2012 11:00	91.1	91.5	91.3	3548	3549	12.6	80.7
7/29/2012 12:00	91.2	91.6	91.4	3549	3540	8.3	82.7
7/29/2012 13:00	91.2	91.7	91.5	3543	3547	9.9	82.3
7/29/2012 14:00	91.2	91.8	91.5	3540	3541	6.5	83.6
7/29/2012 15:00	91.2	91.7	91.5	3545	3542	7.9	83.2
7/29/2012 16:00	91.3	91.7	91.5	3546	3542	6.7	84.3
7/29/2012 17:00	91.4	91.8	91.6	3542	3551	8.9	85.0
7/29/2012 18:00	91.4	91.8	91.6	3534	3544	7.6	83.9
7/29/2012 19:00	91.4	91.7	91.5	3538	3539	6.0	82.9
7/29/2012 20:00	91.3	91.6	91.4	3541	3548	4.3	80.0

7/29/2012 21:00	91.2	91.5	91.3	3544	3545	6.0	76.9
7/29/2012 22:00	91.0	91.4	91.2	3551	3546	5.2	72.8
7/29/2012 23:00	91.0	91.3	91.2	3550	3542	5.4	70.9
7/30/2012 0:00	90.9	91.3	91.1	3542	3546	6.3	70.8
7/30/2012 1:00	90.9	91.2	91.0	3538	3549	5.7	70.6
7/30/2012 2:00	90.7	91.0	90.9	3545	3547	6.7	70.8
7/30/2012 3:00	90.6	90.9	90.8	3545	3545	5.1	70.6
7/30/2012 4:00	90.8	91.2	91.0	3548	3540	6.2	67.9
7/30/2012 5:00	91.1	91.6	91.4	3539	3544	6.6	69.2
7/30/2012 6:00	91.2	91.7	91.5	3544	3544	5.4	67.6
7/30/2012 7:00	91.1	91.5	91.3	3547	3539	2.4	68.9
7/30/2012 8:00	90.9	91.4	91.1	3533	3541	4.1	71.9
7/30/2012 9:00	90.8	91.3	91.1	3540	3545	6.4	76.2
7/30/2012 10:00	90.9	91.4	91.1	3540	3539	3.1	81.4
7/30/2012 11:00	90.9	91.6	91.3	3537	3549	3.4	84.6
7/30/2012 12:00	91.0	91.8	91.4	3551	3538	3.7	85.6
7/30/2012 13:00	91.4	92.1	91.8	3541	3543	2.3	85.9
7/30/2012 14:00	92.0	92.6	92.3	3543	3540	6.3	88.2
7/30/2012 15:00	92.4	93.0	92.7	3543	3544	2.7	88.2
7/30/2012 16:00	92.7	93.4	93.1	3552	3545	12.0	87.8
7/30/2012 17:00	93.1	93.7	93.4	3539	3529	6.1	89.1
7/30/2012 18:00	93.3	93.9	93.6	3542	3543	8.9	89.0
7/30/2012 19:00	93.7	94.2	93.9	3546	3539	6.1	88.2
7/30/2012 20:00	93.8	94.3	94.0	3546	3544	4.5	85.5
7/30/2012 21:00	93.8	94.4	94.1	3546	3533	5.5	82.2
7/30/2012 22:00	93.8	94.3	94.0	3542	3541	7.1	80.6
7/30/2012 23:00	93.7	94.1	93.9	3543	3551	7.4	78.9
7/31/2012 0:00	93.4	93.9	93.7	3540	3548	9.0	77.3
7/31/2012 1:00	93.3	93.8	93.6	3545	3545	8.1	75.2
7/31/2012 2:00	93.4	93.8	93.6	3543	3547	6.1	74.0
7/31/2012 3:00	93.4	93.9	93.7	3536	3539	6.7	75.0
7/31/2012 4:00	93.6	94.1	93.8	3537	3544	8.9	74.7
7/31/2012 5:00	93.8	94.3	94.0	3544	3546	7.9	74.3
7/31/2012 6:00	93.7	94.1	93.9	3545	3549	6.3	70.4
7/31/2012 7:00	93.6	94.0	93.8	3552	3540	6.1	71.6
7/31/2012 8:00	93.5	93.8	93.7	3541	3541	3.4	77.1
7/31/2012 9:00	93.4	93.7	93.6	3542	3546	9.7	78.3
7/31/2012 10:00	93.6	94.0	93.8	3551	3542	6.4	79.5
7/31/2012 11:00	93.9	94.4	94.1	3538	3541	2.1	82.5
7/31/2012 12:00	94.2	94.7	94.5	3538	3547	8.1	84.0
7/31/2012 13:00	94.4	95.0	94.7	3535	3547	9.3	87.3
7/31/2012 14:00	94.6	95.2	94.9	3540	3541	11.6	86.5

7/31/2012 15:00	94.8	95.3	95.0	3540	3541	11.8	86.7
7/31/2012 16:00	94.8	95.4	95.1	3544	3541	11.0	86.1
7/31/2012 17:00	94.8	95.4	95.1	3553	3541	8.6	86.5
7/31/2012 18:00	94.8	95.2	95.0	3546	3541	7.4	85.3
7/31/2012 19:00	94.7	95.0	94.9	3535	3544	9.3	83.9
7/31/2012 20:00	94.5	94.8	94.6	3554	3544	11.1	79.5
7/31/2012 21:00	94.1	94.4	94.3	3549	3541	6.4	74.8
7/31/2012 22:00	93.8	94.1	94.0	3541	3540	6.7	72.8
7/31/2012 23:00	93.5	93.8	93.7	3541	3540	7.3	70.0
8/1/2012 0:00	93.2	93.5	93.4	3546	3547	4.5	69.6
8/1/2012 1:00	93.1	93.4	93.2	3541	3543	5.9	69.0
8/1/2012 2:00	93.2	93.6	93.4	3539	3541	5.1	68.8
8/1/2012 3:00	93.3	93.7	93.5	3546	3551	5.5	67.5
8/1/2012 4:00	93.5	93.9	93.7	3538	3536	5.2	67.2
8/1/2012 5:00	93.6	94.0	93.8	3554	3543	3.0	66.1
8/1/2012 6:00	93.6	93.9	93.8	3543	3544	3.3	65.6
8/1/2012 7:00	93.5	93.9	93.7	3541	3548	2.8	66.9
8/1/2012 8:00	93.5	93.8	93.6	3542	3542	2.3	70.9
8/1/2012 9:00	93.4	93.8	93.6	3541	3537	4.6	75.5
8/1/2012 10:00	93.4	93.8	93.6	3549	3548	8.1	78.0
8/1/2012 11:00	93.5	94.0	93.8	3542	3545	1.0	80.7
8/1/2012 12:00	93.7	94.2	93.9	3533	3543	7.4	83.8
8/1/2012 13:00	93.8	94.4	94.1	3532	3545	5.9	83.7
8/1/2012 14:00	94.1	95.0	94.5	3541	3545	4.5	87.0
8/1/2012 15:00	94.7	95.6	95.2	3542	3549	4.5	88.1
8/1/2012 16:00	95.5	96.1	95.8	3542	3545	3.0	89.6
8/1/2012 17:00	95.9	96.6	96.3	3541	3540	5.4	89.0
8/1/2012 18:00	96.2	97.0	96.6	3547	3539	8.3	88.8
8/1/2012 19:00	96.4	97.0	96.7	3551	3538	5.7	87.6
8/1/2012 20:00	96.5	97.1	96.8	3549	3541	4.2	85.5
8/1/2012 21:00	96.6	97.2	96.9	3546	3539	3.9	81.5
8/1/2012 22:00	96.6	97.2	96.9	3548	3541	4.6	78.8
8/1/2012 23:00	96.7	97.2	96.9	3539	3537	5.5	74.0
8/2/2012 0:00	96.6	97.1	96.9	3543	3543	7.0	73.0
8/2/2012 1:00	96.5	96.9	96.7	3546	3538	7.7	71.3
8/2/2012 2:00	96.4	96.7	96.6	3540	3541	8.8	70.8
8/2/2012 3:00	96.3	96.6	96.4	3547	3535	9.4	69.4
8/2/2012 4:00	96.2	96.5	96.3	3547	3544	5.9	68.4
8/2/2012 5:00	96.1	96.4	96.3	3547	3546	11.4	68.8
8/2/2012 6:00	95.9	96.2	96.1	3540	3546	5.4	68.4
8/2/2012 7:00	95.6	96.0	95.8	3547	3542	5.7	71.0
8/2/2012 8:00	95.2	95.5	95.4	3542	3543	4.9	73.1

