# A Methodology for Identification of Weather Sensitive Component of Electrical Load Using Empirical Mode Decomposition Technique

by

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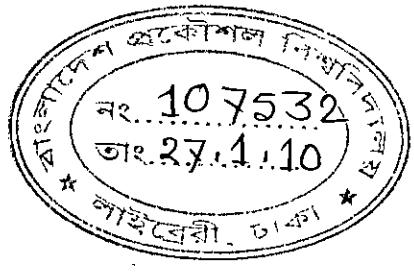


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## CANDIDATE'S DECLARATION

It is hereby declared that this thesis or any part of it has not been submitted elsewhere for the award of any degree or diploma.

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## LIST OF ABBREVIATIONS OF TECHNICAL SYMBOLS AND TERMS

| | |
|---|---|
| EMD | : Empirical mode decomposition |
| BPS | : Bangladesh Power System |
| ISO | : Independent system operator |
| THI | : Temperature-humidity index |
| WCI | : Wind chill index |
| ANN | : Artificial neural network |
| IMF | : Intrinsic mode function |
| m | : Mean value |
| $c_i$ | : i-th IMF |
| $r_n$ | : Residue signal |
| R(X,Y) | : Correlation coefficient between 'X' and 'Y' data set |
| E(X) | : Expected value of the data set 'X' |
| E(Y) | : Expected value of the data set 'Y' |
| E(XY) | : Expected value of the data set 'XY' |
| $E(X^2)$ | : Expected value of the data set '$X^2$' |
| $E(Y^2)$ | : Expected value of the data set '$Y^2$' |
| $S_X$ | : Variance of 'X' data |
| $S_Y$ | : Variance of 'Y' data |
| T | : Temperature ( Degree Celsius) |
| RH | : Relative Humidity ( %) |
| $\hat{L}(t)$ | : Modified load signal |
| $L(t)$ | : Original load signal |

| | |
|---|---|
| $L_{min}$ | : Minimum load during the considered period |
| Re | : Residue of load signal |
| C2f | : Coarse to fine |
| max | : The maximum value |
| PL | : Peak load |
| Jan | : Month of January |
| Feb | : Month of February |
| Mar | : Month of March |
| Apr | : Month of April |
| May | : Month of May |
| Jun | : Month of June |
| Jul | : Month of July |
| Aug | : Month of August |
| Sep | : Month of September |
| Oct | : Month of October |
| Nov | : Month of November |
| Dec | : Month of December |
| $L_w$ | : Weather sensitive portion of the electrical load |
| $\bar{y}$ | : Average value of the 'y' data set |
| n | : Total number of samples |
| $\sigma^2$ | : Variance |
| NLDC | : National Load Dispatch Center |
| BMD | : Bangladesh Meteorological Department |

| | |
|---|---|
| Avg | : Average Value |
| NWL | : Non weather sensitive component of load |
| HRL | : Hourly load |

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# ABSTRACT

The expansion planning and operation of all three sectors, generation, transmission and distribution, of power system essentially require load forecasting. Weather conditions have significant impacts on forecasted load, especially short-term and mid-term. A momentous portion of the electrical energy is consumed, especially in cold or hot countries, to mitigate the impact of weather on the daily life of human society. The objective of this thesis is to develop a methodology to identify the component of electrical demand generated due to the weather. Usually, weather dependent component of load is identified by fitting appropriate non-linear curve to the scatter plot of weather-load model. This technique some times shows lower correlation with weather variables.

So far, empirical mode decomposition (EMD) technique is used for noise suppression of speech signal and biomedical signal processing in the field of Electrical and Electronic Engineering. Electrical load has, to some extent, similarity with speech and biomedical signal. So, like other non-stationary time series signal, electrical load can be decomposed using EMD technique. In this thesis, a methodology has been developed to identify the weather sensitive component of electrical load using empirical mode decomposition (EMD) technique.

In this thesis, EMD technique is used to decompose the load into several components. The characteristic features of each decomposed component of load are compared with the weather pattern, especially the variation characteristics of temperature and humidity. The characteristics of different combination of different components of load are also compared with that of weather variables. The correlation between load component or that of combination and weather component is evaluated. From the degree of correlation the weather sensitive components of loads is identified.

The proposed methodology is applied to the historical load of Bangladesh Power System (BPS). The temperature and humidity data of Bangladesh for the corresponding duration are considered in this process of load decomposition. The proposed methodology is validated by comparing the results obtained through this technique with those obtained using the conventional technique. The accuracy of results is also verified.

The developed methodology is applied to the peak loads and the hourly loads of Bangladesh Power System to disintegrate them into weather sensitive portion and non-weather sensitive portion and interesting observations are made.

# CHAPTER 1

# INTRODUCTION

## 1.1 INTRODUCTION

Power system expansion planning begins with a forecast of anticipated future load. Estimation of both demand and energy requirements are crucial to effective system planning. Load forecasting is used to determine the timing and characteristics of additional generation, transmission and distribution of electric power for system expansion. Load forecasting also helps an electric utility to make important decisions on purchasing and generating electric power, load switching and infrastructure development. Load forecasting is extremely important for energy suppliers, independent system operators (ISOs), financial institutions and other participants in electric energy generation, transmission, distribution and markets.

Electric loads may be broadly classified as residential, commercial and industrial. Residential customers use energy for domestic purposes, whereas commercial and industrial customers obviously use energy for commercial and industrial purposes. Among three broad classes of loads, residential loads have the most constant annual growth with seasonal fluctuations. Commercial loads are also characterized by seasonal fluctuations. These fluctuations are mainly due to extensive use of air conditioning and space heating. Industrial loads are considered as base loads that contain very little dependence on weather fluctuations.

As saturation level and per capita consumption increases, to reflect the wide-spread use of weather-sensitive devices, it is necessary to include weather effects in forecasting future load requirements. It is well documented that most of the system peak demands occur as a direct result of seasonal weather extremes [1].

Load forecasting can be divided into three categories: short-term forecasting which are usually from one hour to one week, mid-term forecasting which are usually from a week to a year and long-term forecasting which are longer than a year. Weather conditions should have significant impacts on forecasted load, especially short-term and mid-term [2, 3]. In fact, forecasted weather parameters are the most important factors in short-term load forecasting. Various weather variables can be considered for load forecasting. Temperature and humidity are the most commonly used load predictors. An electric load prediction survey published in [4] indicated that out of 22 considered

research reports, 13 use temperature only, 3 temperature and humidity, 3 additional weather parameters and 3 used only load parameters. Two composite weather variable functions, the THI (temperature-humidity index) and WCI (wind chill index), are broadly used by utility companies. THI is a measure of summer heat discomfort and similarly WCI is cold stress in winter.

Statistical approaches usually require a mathematical model that represents load as function of different factors such as time, weather and customer class. The two important categories of such mathematical models are: additive models and multiplicative models. They differ in whether the forecasted load is the sum (additive) of a number of components or the product (multiplicative) of a number of factors. In additive load model, total load is represented as a summation of four components. The components are, "normal part of the load", " weather sensitive part of the load", "special event part of the load" and " random part of the load" [5]. For accurate forecasting of load, each component should be forecasted separately. In this thesis, a methodology has been developed to isolate the weather sensitive portion of the electrical load. This separate evaluation of weather sensitive portion of the load will help forecast the electrical load closer to the realistic one.

## 1.2 LITERATURE REVIEW

A number of research works in the field of power system planning to incorporate the effects of weather conditions on electrical loads have been reported.

Heinmann, G.T., Nordman, D.A. and Plant E.C. [6] developed a relationship between summer weather conditions and summer load in 1966. This relationship is based on regression analysis. It is the first approach found in the literature that relates the electrical load with weather conditions. Following this path, necessity of separate treatment of weather sensitive component of annual peak demand is mentioned in [7-9]. The developed forecasting methodologies provide probabilistic demand of the full spectrum of an electric utility's requirement for the system planning and long-term operation. But short-term forecasting usually required day-to-day system operation. In 1970, Santon, K. Neil proposed a weather- induced demand model [10]. But these

research works neither show any decomposition technique of the weather sensitive portion of the load nor non- weather sensitive portion of the load i.e. base load.

A methodology is developed for adaptive short- term load forecasting in [11] and [12]. In [11], the weather-load model is assumed to be static and there is no guarantee that it would perform well with the prediction of future loads as it did in determining the past ones. Another methodology is reported in [13] for the practical application of weather sensitive load forecasting.

A weather sensitive model for the summer afternoon peak loads is developed and applied to both the short and long term forecasting of Virginia Electric and Power Company System [14]. This weather-load model is a trial and error approach using historical load and weather data of several seasons. No appropriate mathematical relationship between weather variables and electrical load is developed. A methodology of forecasting the heat sensitive portion of electrical demand and energy is reported in [15]. In this approach, the model parameters are calculated using historical information. However, all methodologies presented in [11-15] do not give any clear direction to disintegrate the weather sensitive portion of the electrical load.

Forecasting of hourly load by pattern recognition and expert system algorithm is presented in [16] and [17], respectively. Application of artificial neural network (ANN) in electrical load forecasting is developed in [18-20]. Weather sensitive short-term load forecasting using artificial neural network is presented in [21] and [22], where the authors present an ANN model to forecast the hourly load for a week. An hourly temperature forecaster using ANN is applied in electrical load forecasting in [23]. A weather ensemble prediction consists of multiple scenarios is applied for load forecasting [24]. The impact of temperature forecasting uncertainty on load forecasting is presented in [25]. One again, these developed methodologies [16-25] do not present any weather- load model that can be used to identify the weather sensitive component of electrical loads.

Time series approach of load forecasting is described in [26-29] and also regression based analysis for load forecasting are presented in [30-34]. Ruzic, S. et al. presents a regression based adaptive weather sensitive short-term load forecasting algorithm in [35]. The algorithm has two main steps. The total daily energy is independently forecasted in first step while hourly loads are predicted in the second step.

All model parameters are automatically calculated and updated from a database using weather and load conditions. This methodology has been applied for the electric power utility of Serbia. But this technique does not represent any segregation technique of the weather sensitive portion of the electrical load.

The impact of weather variables on monthly electricity demand is presented in [2]. This paper reports, a load demand pattern between demand and climatic variables. A hybrid load forecasting method with analysis of temperature sensitivities is developed in [3]. This method is based on the combination of fuzzy linear regression method and the general exponential smoothing method with analysis of temperature sensitivities. But the developed methodologies in [2] and [3] do not represent any identification technique for the weather sensitive portion of the electrical load.

The weather dependency and load diversity of Queensland electricity demand are investigated in [36]. A short-term multi region load forecasting based on weather and load diversity analysis is presented in [37]. The authors have proved that in a power system covering large geographical area, a single forecasting model for overall load of the whole region sometimes can not guarantee satisfactory forecasting accuracy. The major reason behind this is the existence of load diversity caused by the weather diversity. Dependency of electricity demand on weather conditions has been modeled in this context. But this model is also not sufficient to segregate the weather sensitive portion of the electrical load.

Sensitivity of Iran electrical network to the temperature has been studied in [38]. The study is based on linear regression method. The study finds that, load pattern is heavily dependent on temperature and a linear relationship exists between the load and temperature for Iran electrical load. In [39], it is established that the short-term load is non-linear and its variation is largely influenced by temperature. Accumulation effects of temperature on electrical load are also represented in [39]. But the techniques described in [38] and [39] do not give any direction to decompose the total load into the weather sensitive portion and non- weather sensitive portion.

A weather-load model based on scatter diagram is presented in [40] and [41]. Separation of weather dependent component of electrical load is rarely addressed [40]. In [40], the scatter diagram of weather-load model is obtained by the scatter plot of the daily

peak load vs. weather variable. By fitting this scatter diagram to the suitable non-linear curve, the weather sensitive portion of the load is evaluated. But this method some times shows higher statistical error as demand growth rate over a year is much higher than that of temperature and humidity.

Empirical Mode Decomposition (EMD) [42] technique is widely used for noise suppression of speech signal [43-45] and biomedical signal processing [46-50]. Electrical load has, to some extent, similarity with speech and biomedical signal. Therefore, like other non-stationary time series signal, electrical load can also be decomposed using EMD technique. However, the identification of weather sensitive component of electrical load using EMD technique is yet to be reported in the literature.

This thesis develops a methodology for identification of weather sensitive component of electrical load using EMD technique. The essence of the proposed methodology is to decompose the electrical load into several components and finally to identify the weather sensitive component of the load by determining the correlation coefficient of the decomposed components of the load with the weather variables.

## 1.3 OBJECTIVE OF THE THESIS

The main objective of thesis is to develop a methodology for identification of the weather sensitive component of the electrical load using EMD technique. The thesis also investigates the applicability of the proposed technique into a realistic power system.

## 1.4 ORGANIZATION OF THE THESIS

A brief description of the contents of the thesis is in what follows.

Chapter 1 is the introductory chapter of the thesis. It consists of introduction, literature review, objective of the thesis and thesis organization. The introduction of chapter 1 briefly clarifies the impacts of weather conditions on electrical load. A review of some previous research works relating to this thesis work is presented in literature

review. This chapter also discusses the objective of the thesis and gives a brief idea about all the chapters of this thesis work.

Chapter 2 introduces the proposed methodology to identify the weather sensitive portion of the electrical load. The terminologies used in the methodology are also clarified. A numerical example to illustrate the proposed methodology is presented in this chapter. A conventional technique to evaluate the weather sensitive portion of the electrical load is also described here. The results obtained using the proposed methodology is validated by comparing with those obtained using the conventional technique. Finally, the accuracy of the proposed methodology is calculated using statistical error evaluation processes.

Chapter 3 presents the past historical data of peak demand of Bangladesh Power System (BPS). It also includes the meteorological data such as daily average temperature and relative humidity data of Bangladesh. The data sources and reliability of the collected data have also been explained in this chapter.

The weather sensitive portion of the daily peak load of BPS for the year 1998 to 2006 is given in Chapter 4. Hourly loads for eight time slots of the year 2006 are also decomposed using the proposed methodology. Discussions on the obtained results are also presented in this chapter.

Chapter 5 concludes the thesis work. It also presents the recommendation for future research works related to this thesis work.

# CHAPTER 2

# METHODOLOGY

## 2.1 INTRODUCTION

The objective of this thesis is to develop a methodology for the identification of weather sensitive component of electrical load. For the development of the methodology, it is assumed that the electrical load can de divided into two portions; weather sensitive and non weather sensitive. The proposed methodology successfully identifies the weather sensitive portion of the electrical load.

Electrical load does not vary about the fixed mean. Therefore it can be considered as a non-stationary time series signal. Like other non-stationary time series signals, speech and biomedical ones, electrical load can be decomposed using EMD technique. After decomposing the load signal, characteristic features of each decomposed component of load is compared with the weather pattern, especially the variation characteristics of temperature and humidity. The characteristics of different combination of components of load are also compared with that of weather variables. The correlation between load component or that of combination and weather variable is evaluated. From the degree of correlation the weather sensitive components of load is identified.

## 2.2 EMPIRICAL MODE DECOMPOSITION (EMD) TECHNIQUE

The key part of the EMD method is to decompose any complicated data set into a finite intrinsic mode functions (IMFs) and a residue. Residue can be either the mean trend of the data or a constant. An intrinsic mode function (IMF) is a function that satisfies two conditions:

I. In the whole data set, the number of extrema and the number of zero crossings must either equal or differ at most by one.

II. At any point, the mean value of the envelope defined by the local maxima and the envelope defined by the local minima is zero.

EMD also can be applied to data with non-zero mean, either all positive or all negative values, without zero crossings. A systematic way to decompose the data is known as the sifting process. It is described as follows:

I. All the local maxima of the data are identified and connected by cubic spline line as the upper envelope.

II. All the local minima of the data are identified and connected by cubic spline line as the lower envelope.

III. The mean of the upper and lower envelope is determined and this mean is subtracted from the original signal. This can be expressed as: $X(t)-m_1= h_1$, where $X(t)$ is the original signal, $m_1$ is the mean of upper and lower envelops and $h_1$ is the first component. It is known as first sifting process.

IV. Now if $h_1$ does not satisfy the properties of an IMF, then $h_1$ is treated as data and steps (I), (II) and (III) are applied to $h_1$. This can be expressed as: $h_1-m_{11}= h_{11}$, where $h_1$ is the original data, $m_{11}$= mean of the upper and lower envelopes derived from $h_1$. This process is known as second sifting process.

V. The process is repeated until the first IMF is obtained. If the first IMF is obtained at the k-th iteration of the sifting procedure, then the generalized expression is: $h_{1(k-1)} - m_{1k}= h_{1k}$, where $h_{1k}$ is the first IMF component of data and denoted as $c_1= h_{1k}$.

VI. After computing the first IMF component, it is separated from the original signal as $X(t)- c_1= r_1$, where $r_1$ is known as the residue.

VII. Since the residue $r_1$ still contains the information of longer period components, it is treated as the new data and processed through the same sifting process as described above.

VIII. The process is repeated on all the subsequent residues and result can be expressed mathematically as: $r_1-c_2= r_2, \ldots \ldots, r_{n-1}- c_n = r_n$.

IX. The sifting process is stopped when the residue $r_n$ becomes a monotonic function from which no IMF can be extracted.

X. Eventually the original signal can be represented as: $x(t) = \sum_{i=1}^{i=n} c_i + r_n$.

XI. Thus original data is decomposed into 'n' IMFs and a residue which can be either the mean trend of the data or a constant.

As discussed above, EMD technique does not require a zero reference of the data. It only needs the locations of local extrema. The zero references of each component will be generated by the sifting process.

## 2.3 OUTLINE OF THE METHODOLOGY:

As mentioned in section 2.2, EMD technique can be applied to data with non-zero mean, either all positive or all negative values, without zero crossings. Electrical load is data set with all positive values. But the data has local extremas, i.e. local maxima and local minima. Therefore, the EMD technique can be used to decompose the electrical load into several components.

### 2.3.1 RELEVANT TERMINOLOGIES

The terminologies used in the thesis are given below.

**(a) AUTOCORRELATION [51-53]:** The autocorrelation among successive values of the data is a key tool of identifying the best model of the data. The correlation between two variables is a measure of the association between two variables. It describes what happen to one of the variables if there is a change in the other.

The degree of the correlation between two data sets X and Y is measured by the correlation coefficient. The coefficient can be expressed as:

$$R(X,Y) = \frac{S_{XY}}{\sqrt{S_X S_Y}} \tag{2.1}$$

Where, $S_{XY} = E[XY] - E(X).E(Y)$

$$S_X = E[X^2] - [E(X)]^2 \tag{2.2}$$

$$S_Y = E[Y^2] - [E(Y)]^2 \tag{2.3}$$

Here E denotes the expected value or mean value. Note that, $S_X$ and $S_Y$ represent the variance of X and Y, respectively.

The correlation coefficient varies between +1 and -1. A value close to +1 implies a strong positive relation between two variables. Therefore, an increase in one variable

causes an increase in the other. A coefficient close to -1 indicates that there is strong negative correlation between two variables. In that case, an increase in one variable causes a decrease in other variable. A zero coefficient implies that there is no association or mutual dependence between the variables.

**(b) TEMPERATURE- HUMIDITY INDEX (THI) [54]:** Temperature and humidity are the most important weather variables. To incorporate the effect of these weather variables together, a composite weather variable known as THI is defined as:

$$THI = (1.8*T+32) - ((0.55-0.0055*RH) * (1.8*T-26)) \quad (2.4)$$

Where T=Temperature ( Degree Celsius) and RH=Relative Humidity ( %)

### 2.3.2 COMPARISON OF CORRELATIONS OF ORIGINAL DATA AND ITS COMPONENTS WITH A VARIABLE

In this section, a mathematical example is given to illustrate that, the degree of correlation between some component of a data set and any other variable is improved from the degree of correlation between the original data and that variable.

Let us consider two data sets as: X= [1 2 3 4] and Y= [8 11 21 39].

The correlation coefficient between X and Y is calculated using equation (2.1) to (2.3) as:

$S_{XY} = E[XY]-E[X].E[Y] = 62.25- 49.3750 = 12.875$

$S_X = E[X^2]-[E(X)]^2 = 7.5- 6.25 = 1.25$

$S_Y = E[Y^2]-[E(Y)]^2 = 536.75- 390.0625 = 146.6875$

$R(X,Y) = 12.875/\sqrt{(1.25*146.6875)} = 0.95$

Now the data Y is decomposed into two data sets as: $Y_1$= [5 6 7 8] and $Y_2$ = [3 5 14 31]. The calculated correlations are,

$R(X, Y_1) = 1.00$ and

$R(X, Y_2) = 0.94$

Note that, $R(X, Y_1) > R(X, Y)$, i.e. degree of correlation improves.

It is clear from above mathematical example that, degree of correlation between the decomposed component of one variable (i.e. $Y_1$) and the other variable (i.e. X) is improved compare to that between the original two variables (i.e. X and Y). This essence is exploited in the development of the methodology to identify the weather sensitive component of electrical load.

### 2.3.3 STEPS OF THE METHODOLOGY

The methodology requires the following steps for the identification of the weather sensitive component of electrical load.

I. Step-1: In the first step, electrical load signal is decomposed using EMD technique. Before decomposition, the minimum value of the load is subtracted from the original load signal which results in modified load signal. It can be expressed as:

$$\hat{L}(t) = L(t) - L_{\min} \tag{2.5}$$

Where, $\hat{L}(t)$ = Modified load signal

$L(t)$ = Original load signal

$L_{\min}$ = Minimum load during the considered period

This subtraction operation is performed because the weather sensitive portion of the electrical load is hidden inside the envelope of the original load signal. To apply EMD on $\hat{L}(t)$, its upper envelope and lower envelopes are identified as depicted in Figure 2.1. The mean of the upper and the lower envelopes is determined and this mean is subtracted from the modified load signal. This is the first iteration to get first IMF. The iteration process continues until the first IMF is separated from the modified load signal. Further, this decomposition is processed through the steps mentioned in the section 2.2. After decomposing $\hat{L}(t)$ using EMD technique, a finite number of IMFs and a residue, Re(t) are produced. Note

that, Re(t) contains all positive values and the IMFs contain both positive and negative values.

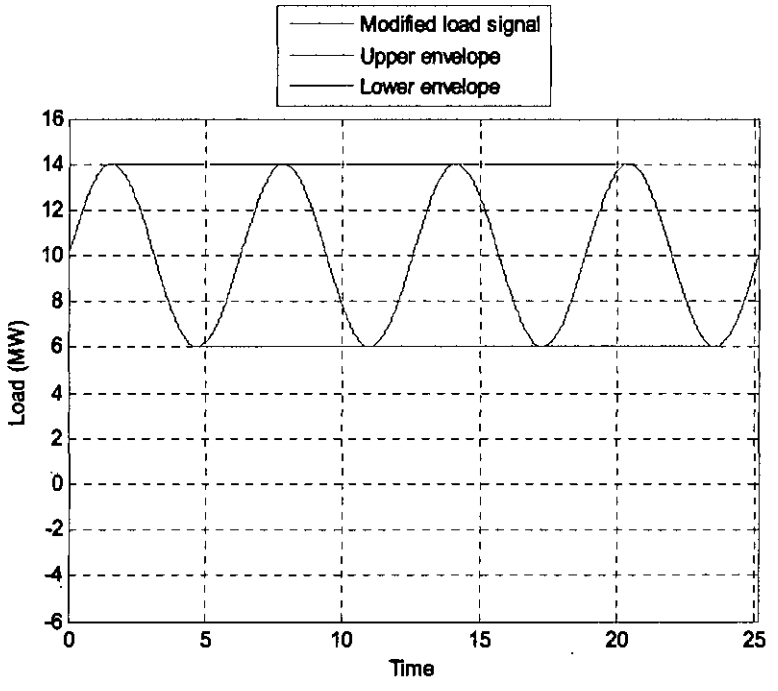


Figure 2.1: Modified version of load signal and the envelopes

II. Step-2: Since electrical load signal can not be negative in magnitude, so at the second step, the correlation coefficient between the residue signal and the weather variable THI(t) is determined. $\hat{L}(t)$, $L(t)$, Re(t) and THI(t) are all time dependent random variables. However, in what follows $\hat{L}(t)$, $L(t)$, Re(t) and THI(t) will be represented by $\hat{L}$, $L$, Re and THI for clarity. The correlation coefficient of Re and THI is expressed as:

$$\therefore R_1 = \frac{E[(\mathrm{Re})(THI)] - E(\mathrm{Re})E(THI)}{\sqrt{\{E(\mathrm{Re}^2) - [E(\mathrm{Re})]^2\}\{E(THI^2) - [E(THI)]^2\}}} \tag{2.6}$$

Where $R_1$ is the correlation coefficient of Re and THI

III. Step-3: In the third step, Re and last decomposed component of load, IMFn are combined to generate a new load signal, $C2f_1$. That is,

$$C2f_1=Re+IMF_n \tag{2.7}$$

Then the correlation coefficient between $C2f_1$ and THI is determined. Mathematically it is expressed as:

$$\therefore R_2 = \frac{E[(C2f_1)(THI)] - E(C2f_1)E(THI)}{\sqrt{\{E(C2f_1^2) - [E(C2f_1)]^2\}\{E(THI^2) - [E(THI)]^2\}}} \tag{2.8}$$

Where, $R_2$= Correlation coefficient of ($C2f_1$ and THI)

IV. Step-4: In this step, Re and $IMF_{n-1}$ are combined as given by:

$$C2f_2= Re+IMF_{n-1} \tag{2.9}$$

Then the correlation between $C2f_2$ and THI is determined. Mathematically it is expressed as:

$$\therefore R_3 = \frac{E[(C2f_2)(THI)] - E(C2f_2)E(THI)}{\sqrt{\{E(C2f_2^2) - [E(C2f_2)]^2\}\{E(THI^2) - [E(THI)]^2\}}} \tag{2.10}$$

Where, $R_3$= Correlation coefficient of ($C2f_2$ and THI)

V. Step-5: Following the similar vein, residue signal is added to all the possible combinations of the IMFs and the corresponding correlation coefficient between each combination and THI is determined.

VI. Step-6: In this step, the maximum value among the correlation coefficients $R_1, R_2, \ldots R_m$ are determined. That is,

$$R_{max}= \max (R_1, R_2, R_3, \ldots, R_m) \tag{2.11}$$

VII. Step-7: In this step, the value of the signal that corresponds to the maximum correlation coefficient is evaluated. This signal represents the weather sensitive portion of the electrical load.

## 2.3.4 A NUMERICAL EXAMPLE ILLUSTRATING THE METHODOLOGY

A numerical example will clarify the proposed methodology. The daily peak load of the year 2006 is considered. The weather sensitive portion of these peak values will be evaluated by applying the proposed methodology. For better assimilation, every step of the proposed methodology is discussed chronologically.

(a) The daily peak load and average THI of the year 2006 is presented graphically in Figure 2.2. THI is multiplied by 15 in order to plot peak load (PL) and THI on the same graph.

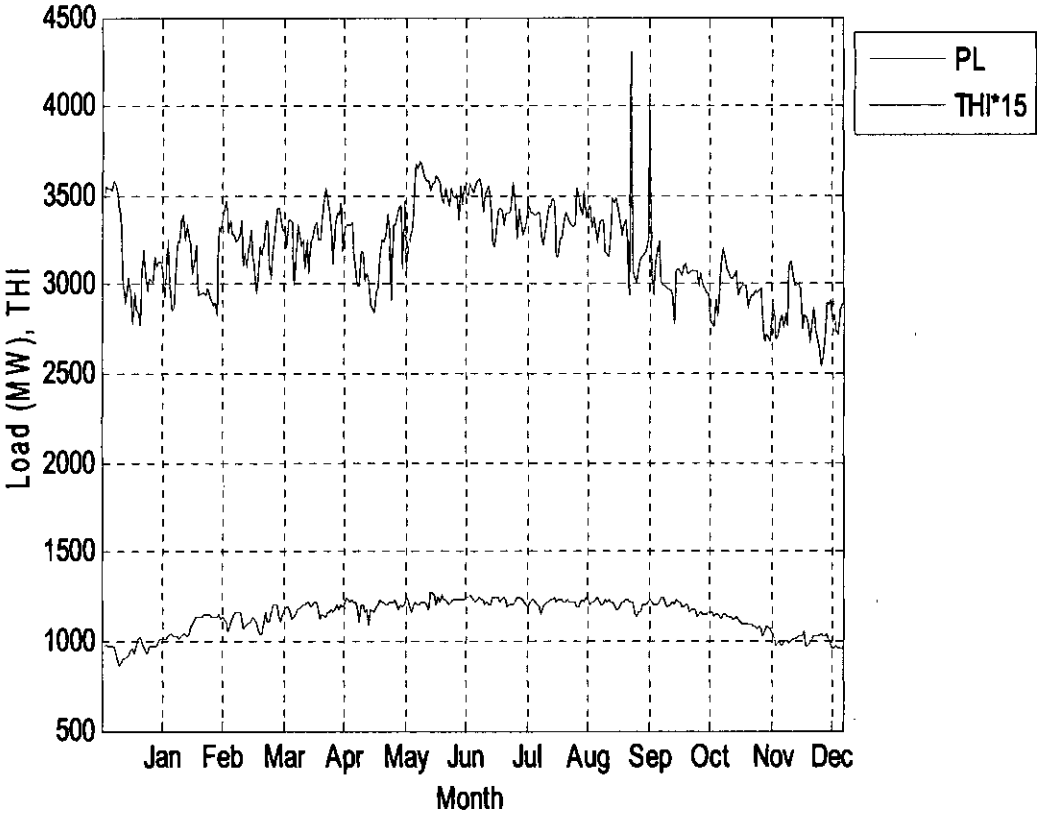


Figure 2.2: Daily peak load and average THI of the year 2006

(b) Minimum value over the whole year is subtracted from the daily peak values to obtain daily modified load. It represented as: $\hat{L}(t) = L(t) - L_{min}$

The daily modified load of the year 2006 is represented graphically in Figure 2.3.

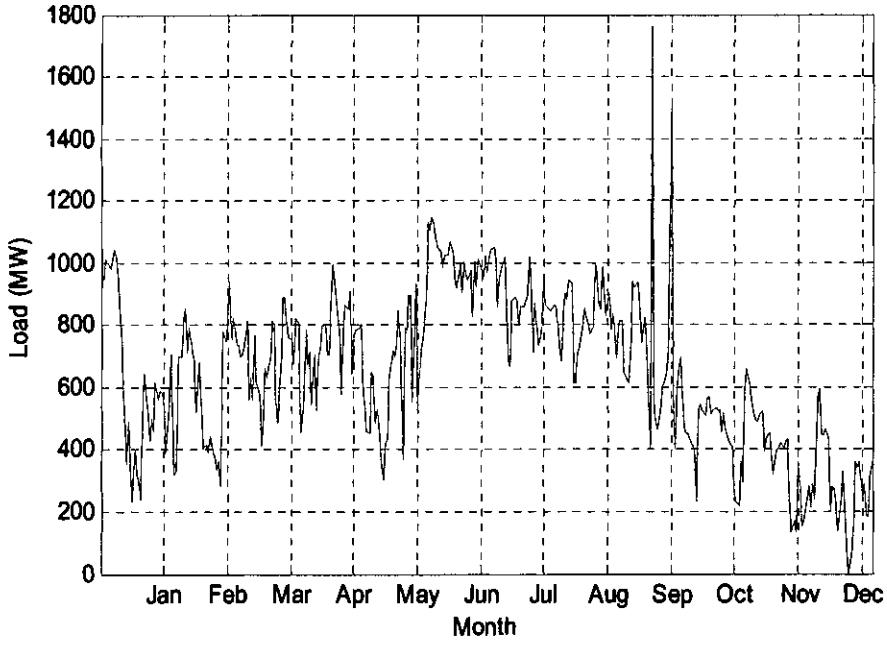


Figure 2.3: Daily modified load of the year 2006.

(c) Decomposition of the daily variable load of the year 2006 using empirical mode decomposition (EMD) technique results seven IMFs and a residue. The residue and the IMFs are presented graphically in the Figures from 2.4 to 2.11.

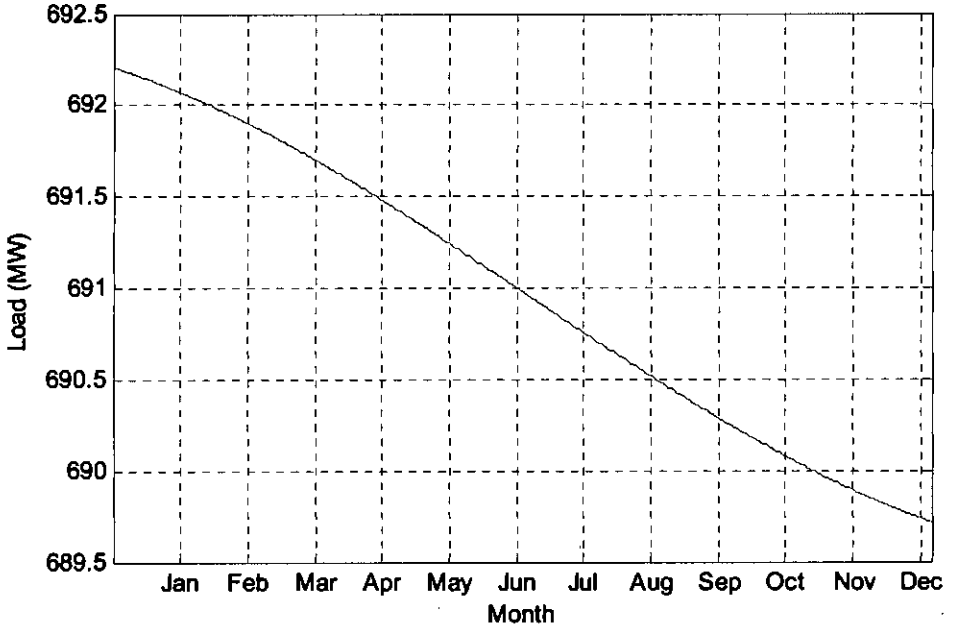


Figure 2.4: Residue of the daily modified load of the year 2006.

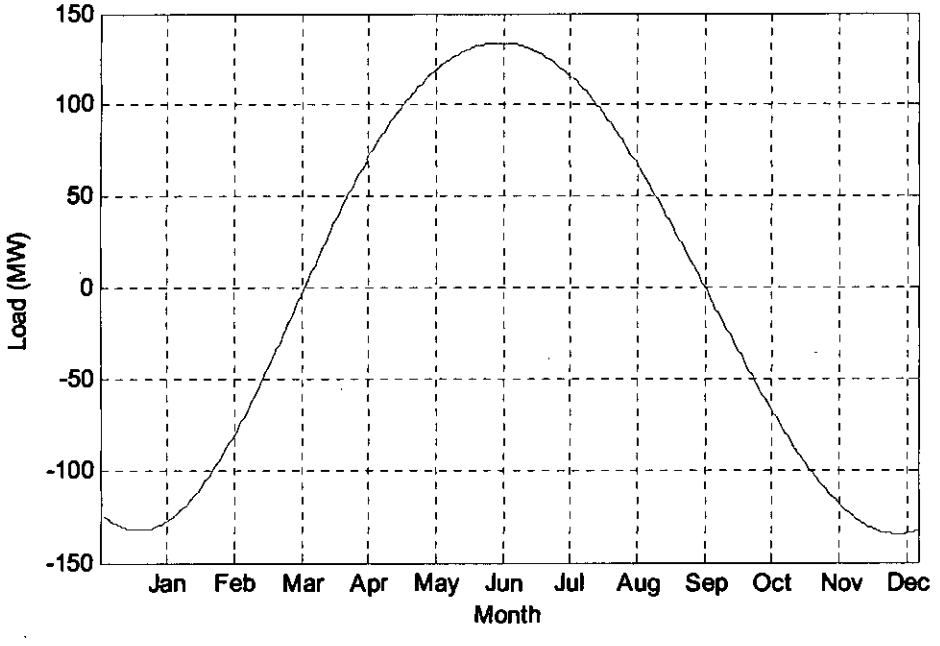


Figure 2.5: 7$^{th}$ IMF of the daily modified load of the year 2006.

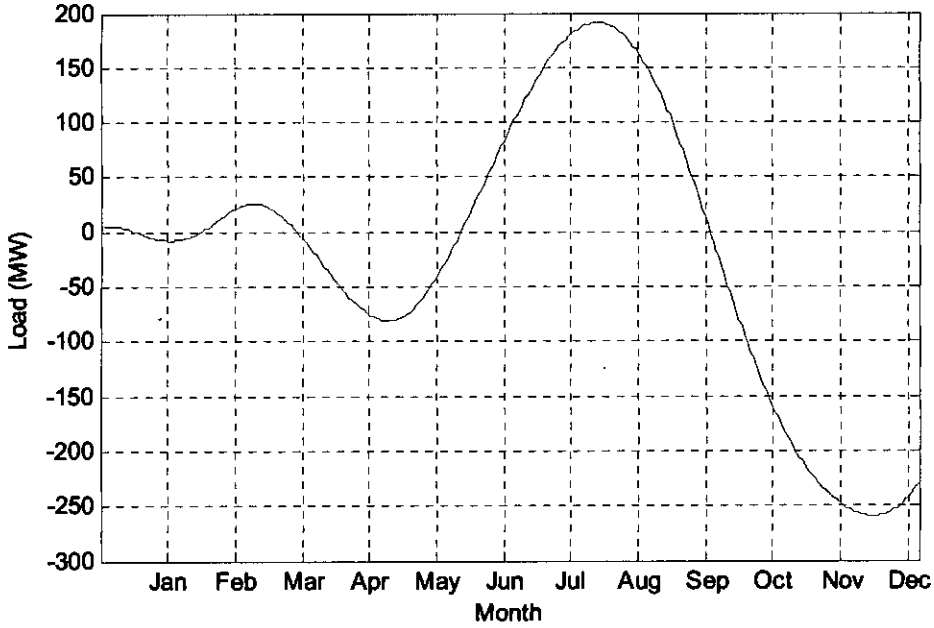


Figure 2.6: 6th IMF of the daily modified load of the year 2006.

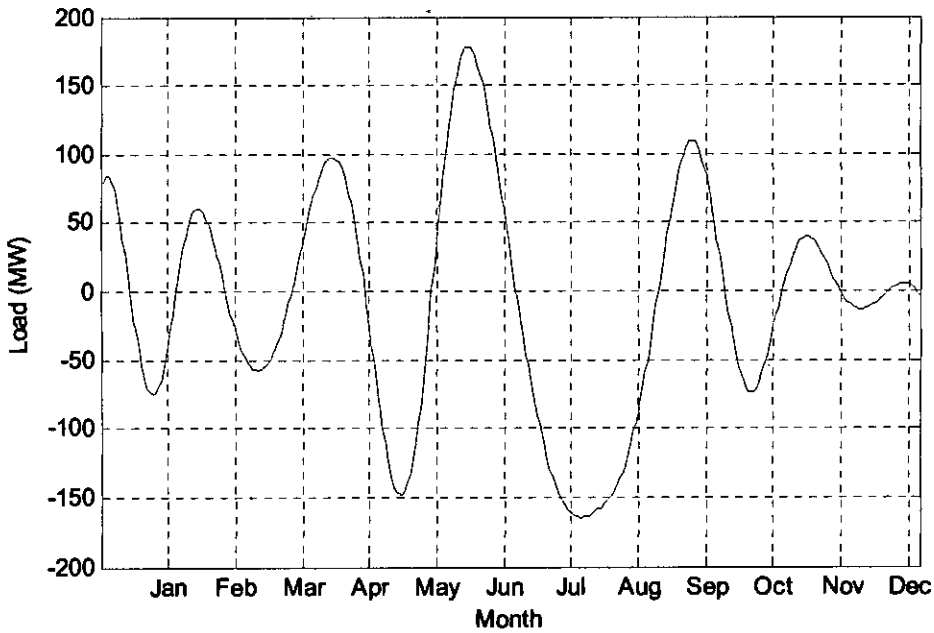


Figure 2.7: 5th IMF of the daily modified load of the year 2006

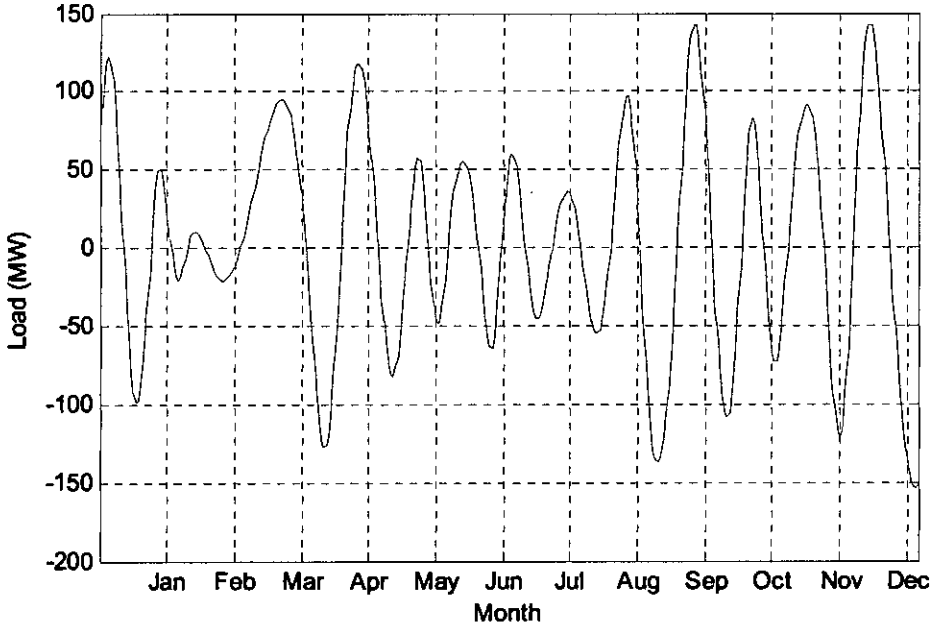


Figure 2.8: 4th IMF of the daily modified load of the year 2006

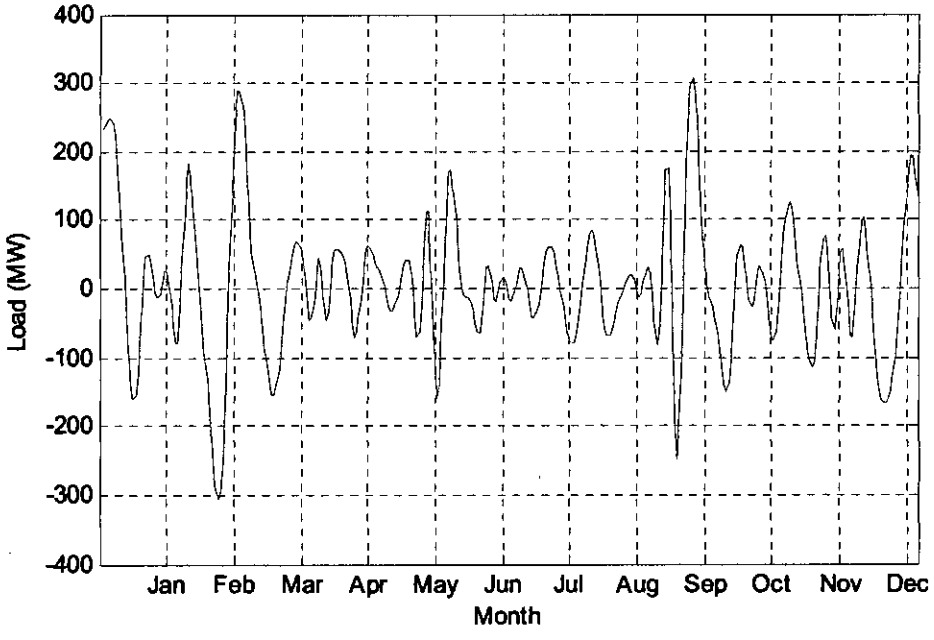


Figure 2.9: 3rd IMF of the daily modified load of the year 2006

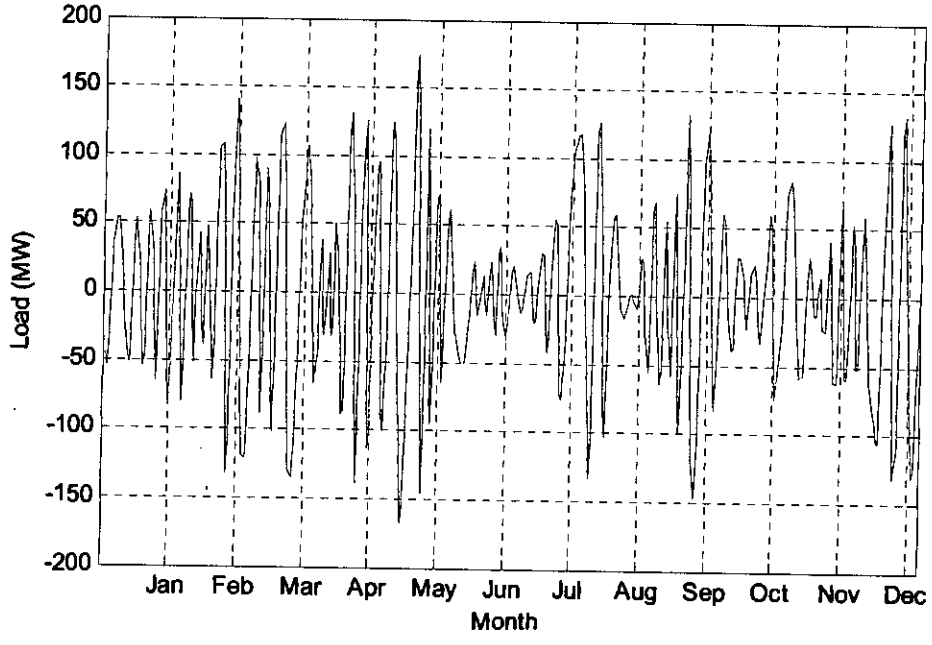


Figure 2.10: 2nd IMF of the daily modified load of the year 2006

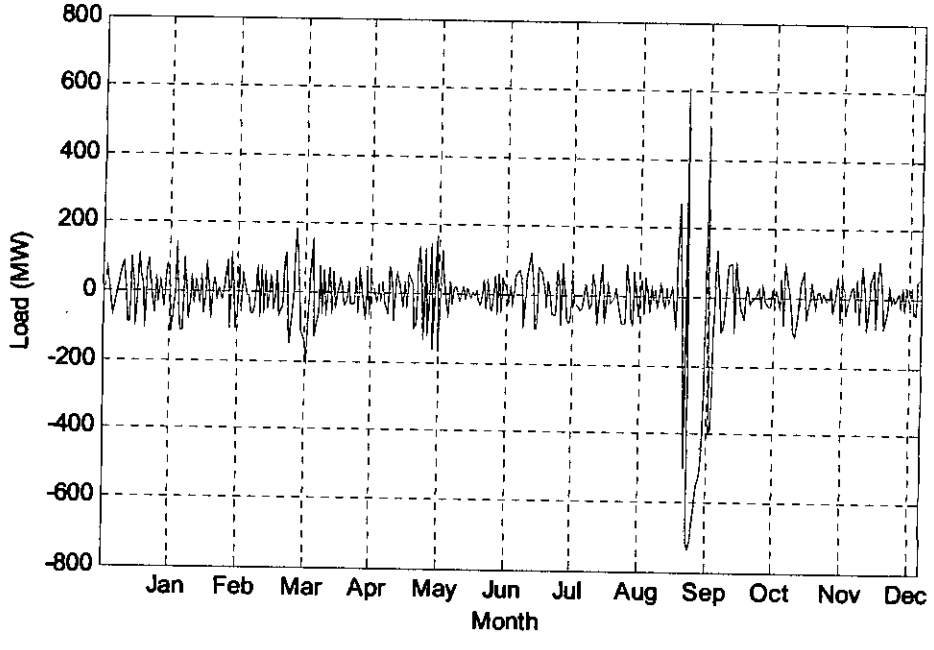


Figure 2.11: 1st IMF of the daily modified load of the year 2006

(d) Combining the seven IMFs, residue and the minimum value of the daily peak load, Figure 2.12 is obtained which actually represents the daily peak load of the year 2006. So, it is evident that, total variable load can be segregated into seven IMFs and a residue component.

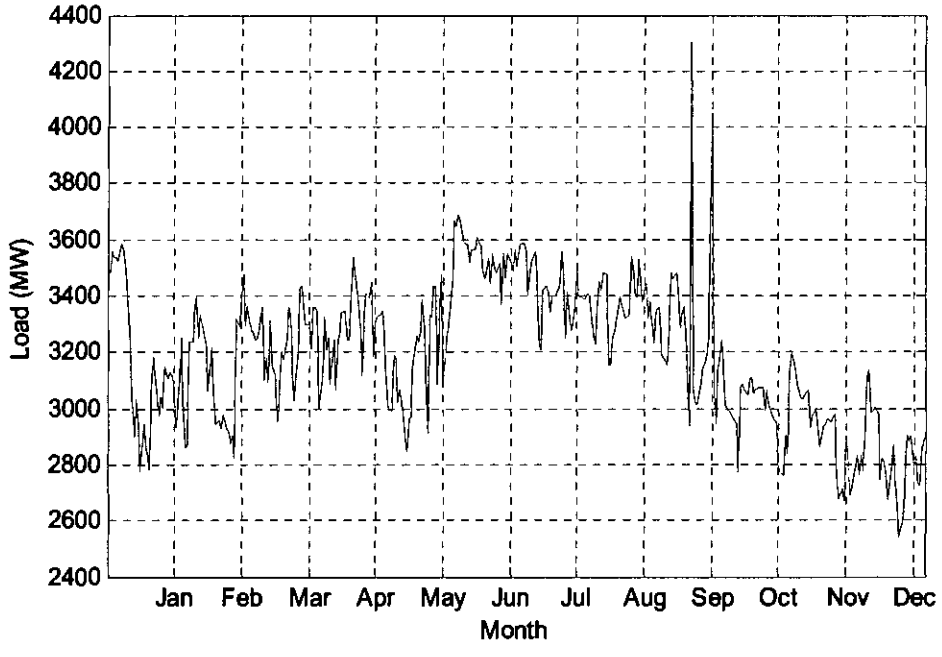


Figure 2.12: Combination of IMFs, residue and minimum value of the daily peak load of the year 2006

(e) Now, the correlation coefficient between the residue and combination of the residue and different IMFs of the variable load of the year 2006 is calculated. The values of these correlation coefficients are listed in Table 2.1 below.

**Table 2.1: Correlation coefficient between the residue and the different combination of residue and IMFs of the year 2006**

| X | Y | Correlation coefficient, R(X,Y) |
|---|---|---|
| Residue | THI | $R_1$= -0.1224 |
| $C2f_1$ = Residue+ IMF 7 | THI | $R_2$= 0.8403 |

| X | Y | Correlation coefficient, R(X,Y) |
|---|---|---|
| $C2f_2$ = Residue + IMF 6 | THI | $R_3 = 0.5159$ |
| $C2f_3$ = Residue + IMF 5 | THI | $R_4 = -0.0736$ |
| C2f4 = Residue + IMF 4 | THI | R5 = -0.0229 |
| $C2f_5$ = Residue + IMF 3 | THI | $R_6 = -0.1094$ |
| $C2f_6$ = Residue + IMF 2 | THI | $R_7 = 0.0809$ |
| $C2f_7$ = Residue + IMF 1 | THI | $R_8 = -0.0545$ |
| $C2f_8$ = Residue + IMF 7+ IMF 6 | THI | $R_9 = 0.7298$ |
| $C2f_9$ = Residue + IMF 7+ IMF 5 | THI | $R_{10} = 0.6412$ |
| $C2f_{10}$ = Residue + IMF 7+ IMF 4 | THI | $R_{11} = 0.6794$ |
| $C2f_{11}$ = Residue + IMF 7+ IMF 3 | THI | $R_{12} = 0.5110$ |
| $C2f_{12}$ = Residue + IMF 7+ IMF 2 | THI | $R_{13} = 0.7304$ |
| $C2f_{13}$ = Residue + IMF 7+ IMF 1 | THI | $R_{14} = 0.4841$ |
| $C2f_{14}$ = Residue + IMF 7+ IMF 6+ IMF 5 | THI | $R_{15} = 0.7075$ |
| $C2f_{15}$ = Residue + IMF 7+ IMF 6+ IMF 4 | THI | $R_{16} = 0.6841$ |
| $C2f_{16}$ = Residue + IMF 7+ IMF 6+ IMF 3 | THI | $R_{17} = 0.6041$ |
| $C2f_{17}$ = Residue + IMF 7+ IMF 6+ IMF 2 | THI | $R_{18} = 0.7062$ |
| $C2f_{18}$ = Residue + IMF 7+ IMF 6+ IMF 1 | THI | $R_{19} = 0.6082$ |

| X | Y | Correlation coefficient, R(X,Y) |
|---|---|---|
| $C2f_{19}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 4 | THI | $R_{20} = 0.6566$ |
| $C2f_{20}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 3 | THI | $R_{21} = 0.5719$ |
| $C2f_{21}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 2 | THI | $R_{22} = 0.6890$ |
| $C2f_{22}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 1 | THI | $R_{23} = 0.6022$ |
| $C2f_{23}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 4 +IMF 3 | THI | $R_{24} = 0.5296$ |
| $C2f_{24}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 4 +IMF 2 | THI | $R_{25} = 0.6441$ |
| $C2f_{25}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 4 +IMF 1 | THI | $R_{26} = 0.5825$ |
| $C2f_{26}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 4 +IMF 3 + IMF 2 | THI | $R_{27} = 0.5324$ |
| $C2f_{27}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 4 +IMF 3 + IMF 1 | THI | $R_{28} = 0.5000$ |
| $C2f_{28}$ = Residue + IMF 7+ IMF 6+ IMF 5 + IMF 4 +IMF 3 + IMF 2 + IMF 1 | THI | $R_{29} = 0.5020$ |

(f) Maximum value of the correlation coefficient is determined as:

$$R_{max} = \max (R_1, R_2, R_3, \ldots R_{29}) = R_2 = 0.8403.$$

The load signal corresponds to this maximum value is $C2f_1$. So, the weather sensitive component of the daily peak load of the year 2006 is given by: $L_w = C_2f_1$.

The graphical representation of the weather sensitive portion of the daily peak load and average THI of the year 2006 is given in the Figure 2.13. THI is multiplied by 5 to represent Lw and THI on the same graph.

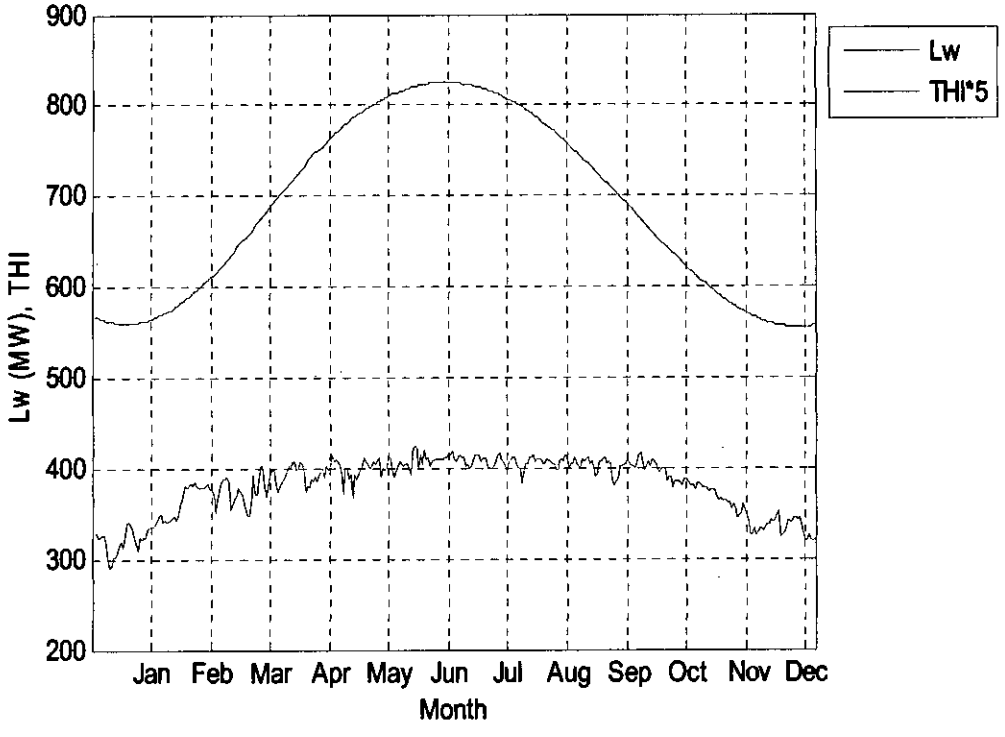


Figure 2.13: Weather sensitive portion of the daily peak load and average THI of the year 2006

## 2.4 VERIFICATION OF THE PROPOSED METHODOLOGY

Verification of the proposed methodology is carried out in this section. The proposed methodology is validated by comparing the results obtained through this technique with those obtained using the techniques proposed in [40] and [41]. The accuracy of results is also verified.