8/2/2012 9:00	94.8	95.1	95.0	3545	3540	9.0	78.7
8/2/2012 10:00	94.4	94.7	94.5	3542	3545	6.4	84.0
8/2/2012 11:00	94.1	94.5	94.3	3542	3548	7.4	86.0
8/2/2012 12:00	93.9	94.4	94.2	3542	3543	7.6	87.5
8/2/2012 13:00	94.1	94.5	94.3	3542	3540	4.0	89.1
8/2/2012 14:00	94.4	94.8	94.6	3536	3544	5.7	90.7
8/2/2012 15:00	94.6	95.6	95.1	3545	3544	11.2	89.2
8/2/2012 16:00	94.9	95.8	95.4	3548	3544	10.2	87.8
8/2/2012 17:00	95.1	95.6	95.4	3540	3537	9.9	87.2
8/2/2012 18:00	95.3	95.7	95.5	3543	3539	11.8	88.0
8/2/2012 19:00	95.3	95.7	95.5	3543	3538	6.0	85.2
8/2/2012 20:00	95.0	95.4	95.2	3543	3542	8.0	83.1
8/2/2012 21:00	94.6	94.9	94.7	3537	3546	6.1	79.7
8/2/2012 22:00	94.4	94.7	94.5	3547	3541	8.3	78.7
8/2/2012 23:00	94.1	94.4	94.3	3544	3544	11.0	78.9
8/3/2012 0:00	94.0	94.4	94.2	3542	3547	8.5	77.2
8/3/2012 1:00	93.9	94.2	94.1	3538	3535	11.9	74.2
8/3/2012 2:00	93.7	94.1	93.9	3538	3536	8.5	70.9
8/3/2012 3:00	93.5	93.8	93.7	3546	3534	7.1	67.9
8/3/2012 4:00	93.3	93.6	93.5	3542	3536	2.2	66.5
8/3/2012 5:00	93.1	93.4	93.2	3543	3541	4.3	68.7
8/3/2012 6:00	92.9	93.2	93.1	3537	3545	5.7	64.3
8/3/2012 7:00	92.8	93.2	93.0	3554	3547	2.0	68.8
8/3/2012 8:00	93.0	93.3	93.1	3536	3550	4.8	72.3
8/3/2012 9:00	93.1	93.5	93.3	3548	3541	4.7	76.8
8/3/2012 10:00	93.2	93.7	93.5	3540	3524	6.2	80.1
8/3/2012 11:00	93.4	94.0	93.7	3547	3537	9.5	83.0
8/3/2012 12:00	93.7	94.3	94.0	3539	3549	6.1	84.8
8/3/2012 13:00	93.9	94.6	94.2	3543	3544	10.4	88.5
8/3/2012 14:00	94.1	94.9	94.5	3547	3551	12.7	90.2
8/3/2012 15:00	94.5	95.3	94.9	3540	3545	9.6	91.5
8/3/2012 16:00	94.8	95.6	95.2	3546	3550	11.5	91.7
8/3/2012 17:00	95.0	95.7	95.4	3539	3546	11.8	91.8
8/3/2012 18:00	95.1	95.6	95.4	3542	3536	10.1	91.0
8/3/2012 19:00	95.0	95.4	95.2	3555	3544	10.5	89.4
8/3/2012 20:00	94.9	95.2	95.0	3546	3553	6.3	85.6
8/3/2012 21:00	94.7	95.1	94.9	3549	3546	6.9	81.8
8/3/2012 22:00	94.7	95.2	95.0	3538	3548	7.9	79.8
8/3/2012 23:00	94.8	95.2	95.0	3547	3551	5.0	77.5
8/4/2012 0:00	94.8	95.2	95.0	3545	3548	4.5	76.9
8/4/2012 1:00	94.7	95.0	94.9	3548	3548	4.6	76.0
8/4/2012 2:00	94.5	94.9	94.7	3540	3545	6.0	72.6

8/4/2012 3:00	94.3	94.7	94.5	3546	3538	4.8	71.8
8/4/2012 4:00	94.3	94.7	94.5	3551	3541	5.0	70.8
8/4/2012 5:00	94.3	94.7	94.5	3545	3536	3.8	70.3
8/4/2012 6:00	94.3	94.6	94.5	3551	3542	5.9	68.8
8/4/2012 7:00	94.3	94.7	94.5	3546	3541	4.5	69.2
8/4/2012 8:00	94.3	94.7	94.5	3534	3541	7.2	74.1
8/4/2012 9:00	94.5	94.8	94.6	3540	3540	8.2	78.8
8/4/2012 10:00	94.5	94.9	94.7	3540	3544	10.7	82.8
8/4/2012 11:00	94.7	95.1	94.9	3547	3542	10.0	85.4
8/4/2012 12:00	94.8	95.3	95.0	3533	3540	11.8	88.8
8/4/2012 13:00	94.9	95.4	95.2	3543	3537	13.8	93.5
8/4/2012 14:00	95.0	95.5	95.2	3536	3550	10.8	94.0
8/4/2012 15:00	95.0	95.4	95.2	3536	3538	12.1	74.0
8/4/2012 16:00	94.7	95.1	94.9	3543	3533	10.8	72.9
8/4/2012 17:00	94.6	94.9	94.7	3538	3540	8.2	71.7
8/4/2012 18:00	94.6	94.9	94.7	3550	3542	5.8	73.5
8/4/2012 19:00	94.4	94.7	94.5	3550	3542	9.5	74.4
8/4/2012 20:00	93.9	94.2	94.1	3551	3543	6.0	73.9
8/4/2012 21:00	93.6	94.0	93.8	3542	3536	8.3	74.0
8/4/2012 22:00	93.5	93.8	93.6	3544	3548	6.8	73.5
8/4/2012 23:00	93.4	93.7	93.6	3540	3541	5.3	73.3
8/5/2012 0:00	93.3	93.6	93.5	3543	3538	10.3	72.7
8/5/2012 1:00	93.2	93.5	93.3	3544	3545	6.1	71.8
8/5/2012 2:00	93.0	93.3	93.1	3541	3537	16.0	71.5
8/5/2012 3:00	92.6	93.1	92.8	3547	3539	9.1	70.4
8/5/2012 4:00	92.3	92.7	92.5	3537	3545	8.2	69.0
8/5/2012 5:00	92.0	92.3	92.1	3534	3546	4.9	68.3
8/5/2012 6:00	91.7	92.1	91.9	3538	3537	5.7	66.4
8/5/2012 7:00	91.6	92.0	91.8	3536	3535	7.2	67.1
8/5/2012 8:00	91.7	92.1	91.9	3543	3549	10.8	68.4
8/5/2012 9:00	91.7	92.1	91.9	3533	3544	10.6	71.6
8/5/2012 10:00	91.8	92.2	92.0	3545	3543	11.7	74.5
8/5/2012 11:00	91.9	92.3	92.1	3538	3544	14.6	77.8
8/5/2012 12:00	92.1	92.5	92.3	3542	3539	20.1	78.3
8/5/2012 13:00	92.2	92.6	92.4	3548	3545	13.1	79.2
8/5/2012 14:00	92.4	92.9	92.6	3544	3548	16.8	80.4
8/5/2012 15:00	92.5	92.9	92.7	3539	3547	22.0	80.4
8/5/2012 16:00	92.6	92.9	92.8	3542	3539	11.8	80.4
8/5/2012 17:00	92.5	92.9	92.7	3538	3540	19.4	80.1
8/5/2012 18:00	92.5	93.0	92.7	3542	3542	14.2	79.2
8/5/2012 19:00	92.4	92.8	92.6	3547	3542	10.6	78.2
8/5/2012 20:00	92.3	92.7	92.5	3541	3539	3.8	76.3

8/5/2012 21:00	92.1	92.6	92.4	3549	3548	4.3	74.3
8/5/2012 22:00	92.1	92.5	92.3	3542	3543	3.4	72.4
8/5/2012 23:00	92.0	92.4	92.2	3543	3545	3.8	71.5
8/6/2012 0:00	91.8	92.2	92.0	3538	3549	4.8	70.7
8/6/2012 1:00	91.7	92.1	91.9	3547	3544	3.7	68.1
8/6/2012 2:00	91.5	91.9	91.7	3544	3539	4.4	65.7
8/6/2012 3:00	91.3	91.8	91.5	3541	3544	2.9	65.8
8/6/2012 4:00	91.4	91.8	91.6	3543	3537	5.4	64.8
8/6/2012 5:00	91.4	91.8	91.6	3544	3543	4.4	62.7
8/6/2012 6:00	91.5	91.9	91.7	3544	3549	2.2	60.5
8/6/2012 7:00	91.6	91.9	91.7	3539	3528	2.6	62.0
8/6/2012 8:00	91.7	92.1	91.9	3537	3545	2.8	66.4
8/6/2012 9:00	91.8	92.2	92.0	3545	3543	3.2	70.4
8/6/2012 10:00	91.9	92.3	92.1	3545	3537	6.5	75.5
8/6/2012 11:00	92.0	92.5	92.3	3544	3542	3.6	76.9
8/6/2012 12:00	92.2	92.8	92.5	3547	3533	8.1	79.0
8/6/2012 13:00	92.6	93.4	93.0	3538	3538	4.2	79.9
8/6/2012 14:00	93.0	93.7	93.3	3540	3544	12.0	81.5
8/6/2012 15:00	93.2	93.9	93.6	3543	3541	3.7	82.0
8/6/2012 16:00	93.6	94.3	93.9	3549	3545	3.7	83.4
8/6/2012 17:00	94.0	94.5	94.3	3541	3545	6.1	84.7
8/6/2012 18:00	94.3	94.8	94.5	3547	3541	5.6	84.3
8/6/2012 19:00	94.3	94.8	94.6	3545	3541	7.5	82.6
8/6/2012 20:00	94.3	94.9	94.6	3537	3542	2.8	77.7
8/6/2012 21:00	94.3	94.8	94.6	3538	3536	4.5	75.9
8/6/2012 22:00	94.3	94.8	94.6	3545	3541	5.6	72.2
8/6/2012 23:00	94.5	94.9	94.7	3539	3531	5.5	71.0
8/7/2012 0:00	94.6	95.0	94.8	3549	3531	5.4	72.0
8/7/2012 1:00	94.6	95.0	94.8	3540	3539	6.8	70.5
8/7/2012 2:00	94.6	95.0	94.8	3540	3540	5.0	64.4
8/7/2012 3:00	94.5	94.9	94.7	3543	3536	4.4	66.0
8/7/2012 4:00	94.5	94.9	94.7	3544	3531	4.1	67.7
8/7/2012 5:00	94.5	94.9	94.7	3541	3547	4.3	66.7
8/7/2012 6:00	94.5	94.9	94.7	3541	3539	5.2	65.7
8/7/2012 7:00	94.4	94.8	94.6	3544	3547	7.0	63.1
8/7/2012 8:00	94.2	94.6	94.4	3540	3535	5.2	70.5
8/7/2012 9:00	94.0	94.4	94.2	3540	3533	6.0	75.5
8/7/2012 10:00	93.9	94.3	94.1	3541	3544	5.1	80.4
8/7/2012 11:00	93.8	94.2	94.0	3544	3549	10.1	83.9
8/7/2012 12:00	93.6	94.2	93.9	3538	3539	5.4	87.1
8/7/2012 13:00	93.6	94.2	93.9	3547	3536	12.1	89.1
8/7/2012 14:00	93.6	94.3	94.0	3539	3547	8.8	90.9