### 2.4.1 CURVE FITTING TECHNIQUE TO EVALUATE THE WEATHER SENSITIVE PORTION OF THE ELECTRICAL LOAD [41]

The weather-load model for every year is obtained by the scatter diagram of the daily peak load vs. one or more weather variables such as temperature and humidity. In this thesis, THI is used to represent the composite weather variable which incorporates the effects of both temperature and humidity.

THI is used to obtain the weather sensitive portion of the daily peak load by fitting the scatter diagram of the weather-load model to appropriate non-linear curves. Historical load of BPS of the year 2006 is considered.

**(a) WEATHER-LOAD MODEL**: Scatter diagram of the weather-load model of the year 2006 is depicted in Figure 2.14.

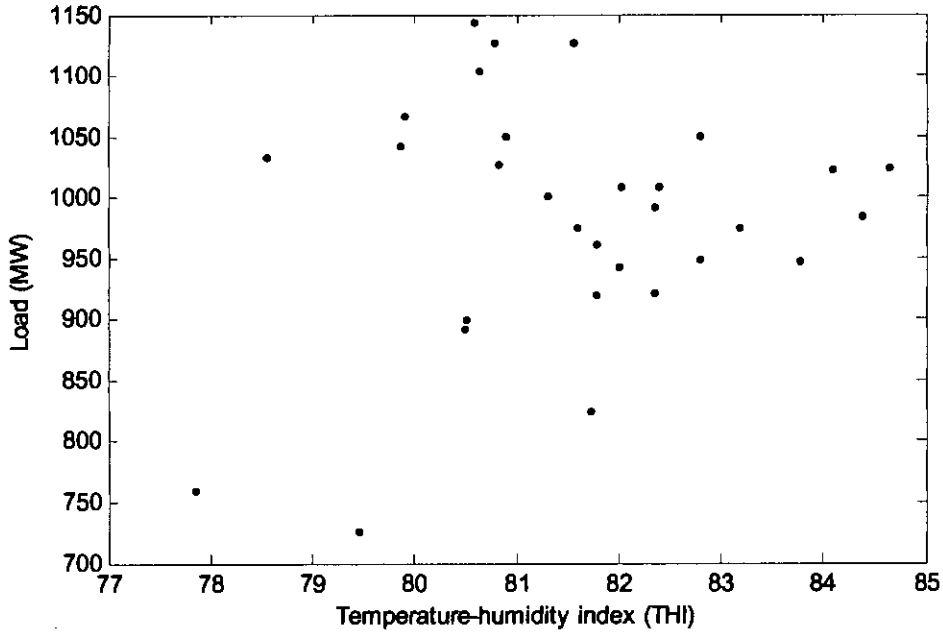


Figure 2.14: Weather-load model of the year 2006

**(b) FITTING NON-LINEAR CURVE TO THE WEATHER- LOAD MODEL:** The weather-load model shown in Figure 2.14 is fitted to the appropriate non-linear curve. The fitted diagram is shown in Figure 2.15.

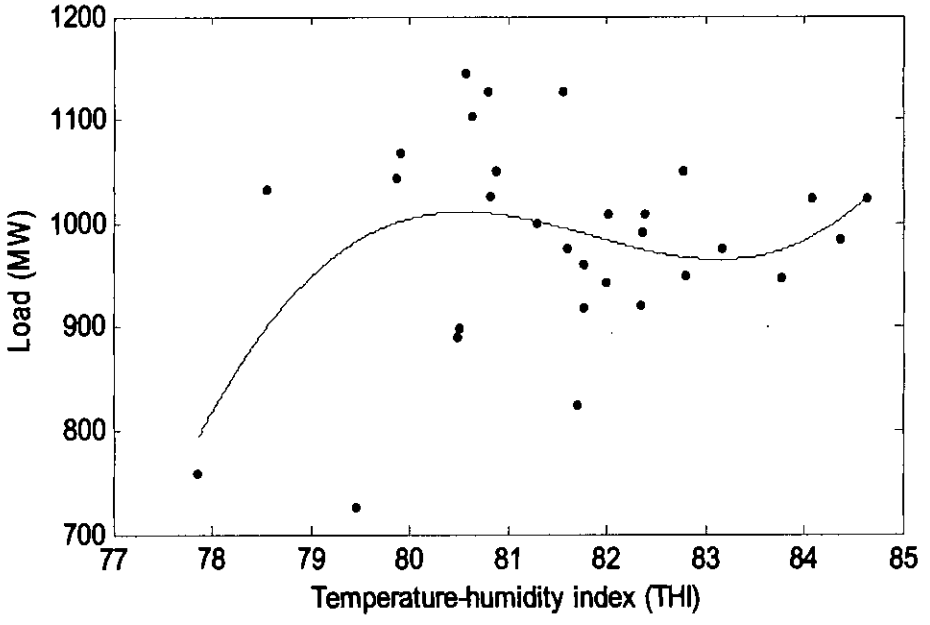


Figure 2.15: Fitted non-linear curve to the weather-load model of the year 2006

The equation of the fitted curve is given by: $a_0x^7+a_1x^6+a_2x^5+a_3x^4+a_4x^3+a_5x^2+a_6x+a_7$. Here 'x' represents temperature-humidity index (THI) and $a_0$ to $a_7$ are the coefficient of the fitted curve. The values of $a_0$ to $a_7$ are listed in the Table 2.2.

**Table 2.2: Coefficients of the fitted curve of Figure 2.15**

| $a_0$ | $a_1$ | $a_2$ | $a_3$ | $a_4$ | $a_5$ | $a_6$ | $a_7$ |
|---|---|---|---|---|---|---|---|
| $27.55\times10^{6}$ | $27.53\times10^{6}$ | 7514.47 | 156.37 | -2.65 | 0.02 | $-2.86\times10^{-4}$ | $3\times10^{-6}$ |

### 2.4.2 COMPARISON OF THE RESULTS

Table 2.3 represents monthly average value of the weather sensitive portion of the peak load obtained from the proposed methodology and those obtained from the weather-load model.

**Table 2.3: Comparison of monthly average value of weather sensitive portion of the load of the year 2006**

| Month | Lw (Avg) (Mw) [Using proposed technique] | Lw (Avg) (Mw) [Using weather-load model] | Difference (MW) |
|---|---|---|---|
| Jan-06 | 562.08 | 502.97 | 59.11 |
| Feb-06 | 584.66 | 509.95 | 74.71 |
| Mar-06 | 648.00 | 557.27 | 90.73 |
| Apr-06 | 728.04 | 683.14 | 44.90 |
| May-06 | 790.59 | 742.92 | 47.67 |
| Jun-06 | 820.71 | 809.72 | 10.99 |
| Jul-06 | 816.91 | 808.27 | 8.64 |
| Aug-06 | 779.29 | 785.38 | 6.09 |
| Sep-06 | 716.81 | 758.15 | 41.34 |
| Oct-06 | 646.50 | 692.86 | 46.36 |
| Nov-06 | 617.80 | 498.46 | 119.34 |
| Dec-06 | 557.74 | 448.71 | 109.03 |

The monthly average values of weather sensitive portion of the load of the year 2006 obtained using proposed methodology and weather-load model are close to each other for most of the observations.

### 2.4.3 COMPARISON OF CORRELATION COEFFICIENTS

In this section, correlation coefficients of $L_w$ and THI are measured for proposed methodology and weather-load model technique. Note that, correlation coefficient between $L_w$ and THI is given by:

$$R = \frac{E[(L_w)(THI)] - E(L_w)E(THI)}{\sqrt{\{E(L_w^2) - [E(L_w)]^2\}\{E(THI^2) - [E(THI)]^2\}}} \tag{2.12}$$

Tables 2.4 to 2.6 present the correlation coefficients for these two techniques of the year 2006 to 2004.

**Table 2.4: Comparison of correlation coefficients of the year 2006**

| Month | R (Proposed methodology) | R (Weather-load model) |
|---|---|---|
| Jan-06 | 0.84 | 0.32 |
| Feb-06 | 0.85 | 0.39 |
| Mar-06 | 0.87 | 0.42 |
| Apr-06 | 0.88 | 0.47 |
| May-06 | 0.89 | 0.52 |
| Jun-06 | 0.95 | 0.21 |
| Jul-06 | 0.92 | 0.37 |
| Aug-06 | 0.91 | 0.26 |
| Sep-06 | 0.87 | 0.42 |
| Oct-06 | 0.86 | 0.59 |
| Nov-06 | 0.85 | 0.52 |
| Dec-06 | 0.83 | 0.29 |

**Table 2.5: Comparison of correlation coefficients of the year 2005**

| Month | R (Proposed methodology) | R (Weather-load model) |
|---|---|---|
| Jan-05 | 0.85 | 0.62 |
| Feb-05 | 0.85 | 0.39 |
| Mar-05 | 0.89 | 0.59 |
| Apr-05 | 0.90 | 0.19 |
| May-05 | 0.91 | 0.23 |
| Jun-05 | 0.97 | 0.51 |
| Jul-05 | 0.95 | 0.32 |
| Aug-05 | 0.94 | 0.27 |
| Sep-05 | 0.89 | 0.56 |
| Oct-05 | 0.88 | 0.58 |
| Nov-05 | 0.86 | 0.38 |
| Dec-05 | 0.81 | 0.17 |

**Table 2.6: Comparison of correlation coefficients of the year 2004**

| Month | R (Proposed methodology) | R (Weather-load model) |
|---|---|---|
| Jan-04 | 0.83 | 0.58 |
| Feb-04 | 0.85 | 0.33 |
| Mar-04 | 0.87 | 0.48 |
| Apr-04 | 0.88 | 0.27 |
| May-04 | 0.89 | 0.39 |
| Jun-04 | 0.96 | 0.57 |
| Jul-04 | 0.95 | 0.42 |
| Aug-04 | 0.91 | 0.38 |
| Sep-04 | 0.88 | 0.26 |
| Oct-04 | 0.86 | 0.29 |
| Nov-04 | 0.85 | 0.59 |
| Dec-04 | 0.84 | 0.27 |

Correlation coefficients between $L_w$ and THI for proposed methodology and weather-load model of the year 2006 to 2004 are compared in Figures 2.16 to 2.18 for better observations.

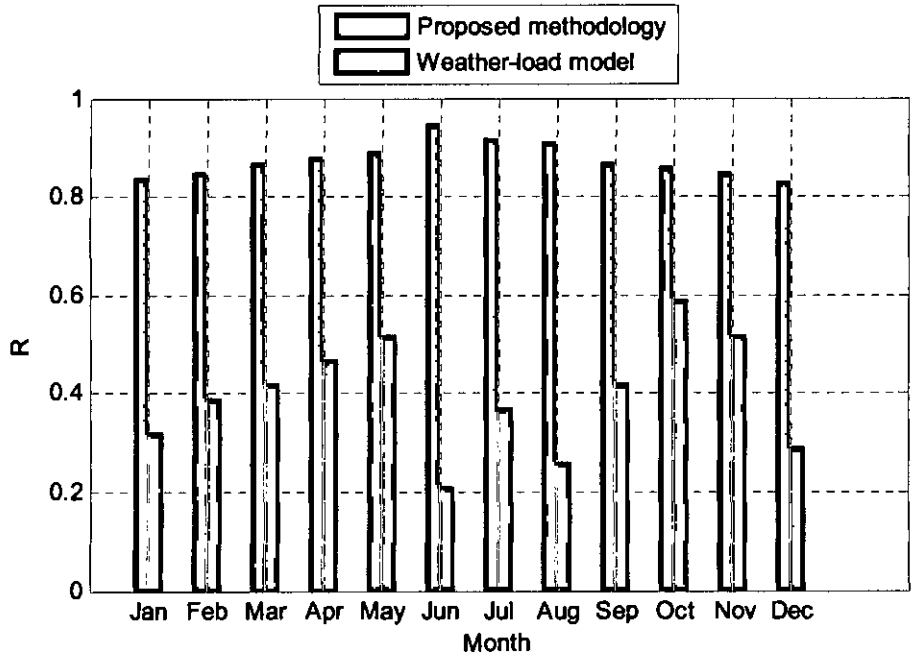


Figure 2.16: Comparison of correlation coefficients of the year 2006

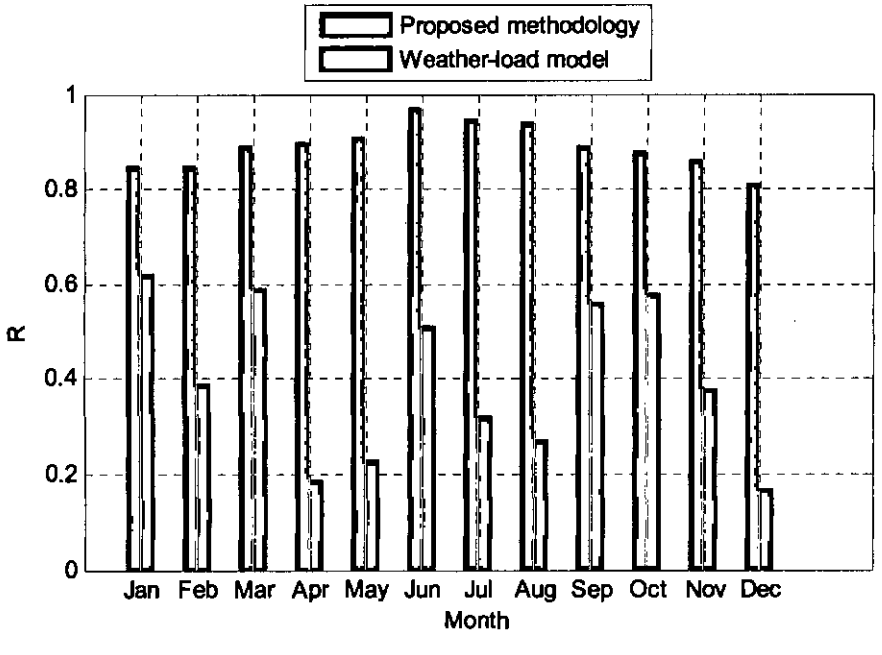


Figure 2.17: Comparison of correlation coefficients of the year 2005

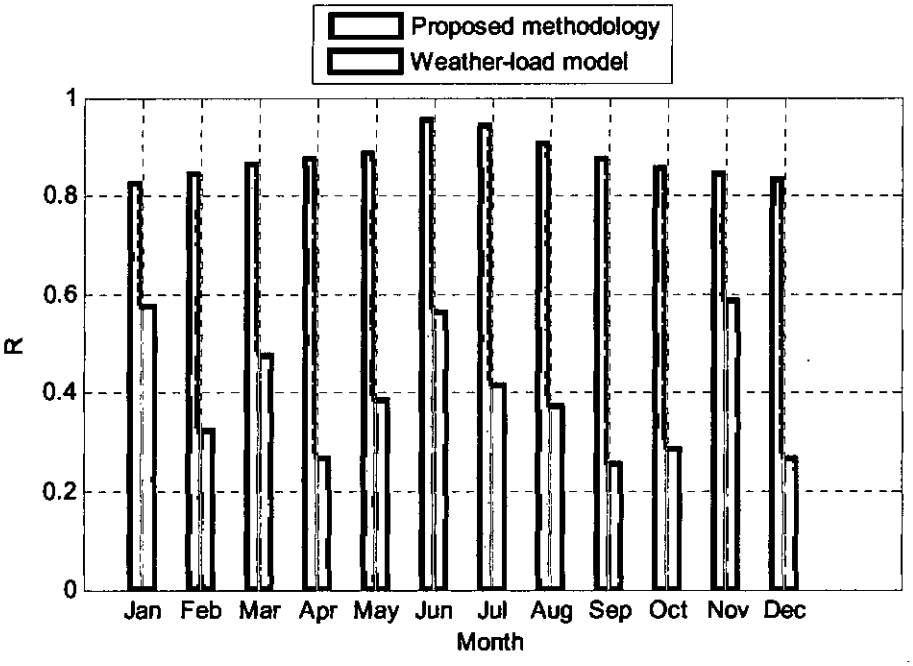


Figure 2.18: Comparison of correlation coefficients of the year 2004

The comparisons from Table 2.4 to 2.6 and Figures 2.16 to 2.18 clearly reveal that the correlation coefficients between the weather sensitive portions of the load and THI for the proposed methodology are greater than that of weather-load model.

### 2.4.4 COMPARISON OF VARIANCES

In this section the variances of $L_w$ for proposed methodology and weather-load model is calculated and these are compared with the variances of corresponding THI. Note that, the variance of any data set 'y' is expressed by:

$$\sigma^2 = \frac{1}{n}\sum_{i=1}^{n}(y_i - \bar{y})^2 \qquad (2.13)$$

Here, yi= i-th sample of the data set 'y'

$\bar{y}$ = Average value of the data set 'y' and

n= Total number of samples of the data set 'y'

Tables 2.7 to 2.9 present the variances of $L_w$ for proposed methodology and weather-load model and corresponding THI of the year 2006 to 2004.

**Table 2.7: Comparison of variances of the year 2006**

| Month | Variance of $L_w$ (Proposed methodology) | Variance of $L_w$ (Weather-load model) | Variance of THI | Difference in variance between $L_w$ and THI (Proposed methodology) | Difference in variance between $L_w$ and THI (Weather-load model) |
|---|---|---|---|---|---|
| Jan-06 | 5.16 | 10227.82 | 7.11 | 1.95 | 10220.71 |
| Feb-06 | 172.90 | 4360.01 | 12.75 | 160.15 | 4347.26 |
| Mar-06 | 548.81 | 7370.71 | 8.47 | 540.33 | 7362.24 |
| Apr-06 | 487.85 | 6585.49 | 3.99 | 483.86 | 6581.50 |
| May-06 | 198.02 | 7962.19 | 5.00 | 193.02 | 7957.19 |
| Jun-06 | 15.84 | 4963.01 | 2.59 | 13.25 | 4960.42 |
| Jul-06 | 39.05 | 2496.25 | 1.29 | 37.76 | 2494.95 |
| Aug-06 | 247.43 | 3002.85 | 1.60 | 245.83 | 3001.25 |
| Sep-06 | 407.03 | 5151.70 | 2.82 | 404.21 | 5148.88 |
| Oct-06 | 413.89 | 8670.83 | 4.88 | 409.01 | 8665.94 |
| Nov-06 | 191.36 | 2500.10 | 10.24 | 181.12 | 2489.85 |
| Dec-06 | 10.63 | 102.09 | 3.35 | 7.28 | 98.74 |

**Table 2.8: Comparison of variances of the year 2005**

| Month | Variance of $L_w$ (Proposed methodology) | Variance of $L_w$ (Weather-load model) | Variance of THI | Difference in variance between $L_w$ and THI (Proposed methodology) | Difference in variance between $L_w$ and THI (Weather-load model) |
|---|---|---|---|---|---|
| Jan-05 | 5.19 | 11134.91 | 4.23 | 0.96 | 11130.68 |
| Feb-05 | 170.93 | 1926.56 | 16.03 | 154.90 | 1910.53 |
| Mar-05 | 546.21 | 2732.48 | 6.21 | 540.00 | 2726.26 |
| Apr-05 | 483.32 | 1831.64 | 4.96 | 478.36 | 1826.68 |
| May-05 | 192.36 | 2076.38 | 9.37 | 182.99 | 2067.01 |
| Jun-05 | 14.72 | 1437.07 | 4.22 | 10.50 | 1432.84 |
| Jul-05 | 38.96 | 169.02 | 1.96 | 37.00 | 167.06 |
| Aug-05 | 242.36 | 11.09 | 0.89 | 241.47 | 10.20 |
| Sep-05 | 409.69 | 33.09 | 1.82 | 407.87 | 31.27 |
| Oct-05 | 412.93 | 2548.26 | 5.66 | 407.27 | 2542.60 |
| Nov-05 | 190.32 | 828.48 | 6.79 | 183.53 | 821.68 |
| Dec-05 | 9.98 | 629.27 | 2.95 | 7.03 | 626.32 |

**Table 2.9: Comparison of variances of the year 2004**

| Month | Variance of $L_w$ (Proposed methodology) | Variance of $L_w$ (Weather-load model) | Variance of THI | Difference in variance between $L_w$ and THI (Proposed methodology) | Difference in variance between $L_w$ and THI (Weather-load model) |
|---|---|---|---|---|---|
| Jan-04 | 4.90 | 2161.89 | 11.13 | 6.23 | 2150.76 |
| Feb-04 | 186.32 | 2295.28 | 14.55 | 171.77 | 2280.73 |
| Mar-04 | 522.12 | 1275.69 | 19.45 | 502.67 | 1256.24 |

| | | | | | |
|---|---|---|---|---|---|
| Apr-04 | 416.96 | 2115.26 | 7.99 | 408.97 | 2107.27 |
| May-04 | 187.23 | 7986.62 | 5.85 | 181.38 | 7980.77 |
| Jun-04 | 12.54 | 1831.43 | 2.61 | 9.93 | 1828.81 |
| Jul-04 | 32.39 | 1057.92 | 1.21 | 31.18 | 1056.72 |
| Aug-04 | 217.59 | 505.03 | 0.73 | 216.86 | 504.29 |
| Sep-04 | 400.36 | 2374.84 | 4.55 | 395.81 | 2370.29 |
| Oct-04 | 412.32 | 1288.36 | 3.58 | 408.74 | 1284.78 |
| Nov-04 | 187.38 | 377.23 | 3.01 | 184.37 | 374.22 |
| Dec-04 | 9.77 | 2389.16 | 7.89 | 1.88 | 2381.27 |

In this section it is clearly observed that the difference in variance between $L_w$ and THI for proposed methodology is much smaller than that of weather-load model. It reveals that the weather sensitive portion of the load results from the proposed methodology is more accurate than that of weather-load model.

# CHAPTER 3

# BASIC DATA

## 3.1 INTRODUCTION

In order to apply the proposed methodology, electrical load and weather parameters data are required. This chapter represents the past historical data of daily peak load of Bangladesh Power System (BPS). It also presents the historical meteorological data of Bangladesh. Temperature and relative humidity data of Bangladesh is presented under the meteorological data. These data are collected from the various sources.

## 3.2 COLLECTION OF DAILY PEAK LOAD DATA

The daily peak load data of Bangladesh Power System are collected for nine historical years (1998-2006).The daily peak load data from the year 1998 to the year 2002 are collected from [55]. Data from the year 2003 to the year 2005 is collected from the National Load Dispatch Center (NLDC) of Bangladesh [56]. Daily peak load data of the year 2006 is collected from [57]. Data that are collected from [55 ] and [57] i.e. the daily peak load data of the year 1998, 1999, 2000, 2001, 2002 and 2006 were also collected from the National Load Dispatch Center (NLDC) of Bangladesh by the respective authors.

## 3.3 COLLECTION OF METEOROLOGICAL DATA

Temperature, relative humidity and rain fall are the major meteorological information that are recorded by the Bangladesh Meteorological Department (BMD), located at Agargaon, Dhaka. [58]. BMD records three hourly temperature and relative humidity data in thirty four weather stations located all over the country. They record the meteorological information in their own data base. Three hourly temperature and relative humidity data of all thirty four stations from the year 1993 to the year 2006 are collected in soft form from BMD. When the data were collected, BMD was unable to supply the meteorological information beyond the year 2006 due to their data base maintenance. In order to incorporate the regional weather variation of Bangladesh, daily average temperature and daily average relative humidity is calculated using the respective three hourly information of all the thirty four weather stations. Using these daily average

temperature and daily average relative humidity, average temperature- humidity index (THI) is calculated by applying the following relationship:

THI = (1.8*T+32) - ((0.55-0.0055*RH) * (1.8*T-26))

Where T=Temperature (Degree Celsius) and RH=Relative Humidity (%)

THI is used as the weather variable to apply the developed methodology on the daily peak load of the Bangladesh Power System.

### 3.4 RELIABILITY OF THE COLLECTED DATA

In the NLDC, the load data are recorded at every hour by reading the energy meters located in it. Data is stored in their own data base in soft form. Though there is little chance in the recording process of the load data, but the loads of the some hours of the day do not represent the actual system demand, because in most of the cases, peak demand is shaved by load shedding due to shortage of generation capacity. The amount of load reduced due to load shedding is not recorded and also it is difficult to assess. The actual peak load will be the recorded load plus the shedded load. Therefore, the reliability of the collected daily peak load data does not remain beyond doubt.

Bangladesh Meteorological Department (BMD) records the three hourly temperature by using thermo meter and relative humidity by using hygro meter in thirty four weather stations located all over the country. These data are sent to the data base of BMD using telemetry. After some manipulation, these data are stored in the data base of BMD in soft form. Though there is a chance of error in the transmission link between the remote weather station and BMD premises, but it can be conclude that the reliability of the meteorological information is much higher than that of load data.

### 3.5 SAMPLE DATA

In this section, data of average temperature, relative humidity, temperature-humidity index (THI) and daily peak load of Bangladesh of January and June, 2006 is presented as a sample in Table 3.1 and 3.2. All these data from the year 2006 to 1998 is enclosed in the Appendix (Tables A1 to A9)

**Table 3.1: Meteorological and load data of January, 2006 of Bangladesh**

| Date | $T_{avg}$ (°C) | $RH_{avg}$ (%) | $THI_{avg}$ | PL (MW) |
|---|---|---|---|---|
| 1-Jan-06 | 19.9 | 65.1 | 65.2 | 3483.0 |
| 2-Jan-06 | 20.2 | 63.10 | 65.4 | 3554.0 |
| 3-Jan-06 | 19.3 | 68.8 | 64.5 | 3537.0 |
| 4-Jan-06 | 19.3 | 67.5 | 64.6 | 3536.0 |
| 5-Jan-06 | 19.5 | 63.1 | 64.8 | 3522.0 |
| 6-Jan-06 | 19.2 | 74.3 | 64.9 | 3582.0 |
| 7-Jan-06 | 18.0 | 78.9 | 63.2 | 3565.0 |
| 8-Jan-06 | 15.5 | 90.0 | 59.6 | 3506.0 |
| 9-Jan-06 | 14.4 | 92.0 | 57.9 | 3426.0 |
| 10-Jan-06 | 14.7 | 90.1 | 58.3 | 3313.0 |
| 11-Jan-06 | 16.2 | 78.4 | 60.1 | 3010.0 |
| 12-Jan-06 | 16.3 | 85.0 | 60.4 | 2897.0 |
| 13-Jan-06 | 17.0 | 83.4 | 61.5 | 3029.0 |
| 14-Jan-06 | 18.0 | 80.4 | 62.9 | 2943.7 |
| 15-Jan-06 | 18.8 | 70.4 | 63.6 | 2770.8 |
| 16-Jan-06 | 17.7 | 72.5 | 62.3 | 2943.7 |
| 17-Jan-06 | 19.4 | 72.6 | 64.7 | 2859.7 |
| 18-Jan-06 | 20.5 | 85.3 | 67.8 | 2838.2 |
| 19-Jan-06 | 21.3 | 73.6 | 67.9 | 2777.3 |
| 20-Jan-06 | 21.2 | 53.5 | 66.6 | 3056.3 |
| 21-Jan-06 | 20.2 | 54.5 | 64.8 | 3181.7 |
| 22-Jan-06 | 19.0 | 55.8 | 63.2 | 3057.2 |
| 23-Jan-06 | 18.0 | 54.1 | 61.7 | 2968.2 |
| 24-Jan-06 | 19.4 | 64.3 | 64.7 | 3036.2 |
| 25-Jan-06 | 19.6 | 47.4 | 64.3 | 3001.2 |
| 26-Jan-06 | 19.7 | 57.3 | 64.8 | 3150.0 |
| 27-Jan-06 | 19.4 | 68.1 | 64.8 | 3103.5 |
| 28-Jan-06 | 21.0 | 58.9 | 66.5 | 3126.2 |
| 29-Jan-06 | 21.5 | 56.1 | 67.0 | 3123.2 |
| 30-Jan-06 | 21.5 | 57.8 | 67.0 | 3083.7 |
| 31-Jan-06 | 21.1 | 69.9 | 67.2 | 2928.6 |

**Table 3.2: Meteorological and load data of June, 2006 of Bangladesh**

| Date | $T_{avg}$ (°C) | $RH_{avg}$ (%) | $THI_{avg}$ | PL (MW) |
|---|---|---|---|---|
| 1-Jun-06 | 27.6 | 83.3 | 79.5 | 3266.5 |
| 2-Jun-06 | 26.2 | 89.4 | 77.9 | 3300.7 |
| 3-Jun-06 | 27.9 | 88.5 | 80.5 | 3432.3 |
| 4-Jun-06 | 28.8 | 84.8 | 81.6 | 3667.5 |
| 5-Jun-06 | 28.3 | 84.4 | 80.6 | 3644.1 |
| 6-Jun-06 | 28.1 | 85.6 | 80.6 | 3685.1 |
| 7-Jun-06 | 28.6 | 81.9 | 80.8 | 3667.6 |
| 8-Jun-06 | 29.1 | 77.1 | 80.9 | 3591.1 |
| 9-Jun-06 | 27.6 | 86.6 | 79.9 | 3584.1 |
| 10-Jun-06 | 26.1 | 96.1 | 78.6 | 3574.9 |
| 11-Jun-06 | 30.6 | 84.1 | 84.4 | 3525.2 |
| 12-Jun-06 | 31.0 | 81.5 | 84.6 | 3565.2 |
| 13-Jun-06 | 30.6 | 82.1 | 84.1 | 3564.2 |
| 14-Jun-06 | 27.8 | 83.6 | 79.9 | 3608.0 |
| 15-Jun-06 | 29.8 | 82.0 | 82.8 | 3591.8 |
| 16-Jun-06 | 28.7 | 83.8 | 80.8 | 3567.7 |
| 17-Jun-06 | 30.9 | 78.1 | 83.8 | 3488.2 |
| 18-Jun-06 | 28.7 | 87.8 | 81.8 | 3460.7 |
| 19-Jun-06 | 29.6 | 83.3 | 82.4 | 3532.6 |
| 20-Jun-06 | 28.5 | 80.1 | 80.5 | 3441.2 |
| 21-Jun-06 | 29.5 | 75.5 | 81.3 | 3541.2 |
| 22-Jun-06 | 29.2 | 81.9 | 81.8 | 3502.2 |
| 23-Jun-06 | 29.9 | 75.4 | 82.0 | 3484.2 |
| 24-Jun-06 | 29.3 | 78.9 | 81.6 | 3515.9 |
| 25-Jun-06 | 29.3 | 79.9 | 81.7 | 3365.2 |
| 26-Jun-06 | 29.7 | 78.3 | 82.0 | 3549.0 |
| 27-Jun-06 | 30.1 | 76.3 | 82.4 | 3462.3 |
| 28-Jun-06 | 29.8 | 79.4 | 82.4 | 3549.7 |
| 29-Jun-06 | 30.7 | 75.5 | 83.2 | 3516.1 |
| 30-Jun-06 | 30.6 | 75.3 | 82.8 | 3490.2 |

# CHAPTER 4

# RESULTS AND DISCUSSIONS

## 4.1 INTRODUCTION

The objective of this thesis is to develop a methodology for identification of weather sensitive portion of the electrical load. This thesis proposes a new methodology base on EMD technique and the developed methodology is applied to the historical load of Bangladesh Power System (BPS). This chapter presents the results both for peak loads and hourly loads. Discussions on the obtained results are also presented here.

## 4.2 IDENTIFICATION OF WEATHER SENSITIVE PORTION OF DAILY PEAK LOAD OF BANGLADESH POWER SYSTEM

The proposed methodology is applied to the historical daily peak load of Bangladesh Power System from the year 1998 to the year 2006. The weather sensitive portion of the daily peak load for mentioned duration is calculated by following the steps described in the section 2.3.3. Tables 4.1 to 4.3 represent the weather dependent portion of the daily peak load ($L_w$) of the year 2006. The weather sensitive portion of the daily peak load from the year 2005 to the year 1998 is represented in the Appendix (Tables A2 to A9)

**Table 4.1: Weather sensitive component of the daily peak load of BPS of January to April, 2006**

| | January | | February | | March | | April | |
|---|---|---|---|---|---|---|---|---|
| Day | PL (MW) | Lw (MW) | PL (MW) | Lw (MW) | PL (MW) | Lw (MW) | PL (MW) | Lw (MW) |
| 1 | 3483.00 | 567.49 | 3099.90 | 566.09 | 3382.40 | 610.93 | 3212.00 | 690.40 |
| 2 | 3554.00 | 566.59 | 3246.80 | 567.01 | 3475.50 | 613.14 | 3360.10 | 693.12 |
| 3 | 3537.00 | 565.74 | 2981.30 | 567.99 | 3293.00 | 615.39 | 3358.00 | 695.84 |
| 4 | 3536.00 | 564.95 | 2859.10 | 569.02 | 3361.40 | 617.67 | 3347.10 | 698.56 |
| 5 | 3522.00 | 564.21 | 2870.10 | 570.12 | 3276.60 | 619.99 | 2994.00 | 701.26 |
| 6 | 3582.00 | 563.53 | 3236.60 | 571.26 | 3273.10 | 622.33 | 3103.10 | 703.96 |
| 7 | 3565.00 | 562.89 | 3236.60 | 572.47 | 3240.50 | 624.71 | 3328.00 | 706.65 |
| 8 | 3506.00 | 562.32 | 3357.80 | 573.72 | 3247.90 | 627.11 | 3212.00 | 709.32 |
| 9 | 3426.00 | 561.79 | 3392.40 | 575.03 | 3276.10 | 629.54 | 3253.00 | 711.99 |
| 10 | 3313.00 | 561.32 | 3251.30 | 576.39 | 3358.70 | 632.00 | 3086.70 | 714.64 |
| 11 | 3010.00 | 560.91 | 3333.10 | 577.80 | 3096.50 | 634.49 | 3244.90 | 717.27 |
| 12 | 2897.00 | 560.56 | 3253.70 | 579.26 | 3174.00 | 637.00 | 3064.90 | 719.89 |
| 13 | 3029.00 | 560.26 | 3227.50 | 580.77 | 3094.70 | 639.54 | 3243.10 | 722.48 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 14 | 2943.70 | 560.02 | 3059.10 | 582.33 | 3308.90 | 642.09 | 3264.30 | 725.06 |
| 15 | 2770.80 | 559.84 | 3131.70 | 583.94 | 3156.10 | 644.67 | 3337.30 | 727.62 |
| 16 | 2943.70 | 559.71 | 3219.00 | 585.59 | 3117.10 | 647.27 | 3343.30 | 730.15 |
| 17 | 2859.70 | 559.65 | 2942.00 | 587.29 | 2949.90 | 649.89 | 3244.50 | 732.65 |
| 18 | 2838.20 | 559.64 | 2949.60 | 589.03 | 3022.10 | 652.52 | 3245.00 | 735.13 |
| 19 | 2777.30 | 559.70 | 2953.60 | 590.82 | 3203.50 | 655.17 | 3372.60 | 737.59 |
| 20 | 3056.30 | 559.81 | 2930.10 | 592.65 | 3173.10 | 657.83 | 3536.50 | 740.02 |
| 21 | 3181.70 | 559.99 | 2978.50 | 594.53 | 3241.00 | 660.51 | 3485.60 | 742.42 |
| 22 | 3057.20 | 560.23 | 2930.10 | 596.44 | 3358.20 | 663.19 | 3383.20 | 744.80 |
| 23 | 2968.20 | 560.53 | 2913.50 | 598.40 | 3341.70 | 665.89 | 3298.20 | 747.14 |
| 24 | 3036.20 | 560.90 | 2875.50 | 600.39 | 3108.00 | 668.60 | 3116.30 | 749.46 |
| 25 | 3001.20 | 561.33 | 2900.50 | 602.42 | 3025.90 | 671.31 | 3327.10 | 751.75 |
| 26 | 3150.00 | 561.82 | 2821.60 | 604.50 | 3210.10 | 674.03 | 3406.90 | 754.01 |
| 27 | 3103.50 | 562.38 | 3319.10 | 606.60 | 3428.80 | 676.75 | 3394.00 | 756.24 |
| 28 | 3126.20 | 563.00 | 3288.00 | 608.75 | 3431.50 | 679.48 | 3450.90 | 758.43 |
| 29 | 3123.20 | 563.68 | | | 3349.00 | 682.21 | 3184.30 | 760.60 |
| 30 | 3083.70 | 564.42 | | | 3299.80 | 684.94 | 3301.50 | 762.73 |
| 31 | 2928.60 | 565.22 | | | 3295.10 | 687.67 | | |

**Table 4.2: Weather sensitive component of the daily peak load of BPS of May to August, 2006**

| Day | May | | June | | July | | August | |
|---|---|---|---|---|---|---|---|---|
| | PL (MW) | Lw (MW) | PL (MW) | Lw (MW) | PL (MW) | Lw (MW) | PL (MW) | Lw (MW) |
| 1 | 3327.00 | 764.83 | 3266.50 | 812.02 | 3559.50 | 824.38 | 3387.20 | 802.99 |
| 2 | 3330.50 | 766.90 | 3300.70 | 812.96 | 3511.20 | 824.23 | 3390.40 | 801.73 |
| 3 | 3342.70 | 768.93 | 3432.30 | 813.86 | 3551.40 | 824.04 | 3406.80 | 800.42 |
| 4 | 3180.30 | 770.92 | 3667.50 | 814.73 | 3585.20 | 823.82 | 3399.80 | 799.09 |
| 5 | 3093.10 | 772.89 | 3644.10 | 815.56 | 3586.80 | 823.56 | 3258.10 | 797.72 |
| 6 | 2996.40 | 774.81 | 3685.10 | 816.35 | 3554.50 | 823.27 | 3228.80 | 796.31 |
| 7 | 2991.70 | 776.70 | 3667.60 | 817.11 | 3399.60 | 822.94 | 3359.70 | 794.87 |
| 8 | 3186.80 | 778.55 | 3591.10 | 817.83 | 3490.60 | 822.57 | 3444.40 | 793.40 |
| 9 | 3178.00 | 780.37 | 3584.10 | 818.51 | 3519.60 | 822.17 | 3422.40 | 791.89 |
| 10 | 3023.30 | 782.15 | 3574.90 | 819.16 | 3555.90 | 821.73 | 3481.90 | 790.35 |
| 11 | 3065.80 | 783.89 | 3525.20 | 819.77 | 3443.40 | 821.26 | 3472.20 | 788.77 |
| 12 | 3023.30 | 785.59 | 3565.20 | 820.35 | 3225.90 | 820.75 | 3151.80 | 787.17 |
| 13 | 2887.10 | 787.26 | 3564.20 | 820.88 | 3210.80 | 820.20 | 3151.80 | 785.53 |
| 14 | 2844.70 | 788.89 | 3608.00 | 821.39 | 3418.70 | 819.62 | 3250.40 | 783.86 |
| 15 | 2964.60 | 790.49 | 3591.80 | 821.85 | 3430.80 | 819.00 | 3269.40 | 782.16 |
| 16 | 2972.80 | 792.05 | 3567.70 | 822.28 | 3414.80 | 818.34 | 3343.20 | 780.44 |
| 17 | 3164.60 | 793.57 | 3488.20 | 822.67 | 3336.80 | 817.65 | 3394.40 | 778.68 |
| 18 | 3256.40 | 795.06 | 3460.70 | 823.03 | 3397.70 | 816.93 | 3367.20 | 776.89 |
| 19 | 3238.70 | 796.51 | 3532.60 | 823.35 | 3397.30 | 816.17 | 3347.90 | 775.08 |
| 20 | 3275.40 | 797.92 | 3441.20 | 823.64 | 3397.30 | 815.37 | 3315.60 | 773.25 |
| 21 | 3385.40 | 799.30 | 3541.20 | 823.89 | 3437.30 | 814.53 | 3334.30 | 771.38 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22 | 3296.50 | 800.64 | 3502.20 | 824.10 | 3559.40 | 813.66 | 3534.50 | 769.49 |
| 23 | 2909.30 | 801.94 | 3484.20 | 824.27 | 3472.00 | 812.76 | 3497.20 | 767.58 |
| 24 | 3330.60 | 803.20 | 3515.90 | 824.41 | 3253.00 | 811.82 | 3409.00 | 765.64 |
| 25 | 3326.60 | 804.43 | 3365.20 | 824.52 | 3411.40 | 810.84 | 3391.60 | 763.68 |
| 26 | 3433.70 | 805.63 | 3549.00 | 824.58 | 3275.50 | 809.82 | 3529.00 | 761.69 |
| 27 | 3437.30 | 806.79 | 3462.30 | 824.61 | 3302.10 | 808.77 | 3376.60 | 759.69 |
| 28 | 3089.10 | 807.91 | 3549.70 | 824.61 | 3340.20 | 807.69 | 3415.10 | 757.66 |
| 29 | 3472.00 | 808.99 | 3516.10 | 824.57 | 3487.30 | 806.57 | 3443.30 | 755.61 |
| 30 | 3073.20 | 810.04 | 3490.20 | 824.49 | 3402.30 | 805.41 | 3322.30 | 753.55 |
| 31 | 3177.60 | 811.05 | | | 3394.80 | 804.22 | 3372.20 | 751.46 |

**Table 4.3: Weather sensitive component of the daily peak load of BPS of September to December, 2006**

| | September | | October | | November | | December | |
|---|---|---|---|---|---|---|---|---|
| Day | PL (MW) | Lw (MW) | PL (MW) | Lw (MW) | PL (MW) | Lw (MW) | PL (MW) | Lw (MW) |
| 1 | 3235.20 | 749.35 | 3192.80 | 680.78 | 3124.40 | 611.95 | 2824.00 | 565.74 |
| 2 | 3340.90 | 747.23 | 3240.20 | 678.43 | 3193.50 | 609.98 | 2762.40 | 564.76 |
| 3 | 3355.60 | 745.09 | 3013.00 | 676.07 | 3143.80 | 608.04 | 2830.00 | 563.82 |
| 4 | 3356.00 | 742.93 | 2993.60 | 673.72 | 3089.40 | 606.12 | 2776.20 | 562.93 |
| 5 | 3189.00 | 740.75 | 2991.20 | 671.38 | 3055.30 | 604.23 | 3107.30 | 562.07 |
| 6 | 3167.20 | 738.56 | 2976.60 | 669.04 | 3037.60 | 602.36 | 3131.80 | 561.27 |
| 7 | 3153.70 | 736.36 | 2965.20 | 666.70 | 3032.10 | 600.51 | 2984.80 | 560.51 |
| 8 | 3284.20 | 734.14 | 2940.80 | 664.37 | 3047.10 | 598.70 | 2988.60 | 559.80 |
| 9 | 3480.30 | 731.91 | 2771.10 | 662.05 | 3067.50 | 596.91 | 3002.70 | 559.13 |
| 10 | 3458.80 | 729.67 | 3069.60 | 659.73 | 2931.80 | 595.14 | 2975.40 | 558.51 |
| 11 | 3480.30 | 727.41 | 3088.20 | 657.42 | 2977.80 | 593.41 | 2742.80 | 557.94 |
| 12 | 3410.40 | 725.14 | 3068.10 | 655.12 | 2986.40 | 591.70 | 2822.50 | 557.42 |
| 13 | 3281.30 | 722.86 | 3045.80 | 652.83 | 2996.30 | 590.03 | 2816.30 | 556.95 |
| 14 | 3335.90 | 720.58 | 3104.20 | 650.55 | 2863.10 | 588.39 | 2772.30 | 556.53 |
| 15 | 3361.40 | 718.28 | 3107.60 | 648.28 | 2904.90 | 586.77 | 2676.30 | 556.16 |
| 16 | 3236.00 | 715.97 | 3054.00 | 646.02 | 2936.70 | 585.19 | 2780.30 | 555.83 |
| 17 | 2939.00 | 713.66 | 3066.20 | 643.78 | 2942.70 | 583.64 | 2868.40 | 555.56 |
| 18 | 4300.00 | 711.34 | 3071.50 | 641.54 | 2961.40 | 582.13 | 2743.80 | 555.33 |
| 19 | 3068.00 | 709.01 | 3069.60 | 639.32 | 2946.50 | 580.64 | 2642.20 | 555.15 |
| 20 | 3027.20 | 706.67 | 3070.00 | 637.11 | 2969.30 | 579.20 | 2541.70 | 555.02 |
| 21 | 3007.80 | 704.33 | 2992.20 | 634.92 | 2973.80 | 577.78 | 2600.80 | 554.93 |
| 22 | 3085.80 | 701.99 | 3055.70 | 632.74 | 2777.60 | 576.41 | 2699.50 | 554.90 |
| 23 | 3141.20 | 699.64 | 3003.00 | 630.58 | 2676.50 | 575.07 | 2902.50 | 554.90 |
| 24 | 3161.60 | 697.29 | 2971.70 | 628.44 | 2711.80 | 573.77 | 2879.80 | 554.95 |
| 25 | 3186.70 | 694.93 | 2954.00 | 626.31 | 2671.90 | 572.50 | 2903.20 | 555.05 |
| 26 | 3248.40 | 692.57 | 2950.80 | 624.20 | 2900.00 | 571.27 | 2793.20 | 555.19 |
| 27 | 4050.00 | 690.22 | 2802.70 | 622.11 | 2828.00 | 570.09 | 2827.20 | 555.38 |
| 28 | 3064.50 | 687.86 | 2773.10 | 620.03 | 2693.00 | 568.94 | 2728.50 | 555.60 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 29 | 2943.00 | 685.50 | 2760.50 | 617.98 | 2710.80 | 567.83 | 2724.70 | 555.87 |
| 30 | 3131.40 | 683.14 | 2904.00 | 615.95 | 2782.60 | 566.77 | 2854.90 | 556.19 |
| 31 | | | 2831.10 | 613.94 | | | 2913.40 | 556.54 |

## 4.3 GRAPHICAL REPRESENTATION OF THE WEATHER SENSITIVE PORTION OF THE DAILY PEAK LOAD OF BANGLADESH POWER SYSTEM

Graphical representation of $L_w$ of the daily peak load of BPS is presented in this section. Figures 4.1 to 4.9 present the weather sensitive portion of the daily peak load of BPS from the year 2006 to 1998. Daily peak load (PL) and average THI are also plotted on the same graph in order to have close comparison of variation pattern of Lw, PL and THI. In these graphs, $L_w$ and THI are multiplied by 3 and 15, respectively, to plot all the quantities on same graph.