8/7/2012 15:00	93.9	94.3	94.1	3545	3547	15.2	91.8
8/7/2012 16:00	94.0	94.4	94.2	3543	3546	13.5	92.2
8/7/2012 17:00	94.0	94.5	94.2	3547	3541	8.7	92.8
8/7/2012 18:00	94.1	94.6	94.3	3549	3550	13.6	92.7
8/7/2012 19:00	94.1	94.5	94.3	3544	3546	14.9	90.1
8/7/2012 20:00	94.0	94.4	94.2	3552	3541	7.3	85.6
8/7/2012 21:00	93.8	94.2	94.0	3546	3544	7.9	82.0
8/7/2012 22:00	93.7	94.1	93.9	3543	3545	5.2	81.3
8/7/2012 23:00	93.5	93.8	93.6	3546	3554	4.0	79.8
8/8/2012 0:00	93.2	93.6	93.4	3542	3546	7.8	79.7
8/8/2012 1:00	93.0	93.3	93.2	3541	3543	4.9	78.2
8/8/2012 2:00	92.7	93.1	92.9	3545	3539	3.8	71.8
8/8/2012 3:00	92.5	92.9	92.7	3546	3542	2.2	67.8
8/8/2012 4:00	92.7	93.1	92.9	3546	3543	5.2	70.9
8/8/2012 5:00	92.8	93.2	93.0	3535	3548	5.0	71.5
8/8/2012 6:00	92.9	93.2	93.0	3544	3550	6.4	70.3
8/8/2012 7:00	92.8	93.2	93.0	3540	3542	5.9	70.2
8/8/2012 8:00	92.8	93.2	93.0	3535	3547	6.9	75.3
8/8/2012 9:00	92.7	93.1	92.9	3544	3541	5.6	76.9
8/8/2012 10:00	92.7	93.1	92.9	3544	3540	7.6	78.4
8/8/2012 11:00	93.0	93.4	93.2	3545	3543	4.5	80.1
8/8/2012 12:00	93.2	93.6	93.4	3544	3548	8.7	78.8
8/8/2012 13:00	93.3	93.7	93.5	3541	3548	4.0	78.3
8/8/2012 14:00	93.3	93.8	93.6	3536	3546	4.2	80.8
8/8/2012 15:00	93.4	93.9	93.6	3541	3548	9.6	77.8
8/8/2012 16:00	93.7	94.2	94.0	3538	3549	6.0	75.0
8/8/2012 17:00	93.9	94.4	94.2	3547	3544	6.6	76.2
8/8/2012 18:00	94.0	94.4	94.2	3538	3547	9.8	74.3
8/8/2012 19:00	93.9	94.3	94.1	3539	3547	7.4	72.7
8/8/2012 20:00	93.8	94.1	94.0	3542	3538	8.6	72.0
8/8/2012 21:00	93.5	93.9	93.7	3542	3532	12.6	71.5
8/8/2012 22:00	93.3	93.7	93.5	3552	3541	8.4	70.3
8/8/2012 23:00	93.1	93.5	93.3	3545	3547	5.1	68.4
8/9/2012 0:00	93.2	93.5	93.3	3544	3541	5.8	68.3
8/9/2012 1:00	93.1	93.4	93.2	3542	3533	5.5	67.4
8/9/2012 2:00	92.9	93.3	93.1	3542	3544	7.5	67.0
8/9/2012 3:00	92.7	93.1	92.9	3540	3538	4.7	67.1
8/9/2012 4:00	92.6	92.9	92.7	3545	3548	1.3	67.9
8/9/2012 5:00	92.5	92.9	92.7	3546	3544	6.9	66.9
8/9/2012 6:00	92.5	92.9	92.7	3545	3545	3.9	67.4
8/9/2012 7:00	92.4	92.8	92.6	3551	3541	8.1	69.7
8/9/2012 8:00	92.2	92.6	92.4	3541	3539	8.7	70.6

8/9/2012 9:00	92.1	92.5	92.3	3540	3529	9.7	70.6
8/9/2012 10:00	91.9	92.3	92.1	3542	3545	8.8	71.9
8/9/2012 11:00	92.0	92.5	92.2	3541	3539	6.9	72.9
8/9/2012 12:00	92.3	92.7	92.5	3545	3542	3.7	75.5
8/9/2012 13:00	92.6	93.2	92.9	3545	3535	4.3	77.8
8/9/2012 14:00	92.9	93.4	93.2	3548	3540	3.6	79.5
8/9/2012 15:00	93.1	93.7	93.4	3543	3544	8.2	78.6
8/9/2012 16:00	93.3	94.0	93.7	3541	3537	8.1	77.2
8/9/2012 17:00	93.5	94.1	93.8	3545	3538	12.6	75.2
8/9/2012 18:00	93.4	93.8	93.6	3542	3539	10.8	69.8
8/9/2012 19:00	93.2	93.6	93.4	3544	3542	12.0	68.3
8/9/2012 20:00	92.9	93.3	93.1	3542	3547	9.9	66.6
8/9/2012 21:00	92.5	92.9	92.7	3547	3546	7.2	64.5
8/9/2012 22:00	92.1	92.5	92.3	3545	3539	10.0	63.2
8/9/2012 23:00	91.8	92.2	92.0	3546	3547	7.2	62.7
8/10/2012 0:00	91.4	91.8	91.6	3547	3551	7.9	62.2
8/10/2012 1:00	91.0	91.4	91.2	3538	3540	20.1	61.8
8/10/2012 2:00	90.6	91.0	90.8	3538	3541	13.2	61.5
8/10/2012 3:00	90.5	90.9	90.7	3532	3533	11.3	61.3
8/10/2012 4:00	90.6	90.9	90.8	3540	3541	12.9	61.5
8/10/2012 5:00	90.5	90.9	90.7	3539	3540	12.4	61.4
8/10/2012 6:00	90.3	90.7	90.5	3539	3546	16.8	60.8
8/10/2012 7:00	90.0	90.5	90.2	3542	3543	17.4	60.4
8/10/2012 8:00	89.9	90.3	90.1	3548	3542	14.2	61.8
8/10/2012 9:00	89.8	90.3	90.0	3540	3536	16.2	65.5
8/10/2012 10:00	89.7	90.2	90.0	3538	3544	8.7	68.8
8/10/2012 11:00	89.6	90.0	89.8	3538	3538	11.3	69.7
8/10/2012 12:00	89.5	89.9	89.7	3546	3536	13.0	69.1
8/10/2012 13:00	89.5	89.9	89.7	3536	3546	13.8	71.7
8/10/2012 14:00	89.6	90.0	89.8	3540	3539	20.2	73.7
8/10/2012 15:00	89.6	90.0	89.8	3536	3537	12.4	73.3
8/10/2012 16:00	89.6	90.1	89.8	3544	3542	20.6	74.2
8/10/2012 17:00	89.7	90.1	89.9	3548	3543	17.5	73.8
8/10/2012 18:00	89.7	90.1	89.9	3541	3540	15.8	73.1
8/10/2012 19:00	89.5	89.9	89.7	3538	3544	16.0	71.7
8/10/2012 20:00	89.4	89.7	89.5	3544	3544	11.9	68.9
8/10/2012 21:00	89.1	89.5	89.3	3545	3542	7.2	67.1
8/10/2012 22:00	88.9	89.2	89.1	3549	3540	6.3	65.9
8/10/2012 23:00	88.8	89.1	88.9	3545	3536	7.6	62.7
8/11/2012 0:00	88.6	88.9	88.8	3536	3539	7.8	60.6
8/11/2012 1:00	88.3	88.7	88.5	3546	3543	8.7	60.1
8/11/2012 2:00	88.1	88.5	88.3	3544	3529	7.4	59.2

8/11/2012 3:00	88.0	88.4	88.2	3539	3545	9.6	58.7
8/11/2012 4:00	87.9	88.3	88.1	3545	3539	8.5	58.3
8/11/2012 5:00	87.7	88.1	87.9	3540	3546	4.4	56.8
8/11/2012 6:00	87.4	87.8	87.6	3553	3538	6.7	54.0
8/11/2012 7:00	87.0	87.4	87.2	3550	3532	6.7	55.4
8/11/2012 8:00	86.9	87.3	87.1	3543	3544	15.9	59.9
8/11/2012 9:00	86.9	87.3	87.1	3545	3541	12.9	64.5
8/11/2012 10:00	86.9	87.3	87.1	3541	3540	17.1	66.6
8/11/2012 11:00	86.9	87.4	87.2	3547	3533	12.8	69.7
8/11/2012 12:00	87.0	87.4	87.2	3550	3545	10.9	71.0
8/11/2012 13:00	87.1	87.4	87.3	3533	3538	13.3	72.8
8/11/2012 14:00	87.3	87.7	87.5	3538	3546	9.7	74.1
8/11/2012 15:00	87.4	87.8	87.6	3546	3542	9.8	75.7
8/11/2012 16:00	87.5	87.9	87.7	3547	3546	7.3	75.6
8/11/2012 17:00	87.6	87.9	87.7	3548	3541	8.3	75.9
8/11/2012 18:00	87.6	87.9	87.7	3543	3534	10.0	75.4
8/11/2012 19:00	87.5	87.8	87.7	3548	3543	9.7	73.7
8/11/2012 20:00	87.4	87.8	87.6	3545	3532	2.6	71.4
8/11/2012 21:00	87.4	87.8	87.6	3545	3542	3.6	70.6
8/11/2012 22:00	87.5	87.9	87.7	3541	3541	5.6	69.1
8/11/2012 23:00	87.6	87.9	87.8	3536	3545	2.6	66.4
8/12/2012 0:00	87.6	88.0	87.8	3544	3534	3.3	65.5
8/12/2012 1:00	87.6	87.9	87.7	3545	3541	6.5	64.4
8/12/2012 2:00	87.4	87.8	87.6	3542	3532	6.6	62.4
8/12/2012 3:00	87.4	87.7	87.5	3547	3533	8.5	62.5
8/12/2012 4:00	87.3	87.7	87.5	3542	3538	6.0	60.8
8/12/2012 5:00	87.3	87.6	87.4	3542	3540	5.6	59.7
8/12/2012 6:00	87.2	87.6	87.4	3541	3546	5.3	59.3
8/12/2012 7:00	87.3	87.6	87.4	3540	3547	3.4	59.9
8/12/2012 8:00	87.3	87.7	87.5	3543	3550	5.1	62.2
8/12/2012 9:00	87.4	87.7	87.5	3545	3544	6.1	66.8
8/12/2012 10:00	87.4	87.7	87.5	3550	3539	5.8	66.8
8/12/2012 11:00	87.3	87.7	87.5	3539	3538	5.8	67.3
8/12/2012 12:00	87.3	87.6	87.4	3542	3535	4.6	69.8
8/12/2012 13:00	87.3	87.6	87.4	3545	3542	5.3	71.7
8/12/2012 14:00	87.3	87.6	87.5	3534	3538	4.1	73.5
8/12/2012 15:00	87.4	87.8	87.6	3546	3538	4.0	74.9
8/12/2012 16:00	87.5	87.9	87.7	3553	3544	6.8	77.2
8/12/2012 17:00	87.6	88.0	87.8	3547	3546	3.3	77.0
8/12/2012 18:00	87.6	88.0	87.8	3547	3545	5.8	74.9
8/12/2012 19:00	87.7	88.2	87.9	3544	3545	5.5	73.6
8/12/2012 20:00	87.9	88.4	88.2	3530	3538	6.6	70.1

8/12/2012 21:00	87.9	88.4	88.2	3538	3540	5.1	66.7
8/12/2012 22:00	87.8	88.2	88.0	3538	3532	5.9	64.7
8/12/2012 23:00	87.7	88.2	88.0	3538	3538	5.2	64.2
8/13/2012 0:00	87.8	88.2	88.0	3543	3549	4.5	65.0
8/13/2012 1:00	87.7	88.0	87.9	3551	3547	9.2	63.0
8/13/2012 2:00	87.6	87.9	87.7	3545	3541	3.6	62.6
8/13/2012 3:00	87.6	87.9	87.8	3539	3544	4.8	61.9
8/13/2012 4:00	87.6	88.0	87.8	3540	3531	8.6	61.6
8/13/2012 5:00	87.6	87.9	87.7	3545	3537	7.0	61.7
8/13/2012 6:00	87.5	87.8	87.6	3542	3535	9.2	61.5
8/13/2012 7:00	87.1	87.5	87.3	3542	3540	7.2	61.6
8/13/2012 8:00	86.7	87.1	86.9	3553	3546	8.3	61.9
8/13/2012 9:00	86.3	86.7	86.5	3545	3535	9.7	62.3
8/13/2012 10:00	86.2	86.6	86.4	3543	3536	13.3	62.6
8/13/2012 11:00	86.1	86.4	86.2	3542	3539	10.4	63.2
8/13/2012 12:00	86.0	86.4	86.2	3546	3534	9.9	63.9
8/13/2012 13:00	86.1	86.5	86.3	3539	3544	9.0	64.2
8/13/2012 14:00	86.4	86.7	86.6	3548	3547	10.2	64.0
8/13/2012 15:00	86.4	86.8	86.6	3542	3546	11.8	63.5
8/13/2012 16:00	86.4	86.8	86.6	3552	3544	11.6	63.0
8/13/2012 17:00	86.4	86.8	86.6	3540	3541	6.3	62.7
8/13/2012 18:00	86.4	86.8	86.6	3536	3553	5.9	62.7
8/13/2012 19:00	86.3	86.7	86.5	3543	3538	4.0	62.4
8/13/2012 20:00	86.2	86.6	86.4	3548	3541	4.3	62.7
8/13/2012 21:00	86.1	86.5	86.3	3548	3544	5.8	62.6
8/13/2012 22:00	85.9	86.3	86.1	3553	3539	6.2	61.9
8/13/2012 23:00	85.8	86.1	86.0	3542	3541	2.4	60.9
8/14/2012 0:00	85.6	86.0	85.8	3543	3543	5.5	58.2
8/14/2012 1:00	85.6	86.0	85.8	3538	3545	3.6	59.1
8/14/2012 2:00	85.6	86.0	85.8	3547	3541	5.4	59.9
8/14/2012 3:00	85.7	86.0	85.9	3541	3548	5.2	57.7
8/14/2012 4:00	85.7	86.1	85.9	3548	3545	3.2	57.0
8/14/2012 5:00	85.8	86.1	85.9	3543	3542	7.0	55.9
8/14/2012 6:00	85.8	86.1	85.9	3551	3542	3.8	55.5
8/14/2012 7:00	85.8	86.1	85.9	3537	3538	4.6	56.2
8/14/2012 8:00	85.8	86.1	86.0	3545	3549	4.1	60.9
8/14/2012 9:00	85.9	86.3	86.1	3543	3546	5.4	61.3
8/14/2012 10:00	86.0	86.4	86.2	3541	3540	5.4	66.7
8/14/2012 11:00	86.2	86.7	86.5	3542	3538	6.3	71.9
8/14/2012 12:00	86.5	87.0	86.7	3543	3542	7.4	75.3
8/14/2012 13:00	86.6	87.3	87.0	3555	3533	5.4	76.8
8/14/2012 14:00	86.8	87.7	87.2	3541	3538	12.3	78.0