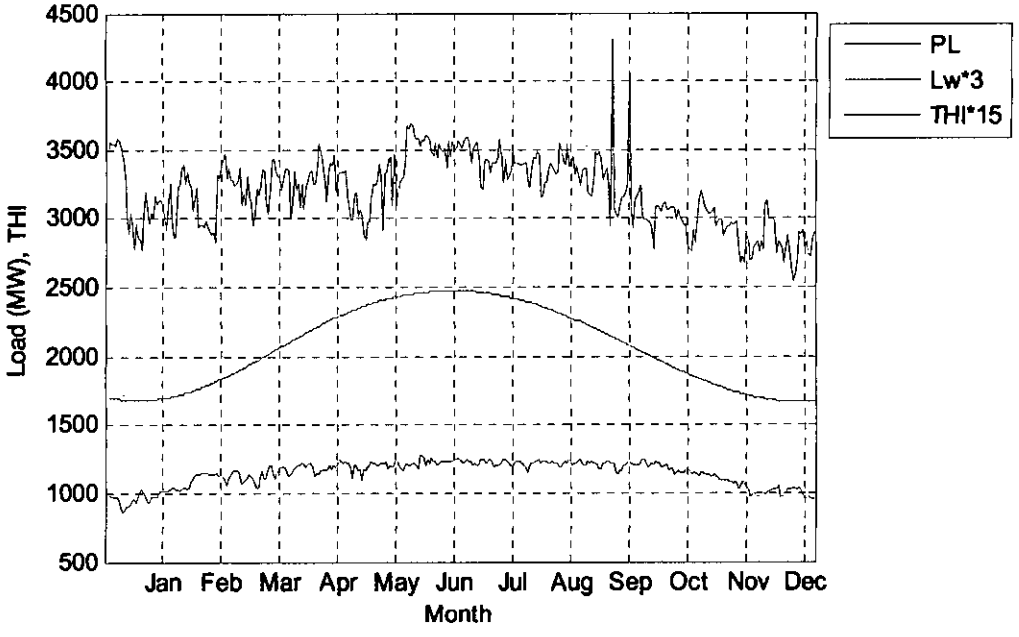


Figure 4.1: PL, $L_w$ and average THI of the year 2006

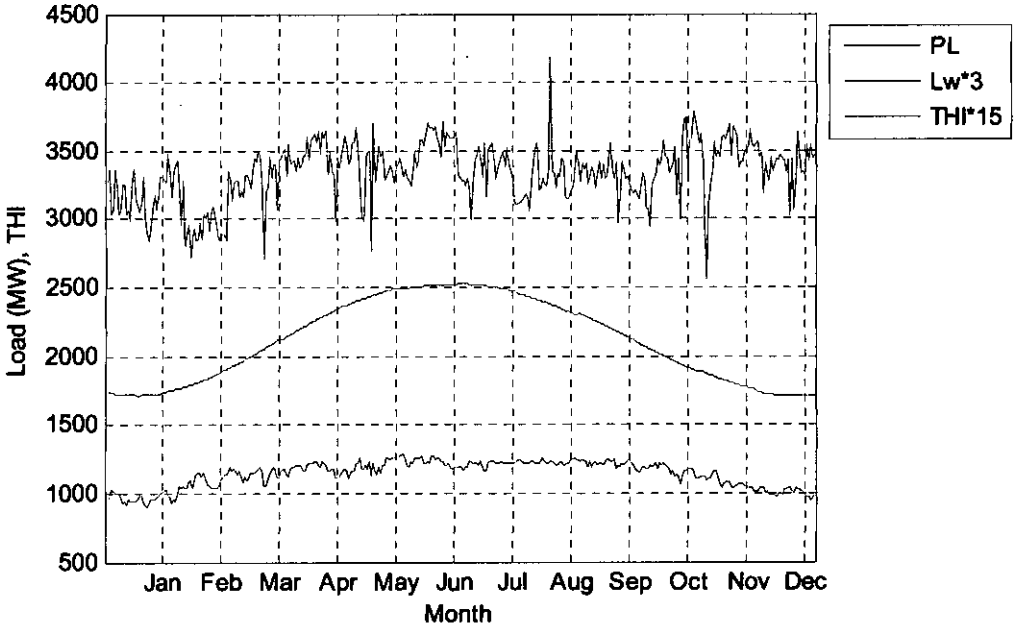


Figure 4.2: PL, $L_w$ and average THI of the year 2005

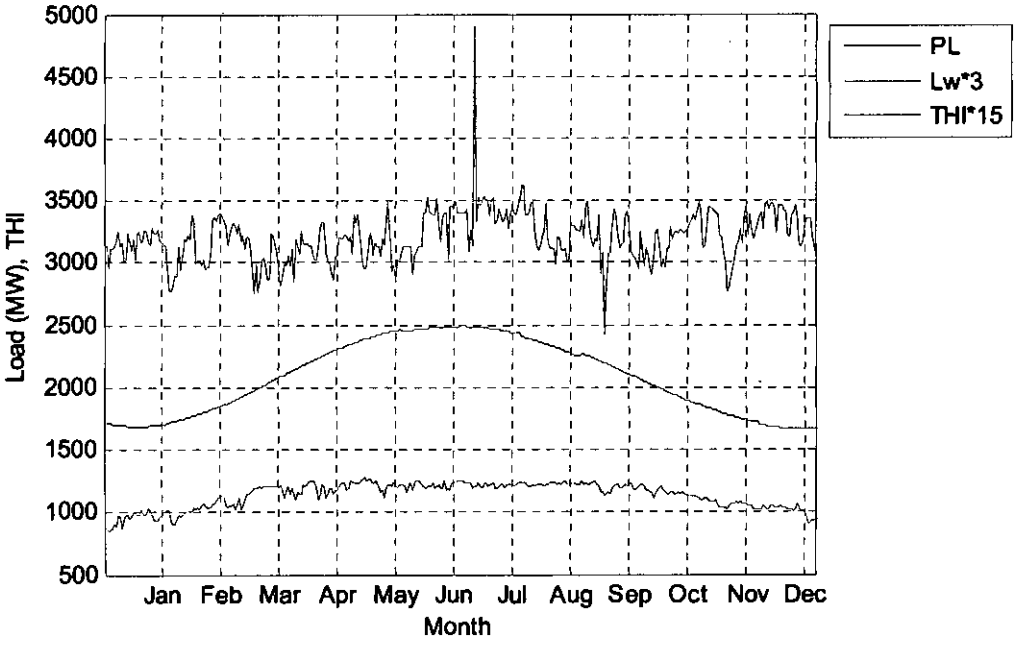


Figure 4.3: PL, $L_w$ and average THI of the year 2004

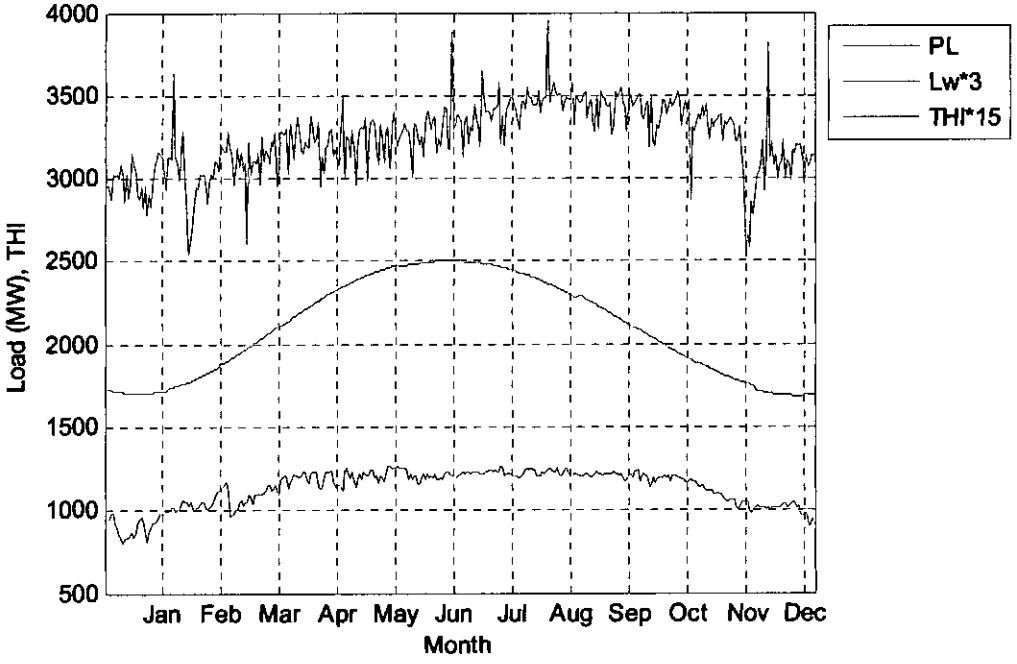


Figure 4.4: PL, $L_w$ and average THI of the year 2003

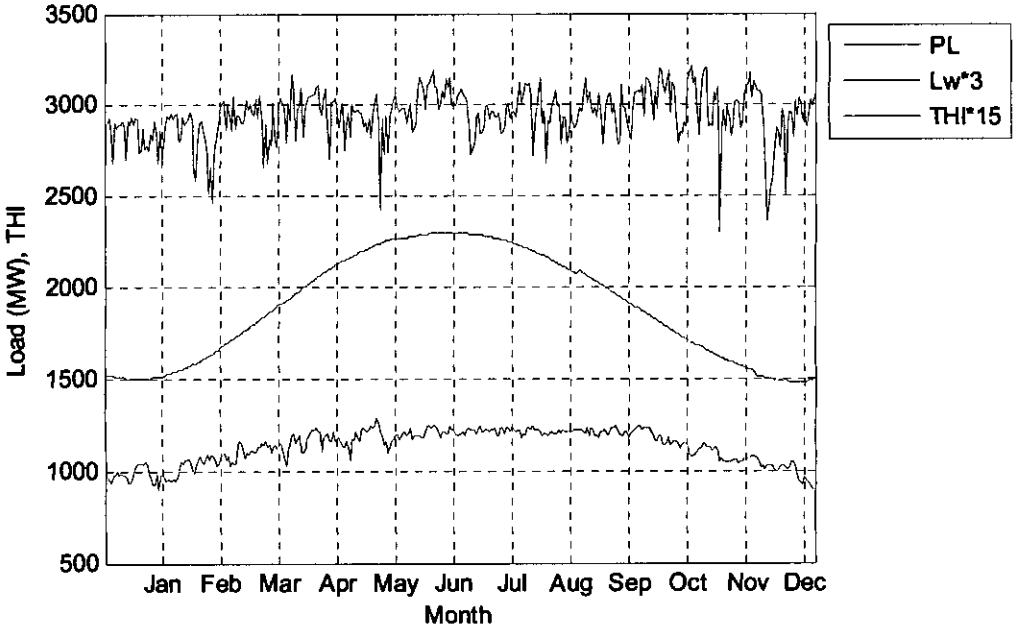


Figure 4.5: PL, $L_w$ and average THI of the year 2002

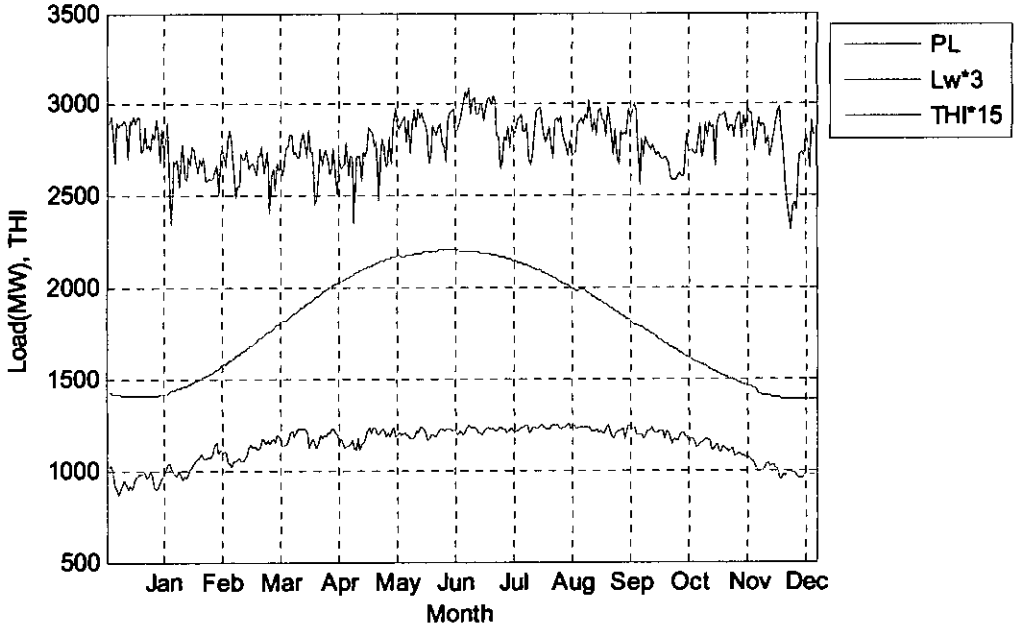


Figure 4.6: PL, $L_w$ and average THI of the year 2001

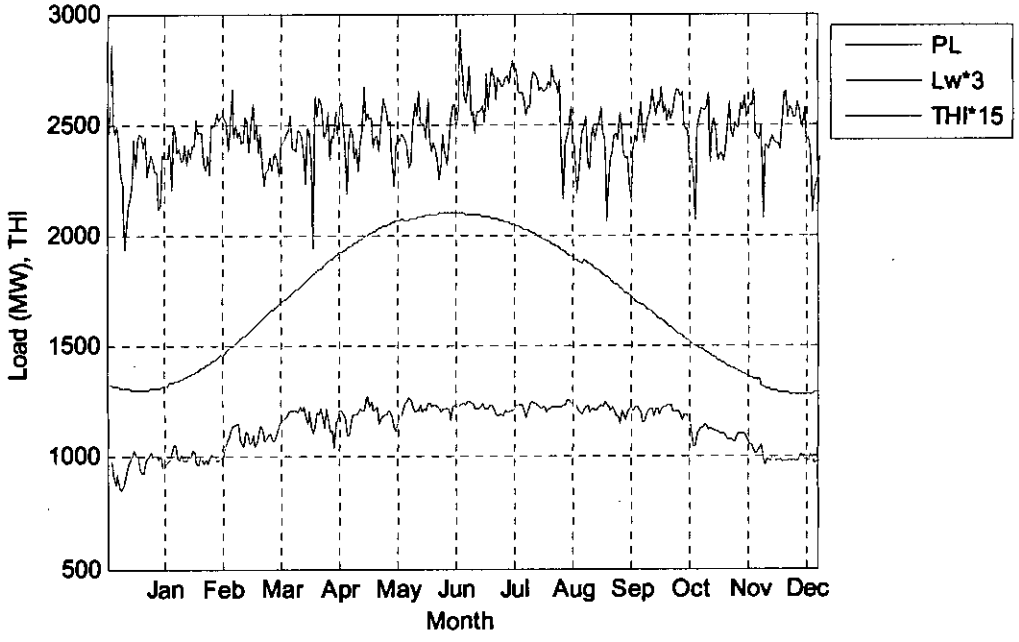


Figure 4.7: PL, $L_w$ and average THI of the year 2000

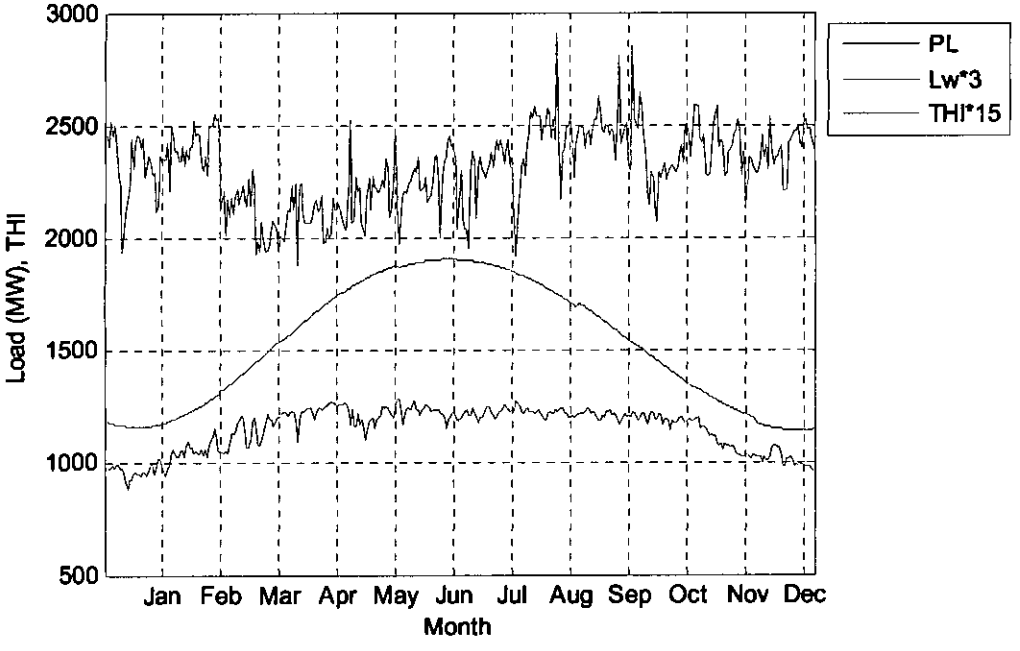


Figure 4.8: PL, $L_w$ and average THI of the year 1999

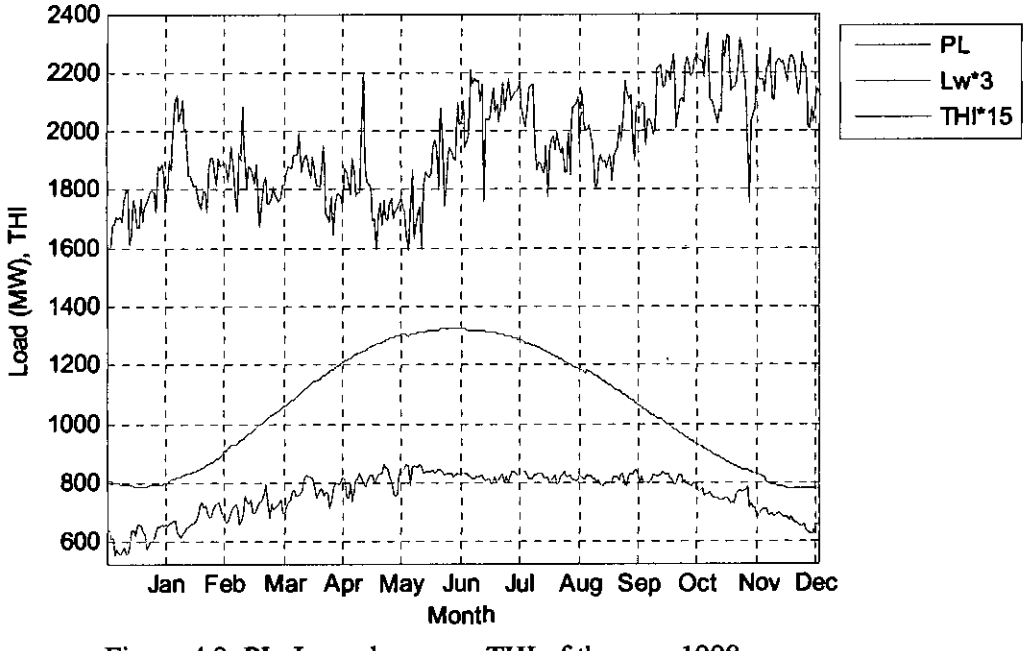


Figure 4.9: PL, $L_w$ and average THI of the year 1998

## 4.4 DISCUSSION ON THE RESULTS FOR PEAK LOADS

The salient features of the results those obtained by applying the proposed methodology are explained in this section. Results of the historical year 2006 and 2005 are explained here. Table 4.4 contains the average monthly peak load, average THI and average weather dependent load from the month of January to the month of December, 2006.

**Table 4.4: Average PL, average THI and average $L_w$ of the year 2006**

| Month | PL(avg) (MW) | THI (avg) | Lw(avg) (MW) |
|---|---|---|---|
| Jan-06 | 3158.37 | 63.94 | 562.08 |
| Feb-06 | 3091.36 | 72.50 | 584.66 |
| Mar-06 | 3244.20 | 74.85 | 648.00 |
| Apr-06 | 3283.28 | 78.59 | 728.04 |
| May-06 | 3170.15 | 79.97 | 790.59 |
| Jun-06 | 3524.49 | 81.56 | 820.71 |
| Jul-06 | 3429.78 | 81.53 | 816.91 |
| Aug-06 | 3369.95 | 81.01 | 779.29 |
| Sep-06 | 3282.69 | 80.37 | 716.81 |
| Oct-06 | 2996.71 | 78.89 | 646.50 |
| Nov-06 | 2964.97 | 75.66 | 617.80 |
| Dec-06 | 2826.37 | 66.68 | 557.74 |

It is observed from Table 4.4 that the average THI of February 2006 is much greater than that of January, 2006 but the average peak load of January, 2006 is not that much greater than that of February, 2006. The weather sensitive portion of February, 2006 is greater than that of January 2006 but their difference is very nominal (584.66-

562.08 = 22.58 MW). In March, 2006 both average THI and average peak load are greater than that of February, 2006. As a consequence, the weather dependent portion of the load of the March, 2006 is greater than that of February, 2006. The same affiliation exists for the month of April, 2006 and March, 2006. This increasing drift of weather sensitive portion of the load continues up to June, 2006. From July, 2006 both monthly average peak load and monthly average THI starts decreasing. As a consequence, monthly average weather dependent portion of the load starts decreasing from July, 2006 and continues up to December, 2006.

The average $L_w$ of January, 2006 and December, 2006 are very close. The average peak load of January, 2006 is grater than that of December, 2006 by 332 MW (3158.37 MW- 2826.37 MW). But average THI of December, 2006 is greater than that of January, 2006 by 2.74 (66.68- 63.94). As a consequence, the average weather sensitive portions of the load for these two months are very close to each other.

Table 4.5 contains the average peak load, average temperature-humidity index (THI) and average weather dependent component of the load from the month of January, 2005 to the month of December, 2005.

**Table 4.5: Average PL, average THI and average $L_w$ of the year 2005**

| Month | PL(avg) (MW) | THI (avg) | Lw(avg) (MW) |
|---|---|---|---|
| Jan-05 | 3188.37 | 64.34 | 574.08 |
| Feb-05 | 3183.32 | 70.12 | 600.66 |
| Mar-05 | 3263.59 | 75.77 | 667.0 |
| Apr-05 | 3459.78 | 78.95 | 745.54 |
| May-05 | 3389.14 | 79.64 | 809.49 |
| Jun-05 | 3579.92 | 82.14 | 835.6 |
| Jul-05 | 3552.59 | 82.71 | 833.78 |
| Aug-05 | 3389.35 | 81.64 | 791.98 |
| Sep-05 | 3312.62 | 81.19 | 735.37 |
| Oct-05 | 3283.51 | 77.88 | 662.19 |
| Nov-05 | 3156.31 | 71.92 | 636.43 |
| Dec-05 | 3092.23 | 66.94 | 570.33 |

From the Table 4.5, it is shown that the monthly average weather sensitive portion of the load increases from January, 2005 to June, 2005. Because in this duration, for any month, either average peak load or average THI or both increase from the previous month. As a result the monthly average weather sensitive portion of the load increases consecutively. Form July, 2005 the average peak load starts decreasing and it continues up to December, 2005. Average THI starts decreasing from August, 2005 and continues up to December, 2005. As a result, the average $L_w$ starts decreasing from July, 2005. This decreasing inclination of monthly average $L_w$ persists up to December, 2005. For June, 2005 and July, 2005, both average peak load and average THI are very close. So the average weather sensitive portions of daily peak load for these two months are very close to each other.

In both years, the average $L_w$ of month of January and December is very close. Another observation is found from Table 4.4 and Table 4.5. December, 2005 and January, 2006 are two consecutive months. So the average values of $L_w$ of these months are very close to each other.

For the other historical years i.e. from 1998 to 2004, the results can be explained in the same way as for year 2005 and 2006. So it is clear that, the weather sensitive portion of the daily peak load varies with two parameters. One parameter is weather condition and the other parameter is daily peak load. If both parameters increase, the weather sensitive portion of the load increases. If both parameter decrease, the weather sensitive portion of the load decreases. If one parameter increases and other decreases, the weather sensitive portion of the load changes depending on the effect of dominating parameter.

For close observation, average peak load, average THI and average weather sensitive component of the peak load of the year 2006 to 2002 are presented graphically in Figures 4.10 to 4.14, respectively. Average peak load is divided by 2 and Average THI is multiplied by 5 in order to plot all the quantities on the same graph.

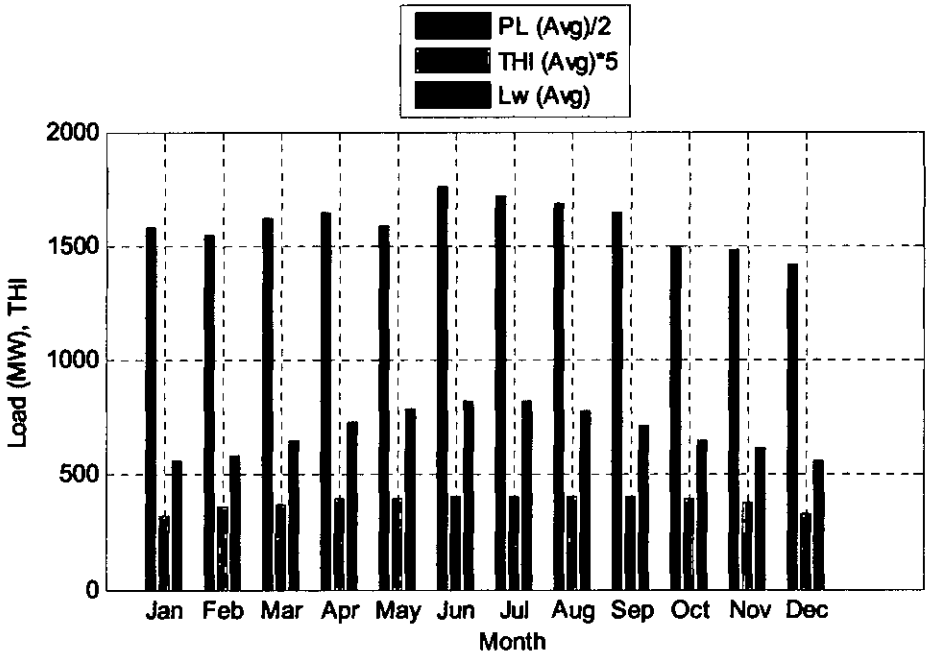


Figure 4.10: Average PL, average THI and average $L_w$ of the year 2006

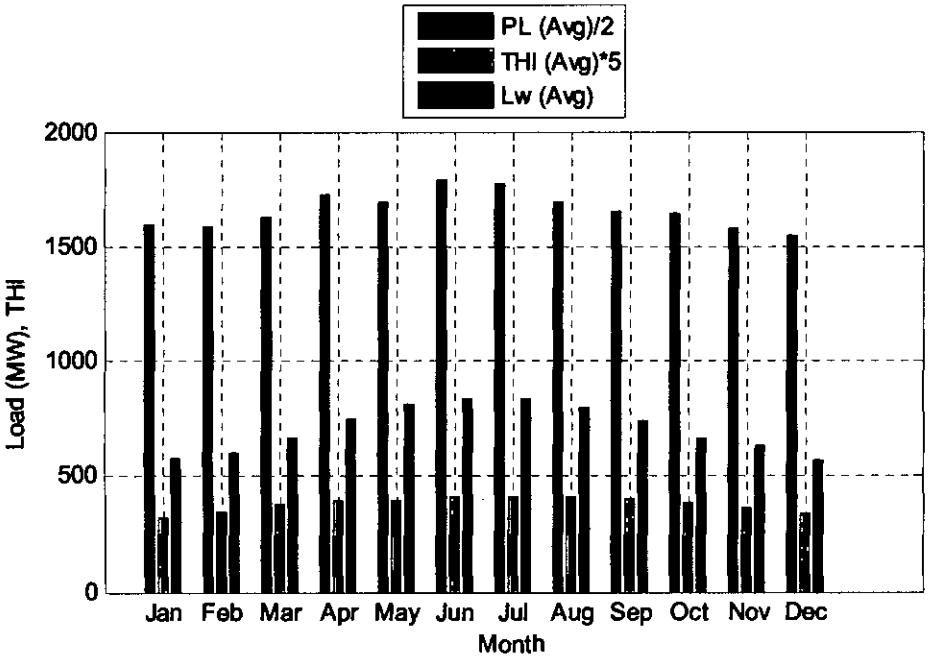


Figure 4.11: Average PL, average THI and average $L_w$ of the year 2005

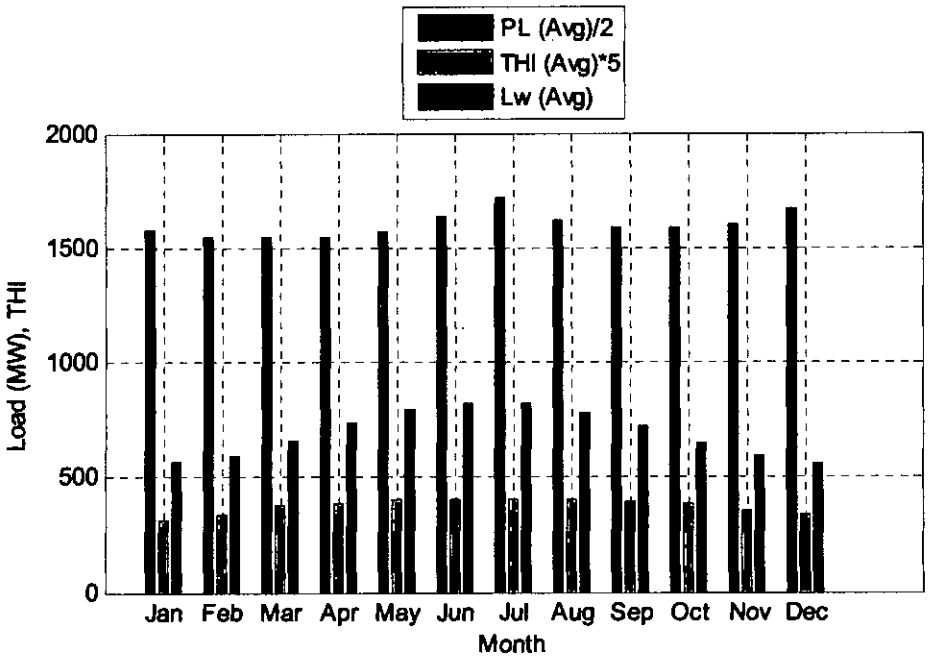


Figure 4.12: Average PL, average THI and average $L_w$ of the year 2004

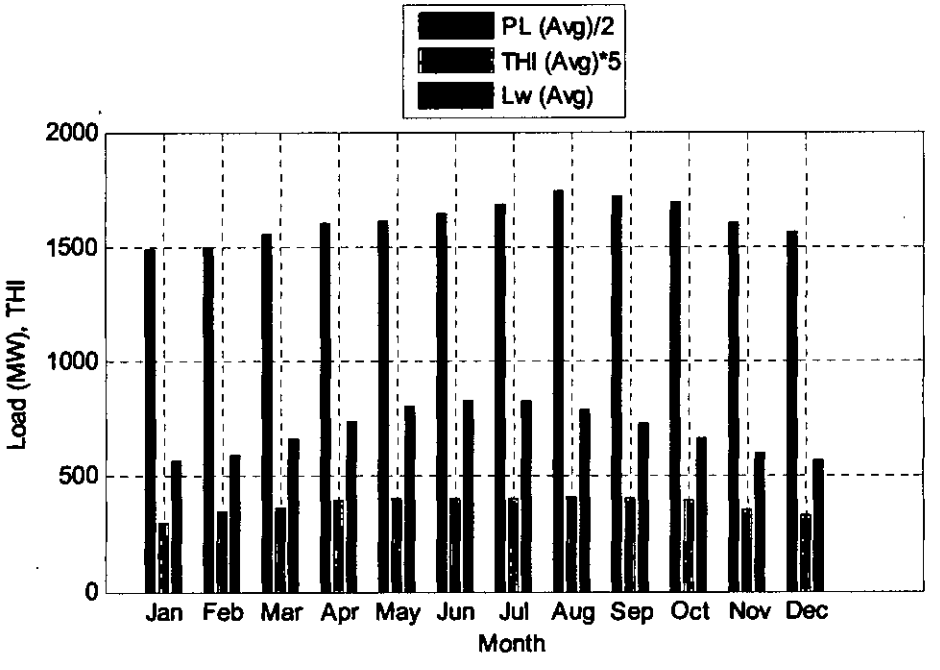


Figure 4.13: Average PL, average THI and average $L_w$ of the year 2003

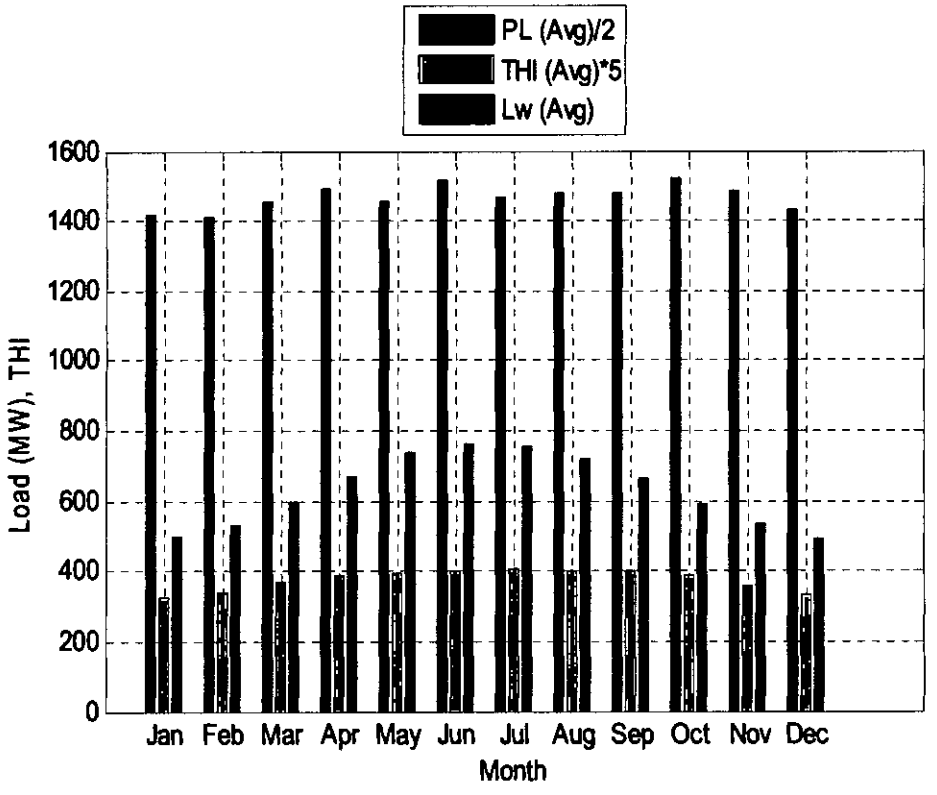


Figure 4.14: Average PL, average THI and average $L_w$ of the year 2002

## 4.5 NON WEATHER SENSITIVE COMPONENT OF LOAD

Non weather sensitive component of load (NWL) is the difference between the total electrical load and the weather sensitive portion of the load [40]. To identify the NWL for Bangladesh Power System, weather sensitive portion of the load is subtracted from the daily peak load. Table 4.6 presents the monthly average NWL for the years 2006 to 2002.

**Table 4.6: Monthly average NWL for the year 2006 to 2002**

| Month | NWL of the year 2006 (MW) | NWLof the year 2005 (MW) | NWL of the year 2004 (MW) | NWL of the year 2003 (MW) | NWL of the year 2002 (MW) |
|---|---|---|---|---|---|
| | Average Values | | | | |
| January | 2596.29 | 2614.29 | 2596.05 | 2411.74 | 2338.22 |
| February | 2506.70 | 2582.66 | 2495.20 | 2406.38 | 2298.40 |
| March | 2596.20 | 2596.59 | 2434.71 | 2446.07 | 2321.39 |
| April | 2555.24 | 2714.24 | 2351.29 | 2468.53 | 2315.03 |
| May | 2379.56 | 2579.65 | 2345.14 | 2421.84 | 2171.23 |
| June | 2703.78 | 2744.32 | 2452.07 | 2461.70 | 2273.32 |
| July | 2612.87 | 2718.61 | 2618.27 | 2549.76 | 2172.99 |
| August | 2590.66 | 2597.37 | 2464.60 | 2698.79 | 2240.76 |
| September | 2565.88 | 2577.25 | 2443.51 | 2706.33 | 2302.83 |
| October | 2350.21 | 2621.32 | 2523.07 | 2717.84 | 2456.19 |
| November | 2347.52 | 2519.88 | 2616.77 | 2602.42 | 2443.43 |
| December | 2268.63 | 2521.90 | 2774.32 | 2563.38 | 2368.13 |

Monthly average NWL for the year 2006 to 2002 are presented graphically in Figures 4.15 to 4.19. For close observation, corresponding average THI and average $L_w$ are also plotted together. THI is multiplied by 5 and NWL is divided by 2 to facilitate all the quantities on same graph.

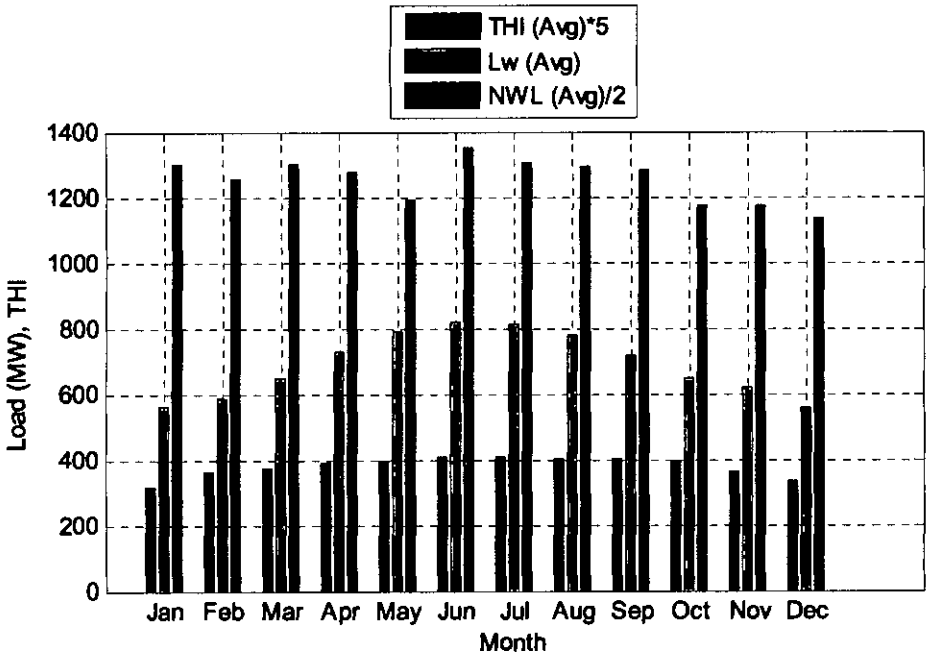


Figure 4.15: Average THI, average $L_w$ and average NWL of the year 2006

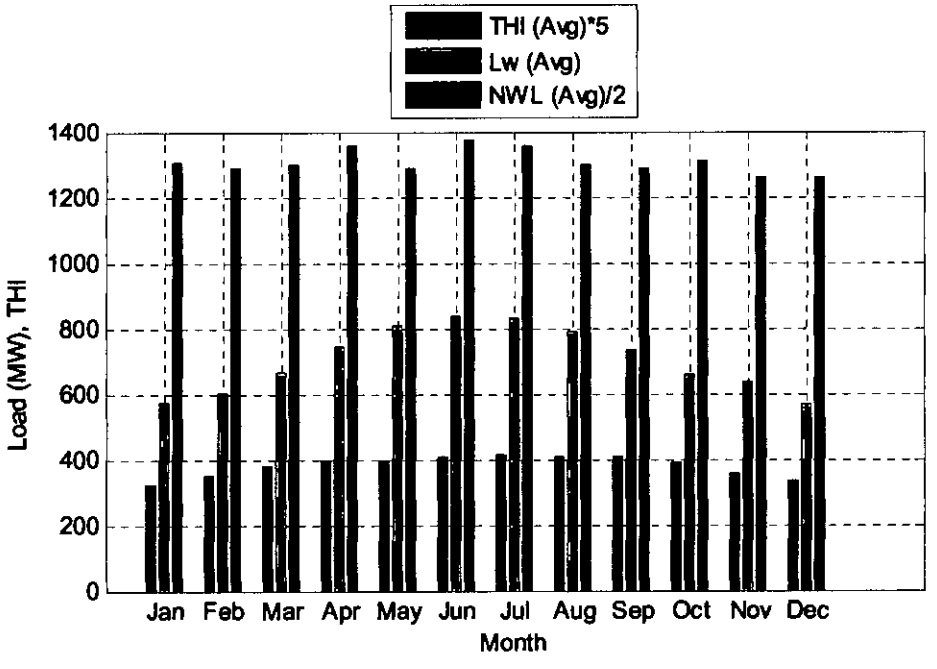


Figure 4.16: Average THI, average $L_w$ and average NWL of the year 2005

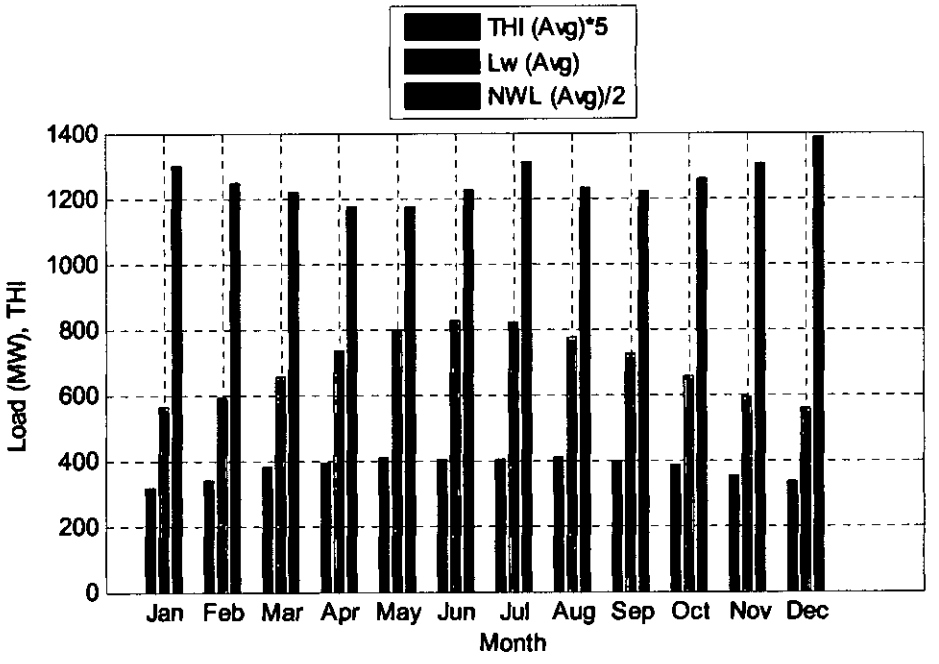


Figure 4.17: Average THI, average $L_w$ and average NWL of the year 2004

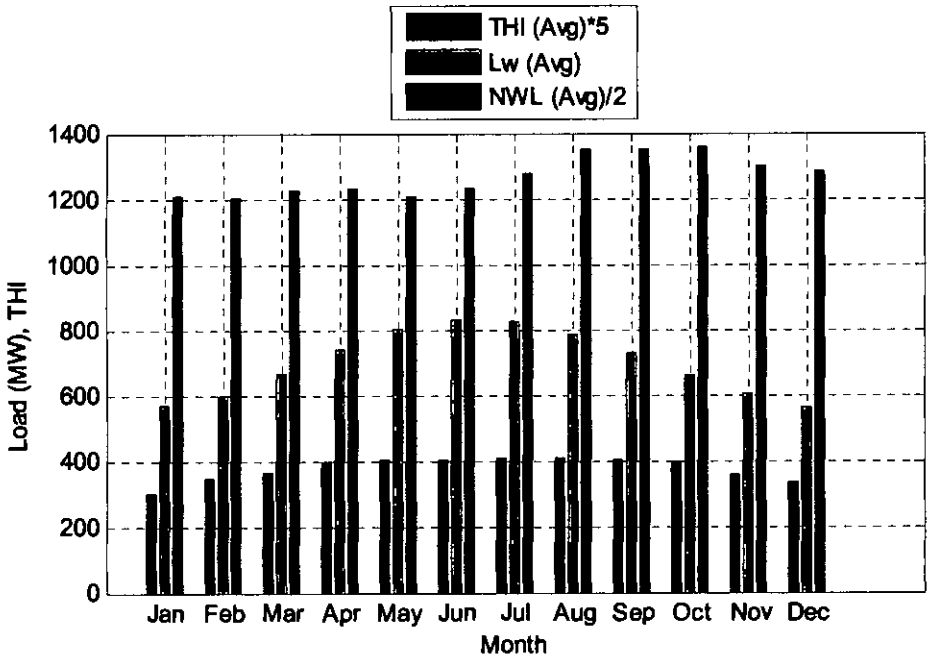


Figure 4.18: Average THI, average $L_w$ and average NWL of the year 2003

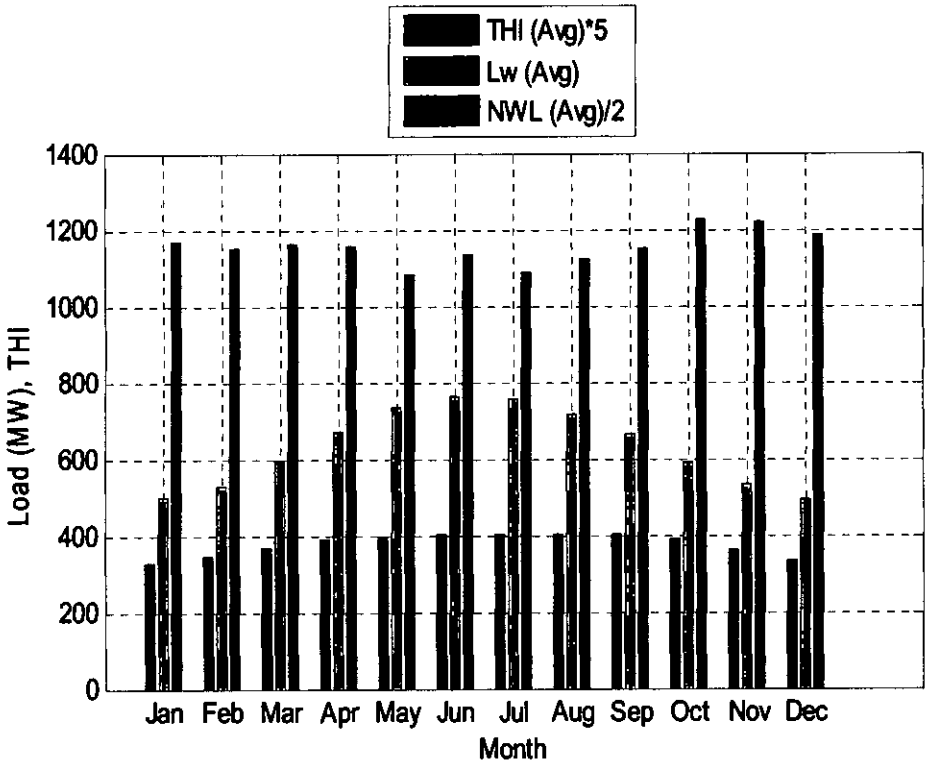


Figure 4.19: Average THI, average $L_w$ and average NWL of the year 2002

From the above graphs, it is clearly observed that, the weather sensitive portion of the loads change sharply with THI. But the NWLs do not change with the weather conditions. For example, average THI of January and February, 2006 is 63.94 and 72.50, respectively. Average $L_w$ of the peak loads of these two months are 562.08 MW and 584.66 MW, respectively. But the average NWL of these two months are 2596.29 MW and 2506.70 MW, respectively. That is, though average THI increases in February, 2006 than January, 2006 but average NWL decreases.

So it can be concluded that NWL are not affected by weather variables like temperature and humidity. It changes due to other factors such as population, education, industrial development, special events etc.

## 4.6 IDENTIFICATION OF WEATHER SENSITIVE PORTION OF THE HOURLY LOAD OF BANGLADESH POWER SYSTEM

In this section, the proposed methodology is used to identify the weather sensitive portion of the hourly load of BPS. Hourly load of 2006 is considered in this case. The $L_w$ of the hourly load is evaluated for eight time slots. The slots are considered at an interval of three hours. That is, the evaluated $L_w$s are for 3.00 A.M., 6.00 A.M., 9.00 A.M., 12.00 P.M., 3.00 P.M., 6.00 P.M., 9.00 P.M. and 12.00 A.M.

Figures 4.29 to 4.36 present the $L_w$ for eight time slots of 2006. Corresponding Hourly load (HRL) and THI are also plotted on the same graph. $L_w$ and THI are multiplied by 3 and 15 respectively in order to plot all the quantities on same graph.

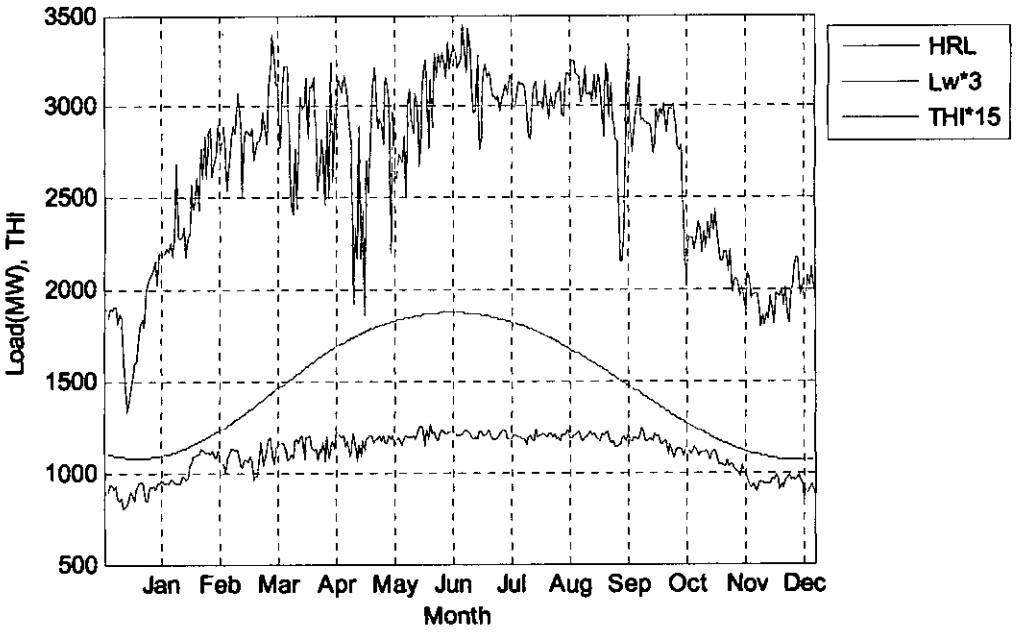


Figure 4.20: HRL, $L_w$ and THI of the year 2006 at 3.00 A.M.

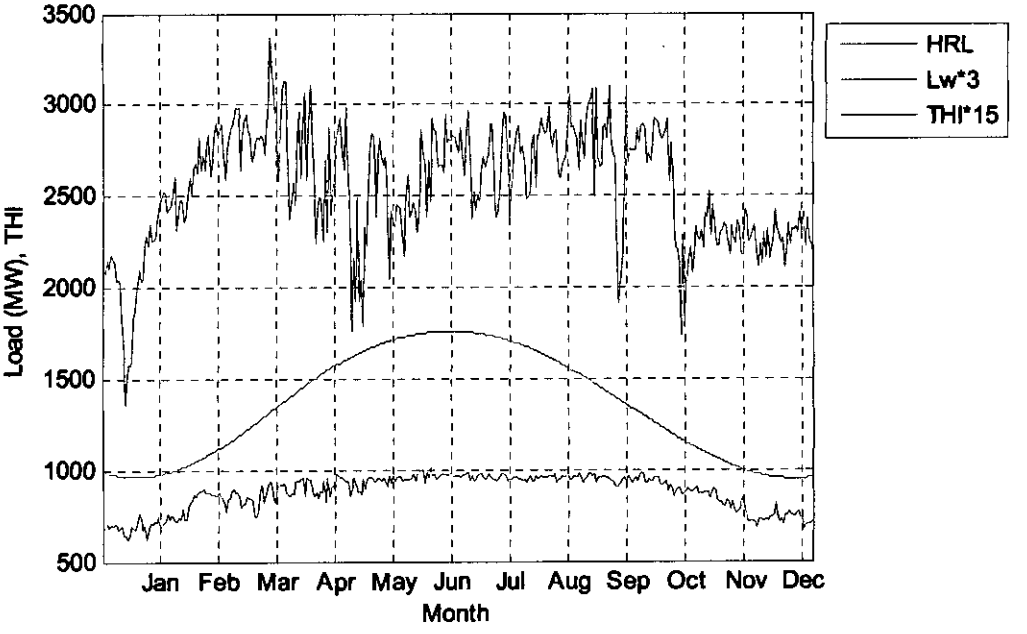


Figure 4.21: HRL, $L_w$ and THI of the year 2006 at 6.00 A.M.

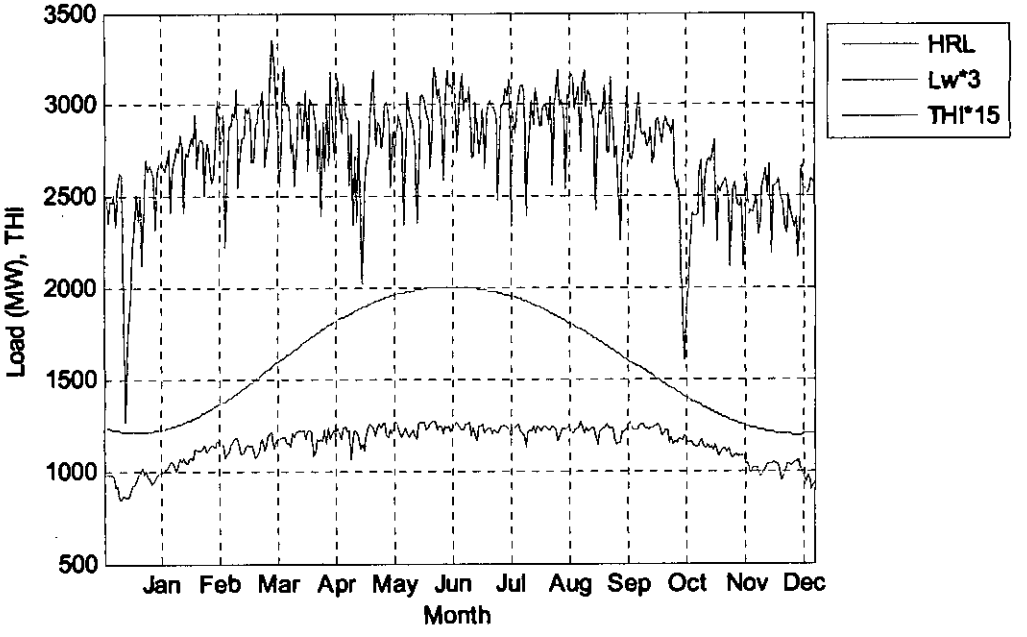


Figure 4.22: HRL, $L_w$ and THI of the year 2006 at 9.00 A.M.

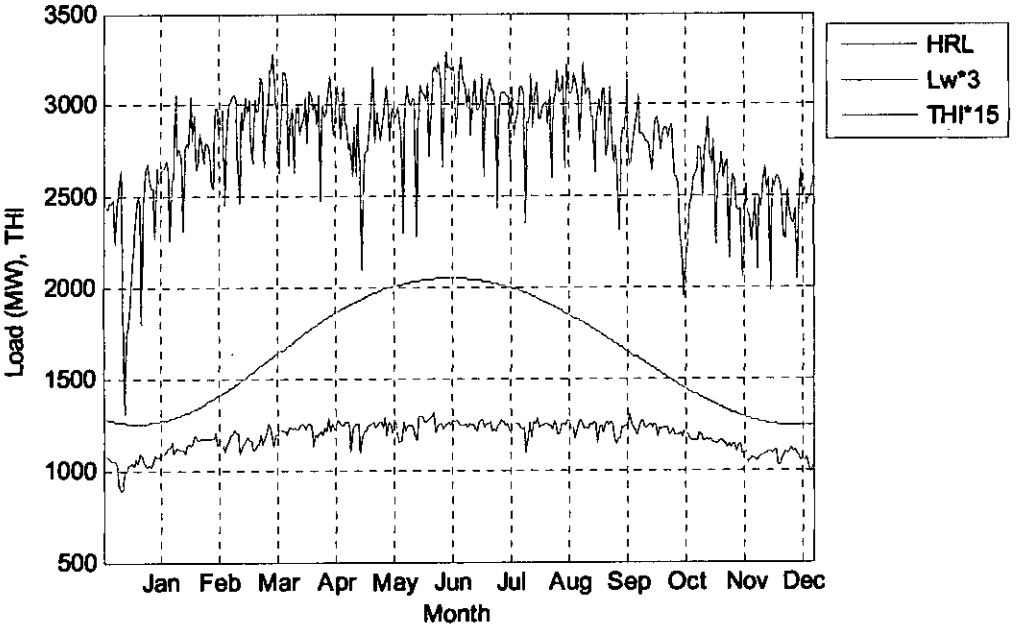


Figure 4.23: HRL, $L_w$ and THI of the year 2006 at 12.00 P.M.

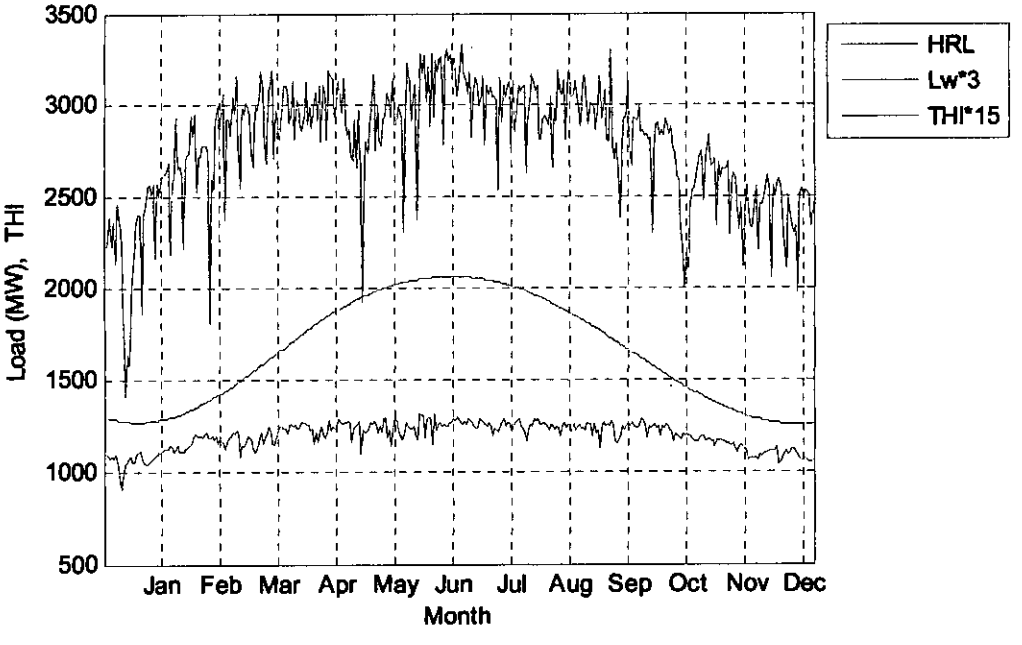


Figure 4.24: HRL, $L_w$ and THI of the year 2006 at 3.00 P.M.

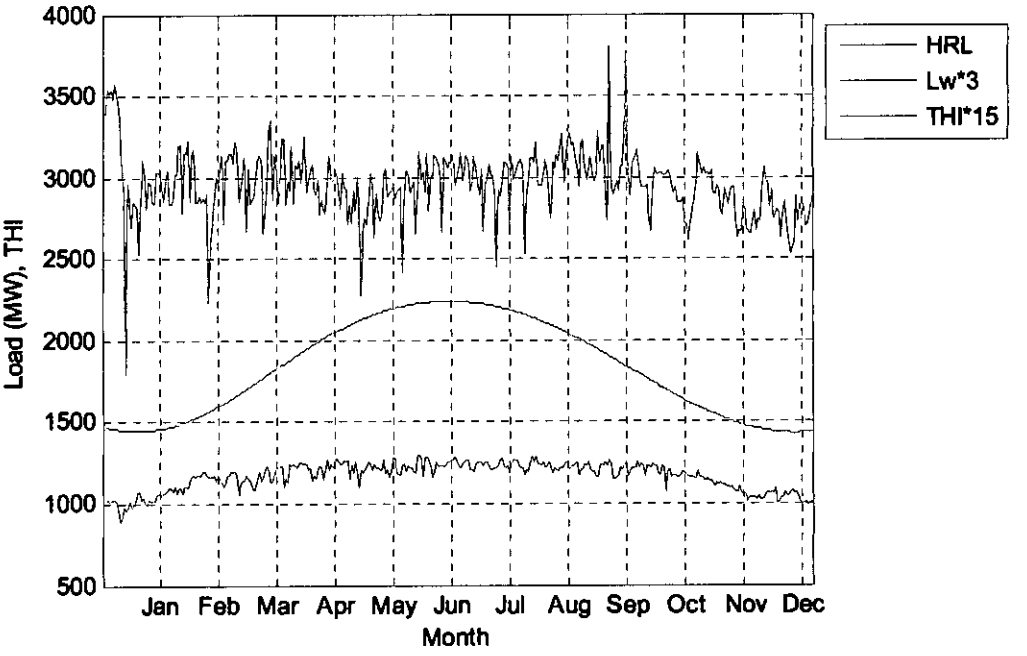


Figure 4.25: HRL, $L_w$ and THI of the year 2006 at 6.00 P.M.

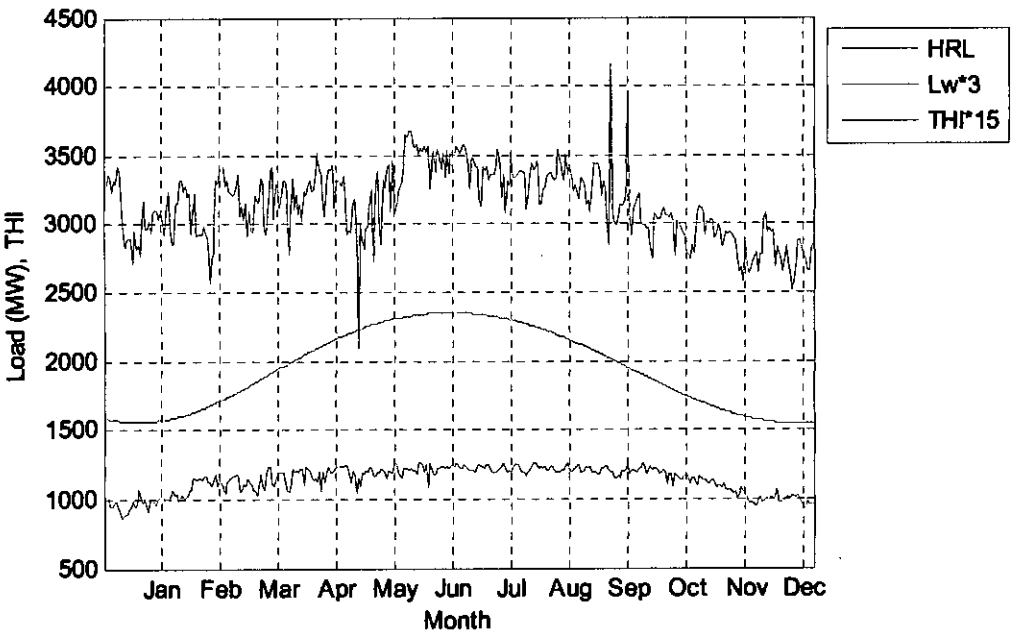


Figure 4.26: HRL, $L_w$ and THI of the year 2006 at 9.00 P.M.