8/14/2012 15:00	87.1	87.8	87.5	3543	3538	7.4	78.7
8/14/2012 16:00	87.4	88.0	87.7	3536	3544	5.7	80.0
8/14/2012 17:00	87.7	88.2	88.0	3543	3541	7.4	79.2
8/14/2012 18:00	88.0	88.5	88.2	3545	3538	7.5	79.1
8/14/2012 19:00	88.1	88.6	88.3	3545	3544	6.4	77.7
8/14/2012 20:00	88.1	88.5	88.3	3544	3535	6.9	73.8
8/14/2012 21:00	88.0	88.4	88.2	3540	3542	4.4	70.4
8/14/2012 22:00	87.9	88.2	88.1	3532	3542	2.8	69.8
8/14/2012 23:00	87.8	88.1	87.9	3542	3540	5.7	69.4
8/15/2012 0:00	87.6	88.0	87.8	3541	3539	7.4	69.2
8/15/2012 1:00	87.6	87.9	87.7	3543	3541	4.3	66.0
8/15/2012 2:00	87.7	88.0	87.9	3545	3547	4.4	63.1
8/15/2012 3:00	87.9	88.4	88.1	3539	3535	5.0	65.0
8/15/2012 4:00	88.0	88.4	88.2	3556	3543	5.7	64.0
8/15/2012 5:00	88.0	88.4	88.2	3547	3531	7.3	65.2
8/15/2012 6:00	88.0	88.4	88.2	3544	3543	9.3	63.1
8/15/2012 7:00	88.0	88.3	88.1	3559	3541	8.2	63.6
8/15/2012 8:00	87.8	88.2	88.0	3543	3537	6.7	66.2
8/15/2012 9:00	87.7	88.1	87.9	3544	3546	9.6	70.1
8/15/2012 10:00	87.9	88.3	88.1	3543	3550	6.1	73.6
8/15/2012 11:00	88.2	88.6	88.4	3546	3541	11.0	77.6
8/15/2012 12:00	88.4	88.9	88.7	3549	3542	10.9	80.0
8/15/2012 13:00	88.6	89.1	88.9	3543	3534	9.8	81.0
8/15/2012 14:00	88.8	89.3	89.0	3543	3547	11.4	81.8
8/15/2012 15:00	89.0	89.4	89.2	3550	3540	7.8	83.6
8/15/2012 16:00	89.0	89.5	89.3	3537	3547	8.4	83.3
8/15/2012 17:00	89.1	89.6	89.4	3539	3540	10.2	83.6
8/15/2012 18:00	89.1	89.7	89.4	3540	3547	7.7	82.0
8/15/2012 19:00	89.2	89.7	89.5	3546	3540	6.5	79.3
8/15/2012 20:00	89.2	89.6	89.4	3548	3548	6.5	76.7
8/15/2012 21:00	89.1	89.5	89.3	3553	3539	7.3	74.3
8/15/2012 22:00	88.8	89.2	89.0	3544	3548	7.2	73.0
8/15/2012 23:00	88.6	88.9	88.8	3546	3530	7.0	72.0
8/16/2012 0:00	88.5	88.8	88.6	3546	3546	10.1	72.5
8/16/2012 1:00	88.4	88.8	88.6	3544	3537	9.2	70.6
8/16/2012 2:00	88.3	88.7	88.5	3543	3540	7.7	71.7
8/16/2012 3:00	88.3	88.7	88.5	3541	3545	10.1	70.9
8/16/2012 4:00	88.2	88.6	88.4	3548	3533	8.8	70.0
8/16/2012 5:00	88.1	88.4	88.2	3546	3536	9.6	70.3
8/16/2012 6:00	87.9	88.2	88.0	3548	3538	12.9	70.0
8/16/2012 7:00	87.6	87.9	87.8	3541	3541	15.1	69.9
8/16/2012 8:00	87.4	87.6	87.5	3537	3535	20.7	71.2

8/16/2012 9:00	87.0	87.4	87.2	3535	3537	16.7	67.6
8/16/2012 10:00	86.9	87.2	87.0	3549	3538	15.0	67.9
8/16/2012 11:00	86.7	87.0	86.8	3545	3530	11.5	68.3
8/16/2012 12:00	86.4	86.6	86.5	3542	3541	8.3	67.7
8/16/2012 13:00	86.3	86.6	86.5	3551	3543	10.3	67.3
8/16/2012 14:00	86.3	86.6	86.5	3542	3541	13.0	68.4
8/16/2012 15:00	86.1	86.4	86.2	3549	3531	12.7	69.8
8/16/2012 16:00	85.8	86.1	85.9	3542	3545	6.2	69.8
8/16/2012 17:00	85.9	86.2	86.1	3547	3536	4.6	70.0
8/16/2012 18:00	86.1	86.5	86.3	3537	3542	5.8	68.9
8/16/2012 19:00	86.2	86.5	86.4	3547	3550	6.4	69.8
8/16/2012 20:00	86.1	86.5	86.3	3548	3550	7.3	69.7
8/16/2012 21:00	86.1	86.4	86.2	3538	3544	8.0	68.1
8/16/2012 22:00	86.0	86.4	86.2	3540	3538	9.9	65.7
8/16/2012 23:00	86.0	86.3	86.2	3551	3539	9.1	65.7
8/17/2012 0:00	85.9	86.2	86.0	3546	3539	3.4	62.2
8/17/2012 1:00	85.7	86.1	85.9	3548	3541	5.5	60.0
8/17/2012 2:00	85.6	86.0	85.8	3541	3533	6.7	58.2
8/17/2012 3:00	85.4	85.8	85.6	3547	3538	9.4	57.5
8/17/2012 4:00	85.2	85.6	85.4	3541	3546	7.7	58.6
8/17/2012 5:00	84.9	85.3	85.1	3548	3527	7.5	57.1
8/17/2012 6:00	84.7	85.0	84.9	3546	3536	10.9	57.7
8/17/2012 7:00	84.4	84.8	84.6	3549	3546	5.7	55.1
8/17/2012 8:00	84.3	84.7	84.5	3548	3537	9.2	58.0
8/17/2012 9:00	84.3	84.7	84.5	3539	3546	9.2	61.3
8/17/2012 10:00	84.3	84.7	84.5	3541	3546	6.3	63.1
8/17/2012 11:00	84.4	84.8	84.6	3549	3542	12.3	66.2
8/17/2012 12:00	84.5	84.9	84.7	3537	3543	7.9	68.1
8/17/2012 13:00	84.7	85.1	84.9	3544	3544	12.2	68.7
8/17/2012 14:00	84.9	85.4	85.2	3540	3535	11.0	69.9
8/17/2012 15:00	85.0	85.7	85.4	3545	3549	11.8	70.9
8/17/2012 16:00	85.3	85.8	85.5	3539	3544	11.9	71.9
8/17/2012 17:00	85.4	85.9	85.7	3549	3536	6.3	72.3
8/17/2012 18:00	85.5	86.1	85.8	3534	3542	8.6	72.1
8/17/2012 19:00	85.8	86.3	86.0	3549	3531	5.0	71.5
8/17/2012 20:00	86.0	86.5	86.3	3544	3539	4.4	69.5
8/17/2012 21:00	86.2	86.8	86.5	3541	3541	2.9	66.8
8/17/2012 22:00	86.4	87.0	86.7	3542	3539	5.5	64.9
8/17/2012 23:00	86.6	87.1	86.8	3544	3538	4.8	65.3
8/18/2012 0:00	86.7	87.2	86.9	3540	3546	3.4	63.9
8/18/2012 1:00	86.7	87.2	87.0	3542	3533	3.8	62.3
8/18/2012 2:00	86.9	87.3	87.1	3548	3548	2.3	60.1

8/18/2012 3:00	87.0	87.4	87.2	3546	3539	4.4	57.6
8/18/2012 4:00	87.0	87.4	87.2	3552	3548	5.7	53.9
8/18/2012 5:00	87.0	87.3	87.1	3543	3545	4.5	54.2
8/18/2012 6:00	87.0	87.3	87.1	3539	3534	7.5	52.2
8/18/2012 7:00	86.8	87.2	87.0	3544	3544	6.2	53.7
8/18/2012 8:00	86.9	87.3	87.1	3548	3541	8.1	58.6
8/18/2012 9:00	87.1	87.4	87.2	3543	3543	9.0	64.4
8/18/2012 10:00	87.1	87.5	87.3	3540	3541	8.8	67.6
8/18/2012 11:00	87.2	87.7	87.4	3546	3544	7.1	69.7
8/18/2012 12:00	87.3	87.8	87.6	3539	3546	5.5	72.0
8/18/2012 13:00	87.4	88.0	87.7	3542	3535	5.3	72.6
8/18/2012 14:00	87.5	88.1	87.8	3544	3542	4.5	72.7
8/18/2012 15:00	87.6	88.2	87.9	3539	3548	6.2	74.6
8/18/2012 16:00	87.7	88.3	88.0	3544	3543	8.8	75.5
8/18/2012 17:00	87.7	88.2	87.9	3556	3532	2.9	74.8
8/18/2012 18:00	87.7	88.2	88.0	3558	3539	4.2	74.1
8/18/2012 19:00	87.8	88.3	88.1	3537	3545	5.5	72.9
8/18/2012 20:00	87.9	88.2	88.0	3547	3537	2.8	70.1
8/18/2012 21:00	87.7	88.1	87.9	3539	3546	2.1	69.4
8/18/2012 22:00	87.5	87.8	87.7	3543	3537	5.2	67.8
8/18/2012 23:00	87.3	87.6	87.4	3544	3545	2.3	65.6
8/19/2012 0:00	87.2	87.5	87.3	3543	3544	2.4	65.3
8/19/2012 1:00	87.3	87.6	87.5	3545	3541	3.5	63.8
8/19/2012 2:00	87.4	87.7	87.5	3540	3544	3.0	62.8
8/19/2012 3:00	87.4	87.7	87.5	3541	3543	4.3	62.3
8/19/2012 4:00	87.4	87.7	87.5	3535	3537	1.7	62.6
8/19/2012 5:00	87.2	87.6	87.4	3553	3541	1.6	61.0
8/19/2012 6:00	87.1	87.5	87.3	3541	3541	5.3	60.7
8/19/2012 7:00	86.9	87.3	87.1	3540	3540	1.4	58.2
8/19/2012 8:00	86.9	87.3	87.1	3542	3539	4.8	61.0
8/19/2012 9:00	87.0	87.4	87.2	3545	3539	3.1	65.4
8/19/2012 10:00	87.1	87.6	87.3	3541	3540	4.1	69.2
8/19/2012 11:00	87.3	87.8	87.6	3549	3544	4.9	72.6
8/19/2012 12:00	87.8	88.7	88.3	3536	3548	3.6	72.3
8/19/2012 13:00	88.4	89.2	88.8	3549	3541	5.7	75.0
8/19/2012 14:00	88.7	89.2	88.9	3546	3540	6.6	74.9
8/19/2012 15:00	88.9	89.6	89.2	3549	3535	8.0	76.0
8/19/2012 16:00	89.3	89.9	89.6	3542	3544	9.8	76.1
8/19/2012 17:00	89.6	90.2	89.9	3550	3544	11.2	76.3
8/19/2012 18:00	89.7	90.4	90.1	3541	3542	10.4	75.5
8/19/2012 19:00	89.9	90.5	90.2	3541	3548	7.7	71.2
8/19/2012 20:00	90.0	90.7	90.3	3548	3543	11.3	69.8

8/19/2012 21:00	90.1	90.6	90.3	3537	3541	7.3	67.1
8/19/2012 22:00	90.1	90.6	90.3	3543	3539	8.3	66.0
8/19/2012 23:00	90.1	90.5	90.3	3547	3539	5.9	63.9
8/20/2012 0:00	89.9	90.3	90.1	3547	3536	5.6	60.7
8/20/2012 1:00	89.7	90.2	90.0	3538	3546	3.0	62.4
8/20/2012 2:00	89.6	90.0	89.8	3543	3542	6.6	62.5
8/20/2012 3:00	89.4	89.8	89.6	3548	3543	6.7	59.0
8/20/2012 4:00	89.2	89.6	89.4	3544	3538	7.6	56.5
8/20/2012 5:00	89.1	89.5	89.3	3544	3543	6.7	54.8
8/20/2012 6:00	88.9	89.3	89.1	3549	3545	6.1	57.1
8/20/2012 7:00	88.8	89.1	88.9	3550	3536	6.7	57.7
8/20/2012 8:00	88.7	89.1	88.9	3548	3539	7.1	60.0
8/20/2012 9:00	88.7	89.0	88.8	3544	3548	5.4	62.9
8/20/2012 10:00	88.6	89.0	88.8	3550	3533	7.4	68.2
8/20/2012 11:00	88.6	89.0	88.8	3534	3535	6.8	70.2
8/20/2012 12:00	88.6	89.0	88.8	3546	3546	7.3	73.1
8/20/2012 13:00	88.6	89.0	88.8	3538	3540	9.8	73.0
8/20/2012 14:00	88.6	89.0	88.8	3543	3541	4.9	74.6
8/20/2012 15:00	88.6	89.1	88.9	3545	3540	5.2	75.0
8/20/2012 16:00	88.7	89.2	89.0	3549	3540	5.0	75.4
8/20/2012 17:00	88.8	89.4	89.1	3541	3546	15.5	73.3
8/20/2012 18:00	88.9	89.3	89.1	3550	3544	8.3	71.6
8/20/2012 19:00	88.9	89.3	89.1	3548	3545	4.6	70.9
8/20/2012 20:00	88.8	89.1	89.0	3544	3541	7.3	65.8
8/20/2012 21:00	88.6	88.9	88.7	3547	3544	5.0	63.6
8/20/2012 22:00	88.4	88.7	88.6	3550	3543	5.1	62.9
8/20/2012 23:00	88.2	88.5	88.4	3539	3536	5.6	59.8
8/21/2012 0:00	88.1	88.5	88.3	3546	3546	6.4	57.8
8/21/2012 1:00	88.2	88.5	88.3	3553	3544	8.9	60.3
8/21/2012 2:00	88.0	88.3	88.2	3548	3540	2.3	57.7
8/21/2012 3:00	87.9	88.3	88.1	3552	3548	1.7	59.3
8/21/2012 4:00	87.8	88.1	87.9	3544	3545	3.7	57.7
8/21/2012 5:00	87.8	88.2	88.0	3540	3541	6.3	57.6
8/21/2012 6:00	87.7	88.0	87.8	3541	3542	3.3	57.2
8/21/2012 7:00	87.6	87.9	87.7	3540	3545	3.3	59.0
8/21/2012 8:00	87.5	87.8	87.6	3541	3535	2.9	60.0
8/21/2012 9:00	87.4	87.7	87.6	3543	3534	4.5	64.9
8/21/2012 10:00	87.4	87.8	87.6	3551	3541	6.6	68.7
8/21/2012 11:00	87.6	88.2	87.9	3546	3539	5.3	71.5
8/21/2012 12:00	88.1	88.8	88.5	3537	3535	4.1	72.9
8/21/2012 13:00	88.4	89.2	88.8	3549	3538	6.4	74.2
8/21/2012 14:00	88.7	89.6	89.1	3552	3538	7.8	75.6

8/21/2012 15:00	89.6	90.2	89.9	3539	3540	7.2	75.0
8/21/2012 16:00	90.0	90.7	90.3	3539	3538	2.4	76.1
8/21/2012 17:00	90.3	91.1	90.7	3540	3543	7.9	77.2
8/21/2012 18:00	90.7	91.4	91.0	3545	3538	4.7	76.1
8/21/2012 19:00	90.8	91.5	91.2	3537	3541	1.7	74.7
8/21/2012 20:00	90.8	91.4	91.1	3540	3548	7.2	72.8
8/21/2012 21:00	90.8	91.2	91.0	3542	3540	6.8	71.2
8/21/2012 22:00	90.6	91.0	90.8	3541	3543	6.4	64.4
8/21/2012 23:00	90.5	90.8	90.6	3541	3546	5.8	62.8
8/22/2012 0:00	90.3	90.6	90.5	3539	3544	7.9	62.3
8/22/2012 1:00	90.1	90.5	90.3	3544	3545	5.7	60.2
8/22/2012 2:00	90.0	90.3	90.1	3547	3541	6.1	59.6
8/22/2012 3:00	90.1	90.5	90.3	3545	3528	5.9	58.4
8/22/2012 4:00	90.2	90.5	90.3	3538	3543	6.4	58.3
8/22/2012 5:00	90.1	90.4	90.2	3545	3544	7.6	58.2
8/22/2012 6:00	89.9	90.3	90.1	3543	3544	5.8	57.1
8/22/2012 7:00	89.8	90.2	90.0	3536	3547	5.7	56.3
8/22/2012 8:00	89.6	90.0	89.8	3540	3537	3.9	61.5
8/22/2012 9:00	89.5	89.8	89.6	3541	3540	6.0	68.0
8/22/2012 10:00	89.2	89.6	89.4	3539	3544	8.2	73.6
8/22/2012 11:00	89.2	89.6	89.4	3538	3543	7.4	77.2
8/22/2012 12:00	89.1	89.5	89.3	3541	3542	6.7	79.8
8/22/2012 13:00	89.0	89.6	89.3	3536	3543	7.5	80.5
8/22/2012 14:00	89.0	89.6	89.3	3538	3540	5.2	82.3
8/22/2012 15:00	89.2	89.4	89.3	3539	3542	3.5	83.6
8/22/2012 16:00	89.2	89.5	89.4	3539	3543	5.9	83.8
8/22/2012 17:00	89.4	89.7	89.5	3540	3543	5.7	84.1
8/22/2012 18:00	89.3	89.9	89.6	3542	3542	6.3	83.5
8/22/2012 19:00	89.4	90.0	89.7	3544	3541	6.4	79.8
8/22/2012 20:00	89.5	90.0	89.7	3541	3549	7.2	75.6
8/22/2012 21:00	89.5	89.8	89.7	3542	3543	7.4	74.7
8/22/2012 22:00	89.3	89.6	89.5	3543	3530	8.1	71.8
8/22/2012 23:00	89.2	89.5	89.3	3543	3539	7.4	67.8
8/23/2012 0:00	89.1	89.4	89.2	3542	3541	8.5	66.5
8/23/2012 1:00	89.1	89.4	89.2	3544	3545	7.4	66.1
8/23/2012 2:00	88.9	89.3	89.1	3537	3540	9.1	68.1
8/23/2012 3:00	88.8	89.1	88.9	3540	3541	6.6	65.8
8/23/2012 4:00	88.7	89.0	88.8	3547	3547	5.2	64.5
8/23/2012 5:00	88.6	88.9	88.7	3541	3540	7.3	64.8
8/23/2012 6:00	88.4	88.8	88.6	3542	3533	8.5	61.9
8/23/2012 7:00	88.3	88.7	88.5	3556	3541	6.2	62.7
8/23/2012 8:00	88.3	88.7	88.5	3546	3551	5.0	67.8