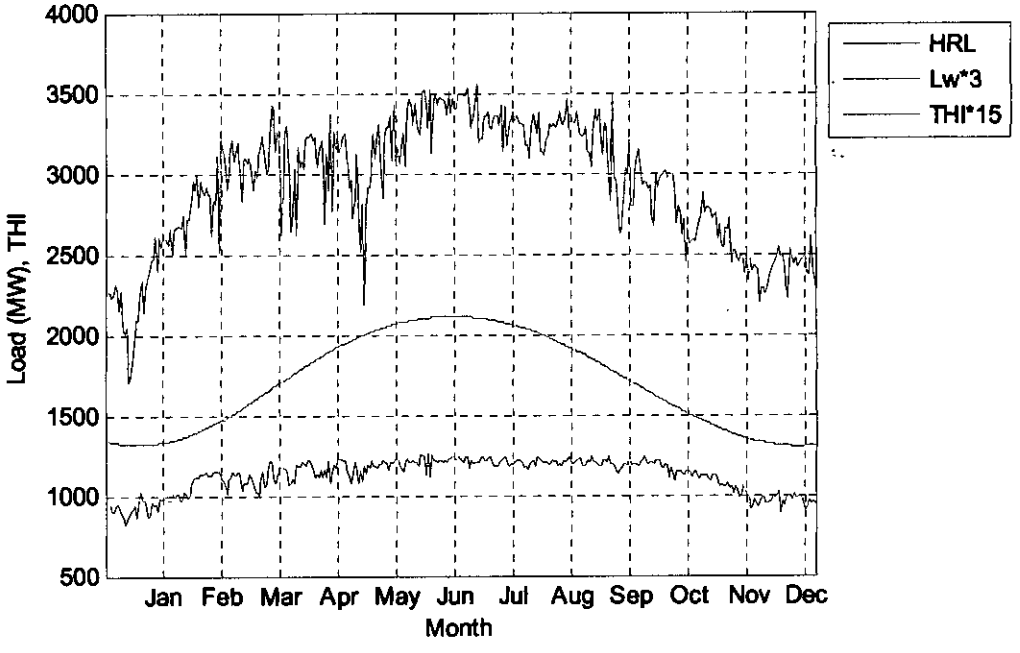


Figure 4.27: HRL, $L_w$ and THI of the year 2006 at 12.00 A.M.

### 4.6.1 DISCUSSIONS ON THE RESULTS FOR HOURLY LOADS

In this section, the various observations of hourly loads of 2006 is discussed. Different features of the results are presented for eight time slots. Table 4.7 contains the monthly average HRL, THI, $L_w$ and BL at 3.00 A.M. of the year 2006.

**Table 4.7: Monthly Average THI, HRL, $L_w$ and NWL at 3.00 A.M. of 2006**

| Month | THI | HRL (MW) | Lw (MW) | BL (MW) |
|---|---|---|---|---|
| Jan-06 | 59.64 | 1841.39 | 362.08 | 1479.31 |
| Feb-06 | 69.14 | 2494.95 | 384.66 | 2110.29 |
| Mar-06 | 72.03 | 2891.70 | 448.00 | 2443.70 |
| Apr-06 | 75.93 | 2853.71 | 528.04 | 2325.67 |
| May-06 | 77.75 | 2759.72 | 590.59 | 2169.13 |
| Jun-06 | 80.48 | 3055.42 | 620.71 | 2434.71 |
| Jul-06 | 80.27 | 3120.00 | 616.91 | 2503.10 |
| Aug-06 | 79.72 | 3062.21 | 579.29 | 2482.92 |
| Sep-06 | 79.11 | 2936.46 | 516.81 | 2419.65 |

| | | | | |
|---|---|---|---|---|
| Oct-06 | 76.85 | 2765.78 | 446.50 | 2319.28 |
| Nov-06 | 69.32 | 2160.28 | 387.18 | 1773.10 |
| Dec-06 | 62.54 | 1961.84 | 357.74 | 1604.10 |

From the above Table, it is found that, the average THI increases from month of January to June. As a consequence, average $L_w$ increases in this duration. From month of July, average THI starts decreasing. As a result, average $L_w$ starts decreasing and it continues up to month of December.

For close surveillance, average THI, HRL, $L_w$ and NWL for eight time slots are presented in Figures 4.28 to 4.35 respectively. THI is multiplied by 5, HRL and BL are divided by 2 in order to plot all the quantities on same graph.

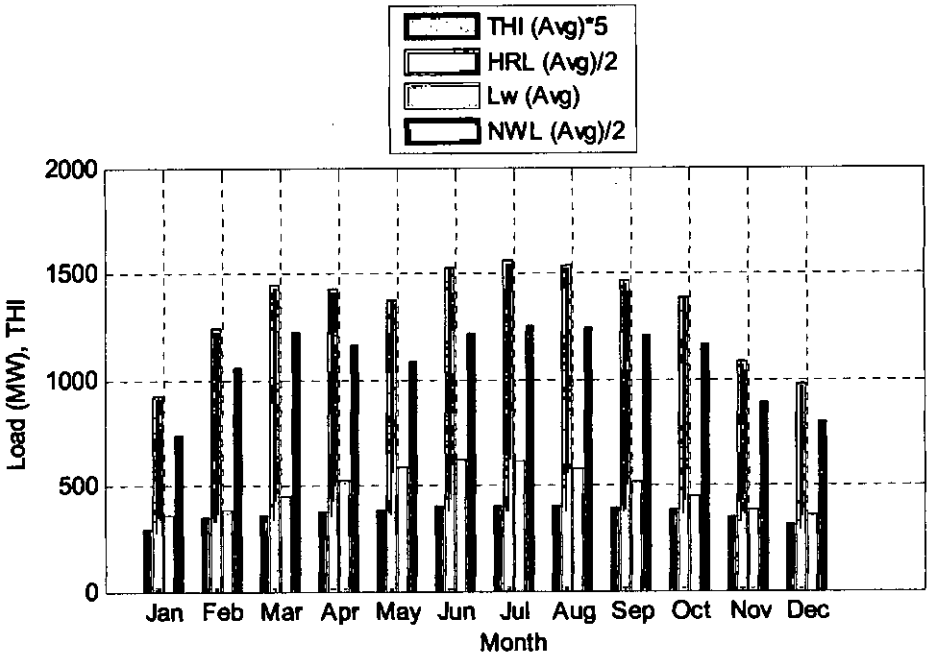


Figure 4.28: Average THI, HRL, $L_w$ and NWL at 3.00 A.M. of 2006

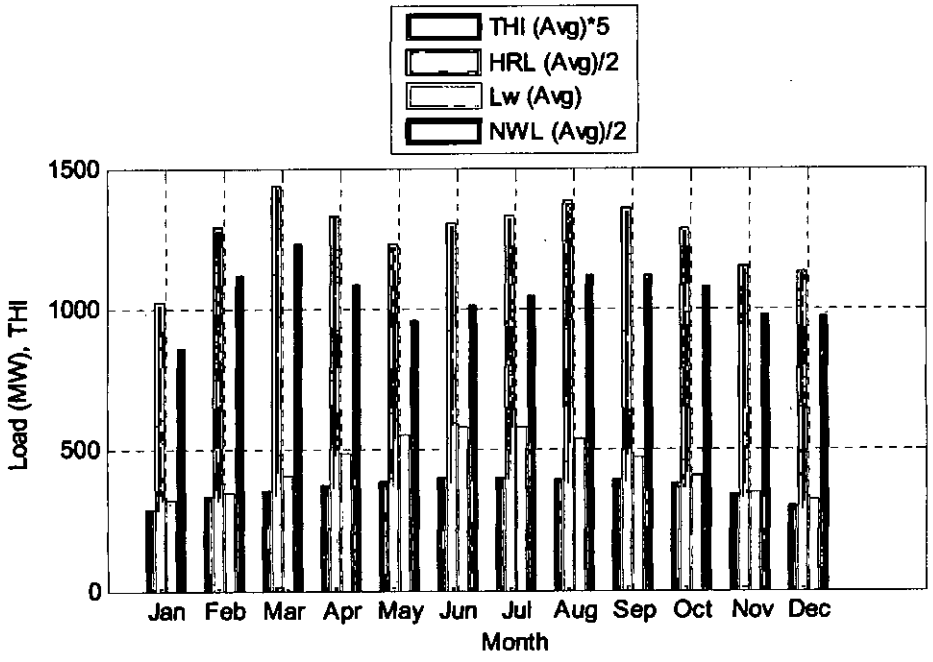


Figure 4.29: Average THI, HRL, $L_w$ and NWL at 6.00 A.M. of 2006

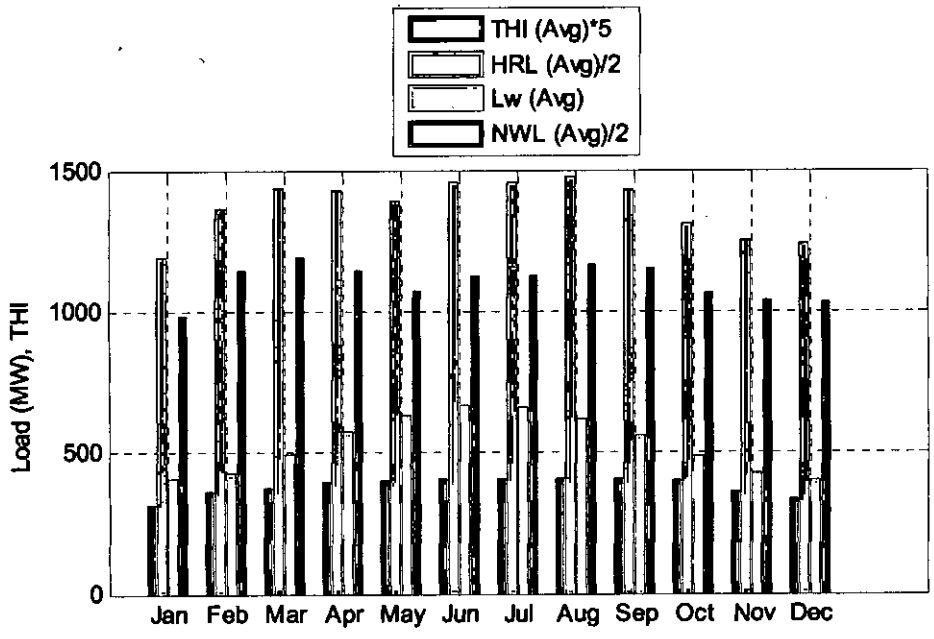


Figure 4.30: Average THI, HRL, $L_w$ and NWL at 9.00 A.M. of 2006

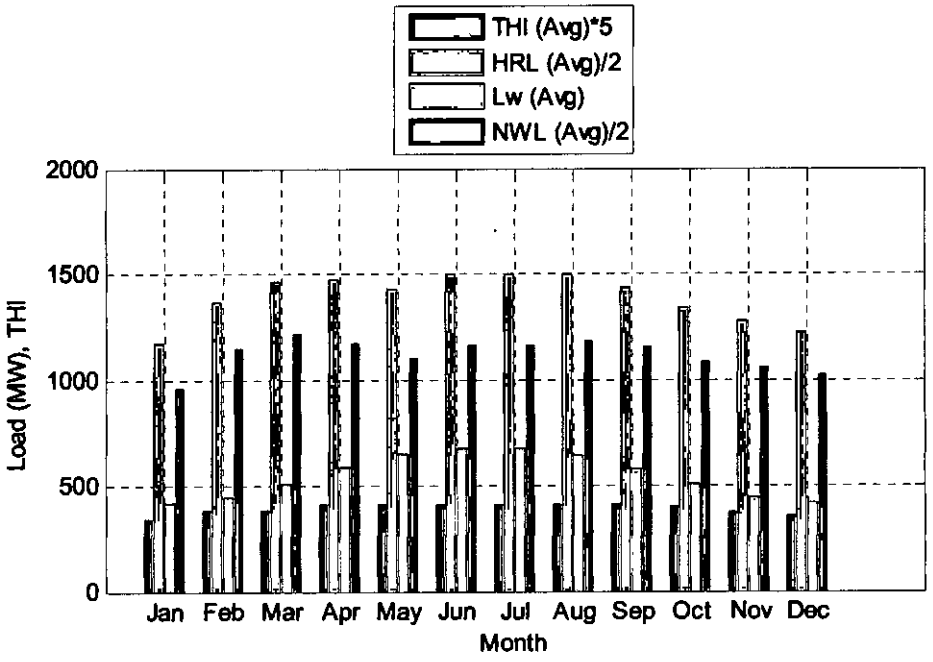


Figure 4.31: Average THI, HRL, $L_w$ and NWL at 12.00 P.M. of 2006

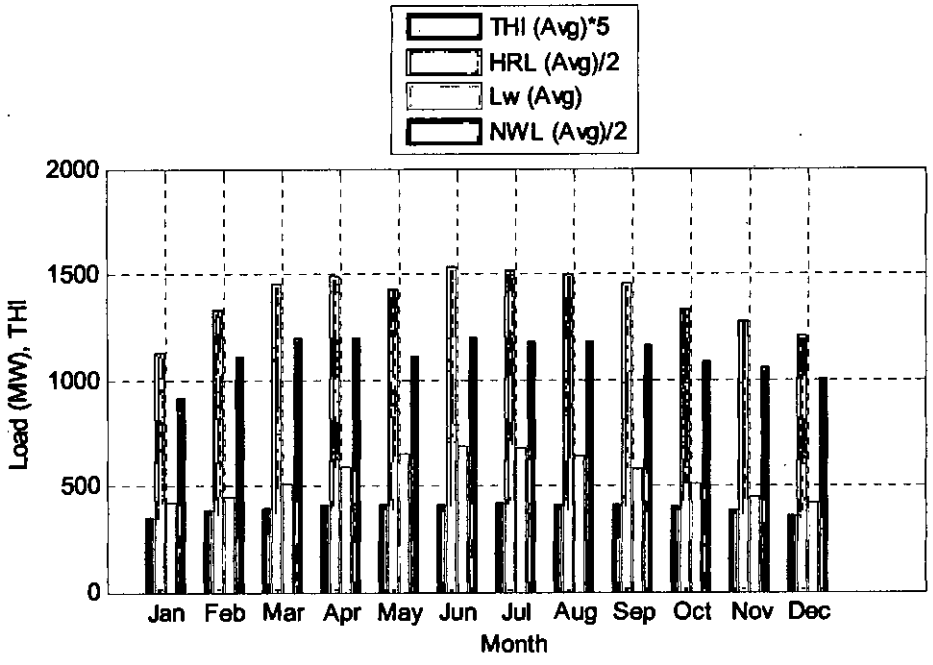


Figure 4.32: Average THI, HRL, $L_w$ and NWL at 3.00 P.M. of 2006

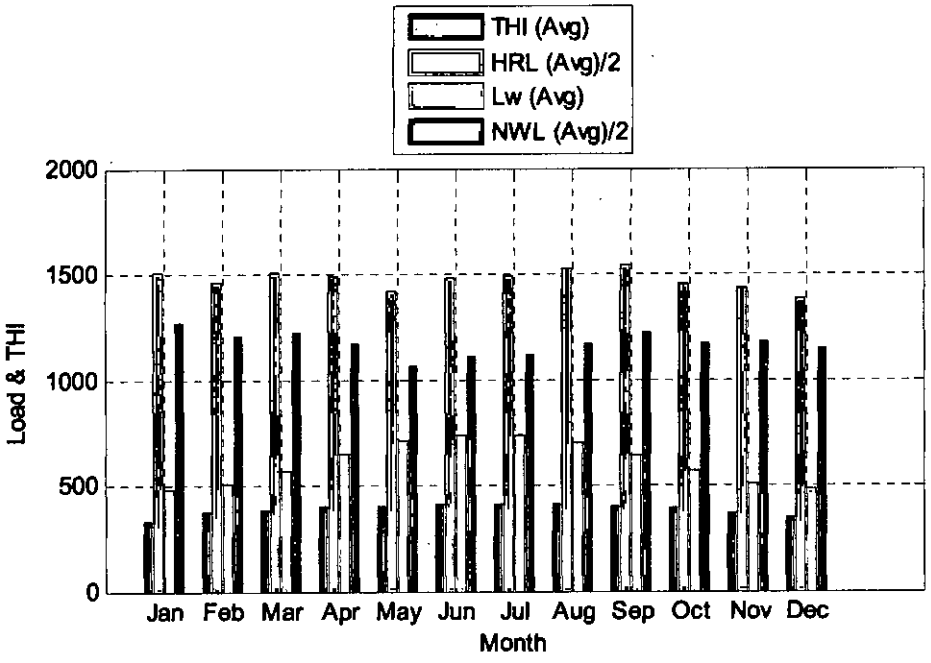


Figure 4.33: Average THI, HRL, $L_w$ and NWL at 6.00 P.M. of 2006

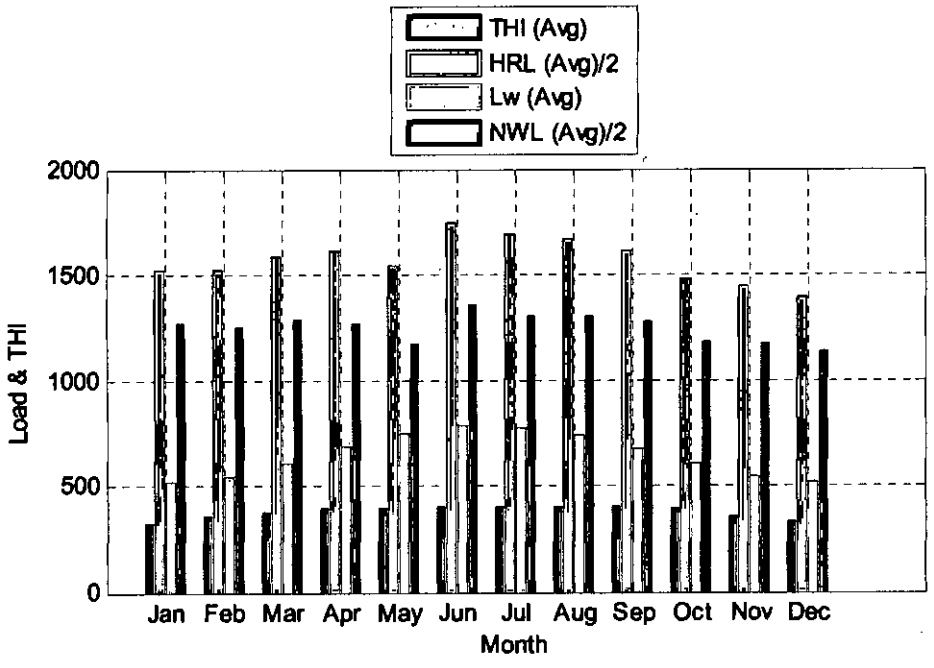


Figure 4.34: Average THI, HRL, $L_w$ and NWL at 9.00 P.M. of 2006

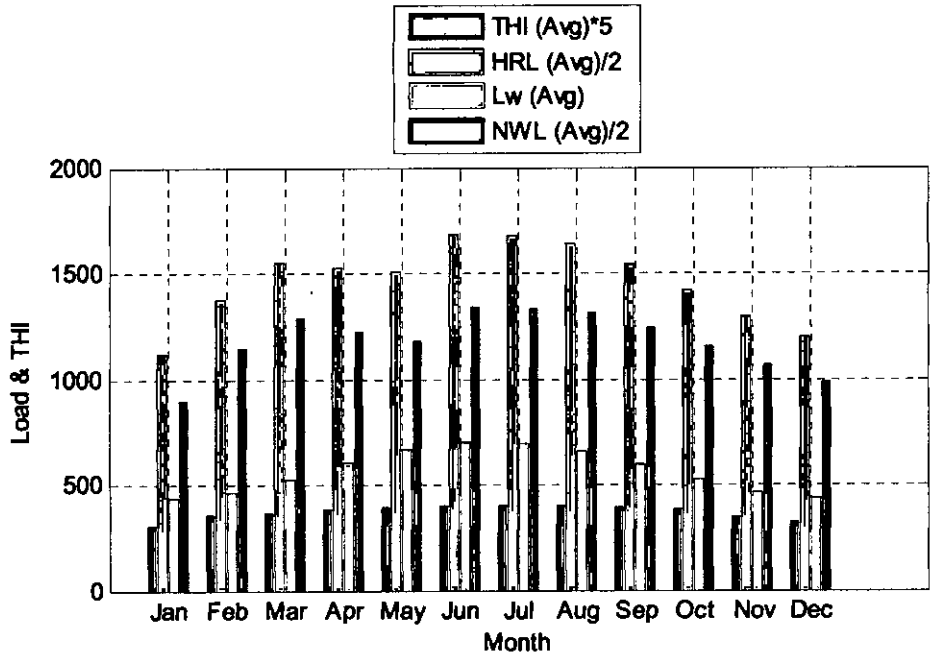


Figure 4.35: Average THI, HRL, $L_w$ and NWL at 12.00 A.M. of 2006

For any particular time, it is observed from the above figures that, the months that have high temperature-humidity index and hourly load, results in high weather sensitive component of the load. NWL are not affected by the change of weather variables.

For any particular month, the weather sensitive component of the load is highest at 9.00 P.M. Because in 9.00 P.M. both average THI and average HRL possess highest value.

### 4.6.2 CORRELATION COEFFICIENTS FOR DIFFERENT TIME SLOTS

Table 4.8 presents the correlation coefficient between THI and $L_w$ for different months at eight time slots of 2006. It is observed from the table that, correlation coefficient starts increasing from January and it continues up to June. From July, the correlation coefficient starts decreasing and this trend continues up to December. For any particular month, the highest correlation coefficient occurs at 9.00 P.M.

**Table 4.8: Correlation coefficient (R) for eight time slots of 2006**

| | Time | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | 3.00 A.M. | 6.00 A.M. | 9.00 A.M. | 12.00 P.M. | 3.00 P.M. | 6.00 P.M. | 9.00 P.M. | 12.00 A.M. |
| Jan-06 | 0.25 | 0.27 | 0.32 | 0.42 | 0.49 | 0.85 | 0.86 | 0.29 |
| Feb-06 | 0.32 | 0.38 | 0.49 | 0.52 | 0.53 | 0.86 | 0.87 | 0.37 |
| Mar-06 | 0.37 | 0.49 | 0.53 | 0.58 | 0.63 | 0.85 | 0.89 | 0.52 |
| Apr-06 | 0.42 | 0.49 | 0.52 | 0.63 | 0.67 | 0.86 | 0.92 | 0.72 |
| May-06 | 0.52 | 0.56 | 0.57 | 0.68 | 0.71 | 0.88 | 0.94 | 0.73 |
| Jun-06 | 0.54 | 0.58 | 0.61 | 0.70 | 0.75 | 0.89 | 0.96 | 0.75 |
| Jul-06 | 0.50 | 0.48 | 0.55 | 0.62 | 0.61 | 0.85 | 0.90 | 0.70 |
| Aug-06 | 0.45 | 0.47 | 0.52 | 0.59 | 0.69 | 0.86 | 0.88 | 0.69 |
| Sep-06 | 0.42 | 0.43 | 0.49 | 0.53 | 0.66 | 0.85 | 0.86 | 0.67 |
| Oct-06 | 0.41 | 0.43 | 0.47 | 0.49 | 0.67 | 0.84 | 0.85 | 0.67 |
| Nov-06 | 0.39 | 0.42 | 0.46 | 0.43 | 0.61 | 0.82 | 0.83 | 0.65 |
| Dec-06 | 0.37 | 0.40 | 0.42 | 0.39 | 0.59 | 0.81 | 0.82 | 0.61 |

Figures 4.36 to 4.43 present the Table 4.8 graphically.

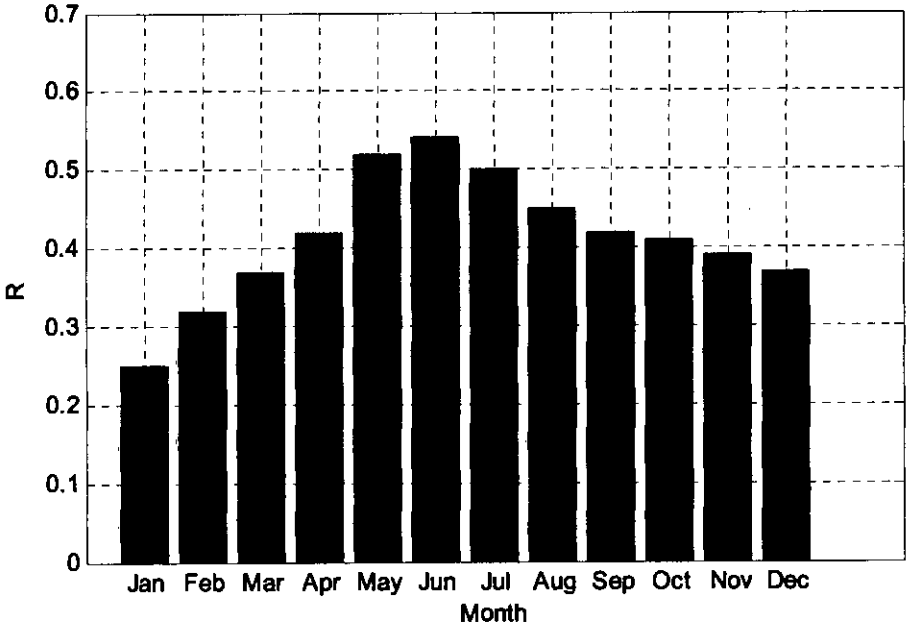


Figure 4.36: Correlation coefficient at 3.00 A.M. of 2006

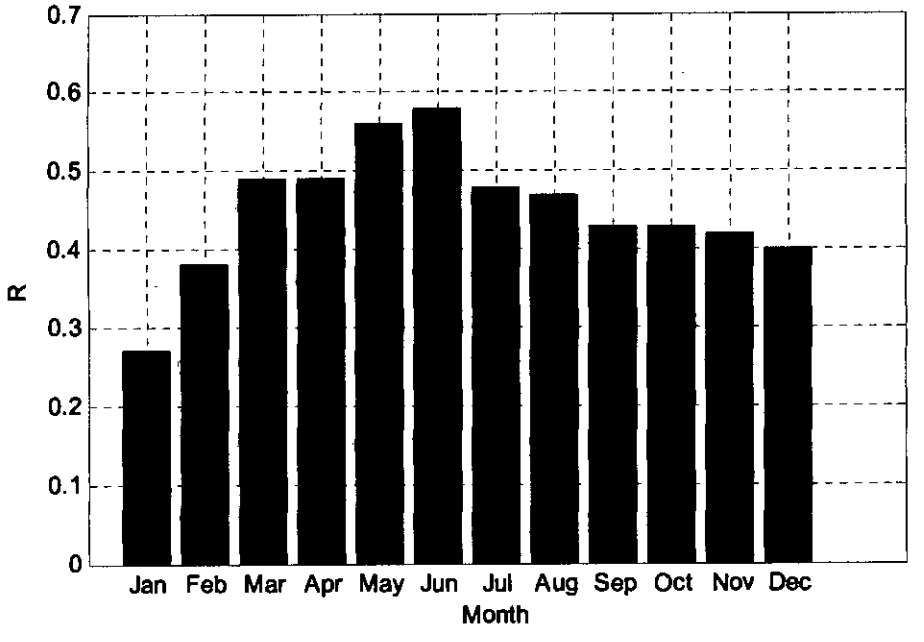


Figure 4.37: Correlation coefficient at 6.00 A.M. of 2006

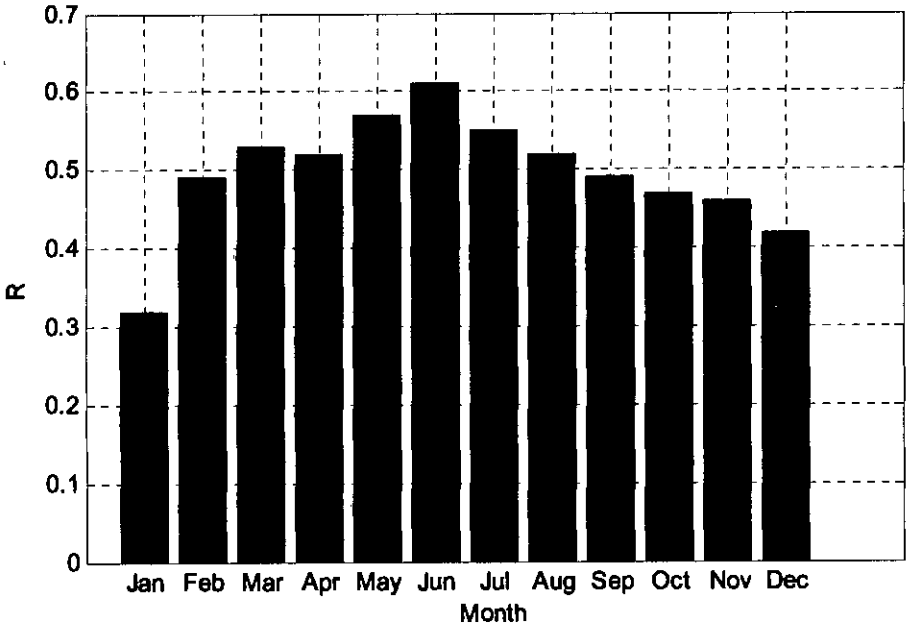


Figure 4.38: Correlation coefficient at 9.00 A.M. of 2006

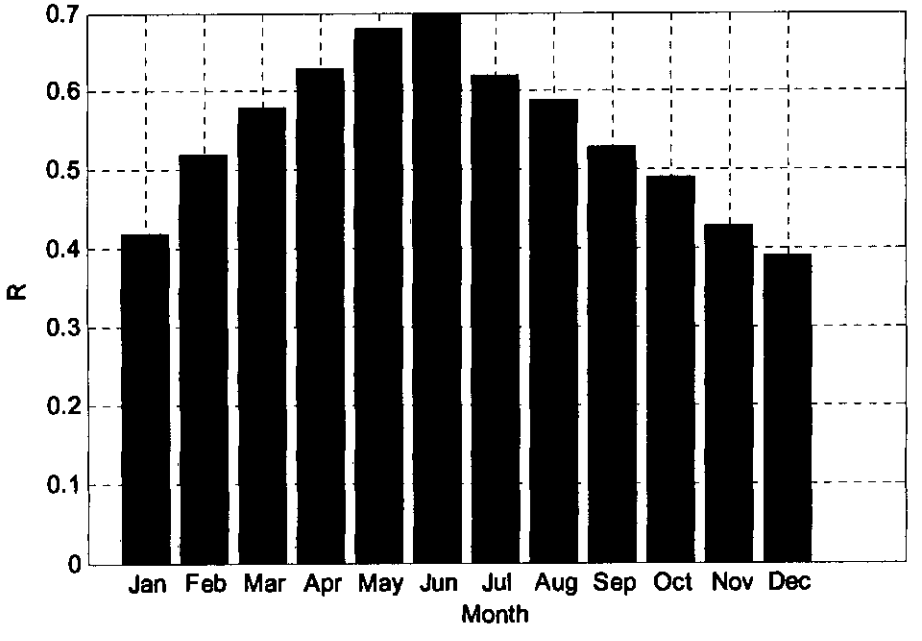


Figure 4.39: Correlation coefficient at 12.00 P.M. of 2006

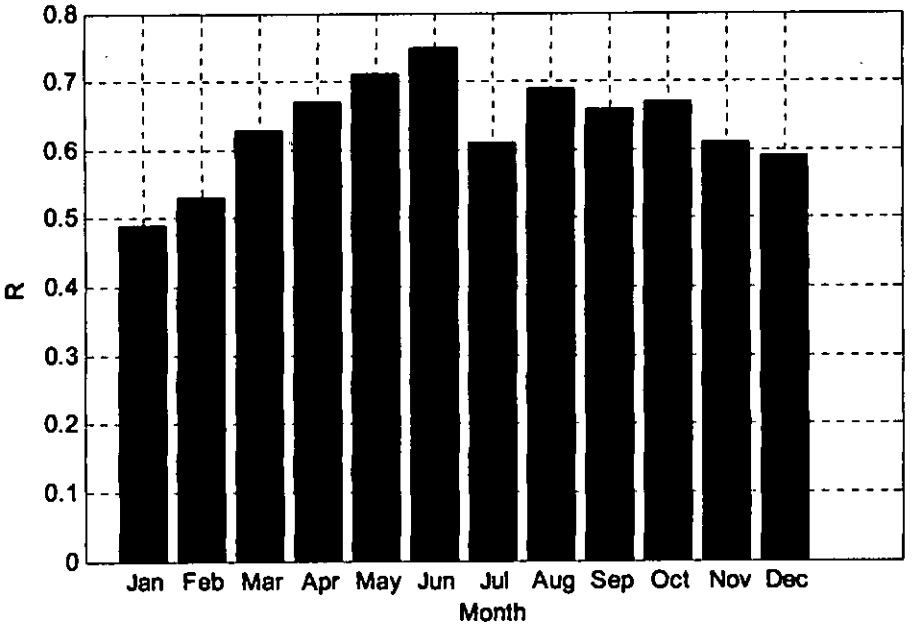


Figure 4.40: Correlation coefficient at 3.00 P.M. of 2006

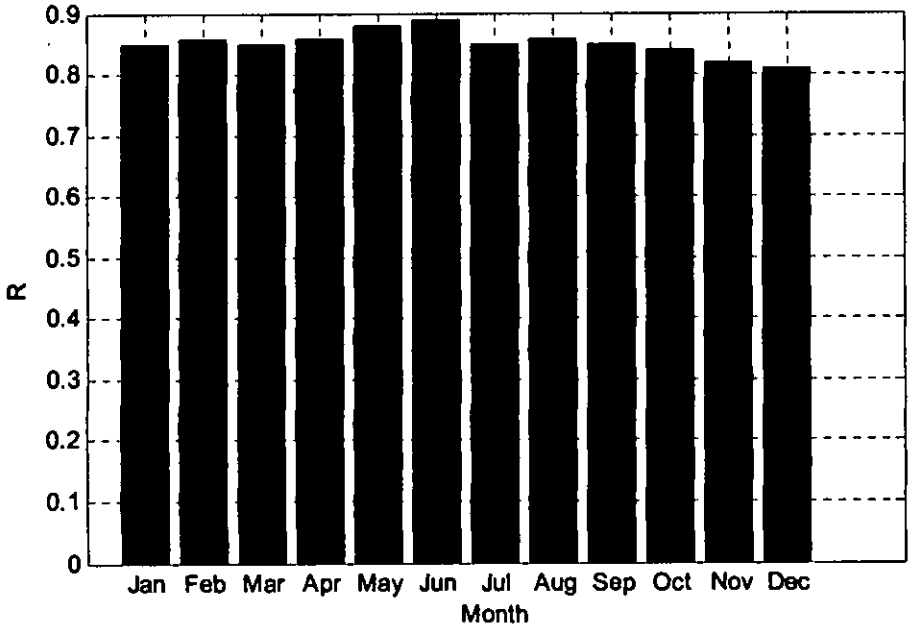


Figure 4.41: Correlation coefficient at 6.00 P.M. of 2006

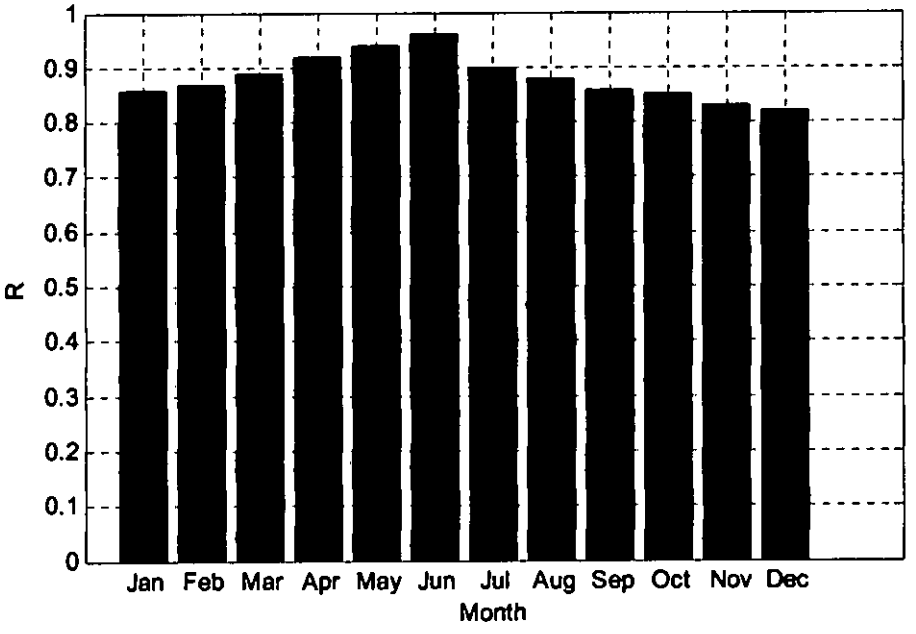


Figure 4.42: Correlation coefficient at 9.00 P.M. of 2006

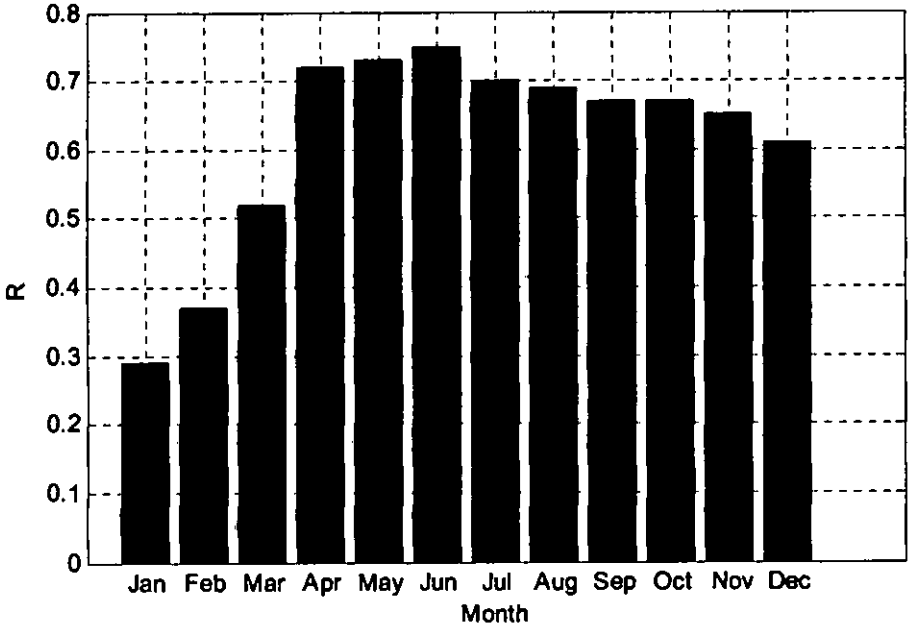


Figure 4.43: Correlation coefficient at 12.00 A.M. of 2006

# CHAPTER 5

# CONCLUSION AND RECOMMENDATIONS

## 5.1 INTRODUCTION

The salient outcomes of the thesis are presented in the form of concluding remarks in this chapter. The chapter ends with recommendations for future areas of research works in continuation of this thesis.

## 5.2 CONCLUSION

In this thesis, a new methodology is proposed to identify the weather sensitive portion of the electrical load based on EMD technique. Presently EMD technique is applied in speech and biomedical signal processing. This thesis work creates a scope of application of EMD technique in electrical load analysis.

The developed methodology is applied to identify the weather sensitive component of the daily peak loads and hourly loads of BPS from year 1998 to 2006. The obtained results have been compared with the outcomes of the conventional technique [40]. The accuracy of the results is also measured by statistical error evaluation process. The accuracy of the results using the proposed methodology is higher than that of the conventional technique. In the conventional technique, weather sensitive component is identified by fitting a non-linear curve to the scatter diagram of the weather-load model of a particular year. The draw-back of this technique is that it does not reflect the change of demand and change of weather parameters properly in a particular year. For example, the weather condition in the month of January and in the month of December in a particular year is almost similar. But the total demand in month of January is less than that of December. Because in a period of whole year, generally total demand increases. But the mathematical model developed by the non-linear curve fitting gives almost similar output for the months those have similar weather conditions. In proposed methodology, the variable portion of the daily peak demand is decomposed into several components and these components have been correlated with weather parameters. As a result the monthly variation of demand and weather conditions have been reflected properly which causes low statistical error.

The NWL of BPS from 1998 to 2006 are also identified in the thesis. It is observed NWLs do not change with weather parameters. Even some times they show negative correlation with weather variables.

The correlation coefficient between the weather sensitive portion of the load and the corresponding weather variable for eight time slots for 2006 is presented in this thesis. Monthly average load and temperature-humidity index is considered in this process. The time slot that shows highest correlation coefficient in a particular day is also identified. The month in which the weather sensitive portion of the load has the highest correlation with the weather pattern is also identified.

Finally it is observed that the weather sensitive portion of the electrical load varies with two parameters. One parameter is weather variables like temperature and humidity and the other parameter is total demand. Though the weather conditions are not that much different from a year to another, but it is observed that the weather sensitive portion of the load changes every year by a significant amount. This is because of the use of electrical appliances that generally increases year by year to mitigate the effect of the weather parameters.

## 5.3 RECOMMENDATION FOR FUTURE RESEARCH

Following are the recommendations for future research in this area:

I. The weather sensitive portion of the load and base load can be segregated using the proposed methodology. These two components can be forecasted separately which helps forecasting the total load closer to the realistic one.

II. Two weather parameters, temperature and humidity are combined as a composite weather variable known as THI (temperature-humidity index) is used as weather variable in this thesis work. The other weather parameters such as rain fall, wind speed etc. is not considered in this thesis. These parameters can be included as weather variable that will help identification of weather sensitive portion of the load more precisely.

III. Wavelet analysis can be applied to identify the weather sensitive portion of the electrical load.

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# APPENDIX

Table A1: Weather and Load Information of the Year 2006

| Date | THI (Avg) | PL (MW) | Lw (MW) | NWL (MW) |
|---|---|---|---|---|
| 1-Jan-06 | 65.18 | 3483.00 | 567.49 | 2915.51 |
| 2-Jan-06 | 65.35 | 3554.00 | 566.59 | 2987.41 |
| 3-Jan-06 | 64.49 | 3537.00 | 565.74 | 2971.26 |
| 4-Jan-06 | 64.56 | 3536.00 | 564.95 | 2971.05 |
| 5-Jan-06 | 64.85 | 3522.00 | 564.21 | 2957.79 |
| 6-Jan-06 | 64.90 | 3582.00 | 563.53 | 3018.47 |
| 7-Jan-06 | 63.17 | 3565.00 | 562.89 | 3002.11 |
| 8-Jan-06 | 59.65 | 3506.00 | 562.32 | 2943.68 |
| 9-Jan-06 | 57.90 | 3426.00 | 561.79 | 2864.21 |
| 10-Jan-06 | 58.27 | 3313.00 | 561.32 | 2751.68 |
| 11-Jan-06 | 60.13 | 3010.00 | 560.91 | 2449.09 |
| 12-Jan-06 | 60.43 | 2897.00 | 560.56 | 2336.44 |
| 13-Jan-06 | 61.46 | 3029.00 | 560.26 | 2468.74 |
| 14-Jan-06 | 62.93 | 2943.70 | 560.02 | 2383.68 |
| 15-Jan-06 | 63.59 | 2770.80 | 559.84 | 2210.96 |
| 16-Jan-06 | 62.26 | 2943.70 | 559.71 | 2383.99 |
| 17-Jan-06 | 64.72 | 2859.70 | 559.65 | 2300.05 |
| 18-Jan-06 | 67.77 | 2838.20 | 559.64 | 2278.56 |
| 19-Jan-06 | 67.92 | 2777.30 | 559.70 | 2217.60 |
| 20-Jan-06 | 66.57 | 3056.30 | 559.81 | 2496.49 |
| 21-Jan-06 | 64.78 | 3181.70 | 559.99 | 2621.71 |
| 22-Jan-06 | 63.24 | 3057.20 | 560.23 | 2496.97 |
| 23-Jan-06 | 61.66 | 2968.20 | 560.53 | 2407.67 |
| 24-Jan-06 | 64.71 | 3036.20 | 560.90 | 2475.30 |
| 25-Jan-06 | 64.28 | 3001.20 | 561.33 | 2439.87 |
| 26-Jan-06 | 64.77 | 3150.00 | 561.82 | 2588.18 |
| 27-Jan-06 | 64.79 | 3103.50 | 562.38 | 2541.12 |
| 28-Jan-06 | 66.48 | 3126.20 | 563.00 | 2563.20 |
| 29-Jan-06 | 67.05 | 3123.20 | 563.68 | 2559.52 |
| 30-Jan-06 | 67.02 | 3083.70 | 564.42 | 2519.28 |
| 31-Jan-06 | 67.20 | 2928.60 | 565.22 | 2363.38 |
| 1-Feb-06 | 67.59 | 3099.90 | 566.09 | 2533.81 |
| 2-Feb-06 | 68.33 | 3246.80 | 567.01 | 2679.79 |
| 3-Feb-06 | 69.21 | 2981.30 | 567.99 | 2413.31 |
| 4-Feb-06 | 69.65 | 2859.10 | 569.02 | 2290.08 |
| 5-Feb-06 | 68.13 | 2870.10 | 570.12 | 2299.98 |
| 6-Feb-06 | 68.55 | 3236.60 | 571.26 | 2665.34 |
| 7-Feb-06 | 67.87 | 3236.60 | 572.47 | 2664.13 |
| 8-Feb-06 | 68.36 | 3357.80 | 573.72 | 2784.08 |
| 9-Feb-06 | 68.98 | 3392.40 | 575.03 | 2817.37 |
| 10-Feb-06 | 69.17 | 3251.30 | 576.39 | 2674.91 |
| 11-Feb-06 | 68.61 | 3333.10 | 577.80 | 2755.30 |
| 12-Feb-06 | 69.17 | 3253.70 | 579.26 | 2674.44 |
| 13-Feb-06 | 71.81 | 3227.50 | 580.77 | 2646.73 |
| 14-Feb-06 | 72.79 | 3059.10 | 582.33 | 2476.77 |
| 15-Feb-06 | 74.45 | 3131.70 | 583.94 | 2547.76 |
| 16-Feb-06 | 75.93 | 3219.00 | 585.59 | 2633.41 |
| 17-Feb-06 | 75.43 | 2942.00 | 587.29 | 2354.71 |
| 18-Feb-06 | 75.93 | 2949.60 | 589.03 | 2360.57 |
| 19-Feb-06 | 76.36 | 2953.60 | 590.82 | 2362.78 |
| 20-Feb-06 | 76.18 | 2930.10 | 592.65 | 2337.45 |

| | | | | |
|---|---|---|---|---|
| 21-Feb-06 | 76.91 | 2978.50 | 594.53 | 2383.97 |
| 22-Feb-06 | 76.13 | 2930.10 | 596.44 | 2333.66 |
| 23-Feb-06 | 75.64 | 2913.50 | 598.40 | 2315.10 |
| 24-Feb-06 | 75.69 | 2875.50 | 600.39 | 2275.11 |
| 25-Feb-06 | 75.78 | 2900.50 | 602.42 | 2298.08 |
| 26-Feb-06 | 75.72 | 2821.60 | 604.50 | 2217.10 |
| 27-Feb-06 | 76.40 | 3319.10 | 606.60 | 2712.50 |
| 28-Feb-06 | 75.11 | 3288.00 | 608.75 | 2679.25 |
| 1-Mar-06 | 75.71 | 3382.40 | 610.93 | 2771.47 |
| 2-Mar-06 | 73.68 | 3475.50 | 613.14 | 2862.36 |
| 3-Mar-06 | 70.41 | 3293.00 | 615.39 | 2677.61 |
| 4-Mar-06 | 73.04 | 3361.40 | 617.67 | 2743.73 |
| 5-Mar-06 | 75.13 | 3276.60 | 619.99 | 2656.61 |
| 6-Mar-06 | 76.44 | 3273.10 | 622.33 | 2650.77 |
| 7-Mar-06 | 77.29 | 3240.50 | 624.71 | 2615.79 |
| 8-Mar-06 | 77.53 | 3247.90 | 627.11 | 2620.79 |
| 9-Mar-06 | 77.84 | 3276.10 | 629.54 | 2646.56 |
| 10-Mar-06 | 76.83 | 3358.70 | 632.00 | 2726.70 |
| 11-Mar-06 | 70.90 | 3096.50 | 634.49 | 2462.01 |
| 12-Mar-06 | 71.80 | 3174.00 | 637.00 | 2537.00 |
| 13-Mar-06 | 73.14 | 3094.70 | 639.54 | 2455.16 |
| 14-Mar-06 | 73.74 | 3308.90 | 642.09 | 2666.81 |
| 15-Mar-06 | 75.83 | 3156.10 | 644.67 | 2511.43 |
| 16-Mar-06 | 74.84 | 3117.10 | 647.27 | 2469.83 |
| 17-Mar-06 | 74.07 | 2949.90 | 649.89 | 2300.01 |
| 18-Mar-06 | 71.02 | 3022.10 | 652.52 | 2369.58 |
| 19-Mar-06 | 69.58 | 3203.50 | 655.17 | 2548.33 |
| 20-Mar-06 | 69.56 | 3173.10 | 657.83 | 2515.27 |
| 21-Mar-06 | 73.40 | 3241.00 | 660.51 | 2580.49 |
| 22-Mar-06 | 77.83 | 3358.20 | 663.19 | 2695.01 |
| 23-Mar-06 | 74.28 | 3341.70 | 665.89 | 2675.81 |
| 24-Mar-06 | 73.95 | 3108.00 | 668.60 | 2439.40 |
| 25-Mar-06 | 77.56 | 3025.90 | 671.31 | 2354.59 |
| 26-Mar-06 | 80.44 | 3210.10 | 674.03 | 2536.07 |
| 27-Mar-06 | 80.26 | 3428.80 | 676.75 | 2752.05 |
| 28-Mar-06 | 76.07 | 3431.50 | 679.48 | 2752.02 |
| 29-Mar-06 | 73.51 | 3349.00 | 682.21 | 2666.79 |
| 30-Mar-06 | 76.13 | 3299.80 | 684.94 | 2614.86 |
| 31-Mar-06 | 78.65 | 3295.10 | 687.67 | 2607.43 |
| 1-Apr-06 | 79.28 | 3212.00 | 690.40 | 2521.60 |
| 2-Apr-06 | 79.44 | 3360.10 | 693.12 | 2666.98 |
| 3-Apr-06 | 77.17 | 3358.00 | 695.84 | 2662.16 |
| 4-Apr-06 | 74.83 | 3347.10 | 698.56 | 2648.54 |
| 5-Apr-06 | 75.44 | 2994.00 | 701.26 | 2292.74 |
| 6-Apr-06 | 76.75 | 3103.10 | 703.96 | 2399.14 |
| 7-Apr-06 | 78.08 | 3328.00 | 706.65 | 2621.35 |
| 8-Apr-06 | 79.34 | 3212.00 | 709.32 | 2502.68 |
| 9-Apr-06 | 80.28 | 3253.00 | 711.99 | 2541.01 |
| 10-Apr-06 | 79.94 | 3086.70 | 714.64 | 2372.06 |
| 11-Apr-06 | 81.24 | 3244.90 | 717.27 | 2527.63 |
| 12-Apr-06 | 81.51 | 3064.90 | 719.89 | 2345.01 |
| 13-Apr-06 | 79.44 | 3243.10 | 722.48 | 2520.62 |
| 14-Apr-06 | 80.10 | 3264.30 | 725.06 | 2539.24 |
| 15-Apr-06 | 81.45 | 3337.30 | 727.62 | 2609.68 |
| 16-Apr-06 | 80.80 | 3343.30 | 730.15 | 2613.15 |
| 17-Apr-06 | 79.55 | 3244.50 | 732.65 | 2511.85 |

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|---|---|---|---|---|
| 18-Apr-06 | 74.61 | 3245.00 | 735.13 | 2509.87 |
| 19-Apr-06 | 76.28 | 3372.60 | 737.59 | 2635.01 |
| 20-Apr-06 | 75.46 | 3536.50 | 740.02 | 2796.48 |
| 21-Apr-06 | 77.52 | 3485.60 | 742.42 | 2743.18 |
| 22-Apr-06 | 77.06 | 3383.20 | 744.80 | 2638.40 |
| 23-Apr-06 | 78.20 | 3298.20 | 747.14 | 2551.06 |
| 24-Apr-06 | 77.18 | 3116.30 | 749.46 | 2366.84 |
| 25-Apr-06 | 78.39 | 3327.10 | 751.75 | 2575.35 |
| 26-Apr-06 | 80.03 | 3406.90 | 754.01 | 2652.89 |
| 27-Apr-06 | 77.94 | 3394.00 | 756.24 | 2637.76 |
| 28-Apr-06 | 80.30 | 3450.90 | 758.43 | 2692.47 |
| 29-Apr-06 | 79.54 | 3184.30 | 760.60 | 2423.70 |
| 30-Apr-06 | 80.60 | 3301.50 | 762.73 | 2538.77 |
| 1-May-06 | 82.91 | 3327.00 | 764.83 | 2562.17 |
| 2-May-06 | 81.21 | 3330.50 | 766.90 | 2563.60 |
| 3-May-06 | 81.78 | 3342.70 | 768.93 | 2573.77 |
| 4-May-06 | 81.15 | 3180.30 | 770.92 | 2409.38 |
| 5-May-06 | 80.68 | 3093.10 | 772.89 | 2320.21 |
| 6-May-06 | 79.13 | 2996.40 | 774.81 | 2221.59 |
| 7-May-06 | 74.13 | 2991.70 | 776.70 | 2215.00 |
| 8-May-06 | 80.02 | 3186.80 | 778.55 | 2408.25 |
| 9-May-06 | 79.83 | 3178.00 | 780.37 | 2397.63 |
| 10-May-06 | 77.61 | 3023.30 | 782.15 | 2241.15 |
| 11-May-06 | 78.64 | 3065.80 | 783.89 | 2281.91 |
| 12-May-06 | 73.06 | 3023.30 | 785.59 | 2237.71 |
| 13-May-06 | 78.23 | 2887.10 | 787.26 | 2099.84 |
| 14-May-06 | 77.60 | 2844.70 | 788.89 | 2055.81 |
| 15-May-06 | 79.22 | 2964.60 | 790.49 | 2174.11 |
| 16-May-06 | 80.54 | 2972.80 | 792.05 | 2180.75 |
| 17-May-06 | 82.11 | 3164.60 | 793.57 | 2371.03 |
| 18-May-06 | 81.54 | 3256.40 | 795.06 | 2461.34 |
| 19-May-06 | 80.81 | 3238.70 | 796.51 | 2442.19 |
| 20-May-06 | 80.04 | 3275.40 | 797.92 | 2477.48 |
| 21-May-06 | 80.28 | 3385.40 | 799.30 | 2586.10 |
| 22-May-06 | 81.22 | 3296.50 | 800.64 | 2495.86 |
| 23-May-06 | 80.84 | 2909.30 | 801.94 | 2107.36 |
| 24-May-06 | 81.41 | 3330.60 | 803.20 | 2527.40 |
| 25-May-06 | 82.25 | 3326.60 | 804.43 | 2522.17 |
| 26-May-06 | 78.11 | 3433.70 | 805.63 | 2628.07 |
| 27-May-06 | 80.11 | 3437.30 | 806.79 | 2630.51 |
| 28-May-06 | 79.52 | 3089.10 | 807.91 | 2281.19 |
| 29-May-06 | 79.81 | 3472.00 | 808.99 | 2663.01 |
| 30-May-06 | 82.83 | 3073.20 | 810.04 | 2263.16 |
| 31-May-06 | 82.42 | 3177.60 | 811.05 | 2366.55 |
| 1-Jun-06 | 79.47 | 3266.50 | 812.02 | 2454.48 |
| 2-Jun-06 | 77.86 | 3300.70 | 812.96 | 2487.74 |
| 3-Jun-06 | 80.49 | 3432.30 | 813.86 | 2618.44 |
| 4-Jun-06 | 81.56 | 3667.50 | 814.73 | 2852.77 |
| 5-Jun-06 | 80.64 | 3644.10 | 815.56 | 2828.54 |
| 6-Jun-06 | 80.58 | 3685.10 | 816.35 | 2868.75 |
| 7-Jun-06 | 80.80 | 3667.60 | 817.11 | 2850.49 |
| 8-Jun-06 | 80.89 | 3591.10 | 817.83 | 2773.27 |
| 9-Jun-06 | 79.87 | 3584.10 | 818.51 | 2765.59 |
| 10-Jun-06 | 78.57 | 3574.90 | 819.16 | 2755.74 |
| 11-Jun-06 | 84.38 | 3525.20 | 819.77 | 2705.43 |
| 12-Jun-06 | 84.64 | 3565.20 | 820.35 | 2744.85 |