8/23/2012 9:00	88.3	88.6	88.5	3543	3542	7.8	73.5
8/23/2012 10:00	88.3	88.7	88.5	3540	3541	4.9	76.4
8/23/2012 11:00	88.4	88.9	88.6	3537	3537	5.8	81.2
8/23/2012 12:00	88.5	89.1	88.8	3537	3543	5.6	86.6
8/23/2012 13:00	88.7	89.3	89.0	3551	3544	9.8	88.8
8/23/2012 14:00	88.0	89.5	88.8	3534	3541	7.1	89.2
8/23/2012 15:00	88.8	89.7	89.2	3542	3543	13.4	90.1
8/23/2012 16:00	89.0	89.7	89.4	3546	3540	12.8	89.9
8/23/2012 17:00	89.2	89.8	89.5	3537	3539	11.6	90.2
8/23/2012 18:00	89.3	89.8	89.6	3552	3542	7.1	88.8
8/23/2012 19:00	89.4	89.8	89.6	3551	3542	6.0	84.3
8/23/2012 20:00	89.4	89.8	89.6	3546	3543	6.9	80.2
8/23/2012 21:00	89.4	89.7	89.5	3541	3546	8.5	76.1
8/23/2012 22:00	89.2	89.5	89.3	3540	3536	8.9	73.1
8/23/2012 23:00	89.1	89.3	89.2	3543	3543	8.6	71.4
8/24/2012 0:00	88.9	89.3	89.1	3536	3541	6.2	70.2
8/24/2012 1:00	88.9	89.2	89.0	3537	3545	7.5	70.0
8/24/2012 2:00	88.8	89.1	88.9	3550	3545	10.7	70.6
8/24/2012 3:00	88.6	88.9	88.7	3537	3545	7.9	67.4
8/24/2012 4:00	88.3	88.7	88.5	3543	3548	5.2	64.5
8/24/2012 5:00	88.3	88.6	88.4	3534	3541	5.8	63.8
8/24/2012 6:00	88.3	88.6	88.4	3541	3546	5.5	62.4
8/24/2012 7:00	88.2	88.5	88.4	3536	3544	5.0	61.9
8/24/2012 8:00	88.1	88.5	88.3	3542	3548	5.9	67.2
8/24/2012 9:00	88.2	88.5	88.3	3534	3545	8.0	75.7
8/24/2012 10:00	88.2	88.6	88.4	3536	3546	10.8	81.7
8/24/2012 11:00	88.3	88.8	88.5	3541	3546	8.6	84.3
8/24/2012 12:00	88.4	89.0	88.7	3540	3543	11.2	87.4
8/24/2012 13:00	88.7	89.1	88.9	3544	3542	5.8	88.5
8/24/2012 14:00	88.8	89.5	89.2	3544	3543	7.2	90.7
8/24/2012 15:00	89.0	89.9	89.5	3542	3543	9.5	91.1
8/24/2012 16:00	89.2	90.1	89.7	3536	3545	7.8	90.3
8/24/2012 17:00	89.4	90.1	89.8	3551	3545	7.3	88.9
8/24/2012 18:00	89.6	90.2	89.9	3548	3542	8.0	88.9
8/24/2012 19:00	89.6	90.1	89.8	3544	3546	6.3	85.6
8/24/2012 20:00	89.6	89.9	89.7	3542	3545	7.0	79.7
8/24/2012 21:00	89.4	89.7	89.5	3549	3547	7.5	75.5
8/24/2012 22:00	89.2	89.6	89.4	3543	3544	7.4	73.6
8/24/2012 23:00	89.1	89.4	89.2	3546	3536	6.7	72.2
8/25/2012 0:00	89.1	89.4	89.2	3547	3543	6.9	70.8
8/25/2012 1:00	89.1	89.5	89.3	3541	3540	8.2	71.2
8/25/2012 2:00	89.1	89.4	89.3	3547	3545	5.8	69.6

8/25/2012 3:00	89.0	89.3	89.1	3546	3541	6.6	68.8
8/25/2012 4:00	88.8	89.2	89.0	3547	3540	7.2	71.5
8/25/2012 5:00	88.5	88.9	88.7	3549	3534	6.6	71.4
8/25/2012 6:00	88.7	88.9	88.8	3536	3542	5.7	70.8
8/25/2012 7:00	88.7	89.1	88.9	3548	3545	4.4	68.1
8/25/2012 8:00	88.8	89.1	88.9	3541	3540	4.5	73.4
8/25/2012 9:00	88.8	89.1	89.0	3543	3542	3.7	79.5
8/25/2012 10:00	88.8	89.2	89.0	3543	3541	7.7	83.0
8/25/2012 11:00	88.8	89.3	89.0	3547	3546	6.3	85.2
8/25/2012 12:00	88.9	89.5	89.2	3541	3539	10.4	87.1
8/25/2012 13:00	89.1	89.6	89.4	3545	3549	21.0	87.7
8/25/2012 14:00	89.2	89.8	89.5	3543	3543	15.9	88.1
8/25/2012 15:00	89.5	90.0	89.7	3540	3540	11.8	89.1
8/25/2012 16:00	89.7	90.2	90.0	3551	3540	16.5	88.2
8/25/2012 17:00	89.9	90.2	90.1	3539	3547	14.4	88.1
8/25/2012 18:00	89.7	90.1	89.9	3545	3542	8.1	87.2
8/25/2012 19:00	89.6	89.9	89.7	3550	3543	5.8	84.0
8/25/2012 20:00	89.3	89.6	89.5	3542	3539	6.7	80.5
8/25/2012 21:00	89.2	89.5	89.3	3549	3547	6.8	76.1
8/25/2012 22:00	89.2	89.5	89.3	3547	3539	6.7	73.0
8/25/2012 23:00	89.2	89.6	89.4	3546	3537	5.8	72.5
8/26/2012 0:00	89.3	89.6	89.4	3547	3541	6.1	73.3
8/26/2012 1:00	89.1	89.5	89.3	3545	3531	5.5	71.6
8/26/2012 2:00	88.9	89.2	89.0	3540	3540	6.2	69.8
8/26/2012 3:00	88.8	89.1	89.0	3537	3546	6.8	69.7
8/26/2012 4:00	88.7	89.0	88.9	3540	3536	5.4	68.2
8/26/2012 5:00	88.7	89.1	88.9	3542	3544	6.1	65.2
8/26/2012 6:00	88.7	89.1	88.9	3536	3539	8.2	67.4
8/26/2012 7:00	88.6	88.9	88.8	3539	3543	5.1	69.5
8/26/2012 8:00	88.5	88.8	88.6	3538	3540	8.1	68.8
8/26/2012 9:00	88.4	88.7	88.5	3538	3543	14.5	70.0
8/26/2012 10:00	88.3	88.6	88.5	3565	3535	13.3	70.7
8/26/2012 11:00	88.3	88.6	88.4	3544	3542	8.3	70.0
8/26/2012 12:00	88.2	88.5	88.4	3539	3541	10.0	70.2
8/26/2012 13:00	88.2	88.5	88.3	3542	3542	6.1	71.4
8/26/2012 14:00	88.1	88.5	88.3	3544	3544	5.4	72.6
8/26/2012 15:00	88.3	88.7	88.5	3550	3542	6.4	73.0
8/26/2012 16:00	88.5	88.9	88.7	3542	3541	4.6	73.7
8/26/2012 17:00	88.7	89.0	88.8	3543	3547	5.9	73.8
8/26/2012 18:00	88.6	88.9	88.8	3537	3534	8.9	72.8
8/26/2012 19:00	88.5	88.8	88.6	3544	3544	8.5	72.1
8/26/2012 20:00	88.2	88.5	88.4	3543	3541	5.6	71.6

8/26/2012 21:00	87.9	88.2	88.1	3543	3541	6.6	71.7
8/26/2012 22:00	87.7	88.0	87.8	3543	3541	6.7	71.1
8/26/2012 23:00	87.4	87.8	87.6	3543	3549	4.8	71.1
8/27/2012 0:00	87.7	88.1	87.9	3544	3536	12.6	69.9
8/27/2012 1:00	87.9	88.2	88.0	3545	3539	8.6	69.2
8/27/2012 2:00	87.9	88.2	88.0	3543	3541	5.6	69.2
8/27/2012 3:00	87.7	88.0	87.9	3537	3537	7.9	68.3
8/27/2012 4:00	87.6	88.0	87.8	3537	3540	7.4	67.2
8/27/2012 5:00	87.7	88.1	87.9	3546	3538	4.9	66.4
8/27/2012 6:00	87.8	88.3	88.1	3541	3536	5.7	67.0
8/27/2012 7:00	87.9	88.3	88.1	3548	3538	9.1	67.9
8/27/2012 8:00	88.0	88.3	88.2	3541	3540	7.6	69.9
8/27/2012 9:00	88.0	88.4	88.2	3540	3543	6.6	72.3
8/27/2012 10:00	88.0	88.4	88.2	3544	3545	4.2	75.4
8/27/2012 11:00	88.2	88.7	88.5	3543	3544	7.8	78.2
8/27/2012 12:00	88.7	89.2	88.9	3542	3542	9.9	81.1
8/27/2012 13:00	89.1	89.7	89.4	3545	3537	12.5	82.6
8/27/2012 14:00	89.3	89.9	89.6	3539	3543	13.3	83.2
8/27/2012 15:00	89.4	90.1	89.8	3541	3548	10.4	84.5
8/27/2012 16:00	89.6	90.2	89.9	3540	3543	14.9	84.6
8/27/2012 17:00	89.7	90.3	90.0	3545	3550	19.6	84.9
8/27/2012 18:00	89.8	90.3	90.0	3542	3551	13.0	84.7
8/27/2012 19:00	89.8	90.3	90.0	3537	3540	8.8	82.8
8/27/2012 20:00	89.7	90.2	90.0	3547	3543	6.4	79.4
8/27/2012 21:00	89.8	90.2	90.0	3546	3540	6.0	78.0
8/27/2012 22:00	89.8	90.2	90.0	3543	3546	4.4	76.6
8/27/2012 23:00	89.8	90.2	90.0	3542	3541	6.5	74.9
8/28/2012 0:00	89.8	90.2	90.0	3543	3539	3.6	71.8
8/28/2012 1:00	89.9	90.3	90.1	3544	3539	4.7	71.0
8/28/2012 2:00	90.1	90.5	90.3	3541	3533	3.2	70.1
8/28/2012 3:00	90.2	90.6	90.4	3545	3541	3.8	68.7
8/28/2012 4:00	90.2	90.6	90.4	3542	3534	6.6	67.7
8/28/2012 5:00	90.2	90.6	90.4	3544	3540	5.3	65.6
8/28/2012 6:00	90.2	90.5	90.3	3550	3541	4.7	66.4
8/28/2012 7:00	90.1	90.4	90.2	3538	3539	5.2	67.2
8/28/2012 8:00	89.9	90.2	90.0	3550	3541	3.6	70.3
8/28/2012 9:00	89.8	90.2	90.0	3541	3546	3.9	74.9
8/28/2012 10:00	90.0	90.4	90.2	3541	3542	2.4	78.2
8/28/2012 11:00	90.1	90.6	90.3	3539	3542	3.6	80.1
8/28/2012 12:00	90.1	90.7	90.4	3542	3550	2.6	81.1
8/28/2012 13:00	90.3	90.9	90.6	3544	3545	2.5	83.2
8/28/2012 14:00	90.5	91.1	90.8	3541	3545	9.9	84.3