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|---|---|---|---|---|
| 13-Jun-06 | 84.08 | 3564.20 | 820.88 | 2743.32 |
| 14-Jun-06 | 79.91 | 3608.00 | 821.39 | 2786.61 |
| 15-Jun-06 | 82.79 | 3591.80 | 821.85 | 2769.95 |
| 16-Jun-06 | 80.83 | 3567.70 | 822.28 | 2745.42 |
| 17-Jun-06 | 83.78 | 3488.20 | 822.67 | 2665.53 |
| 18-Jun-06 | 81.77 | 3460.70 | 823.03 | 2637.67 |
| 19-Jun-06 | 82.36 | 3532.60 | 823.35 | 2709.25 |
| 20-Jun-06 | 80.51 | 3441.20 | 823.64 | 2617.56 |
| 21-Jun-06 | 81.30 | 3541.20 | 823.89 | 2717.31 |
| 22-Jun-06 | 81.78 | 3502.20 | 824.10 | 2678.10 |
| 23-Jun-06 | 82.00 | 3484.20 | 824.27 | 2659.93 |
| 24-Jun-06 | 81.60 | 3515.90 | 824.41 | 2691.49 |
| 25-Jun-06 | 81.72 | 3365.20 | 824.52 | 2540.68 |
| 26-Jun-06 | 82.02 | 3549.00 | 824.58 | 2724.42 |
| 27-Jun-06 | 82.36 | 3462.30 | 824.61 | 2637.69 |
| 28-Jun-06 | 82.40 | 3549.70 | 824.61 | 2725.09 |
| 29-Jun-06 | 83.18 | 3516.10 | 824.57 | 2691.53 |
| 30-Jun-06 | 82.79 | 3490.20 | 824.49 | 2665.71 |
| 1-Jul-06 | 83.53 | 3559.50 | 824.38 | 2735.12 |
| 2-Jul-06 | 81.61 | 3511.20 | 824.23 | 2686.97 |
| 3-Jul-06 | 81.30 | 3551.40 | 824.04 | 2727.36 |
| 4-Jul-06 | 82.26 | 3585.20 | 823.82 | 2761.38 |
| 5-Jul-06 | 82.66 | 3586.80 | 823.56 | 2763.24 |
| 6-Jul-06 | 82.14 | 3554.50 | 823.27 | 2731.23 |
| 7-Jul-06 | 82.46 | 3399.60 | 822.94 | 2576.66 |
| 8-Jul-06 | 80.44 | 3490.60 | 822.57 | 2668.03 |
| 9-Jul-06 | 80.88 | 3519.60 | 822.17 | 2697.43 |
| 10-Jul-06 | 79.97 | 3555.90 | 821.73 | 2734.17 |
| 11-Jul-06 | 80.36 | 3443.40 | 821.26 | 2622.14 |
| 12-Jul-06 | 82.80 | 3225.90 | 820.75 | 2405.15 |
| 13-Jul-06 | 82.77 | 3210.80 | 820.20 | 2390.60 |
| 14-Jul-06 | 82.66 | 3418.70 | 819.62 | 2599.08 |
| 15-Jul-06 | 81.26 | 3430.80 | 819.00 | 2611.80 |
| 16-Jul-06 | 82.04 | 3414.80 | 818.34 | 2596.46 |
| 17-Jul-06 | 82.52 | 3336.80 | 817.65 | 2519.15 |
| 18-Jul-06 | 81.78 | 3397.70 | 816.93 | 2580.77 |
| 19-Jul-06 | 79.73 | 3397.30 | 816.17 | 2581.13 |
| 20-Jul-06 | 80.12 | 3397.30 | 815.37 | 2581.93 |
| 21-Jul-06 | 79.84 | 3437.30 | 814.53 | 2622.77 |
| 22-Jul-06 | 80.30 | 3559.40 | 813.66 | 2745.74 |
| 23-Jul-06 | 81.56 | 3472.00 | 812.76 | 2659.24 |
| 24-Jul-06 | 82.67 | 3253.00 | 811.82 | 2441.18 |
| 25-Jul-06 | 83.34 | 3411.40 | 810.84 | 2600.56 |
| 26-Jul-06 | 81.84 | 3275.50 | 809.82 | 2465.68 |
| 27-Jul-06 | 81.12 | 3302.10 | 808.77 | 2493.33 |
| 28-Jul-06 | 80.56 | 3340.20 | 807.69 | 2532.51 |
| 29-Jul-06 | 79.39 | 3487.30 | 806.57 | 2680.73 |
| 30-Jul-06 | 81.25 | 3402.30 | 805.41 | 2596.89 |
| 31-Jul-06 | 82.19 | 3394.80 | 804.22 | 2590.58 |
| 1-Aug-06 | 82.39 | 3387.20 | 802.99 | 2584.21 |
| 2-Aug-06 | 80.72 | 3390.40 | 801.73 | 2588.67 |
| 3-Aug-06 | 79.85 | 3406.80 | 800.42 | 2606.38 |
| 4-Aug-06 | 79.69 | 3399.80 | 799.09 | 2600.71 |
| 5-Aug-06 | 76.72 | 3258.10 | 797.72 | 2460.38 |
| 6-Aug-06 | 79.43 | 3228.80 | 796.31 | 2432.49 |
| 7-Aug-06 | 80.96 | 3359.70 | 794.87 | 2564.83 |

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|---|---|---|---|---|
| 8-Aug-06 | 80.92 | 3444.40 | 793.40 | 2651.00 |
| 9-Aug-06 | 82.15 | 3422.40 | 791.89 | 2630.51 |
| 10-Aug-06 | 82.39 | 3481.90 | 790.35 | 2691.55 |
| 11-Aug-06 | 82.89 | 3472.20 | 788.77 | 2683.43 |
| 12-Aug-06 | 81.44 | 3151.80 | 787.17 | 2364.63 |
| 13-Aug-06 | 81.58 | 3151.80 | 785.53 | 2366.27 |
| 14-Aug-06 | 81.67 | 3250.40 | 783.86 | 2466.54 |
| 15-Aug-06 | 81.95 | 3269.40 | 782.16 | 2487.24 |
| 16-Aug-06 | 81.06 | 3343.20 | 780.44 | 2562.76 |
| 17-Aug-06 | 80.99 | 3394.40 | 778.68 | 2615.72 |
| 18-Aug-06 | 82.00 | 3367.20 | 776.89 | 2590.31 |
| 19-Aug-06 | 81.29 | 3347.90 | 775.08 | 2572.82 |
| 20-Aug-06 | 80.97 | 3315.60 | 773.25 | 2542.35 |
| 21-Aug-06 | 80.77 | 3334.30 | 771.38 | 2562.92 |
| 22-Aug-06 | 79.37 | 3534.50 | 769.49 | 2765.01 |
| 23-Aug-06 | 79.18 | 3497.20 | 767.58 | 2729.62 |
| 24-Aug-06 | 81.34 | 3409.00 | 765.64 | 2643.36 |
| 25-Aug-06 | 81.73 | 3391.60 | 763.68 | 2627.92 |
| 26-Aug-06 | 81.48 | 3529.00 | 761.69 | 2767.31 |
| 27-Aug-06 | 82.92 | 3376.60 | 759.69 | 2616.91 |
| 28-Aug-06 | 81.81 | 3415.10 | 757.66 | 2657.44 |
| 29-Aug-06 | 79.97 | 3443.30 | 755.61 | 2687.69 |
| 30-Aug-06 | 80.81 | 3322.30 | 753.55 | 2568.75 |
| 31-Aug-06 | 80.72 | 3372.20 | 751.46 | 2620.74 |
| 1-Sep-06 | 82.51 | 3235.20 | 749.35 | 2485.85 |
| 2-Sep-06 | 80.99 | 3340.90 | 747.23 | 2593.67 |
| 3-Sep-06 | 80.34 | 3355.60 | 745.09 | 2610.51 |
| 4-Sep-06 | 79.93 | 3356.00 | 742.93 | 2613.07 |
| 5-Sep-06 | 81.59 | 3189.00 | 740.75 | 2448.25 |
| 6-Sep-06 | 81.26 | 3167.20 | 738.56 | 2428.64 |
| 7-Sep-06 | 82.41 | 3153.70 | 736.36 | 2417.34 |
| 8-Sep-06 | 80.76 | 3284.20 | 734.14 | 2550.06 |
| 9-Sep-06 | 81.28 | 3480.30 | 731.91 | 2748.39 |
| 10-Sep-06 | 80.20 | 3458.80 | 729.67 | 2729.13 |
| 11-Sep-06 | 78.12 | 3480.30 | 727.41 | 2752.89 |
| 12-Sep-06 | 78.62 | 3410.40 | 725.14 | 2685.26 |
| 13-Sep-06 | 81.37 | 3281.30 | 722.86 | 2558.44 |
| 14-Sep-06 | 81.40 | 3335.90 | 720.58 | 2615.32 |
| 15-Sep-06 | 81.73 | 3361.40 | 718.28 | 2643.12 |
| 16-Sep-06 | 82.37 | 3236.00 | 715.97 | 2520.03 |
| 17-Sep-06 | 80.95 | 2939.00 | 713.66 | 2225.34 |
| 18-Sep-06 | 81.41 | 4300.00 | 711.34 | 3588.66 |
| 19-Sep-06 | 80.67 | 3068.00 | 709.01 | 2358.99 |
| 20-Sep-06 | 76.90 | 3027.20 | 706.67 | 2320.53 |
| 21-Sep-06 | 76.09 | 3007.80 | 704.33 | 2303.47 |
| 22-Sep-06 | 77.14 | 3085.80 | 701.99 | 2383.81 |
| 23-Sep-06 | 77.61 | 3141.20 | 699.64 | 2441.56 |
| 24-Sep-06 | 80.46 | 3161.60 | 697.29 | 2464.31 |
| 25-Sep-06 | 80.31 | 3186.70 | 694.93 | 2491.77 |
| 26-Sep-06 | 80.67 | 3248.40 | 692.57 | 2555.83 |
| 27-Sep-06 | 82.03 | 4050.00 | 690.22 | 3359.78 |
| 28-Sep-06 | 80.88 | 3064.50 | 687.86 | 2376.64 |
| 29-Sep-06 | 80.60 | 2943.00 | 685.50 | 2257.50 |
| 30-Sep-06 | 80.51 | 3131.40 | 683.14 | 2448.26 |
| 1-Oct-06 | 79.96 | 3192.80 | 680.78 | 2512.02 |
| 2-Oct-06 | 81.39 | 3240.20 | 678.43 | 2561.77 |

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| 3-Oct-06 | 82.53 | 3013.00 | 676.07 | 2336.93 |
| 4-Oct-06 | 83.22 | 2993.60 | 673.72 | 2319.88 |
| 5-Oct-06 | 81.40 | 2991.20 | 671.38 | 2319.82 |
| 6-Oct-06 | 79.31 | 2976.60 | 669.04 | 2307.56 |
| 7-Oct-06 | 80.55 | 2965.20 | 666.70 | 2298.50 |
| 8-Oct-06 | 81.11 | 2940.80 | 664.37 | 2276.43 |
| 9-Oct-06 | 80.58 | 2771.10 | 662.05 | 2109.05 |
| 10-Oct-06 | 81.59 | 3069.60 | 659.73 | 2409.87 |
| 11-Oct-06 | 81.28 | 3088.20 | 657.42 | 2430.78 |
| 12-Oct-06 | 81.02 | 3068.10 | 655.12 | 2412.98 |
| 13-Oct-06 | 79.50 | 3045.80 | 652.83 | 2392.97 |
| 14-Oct-06 | 79.03 | 3104.20 | 650.55 | 2453.65 |
| 15-Oct-06 | 80.13 | 3107.60 | 648.28 | 2459.32 |
| 16-Oct-06 | 80.13 | 3054.00 | 646.02 | 2407.98 |
| 17-Oct-06 | 77.16 | 3066.20 | 643.78 | 2422.42 |
| 18-Oct-06 | 77.97 | 3071.50 | 641.54 | 2429.96 |
| 19-Oct-06 | 77.93 | 3069.60 | 639.32 | 2430.28 |
| 20-Oct-06 | 75.40 | 3070.00 | 637.11 | 2432.89 |
| 21-Oct-06 | 76.89 | 2992.20 | 634.92 | 2357.28 |
| 22-Oct-06 | 77.07 | 3055.70 | 632.74 | 2422.96 |
| 23-Oct-06 | 76.95 | 3003.00 | 630.58 | 2372.42 |
| 24-Oct-06 | 76.72 | 2971.70 | 628.44 | 2343.26 |
| 25-Oct-06 | 76.23 | 2954.00 | 626.31 | 2327.69 |
| 26-Oct-06 | 77.52 | 2950.80 | 624.20 | 2326.60 |
| 27-Oct-06 | 77.65 | 2802.70 | 622.11 | 2180.59 |
| 28-Oct-06 | 77.05 | 2773.10 | 620.03 | 2153.07 |
| 29-Oct-06 | 76.01 | 2760.50 | 617.98 | 2142.52 |
| 30-Oct-06 | 76.16 | 2904.00 | 615.95 | 2288.05 |
| 31-Oct-06 | 76.29 | 2831.10 | 613.94 | 2217.16 |
| 1-Nov-06 | 75.01 | 3124.40 | 611.95 | 2512.45 |
| 2-Nov-06 | 76.77 | 3193.50 | 609.98 | 2583.52 |
| 3-Nov-06 | 76.52 | 3143.80 | 608.04 | 2535.76 |
| 4-Nov-06 | 75.77 | 3089.40 | 606.12 | 2483.28 |
| 5-Nov-06 | 75.52 | 3055.30 | 604.23 | 2451.07 |
| 6-Nov-06 | 75.39 | 3037.60 | 602.36 | 2435.24 |
| 7-Nov-06 | 74.57 | 3032.10 | 600.51 | 2431.59 |
| 8-Nov-06 | 74.96 | 3047.10 | 598.70 | 2448.40 |
| 9-Nov-06 | 75.28 | 3067.50 | 596.91 | 2470.59 |
| 10-Nov-06 | 75.17 | 2931.80 | 595.14 | 2336.66 |
| 11-Nov-06 | 73.68 | 2977.80 | 593.41 | 2384.39 |
| 12-Nov-06 | 72.85 | 2986.40 | 591.70 | 2394.70 |
| 13-Nov-06 | 73.23 | 2996.30 | 590.03 | 2406.27 |
| 14-Nov-06 | 72.95 | 2863.10 | 588.39 | 2274.71 |
| 15-Nov-06 | 72.74 | 2904.90 | 586.77 | 2318.13 |
| 16-Nov-06 | 72.60 | 2936.70 | 585.19 | 2351.51 |
| 17-Nov-06 | 72.19 | 2942.70 | 583.64 | 2359.06 |
| 18-Nov-06 | 72.19 | 2961.40 | 582.13 | 2379.27 |
| 19-Nov-06 | 70.75 | 2946.50 | 580.64 | 2365.86 |
| 20-Nov-06 | 71.71 | 2969.30 | 579.20 | 2390.10 |
| 21-Nov-06 | 70.85 | 2973.80 | 577.78 | 2396.02 |
| 22-Nov-06 | 68.81 | 2777.60 | 576.41 | 2201.19 |
| 23-Nov-06 | 69.75 | 2676.50 | 575.07 | 2101.43 |
| 24-Nov-06 | 71.85 | 2711.80 | 573.77 | 2138.03 |
| 25-Nov-06 | 70.72 | 2671.90 | 572.50 | 2099.40 |
| 26-Nov-06 | 69.31 | 2900.00 | 571.27 | 2328.73 |
| 27-Nov-06 | 68.66 | 2828.00 | 570.09 | 2257.91 |

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| 28-Nov-06 | 64.90 | 2693.00 | 568.94 | 2124.06 |
| 29-Nov-06 | 65.32 | 2710.80 | 567.83 | 2142.97 |
| 30-Nov-06 | 66.38 | 2782.60 | 566.77 | 2215.83 |
| 1-Dec-06 | 65.14 | 2824.00 | 565.74 | 2258.26 |
| 2-Dec-06 | 65.44 | 2762.40 | 564.76 | 2197.64 |
| 3-Dec-06 | 66.75 | 2830.00 | 563.82 | 2266.18 |
| 4-Dec-06 | 66.68 | 2776.20 | 562.93 | 2213.27 |
| 5-Dec-06 | 66.07 | 3107.30 | 562.07 | 2545.23 |
| 6-Dec-06 | 66.93 | 3131.80 | 561.27 | 2570.53 |
| 7-Dec-06 | 67.39 | 2984.80 | 560.51 | 2424.29 |
| 8-Dec-06 | 67.67 | 2988.60 | 559.80 | 2428.80 |
| 9-Dec-06 | 68.51 | 3002.70 | 559.13 | 2443.57 |
| 10-Dec-06 | 68.18 | 2975.40 | 558.51 | 2416.89 |
| 11-Dec-06 | 68.56 | 2742.80 | 557.94 | 2184.86 |
| 12-Dec-06 | 70.25 | 2822.50 | 557.42 | 2265.08 |
| 13-Dec-06 | 64.81 | 2816.30 | 556.95 | 2259.35 |
| 14-Dec-06 | 64.91 | 2772.30 | 556.53 | 2215.77 |
| 15-Dec-06 | 65.60 | 2676.30 | 556.16 | 2120.14 |
| 16-Dec-06 | 66.43 | 2780.30 | 555.83 | 2224.47 |
| 17-Dec-06 | 68.50 | 2868.40 | 555.56 | 2312.84 |
| 18-Dec-06 | 68.15 | 2743.80 | 555.33 | 2188.47 |
| 19-Dec-06 | 68.04 | 2642.20 | 555.15 | 2087.05 |
| 20-Dec-06 | 68.86 | 2541.70 | 555.02 | 1986.68 |
| 21-Dec-06 | 68.76 | 2600.80 | 554.93 | 2045.87 |
| 22-Dec-06 | 68.32 | 2699.50 | 554.90 | 2144.60 |
| 23-Dec-06 | 68.86 | 2902.50 | 554.90 | 2347.60 |
| 24-Dec-06 | 67.65 | 2879.80 | 554.95 | 2324.85 |
| 25-Dec-06 | 65.73 | 2903.20 | 555.05 | 2348.15 |
| 26-Dec-06 | 64.03 | 2793.20 | 555.19 | 2238.01 |
| 27-Dec-06 | 63.74 | 2827.20 | 555.38 | 2271.82 |
| 28-Dec-06 | 65.19 | 2728.50 | 555.60 | 2172.90 |
| 29-Dec-06 | 64.11 | 2724.70 | 555.87 | 2168.83 |
| 30-Dec-06 | 63.76 | 2854.90 | 556.19 | 2298.71 |
| 31-Dec-06 | 64.19 | 2913.40 | 556.54 | 2356.86 |

Table A2: Weather and Load Information of the Year 2005

| Date | THI (Avg) | PL (MW) | Lw (MW) | NWL (MW) |
|---|---|---|---|---|
| 1-Jan-05 | 63.50 | 3270.10 | 579.49 | 2690.61 |
| 2-Jan-05 | 65.02 | 3366.10 | 578.59 | 2787.51 |
| 3-Jan-05 | 67.97 | 3032.20 | 577.74 | 2454.46 |
| 4-Jan-05 | 67.32 | 3062.70 | 576.95 | 2485.75 |
| 5-Jan-05 | 66.28 | 3366.10 | 576.21 | 2789.89 |
| 6-Jan-05 | 66.51 | 3246.60 | 575.53 | 2671.07 |
| 7-Jan-05 | 66.14 | 3032.20 | 574.89 | 2457.31 |
| 8-Jan-05 | 64.83 | 3062.70 | 574.32 | 2488.38 |
| 9-Jan-05 | 62.38 | 3246.60 | 573.79 | 2672.81 |
| 10-Jan-05 | 63.11 | 3246.60 | 573.32 | 2673.28 |
| 11-Jan-05 | 61.06 | 3032.20 | 572.91 | 2459.29 |
| 12-Jan-05 | 63.52 | 3062.70 | 572.56 | 2490.14 |
| 13-Jan-05 | 62.82 | 2993.70 | 572.26 | 2421.44 |
| 14-Jan-05 | 62.96 | 3270.10 | 572.02 | 2698.08 |
| 15-Jan-05 | 63.14 | 3366.10 | 571.84 | 2794.26 |

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| 16-Jan-05 | 63.28 | 3148.20 | 571.71 | 2576.49 |
| 17-Jan-05 | 63.96 | 3096.10 | 571.65 | 2524.45 |
| 18-Jan-05 | 65.73 | 3047.60 | 571.64 | 2475.96 |
| 19-Jan-05 | 65.80 | 3114.60 | 571.70 | 2542.90 |
| 20-Jan-05 | 62.31 | 3303.10 | 571.81 | 2731.29 |
| 21-Jan-05 | 61.18 | 3000.10 | 571.99 | 2428.11 |
| 22-Jan-05 | 60.19 | 2891.00 | 572.23 | 2318.77 |
| 23-Jan-05 | 62.35 | 2841.00 | 572.53 | 2268.47 |
| 24-Jan-05 | 63.78 | 2934.70 | 572.90 | 2361.80 |
| 25-Jan-05 | 63.78 | 3078.70 | 573.33 | 2505.37 |
| 26-Jan-05 | 64.14 | 3172.50 | 573.82 | 2598.68 |
| 27-Jan-05 | 64.29 | 3078.70 | 574.38 | 2504.32 |
| 28-Jan-05 | 65.53 | 3182.70 | 575.00 | 2607.70 |
| 29-Jan-05 | 66.12 | 3311.80 | 575.68 | 2736.12 |
| 30-Jan-05 | 67.26 | 3311.80 | 576.42 | 2735.38 |
| 31-Jan-05 | 68.22 | 3267.10 | 577.22 | 2689.88 |
| 1-Feb-05 | 65.85 | 3471.20 | 582.09 | 2889.11 |
| 2-Feb-05 | 64.59 | 3343.40 | 583.01 | 2760.39 |
| 3-Feb-05 | 61.91 | 3153.20 | 583.99 | 2569.21 |
| 4-Feb-05 | 63.40 | 3346.60 | 585.02 | 2761.58 |
| 5-Feb-05 | 62.99 | 3382.20 | 586.12 | 2796.08 |
| 6-Feb-05 | 66.41 | 3433.00 | 587.26 | 2845.74 |
| 7-Feb-05 | 69.86 | 3235.20 | 588.47 | 2646.73 |
| 8-Feb-05 | 69.15 | 2950.40 | 589.72 | 2360.68 |
| 9-Feb-05 | 70.44 | 3275.00 | 591.03 | 2683.97 |
| 10-Feb-05 | 69.57 | 2805.20 | 592.39 | 2212.81 |
| 11-Feb-05 | 69.68 | 2877.60 | 593.80 | 2283.80 |
| 12-Feb-05 | 71.75 | 2956.10 | 595.26 | 2360.84 |
| 13-Feb-05 | 72.62 | 2720.70 | 596.77 | 2123.93 |
| 14-Feb-05 | 69.55 | 2871.20 | 598.33 | 2272.87 |
| 15-Feb-05 | 71.71 | 2922.10 | 599.94 | 2322.16 |
| 16-Feb-05 | 75.87 | 2838.70 | 601.59 | 2237.11 |
| 17-Feb-05 | 76.65 | 2856.80 | 603.29 | 2253.51 |
| 18-Feb-05 | 76.24 | 2962.20 | 605.03 | 2357.17 |
| 19-Feb-05 | 74.96 | 2861.40 | 606.82 | 2254.58 |
| 20-Feb-05 | 76.16 | 3030.30 | 608.65 | 2421.65 |
| 21-Feb-05 | 74.27 | 3000.20 | 610.53 | 2389.67 |
| 22-Feb-05 | 71.27 | 3046.20 | 612.44 | 2433.76 |
| 23-Feb-05 | 70.44 | 2905.20 | 614.40 | 2290.80 |
| 24-Feb-05 | 69.73 | 3046.20 | 616.39 | 2429.81 |
| 25-Feb-05 | 69.54 | 3090.70 | 618.42 | 2472.28 |
| 26-Feb-05 | 69.29 | 3023.70 | 620.50 | 2403.20 |
| 27-Feb-05 | 69.44 | 2926.30 | 622.60 | 2303.70 |
| 28-Feb-05 | 69.95 | 2839.60 | 624.75 | 2214.85 |
| 1-Mar-05 | 72.99 | 2880.60 | 629.93 | 2250.67 |
| 2-Mar-05 | 75.36 | 2880.60 | 632.14 | 2248.46 |
| 3-Mar-05 | 75.28 | 2847.00 | 634.39 | 2212.61 |
| 4-Mar-05 | 76.97 | 3348.20 | 636.67 | 2711.53 |
| 5-Mar-05 | 79.17 | 3291.20 | 638.99 | 2652.21 |
| 6-Mar-05 | 77.69 | 3143.70 | 641.33 | 2502.37 |
| 7-Mar-05 | 78.19 | 3268.70 | 643.71 | 2624.99 |
| 8-Mar-05 | 77.61 | 3283.80 | 646.11 | 2637.69 |
| 9-Mar-05 | 75.25 | 3273.80 | 648.54 | 2625.26 |
| 10-Mar-05 | 77.37 | 3159.60 | 651.00 | 2508.60 |
| 11-Mar-05 | 74.77 | 3200.10 | 653.49 | 2546.61 |
| 12-Mar-05 | 71.79 | 3160.20 | 656.00 | 2504.20 |

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| 13-Mar-05 | 74.54 | 3320.90 | 658.54 | 2662.36 |
| 14-Mar-05 | 72.91 | 3319.30 | 661.09 | 2658.21 |
| 15-Mar-05 | 73.53 | 3277.20 | 663.67 | 2613.53 |
| 16-Mar-05 | 76.63 | 3223.80 | 666.27 | 2557.53 |
| 17-Mar-05 | 76.89 | 3365.70 | 668.89 | 2696.81 |
| 18-Mar-05 | 76.37 | 3440.20 | 671.52 | 2768.68 |
| 19-Mar-05 | 77.50 | 3413.80 | 674.17 | 2739.63 |
| 20-Mar-05 | 78.50 | 3489.90 | 676.83 | 2813.07 |
| 21-Mar-05 | 79.30 | 3469.00 | 679.51 | 2789.49 |
| 22-Mar-05 | 77.27 | 3187.70 | 682.19 | 2505.51 |
| 23-Mar-05 | 70.23 | 2705.70 | 684.89 | 2020.81 |
| 24-Mar-05 | 70.31 | 3196.50 | 687.60 | 2508.90 |
| 25-Mar-05 | 73.29 | 3235.60 | 690.31 | 2545.29 |
| 26-Mar-05 | 76.01 | 3450.10 | 693.03 | 2757.07 |
| 27-Mar-05 | 77.26 | 3305.80 | 695.75 | 2610.05 |
| 28-Mar-05 | 78.90 | 3403.90 | 698.48 | 2705.42 |
| 29-Mar-05 | 78.48 | 3384.90 | 701.21 | 2683.69 |
| 30-Mar-05 | 74.66 | 3053.50 | 703.94 | 2349.56 |
| 31-Mar-05 | 74.02 | 3431.80 | 706.67 | 2725.13 |
| 1-Apr-05 | 77.19 | 3441.20 | 707.90 | 2733.30 |
| 2-Apr-05 | 78.11 | 3516.00 | 710.62 | 2805.38 |
| 3-Apr-05 | 75.74 | 3309.80 | 713.34 | 2596.46 |
| 4-Apr-05 | 75.12 | 3531.00 | 716.06 | 2814.94 |
| 5-Apr-05 | 78.10 | 3405.40 | 718.76 | 2686.64 |
| 6-Apr-05 | 79.44 | 3415.10 | 721.46 | 2693.64 |
| 7-Apr-05 | 79.02 | 3424.00 | 724.15 | 2699.85 |
| 8-Apr-05 | 79.76 | 3349.80 | 726.82 | 2622.98 |
| 9-Apr-05 | 80.51 | 3438.00 | 729.49 | 2708.51 |
| 10-Apr-05 | 79.99 | 3368.90 | 732.14 | 2636.76 |
| 11-Apr-05 | 79.33 | 3400.40 | 734.77 | 2665.63 |
| 12-Apr-05 | 77.28 | 3450.10 | 737.39 | 2712.71 |
| 13-Apr-05 | 77.04 | 3466.10 | 739.98 | 2726.12 |
| 14-Apr-05 | 80.34 | 3590.90 | 742.56 | 2848.34 |
| 15-Apr-05 | 81.18 | 3435.60 | 745.12 | 2690.48 |
| 16-Apr-05 | 81.27 | 3582.40 | 747.65 | 2834.75 |
| 17-Apr-05 | 81.23 | 3597.90 | 750.15 | 2847.75 |
| 18-Apr-05 | 81.89 | 3619.50 | 752.63 | 2866.87 |
| 19-Apr-05 | 82.47 | 3562.40 | 755.09 | 2807.31 |
| 20-Apr-05 | 80.42 | 3638.90 | 757.52 | 2881.38 |
| 21-Apr-05 | 79.41 | 3483.40 | 759.92 | 2723.48 |
| 22-Apr-05 | 81.75 | 3635.90 | 762.30 | 2873.60 |
| 23-Apr-05 | 81.31 | 3598.90 | 764.64 | 2834.26 |
| 24-Apr-05 | 80.17 | 3648.90 | 766.96 | 2881.94 |
| 25-Apr-05 | 77.70 | 3317.40 | 769.25 | 2548.15 |
| 26-Apr-05 | 77.74 | 3483.40 | 771.51 | 2711.89 |
| 27-Apr-05 | 78.03 | 3340.90 | 773.74 | 2567.16 |
| 28-Apr-05 | 78.21 | 3317.40 | 775.93 | 2541.47 |
| 29-Apr-05 | 73.85 | 2982.60 | 778.10 | 2204.50 |
| 30-Apr-05 | 74.82 | 3441.20 | 780.23 | 2660.97 |
| 1-May-05 | 74.77 | 3378.40 | 783.73 | 2594.67 |
| 2-May-05 | 77.77 | 3528.90 | 785.80 | 2743.10 |
| 3-May-05 | 77.97 | 3601.10 | 787.83 | 2813.27 |
| 4-May-05 | 77.07 | 3543.90 | 789.82 | 2754.08 |
| 5-May-05 | 74.03 | 3402.10 | 791.79 | 2610.31 |
| 6-May-05 | 76.26 | 3436.90 | 793.71 | 2643.19 |
| 7-May-05 | 77.70 | 3550.80 | 795.60 | 2755.20 |

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| 8-May-05 | 77.49 | 3571.30 | 797.45 | 2773.85 |
| 9-May-05 | 81.08 | 3664.50 | 799.27 | 2865.23 |
| 10-May-05 | 80.94 | 3511.90 | 801.05 | 2710.85 |
| 11-May-05 | 83.48 | 3187.50 | 802.79 | 2384.71 |
| 12-May-05 | 78.47 | 3020.00 | 804.49 | 2215.51 |
| 13-May-05 | 78.78 | 2972.80 | 806.16 | 2166.64 |
| 14-May-05 | 80.40 | 3425.40 | 807.79 | 2617.61 |
| 15-May-05 | 78.46 | 3479.40 | 809.39 | 2670.01 |
| 16-May-05 | 82.02 | 3495.70 | 810.95 | 2684.75 |
| 17-May-05 | 75.37 | 2755.00 | 812.47 | 1942.53 |
| 18-May-05 | 80.85 | 3696.00 | 813.96 | 2882.04 |
| 19-May-05 | 77.70 | 3263.60 | 815.41 | 2448.19 |
| 20-May-05 | 75.92 | 3395.40 | 816.82 | 2578.58 |
| 21-May-05 | 79.71 | 3528.90 | 818.20 | 2710.70 |
| 22-May-05 | 76.49 | 3451.60 | 819.54 | 2632.06 |
| 23-May-05 | 79.87 | 3491.90 | 820.84 | 2671.06 |
| 24-May-05 | 80.27 | 3284.90 | 822.10 | 2462.80 |
| 25-May-05 | 83.59 | 3302.80 | 823.33 | 2479.47 |
| 26-May-05 | 84.13 | 3343.90 | 824.53 | 2519.37 |
| 27-May-05 | 83.27 | 3392.70 | 825.69 | 2567.01 |
| 28-May-05 | 83.87 | 3349.40 | 826.81 | 2522.59 |
| 29-May-05 | 83.57 | 3269.10 | 827.89 | 2441.21 |
| 30-May-05 | 83.50 | 3373.20 | 828.94 | 2544.26 |
| 31-May-05 | 84.13 | 3394.40 | 829.95 | 2564.45 |
| 1-Jun-05 | 84.50 | 3445.90 | 826.91 | 2618.99 |
| 2-Jun-05 | 85.31 | 3308.50 | 827.85 | 2480.65 |
| 3-Jun-05 | 84.30 | 3359.90 | 828.75 | 2531.15 |
| 4-Jun-05 | 80.08 | 3288.00 | 829.62 | 2458.38 |
| 5-Jun-05 | 79.12 | 3272.90 | 830.45 | 2442.45 |
| 6-Jun-05 | 82.39 | 3236.40 | 831.24 | 2405.16 |
| 7-Jun-05 | 81.46 | 3354.40 | 832.00 | 2522.40 |
| 8-Jun-05 | 84.11 | 3487.00 | 832.72 | 2654.28 |
| 9-Jun-05 | 83.83 | 3371.60 | 833.40 | 2538.20 |
| 10-Jun-05 | 83.72 | 3439.40 | 834.05 | 2605.35 |
| 11-Jun-05 | 83.79 | 3572.90 | 834.66 | 2738.24 |
| 12-Jun-05 | 84.33 | 3579.50 | 835.24 | 2744.26 |
| 13-Jun-05 | 81.29 | 3538.50 | 835.77 | 2702.73 |
| 14-Jun-05 | 81.08 | 3625.40 | 836.28 | 2789.12 |
| 15-Jun-05 | 82.07 | 3698.80 | 836.74 | 2862.06 |
| 16-Jun-05 | 80.81 | 3659.60 | 837.17 | 2822.43 |
| 17-Jun-05 | 84.32 | 3678.90 | 837.56 | 2841.34 |
| 18-Jun-05 | 85.19 | 3648.50 | 837.92 | 2810.58 |
| 19-Jun-05 | 83.27 | 3677.10 | 838.24 | 2838.86 |
| 20-Jun-05 | 83.97 | 3586.00 | 838.53 | 2747.47 |
| 21-Jun-05 | 83.60 | 3556.50 | 838.78 | 2717.72 |
| 22-Jun-05 | 81.84 | 3450.20 | 838.99 | 2611.21 |
| 23-Jun-05 | 81.64 | 3720.80 | 839.16 | 2881.64 |
| 24-Jun-05 | 80.50 | 3518.80 | 839.30 | 2679.50 |
| 25-Jun-05 | 80.56 | 3628.90 | 839.41 | 2789.49 |
| 26-Jun-05 | 81.41 | 3603.50 | 839.47 | 2764.03 |
| 27-Jun-05 | 79.18 | 3588.00 | 839.50 | 2748.50 |
| 28-Jun-05 | 78.29 | 3589.40 | 839.50 | 2749.90 |
| 29-Jun-05 | 78.94 | 3596.70 | 839.46 | 2757.24 |
| 30-Jun-05 | 79.45 | 3635.70 | 839.38 | 2796.32 |
| 1-Jul-05 | 79.56 | 3313.50 | 841.25 | 2472.25 |
| 2-Jul-05 | 79.25 | 3278.50 | 841.10 | 2437.40 |

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| 3-Jul-05 | 77.38 | 3281.00 | 840.91 | 2440.09 |
| 4-Jul-05 | 79.02 | 3242.20 | 840.69 | 2401.51 |
| 5-Jul-05 | 78.92 | 3292.30 | 840.43 | 2451.87 |
| 6-Jul-05 | 81.90 | 3208.60 | 840.14 | 2368.46 |
| 7-Jul-05 | 81.60 | 2985.00 | 839.81 | 2145.19 |
| 8-Jul-05 | 81.52 | 3292.00 | 839.44 | 2452.56 |
| 9-Jul-05 | 81.04 | 3428.80 | 839.04 | 2589.76 |
| 10-Jul-05 | 81.05 | 3453.90 | 838.60 | 2615.30 |
| 11-Jul-05 | 80.36 | 3524.50 | 838.13 | 2686.37 |
| 12-Jul-05 | 81.77 | 3439.00 | 837.62 | 2601.38 |
| 13-Jul-05 | 79.03 | 3311.00 | 837.07 | 2473.93 |
| 14-Jul-05 | 77.87 | 3547.00 | 836.49 | 2710.51 |
| 15-Jul-05 | 77.55 | 3151.70 | 835.87 | 2315.83 |
| 16-Jul-05 | 80.74 | 3495.00 | 835.21 | 2659.79 |
| 17-Jul-05 | 81.86 | 3528.30 | 834.52 | 2693.78 |
| 18-Jul-05 | 81.86 | 3547.90 | 833.80 | 2714.10 |
| 19-Jul-05 | 81.79 | 3446.90 | 833.04 | 2613.86 |
| 20-Jul-05 | 81.15 | 3298.50 | 832.24 | 2466.26 |
| 21-Jul-05 | 81.39 | 3377.10 | 831.40 | 2545.70 |
| 22-Jul-05 | 81.45 | 3414.00 | 830.53 | 2583.47 |
| 23-Jul-05 | 82.02 | 3457.80 | 829.63 | 2628.17 |
| 24-Jul-05 | 81.57 | 3482.20 | 828.69 | 2653.51 |
| 25-Jul-05 | 81.47 | 3389.80 | 827.71 | 2562.09 |
| 26-Jul-05 | 81.04 | 3505.30 | 826.69 | 2678.61 |
| 27-Jul-05 | 81.29 | 3392.20 | 825.64 | 2566.56 |
| 28-Jul-05 | 81.40 | 3352.80 | 824.56 | 2528.24 |
| 29-Jul-05 | 81.34 | 3262.30 | 823.44 | 2438.86 |
| 30-Jul-05 | 81.53 | 3131.20 | 822.28 | 2308.92 |
| 31-Jul-05 | 82.37 | 3100.00 | 821.09 | 2278.91 |
| 1-Aug-05 | 83.19 | 3120.00 | 815.68 | 2304.32 |
| 2-Aug-05 | 82.39 | 3130.00 | 814.42 | 2315.58 |
| 3-Aug-05 | 80.98 | 3159.80 | 813.11 | 2346.69 |
| 4-Aug-05 | 80.76 | 3187.40 | 811.78 | 2375.62 |
| 5-Aug-05 | 81.51 | 3139.50 | 810.41 | 2329.09 |
| 6-Aug-05 | 80.99 | 3057.40 | 809.00 | 2248.40 |
| 7-Aug-05 | 82.20 | 3271.50 | 807.56 | 2463.94 |
| 8-Aug-05 | 81.63 | 3410.50 | 806.09 | 2604.41 |
| 9-Aug-05 | 81.37 | 3506.40 | 804.58 | 2701.82 |
| 10-Aug-05 | 81.18 | 3545.50 | 803.04 | 2742.46 |
| 11-Aug-05 | 81.19 | 3206.00 | 801.46 | 2404.54 |
| 12-Aug-05 | 81.69 | 3229.50 | 799.86 | 2429.64 |
| 13-Aug-05 | 83.46 | 3290.00 | 798.22 | 2491.78 |
| 14-Aug-05 | 82.37 | 3256.80 | 796.55 | 2460.25 |
| 15-Aug-05 | 81.29 | 3238.20 | 794.85 | 2443.35 |
| 16-Aug-05 | 81.24 | 3364.00 | 793.13 | 2570.87 |
| 17-Aug-05 | 81.98 | 4181.00 | 791.37 | 3389.63 |
| 18-Aug-05 | 81.69 | 3344.40 | 789.58 | 2554.82 |
| 19-Aug-05 | 80.80 | 3328.00 | 787.77 | 2540.23 |
| 20-Aug-05 | 80.48 | 3220.00 | 785.94 | 2434.06 |
| 21-Aug-05 | 80.43 | 3329.00 | 784.07 | 2544.93 |
| 22-Aug-05 | 81.23 | 3308.30 | 782.18 | 2526.12 |
| 23-Aug-05 | 82.09 | 3441.60 | 780.27 | 2661.33 |
| 24-Aug-05 | 79.98 | 3408.60 | 778.33 | 2630.27 |
| 25-Aug-05 | 80.31 | 3157.00 | 776.37 | 2380.63 |
| 26-Aug-05 | 81.35 | 3136.90 | 774.38 | 2362.52 |
| 27-Aug-05 | 81.06 | 3149.80 | 772.38 | 2377.42 |

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| 28-Aug-05 | 82.51 | 3207.00 | 770.35 | 2436.65 |
| 29-Aug-05 | 83.13 | 3226.00 | 768.30 | 2457.70 |
| 30-Aug-05 | 83.63 | 3392.50 | 766.24 | 2626.26 |
| 31-Aug-05 | 82.76 | 3492.10 | 764.15 | 2727.95 |
| 1-Sep-05 | 82.10 | 3272.10 | 767.91 | 2504.19 |
| 2-Sep-05 | 83.11 | 3403.10 | 765.79 | 2637.31 |
| 3-Sep-05 | 82.18 | 3361.00 | 763.65 | 2597.35 |
| 4-Sep-05 | 82.03 | 3402.50 | 761.49 | 2641.01 |
| 5-Sep-05 | 79.34 | 3254.50 | 759.31 | 2495.19 |
| 6-Sep-05 | 82.26 | 3321.50 | 757.12 | 2564.38 |
| 7-Sep-05 | 79.17 | 3367.00 | 754.92 | 2612.08 |
| 8-Sep-05 | 81.31 | 3333.50 | 752.70 | 2580.80 |
| 9-Sep-05 | 81.80 | 3229.50 | 750.47 | 2479.03 |
| 10-Sep-05 | 80.04 | 3330.00 | 748.23 | 2581.77 |
| 11-Sep-05 | 80.74 | 3419.00 | 745.97 | 2673.03 |
| 12-Sep-05 | 80.77 | 3290.00 | 743.70 | 2546.30 |
| 13-Sep-05 | 80.41 | 3394.00 | 741.42 | 2652.58 |
| 14-Sep-05 | 81.33 | 3294.20 | 739.14 | 2555.06 |
| 15-Sep-05 | 83.24 | 3306.10 | 736.84 | 2569.26 |
| 16-Sep-05 | 82.61 | 3445.60 | 734.53 | 2711.07 |
| 17-Sep-05 | 82.27 | 3551.50 | 732.22 | 2819.28 |
| 18-Sep-05 | 81.72 | 3350.50 | 729.90 | 2620.60 |
| 19-Sep-05 | 83.38 | 3296.50 | 727.57 | 2568.93 |
| 20-Sep-05 | 78.41 | 3419.80 | 725.23 | 2694.57 |
| 21-Sep-05 | 80.38 | 2969.00 | 722.89 | 2246.11 |
| 22-Sep-05 | 79.19 | 3155.50 | 720.55 | 2434.95 |
| 23-Sep-05 | 81.43 | 3408.00 | 718.20 | 2689.80 |
| 24-Sep-05 | 80.64 | 3353.60 | 715.85 | 2637.75 |
| 25-Sep-05 | 81.28 | 3287.50 | 713.49 | 2574.01 |
| 26-Sep-05 | 81.65 | 3300.50 | 711.13 | 2589.37 |
| 27-Sep-05 | 82.74 | 3250.50 | 708.78 | 2541.72 |
| 28-Sep-05 | 81.29 | 3212.50 | 706.42 | 2506.08 |
| 29-Sep-05 | 80.46 | 3183.60 | 704.06 | 2479.54 |
| 30-Sep-05 | 78.57 | 3215.90 | 701.70 | 2514.20 |
| 1-Oct-05 | 76.66 | 3147.50 | 696.47 | 2451.03 |
| 2-Oct-05 | 77.49 | 3220.40 | 694.12 | 2526.28 |
| 3-Oct-05 | 78.98 | 3327.50 | 691.76 | 2635.74 |
| 4-Oct-05 | 79.15 | 3285.50 | 689.41 | 2596.09 |
| 5-Oct-05 | 78.68 | 3073.50 | 687.07 | 2386.43 |
| 6-Oct-05 | 78.39 | 3067.90 | 684.73 | 2383.17 |
| 7-Oct-05 | 80.37 | 2935.70 | 682.39 | 2253.31 |
| 8-Oct-05 | 78.98 | 3254.70 | 680.06 | 2574.64 |
| 9-Oct-05 | 80.52 | 3288.80 | 677.74 | 2611.06 |
| 10-Oct-05 | 80.71 | 3320.50 | 675.42 | 2645.08 |
| 11-Oct-05 | 78.79 | 3445.50 | 673.11 | 2772.39 |
| 12-Oct-05 | 80.68 | 3381.50 | 670.81 | 2710.69 |
| 13-Oct-05 | 80.29 | 3439.50 | 668.52 | 2770.98 |
| 14-Oct-05 | 81.08 | 3559.10 | 666.24 | 2892.86 |
| 15-Oct-05 | 80.43 | 3460.10 | 663.97 | 2796.13 |
| 16-Oct-05 | 79.66 | 3436.00 | 661.71 | 2774.29 |
| 17-Oct-05 | 78.50 | 3334.70 | 659.47 | 2675.23 |
| 18-Oct-05 | 76.01 | 3363.50 | 657.23 | 2706.27 |
| 19-Oct-05 | 77.20 | 3396.50 | 655.01 | 2741.49 |
| 20-Oct-05 | 74.47 | 3526.20 | 652.80 | 2873.40 |
| 21-Oct-05 | 75.36 | 3168.00 | 650.61 | 2517.39 |
| 22-Oct-05 | 75.19 | 3440.10 | 648.43 | 2791.67 |

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|---|---|---|---|---|
| 23-Oct-05 | 70.87 | 2990.40 | 646.27 | 2344.13 |
| 24-Oct-05 | 74.37 | 3573.90 | 644.13 | 2929.77 |
| 25-Oct-05 | 77.18 | 3722.10 | 642.00 | 3080.10 |
| 26-Oct-05 | 77.46 | 3738.70 | 639.89 | 3098.81 |
| 27-Oct-05 | 78.20 | 3325.60 | 637.80 | 2687.80 |
| 28-Oct-05 | 78.62 | 3577.60 | 635.72 | 2941.88 |
| 29-Oct-05 | 78.75 | 3590.60 | 633.67 | 2956.93 |
| 30-Oct-05 | 77.07 | 3782.10 | 631.64 | 3150.46 |
| 31-Oct-05 | 74.16 | 3715.10 | 629.63 | 3085.47 |
| 1-Nov-05 | 74.11 | 3550.00 | 630.58 | 2919.42 |
| 2-Nov-05 | 74.72 | 3623.90 | 628.61 | 2995.29 |
| 3-Nov-05 | 74.61 | 3423.50 | 626.67 | 2796.83 |
| 4-Nov-05 | 74.48 | 2955.00 | 624.75 | 2330.25 |
| 5-Nov-05 | 73.25 | 2550.20 | 622.86 | 1927.34 |
| 6-Nov-05 | 74.07 | 3109.60 | 620.99 | 2488.61 |
| 7-Nov-05 | 74.20 | 3252.60 | 619.14 | 2633.46 |
| 8-Nov-05 | 76.39 | 3341.00 | 617.33 | 2723.67 |
| 9-Nov-05 | 77.23 | 3552.90 | 615.54 | 2937.36 |
| 10-Nov-05 | 77.09 | 3462.10 | 613.77 | 2848.33 |
| 11-Nov-05 | 73.62 | 3491.80 | 612.04 | 2879.76 |
| 12-Nov-05 | 70.96 | 3461.70 | 610.33 | 2851.37 |
| 13-Nov-05 | 69.26 | 3587.70 | 608.66 | 2979.04 |
| 14-Nov-05 | 70.81 | 3606.20 | 607.02 | 2999.18 |
| 15-Nov-05 | 71.67 | 3579.10 | 605.40 | 2973.70 |
| 16-Nov-05 | 72.31 | 3637.60 | 603.82 | 3033.78 |
| 17-Nov-05 | 71.96 | 3691.80 | 602.27 | 3089.53 |
| 18-Nov-05 | 69.10 | 3452.60 | 600.76 | 2851.84 |
| 19-Nov-05 | 69.58 | 3670.60 | 599.27 | 3071.33 |
| 20-Nov-05 | 70.53 | 3649.30 | 597.83 | 3051.47 |
| 21-Nov-05 | 70.45 | 3609.10 | 596.41 | 3012.69 |
| 22-Nov-05 | 70.66 | 3380.10 | 595.04 | 2785.06 |
| 23-Nov-05 | 71.04 | 3421.10 | 593.70 | 2827.40 |
| 24-Nov-05 | 70.86 | 3418.10 | 592.40 | 2825.70 |
| 25-Nov-05 | 70.28 | 3497.10 | 591.13 | 2905.97 |
| 26-Nov-05 | 68.85 | 3474.20 | 589.90 | 2884.30 |
| 27-Nov-05 | 69.15 | 3524.20 | 588.72 | 2935.48 |
| 28-Nov-05 | 69.58 | 3645.50 | 587.57 | 3057.93 |
| 29-Nov-05 | 69.27 | 3544.60 | 586.46 | 2958.14 |
| 30-Nov-05 | 67.64 | 3526.00 | 585.40 | 2940.60 |
| 1-Dec-05 | 67.86 | 3558.10 | 578.33 | 2979.77 |
| 2-Dec-05 | 69.03 | 3454.20 | 577.35 | 2876.85 |
| 3-Dec-05 | 69.45 | 3477.70 | 576.41 | 2901.29 |
| 4-Dec-05 | 69.26 | 3184.30 | 575.52 | 2608.78 |
| 5-Dec-05 | 66.24 | 3398.30 | 574.66 | 2823.64 |
| 6-Dec-05 | 67.51 | 3323.10 | 573.86 | 2749.24 |
| 7-Dec-05 | 66.00 | 3273.60 | 573.10 | 2700.50 |
| 8-Dec-05 | 66.03 | 3444.00 | 572.39 | 2871.61 |
| 9-Dec-05 | 65.55 | 3347.20 | 571.72 | 2775.48 |
| 10-Dec-05 | 65.64 | 3399.60 | 571.10 | 2828.50 |
| 11-Dec-05 | 64.61 | 3442.70 | 570.53 | 2872.17 |
| 12-Dec-05 | 66.60 | 3422.60 | 570.01 | 2852.59 |
| 13-Dec-05 | 66.48 | 3471.20 | 569.54 | 2901.66 |
| 14-Dec-05 | 65.37 | 3447.20 | 569.12 | 2878.08 |
| 15-Dec-05 | 67.99 | 3423.20 | 568.75 | 2854.45 |
| 16-Dec-05 | 68.26 | 3344.70 | 568.42 | 2776.28 |
| 17-Dec-05 | 69.65 | 3424.20 | 568.15 | 2856.05 |

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|---|---|---|---|---|
| 18-Dec-05 | 69.36 | 3023.50 | 567.92 | 2455.58 |
| 19-Dec-05 | 67.24 | 3445.80 | 567.74 | 2878.06 |
| 20-Dec-05 | 66.89 | 3062.80 | 567.61 | 2495.19 |
| 21-Dec-05 | 69.04 | 3245.20 | 567.52 | 2677.68 |
| 22-Dec-05 | 68.69 | 3631.70 | 567.49 | 3064.21 |
| 23-Dec-05 | 68.39 | 3490.00 | 567.49 | 2922.51 |
| 24-Dec-05 | 67.76 | 3334.80 | 567.54 | 2767.26 |
| 25-Dec-05 | 67.15 | 3342.10 | 567.64 | 2774.46 |
| 26-Dec-05 | 65.66 | 3323.70 | 567.78 | 2755.92 |
| 27-Dec-05 | 64.71 | 3533.70 | 567.97 | 2965.73 |
| 28-Dec-05 | 65.17 | 3427.30 | 568.19 | 2859.11 |
| 29-Dec-05 | 63.13 | 3541.70 | 568.46 | 2973.24 |
| 30-Dec-05 | 64.56 | 3437.20 | 568.78 | 2868.42 |
| 31-Dec-05 | 65.97 | 3483.70 | 569.13 | 2914.57 |

Table A3: Weather and Load Information of the Year 2004

| Date | THI (Avg) | PL (MW) | Lw (MW) | NWL (MW) |
|---|---|---|---|---|
| 1-Jan-04 | 57.78 | 3140.00 | 569.82 | 2570.18 |
| 2-Jan-04 | 56.23 | 2953.00 | 568.92 | 2384.08 |
| 3-Jan-04 | 57.31 | 3111.00 | 568.07 | 2542.93 |
| 4-Jan-04 | 58.26 | 3111.00 | 567.28 | 2543.72 |
| 5-Jan-04 | 59.80 | 3127.00 | 566.54 | 2560.46 |
| 6-Jan-04 | 58.89 | 3172.00 | 565.86 | 2606.14 |
| 7-Jan-04 | 64.83 | 3244.00 | 565.22 | 2678.78 |
| 8-Jan-04 | 63.50 | 3133.00 | 564.65 | 2568.35 |
| 9-Jan-04 | 57.69 | 3157.00 | 564.12 | 2592.88 |
| 10-Jan-04 | 62.66 | 3008.00 | 563.65 | 2444.35 |
| 11-Jan-04 | 64.46 | 3020.00 | 563.24 | 2456.76 |
| 12-Jan-04 | 65.33 | 3236.00 | 562.89 | 2673.11 |
| 13-Jan-04 | 63.38 | 3172.00 | 562.59 | 2609.41 |
| 14-Jan-04 | 63.77 | 3099.00 | 562.35 | 2536.65 |
| 15-Jan-04 | 66.09 | 3180.00 | 562.17 | 2617.83 |
| 16-Jan-04 | 66.55 | 3031.00 | 562.04 | 2468.96 |
| 17-Jan-04 | 64.69 | 3216.00 | 561.98 | 2654.02 |
| 18-Jan-04 | 64.88 | 3243.00 | 561.97 | 2681.03 |
| 19-Jan-04 | 67.55 | 3158.00 | 562.03 | 2595.97 |
| 20-Jan-04 | 65.57 | 3179.30 | 562.14 | 2617.16 |
| 21-Jan-04 | 64.55 | 3256.80 | 562.32 | 2694.48 |
| 22-Jan-04 | 66.36 | 3254.00 | 562.56 | 2691.44 |
| 23-Jan-04 | 68.57 | 3161.00 | 562.86 | 2598.14 |
| 24-Jan-04 | 66.68 | 3137.40 | 563.23 | 2574.17 |
| 25-Jan-04 | 64.53 | 3283.00 | 563.66 | 2719.34 |
| 26-Jan-04 | 62.42 | 3227.90 | 564.15 | 2663.75 |
| 27-Jan-04 | 61.49 | 3238.30 | 564.71 | 2673.59 |
| 28-Jan-04 | 61.81 | 3266.80 | 565.33 | 2701.47 |
| 29-Jan-04 | 63.59 | 3164.30 | 566.01 | 2598.29 |
| 30-Jan-04 | 65.28 | 3161.60 | 566.75 | 2594.85 |
| 31-Jan-04 | 66.86 | 3132.90 | 567.55 | 2565.35 |
| 1-Feb-04 | 68.26 | 2945.00 | 571.97 | 2373.03 |
| 2-Feb-04 | 67.32 | 2785.00 | 572.89 | 2212.11 |
| 3-Feb-04 | 61.07 | 2772.00 | 573.87 | 2198.13 |
| 4-Feb-04 | 60.01 | 2815.00 | 574.90 | 2240.10 |