8/28/2012 15:00	90.8	91.4	91.1	3547	3538	8.1	84.4
8/28/2012 16:00	91.0	91.7	91.4	3545	3546	3.9	84.1
8/28/2012 17:00	91.4	92.0	91.7	3550	3540	9.8	84.2
8/28/2012 18:00	91.8	92.5	92.2	3548	3549	3.8	83.7
8/28/2012 19:00	92.0	92.7	92.4	3550	3538	5.6	82.7
8/28/2012 20:00	92.2	92.8	92.5	3543	3543	11.3	77.1
8/28/2012 21:00	92.4	93.0	92.7	3548	3547	6.8	72.7
8/28/2012 22:00	92.6	93.1	92.8	3537	3538	6.1	70.2
8/28/2012 23:00	92.6	93.1	92.9	3542	3544	10.3	69.3
8/29/2012 0:00	92.6	92.9	92.8	3548	3540	11.2	68.4
8/29/2012 1:00	92.4	92.7	92.6	3544	3541	8.6	66.9
8/29/2012 2:00	92.1	92.5	92.3	3545	3546	5.5	65.2
8/29/2012 3:00	91.8	92.2	92.0	3542	3543	6.0	64.1
8/29/2012 4:00	91.6	92.0	91.8	3542	3543	5.1	64.5
8/29/2012 5:00	91.6	91.9	91.8	3540	3542	5.9	63.5
8/29/2012 6:00	91.5	91.8	91.6	3543	3540	6.2	62.4
8/29/2012 7:00	91.3	91.7	91.5	3544	3539	5.1	62.3
8/29/2012 8:00	91.2	91.5	91.4	3540	3538	6.5	64.9
8/29/2012 9:00	91.1	91.4	91.2	3545	3539	8.8	69.9
8/29/2012 10:00	90.9	91.2	91.0	3542	3543	10.4	74.2
8/29/2012 11:00	90.9	91.2	91.0	3540	3545	9.5	77.7
8/29/2012 12:00	90.8	91.3	91.0	3539	3545	4.1	80.1
8/29/2012 13:00	90.9	91.6	91.3	3544	3546	8.2	81.4
8/29/2012 14:00	91.1	91.8	91.5	3543	3535	7.3	82.3
8/29/2012 15:00	91.5	91.8	91.7	3542	3540	5.7	83.3
8/29/2012 16:00	91.4	92.2	91.8	3543	3539	3.2	84.3
8/29/2012 17:00	91.6	92.2	91.9	3544	3541	6.2	84.8
8/29/2012 18:00	91.6	92.3	91.9	3543	3541	4.6	84.4
8/29/2012 19:00	91.8	92.5	92.1	3546	3541	5.5	81.2
8/29/2012 20:00	92.0	92.6	92.3	3542	3542	8.4	76.1
8/29/2012 21:00	92.0	92.5	92.3	3544	3546	6.1	73.3
8/29/2012 22:00	91.9	92.3	92.1	3543	3544	6.4	71.8
8/29/2012 23:00	91.8	92.1	92.0	3545	3542	6.6	69.8
8/30/2012 0:00	91.8	92.1	92.0	3547	3541	7.1	68.2
8/30/2012 1:00	91.7	92.0	91.8	3546	3540	6.4	67.3
8/30/2012 2:00	91.5	91.9	91.7	3535	3547	6.3	65.5
8/30/2012 3:00	91.4	91.8	91.6	3540	3545	7.0	65.0
8/30/2012 4:00	91.2	91.5	91.4	3543	3541	6.8	63.8
8/30/2012 5:00	91.1	91.5	91.3	3542	3539	7.8	63.7
8/30/2012 6:00	91.1	91.4	91.2	3542	3541	8.4	63.7
8/30/2012 7:00	90.9	91.2	91.0	3547	3543	9.0	65.1
8/30/2012 8:00	90.7	91.0	90.9	3543	3544	12.0	68.3

8/30/2012 9:00	90.5	90.9	90.7	3543	3546	6.4	73.3
8/30/2012 10:00	90.3	90.7	90.5	3543	3544	15.1	78.5
8/30/2012 11:00	90.3	90.7	90.5	3540	3542	11.9	80.9
8/30/2012 12:00	90.4	90.7	90.6	3541	3537	10.1	83.9
8/30/2012 13:00	90.5	90.9	90.7	3541	3541	15.8	84.9
8/30/2012 14:00	90.5	91.1	90.8	3543	3542	8.6	87.2
8/30/2012 15:00	90.8	91.3	91.0	3545	3542	7.7	88.9
8/30/2012 16:00	90.9	91.4	91.2	3544	3546	8.8	89.8
8/30/2012 17:00	91.0	91.5	91.2	3543	3537	9.9	88.8
8/30/2012 18:00	91.0	91.4	91.2	3542	3540	11.8	87.2
8/30/2012 19:00	90.9	91.2	91.0	3540	3544	7.8	83.1
8/30/2012 20:00	90.7	91.0	90.8	3545	3545	6.9	79.5
8/30/2012 21:00	90.5	90.7	90.6	3541	3545	9.3	77.5
8/30/2012 22:00	90.2	90.5	90.3	3541	3542	9.3	73.9
8/30/2012 23:00	89.9	90.2	90.1	3541	3541	10.2	73.2
8/31/2012 0:00	89.6	89.9	89.8	3538	3541	8.9	73.4
8/31/2012 1:00	89.3	89.6	89.5	3538	3536	8.2	71.4
8/31/2012 2:00	89.1	89.4	89.2	3543	3534	7.0	71.1
8/31/2012 3:00	88.9	89.3	89.1	3546	3543	7.4	69.7
8/31/2012 4:00	88.9	89.2	89.0	3539	3544	7.9	68.8
8/31/2012 5:00	88.8	89.1	88.9	3545	3539	10.5	70.7
8/31/2012 6:00	88.6	88.9	88.7	3546	3540	11.1	72.3
8/31/2012 7:00	88.6	88.9	88.7	3540	3540	10.6	71.4
8/31/2012 8:00	88.6	89.0	88.8	3546	3540	9.6	75.6
8/31/2012 9:00	88.7	89.1	88.9	3545	3544	7.1	79.0
8/31/2012 10:00	88.8	89.2	89.0	3541	3539	7.8	82.9
8/31/2012 11:00	89.0	89.4	89.2	3544	3544	9.4	85.2
8/31/2012 12:00	89.1	89.6	89.4	3543	3541	9.5	85.1
8/31/2012 13:00	89.3	89.7	89.5	3543	3538	11.5	86.7
8/31/2012 14:00	89.4	89.9	89.6	3545	3531	10.9	86.2
8/31/2012 15:00	89.5	89.9	89.7	3535	3540	11.7	84.2
8/31/2012 16:00	89.5	90.0	89.8	3547	3541	5.1	83.4
8/31/2012 17:00	89.6	90.1	89.8	3544	3545	3.8	83.0
8/31/2012 18:00	89.7	90.1	89.9	3543	3541	6.2	81.7
8/31/2012 19:00	89.7	90.1	89.9	3548	3543	6.0	81.0
8/31/2012 20:00	89.7	90.0	89.8	3541	3537	6.4	78.8
8/31/2012 21:00	89.6	89.9	89.7	3543	3546	5.7	78.1
8/31/2012 22:00	89.5	89.8	89.7	3541	3546	5.4	75.7
8/31/2012 23:00	89.4	89.7	89.6	3542	3536	6.9	75.2
9/1/2012 0:00	89.3	89.7	89.5	3544	3536	3.7	75.0