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|---|---|---|---|---|
| 5-Feb-04 | 60.31 | 2879.00 | 576.00 | 2303.00 |
| 6-Feb-04 | 62.64 | 2888.00 | 577.14 | 2310.86 |
| 7-Feb-04 | 64.70 | 3127.00 | 578.35 | 2548.65 |
| 8-Feb-04 | 63.53 | 2950.00 | 579.60 | 2370.40 |
| 9-Feb-04 | 65.05 | 3047.00 | 580.91 | 2466.09 |
| 10-Feb-04 | 65.98 | 3184.00 | 582.27 | 2601.73 |
| 11-Feb-04 | 66.95 | 3173.00 | 583.68 | 2589.32 |
| 12-Feb-04 | 66.54 | 3214.00 | 585.14 | 2628.86 |
| 13-Feb-04 | 66.70 | 3181.00 | 586.65 | 2594.35 |
| 14-Feb-04 | 67.10 | 3375.00 | 588.21 | 2786.79 |
| 15-Feb-04 | 69.21 | 3357.00 | 589.82 | 2767.18 |
| 16-Feb-04 | 68.09 | 2991.00 | 591.47 | 2399.53 |
| 17-Feb-04 | 68.92 | 3017.00 | 593.17 | 2423.83 |
| 18-Feb-04 | 68.18 | 3025.00 | 594.91 | 2430.09 |
| 19-Feb-04 | 69.96 | 2981.00 | 596.70 | 2384.30 |
| 20-Feb-04 | 71.05 | 3023.00 | 598.53 | 2424.47 |
| 21-Feb-04 | 70.22 | 2949.00 | 600.41 | 2348.59 |
| 22-Feb-04 | 68.91 | 2960.90 | 602.32 | 2358.58 |
| 23-Feb-04 | 69.20 | 2966.90 | 604.28 | 2362.62 |
| 24-Feb-04 | 68.70 | 3097.80 | 606.27 | 2491.53 |
| 25-Feb-04 | 70.54 | 3342.40 | 608.30 | 2734.10 |
| 26-Feb-04 | 71.44 | 3362.30 | 610.38 | 2751.92 |
| 27-Feb-04 | 72.79 | 3330.90 | 612.48 | 2718.42 |
| 28-Feb-04 | 74.03 | 3376.30 | 614.63 | 2761.67 |
| 29-Feb-04 | 75.72 | 3395.90 | 615.32 | 2780.58 |
| 1-Mar-04 | 73.87 | 3340.00 | 618.25 | 2721.75 |
| 2-Mar-04 | 70.09 | 3297.00 | 620.46 | 2676.54 |
| 3-Mar-04 | 68.46 | 3137.00 | 622.71 | 2514.29 |
| 4-Mar-04 | 70.16 | 3210.00 | 624.99 | 2585.01 |
| 5-Mar-04 | 69.77 | 3276.00 | 627.31 | 2648.69 |
| 6-Mar-04 | 71.03 | 3317.00 | 629.65 | 2687.35 |
| 7-Mar-04 | 68.31 | 3295.00 | 632.03 | 2662.97 |
| 8-Mar-04 | 70.61 | 3235.00 | 634.43 | 2600.57 |
| 9-Mar-04 | 74.31 | 3302.00 | 636.86 | 2665.14 |
| 10-Mar-04 | 68.42 | 3174.00 | 639.32 | 2534.68 |
| 11-Mar-04 | 69.94 | 3210.00 | 641.81 | 2568.19 |
| 12-Mar-04 | 73.25 | 3109.00 | 644.32 | 2464.68 |
| 13-Mar-04 | 75.84 | 3201.00 | 646.86 | 2554.14 |
| 14-Mar-04 | 76.30 | 3198.00 | 649.41 | 2548.59 |
| 15-Mar-04 | 76.66 | 3097.00 | 651.99 | 2445.01 |
| 16-Mar-04 | 77.71 | 2932.00 | 654.59 | 2277.41 |
| 17-Mar-04 | 78.63 | 2757.00 | 657.21 | 2099.79 |
| 18-Mar-04 | 78.49 | 2986.00 | 659.84 | 2326.16 |
| 19-Mar-04 | 79.08 | 2759.00 | 662.49 | 2096.51 |
| 20-Mar-04 | 79.54 | 2842.00 | 665.15 | 2176.85 |
| 21-Mar-04 | 79.43 | 3016.00 | 667.83 | 2348.17 |
| 22-Mar-04 | 79.96 | 3038.00 | 670.51 | 2367.49 |
| 23-Mar-04 | 79.83 | 2965.00 | 673.21 | 2291.79 |
| 24-Mar-04 | 79.83 | 2850.00 | 675.92 | 2174.08 |
| 25-Mar-04 | 79.62 | 2869.00 | 678.63 | 2190.37 |
| 26-Mar-04 | 79.76 | 3237.00 | 681.35 | 2555.65 |
| 27-Mar-04 | 79.94 | 3220.00 | 684.07 | 2535.93 |
| 28-Mar-04 | 79.61 | 3143.00 | 686.80 | 2456.20 |
| 29-Mar-04 | 80.15 | 3073.00 | 689.53 | 2383.47 |
| 30-Mar-04 | 79.15 | 2893.10 | 692.26 | 2200.84 |
| 31-Mar-04 | 80.51 | 2812.70 | 694.99 | 2117.71 |

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| 1-Apr-04 | 74.47 | 2985.00 | 698.27 | 2286.73 |
| 2-Apr-04 | 78.04 | 2973.00 | 700.99 | 2272.01 |
| 3-Apr-04 | 79.77 | 3046.00 | 703.71 | 2342.29 |
| 4-Apr-04 | 76.10 | 2975.00 | 706.43 | 2268.57 |
| 5-Apr-04 | 78.76 | 3116.00 | 709.13 | 2406.87 |
| 6-Apr-04 | 76.26 | 2841.00 | 711.83 | 2129.17 |
| 7-Apr-04 | 73.09 | 3188.00 | 714.52 | 2473.48 |
| 8-Apr-04 | 76.56 | 3122.00 | 717.19 | 2404.81 |
| 9-Apr-04 | 75.51 | 3062.00 | 719.86 | 2342.14 |
| 10-Apr-04 | 75.95 | 3240.00 | 722.51 | 2517.49 |
| 11-Apr-04 | 81.21 | 3163.00 | 725.14 | 2437.86 |
| 12-Apr-04 | 79.58 | 3146.00 | 727.76 | 2418.24 |
| 13-Apr-04 | 81.38 | 3157.00 | 730.35 | 2426.65 |
| 14-Apr-04 | 81.85 | 3132.00 | 732.93 | 2399.07 |
| 15-Apr-04 | 82.52 | 3136.00 | 735.49 | 2400.51 |
| 16-Apr-04 | 82.82 | 3068.00 | 738.02 | 2329.98 |
| 17-Apr-04 | 82.80 | 3022.00 | 740.52 | 2281.48 |
| 18-Apr-04 | 79.04 | 3015.00 | 743.00 | 2272.00 |
| 19-Apr-04 | 73.20 | 3152.00 | 745.46 | 2406.54 |
| 20-Apr-04 | 75.77 | 3272.00 | 747.89 | 2524.11 |
| 21-Apr-04 | 80.55 | 3320.00 | 750.29 | 2569.71 |
| 22-Apr-04 | 80.42 | 3322.00 | 752.67 | 2569.33 |
| 23-Apr-04 | 74.44 | 3078.00 | 755.01 | 2322.99 |
| 24-Apr-04 | 76.44 | 3019.00 | 757.33 | 2261.67 |
| 25-Apr-04 | 78.85 | 2991.00 | 759.62 | 2231.38 |
| 26-Apr-04 | 79.20 | 2922.00 | 761.88 | 2160.12 |
| 27-Apr-04 | 75.51 | 2853.00 | 764.11 | 2088.89 |
| 28-Apr-04 | 77.92 | 3049.00 | 766.30 | 2282.70 |
| 29-Apr-04 | 78.32 | 3051.00 | 768.47 | 2282.53 |
| 30-Apr-04 | 79.63 | 3200.00 | 770.60 | 2429.40 |
| 1-May-04 | 81.99 | 3185.00 | 773.04 | 2411.96 |
| 2-May-04 | 82.09 | 3219.00 | 775.11 | 2443.89 |
| 3-May-04 | 77.96 | 3219.00 | 777.14 | 2441.86 |
| 4-May-04 | 79.13 | 3164.00 | 779.13 | 2384.87 |
| 5-May-04 | 82.04 | 3200.00 | 781.10 | 2418.90 |
| 6-May-04 | 82.99 | 3068.00 | 783.02 | 2284.98 |
| 7-May-04 | 82.45 | 3378.00 | 784.91 | 2593.09 |
| 8-May-04 | 81.99 | 3329.00 | 786.76 | 2542.24 |
| 9-May-04 | 82.15 | 3378.00 | 788.58 | 2589.42 |
| 10-May-04 | 82.39 | 3231.00 | 790.36 | 2440.64 |
| 11-May-04 | 83.26 | 3049.00 | 792.10 | 2256.90 |
| 12-May-04 | 83.90 | 2955.00 | 793.80 | 2161.20 |
| 13-May-04 | 84.72 | 2951.00 | 795.47 | 2155.53 |
| 14-May-04 | 82.80 | 3017.00 | 797.10 | 2219.90 |
| 15-May-04 | 84.23 | 3194.00 | 798.70 | 2395.30 |
| 16-May-04 | 84.49 | 3238.00 | 800.26 | 2437.74 |
| 17-May-04 | 82.18 | 3069.00 | 801.78 | 2267.22 |
| 18-May-04 | 82.43 | 3154.00 | 803.27 | 2350.73 |
| 19-May-04 | 82.63 | 3122.00 | 804.72 | 2317.28 |
| 20-May-04 | 80.40 | 3131.00 | 806.13 | 2324.87 |
| 21-May-04 | 76.93 | 3051.00 | 807.51 | 2243.49 |
| 22-May-04 | 77.73 | 3185.00 | 808.85 | 2376.15 |
| 23-May-04 | 73.68 | 3142.00 | 810.15 | 2331.85 |
| 24-May-04 | 78.69 | 3294.00 | 811.41 | 2482.59 |
| 25-May-04 | 80.67 | 3487.00 | 812.64 | 2674.36 |
| 26-May-04 | 81.47 | 3245.00 | 813.84 | 2431.16 |

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| 27-May-04 | 80.41 | 2925.00 | 815.00 | 2110.00 |
| 28-May-04 | 81.87 | 2971.00 | 816.12 | 2154.88 |
| 29-May-04 | 80.69 | 2875.00 | 817.20 | 2057.80 |
| 30-May-04 | 79.07 | 3025.00 | 818.25 | 2206.75 |
| 31-May-04 | 81.30 | 3011.00 | 819.26 | 2191.74 |
| 1-Jun-04 | 80.77 | 3119.20 | 814.42 | 2304.78 |
| 2-Jun-04 | 79.84 | 3119.20 | 815.36 | 2303.84 |
| 3-Jun-04 | 76.88 | 3119.20 | 816.26 | 2302.94 |
| 4-Jun-04 | 80.30 | 3119.20 | 817.13 | 2302.07 |
| 5-Jun-04 | 81.98 | 3119.20 | 817.96 | 2301.24 |
| 6-Jun-04 | 78.02 | 2898.50 | 818.75 | 2079.75 |
| 7-Jun-04 | 81.17 | 3043.60 | 819.51 | 2224.09 |
| 8-Jun-04 | 82.67 | 3083.80 | 820.23 | 2263.57 |
| 9-Jun-04 | 82.64 | 3121.80 | 820.91 | 2300.89 |
| 10-Jun-04 | 82.68 | 3121.80 | 821.56 | 2300.24 |
| 11-Jun-04 | 80.66 | 3121.80 | 822.17 | 2299.63 |
| 12-Jun-04 | 80.49 | 3400.00 | 822.75 | 2577.25 |
| 13-Jun-04 | 79.20 | 3392.50 | 823.28 | 2569.22 |
| 14-Jun-04 | 79.69 | 3524.80 | 823.79 | 2701.01 |
| 15-Jun-04 | 80.10 | 3407.00 | 824.25 | 2582.75 |
| 16-Jun-04 | 80.10 | 3393.50 | 824.68 | 2568.82 |
| 17-Jun-04 | 82.33 | 3385.60 | 825.07 | 2560.53 |
| 18-Jun-04 | 79.20 | 3385.60 | 825.43 | 2560.17 |
| 19-Jun-04 | 79.67 | 3510.50 | 825.75 | 2684.75 |
| 20-Jun-04 | 80.88 | 3321.50 | 826.04 | 2495.46 |
| 21-Jun-04 | 79.16 | 3175.00 | 826.29 | 2348.71 |
| 22-Jun-04 | 79.16 | 3352.60 | 826.50 | 2526.10 |
| 23-Jun-04 | 82.62 | 3390.70 | 826.67 | 2564.03 |
| 24-Jun-04 | 78.45 | 3390.70 | 826.81 | 2563.89 |
| 25-Jun-04 | 78.97 | 3022.90 | 826.92 | 2195.98 |
| 26-Jun-04 | 78.31 | 3440.80 | 826.98 | 2613.82 |
| 27-Jun-04 | 81.79 | 3454.00 | 827.01 | 2626.99 |
| 28-Jun-04 | 81.60 | 3431.00 | 827.01 | 2603.99 |
| 29-Jun-04 | 82.25 | 3489.00 | 826.97 | 2662.03 |
| 30-Jun-04 | 82.81 | 3400.50 | 826.89 | 2573.61 |
| 1-Jul-04 | 83.14 | 3400.60 | 829.28 | 2571.32 |
| 2-Jul-04 | 82.54 | 3400.60 | 829.13 | 2571.47 |
| 3-Jul-04 | 81.68 | 3400.60 | 828.94 | 2571.66 |
| 4-Jul-04 | 82.26 | 3422.70 | 828.72 | 2593.98 |
| 5-Jul-04 | 82.22 | 3083.10 | 828.46 | 2254.64 |
| 6-Jul-04 | 82.18 | 3242.60 | 828.17 | 2414.43 |
| 7-Jul-04 | 79.09 | 3126.30 | 827.84 | 2298.46 |
| 8-Jul-04 | 80.39 | 4897.60 | 827.47 | 4070.13 |
| 9-Jul-04 | 80.36 | 3322.10 | 827.07 | 2495.03 |
| 10-Jul-04 | 81.64 | 3520.60 | 826.63 | 2693.97 |
| 11-Jul-04 | 80.49 | 3457.20 | 826.16 | 2631.04 |
| 12-Jul-04 | 79.35 | 3485.30 | 825.65 | 2659.65 |
| 13-Jul-04 | 80.90 | 3538.50 | 825.10 | 2713.40 |
| 14-Jul-04 | 81.50 | 3502.50 | 824.52 | 2677.98 |
| 15-Jul-04 | 79.64 | 3497.40 | 823.90 | 2673.50 |
| 16-Jul-04 | 80.68 | 3381.80 | 823.24 | 2558.56 |
| 17-Jul-04 | 81.23 | 3495.80 | 822.55 | 2673.25 |
| 18-Jul-04 | 81.71 | 3510.80 | 821.83 | 2688.97 |
| 19-Jul-04 | 78.97 | 3305.40 | 821.07 | 2484.33 |
| 20-Jul-04 | 78.91 | 3331.70 | 820.27 | 2511.43 |
| 21-Jul-04 | 79.77 | 3434.40 | 819.43 | 2614.97 |

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| 22-Jul-04 | 81.10 | 3380.80 | 818.56 | 2562.24 |
| 23-Jul-04 | 81.05 | 3326.50 | 817.66 | 2508.84 |
| 24-Jul-04 | 79.32 | 3351.30 | 816.72 | 2534.58 |
| 25-Jul-04 | 81.00 | 3421.80 | 815.74 | 2606.06 |
| 26-Jul-04 | 81.10 | 3275.80 | 814.72 | 2461.08 |
| 27-Jul-04 | 81.02 | 3387.70 | 813.67 | 2574.03 |
| 28-Jul-04 | 80.64 | 3449.70 | 812.59 | 2637.11 |
| 29-Jul-04 | 80.13 | 3401.80 | 811.47 | 2590.33 |
| 30-Jul-04 | 80.82 | 3381.70 | 810.31 | 2571.39 |
| 31-Jul-04 | 81.76 | 3507.70 | 809.12 | 2698.58 |
| 1-Aug-04 | 82.01 | 3618.20 | 800.81 | 2817.39 |
| 2-Aug-04 | 82.27 | 3609.70 | 799.55 | 2810.15 |
| 3-Aug-04 | 82.23 | 3376.20 | 798.24 | 2577.96 |
| 4-Aug-04 | 80.25 | 3379.20 | 796.91 | 2582.29 |
| 5-Aug-04 | 79.60 | 3397.70 | 795.54 | 2602.16 |
| 6-Aug-04 | 79.97 | 3474.20 | 794.13 | 2680.07 |
| 7-Aug-04 | 80.51 | 3485.00 | 792.69 | 2692.31 |
| 8-Aug-04 | 80.10 | 3240.30 | 791.22 | 2449.08 |
| 9-Aug-04 | 80.53 | 3131.80 | 789.71 | 2342.09 |
| 10-Aug-04 | 80.85 | 3090.80 | 788.17 | 2302.63 |
| 11-Aug-04 | 81.17 | 3138.90 | 786.59 | 2352.31 |
| 12-Aug-04 | 80.53 | 3199.30 | 784.99 | 2414.31 |
| 13-Aug-04 | 79.65 | 3247.80 | 783.35 | 2464.45 |
| 14-Aug-04 | 80.95 | 3474.20 | 781.68 | 2692.52 |
| 15-Aug-04 | 81.09 | 3155.40 | 779.98 | 2375.42 |
| 16-Aug-04 | 81.70 | 3110.30 | 778.26 | 2332.04 |
| 17-Aug-04 | 82.06 | 3110.40 | 776.50 | 2333.90 |
| 18-Aug-04 | 81.97 | 3107.00 | 774.71 | 2332.29 |
| 19-Aug-04 | 81.60 | 2992.40 | 772.90 | 2219.50 |
| 20-Aug-04 | 81.08 | 3202.20 | 771.07 | 2431.13 |
| 21-Aug-04 | 81.57 | 3203.40 | 769.20 | 2434.20 |
| 22-Aug-04 | 81.49 | 3092.90 | 767.31 | 2325.59 |
| 23-Aug-04 | 81.93 | 3092.90 | 765.40 | 2327.50 |
| 24-Aug-04 | 82.91 | 3116.00 | 763.46 | 2352.54 |
| 25-Aug-04 | 82.14 | 3003.00 | 761.50 | 2241.50 |
| 26-Aug-04 | 80.71 | 3026.60 | 759.51 | 2267.09 |
| 27-Aug-04 | 80.54 | 3324.90 | 757.51 | 2567.39 |
| 28-Aug-04 | 82.21 | 3295.60 | 755.48 | 2540.12 |
| 29-Aug-04 | 82.19 | 3295.60 | 753.43 | 2542.17 |
| 30-Aug-04 | 81.10 | 3258.60 | 751.37 | 2507.23 |
| 31-Aug-04 | 81.08 | 3242.40 | 749.28 | 2493.12 |
| 1-Sep-04 | 82.69 | 3343.50 | 757.55 | 2585.95 |
| 2-Sep-04 | 81.02 | 3206.80 | 755.43 | 2451.37 |
| 3-Sep-04 | 81.86 | 3464.40 | 753.29 | 2711.11 |
| 4-Sep-04 | 80.97 | 3485.50 | 751.13 | 2734.37 |
| 5-Sep-04 | 81.33 | 3274.40 | 748.95 | 2525.45 |
| 6-Sep-04 | 81.86 | 3171.50 | 746.76 | 2424.74 |
| 7-Sep-04 | 81.89 | 3127.50 | 744.56 | 2382.94 |
| 8-Sep-04 | 82.83 | 3183.50 | 742.34 | 2441.16 |
| 9-Sep-04 | 80.56 | 3167.20 | 740.11 | 2427.09 |
| 10-Sep-04 | 79.66 | 3386.20 | 737.87 | 2648.33 |
| 11-Sep-04 | 77.46 | 2901.50 | 735.61 | 2165.89 |
| 12-Sep-04 | 76.80 | 3084.00 | 733.34 | 2350.66 |
| 13-Sep-04 | 74.78 | 2419.10 | 731.06 | 1688.04 |
| 14-Sep-04 | 75.52 | 2801.20 | 728.78 | 2072.42 |
| 15-Sep-04 | 76.65 | 3066.40 | 726.48 | 2339.92 |

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|---|---|---|---|---|
| 16-Sep-04 | 76.20 | 3083.70 | 724.17 | 2359.53 |
| 17-Sep-04 | 79.16 | 3270.30 | 721.86 | 2548.44 |
| 18-Sep-04 | 79.88 | 3430.50 | 719.54 | 2710.96 |
| 19-Sep-04 | 80.66 | 3385.10 | 717.21 | 2667.89 |
| 20-Sep-04 | 80.68 | 3209.90 | 714.87 | 2495.03 |
| 21-Sep-04 | 79.44 | 3118.10 | 712.53 | 2405.57 |
| 22-Sep-04 | 79.37 | 3138.10 | 710.19 | 2427.91 |
| 23-Sep-04 | 80.10 | 3149.40 | 707.84 | 2441.56 |
| 24-Sep-04 | 81.17 | 3363.80 | 705.49 | 2658.31 |
| 25-Sep-04 | 80.03 | 3406.80 | 703.13 | 2703.67 |
| 26-Sep-04 | 81.40 | 3306.40 | 700.77 | 2605.63 |
| 27-Sep-04 | 81.71 | 3075.40 | 698.42 | 2376.98 |
| 28-Sep-04 | 78.87 | 3053.30 | 696.06 | 2357.24 |
| 29-Sep-04 | 78.06 | 3032.20 | 693.70 | 2338.50 |
| 30-Sep-04 | 80.46 | 2949.90 | 691.34 | 2258.56 |
| 1-Oct-04 | 81.38 | 3252.90 | 687.26 | 2565.64 |
| 2-Oct-04 | 81.45 | 3078.50 | 684.91 | 2393.59 |
| 3-Oct-04 | 80.08 | 2971.10 | 682.55 | 2288.55 |
| 4-Oct-04 | 78.03 | 3109.30 | 680.20 | 2429.10 |
| 5-Oct-04 | 77.76 | 3049.80 | 677.86 | 2371.94 |
| 6-Oct-04 | 77.13 | 2947.10 | 675.52 | 2271.58 |
| 7-Oct-04 | 77.38 | 2893.30 | 673.18 | 2220.12 |
| 8-Oct-04 | 74.17 | 3067.80 | 670.85 | 2396.95 |
| 9-Oct-04 | 76.27 | 3225.90 | 668.53 | 2557.37 |
| 10-Oct-04 | 78.29 | 3269.00 | 666.21 | 2602.79 |
| 11-Oct-04 | 79.15 | 3131.50 | 663.90 | 2467.60 |
| 12-Oct-04 | 80.16 | 2967.80 | 661.60 | 2306.20 |
| 13-Oct-04 | 78.21 | 3025.70 | 659.31 | 2366.39 |
| 14-Oct-04 | 76.65 | 2961.70 | 657.03 | 2304.67 |
| 15-Oct-04 | 76.30 | 3113.80 | 654.76 | 2459.04 |
| 16-Oct-04 | 76.29 | 3110.90 | 652.50 | 2458.40 |
| 17-Oct-04 | 76.59 | 3278.80 | 650.26 | 2628.54 |
| 18-Oct-04 | 76.88 | 3189.40 | 648.02 | 2541.38 |
| 19-Oct-04 | 76.00 | 3235.40 | 645.80 | 2589.60 |
| 20-Oct-04 | 76.20 | 3253.90 | 643.59 | 2610.31 |
| 21-Oct-04 | 76.57 | 3229.50 | 641.40 | 2588.10 |
| 22-Oct-04 | 75.74 | 3261.20 | 639.22 | 2621.98 |
| 23-Oct-04 | 76.74 | 3245.50 | 637.06 | 2608.44 |
| 24-Oct-04 | 76.01 | 3224.40 | 634.92 | 2589.48 |
| 25-Oct-04 | 75.69 | 3246.40 | 632.79 | 2613.61 |
| 26-Oct-04 | 75.19 | 3265.90 | 630.68 | 2635.22 |
| 27-Oct-04 | 75.43 | 3302.40 | 628.59 | 2673.81 |
| 28-Oct-04 | 75.44 | 3330.70 | 626.51 | 2704.19 |
| 29-Oct-04 | 75.46 | 3383.30 | 624.46 | 2758.84 |
| 30-Oct-04 | 75.10 | 3342.20 | 622.43 | 2719.77 |
| 31-Oct-04 | 73.96 | 3492.30 | 620.42 | 2871.88 |
| 1-Nov-04 | 73.28 | 3423.40 | 618.22 | 2805.18 |
| 2-Nov-04 | 73.23 | 3115.30 | 616.25 | 2499.05 |
| 3-Nov-04 | 74.09 | 3119.30 | 614.31 | 2504.99 |
| 4-Nov-04 | 73.73 | 3241.40 | 612.39 | 2629.01 |
| 5-Nov-04 | 72.51 | 3439.30 | 610.50 | 2828.80 |
| 6-Nov-04 | 71.49 | 3439.30 | 608.63 | 2830.67 |
| 7-Nov-04 | 71.89 | 3423.40 | 606.78 | 2816.62 |
| 8-Nov-04 | 72.38 | 3407.30 | 604.97 | 2802.33 |
| 9-Nov-04 | 72.72 | 3403.90 | 603.18 | 2800.72 |
| 10-Nov-04 | 70.31 | 3386.40 | 601.41 | 2784.99 |

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|---|---|---|---|---|
| 11-Nov-04 | 68.88 | 3211.30 | 599.68 | 2611.62 |
| 12-Nov-04 | 69.00 | 3197.20 | 597.97 | 2599.23 |
| 13-Nov-04 | 69.03 | 3087.20 | 596.30 | 2490.90 |
| 14-Nov-04 | 69.06 | 2989.20 | 594.66 | 2394.54 |
| 15-Nov-04 | 68.18 | 2767.10 | 593.04 | 2174.06 |
| 16-Nov-04 | 70.31 | 2798.60 | 591.46 | 2207.14 |
| 17-Nov-04 | 70.56 | 2907.60 | 589.91 | 2317.69 |
| 18-Nov-04 | 70.59 | 2970.60 | 588.40 | 2382.20 |
| 19-Nov-04 | 71.25 | 3056.60 | 586.91 | 2469.69 |
| 20-Nov-04 | 71.95 | 3138.00 | 585.47 | 2552.53 |
| 21-Nov-04 | 70.95 | 3167.70 | 584.05 | 2583.65 |
| 22-Nov-04 | 71.51 | 3266.70 | 582.68 | 2684.02 |
| 23-Nov-04 | 70.78 | 3161.20 | 581.34 | 2579.86 |
| 24-Nov-04 | 70.99 | 3388.70 | 580.04 | 2808.66 |
| 25-Nov-04 | 70.52 | 3460.20 | 578.77 | 2881.43 |
| 26-Nov-04 | 69.55 | 3210.20 | 577.54 | 2632.66 |
| 27-Nov-04 | 69.63 | 3377.10 | 576.36 | 2800.74 |
| 28-Nov-04 | 69.78 | 3258.70 | 575.21 | 2683.49 |
| 29-Nov-04 | 67.60 | 3186.70 | 574.10 | 2612.60 |
| 30-Nov-04 | 67.97 | 3307.20 | 573.04 | 2734.16 |
| 1-Dec-04 | 68.19 | 3359.70 | 566.10 | 2793.60 |
| 2-Dec-04 | 68.36 | 3399.20 | 565.12 | 2834.08 |
| 3-Dec-04 | 69.53 | 3272.20 | 564.18 | 2708.02 |
| 4-Dec-04 | 68.76 | 3454.70 | 563.29 | 2891.41 |
| 5-Dec-04 | 67.54 | 3481.20 | 562.43 | 2918.77 |
| 6-Dec-04 | 67.86 | 3420.70 | 561.63 | 2859.07 |
| 7-Dec-04 | 69.48 | 3476.70 | 560.87 | 2915.83 |
| 8-Dec-04 | 69.97 | 3470.70 | 560.16 | 2910.54 |
| 9-Dec-04 | 68.93 | 3433.70 | 559.49 | 2874.21 |
| 10-Dec-04 | 69.23 | 3232.70 | 558.87 | 2673.83 |
| 11-Dec-04 | 69.00 | 3456.30 | 558.30 | 2898.00 |
| 12-Dec-04 | 69.52 | 3462.60 | 557.78 | 2904.82 |
| 13-Dec-04 | 69.24 | 3460.60 | 557.31 | 2903.29 |
| 14-Dec-04 | 69.21 | 3417.60 | 556.89 | 2860.71 |
| 15-Dec-04 | 68.61 | 3413.70 | 556.52 | 2857.18 |
| 16-Dec-04 | 67.73 | 3216.70 | 556.19 | 2660.51 |
| 17-Dec-04 | 68.16 | 3201.70 | 555.92 | 2645.78 |
| 18-Dec-04 | 68.26 | 3386.20 | 555.69 | 2830.51 |
| 19-Dec-04 | 66.97 | 3395.70 | 555.51 | 2840.19 |
| 20-Dec-04 | 67.67 | 3452.70 | 555.38 | 2897.32 |
| 21-Dec-04 | 70.48 | 3369.20 | 555.29 | 2813.91 |
| 22-Dec-04 | 69.10 | 3144.20 | 555.26 | 2588.94 |
| 23-Dec-04 | 67.16 | 3126.70 | 555.26 | 2571.44 |
| 24-Dec-04 | 67.95 | 3171.40 | 555.31 | 2616.09 |
| 25-Dec-04 | 66.33 | 3291.70 | 555.41 | 2736.29 |
| 26-Dec-04 | 63.52 | 3346.70 | 555.55 | 2791.15 |
| 27-Dec-04 | 60.13 | 3352.70 | 555.74 | 2796.96 |
| 28-Dec-04 | 61.11 | 3346.60 | 555.96 | 2790.64 |
| 29-Dec-04 | 62.32 | 3196.70 | 556.23 | 2640.47 |
| 30-Dec-04 | 62.09 | 3037.70 | 556.55 | 2481.15 |
| 31-Dec-04 | 62.897415 | 3056.2 | 556.9 | 2499.30 |

Table A4: Weather and Load Information of the Year 2003

| Date | THI (Avg) | PL (MW) | Lw (MW) | NWL (MW) |
|---|---|---|---|---|
| 1-Jan-03 | 63.25 | 2961.00 | 575.32 | 2385.68 |
| 2-Jan-03 | 63.28 | 2923.00 | 574.42 | 2348.58 |
| 3-Jan-03 | 65.45 | 2877.00 | 573.57 | 2303.43 |
| 4-Jan-03 | 65.09 | 3021.00 | 572.78 | 2448.22 |
| 5-Jan-03 | 61.38 | 3008.00 | 572.04 | 2435.96 |
| 6-Jan-03 | 59.91 | 3025.00 | 571.36 | 2453.64 |
| 7-Jan-03 | 56.73 | 3006.00 | 570.72 | 2435.28 |
| 8-Jan-03 | 55.58 | 3085.00 | 570.15 | 2514.85 |
| 9-Jan-03 | 53.65 | 3026.00 | 569.62 | 2456.38 |
| 10-Jan-03 | 54.85 | 2858.00 | 569.15 | 2288.85 |
| 11-Jan-03 | 55.64 | 3029.00 | 568.74 | 2460.26 |
| 12-Jan-03 | 55.74 | 2877.00 | 568.39 | 2308.61 |
| 13-Jan-03 | 56.11 | 2957.00 | 568.09 | 2388.91 |
| 14-Jan-03 | 58.15 | 3142.00 | 567.85 | 2574.15 |
| 15-Jan-03 | 55.44 | 3081.00 | 567.67 | 2513.33 |
| 16-Jan-03 | 56.90 | 3033.00 | 567.54 | 2465.46 |
| 17-Jan-03 | 61.60 | 2885.00 | 567.48 | 2317.52 |
| 18-Jan-03 | 63.35 | 2879.00 | 567.47 | 2311.53 |
| 19-Jan-03 | 63.73 | 2941.00 | 567.53 | 2373.47 |
| 20-Jan-03 | 61.50 | 2824.00 | 567.64 | 2256.36 |
| 21-Jan-03 | 58.24 | 2959.00 | 567.82 | 2391.18 |
| 22-Jan-03 | 54.22 | 2774.00 | 568.06 | 2205.94 |
| 23-Jan-03 | 57.69 | 2896.00 | 568.36 | 2327.64 |
| 24-Jan-03 | 59.67 | 2829.00 | 568.73 | 2260.27 |
| 25-Jan-03 | 61.63 | 2980.00 | 569.16 | 2410.84 |
| 26-Jan-03 | 61.34 | 3079.00 | 569.65 | 2509.35 |
| 27-Jan-03 | 62.15 | 3115.00 | 570.21 | 2544.79 |
| 28-Jan-03 | 63.46 | 3159.00 | 570.83 | 2588.17 |
| 29-Jan-03 | 65.33 | 3144.00 | 571.51 | 2572.49 |
| 30-Jan-03 | 64.35 | 3126.00 | 572.25 | 2553.75 |
| 31-Jan-03 | 66.25 | 2932.00 | 573.05 | 2358.95 |
| 1-Feb-03 | 65.99 | 3130.00 | 576.87 | 2553.13 |
| 2-Feb-03 | 67.15 | 3124.00 | 577.79 | 2546.21 |
| 3-Feb-03 | 67.34 | 3110.00 | 578.77 | 2531.23 |
| 4-Feb-03 | 67.94 | 3636.00 | 579.80 | 3056.20 |
| 5-Feb-03 | 65.84 | 3128.00 | 580.90 | 2547.10 |
| 6-Feb-03 | 66.59 | 3086.00 | 582.04 | 2503.96 |
| 7-Feb-03 | 66.82 | 2977.00 | 583.25 | 2393.75 |
| 8-Feb-03 | 69.06 | 3136.00 | 584.50 | 2551.50 |
| 9-Feb-03 | 70.56 | 3288.00 | 585.81 | 2702.19 |
| 10-Feb-03 | 69.98 | 2962.00 | 587.17 | 2374.83 |
| 11-Feb-03 | 69.80 | 2831.00 | 588.58 | 2242.42 |
| 12-Feb-03 | 67.99 | 2541.00 | 590.04 | 1950.96 |
| 13-Feb-03 | 69.51 | 2619.00 | 591.55 | 2027.45 |
| 14-Feb-03 | 67.29 | 2680.00 | 593.11 | 2086.89 |
| 15-Feb-03 | 66.39 | 2819.00 | 594.72 | 2224.28 |
| 16-Feb-03 | 67.36 | 2940.00 | 596.37 | 2343.63 |
| 17-Feb-03 | 67.55 | 2929.00 | 598.07 | 2330.93 |
| 18-Feb-03 | 68.81 | 3018.00 | 599.81 | 2418.19 |
| 19-Feb-03 | 69.88 | 3008.00 | 601.60 | 2406.40 |
| 20-Feb-03 | 70.16 | 3027.00 | 603.43 | 2423.57 |
| 21-Feb-03 | 67.82 | 2960.00 | 605.31 | 2354.69 |

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| 22-Feb-03 | 66.63 | 2857.00 | 607.22 | 2249.78 |
| 23-Feb-03 | 67.23 | 2978.00 | 609.18 | 2368.82 |
| 24-Feb-03 | 68.20 | 3029.00 | 611.17 | 2417.83 |
| 25-Feb-03 | 69.69 | 3003.00 | 613.20 | 2389.80 |
| 26-Feb-03 | 72.29 | 3104.00 | 615.28 | 2488.72 |
| 27-Feb-03 | 73.36 | 3087.00 | 617.38 | 2469.62 |
| 28-Feb-03 | 74.41 | 3044.00 | 619.53 | 2424.47 |
| 1-Mar-03 | 75.03 | 3202.00 | 626.15 | 2575.85 |
| 2-Mar-03 | 76.89 | 3162.00 | 628.36 | 2533.64 |
| 3-Mar-03 | 77.99 | 3160.00 | 630.61 | 2529.39 |
| 4-Mar-03 | 74.05 | 3273.00 | 632.89 | 2640.11 |
| 5-Mar-03 | 63.86 | 3186.00 | 635.21 | 2550.79 |
| 6-Mar-03 | 64.60 | 3152.00 | 637.55 | 2514.45 |
| 7-Mar-03 | 65.45 | 2956.00 | 639.93 | 2316.07 |
| 8-Mar-03 | 67.15 | 3071.00 | 642.33 | 2428.67 |
| 9-Mar-03 | 67.20 | 3181.00 | 644.76 | 2536.24 |
| 10-Mar-03 | 69.83 | 3066.00 | 647.22 | 2418.78 |
| 11-Mar-03 | 70.76 | 3147.00 | 649.71 | 2497.29 |
| 12-Mar-03 | 68.12 | 3051.00 | 652.22 | 2398.78 |
| 13-Mar-03 | 70.19 | 3090.00 | 654.76 | 2435.24 |
| 14-Mar-03 | 69.72 | 2606.00 | 657.31 | 1948.69 |
| 15-Mar-03 | 73.11 | 3219.00 | 659.89 | 2559.11 |
| 16-Mar-03 | 71.03 | 3029.00 | 662.49 | 2366.51 |
| 17-Mar-03 | 69.04 | 3098.00 | 665.11 | 2432.89 |
| 18-Mar-03 | 72.78 | 3097.00 | 667.74 | 2429.26 |
| 19-Mar-03 | 73.01 | 3088.00 | 670.39 | 2417.61 |
| 20-Mar-03 | 72.72 | 3144.00 | 673.05 | 2470.95 |
| 21-Mar-03 | 72.49 | 2952.00 | 675.73 | 2276.27 |
| 22-Mar-03 | 72.94 | 3247.00 | 678.41 | 2568.59 |
| 23-Mar-03 | 73.52 | 3101.00 | 681.11 | 2419.89 |
| 24-Mar-03 | 74.59 | 3174.00 | 683.82 | 2490.18 |
| 25-Mar-03 | 76.86 | 3147.00 | 686.53 | 2460.47 |
| 26-Mar-03 | 76.76 | 3087.00 | 689.25 | 2397.75 |
| 27-Mar-03 | 74.36 | 3215.00 | 691.97 | 2523.03 |
| 28-Mar-03 | 75.36 | 3188.00 | 694.70 | 2493.30 |
| 29-Mar-03 | 76.92 | 3273.00 | 697.43 | 2575.57 |
| 30-Mar-03 | 74.04 | 2941.00 | 700.16 | 2240.84 |
| 31-Mar-03 | 73.13 | 3085.00 | 702.89 | 2382.11 |
| 1-Apr-03 | 78.70 | 3281.00 | 703.96 | 2577.04 |
| 2-Apr-03 | 80.03 | 3261.00 | 706.68 | 2554.32 |
| 3-Apr-03 | 80.21 | 3293.00 | 709.40 | 2583.60 |
| 4-Apr-03 | 75.10 | 3023.00 | 712.12 | 2310.88 |
| 5-Apr-03 | 78.43 | 3329.00 | 714.82 | 2614.18 |
| 6-Apr-03 | 79.04 | 3250.00 | 717.52 | 2532.48 |
| 7-Apr-03 | 80.80 | 3114.00 | 720.21 | 2393.79 |
| 8-Apr-03 | 80.56 | 3270.00 | 722.88 | 2547.12 |
| 9-Apr-03 | 80.71 | 3359.00 | 725.55 | 2633.45 |
| 10-Apr-03 | 79.92 | 3270.00 | 728.20 | 2541.80 |
| 11-Apr-03 | 80.73 | 3173.00 | 730.83 | 2442.17 |
| 12-Apr-03 | 81.61 | 3147.00 | 733.45 | 2413.55 |
| 13-Apr-03 | 81.72 | 3213.00 | 736.04 | 2476.96 |
| 14-Apr-03 | 78.80 | 3192.00 | 738.62 | 2453.38 |
| 15-Apr-03 | 77.01 | 3185.00 | 741.18 | 2443.82 |
| 16-Apr-03 | 80.95 | 3372.00 | 743.71 | 2628.29 |
| 17-Apr-03 | 81.55 | 3307.00 | 746.21 | 2560.79 |
| 18-Apr-03 | 82.11 | 3210.00 | 748.69 | 2461.31 |

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|---|---|---|---|---|
| 19-Apr-03 | 81.60 | 3234.00 | 751.15 | 2482.85 |
| 20-Apr-03 | 75.78 | 3335.00 | 753.58 | 2581.42 |
| 21-Apr-03 | 74.80 | 2940.00 | 755.98 | 2184.02 |
| 22-Apr-03 | 76.15 | 3128.00 | 758.36 | 2369.64 |
| 23-Apr-03 | 78.52 | 3035.00 | 760.70 | 2274.30 |
| 24-Apr-03 | 81.56 | 3183.00 | 763.02 | 2419.98 |
| 25-Apr-03 | 81.91 | 3197.00 | 765.31 | 2431.69 |
| 26-Apr-03 | 82.22 | 3285.00 | 767.57 | 2517.43 |
| 27-Apr-03 | 82.70 | 3290.00 | 769.80 | 2520.20 |
| 28-Apr-03 | 78.39 | 3140.00 | 771.99 | 2368.01 |
| 29-Apr-03 | 76.03 | 3175.00 | 774.16 | 2400.84 |
| 30-Apr-03 | 76.67 | 3113.00 | 776.29 | 2336.71 |
| 1-May-03 | 76.76 | 3083.00 | 778.73 | 2304.27 |
| 2-May-03 | 74.39 | 3502.00 | 780.80 | 2721.20 |
| 3-May-03 | 81.60 | 2991.00 | 782.83 | 2208.17 |
| 4-May-03 | 83.40 | 3252.00 | 784.82 | 2467.18 |
| 5-May-03 | 81.35 | 3235.00 | 786.79 | 2448.21 |
| 6-May-03 | 79.74 | 3127.00 | 788.71 | 2338.29 |
| 7-May-03 | 81.88 | 3285.00 | 790.60 | 2494.40 |
| 8-May-03 | 78.14 | 3179.00 | 792.45 | 2386.55 |
| 9-May-03 | 76.23 | 2954.00 | 794.27 | 2159.73 |
| 10-May-03 | 78.70 | 3194.00 | 796.05 | 2397.95 |
| 11-May-03 | 80.76 | 3299.00 | 797.79 | 2501.21 |
| 12-May-03 | 79.14 | 3307.00 | 799.49 | 2507.51 |
| 13-May-03 | 81.70 | 3299.00 | 801.16 | 2497.84 |
| 14-May-03 | 81.32 | 3360.00 | 802.79 | 2557.21 |
| 15-May-03 | 80.05 | 2975.00 | 804.39 | 2170.61 |
| 16-May-03 | 81.42 | 3260.00 | 805.95 | 2454.05 |
| 17-May-03 | 82.34 | 3343.00 | 807.47 | 2535.53 |
| 18-May-03 | 82.34 | 3355.00 | 808.96 | 2546.04 |
| 19-May-03 | 79.55 | 3325.00 | 810.41 | 2514.59 |
| 20-May-03 | 80.66 | 3184.00 | 811.82 | 2372.18 |
| 21-May-03 | 77.03 | 3077.00 | 813.20 | 2263.80 |
| 22-May-03 | 80.48 | 3322.00 | 814.54 | 2507.46 |
| 23-May-03 | 79.68 | 3251.00 | 815.84 | 2435.16 |
| 24-May-03 | 78.48 | 3089.00 | 817.10 | 2271.90 |
| 25-May-03 | 81.20 | 3273.00 | 818.33 | 2454.67 |
| 26-May-03 | 84.23 | 3307.00 | 819.53 | 2487.47 |
| 27-May-03 | 83.82 | 3061.00 | 820.69 | 2240.31 |
| 28-May-03 | 83.12 | 3212.00 | 821.81 | 2390.19 |
| 29-May-03 | 83.61 | 3399.00 | 822.89 | 2576.11 |
| 30-May-03 | 83.64 | 3318.00 | 823.94 | 2494.06 |
| 31-May-03 | 84.42 | 3198.00 | 824.95 | 2373.05 |
| 1-Jun-03 | 83.76 | 3242.00 | 821.78 | 2420.22 |
| 2-Jun-03 | 83.44 | 3288.00 | 822.72 | 2465.28 |
| 3-Jun-03 | 83.09 | 3330.00 | 823.62 | 2506.38 |
| 4-Jun-03 | 82.33 | 3281.00 | 824.49 | 2456.51 |
| 5-Jun-03 | 78.60 | 3281.00 | 825.32 | 2455.68 |
| 6-Jun-03 | 81.11 | 3206.00 | 826.11 | 2379.89 |
| 7-Jun-03 | 79.13 | 3002.00 | 826.87 | 2175.13 |
| 8-Jun-03 | 80.38 | 3325.00 | 827.59 | 2497.41 |
| 9-Jun-03 | 80.46 | 3315.00 | 828.27 | 2486.73 |
| 10-Jun-03 | 76.79 | 3238.00 | 828.92 | 2409.08 |
| 11-Jun-03 | 77.67 | 3202.00 | 829.53 | 2372.47 |
| 12-Jun-03 | 79.54 | 3253.00 | 830.11 | 2422.89 |
| 13-Jun-03 | 80.99 | 3120.00 | 830.64 | 2289.36 |

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|---|---|---|---|---|
| 14-Jun-03 | 79.05 | 3329.00 | 831.15 | 2497.85 |
| 15-Jun-03 | 80.83 | 3406.00 | 831.61 | 2574.39 |
| 16-Jun-03 | 79.87 | 3361.00 | 832.04 | 2528.96 |
| 17-Jun-03 | 80.28 | 3298.00 | 832.43 | 2465.57 |
| 18-Jun-03 | 79.98 | 3353.00 | 832.79 | 2520.21 |
| 19-Jun-03 | 81.24 | 3370.00 | 833.11 | 2536.89 |
| 20-Jun-03 | 79.08 | 3146.00 | 833.40 | 2312.60 |
| 21-Jun-03 | 78.96 | 3243.00 | 833.65 | 2409.35 |
| 22-Jun-03 | 79.35 | 3198.00 | 833.86 | 2364.14 |
| 23-Jun-03 | 79.14 | 3289.00 | 834.03 | 2454.97 |
| 24-Jun-03 | 81.26 | 3428.00 | 834.17 | 2593.83 |
| 25-Jun-03 | 81.70 | 3422.00 | 834.28 | 2587.72 |
| 26-Jun-03 | 81.58 | 3184.00 | 834.34 | 2349.66 |
| 27-Jun-03 | 81.00 | 3165.00 | 834.37 | 2330.63 |
| 28-Jun-03 | 80.70 | 3886.00 | 834.37 | 3051.63 |
| 29-Jun-03 | 80.54 | 3290.00 | 834.33 | 2455.67 |
| 30-Jun-03 | 79.73 | 3314.00 | 834.25 | 2479.75 |
| 1-Jul-03 | 80.45 | 3382.00 | 832.97 | 2549.03 |
| 2-Jul-03 | 81.41 | 3341.00 | 832.82 | 2508.18 |
| 3-Jul-03 | 81.68 | 3129.00 | 832.63 | 2296.37 |
| 4-Jul-03 | 81.16 | 3342.00 | 832.41 | 2509.59 |
| 5-Jul-03 | 81.93 | 3376.00 | 832.15 | 2543.85 |
| 6-Jul-03 | 81.88 | 3206.00 | 831.86 | 2374.14 |
| 7-Jul-03 | 81.37 | 3309.00 | 831.53 | 2477.47 |
| 8-Jul-03 | 81.89 | 3278.00 | 831.16 | 2446.84 |
| 9-Jul-03 | 82.23 | 3446.00 | 830.76 | 2615.24 |
| 10-Jul-03 | 81.51 | 3358.00 | 830.32 | 2527.68 |
| 11-Jul-03 | 81.60 | 3312.00 | 829.85 | 2482.15 |
| 12-Jul-03 | 81.07 | 3187.00 | 829.34 | 2357.66 |
| 13-Jul-03 | 81.36 | 3642.00 | 828.79 | 2813.21 |
| 14-Jul-03 | 81.26 | 3483.00 | 828.21 | 2654.79 |
| 15-Jul-03 | 81.67 | 3397.00 | 827.59 | 2569.41 |
| 16-Jul-03 | 81.78 | 3407.00 | 826.93 | 2580.07 |
| 17-Jul-03 | 82.78 | 3401.00 | 826.24 | 2574.76 |
| 18-Jul-03 | 82.50 | 3345.00 | 825.52 | 2519.48 |
| 19-Jul-03 | 82.11 | 3423.00 | 824.76 | 2598.24 |
| 20-Jul-03 | 82.43 | 3422.00 | 823.96 | 2598.04 |
| 21-Jul-03 | 82.19 | 3432.00 | 823.12 | 2608.88 |
| 22-Jul-03 | 81.67 | 3572.00 | 822.25 | 2749.75 |
| 23-Jul-03 | 83.82 | 3204.00 | 821.35 | 2382.65 |
| 24-Jul-03 | 83.04 | 3376.00 | 820.41 | 2555.59 |
| 25-Jul-03 | 80.49 | 3196.00 | 819.43 | 2376.57 |
| 26-Jul-03 | 81.32 | 3413.00 | 818.41 | 2594.59 |
| 27-Jul-03 | 80.79 | 3443.00 | 817.36 | 2625.64 |
| 28-Jul-03 | 81.15 | 3488.00 | 816.28 | 2671.72 |
| 29-Jul-03 | 80.20 | 3481.00 | 815.16 | 2665.84 |
| 30-Jul-03 | 80.33 | 3436.00 | 814.00 | 2622.00 |
| 31-Jul-03 | 80.44 | 3406.00 | 812.81 | 2593.19 |
| 1-Aug-03 | 79.92 | 3298.00 | 810.17 | 2487.83 |
| 2-Aug-03 | 80.28 | 3460.00 | 808.91 | 2651.09 |
| 3-Aug-03 | 81.28 | 3468.00 | 807.60 | 2660.40 |
| 4-Aug-03 | 82.85 | 3416.00 | 806.27 | 2609.73 |
| 5-Aug-03 | 83.54 | 3539.00 | 804.90 | 2734.10 |
| 6-Aug-03 | 82.94 | 3488.00 | 803.49 | 2684.51 |
| 7-Aug-03 | 83.25 | 3483.00 | 802.05 | 2680.95 |
| 8-Aug-03 | 82.93 | 3437.00 | 800.58 | 2636.42 |

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|---|---|---|---|---|
| 9-Aug-03 | 82.31 | 3437.00 | 799.07 | 2637.93 |
| 10-Aug-03 | 80.58 | 3444.00 | 797.53 | 2646.47 |
| 11-Aug-03 | 80.70 | 3519.00 | 795.95 | 2723.05 |
| 12-Aug-03 | 80.28 | 3391.00 | 794.35 | 2596.65 |
| 13-Aug-03 | 81.60 | 3461.00 | 792.71 | 2668.29 |
| 14-Aug-03 | 81.11 | 3489.00 | 791.04 | 2697.96 |
| 15-Aug-03 | 82.02 | 3490.00 | 789.34 | 2700.66 |
| 16-Aug-03 | 82.45 | 3953.00 | 787.62 | 3165.38 |
| 17-Aug-03 | 83.02 | 3454.00 | 785.86 | 2668.14 |
| 18-Aug-03 | 82.40 | 3522.00 | 784.07 | 2737.93 |
| 19-Aug-03 | 81.68 | 3572.00 | 782.26 | 2789.74 |
| 20-Aug-03 | 82.17 | 3521.00 | 780.43 | 2740.57 |
| 21-Aug-03 | 83.41 | 3502.00 | 778.56 | 2723.44 |
| 22-Aug-03 | 80.84 | 3512.00 | 776.67 | 2735.33 |
| 23-Aug-03 | 80.32 | 3502.00 | 774.76 | 2727.24 |
| 24-Aug-03 | 81.50 | 3405.00 | 772.82 | 2632.18 |
| 25-Aug-03 | 82.92 | 3467.00 | 770.86 | 2696.14 |
| 26-Aug-03 | 83.10 | 3483.00 | 768.87 | 2714.13 |
| 27-Aug-03 | 81.01 | 3480.00 | 766.87 | 2713.13 |
| 28-Aug-03 | 80.24 | 3472.00 | 764.84 | 2707.16 |
| 29-Aug-03 | 80.10 | 3571.00 | 762.79 | 2808.21 |
| 30-Aug-03 | 81.17 | 3313.00 | 760.73 | 2552.27 |
| 31-Aug-03 | 81.10 | 3494.00 | 758.64 | 2735.36 |
| 1-Sep-03 | 80.41 | 3457.00 | 763.94 | 2693.06 |
| 2-Sep-03 | 80.43 | 3468.00 | 761.82 | 2706.18 |
| 3-Sep-03 | 80.62 | 3513.00 | 759.68 | 2753.32 |
| 4-Sep-03 | 81.50 | 3525.00 | 757.52 | 2767.48 |
| 5-Sep-03 | 81.26 | 3366.00 | 755.34 | 2610.66 |
| 6-Sep-03 | 80.57 | 3452.00 | 753.15 | 2698.85 |
| 7-Sep-03 | 79.89 | 3475.00 | 750.95 | 2724.05 |
| 8-Sep-03 | 80.39 | 3338.00 | 748.73 | 2589.27 |
| 9-Sep-03 | 81.38 | 3282.00 | 746.50 | 2535.50 |
| 10-Sep-03 | 81.97 | 3499.00 | 744.26 | 2754.74 |
| 11-Sep-03 | 81.19 | 3292.00 | 742.00 | 2550.00 |
| 12-Sep-03 | 80.85 | 3522.00 | 739.73 | 2782.27 |
| 13-Sep-03 | 80.25 | 3488.00 | 737.45 | 2750.55 |
| 14-Sep-03 | 81.43 | 3488.00 | 735.17 | 2752.83 |
| 15-Sep-03 | 81.38 | 3442.00 | 732.87 | 2709.13 |
| 16-Sep-03 | 81.47 | 3426.00 | 730.56 | 2695.44 |
| 17-Sep-03 | 80.77 | 3454.00 | 728.25 | 2725.75 |
| 18-Sep-03 | 81.11 | 3256.00 | 725.93 | 2530.07 |
| 19-Sep-03 | 82.03 | 3303.00 | 723.60 | 2579.40 |
| 20-Sep-03 | 81.04 | 3525.00 | 721.26 | 2803.74 |
| 21-Sep-03 | 80.77 | 3483.00 | 718.92 | 2764.08 |
| 22-Sep-03 | 80.58 | 3518.00 | 716.58 | 2801.42 |
| 23-Sep-03 | 80.77 | 3544.00 | 714.23 | 2829.77 |
| 24-Sep-03 | 79.98 | 3454.00 | 711.88 | 2742.12 |
| 25-Sep-03 | 78.39 | 3425.00 | 709.52 | 2715.48 |
| 26-Sep-03 | 78.66 | 3271.00 | 707.16 | 2563.84 |
| 27-Sep-03 | 80.44 | 3475.00 | 704.81 | 2770.19 |
| 28-Sep-03 | 81.23 | 3502.00 | 702.45 | 2799.55 |
| 29-Sep-03 | 79.88 | 3433.00 | 700.09 | 2732.91 |
| 30-Sep-03 | 81.56 | 3456.00 | 697.73 | 2758.27 |
| 1-Oct-03 | 82.63 | 3492.00 | 696.22 | 2795.78 |
| 2-Oct-03 | 78.16 | 3506.00 | 693.87 | 2812.13 |
| 3-Oct-03 | 80.58 | 3370.00 | 691.51 | 2678.49 |

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|---|---|---|---|---|
| 4-Oct-03 | 80.93 | 3354.00 | 689.16 | 2664.84 |
| 5-Oct-03 | 80.35 | 3437.00 | 686.82 | 2750.18 |
| 6-Oct-03 | 79.86 | 3468.00 | 684.48 | 2783.52 |
| 7-Oct-03 | 76.09 | 3176.00 | 682.14 | 2493.86 |
| 8-Oct-03 | 76.51 | 3487.00 | 679.81 | 2807.19 |
| 9-Oct-03 | 79.30 | 3210.00 | 677.49 | 2532.51 |
| 10-Oct-03 | 77.54 | 3191.00 | 675.17 | 2515.83 |
| 11-Oct-03 | 78.57 | 3313.00 | 672.86 | 2640.14 |
| 12-Oct-03 | 79.32 | 3291.00 | 670.56 | 2620.44 |
| 13-Oct-03 | 79.86 | 3364.00 | 668.27 | 2695.73 |
| 14-Oct-03 | 79.70 | 3480.00 | 665.99 | 2814.01 |
| 15-Oct-03 | 80.60 | 3462.00 | 663.72 | 2798.28 |
| 16-Oct-03 | 79.80 | 3386.00 | 661.46 | 2724.54 |
| 17-Oct-03 | 80.09 | 3433.00 | 659.22 | 2773.78 |
| 18-Oct-03 | 78.21 | 3477.00 | 656.98 | 2820.02 |
| 19-Oct-03 | 80.26 | 3426.00 | 654.76 | 2771.24 |
| 20-Oct-03 | 80.48 | 3450.00 | 652.55 | 2797.45 |
| 21-Oct-03 | 80.35 | 3490.00 | 650.36 | 2839.64 |
| 22-Oct-03 | 79.43 | 3522.00 | 648.18 | 2873.82 |
| 23-Oct-03 | 79.62 | 3469.00 | 646.02 | 2822.98 |
| 24-Oct-03 | 78.58 | 3309.00 | 643.88 | 2665.12 |
| 25-Oct-03 | 78.98 | 3421.00 | 641.75 | 2779.25 |
| 26-Oct-03 | 77.91 | 3468.00 | 639.64 | 2828.36 |
| 27-Oct-03 | 77.20 | 3394.00 | 637.55 | 2756.45 |
| 28-Oct-03 | 78.29 | 3479.00 | 635.47 | 2843.53 |
| 29-Oct-03 | 78.83 | 2860.00 | 633.42 | 2226.58 |
| 30-Oct-03 | 78.19 | 3309.00 | 631.39 | 2677.61 |
| 31-Oct-03 | 78.00 | 3279.00 | 629.38 | 2649.62 |
| 1-Nov-03 | 76.03 | 3383.00 | 627.91 | 2755.09 |
| 2-Nov-03 | 76.12 | 3352.00 | 625.94 | 2726.06 |
| 3-Nov-03 | 76.82 | 3433.00 | 624.00 | 2809.00 |
| 4-Nov-03 | 75.43 | 3378.00 | 622.08 | 2755.92 |
| 5-Nov-03 | 74.47 | 3445.00 | 620.19 | 2824.81 |
| 6-Nov-03 | 74.62 | 3323.00 | 618.32 | 2704.68 |
| 7-Nov-03 | 74.60 | 3237.00 | 616.47 | 2620.53 |
| 8-Nov-03 | 74.32 | 3349.00 | 614.66 | 2734.34 |
| 9-Nov-03 | 72.82 | 3306.00 | 612.87 | 2693.13 |
| 10-Nov-03 | 73.21 | 3341.00 | 611.10 | 2729.90 |
| 11-Nov-03 | 73.40 | 3346.00 | 609.37 | 2736.63 |
| 12-Nov-03 | 72.66 | 3371.00 | 607.66 | 2763.34 |
| 13-Nov-03 | 73.21 | 3383.00 | 605.99 | 2777.01 |
| 14-Nov-03 | 71.67 | 3216.00 | 604.35 | 2611.65 |
| 15-Nov-03 | 70.56 | 3334.00 | 602.73 | 2731.27 |
| 16-Nov-03 | 70.21 | 3321.00 | 601.15 | 2719.85 |
| 17-Nov-03 | 70.77 | 3334.00 | 599.60 | 2734.40 |
| 18-Nov-03 | 70.43 | 3366.00 | 598.09 | 2767.91 |
| 19-Nov-03 | 70.70 | 3336.00 | 596.60 | 2739.40 |
| 20-Nov-03 | 70.30 | 3314.00 | 595.16 | 2718.84 |
| 21-Nov-03 | 67.85 | 3210.00 | 593.74 | 2616.26 |
| 22-Nov-03 | 67.06 | 3227.00 | 592.37 | 2634.63 |
| 23-Nov-03 | 67.97 | 3305.00 | 591.03 | 2713.97 |
| 24-Nov-03 | 69.89 | 3145.00 | 589.73 | 2555.27 |
| 25-Nov-03 | 69.81 | 2974.00 | 588.46 | 2385.54 |
| 26-Nov-03 | 70.82 | 2563.00 | 587.23 | 1975.77 |
| 27-Nov-03 | 70.21 | 2648.00 | 586.05 | 2061.95 |
| 28-Nov-03 | 66.06 | 2588.00 | 584.90 | 2003.10 |

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| 29-Nov-03 | 65.16 | 2852.00 | 583.79 | 2268.21 |
| 30-Nov-03 | 67.15 | 2787.00 | 582.73 | 2204.27 |
| 1-Dec-03 | 68.13 | 3007.00 | 572.49 | 2434.51 |
| 2-Dec-03 | 67.76 | 3030.00 | 571.51 | 2458.49 |
| 3-Dec-03 | 67.35 | 3093.00 | 570.57 | 2522.43 |
| 4-Dec-03 | 67.51 | 3228.00 | 569.68 | 2658.32 |
| 5-Dec-03 | 67.68 | 2924.00 | 568.82 | 2355.18 |
| 6-Dec-03 | 67.19 | 3145.00 | 568.02 | 2576.98 |
| 7-Dec-03 | 67.25 | 3809.00 | 567.26 | 3241.74 |
| 8-Dec-03 | 66.58 | 3127.00 | 566.55 | 2560.45 |
| 9-Dec-03 | 67.66 | 3216.00 | 565.88 | 2650.12 |
| 10-Dec-03 | 67.68 | 3081.00 | 565.26 | 2515.74 |
| 11-Dec-03 | 67.95 | 3136.00 | 564.69 | 2571.31 |
| 12-Dec-03 | 67.68 | 2985.00 | 564.17 | 2420.83 |
| 13-Dec-03 | 67.62 | 3082.00 | 563.70 | 2518.30 |
| 14-Dec-03 | 68.46 | 3105.00 | 563.28 | 2541.72 |
| 15-Dec-03 | 69.24 | 3221.00 | 562.91 | 2658.09 |
| 16-Dec-03 | 69.17 | 2995.00 | 562.58 | 2432.42 |
| 17-Dec-03 | 67.90 | 3107.00 | 562.31 | 2544.69 |
| 18-Dec-03 | 68.41 | 3087.00 | 562.08 | 2524.92 |
| 19-Dec-03 | 69.40 | 2993.00 | 561.90 | 2431.10 |
| 20-Dec-03 | 69.59 | 3171.00 | 561.77 | 2609.23 |
| 21-Dec-03 | 69.09 | 3149.00 | 561.68 | 2587.32 |
| 22-Dec-03 | 67.92 | 3205.00 | 561.65 | 2643.35 |
| 23-Dec-03 | 68.06 | 3189.00 | 561.65 | 2627.35 |
| 24-Dec-03 | 64.66 | 3202.00 | 561.70 | 2640.30 |
| 25-Dec-03 | 64.50 | 3150.00 | 561.80 | 2588.20 |
| 26-Dec-03 | 64.70 | 2958.00 | 561.94 | 2396.06 |
| 27-Dec-03 | 65.26 | 3134.00 | 562.13 | 2571.87 |
| 28-Dec-03 | 61.87 | 3068.00 | 562.35 | 2505.65 |
| 29-Dec-03 | 60.20 | 3092.00 | 562.62 | 2529.38 |
| 30-Dec-03 | 62.74 | 3137.00 | 562.94 | 2574.06 |
| 31-Dec-03 | 59.73 | 3138.00 | 563.29 | 2574.71 |

Table A5: Weather and Load Information of the Year 2002

| Date | THI (Avg) | PL (MW) | Lw (MW) | NWL (MW) |
|---|---|---|---|---|
| 1-Jan-02 | 64.35 | 2890.00 | 507.35 | 2382.65 |
| 2-Jan-02 | 63.14 | 2927.50 | 506.45 | 2421.05 |
| 3-Jan-02 | 62.39 | 2863.00 | 505.60 | 2357.40 |
| 4-Jan-02 | 65.16 | 2676.50 | 504.81 | 2171.69 |
| 5-Jan-02 | 65.11 | 2902.00 | 504.07 | 2397.93 |
| 6-Jan-02 | 66.36 | 2869.00 | 503.39 | 2365.61 |
| 7-Jan-02 | 65.15 | 2889.50 | 502.75 | 2386.75 |
| 8-Jan-02 | 65.95 | 2886.50 | 502.18 | 2384.32 |
| 9-Jan-02 | 65.38 | 2912.00 | 501.65 | 2410.35 |
| 10-Jan-02 | 64.85 | 2880.50 | 501.18 | 2379.32 |
| 11-Jan-02 | 64.19 | 2696.50 | 500.77 | 2195.73 |
| 12-Jan-02 | 62.22 | 2912.50 | 500.42 | 2412.08 |
| 13-Jan-02 | 62.67 | 2890.00 | 500.12 | 2389.88 |
| 14-Jan-02 | 63.65 | 2931.00 | 499.88 | 2431.12 |
| 15-Jan-02 | 66.74 | 2887.50 | 499.70 | 2387.80 |
| 16-Jan-02 | 68.24 | 2929.00 | 499.57 | 2429.43 |
| 17-Jan-02 | 69.19 | 2920.00 | 499.51 | 2420.49 |

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| 18-Jan-02 | 68.99 | 2739.50 | 499.50 | 2240.00 |
| 19-Jan-02 | 69.21 | 2749.50 | 499.56 | 2249.94 |
| 20-Jan-02 | 69.21 | 2873.50 | 499.67 | 2373.83 |
| 21-Jan-02 | 70.00 | 2761.20 | 499.85 | 2261.35 |
| 22-Jan-02 | 69.15 | 2779.60 | 500.09 | 2279.51 |
| 23-Jan-02 | 65.88 | 2743.60 | 500.39 | 2243.21 |
| 24-Jan-02 | 63.59 | 2834.70 | 500.76 | 2333.94 |
| 25-Jan-02 | 61.76 | 2807.50 | 501.19 | 2306.31 |
| 26-Jan-02 | 61.79 | 2910.50 | 501.68 | 2408.82 |
| 27-Jan-02 | 64.75 | 2849.00 | 502.24 | 2346.76 |
| 28-Jan-02 | 60.37 | 2677.50 | 502.86 | 2174.64 |
| 29-Jan-02 | 64.97 | 2861.40 | 503.54 | 2357.86 |
| 30-Jan-02 | 65.25 | 2693.50 | 504.28 | 2189.22 |
| 31-Jan-02 | 62.91 | 2901.00 | 505.08 | 2395.92 |
| 1-Feb-02 | 63.96 | 2942.00 | 508.90 | 2433.10 |
| 2-Feb-02 | 63.11 | 2920.00 | 509.82 | 2410.18 |
| 3-Feb-02 | 63.33 | 2951.50 | 510.80 | 2440.70 |
| 4-Feb-02 | 63.54 | 2922.00 | 511.83 | 2410.17 |
| 5-Feb-02 | 63.20 | 2940.80 | 512.93 | 2427.87 |
| 6-Feb-02 | 64.34 | 2954.70 | 514.07 | 2440.63 |
| 7-Feb-02 | 67.45 | 2802.50 | 515.28 | 2287.22 |
| 8-Feb-02 | 69.82 | 2810.50 | 516.53 | 2293.97 |
| 9-Feb-02 | 69.45 | 2931.00 | 517.84 | 2413.16 |
| 10-Feb-02 | 70.82 | 2889.50 | 519.20 | 2370.30 |
| 11-Feb-02 | 70.78 | 2914.00 | 520.61 | 2393.39 |
| 12-Feb-02 | 71.11 | 2926.50 | 522.07 | 2404.43 |
| 13-Feb-02 | 69.21 | 2963.20 | 523.58 | 2439.62 |
| 14-Feb-02 | 66.79 | 2921.20 | 525.14 | 2396.06 |
| 15-Feb-02 | 65.91 | 2646.70 | 526.75 | 2119.95 |
| 16-Feb-02 | 68.81 | 2582.00 | 528.40 | 2053.60 |
| 17-Feb-02 | 70.45 | 2810.80 | 530.10 | 2280.70 |
| 18-Feb-02 | 71.83 | 2904.40 | 531.84 | 2372.56 |
| 19-Feb-02 | 70.03 | 2906.40 | 533.63 | 2372.77 |
| 20-Feb-02 | 69.23 | 2854.90 | 535.46 | 2319.44 |
| 21-Feb-02 | 71.27 | 2807.00 | 537.34 | 2269.66 |
| 22-Feb-02 | 72.87 | 2722.00 | 539.25 | 2182.75 |
| 23-Feb-02 | 70.30 | 2509.00 | 541.21 | 1967.79 |
| 24-Feb-02 | 72.35 | 2652.50 | 543.20 | 2109.30 |
| 25-Feb-02 | 72.08 | 2459.50 | 545.23 | 1914.27 |
| 26-Feb-02 | 70.87 | 2769.50 | 547.31 | 2222.19 |
| 27-Feb-02 | 68.32 | 2816.00 | 549.41 | 2266.59 |
| 28-Feb-02 | 69.18 | 2894.50 | 551.56 | 2342.94 |
| 1-Mar-02 | 72.06 | 2987.00 | 558.18 | 2428.82 |
| 2-Mar-02 | 73.02 | 3022.80 | 560.39 | 2462.41 |
| 3-Mar-02 | 70.47 | 2855.80 | 562.64 | 2293.16 |
| 4-Mar-02 | 72.22 | 2991.90 | 564.92 | 2426.98 |
| 5-Mar-02 | 68.55 | 2946.40 | 567.24 | 2379.16 |
| 6-Mar-02 | 69.96 | 2864.00 | 569.58 | 2294.42 |
| 7-Mar-02 | 68.96 | 3043.50 | 571.96 | 2471.54 |
| 8-Mar-02 | 69.30 | 2868.50 | 574.36 | 2294.14 |
| 9-Mar-02 | 75.34 | 2945.00 | 576.79 | 2368.21 |
| 10-Mar-02 | 77.03 | 2941.00 | 579.25 | 2361.75 |
| 11-Mar-02 | 76.70 | 2904.50 | 581.74 | 2322.76 |
| 12-Mar-02 | 73.78 | 2903.70 | 584.25 | 2319.45 |
| 13-Mar-02 | 71.39 | 2931.50 | 586.79 | 2344.71 |
| 14-Mar-02 | 72.95 | 3024.50 | 589.34 | 2435.16 |

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| 15-Mar-02 | 72.65 | 2968.40 | 591.92 | 2376.48 |
| 16-Mar-02 | 74.23 | 3001.00 | 594.52 | 2406.48 |
| 17-Mar-02 | 73.61 | 2955.50 | 597.14 | 2358.36 |
| 18-Mar-02 | 73.30 | 2941.50 | 599.77 | 2341.73 |
| 19-Mar-02 | 73.88 | 3029.60 | 602.42 | 2427.18 |
| 20-Mar-02 | 75.16 | 2935.00 | 605.08 | 2329.92 |
| 21-Mar-02 | 75.29 | 3039.60 | 607.76 | 2431.84 |
| 22-Mar-02 | 76.98 | 2940.50 | 610.44 | 2330.06 |
| 23-Mar-02 | 75.89 | 2656.50 | 613.14 | 2043.36 |
| 24-Mar-02 | 77.11 | 2886.10 | 615.85 | 2270.25 |
| 25-Mar-02 | 75.51 | 2678.50 | 618.56 | 2059.94 |
| 26-Mar-02 | 76.02 | 2807.50 | 621.28 | 2186.22 |
| 27-Mar-02 | 73.21 | 2783.00 | 624.00 | 2159.00 |
| 28-Mar-02 | 75.30 | 3012.50 | 626.73 | 2385.77 |
| 29-Mar-02 | 76.17 | 2807.20 | 629.46 | 2177.74 |
| 30-Mar-02 | 74.62 | 2769.10 | 632.19 | 2136.91 |
| 31-Mar-02 | 76.11 | 2974.00 | 634.92 | 2339.08 |
| 1-Apr-02 | 76.62 | 3034.80 | 635.99 | 2398.81 |
| 2-Apr-02 | 70.76 | 2978.00 | 638.71 | 2339.29 |
| 3-Apr-02 | 68.37 | 2785.50 | 641.43 | 2144.07 |
| 4-Apr-02 | 74.77 | 3011.50 | 644.15 | 2367.35 |
| 5-Apr-02 | 76.55 | 2908.10 | 646.85 | 2261.25 |
| 6-Apr-02 | 79.19 | 3170.50 | 649.55 | 2520.95 |
| 7-Apr-02 | 80.29 | 3081.50 | 652.24 | 2429.26 |
| 8-Apr-02 | 76.77 | 2794.30 | 654.91 | 2139.39 |
| 9-Apr-02 | 78.01 | 2977.00 | 657.58 | 2319.42 |
| 10-Apr-02 | 79.69 | 2996.30 | 660.23 | 2336.07 |
| 11-Apr-02 | 73.53 | 3099.40 | 662.86 | 2436.54 |
| 12-Apr-02 | 73.24 | 2814.90 | 665.48 | 2149.42 |
| 13-Apr-02 | 74.71 | 2970.50 | 668.07 | 2302.43 |
| 14-Apr-02 | 78.16 | 3010.40 | 670.65 | 2339.75 |
| 15-Apr-02 | 79.22 | 3043.50 | 673.21 | 2370.29 |
| 16-Apr-02 | 80.95 | 3040.50 | 675.74 | 2364.76 |
| 17-Apr-02 | 81.64 | 3057.80 | 678.24 | 2379.56 |
| 18-Apr-02 | 81.72 | 3052.10 | 680.72 | 2371.38 |
| 19-Apr-02 | 82.31 | 3099.00 | 683.18 | 2415.82 |
| 20-Apr-02 | 80.97 | 3101.70 | 685.61 | 2416.09 |
| 21-Apr-02 | 81.11 | 2968.50 | 688.01 | 2280.49 |
| 22-Apr-02 | 74.26 | 2937.50 | 690.39 | 2247.11 |
| 23-Apr-02 | 78.39 | 3032.30 | 692.73 | 2339.57 |
| 24-Apr-02 | 79.63 | 3086.50 | 695.05 | 2391.45 |
| 25-Apr-02 | 79.94 | 2856.60 | 697.34 | 2159.26 |
| 26-Apr-02 | 77.44 | 2693.70 | 699.60 | 1994.10 |
| 27-Apr-02 | 77.61 | 3014.60 | 701.83 | 2312.77 |
| 28-Apr-02 | 80.70 | 3017.80 | 704.02 | 2313.78 |
| 29-Apr-02 | 77.49 | 3035.50 | 706.19 | 2329.31 |
| 30-Apr-02 | 77.83 | 2989.60 | 708.32 | 2281.28 |
| 1-May-02 | 78.50 | 2884.20 | 710.76 | 2173.44 |
| 2-May-02 | 75.38 | 3013.00 | 712.83 | 2300.17 |
| 3-May-02 | 75.65 | 2746.80 | 714.86 | 2031.94 |
| 4-May-02 | 77.09 | 2900.30 | 716.85 | 2183.45 |
| 5-May-02 | 74.79 | 2950.70 | 718.82 | 2231.88 |
| 6-May-02 | 70.66 | 2816.60 | 720.74 | 2095.86 |
| 7-May-02 | 77.80 | 3003.50 | 722.63 | 2280.87 |
| 8-May-02 | 78.32 | 2959.40 | 724.48 | 2234.92 |
| 9-May-02 | 80.59 | 2962.00 | 726.30 | 2235.70 |

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| 10-May-02 | 78.96 | 2974.10 | 728.08 | 2246.02 |
| 11-May-02 | 77.39 | 2965.50 | 729.82 | 2235.68 |
| 12-May-02 | 81.52 | 2949.90 | 731.52 | 2218.38 |
| 13-May-02 | 82.04 | 2879.40 | 733.19 | 2146.21 |
| 14-May-02 | 81.48 | 2903.70 | 734.82 | 2168.88 |
| 15-May-02 | 80.50 | 2854.50 | 736.42 | 2118.08 |
| 16-May-02 | 81.61 | 2925.00 | 737.98 | 2187.02 |
| 17-May-02 | 82.80 | 2831.00 | 739.50 | 2091.50 |
| 18-May-02 | 82.46 | 2928.50 | 740.99 | 2187.51 |
| 19-May-02 | 82.53 | 3005.60 | 742.44 | 2263.16 |
| 20-May-02 | 85.65 | 3058.10 | 743.85 | 2314.25 |
| 21-May-02 | 84.16 | 2916.40 | 745.23 | 2171.17 |
| 22-May-02 | 80.84 | 2423.00 | 746.57 | 1676.43 |
| 23-May-02 | 79.45 | 2924.50 | 747.87 | 2176.63 |
| 24-May-02 | 75.68 | 2722.50 | 749.13 | 1973.37 |
| 25-May-02 | 77.65 | 2944.30 | 750.36 | 2193.94 |
| 26-May-02 | 73.40 | 2739.90 | 751.56 | 1988.34 |
| 27-May-02 | 75.59 | 2917.20 | 752.72 | 2164.48 |
| 28-May-02 | 77.28 | 2972.50 | 753.84 | 2218.66 |
| 29-May-02 | 77.90 | 3024.80 | 754.92 | 2269.88 |
| 30-May-02 | 79.65 | 3054.90 | 755.97 | 2298.93 |
| 31-May-02 | 80.32 | 2988.40 | 756.98 | 2231.42 |
| 1-Jun-02 | 78.08 | 2960.00 | 753.81 | 2206.19 |
| 2-Jun-02 | 80.03 | 2981.40 | 754.75 | 2226.65 |
| 3-Jun-02 | 81.07 | 2981.50 | 755.65 | 2225.85 |
| 4-Jun-02 | 79.25 | 2899.80 | 756.52 | 2143.28 |
| 5-Jun-02 | 80.37 | 2956.30 | 757.35 | 2198.95 |
| 6-Jun-02 | 82.00 | 3008.50 | 758.14 | 2250.36 |
| 7-Jun-02 | 78.04 | 2854.70 | 758.90 | 2095.80 |
| 8-Jun-02 | 79.48 | 2870.00 | 759.62 | 2110.38 |
| 9-Jun-02 | 79.65 | 2911.50 | 760.30 | 2151.20 |
| 10-Jun-02 | 79.45 | 3090.60 | 760.95 | 2329.65 |
| 11-Jun-02 | 79.61 | 3149.50 | 761.56 | 2387.94 |
| 12-Jun-02 | 78.53 | 3119.60 | 762.14 | 2357.46 |
| 13-Jun-02 | 78.73 | 3086.90 | 762.67 | 2324.23 |
| 14-Jun-02 | 80.56 | 2978.90 | 763.18 | 2215.72 |
| 15-Jun-02 | 82.69 | 3107.00 | 763.64 | 2343.36 |
| 16-Jun-02 | 82.61 | 3113.60 | 764.07 | 2349.53 |
| 17-Jun-02 | 81.83 | 3145.00 | 764.46 | 2380.54 |
| 18-Jun-02 | 83.03 | 3191.50 | 764.82 | 2426.68 |
| 19-Jun-02 | 82.94 | 3098.70 | 765.14 | 2333.56 |
| 20-Jun-02 | 81.95 | 3092.20 | 765.43 | 2326.77 |
| 21-Jun-02 | 80.65 | 2976.20 | 765.68 | 2210.52 |
| 22-Jun-02 | 78.75 | 2999.50 | 765.89 | 2233.61 |
| 23-Jun-02 | 80.45 | 3078.40 | 766.06 | 2312.34 |
| 24-Jun-02 | 80.94 | 3034.20 | 766.20 | 2268.00 |
| 25-Jun-02 | 80.29 | 3141.50 | 766.31 | 2375.19 |
| 26-Jun-02 | 80.42 | 3096.70 | 766.37 | 2330.33 |
| 27-Jun-02 | 82.68 | 3151.80 | 766.40 | 2385.40 |
| 28-Jun-02 | 81.72 | 2989.30 | 766.40 | 2222.90 |
| 29-Jun-02 | 81.67 | 3017.50 | 766.36 | 2251.14 |
| 30-Jun-02 | 80.11 | 2992.20 | 766.28 | 2225.92 |
| 1-Jul-02 | 79.08 | 3046.00 | 765.00 | 2281.00 |
| 2-Jul-02 | 79.99 | 3086.40 | 764.85 | 2321.55 |
| 3-Jul-02 | 80.44 | 3055.50 | 764.66 | 2290.84 |
| 4-Jul-02 | 79.67 | 3041.00 | 764.44 | 2276.56 |

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| 5-Jul-02 | 81.36 | 3025.60 | 764.18 | 2261.42 |
| 6-Jul-02 | 81.82 | 2886.60 | 763.89 | 2122.71 |
| 7-Jul-02 | 81.49 | 2728.10 | 763.56 | 1964.54 |
| 8-Jul-02 | 81.23 | 2758.90 | 763.19 | 1995.71 |
| 9-Jul-02 | 81.71 | 2784.60 | 762.79 | 2021.81 |
| 10-Jul-02 | 79.79 | 2928.80 | 762.35 | 2166.45 |
| 11-Jul-02 | 81.18 | 2955.60 | 761.88 | 2193.72 |
| 12-Jul-02 | 82.79 | 2842.60 | 761.37 | 2081.23 |
| 13-Jul-02 | 81.04 | 2849.70 | 760.82 | 2088.88 |
| 14-Jul-02 | 80.48 | 2885.00 | 760.24 | 2124.76 |
| 15-Jul-02 | 81.56 | 2993.30 | 759.62 | 2233.68 |
| 16-Jul-02 | 81.61 | 2989.30 | 758.96 | 2230.34 |
| 17-Jul-02 | 80.95 | 2918.80 | 758.27 | 2160.53 |
| 18-Jul-02 | 81.21 | 2964.20 | 757.55 | 2206.65 |
| 19-Jul-02 | 81.12 | 2959.60 | 756.79 | 2202.81 |
| 20-Jul-02 | 82.34 | 2929.80 | 755.99 | 2173.81 |
| 21-Jul-02 | 79.14 | 2928.80 | 755.15 | 2173.65 |
| 22-Jul-02 | 79.62 | 2955.60 | 754.28 | 2201.32 |
| 23-Jul-02 | 82.11 | 2842.60 | 753.38 | 2089.22 |
| 24-Jul-02 | 82.22 | 2849.70 | 752.44 | 2097.26 |
| 25-Jul-02 | 80.10 | 2885.00 | 751.46 | 2133.54 |
| 26-Jul-02 | 82.20 | 2993.30 | 750.44 | 2242.86 |
| 27-Jul-02 | 82.03 | 2989.30 | 749.39 | 2239.91 |
| 28-Jul-02 | 80.44 | 2918.80 | 748.31 | 2170.49 |
| 29-Jul-02 | 82.58 | 2964.20 | 747.19 | 2217.01 |
| 30-Jul-02 | 81.26 | 2959.60 | 746.03 | 2213.57 |
| 31-Jul-02 | 80.98 | 2929.80 | 744.84 | 2184.96 |
| 1-Aug-02 | 81.75 | 3118.00 | 742.20 | 2375.80 |
| 2-Aug-02 | 78.98 | 3016.00 | 740.94 | 2275.06 |
| 3-Aug-02 | 80.21 | 3053.00 | 739.63 | 2313.37 |
| 4-Aug-02 | 79.71 | 3119.00 | 738.30 | 2380.70 |
| 5-Aug-02 | 81.95 | 3107.00 | 736.93 | 2370.07 |
| 6-Aug-02 | 82.45 | 3116.00 | 735.52 | 2380.48 |
| 7-Aug-02 | 81.77 | 3055.00 | 734.08 | 2320.92 |
| 8-Aug-02 | 83.03 | 2720.00 | 732.61 | 1987.39 |
| 9-Aug-02 | 81.64 | 2900.00 | 731.10 | 2168.90 |
| 10-Aug-02 | 81.51 | 2974.00 | 729.56 | 2244.44 |
| 11-Aug-02 | 81.22 | 3067.00 | 727.98 | 2339.02 |
| 12-Aug-02 | 80.46 | 3145.00 | 726.38 | 2418.62 |
| 13-Aug-02 | 79.44 | 2905.00 | 724.74 | 2180.26 |
| 14-Aug-02 | 79.92 | 2959.00 | 723.07 | 2235.93 |
| 15-Aug-02 | 80.18 | 2678.00 | 721.37 | 1956.63 |
| 16-Aug-02 | 79.56 | 2916.00 | 719.65 | 2196.35 |
| 17-Aug-02 | 79.80 | 2896.00 | 717.89 | 2178.11 |
| 18-Aug-02 | 80.63 | 2986.00 | 716.10 | 2269.90 |
| 19-Aug-02 | 80.19 | 3025.00 | 714.29 | 2310.71 |
| 20-Aug-02 | 80.21 | 3071.00 | 712.46 | 2358.54 |
| 21-Aug-02 | 80.00 | 2996.00 | 710.59 | 2285.41 |
| 22-Aug-02 | 81.12 | 3000.00 | 708.70 | 2291.30 |
| 23-Aug-02 | 80.25 | 2783.00 | 706.79 | 2076.21 |
| 24-Aug-02 | 81.34 | 2928.00 | 704.85 | 2223.15 |
| 25-Aug-02 | 81.02 | 2932.00 | 702.89 | 2229.11 |
| 26-Aug-02 | 80.55 | 2786.00 | 700.90 | 2085.10 |
| 27-Aug-02 | 80.99 | 2834.00 | 698.90 | 2135.10 |
| 28-Aug-02 | 81.03 | 2996.00 | 696.87 | 2299.13 |
| 29-Aug-02 | 80.79 | 2896.00 | 694.82 | 2201.18 |

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| 30-Aug-02 | 81.22 | 2870.00 | 692.76 | 2177.24 |
| 31-Aug-02 | 81.29 | 2890.00 | 690.67 | 2199.33 |
| 1-Sep-02 | 81.63 | 2984.00 | 695.97 | 2288.03 |
| 2-Sep-02 | 81.36 | 2958.00 | 693.85 | 2264.15 |
| 3-Sep-02 | 80.99 | 3063.00 | 691.71 | 2371.29 |
| 4-Sep-02 | 80.23 | 3132.00 | 689.55 | 2442.45 |
| 5-Sep-02 | 81.99 | 3018.00 | 687.37 | 2330.63 |
| 6-Sep-02 | 79.40 | 3063.00 | 685.18 | 2377.82 |
| 7-Sep-02 | 82.09 | 2996.00 | 682.98 | 2313.02 |
| 8-Sep-02 | 81.77 | 2954.00 | 680.76 | 2273.24 |
| 9-Sep-02 | 79.50 | 2980.00 | 678.53 | 2301.47 |
| 10-Sep-02 | 79.40 | 2933.00 | 676.29 | 2256.71 |
| 11-Sep-02 | 78.86 | 3056.00 | 674.03 | 2381.97 |
| 12-Sep-02 | 80.81 | 2965.00 | 671.76 | 2293.24 |
| 13-Sep-02 | 81.01 | 2780.00 | 669.48 | 2110.52 |
| 14-Sep-02 | 81.47 | 2920.00 | 667.20 | 2252.80 |
| 15-Sep-02 | 80.90 | 3003.00 | 664.90 | 2338.10 |
| 16-Sep-02 | 79.68 | 3045.00 | 662.59 | 2382.41 |
| 17-Sep-02 | 81.03 | 3061.00 | 660.28 | 2400.72 |
| 18-Sep-02 | 81.84 | 2954.00 | 657.96 | 2296.04 |
| 19-Sep-02 | 82.08 | 3004.00 | 655.63 | 2348.37 |
| 20-Sep-02 | 82.71 | 2877.00 | 653.29 | 2223.71 |
| 21-Sep-02 | 81.14 | 2780.00 | 650.95 | 2129.05 |
| 22-Sep-02 | 80.10 | 2797.00 | 648.61 | 2148.39 |
| 23-Sep-02 | 79.47 | 3101.00 | 646.26 | 2454.74 |
| 24-Sep-02 | 79.62 | 2979.00 | 643.91 | 2335.09 |
| 25-Sep-02 | 80.43 | 2978.00 | 641.55 | 2336.45 |
| 26-Sep-02 | 80.70 | 2891.00 | 639.19 | 2251.81 |
| 27-Sep-02 | 78.49 | 2848.00 | 636.84 | 2211.16 |
| 28-Sep-02 | 80.39 | 2812.00 | 634.48 | 2177.52 |
| 29-Sep-02 | 80.97 | 2988.00 | 632.12 | 2355.88 |
| 30-Sep-02 | 81.35 | 3068.00 | 629.76 | 2438.24 |
| 1-Oct-02 | 82.51 | 3074.00 | 628.25 | 2445.75 |
| 2-Oct-02 | 82.71 | 3061.00 | 625.90 | 2435.10 |
| 3-Oct-02 | 81.36 | 3110.00 | 623.54 | 2486.46 |
| 4-Oct-02 | 82.36 | 2932.00 | 621.19 | 2310.81 |
| 5-Oct-02 | 82.15 | 3143.00 | 618.85 | 2524.15 |
| 6-Oct-02 | 81.99 | 3132.00 | 616.51 | 2515.49 |
| 7-Oct-02 | 82.10 | 3115.00 | 614.17 | 2500.83 |
| 8-Oct-02 | 80.71 | 3049.00 | 611.84 | 2437.16 |
| 9-Oct-02 | 79.45 | 2915.00 | 609.52 | 2305.48 |
| 10-Oct-02 | 78.24 | 3069.00 | 607.20 | 2461.80 |
| 11-Oct-02 | 77.05 | 2978.00 | 604.89 | 2373.11 |
| 12-Oct-02 | 79.45 | 3195.00 | 602.59 | 2592.41 |
| 13-Oct-02 | 79.18 | 3185.00 | 600.30 | 2584.70 |
| 14-Oct-02 | 76.04 | 3102.00 | 598.02 | 2503.98 |
| 15-Oct-02 | 76.22 | 3067.00 | 595.75 | 2471.25 |
| 16-Oct-02 | 76.71 | 3116.00 | 593.49 | 2522.51 |
| 17-Oct-02 | 78.46 | 3185.00 | 591.25 | 2593.75 |
| 18-Oct-02 | 75.76 | 2955.00 | 589.01 | 2365.99 |
| 19-Oct-02 | 76.50 | 3117.00 | 586.79 | 2530.21 |
| 20-Oct-02 | 77.66 | 3099.00 | 584.58 | 2514.42 |
| 21-Oct-02 | 77.27 | 2909.00 | 582.39 | 2326.61 |
| 22-Oct-02 | 76.51 | 2784.00 | 580.21 | 2203.79 |
| 23-Oct-02 | 74.88 | 2852.00 | 578.05 | 2273.95 |
| 24-Oct-02 | 75.97 | 2843.00 | 575.91 | 2267.09 |

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| 25-Oct-02 | 76.63 | 2899.00 | 573.78 | 2325.22 |
| 26-Oct-02 | 76.79 | 2879.00 | 571.67 | 2307.33 |
| 27-Oct-02 | 75.72 | 3140.00 | 569.58 | 2570.42 |
| 28-Oct-02 | 72.91 | 3182.00 | 567.50 | 2614.50 |
| 29-Oct-02 | 71.67 | 3208.00 | 565.45 | 2642.55 |
| 30-Oct-02 | 71.96 | 3117.00 | 563.42 | 2553.58 |
| 31-Oct-02 | 72.25 | 3143.00 | 561.41 | 2581.59 |
| 1-Nov-02 | 74.49 | 2830.00 | 559.94 | 2270.06 |
| 2-Nov-02 | 74.71 | 3020.00 | 557.97 | 2462.03 |
| 3-Nov-02 | 75.96 | 3170.00 | 556.03 | 2613.97 |
| 4-Nov-02 | 76.70 | 3200.00 | 554.11 | 2645.89 |
| 5-Nov-02 | 75.26 | 3200.00 | 552.22 | 2647.78 |
| 6-Nov-02 | 75.34 | 2882.00 | 550.35 | 2331.65 |
| 7-Nov-02 | 75.47 | 2886.00 | 548.50 | 2337.50 |
| 8-Nov-02 | 74.02 | 2879.00 | 546.69 | 2332.31 |
| 9-Nov-02 | 74.78 | 3069.00 | 544.90 | 2524.10 |
| 10-Nov-02 | 75.56 | 3029.00 | 543.13 | 2485.87 |
| 11-Nov-02 | 73.99 | 3095.00 | 541.40 | 2553.60 |
| 12-Nov-02 | 69.75 | 2302.00 | 539.69 | 1762.31 |
| 13-Nov-02 | 71.03 | 2870.00 | 538.02 | 2331.98 |
| 14-Nov-02 | 69.88 | 2967.00 | 536.38 | 2430.62 |
| 15-Nov-02 | 69.83 | 2857.00 | 534.76 | 2322.24 |
| 16-Nov-02 | 70.01 | 2994.00 | 533.18 | 2460.82 |
| 17-Nov-02 | 69.99 | 2936.00 | 531.63 | 2404.37 |
| 18-Nov-02 | 69.78 | 2829.00 | 530.12 | 2298.88 |
| 19-Nov-02 | 70.24 | 2902.00 | 528.63 | 2373.37 |
| 20-Nov-02 | 70.88 | 3016.00 | 527.19 | 2488.81 |
| 21-Nov-02 | 70.24 | 3022.00 | 525.77 | 2496.23 |
| 22-Nov-02 | 68.91 | 3014.00 | 524.40 | 2489.60 |
| 23-Nov-02 | 69.61 | 2874.00 | 523.06 | 2350.94 |
| 24-Nov-02 | 69.93 | 2906.00 | 521.76 | 2384.24 |
| 25-Nov-02 | 71.32 | 3056.00 | 520.49 | 2535.51 |
| 26-Nov-02 | 71.31 | 3109.00 | 519.26 | 2589.74 |
| 27-Nov-02 | 71.50 | 3103.00 | 518.08 | 2584.92 |
| 28-Nov-02 | 71.37 | 3180.00 | 516.93 | 2663.07 |
| 29-Nov-02 | 71.74 | 3037.00 | 515.82 | 2521.18 |
| 30-Nov-02 | 72.20 | 3124.00 | 514.76 | 2609.24 |
| 1-Dec-02 | 71.44 | 3076.00 | 504.52 | 2571.48 |
| 2-Dec-02 | 69.59 | 3075.00 | 503.54 | 2571.46 |
| 3-Dec-02 | 67.99 | 3059.00 | 502.60 | 2556.40 |
| 4-Dec-02 | 68.15 | 2915.00 | 501.71 | 2413.29 |
| 5-Dec-02 | 66.86 | 2711.00 | 500.85 | 2210.15 |
| 6-Dec-02 | 68.37 | 2362.00 | 500.05 | 1861.95 |
| 7-Dec-02 | 68.32 | 2439.00 | 499.29 | 1939.71 |
| 8-Dec-02 | 68.47 | 2539.00 | 498.58 | 2040.42 |
| 9-Dec-02 | 68.33 | 2593.00 | 497.91 | 2095.09 |
| 10-Dec-02 | 66.95 | 2755.00 | 497.29 | 2257.71 |
| 11-Dec-02 | 66.33 | 2866.00 | 496.72 | 2369.28 |
| 12-Dec-02 | 66.41 | 2847.00 | 496.20 | 2350.80 |
| 13-Dec-02 | 67.60 | 2762.00 | 495.73 | 2266.27 |
| 14-Dec-02 | 68.31 | 2969.00 | 495.31 | 2473.69 |
| 15-Dec-02 | 68.49 | 2931.00 | 494.94 | 2436.06 |
| 16-Dec-02 | 67.70 | 2500.00 | 494.61 | 2005.39 |
| 17-Dec-02 | 67.30 | 2891.00 | 494.34 | 2396.66 |
| 18-Dec-02 | 67.67 | 2963.00 | 494.11 | 2468.89 |
| 19-Dec-02 | 70.05 | 2954.00 | 493.93 | 2460.07 |

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| 20-Dec-02 | 69.79 | 2820.00 | 493.80 | 2326.20 |
| 21-Dec-02 | 68.40 | 3009.00 | 493.71 | 2515.29 |
| 22-Dec-02 | 65.65 | 2937.00 | 493.68 | 2443.32 |
| 23-Dec-02 | 63.34 | 3035.00 | 493.68 | 2541.32 |
| 24-Dec-02 | 62.49 | 3015.00 | 493.73 | 2521.27 |
| 25-Dec-02 | 61.85 | 2909.00 | 493.83 | 2415.17 |
| 26-Dec-02 | 64.27 | 2975.00 | 493.97 | 2481.03 |
| 27-Dec-02 | 63.05 | 2876.00 | 494.16 | 2381.84 |
| 28-Dec-02 | 62.47 | 2940.00 | 494.38 | 2445.62 |
| 29-Dec-02 | 61.79 | 3020.00 | 494.65 | 2525.35 |
| 30-Dec-02 | 60.30 | 2994.00 | 494.97 | 2499.03 |
| 31-Dec-02 | 59.94 | 3067.00 | 495.32 | 2571.68 |

Table A6: Weather and Load Information of the Year 2001

| Date | THI (Avg) | PL (MW) | Lw (MW) | NWL (MW) |
|---|---|---|---|---|
| 1-Jan-01 | 67.22 | 2890.00 | 475.17 | 2414.83 |
| 2-Jan-01 | 68.61 | 2927.50 | 474.27 | 2453.23 |
| 3-Jan-01 | 66.73 | 2863.00 | 473.42 | 2389.58 |
| 4-Jan-01 | 61.27 | 2676.50 | 472.63 | 2203.87 |
| 5-Jan-01 | 59.60 | 2902.00 | 471.89 | 2430.11 |
| 6-Jan-01 | 57.65 | 2869.00 | 471.21 | 2397.79 |
| 7-Jan-01 | 59.59 | 2889.50 | 470.57 | 2418.93 |
| 8-Jan-01 | 61.27 | 2886.50 | 470.00 | 2416.50 |
| 9-Jan-01 | 62.78 | 2912.00 | 469.47 | 2442.53 |
| 10-Jan-01 | 61.72 | 2880.50 | 469.00 | 2411.50 |
| 11-Jan-01 | 59.60 | 2696.50 | 468.59 | 2227.91 |
| 12-Jan-01 | 60.94 | 2912.50 | 468.24 | 2444.26 |
| 13-Jan-01 | 59.82 | 2890.00 | 467.94 | 2422.06 |
| 14-Jan-01 | 60.64 | 2931.00 | 467.70 | 2463.30 |
| 15-Jan-01 | 63.40 | 2887.50 | 467.52 | 2419.98 |
| 16-Jan-01 | 64.71 | 2929.00 | 467.39 | 2461.61 |
| 17-Jan-01 | 65.07 | 2920.00 | 467.33 | 2452.67 |
| 18-Jan-01 | 64.78 | 2739.50 | 467.32 | 2272.18 |
| 19-Jan-01 | 65.56 | 2749.50 | 467.38 | 2282.12 |
| 20-Jan-01 | 65.80 | 2873.50 | 467.49 | 2406.01 |
| 21-Jan-01 | 63.72 | 2761.20 | 467.67 | 2293.53 |
| 22-Jan-01 | 64.31 | 2779.60 | 467.91 | 2311.69 |
| 23-Jan-01 | 66.51 | 2743.60 | 468.21 | 2275.39 |
| 24-Jan-01 | 64.18 | 2834.70 | 468.58 | 2366.12 |
| 25-Jan-01 | 59.99 | 2807.50 | 469.01 | 2338.49 |
| 26-Jan-01 | 59.58 | 2910.50 | 469.50 | 2441.00 |
| 27-Jan-01 | 60.21 | 2849.00 | 470.06 | 2378.94 |
| 28-Jan-01 | 62.37 | 2677.50 | 470.68 | 2206.82 |
| 29-Jan-01 | 63.47 | 2861.40 | 471.36 | 2390.04 |
| 30-Jan-01 | 64.53 | 2693.50 | 472.10 | 2221.40 |
| 31-Jan-01 | 68.25 | 2901.00 | 472.90 | 2428.10 |
| 1-Feb-01 | 68.98 | 2499.50 | 476.72 | 2022.78 |
| 2-Feb-01 | 67.21 | 2334.30 | 477.64 | 1856.66 |
| 3-Feb-01 | 65.82 | 2687.70 | 478.62 | 2209.08 |
| 4-Feb-01 | 65.02 | 2672.00 | 479.65 | 2192.35 |
| 5-Feb-01 | 64.70 | 2694.40 | 480.75 | 2213.65 |
| 6-Feb-01 | 66.40 | 2547.00 | 481.89 | 2065.11 |

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|---|---|---|---|---|
| 7-Feb-01 | 64.78 | 2693.20 | 483.10 | 2210.10 |
| 8-Feb-01 | 63.33 | 2776.40 | 484.35 | 2292.05 |
| 9-Feb-01 | 64.56 | 2598.00 | 485.66 | 2112.34 |
| 10-Feb-01 | 63.99 | 2585.00 | 487.02 | 2097.98 |
| 11-Feb-01 | 65.41 | 2701.80 | 488.43 | 2213.37 |
| 12-Feb-01 | 66.78 | 2668.30 | 489.89 | 2178.41 |
| 13-Feb-01 | 67.71 | 2763.40 | 491.40 | 2272.00 |
| 14-Feb-01 | 68.89 | 2747.40 | 492.96 | 2254.44 |
| 15-Feb-01 | 69.98 | 2680.10 | 494.57 | 2185.53 |
| 16-Feb-01 | 70.67 | 2627.10 | 496.22 | 2130.88 |
| 17-Feb-01 | 71.08 | 2694.60 | 497.92 | 2196.68 |
| 18-Feb-01 | 72.67 | 2666.30 | 499.66 | 2166.64 |
| 19-Feb-01 | 71.23 | 2707.20 | 501.45 | 2205.75 |
| 20-Feb-01 | 70.34 | 2577.00 | 503.28 | 2073.72 |
| 21-Feb-01 | 71.44 | 2585.70 | 505.16 | 2080.54 |
| 22-Feb-01 | 70.95 | 2593.40 | 507.07 | 2086.33 |
| 23-Feb-01 | 71.04 | 2580.40 | 509.03 | 2071.37 |
| 24-Feb-01 | 72.30 | 2594.70 | 511.02 | 2083.68 |
| 25-Feb-01 | 75.80 | 2639.60 | 513.05 | 2126.55 |
| 26-Feb-01 | 76.84 | 2662.10 | 515.13 | 2146.97 |
| 27-Feb-01 | 72.66 | 2498.00 | 517.23 | 1980.77 |
| 28-Feb-01 | 73.91 | 2707.10 | 519.38 | 2187.72 |
| 1-Mar-01 | 73.02 | 2753.50 | 526.00 | 2227.50 |
| 2-Mar-01 | 73.16 | 2660.10 | 528.21 | 2131.89 |
| 3-Mar-01 | 69.29 | 2808.70 | 530.46 | 2278.24 |
| 4-Mar-01 | 68.84 | 2853.10 | 532.74 | 2320.36 |
| 5-Mar-01 | 68.13 | 2798.10 | 535.06 | 2263.04 |
| 6-Mar-01 | 69.96 | 2627.50 | 537.40 | 2090.10 |
| 7-Mar-01 | 69.67 | 2493.90 | 539.78 | 1954.12 |
| 8-Mar-01 | 70.46 | 2551.20 | 542.18 | 2009.02 |
| 9-Mar-01 | 70.99 | 2557.90 | 544.61 | 2013.29 |
| 10-Mar-01 | 69.93 | 2722.50 | 547.07 | 2175.43 |
| 11-Mar-01 | 70.09 | 2694.90 | 549.56 | 2145.34 |
| 12-Mar-01 | 70.48 | 2694.90 | 552.07 | 2142.83 |
| 13-Mar-01 | 71.85 | 2745.70 | 554.61 | 2191.09 |
| 14-Mar-01 | 74.64 | 2643.40 | 557.16 | 2086.24 |
| 15-Mar-01 | 76.29 | 2667.00 | 559.74 | 2107.26 |
| 16-Mar-01 | 74.55 | 2677.90 | 562.34 | 2115.56 |
| 17-Mar-01 | 75.60 | 2644.20 | 564.96 | 2079.24 |
| 18-Mar-01 | 74.93 | 2617.50 | 567.59 | 2049.91 |
| 19-Mar-01 | 73.85 | 2715.70 | 570.24 | 2145.46 |
| 20-Mar-01 | 74.79 | 2715.50 | 572.90 | 2142.60 |
| 21-Mar-01 | 77.77 | 2773.00 | 575.58 | 2197.42 |
| 22-Mar-01 | 77.40 | 2623.80 | 578.26 | 2045.54 |
| 23-Mar-01 | 75.75 | 2678.50 | 580.96 | 2097.54 |
| 24-Mar-01 | 77.13 | 2732.20 | 583.67 | 2148.53 |
| 25-Mar-01 | 76.02 | 2396.50 | 586.38 | 1810.12 |
| 26-Mar-01 | 77.29 | 2606.70 | 589.10 | 2017.60 |
| 27-Mar-01 | 78.32 | 2643.20 | 591.82 | 2051.38 |
| 28-Mar-01 | 76.39 | 2520.70 | 594.55 | 1926.15 |
| 29-Mar-01 | 79.50 | 2674.70 | 597.28 | 2077.42 |
| 30-Mar-01 | 78.54 | 2630.20 | 600.01 | 2030.19 |
| 31-Mar-01 | 76.72 | 2656.20 | 602.74 | 2053.46 |
| 1-Apr-01 | 75.44 | 2616.70 | 603.81 | 2012.89 |
| 2-Apr-01 | 75.66 | 2758.70 | 606.53 | 2152.17 |
| 3-Apr-01 | 77.92 | 2772.70 | 609.25 | 2163.45 |

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|---|---|---|---|---|
| 4-Apr-01 | 80.14 | 2831.00 | 611.97 | 2219.03 |
| 5-Apr-01 | 80.47 | 2831.00 | 614.67 | 2216.33 |
| 6-Apr-01 | 78.65 | 2724.00 | 617.37 | 2106.63 |
| 7-Apr-01 | 80.09 | 2735.70 | 620.06 | 2115.64 |
| 8-Apr-01 | 81.75 | 2711.20 | 622.73 | 2088.47 |
| 9-Apr-01 | 81.55 | 2701.70 | 625.40 | 2076.30 |
| 10-Apr-01 | 81.69 | 2802.00 | 628.05 | 2173.95 |
| 11-Apr-01 | 81.76 | 2842.90 | 630.68 | 2212.22 |
| 12-Apr-01 | 81.38 | 2784.80 | 633.30 | 2151.50 |
| 13-Apr-01 | 79.90 | 2711.10 | 635.89 | 2075.21 |
| 14-Apr-01 | 74.56 | 2855.80 | 638.47 | 2217.33 |
| 15-Apr-01 | 76.51 | 2738.90 | 641.03 | 2097.87 |
| 16-Apr-01 | 78.06 | 2739.70 | 643.56 | 2096.14 |
| 17-Apr-01 | 76.17 | 2453.80 | 646.06 | 1807.74 |
| 18-Apr-01 | 74.88 | 2484.00 | 648.54 | 1835.46 |
| 19-Apr-01 | 76.88 | 2614.60 | 651.00 | 1963.60 |
| 20-Apr-01 | 79.42 | 2751.20 | 653.43 | 2097.77 |
| 21-Apr-01 | 78.04 | 2668.20 | 655.83 | 2012.37 |
| 22-Apr-01 | 79.22 | 2710.30 | 658.21 | 2052.09 |
| 23-Apr-01 | 78.97 | 2743.20 | 660.55 | 2082.65 |
| 24-Apr-01 | 79.92 | 2706.70 | 662.87 | 2043.83 |
| 25-Apr-01 | 80.05 | 2610.80 | 665.16 | 1945.64 |
| 26-Apr-01 | 81.68 | 2645.20 | 667.42 | 1977.78 |
| 27-Apr-01 | 81.45 | 2752.70 | 669.65 | 2083.05 |
| 28-Apr-01 | 80.18 | 2603.70 | 671.84 | 1931.86 |
| 29-Apr-01 | 79.20 | 2506.70 | 674.01 | 1832.69 |
| 30-Apr-01 | 75.30 | 2722.50 | 676.14 | 2046.36 |
| 1-May-01 | 77.87 | 2648.30 | 678.58 | 1969.72 |
| 2-May-01 | 74.72 | 2672.30 | 680.65 | 1991.65 |
| 3-May-01 | 75.40 | 2789.60 | 682.68 | 2106.92 |
| 4-May-01 | 75.59 | 2604.30 | 684.67 | 1919.63 |
| 5-May-01 | 76.13 | 2713.20 | 686.64 | 2026.56 |
| 6-May-01 | 77.05 | 2705.40 | 688.56 | 2016.84 |
| 7-May-01 | 74.70 | 2345.00 | 690.45 | 1654.55 |
| 8-May-01 | 74.01 | 2684.70 | 692.30 | 1992.40 |
| 9-May-01 | 77.97 | 2718.00 | 694.12 | 2023.88 |
| 10-May-01 | 74.22 | 2718.00 | 695.90 | 2022.10 |
| 11-May-01 | 75.69 | 2574.30 | 697.64 | 1876.66 |
| 12-May-01 | 76.81 | 2740.50 | 699.34 | 2041.16 |
| 13-May-01 | 78.93 | 2719.80 | 701.01 | 2018.79 |
| 14-May-01 | 80.95 | 2748.30 | 702.64 | 2045.66 |
| 15-May-01 | 82.08 | 2875.10 | 704.24 | 2170.86 |
| 16-May-01 | 80.42 | 2848.50 | 705.80 | 2142.70 |
| 17-May-01 | 82.09 | 2837.60 | 707.32 | 2130.28 |
| 18-May-01 | 82.24 | 2770.00 | 708.81 | 2061.19 |
| 19-May-01 | 80.42 | 2785.50 | 710.26 | 2075.24 |
| 20-May-01 | 79.12 | 2470.10 | 711.67 | 1758.43 |
| 21-May-01 | 80.99 | 2676.60 | 713.05 | 1963.55 |
| 22-May-01 | 81.45 | 2804.50 | 714.39 | 2090.11 |
| 23-May-01 | 80.50 | 2767.20 | 715.69 | 2051.51 |
| 24-May-01 | 78.95 | 2658.20 | 716.95 | 1941.25 |
| 25-May-01 | 80.02 | 2678.50 | 718.18 | 1960.32 |
| 26-May-01 | 78.75 | 2817.50 | 719.38 | 2098.12 |
| 27-May-01 | 80.75 | 2669.50 | 720.54 | 1948.96 |
| 28-May-01 | 82.45 | 2892.50 | 721.66 | 2170.84 |
| 29-May-01 | 79.06 | 2972.00 | 722.74 | 2249.26 |

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| 30-May-01 | 79.51 | 2889.00 | 723.79 | 2165.21 |
| 31-May-01 | 80.37 | 2862.50 | 724.80 | 2137.70 |
| 1-Jun-01 | 79.57 | 2888.00 | 721.63 | 2166.37 |
| 2-Jun-01 | 80.24 | 2933.00 | 722.57 | 2210.43 |
| 3-Jun-01 | 79.65 | 2787.60 | 723.47 | 2064.13 |
| 4-Jun-01 | 79.04 | 2910.00 | 724.34 | 2185.66 |
| 5-Jun-01 | 77.86 | 2729.50 | 725.17 | 2004.33 |
| 6-Jun-01 | 78.23 | 2870.50 | 725.96 | 2144.54 |
| 7-Jun-01 | 78.98 | 2962.70 | 726.72 | 2235.98 |
| 8-Jun-01 | 81.11 | 2880.50 | 727.44 | 2153.06 |
| 9-Jun-01 | 80.39 | 2973.00 | 728.12 | 2244.88 |
| 10-Jun-01 | 82.11 | 2925.80 | 728.77 | 2197.03 |
| 11-Jun-01 | 82.21 | 2955.20 | 729.38 | 2225.82 |
| 12-Jun-01 | 81.55 | 2914.50 | 729.96 | 2184.54 |
| 13-Jun-01 | 79.81 | 2889.20 | 730.49 | 2158.71 |
| 14-Jun-01 | 77.38 | 2835.10 | 731.00 | 2104.10 |
| 15-Jun-01 | 77.99 | 2671.30 | 731.46 | 1939.84 |
| 16-Jun-01 | 79.08 | 2718.40 | 731.89 | 1986.51 |
| 17-Jun-01 | 79.30 | 2875.80 | 732.28 | 2143.52 |
| 18-Jun-01 | 78.92 | 2854.40 | 732.64 | 2121.76 |
| 19-Jun-01 | 79.10 | 2831.20 | 732.96 | 2098.24 |
| 20-Jun-01 | 80.84 | 2866.80 | 733.25 | 2133.55 |
| 21-Jun-01 | 81.41 | 2890.00 | 733.50 | 2156.50 |
| 22-Jun-01 | 81.36 | 2791.10 | 733.71 | 2057.39 |
| 23-Jun-01 | 81.01 | 2771.80 | 733.88 | 2037.92 |
| 24-Jun-01 | 81.29 | 2687.10 | 734.02 | 1953.08 |
| 25-Jun-01 | 81.26 | 2925.00 | 734.13 | 2190.87 |
| 26-Jun-01 | 81.25 | 2953.30 | 734.19 | 2219.11 |
| 27-Jun-01 | 81.03 | 2959.00 | 734.22 | 2224.78 |
| 28-Jun-01 | 81.66 | 2968.60 | 734.22 | 2234.38 |
| 29-Jun-01 | 80.86 | 2831.00 | 734.18 | 2096.82 |
| 30-Jun-01 | 79.28 | 2862.80 | 734.10 | 2128.70 |
| 1-Jul-01 | 80.75 | 2891.40 | 732.82 | 2158.58 |
| 2-Jul-01 | 79.70 | 3005.30 | 732.67 | 2272.63 |
| 3-Jul-01 | 81.05 | 3066.00 | 732.48 | 2333.52 |
| 4-Jul-01 | 82.07 | 3030.50 | 732.26 | 2298.24 |
| 5-Jul-01 | 82.65 | 3084.00 | 732.00 | 2352.00 |
| 6-Jul-01 | 82.41 | 2940.50 | 731.71 | 2208.79 |
| 7-Jul-01 | 81.88 | 3021.80 | 731.38 | 2290.42 |
| 8-Jul-01 | 81.90 | 3033.70 | 731.01 | 2302.69 |
| 9-Jul-01 | 81.29 | 2944.00 | 730.61 | 2213.39 |
| 10-Jul-01 | 80.33 | 2939.50 | 730.17 | 2209.33 |
| 11-Jul-01 | 80.35 | 3001.40 | 729.70 | 2271.70 |
| 12-Jul-01 | 79.44 | 2992.70 | 729.19 | 2263.51 |
| 13-Jul-01 | 81.01 | 2906.90 | 728.64 | 2178.26 |
| 14-Jul-01 | 81.36 | 2969.00 | 728.06 | 2240.94 |
| 15-Jul-01 | 81.96 | 3019.40 | 727.44 | 2291.96 |
| 16-Jul-01 | 81.41 | 3034.20 | 726.78 | 2307.42 |
| 17-Jul-01 | 81.72 | 2996.50 | 726.09 | 2270.41 |
| 18-Jul-01 | 81.48 | 3040.90 | 725.37 | 2315.53 |
| 19-Jul-01 | 80.81 | 3013.90 | 724.61 | 2289.29 |
| 20-Jul-01 | 80.67 | 2824.60 | 723.81 | 2100.79 |
| 21-Jul-01 | 82.08 | 2822.70 | 722.97 | 2099.73 |
| 22-Jul-01 | 81.90 | 2644.70 | 722.10 | 1922.60 |
| 23-Jul-01 | 81.41 | 2688.70 | 721.20 | 1967.50 |
| 24-Jul-01 | 81.40 | 2822.00 | 720.26 | 2101.74 |

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| 25-Jul-01 | 80.08 | 2801.70 | 719.28 | 2082.42 |
| 26-Jul-01 | 81.06 | 2866.70 | 718.26 | 2148.44 |
| 27-Jul-01 | 81.49 | 2772.20 | 717.21 | 2054.99 |
| 28-Jul-01 | 81.63 | 2881.80 | 716.13 | 2165.67 |
| 29-Jul-01 | 80.27 | 2838.80 | 715.01 | 2123.79 |
| 30-Jul-01 | 80.59 | 2838.80 | 713.85 | 2124.95 |
| 31-Jul-01 | 80.73 | 2909.60 | 712.66 | 2196.94 |
| 1-Aug-01 | 81.84 | 2945.20 | 710.02 | 2235.18 |
| 2-Aug-01 | 82.02 | 2852.00 | 708.76 | 2143.24 |
| 3-Aug-01 | 82.62 | 2845.70 | 707.45 | 2138.25 |
| 4-Aug-01 | 82.70 | 2894.50 | 706.12 | 2188.38 |
| 5-Aug-01 | 80.08 | 2695.80 | 704.75 | 1991.05 |
| 6-Aug-01 | 80.69 | 2669.70 | 703.34 | 1966.36 |
| 7-Aug-01 | 82.33 | 2714.00 | 701.90 | 2012.10 |
| 8-Aug-01 | 82.15 | 2826.80 | 700.43 | 2126.37 |
| 9-Aug-01 | 81.45 | 2964.90 | 698.92 | 2265.98 |
| 10-Aug-01 | 81.97 | 2971.30 | 697.38 | 2273.92 |
| 11-Aug-01 | 82.59 | 2979.50 | 695.80 | 2283.70 |
| 12-Aug-01 | 82.55 | 2902.00 | 694.20 | 2207.80 |
| 13-Aug-01 | 82.26 | 2835.10 | 692.56 | 2142.54 |
| 14-Aug-01 | 81.38 | 2786.30 | 690.89 | 2095.41 |
| 15-Aug-01 | 81.62 | 2823.90 | 689.19 | 2134.71 |
| 16-Aug-01 | 81.68 | 2871.30 | 687.47 | 2183.83 |
| 17-Aug-01 | 82.65 | 2775.80 | 685.71 | 2090.09 |
| 18-Aug-01 | 82.88 | 2711.20 | 683.92 | 2027.28 |
| 19-Aug-01 | 83.05 | 2908.80 | 682.11 | 2226.69 |
| 20-Aug-01 | 82.52 | 2925.30 | 680.28 | 2245.02 |
| 21-Aug-01 | 82.02 | 2901.20 | 678.41 | 2222.79 |
| 22-Aug-01 | 81.76 | 2936.30 | 676.52 | 2259.78 |
| 23-Aug-01 | 82.23 | 2839.80 | 674.61 | 2165.19 |
| 24-Aug-01 | 82.40 | 2798.60 | 672.67 | 2125.93 |
| 25-Aug-01 | 82.68 | 2763.40 | 670.71 | 2092.69 |
| 26-Aug-01 | 83.21 | 2717.00 | 668.72 | 2048.28 |
| 27-Aug-01 | 81.64 | 2803.30 | 666.72 | 2136.58 |
| 28-Aug-01 | 82.66 | 2712.50 | 664.69 | 2047.81 |
| 29-Aug-01 | 82.52 | 2721.90 | 662.64 | 2059.26 |
| 30-Aug-01 | 81.51 | 2735.20 | 660.58 | 2074.62 |
| 31-Aug-01 | 82.16 | 2880.20 | 658.49 | 2221.71 |
| 1-Sep-01 | 81.81 | 2918.90 | 663.79 | 2255.11 |
| 2-Sep-01 | 81.87 | 2894.90 | 661.67 | 2233.23 |
| 3-Sep-01 | 82.45 | 2946.30 | 659.53 | 2286.77 |
| 4-Sep-01 | 82.36 | 2926.20 | 657.37 | 2268.83 |
| 5-Sep-01 | 82.00 | 3014.50 | 655.19 | 2359.31 |
| 6-Sep-01 | 80.51 | 2920.30 | 653.00 | 2267.30 |
| 7-Sep-01 | 80.75 | 2846.20 | 650.80 | 2195.40 |
| 8-Sep-01 | 81.00 | 2908.30 | 648.58 | 2259.72 |
| 9-Sep-01 | 81.78 | 2833.90 | 646.35 | 2187.55 |
| 10-Sep-01 | 80.34 | 2966.70 | 644.11 | 2322.59 |
| 11-Sep-01 | 81.02 | 2968.00 | 641.85 | 2326.15 |
| 12-Sep-01 | 80.34 | 2910.70 | 639.58 | 2271.12 |
| 13-Sep-01 | 80.10 | 2907.60 | 637.30 | 2270.30 |
| 14-Sep-01 | 81.98 | 2822.80 | 635.02 | 2187.78 |
| 15-Sep-01 | 82.77 | 2979.60 | 632.72 | 2346.88 |
| 16-Sep-01 | 80.94 | 2919.70 | 630.41 | 2289.29 |
| 17-Sep-01 | 78.97 | 2844.50 | 628.10 | 2216.40 |
| 18-Sep-01 | 78.12 | 2714.90 | 625.78 | 2089.12 |

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| 19-Sep-01 | 79.75 | 2862.10 | 623.45 | 2238.65 |
| 20-Sep-01 | 80.62 | 2707.90 | 621.11 | 2086.79 |
| 21-Sep-01 | 80.79 | 2662.30 | 618.77 | 2043.53 |
| 22-Sep-01 | 81.46 | 2847.30 | 616.43 | 2230.87 |
| 23-Sep-01 | 81.51 | 2832.50 | 614.08 | 2218.42 |
| 24-Sep-01 | 77.73 | 2837.50 | 611.73 | 2225.77 |
| 25-Sep-01 | 81.17 | 2827.10 | 609.37 | 2217.73 |
| 26-Sep-01 | 82.67 | 2967.60 | 607.01 | 2360.59 |
| 27-Sep-01 | 81.81 | 2921.10 | 604.66 | 2316.44 |
| 28-Sep-01 | 81.48 | 2961.00 | 602.30 | 2358.70 |
| 29-Sep-01 | 81.82 | 3004.20 | 599.94 | 2404.26 |
| 30-Sep-01 | 79.19 | 2967.40 | 597.58 | 2369.82 |
| 1-Oct-01 | 79.13 | 2552.70 | 596.07 | 1956.63 |
| 2-Oct-01 | 79.74 | 2808.50 | 593.72 | 2214.78 |
| 3-Oct-01 | 78.30 | 2721.80 | 591.36 | 2130.44 |
| 4-Oct-01 | 79.30 | 2816.80 | 589.01 | 2227.79 |
| 5-Oct-01 | 80.74 | 2788.90 | 586.67 | 2202.23 |
| 6-Oct-01 | 80.59 | 2765.90 | 584.33 | 2181.57 |
| 7-Oct-01 | 81.84 | 2746.70 | 581.99 | 2164.71 |
| 8-Oct-01 | 80.60 | 2773.40 | 579.66 | 2193.74 |
| 9-Oct-01 | 80.36 | 2742.10 | 577.34 | 2164.76 |
| 10-Oct-01 | 79.79 | 2715.00 | 575.02 | 2139.98 |
| 11-Oct-01 | 80.68 | 2741.30 | 572.71 | 2168.59 |
| 12-Oct-01 | 81.02 | 2706.00 | 570.41 | 2135.59 |
| 13-Oct-01 | 80.45 | 2695.10 | 568.12 | 2126.98 |
| 14-Oct-01 | 78.13 | 2709.00 | 565.84 | 2143.16 |
| 15-Oct-01 | 80.49 | 2704.50 | 563.57 | 2140.93 |
| 16-Oct-01 | 79.82 | 2679.00 | 561.31 | 2117.69 |
| 17-Oct-01 | 77.97 | 2605.20 | 559.07 | 2046.13 |
| 18-Oct-01 | 75.86 | 2583.00 | 556.83 | 2026.17 |
| 19-Oct-01 | 77.77 | 2579.00 | 554.61 | 2024.39 |
| 20-Oct-01 | 77.33 | 2587.00 | 552.40 | 2034.60 |
| 21-Oct-01 | 77.45 | 2609.00 | 550.21 | 2058.79 |
| 22-Oct-01 | 79.27 | 2629.40 | 548.03 | 2081.37 |
| 23-Oct-01 | 80.02 | 2601.10 | 545.87 | 2055.23 |
| 24-Oct-01 | 80.05 | 2606.00 | 543.73 | 2062.27 |
| 25-Oct-01 | 78.64 | 2704.00 | 541.60 | 2162.40 |
| 26-Oct-01 | 78.95 | 2825.60 | 539.49 | 2286.11 |
| 27-Oct-01 | 76.93 | 2734.30 | 537.40 | 2196.90 |
| 28-Oct-01 | 77.77 | 2752.30 | 535.32 | 2216.98 |
| 29-Oct-01 | 78.06 | 2746.40 | 533.27 | 2213.13 |
| 30-Oct-01 | 76.79 | 2729.00 | 531.24 | 2197.76 |
| 31-Oct-01 | 74.77 | 2729.00 | 529.23 | 2199.77 |
| 1-Nov-01 | 76.37 | 2892.30 | 527.76 | 2364.54 |
| 2-Nov-01 | 76.76 | 2704.50 | 525.79 | 2178.71 |
| 3-Nov-01 | 77.27 | 2758.50 | 523.85 | 2234.65 |
| 4-Nov-01 | 77.94 | 2895.00 | 521.93 | 2373.07 |
| 5-Nov-01 | 77.22 | 2821.10 | 520.04 | 2301.06 |
| 6-Nov-01 | 77.05 | 2905.00 | 518.17 | 2386.83 |
| 7-Nov-01 | 73.68 | 2865.50 | 516.32 | 2349.18 |
| 8-Nov-01 | 73.61 | 2881.50 | 514.51 | 2366.99 |
| 9-Nov-01 | 75.00 | 2656.40 | 512.72 | 2143.68 |
| 10-Nov-01 | 75.75 | 2870.40 | 510.95 | 2359.45 |
| 11-Nov-01 | 73.06 | 2941.00 | 509.22 | 2431.78 |
| 12-Nov-01 | 72.93 | 2934.30 | 507.51 | 2426.79 |
| 13-Nov-01 | 75.01 | 2939.40 | 505.84 | 2433.56 |

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|---|---|---|---|---|
| 14-Nov-01 | 74.50 | 2952.70 | 504.20 | 2448.50 |
| 15-Nov-01 | 74.00 | 2898.60 | 502.58 | 2396.02 |
| 16-Nov-01 | 73.56 | 2848.50 | 501.00 | 2347.50 |
| 17-Nov-01 | 73.93 | 2883.60 | 499.45 | 2384.15 |
| 18-Nov-01 | 74.38 | 2881.30 | 497.94 | 2383.36 |
| 19-Nov-01 | 71.71 | 2815.80 | 496.45 | 2319.35 |
| 20-Nov-01 | 71.89 | 2903.10 | 495.01 | 2408.09 |
| 21-Nov-01 | 72.60 | 2938.80 | 493.59 | 2445.21 |
| 22-Nov-01 | 72.86 | 2954.30 | 492.22 | 2462.08 |
| 23-Nov-01 | 71.92 | 2813.00 | 490.88 | 2322.12 |
| 24-Nov-01 | 71.69 | 2936.40 | 489.58 | 2446.82 |
| 25-Nov-01 | 71.27 | 2869.90 | 488.31 | 2381.59 |
| 26-Nov-01 | 71.46 | 2982.90 | 487.08 | 2495.82 |
| 27-Nov-01 | 71.05 | 2957.00 | 485.90 | 2471.10 |
| 28-Nov-01 | 70.15 | 2949.80 | 484.75 | 2465.05 |
| 29-Nov-01 | 69.75 | 2867.00 | 483.64 | 2383.36 |
| 30-Nov-01 | 68.27 | 2745.40 | 482.58 | 2262.82 |
| 1-Dec-01 | 65.74 | 2920.40 | 472.34 | 2448.06 |
| 2-Dec-01 | 66.13 | 2869.90 | 471.36 | 2398.54 |
| 3-Dec-01 | 66.60 | 2886.10 | 470.42 | 2415.68 |
| 4-Dec-01 | 66.91 | 2877.00 | 469.53 | 2407.47 |
| 5-Dec-01 | 68.19 | 2782.00 | 468.67 | 2313.33 |
| 6-Dec-01 | 68.99 | 2821.90 | 467.87 | 2354.03 |
| 7-Dec-01 | 67.69 | 2715.90 | 467.11 | 2248.79 |
| 8-Dec-01 | 68.27 | 2772.70 | 466.40 | 2306.30 |
| 9-Dec-01 | 68.52 | 2829.50 | 465.73 | 2363.77 |
| 10-Dec-01 | 67.14 | 2906.00 | 465.11 | 2440.89 |
| 11-Dec-01 | 66.95 | 2964.50 | 464.54 | 2499.96 |
| 12-Dec-01 | 63.41 | 2985.50 | 464.02 | 2521.48 |
| 13-Dec-01 | 62.80 | 2857.00 | 463.55 | 2393.45 |
| 14-Dec-01 | 64.76 | 2757.00 | 463.13 | 2293.87 |
| 15-Dec-01 | 64.68 | 2577.00 | 462.76 | 2114.24 |
| 16-Dec-01 | 65.73 | 2471.00 | 462.43 | 2008.57 |
| 17-Dec-01 | 66.68 | 2391.00 | 462.16 | 1928.84 |
| 18-Dec-01 | 65.72 | 2313.00 | 461.93 | 1851.07 |
| 19-Dec-01 | 65.68 | 2440.50 | 461.75 | 1978.75 |
| 20-Dec-01 | 66.01 | 2461.50 | 461.62 | 1999.88 |
| 21-Dec-01 | 64.11 | 2424.50 | 461.53 | 1962.97 |
| 22-Dec-01 | 63.50 | 2668.00 | 461.50 | 2206.50 |
| 23-Dec-01 | 63.80 | 2726.00 | 461.50 | 2264.50 |
| 24-Dec-01 | 63.56 | 2733.00 | 461.55 | 2271.45 |
| 25-Dec-01 | 64.59 | 2716.50 | 461.65 | 2254.85 |
| 26-Dec-01 | 66.58 | 2824.50 | 461.79 | 2362.71 |
| 27-Dec-01 | 65.54 | 2793.00 | 461.98 | 2331.02 |
| 28-Dec-01 | 65.13 | 2645.50 | 462.20 | 2183.30 |
| 29-Dec-01 | 64.77 | 2913.50 | 462.47 | 2451.03 |
| 30-Dec-01 | 64.87 | 2829.50 | 462.79 | 2366.71 |
| 31-Dec-01 | 65.26 | 2853.50 | 463.14 | 2390.36 |

Table A7: Weather and Load Information of the Year 2000

| Date | THI (Avg) | PL (MW) | Lw (MW) | NWL (MW) |
|---|---|---|---|---|
| 1-Jan-00 | 63.88 | 2454.00 | 441.20 | 2012.80 |
| 2-Jan-00 | 64.92 | 2858.00 | 440.30 | 2417.70 |
| 3-Jan-00 | 61.00 | 2512.00 | 439.45 | 2072.55 |
| 4-Jan-00 | 58.65 | 2456.00 | 438.66 | 2017.34 |
| 5-Jan-00 | 60.95 | 2492.00 | 437.92 | 2054.08 |
| 6-Jan-00 | 57.31 | 2421.00 | 437.24 | 1983.76 |
| 7-Jan-00 | 56.76 | 2267.00 | 436.60 | 1830.40 |
| 8-Jan-00 | 57.61 | 2229.00 | 436.03 | 1792.97 |
| 9-Jan-00 | 59.56 | 1929.00 | 435.50 | 1493.50 |
| 10-Jan-00 | 62.07 | 2021.00 | 435.03 | 1585.97 |
| 11-Jan-00 | 64.48 | 2124.00 | 434.62 | 1689.38 |
| 12-Jan-00 | 65.75 | 2168.00 | 434.27 | 1733.73 |
| 13-Jan-00 | 66.77 | 2235.00 | 433.97 | 1801.03 |
| 14-Jan-00 | 68.61 | 2434.00 | 433.73 | 2000.27 |
| 15-Jan-00 | 67.09 | 2304.00 | 433.55 | 1870.45 |
| 16-Jan-00 | 66.80 | 2424.00 | 433.42 | 1990.58 |
| 17-Jan-00 | 62.74 | 2456.00 | 433.36 | 2022.64 |
| 18-Jan-00 | 61.70 | 2448.00 | 433.35 | 2014.65 |
| 19-Jan-00 | 62.01 | 2396.00 | 433.41 | 1962.59 |
| 20-Jan-00 | 65.25 | 2438.00 | 433.52 | 2004.48 |
| 21-Jan-00 | 66.54 | 2259.00 | 433.70 | 1825.30 |
| 22-Jan-00 | 66.80 | 2317.00 | 433.94 | 1883.06 |
| 23-Jan-00 | 68.04 | 2364.00 | 434.24 | 1929.76 |
| 24-Jan-00 | 66.77 | 2331.00 | 434.61 | 1896.39 |
| 25-Jan-00 | 66.65 | 2283.00 | 435.04 | 1847.96 |
| 26-Jan-00 | 66.65 | 2289.00 | 435.53 | 1853.47 |
| 27-Jan-00 | 65.87 | 2115.00 | 436.09 | 1678.91 |
| 28-Jan-00 | 67.11 | 2136.00 | 436.71 | 1699.29 |
| 29-Jan-00 | 63.64 | 2363.00 | 437.39 | 1925.61 |
| 30-Jan-00 | 63.43 | 2349.00 | 438.13 | 1910.87 |
| 31-Jan-00 | 64.87 | 2346.00 | 438.93 | 1907.07 |
| 1-Feb-00 | 65.82 | 2417.00 | 442.75 | 1974.25 |
| 2-Feb-00 | 68.04 | 2205.00 | 443.67 | 1761.33 |
| 3-Feb-00 | 70.39 | 2497.00 | 444.65 | 2052.35 |
| 4-Feb-00 | 70.26 | 2457.00 | 445.68 | 2011.32 |
| 5-Feb-00 | 66.24 | 2375.00 | 446.78 | 1928.22 |
| 6-Feb-00 | 65.69 | 2386.00 | 447.92 | 1938.08 |
| 7-Feb-00 | 67.63 | 2337.00 | 449.13 | 1887.87 |
| 8-Feb-00 | 65.74 | 2334.00 | 450.38 | 1883.62 |
| 9-Feb-00 | 65.07 | 2405.00 | 451.69 | 1953.31 |
| 10-Feb-00 | 65.57 | 2324.00 | 453.05 | 1870.95 |
| 11-Feb-00 | 66.61 | 2389.00 | 454.46 | 1934.54 |
| 12-Feb-00 | 66.35 | 2349.00 | 455.92 | 1893.08 |
| 13-Feb-00 | 68.40 | 2401.00 | 457.43 | 1943.57 |
| 14-Feb-00 | 67.88 | 2405.00 | 458.99 | 1946.01 |
| 15-Feb-00 | 64.48 | 2515.00 | 460.60 | 2054.40 |
| 16-Feb-00 | 63.75 | 2457.00 | 462.25 | 1994.75 |
| 17-Feb-00 | 66.13 | 2464.00 | 463.95 | 2000.05 |
| 18-Feb-00 | 65.88 | 2458.00 | 465.69 | 1992.31 |
| 19-Feb-00 | 64.64 | 2317.00 | 467.48 | 1849.52 |
| 20-Feb-00 | 65.55 | 2297.00 | 469.31 | 1827.69 |
| 21-Feb-00 | 64.76 | 2351.00 | 471.19 | 1879.81 |

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|---|---|---|---|---|
| 22-Feb-00 | 66.28 | 2267.00 | 473.10 | 1793.90 |
| 23-Feb-00 | 67.54 | 2485.00 | 475.06 | 2009.94 |
| 24-Feb-00 | 66.94 | 2492.00 | 477.05 | 2014.95 |
| 25-Feb-00 | 67.04 | 2495.00 | 479.08 | 2015.92 |
| 26-Feb-00 | 65.06 | 2548.00 | 481.16 | 2066.84 |
| 27-Feb-00 | 65.78 | 2517.00 | 483.26 | 2033.74 |
| 28-Feb-00 | 66.35 | 2528.00 | 485.41 | 2042.59 |
| 29-Feb-00 | 66.26 | 2540.00 | 484.21 | 2055.79 |
| 1-Mar-00 | 70.75 | 2510.00 | 492.03 | 2017.97 |
| 2-Mar-00 | 72.36 | 2378.00 | 494.24 | 1883.76 |
| 3-Mar-00 | 74.12 | 2468.00 | 496.49 | 1971.51 |
| 4-Mar-00 | 75.62 | 2655.00 | 498.77 | 2156.23 |
| 5-Mar-00 | 76.00 | 2436.00 | 501.09 | 1934.91 |
| 6-Mar-00 | 76.53 | 2497.00 | 503.43 | 1993.57 |
| 7-Mar-00 | 76.42 | 2441.00 | 505.81 | 1935.19 |
| 8-Mar-00 | 72.12 | 2464.00 | 508.21 | 1955.79 |
| 9-Mar-00 | 70.99 | 2415.00 | 510.64 | 1904.36 |
| 10-Mar-00 | 69.45 | 2425.00 | 513.10 | 1911.90 |
| 11-Mar-00 | 73.92 | 2533.00 | 515.59 | 2017.41 |
| 12-Mar-00 | 73.69 | 2517.00 | 518.10 | 1998.90 |
| 13-Mar-00 | 70.74 | 2369.00 | 520.64 | 1848.36 |
| 14-Mar-00 | 70.80 | 2492.00 | 523.19 | 1968.81 |
| 15-Mar-00 | 73.05 | 2593.00 | 525.77 | 2067.23 |
| 16-Mar-00 | 69.45 | 2440.00 | 528.37 | 1911.63 |
| 17-Mar-00 | 70.78 | 2497.00 | 530.99 | 1966.01 |
| 18-Mar-00 | 74.09 | 2367.00 | 533.62 | 1833.38 |
| 19-Mar-00 | 75.73 | 2453.00 | 536.27 | 1916.73 |
| 20-Mar-00 | 74.66 | 2320.00 | 538.93 | 1781.07 |
| 21-Mar-00 | 71.34 | 2224.00 | 541.61 | 1682.39 |
| 22-Mar-00 | 72.00 | 2283.00 | 544.29 | 1738.71 |
| 23-Mar-00 | 72.87 | 2293.00 | 546.99 | 1746.01 |
| 24-Mar-00 | 73.83 | 2348.00 | 549.70 | 1798.30 |
| 25-Mar-00 | 71.79 | 2291.00 | 552.41 | 1738.59 |
| 26-Mar-00 | 71.07 | 2351.00 | 555.13 | 1795.87 |
| 27-Mar-00 | 72.54 | 2371.00 | 557.85 | 1813.15 |
| 28-Mar-00 | 74.31 | 2332.00 | 560.58 | 1771.42 |
| 29-Mar-00 | 76.26 | 2268.00 | 563.31 | 1704.69 |
| 30-Mar-00 | 76.82 | 2407.00 | 566.04 | 1840.96 |
| 31-Mar-00 | 77.34 | 2410.00 | 568.77 | 1841.23 |
| 1-Apr-00 | 78.61 | 2453.00 | 569.84 | 1883.16 |
| 2-Apr-00 | 79.75 | 2473.00 | 572.56 | 1900.44 |
| 3-Apr-00 | 80.22 | 2541.00 | 575.28 | 1965.72 |
| 4-Apr-00 | 80.30 | 2385.00 | 578.00 | 1807.00 |
| 5-Apr-00 | 80.43 | 2390.00 | 580.70 | 1809.30 |
| 6-Apr-00 | 80.17 | 2376.00 | 583.40 | 1792.60 |
| 7-Apr-00 | 80.03 | 2469.00 | 586.09 | 1882.91 |
| 8-Apr-00 | 81.23 | 2463.00 | 588.76 | 1874.24 |
| 9-Apr-00 | 80.57 | 2439.00 | 591.43 | 1847.57 |
| 10-Apr-00 | 81.39 | 2366.00 | 594.08 | 1771.92 |
| 11-Apr-00 | 78.62 | 2230.00 | 596.71 | 1633.29 |
| 12-Apr-00 | 76.14 | 2482.00 | 599.33 | 1882.67 |
| 13-Apr-00 | 79.64 | 2471.00 | 601.92 | 1869.08 |
| 14-Apr-00 | 75.54 | 2346.00 | 604.50 | 1741.50 |
| 15-Apr-00 | 73.44 | 1940.00 | 607.06 | 1332.94 |
| 16-Apr-00 | 76.45 | 2620.00 | 609.59 | 2010.41 |
| 17-Apr-00 | 79.56 | 2543.00 | 612.09 | 1930.91 |

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|---|---|---|---|---|
| 18-Apr-00 | 79.46 | 2616.00 | 614.57 | 2001.43 |
| 19-Apr-00 | 81.04 | 2594.00 | 617.03 | 1976.97 |
| 20-Apr-00 | 77.96 | 2519.00 | 619.46 | 1899.54 |
| 21-Apr-00 | 75.18 | 2442.00 | 621.86 | 1820.14 |
| 22-Apr-00 | 80.76 | 2466.00 | 624.24 | 1841.76 |
| 23-Apr-00 | 77.75 | 2557.00 | 626.58 | 1930.42 |
| 24-Apr-00 | 74.33 | 2334.00 | 628.90 | 1705.10 |
| 25-Apr-00 | 74.54 | 2451.00 | 631.19 | 1819.81 |
| 26-Apr-00 | 69.66 | 2436.00 | 633.45 | 1802.55 |
| 27-Apr-00 | 77.22 | 2557.00 | 635.68 | 1921.32 |
| 28-Apr-00 | 77.42 | 2449.00 | 637.87 | 1811.13 |
| 29-Apr-00 | 80.10 | 2572.00 | 640.04 | 1931.96 |
| 30-Apr-00 | 80.61 | 2598.00 | 642.17 | 1955.83 |
| 1-May-00 | 78.32 | 2404.00 | 644.61 | 1759.39 |
| 2-May-00 | 72.77 | 2183.00 | 646.68 | 1536.32 |
| 3-May-00 | 72.79 | 2413.00 | 648.71 | 1764.29 |
| 4-May-00 | 77.01 | 2483.00 | 650.70 | 1832.30 |
| 5-May-00 | 79.32 | 2459.00 | 652.67 | 1806.33 |
| 6-May-00 | 79.05 | 2349.00 | 654.59 | 1694.41 |
| 7-May-00 | 79.10 | 2386.00 | 656.48 | 1729.52 |
| 8-May-00 | 80.06 | 2290.00 | 658.33 | 1631.67 |
| 9-May-00 | 81.08 | 2406.00 | 660.15 | 1745.85 |
| 10-May-00 | 80.21 | 2467.00 | 661.93 | 1805.07 |
| 11-May-00 | 80.62 | 2665.00 | 663.67 | 2001.33 |
| 12-May-00 | 83.07 | 2517.00 | 665.37 | 1851.63 |
| 13-May-00 | 84.74 | 2550.00 | 667.04 | 1882.96 |
| 14-May-00 | 81.46 | 2525.00 | 668.67 | 1856.33 |
| 15-May-00 | 83.00 | 2534.00 | 670.27 | 1863.73 |
| 16-May-00 | 80.63 | 2400.00 | 671.83 | 1728.17 |
| 17-May-00 | 80.95 | 2442.00 | 673.35 | 1768.65 |
| 18-May-00 | 81.33 | 2444.00 | 674.84 | 1769.16 |
| 19-May-00 | 76.33 | 2381.00 | 676.29 | 1704.71 |
| 20-May-00 | 77.94 | 2484.00 | 677.70 | 1806.30 |
| 21-May-00 | 78.63 | 2618.00 | 679.08 | 1938.92 |
| 22-May-00 | 78.97 | 2579.00 | 680.42 | 1898.58 |
| 23-May-00 | 79.17 | 2544.00 | 681.72 | 1862.28 |
| 24-May-00 | 80.60 | 2498.00 | 682.98 | 1815.02 |
| 25-May-00 | 79.72 | 2517.00 | 684.21 | 1832.79 |
| 26-May-00 | 78.07 | 2327.00 | 685.41 | 1641.59 |
| 27-May-00 | 75.28 | 2219.00 | 686.57 | 1532.43 |
| 28-May-00 | 74.25 | 2394.00 | 687.69 | 1706.31 |
| 29-May-00 | 77.77 | 2449.00 | 688.77 | 1760.23 |
| 30-May-00 | 77.89 | 2418.00 | 689.82 | 1728.18 |
| 31-May-00 | 79.12 | 2452.00 | 690.83 | 1761.17 |
| 1-Jun-00 | 82.75 | 2432.00 | 687.66 | 1744.34 |
| 2-Jun-00 | 83.10 | 2394.00 | 688.60 | 1705.40 |
| 3-Jun-00 | 84.45 | 2302.00 | 689.50 | 1612.50 |
| 4-Jun-00 | 83.77 | 2329.00 | 690.37 | 1638.63 |
| 5-Jun-00 | 81.69 | 2491.00 | 691.20 | 1799.80 |
| 6-Jun-00 | 79.78 | 2588.00 | 691.99 | 1896.01 |
| 7-Jun-00 | 80.58 | 2541.00 | 692.75 | 1848.25 |
| 8-Jun-00 | 80.25 | 2647.00 | 693.47 | 1953.53 |
| 9-Jun-00 | 82.02 | 2508.00 | 694.15 | 1813.85 |
| 10-Jun-00 | 79.68 | 2510.00 | 694.80 | 1815.20 |
| 11-Jun-00 | 80.98 | 2498.00 | 695.41 | 1802.59 |
| 12-Jun-00 | 80.50 | 2440.00 | 695.99 | 1744.01 |

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|---|---|---|---|---|
| 13-Jun-00 | 82.64 | 2612.00 | 696.52 | 1915.48 |
| 14-Jun-00 | 82.43 | 2430.00 | 697.03 | 1732.97 |
| 15-Jun-00 | 81.22 | 2382.00 | 697.49 | 1684.51 |
| 16-Jun-00 | 81.85 | 2410.00 | 697.92 | 1712.08 |
| 17-Jun-00 | 81.77 | 2387.00 | 698.31 | 1688.69 |
| 18-Jun-00 | 81.30 | 2341.00 | 698.67 | 1642.33 |
| 19-Jun-00 | 80.98 | 2250.00 | 698.99 | 1551.01 |
| 20-Jun-00 | 80.01 | 2318.00 | 699.28 | 1618.72 |
| 21-Jun-00 | 81.08 | 2443.00 | 699.53 | 1743.47 |
| 22-Jun-00 | 80.97 | 2371.00 | 699.74 | 1671.26 |
| 23-Jun-00 | 81.15 | 2321.00 | 699.91 | 1621.09 |
| 24-Jun-00 | 80.87 | 2391.00 | 700.05 | 1690.95 |
| 25-Jun-00 | 77.66 | 2506.00 | 700.16 | 1805.84 |
| 26-Jun-00 | 80.95 | 2584.00 | 700.22 | 1883.78 |
| 27-Jun-00 | 82.17 | 2593.00 | 700.25 | 1892.75 |
| 28-Jun-00 | 81.09 | 2490.00 | 700.25 | 1789.75 |
| 29-Jun-00 | 81.51 | 2520.00 | 700.21 | 1819.79 |
| 30-Jun-00 | 82.02 | 2925.00 | 700.13 | 2224.87 |
| 1-Jul-00 | 82.37 | 2636.00 | 698.85 | 1937.15 |
| 2-Jul-00 | 82.23 | 2601.00 | 698.70 | 1902.30 |
| 3-Jul-00 | 82.93 | 2649.00 | 698.51 | 1950.49 |
| 4-Jul-00 | 83.41 | 2760.00 | 698.29 | 2061.71 |
| 5-Jul-00 | 82.84 | 2543.00 | 698.03 | 1844.97 |
| 6-Jul-00 | 82.76 | 2554.00 | 697.74 | 1856.26 |
| 7-Jul-00 | 80.96 | 2467.00 | 697.41 | 1769.59 |
| 8-Jul-00 | 80.76 | 2560.00 | 697.04 | 1862.96 |
| 9-Jul-00 | 81.07 | 2558.00 | 696.64 | 1861.36 |
| 10-Jul-00 | 81.21 | 2566.00 | 696.20 | 1869.80 |
| 11-Jul-00 | 82.86 | 2586.00 | 695.73 | 1890.27 |
| 12-Jul-00 | 80.86 | 2510.00 | 695.22 | 1814.78 |
| 13-Jul-00 | 80.88 | 2722.00 | 694.67 | 2027.33 |
| 14-Jul-00 | 80.65 | 2563.00 | 694.09 | 1868.91 |
| 15-Jul-00 | 81.77 | 2704.00 | 693.47 | 2010.53 |
| 16-Jul-00 | 82.09 | 2749.00 | 692.81 | 2056.19 |
| 17-Jul-00 | 81.06 | 2705.00 | 692.12 | 2012.88 |
| 18-Jul-00 | 78.98 | 2619.00 | 691.40 | 1927.60 |
| 19-Jul-00 | 78.52 | 2707.00 | 690.64 | 2016.36 |
| 20-Jul-00 | 79.39 | 2693.00 | 689.84 | 2003.16 |
| 21-Jul-00 | 79.28 | 2668.00 | 689.00 | 1979.00 |
| 22-Jul-00 | 78.65 | 2674.00 | 688.13 | 1985.87 |
| 23-Jul-00 | 80.21 | 2705.00 | 687.23 | 2017.77 |
| 24-Jul-00 | 79.71 | 2716.00 | 686.29 | 2029.71 |
| 25-Jul-00 | 79.89 | 2684.00 | 685.31 | 1998.69 |
| 26-Jul-00 | 80.54 | 2743.00 | 684.29 | 2058.71 |
| 27-Jul-00 | 80.08 | 2786.00 | 683.24 | 2102.76 |
| 28-Jul-00 | 80.88 | 2736.00 | 682.16 | 2053.84 |
| 29-Jul-00 | 81.98 | 2748.00 | 681.04 | 2066.96 |
| 30-Jul-00 | 82.01 | 2637.00 | 679.88 | 1957.12 |
| 31-Jul-00 | 82.20 | 2645.00 | 678.69 | 1966.31 |
| 1-Aug-00 | 80.15 | 2604.00 | 676.05 | 1927.95 |
| 2-Aug-00 | 78.33 | 2538.00 | 674.79 | 1863.21 |
| 3-Aug-00 | 80.15 | 2581.00 | 673.48 | 1907.52 |
| 4-Aug-00 | 81.88 | 2577.00 | 672.15 | 1904.85 |
| 5-Aug-00 | 83.38 | 2695.00 | 670.78 | 2024.22 |
| 6-Aug-00 | 82.52 | 2730.00 | 669.37 | 2060.63 |
| 7-Aug-00 | 82.59 | 2729.00 | 667.93 | 2061.07 |

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|---|---|---|---|---|
| 8-Aug-00 | 82.03 | 2709.00 | 666.46 | 2042.54 |
| 9-Aug-00 | 81.48 | 2649.00 | 664.95 | 1984.05 |
| 10-Aug-00 | 80.66 | 2663.00 | 663.41 | 1999.59 |
| 11-Aug-00 | 81.23 | 2646.00 | 661.83 | 1984.17 |
| 12-Aug-00 | 81.20 | 2646.00 | 660.23 | 1985.77 |
| 13-Aug-00 | 79.55 | 2660.00 | 658.59 | 2001.41 |
| 14-Aug-00 | 81.15 | 2691.00 | 656.92 | 2034.08 |
| 15-Aug-00 | 81.14 | 2666.00 | 655.22 | 2010.78 |
| 16-Aug-00 | 81.21 | 2758.00 | 653.50 | 2104.50 |
| 17-Aug-00 | 81.46 | 2689.00 | 651.74 | 2037.26 |
| 18-Aug-00 | 81.54 | 2685.00 | 649.95 | 2035.05 |
| 19-Aug-00 | 81.32 | 2644.00 | 648.14 | 1995.86 |
| 20-Aug-00 | 81.29 | 2700.00 | 646.31 | 2053.69 |
| 21-Aug-00 | 81.48 | 2373.00 | 644.44 | 1728.56 |
| 22-Aug-00 | 82.04 | 2159.00 | 642.55 | 1516.45 |
| 23-Aug-00 | 82.24 | 2406.00 | 640.64 | 1765.36 |
| 24-Aug-00 | 83.48 | 2439.00 | 638.70 | 1800.30 |
| 25-Aug-00 | 83.56 | 2478.00 | 636.74 | 1841.26 |
| 26-Aug-00 | 82.46 | 2580.00 | 634.75 | 1945.25 |
| 27-Aug-00 | 82.54 | 2410.00 | 632.75 | 1777.25 |
| 28-Aug-00 | 82.60 | 2413.00 | 630.72 | 1782.28 |
| 29-Aug-00 | 81.59 | 2188.00 | 628.67 | 1559.33 |
| 30-Aug-00 | 80.48 | 2259.00 | 626.61 | 1632.39 |
| 31-Aug-00 | 79.27 | 2467.00 | 624.52 | 1842.48 |
| 1-Sep-00 | 80.87 | 2481.00 | 629.82 | 1851.18 |
| 2-Sep-00 | 81.66 | 2529.00 | 627.70 | 1901.30 |
| 3-Sep-00 | 81.93 | 2318.00 | 625.56 | 1692.44 |
| 4-Sep-00 | 79.85 | 2296.00 | 623.40 | 1672.60 |
| 5-Sep-00 | 81.06 | 2449.00 | 621.22 | 1827.78 |
| 6-Sep-00 | 81.06 | 2489.00 | 619.03 | 1869.97 |
| 7-Sep-00 | 80.43 | 2434.00 | 616.83 | 1817.17 |
| 8-Sep-00 | 80.90 | 2486.00 | 614.61 | 1871.39 |
| 9-Sep-00 | 81.50 | 2507.00 | 612.38 | 1894.62 |
| 10-Sep-00 | 81.89 | 2576.00 | 610.14 | 1965.86 |
| 11-Sep-00 | 81.76 | 2460.00 | 607.88 | 1852.12 |
| 12-Sep-00 | 83.09 | 2432.00 | 605.61 | 1826.39 |
| 13-Sep-00 | 82.18 | 2061.00 | 603.33 | 1457.67 |
| 14-Sep-00 | 81.61 | 2227.00 | 601.05 | 1625.95 |
| 15-Sep-00 | 80.53 | 2345.00 | 598.75 | 1746.25 |
| 16-Sep-00 | 81.22 | 2369.00 | 596.44 | 1772.56 |
| 17-Sep-00 | 80.34 | 2446.00 | 594.13 | 1851.87 |
| 18-Sep-00 | 78.88 | 2456.00 | 591.81 | 1864.19 |
| 19-Sep-00 | 78.49 | 2430.00 | 589.48 | 1840.52 |
| 20-Sep-00 | 76.47 | 2546.00 | 587.14 | 1958.86 |
| 21-Sep-00 | 80.19 | 2491.00 | 584.80 | 1906.20 |
| 22-Sep-00 | 79.07 | 2368.00 | 582.46 | 1785.54 |
| 23-Sep-00 | 77.50 | 2349.00 | 580.11 | 1768.89 |
| 24-Sep-00 | 79.75 | 2356.00 | 577.76 | 1778.24 |
| 25-Sep-00 | 80.82 | 2224.00 | 575.40 | 1648.60 |
| 26-Sep-00 | 81.33 | 2170.00 | 573.04 | 1596.96 |
| 27-Sep-00 | 80.15 | 2378.00 | 570.69 | 1807.31 |
| 28-Sep-00 | 81.40 | 2450.00 | 568.33 | 1881.67 |
| 29-Sep-00 | 81.29 | 2422.00 | 565.97 | 1856.03 |
| 30-Sep-00 | 80.02 | 2595.00 | 563.61 | 2031.39 |
| 1-Oct-00 | 76.90 | 2478.00 | 562.10 | 1915.90 |
| 2-Oct-00 | 77.00 | 2419.00 | 559.75 | 1859.25 |

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|---|---|---|---|---|
| 3-Oct-00 | 79.36 | 2484.00 | 557.39 | 1926.61 |
| 4-Oct-00 | 80.54 | 2528.00 | 555.04 | 1972.96 |
| 5-Oct-00 | 80.67 | 2567.00 | 552.70 | 2014.30 |
| 6-Oct-00 | 81.19 | 2646.00 | 550.36 | 2095.64 |
| 7-Oct-00 | 78.91 | 2601.00 | 548.02 | 2052.98 |
| 8-Oct-00 | 80.93 | 2541.00 | 545.69 | 1995.31 |
| 9-Oct-00 | 80.82 | 2599.00 | 543.37 | 2055.63 |
| 10-Oct-00 | 79.41 | 2582.00 | 541.05 | 2040.95 |
| 11-Oct-00 | 81.07 | 2668.00 | 538.74 | 2129.26 |
| 12-Oct-00 | 81.66 | 2550.00 | 536.44 | 2013.56 |
| 13-Oct-00 | 81.42 | 2579.00 | 534.15 | 2044.85 |
| 14-Oct-00 | 81.91 | 2518.00 | 531.87 | 1986.13 |
| 15-Oct-00 | 82.16 | 2562.00 | 529.60 | 2032.40 |
| 16-Oct-00 | 81.77 | 2524.00 | 527.34 | 1996.66 |
| 17-Oct-00 | 80.48 | 2560.00 | 525.10 | 2034.90 |
| 18-Oct-00 | 80.06 | 2614.00 | 522.86 | 2091.14 |
| 19-Oct-00 | 80.32 | 2657.00 | 520.64 | 2136.36 |
| 20-Oct-00 | 80.09 | 2651.00 | 518.43 | 2132.57 |
| 21-Oct-00 | 79.38 | 2622.00 | 516.24 | 2105.76 |
| 22-Oct-00 | 77.75 | 2644.00 | 514.06 | 2129.94 |
| 23-Oct-00 | 79.32 | 2494.00 | 511.90 | 1982.10 |
| 24-Oct-00 | 79.27 | 2469.00 | 509.76 | 1959.24 |
| 25-Oct-00 | 78.54 | 2484.00 | 507.63 | 1976.37 |
| 26-Oct-00 | 78.50 | 2339.00 | 505.52 | 1833.48 |
| 27-Oct-00 | 73.89 | 2345.00 | 503.43 | 1841.57 |
| 28-Oct-00 | 69.66 | 2251.00 | 501.35 | 1749.65 |
| 29-Oct-00 | 69.72 | 2070.00 | 499.30 | 1570.70 |
| 30-Oct-00 | 73.51 | 2475.00 | 497.27 | 1977.73 |
| 31-Oct-00 | 75.45 | 2575.00 | 495.26 | 2079.74 |
| 1-Nov-00 | 75.45 | 2561.00 | 493.79 | 2067.21 |
| 2-Nov-00 | 76.24 | 2563.00 | 491.82 | 2071.18 |
| 3-Nov-00 | 76.09 | 2585.00 | 489.88 | 2095.12 |
| 4-Nov-00 | 74.76 | 2643.00 | 487.96 | 2155.04 |
| 5-Nov-00 | 75.03 | 2332.00 | 486.07 | 1845.93 |
| 6-Nov-00 | 74.52 | 2496.00 | 484.20 | 2011.80 |
| 7-Nov-00 | 74.49 | 2524.00 | 482.35 | 2041.65 |
| 8-Nov-00 | 73.92 | 2468.00 | 480.54 | 1987.46 |
| 9-Nov-00 | 73.88 | 2339.00 | 478.75 | 1860.25 |
| 10-Nov-00 | 73.71 | 2359.00 | 476.98 | 1882.02 |
| 11-Nov-00 | 73.78 | 2369.00 | 475.25 | 1893.75 |
| 12-Nov-00 | 73.78 | 2341.00 | 473.54 | 1867.46 |
| 13-Nov-00 | 72.98 | 2378.00 | 471.87 | 1906.13 |
| 14-Nov-00 | 71.88 | 2469.00 | 470.23 | 1998.77 |
| 15-Nov-00 | 72.06 | 2598.00 | 468.61 | 2129.39 |
| 16-Nov-00 | 72.06 | 2471.00 | 467.03 | 2003.97 |
| 17-Nov-00 | 71.47 | 2436.00 | 465.48 | 1970.52 |
| 18-Nov-00 | 71.59 | 2510.00 | 463.97 | 2046.03 |
| 19-Nov-00 | 72.92 | 2489.00 | 462.48 | 2026.52 |
| 20-Nov-00 | 73.66 | 2483.00 | 461.04 | 2021.96 |
| 21-Nov-00 | 73.77 | 2588.00 | 459.62 | 2128.38 |
| 22-Nov-00 | 73.39 | 2564.00 | 458.25 | 2105.75 |
| 23-Nov-00 | 73.37 | 2626.00 | 456.91 | 2169.09 |
| 24-Nov-00 | 72.34 | 2532.00 | 455.61 | 2076.39 |
| 25-Nov-00 | 71.16 | 2567.00 | 454.34 | 2112.66 |
| 26-Nov-00 | 70.10 | 2589.00 | 453.11 | 2135.89 |
| 27-Nov-00 | 70.31 | 2582.00 | 451.93 | 2130.07 |

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|---|---|---|---|---|
| 28-Nov-00 | 68.55 | 2661.00 | 450.78 | 2210.22 |
| 29-Nov-00 | 67.48 | 2452.00 | 449.67 | 2002.33 |
| 30-Nov-00 | 69.19 | 2432.00 | 448.61 | 1983.39 |
| 1-Dec-00 | 69.96 | 2500.00 | 438.37 | 2061.63 |
| 2-Dec-00 | 66.16 | 2078.00 | 437.39 | 1640.61 |
| 3-Dec-00 | 64.27 | 2406.00 | 436.45 | 1969.55 |
| 4-Dec-00 | 65.61 | 2408.00 | 435.56 | 1972.44 |
| 5-Dec-00 | 65.57 | 2387.00 | 434.70 | 1952.30 |
| 6-Dec-00 | 65.30 | 2419.00 | 433.90 | 1985.10 |
| 7-Dec-00 | 66.79 | 2444.00 | 433.14 | 2010.86 |
| 8-Dec-00 | 66.72 | 2424.00 | 432.43 | 1991.57 |
| 9-Dec-00 | 64.97 | 2409.00 | 431.76 | 1977.24 |
| 10-Dec-00 | 65.46 | 2416.00 | 431.14 | 1984.86 |
| 11-Dec-00 | 65.43 | 2384.00 | 430.57 | 1953.43 |
| 12-Dec-00 | 65.25 | 2483.00 | 430.05 | 2052.95 |
| 13-Dec-00 | 65.21 | 2639.00 | 429.58 | 2209.42 |
| 14-Dec-00 | 65.16 | 2647.00 | 429.16 | 2217.84 |
| 15-Dec-00 | 65.16 | 2529.00 | 428.79 | 2100.21 |
| 16-Dec-00 | 65.55 | 2583.00 | 428.46 | 2154.54 |
| 17-Dec-00 | 65.12 | 2564.00 | 428.19 | 2135.81 |
| 18-Dec-00 | 65.85 | 2529.00 | 427.96 | 2101.04 |
| 19-Dec-00 | 65.16 | 2535.00 | 427.78 | 2107.22 |
| 20-Dec-00 | 65.38 | 2595.00 | 427.65 | 2167.35 |
| 21-Dec-00 | 66.55 | 2568.00 | 427.56 | 2140.44 |
| 22-Dec-00 | 67.34 | 2512.00 | 427.53 | 2084.47 |
| 23-Dec-00 | 66.77 | 2484.00 | 427.53 | 2056.47 |
| 24-Dec-00 | 65.73 | 2577.00 | 427.58 | 2149.42 |
| 25-Dec-00 | 66.03 | 2425.00 | 427.68 | 1997.32 |
| 26-Dec-00 | 65.40 | 2440.00 | 427.82 | 2012.18 |
| 27-Dec-00 | 67.28 | 2385.00 | 428.01 | 1956.99 |
| 28-Dec-00 | 66.25 | 2102.00 | 428.23 | 1673.77 |
| 29-Dec-00 | 64.55 | 2205.00 | 428.50 | 1776.50 |
| 30-Dec-00 | 65.37 | 2263.00 | 428.82 | 1834.18 |
| 31-Dec-00 | 65.0144525 | 2359 | 429.17 | 1929.83 |

Table A8: Weather and Load Information of the Year 1999

| Date | THI (Avg) | PL (MW) | Lw (MW) | NWL (MW) |
|---|---|---|---|---|
| 1-Jan-99 | 64.49 | 2454.00 | 419.88 | 2034.12 |
| 2-Jan-99 | 64.55 | 2400.00 | 418.98 | 1981.02 |
| 3-Jan-99 | 64.80 | 2512.00 | 418.13 | 2093.87 |
| 4-Jan-99 | 65.65 | 2456.00 | 417.34 | 2038.66 |
| 5-Jan-99 | 64.53 | 2492.00 | 416.60 | 2075.40 |
| 6-Jan-99 | 65.96 | 2421.00 | 415.92 | 2005.08 |
| 7-Jan-99 | 65.70 | 2267.00 | 415.28 | 1851.72 |
| 8-Jan-99 | 64.87 | 2229.00 | 414.71 | 1814.29 |
| 9-Jan-99 | 64.88 | 1929.00 | 414.18 | 1514.82 |
| 10-Jan-99 | 63.15 | 2021.00 | 413.71 | 1607.29 |
| 11-Jan-99 | 60.03 | 2124.00 | 413.30 | 1710.70 |
| 12-Jan-99 | 58.45 | 2168.00 | 412.95 | 1755.05 |
| 13-Jan-99 | 61.22 | 2235.00 | 412.65 | 1822.35 |
| 14-Jan-99 | 61.51 | 2434.00 | 412.41 | 2021.59 |
| 15-Jan-99 | 62.79 | 2304.00 | 412.23 | 1891.77 |

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|---|---|---|---|---|
| 16-Jan-99 | 63.56 | 2424.00 | 412.10 | 2011.90 |
| 17-Jan-99 | 63.20 | 2456.00 | 412.04 | 2043.96 |
| 18-Jan-99 | 62.82 | 2448.00 | 412.03 | 2035.97 |
| 19-Jan-99 | 62.29 | 2396.00 | 412.09 | 1983.91 |
| 20-Jan-99 | 63.64 | 2438.00 | 412.20 | 2025.80 |
| 21-Jan-99 | 63.82 | 2259.00 | 412.38 | 1846.62 |
| 22-Jan-99 | 62.44 | 2317.00 | 412.62 | 1904.38 |
| 23-Jan-99 | 63.36 | 2364.00 | 412.92 | 1951.08 |
| 24-Jan-99 | 65.40 | 2331.00 | 413.29 | 1917.71 |
| 25-Jan-99 | 66.47 | 2283.00 | 413.72 | 1869.28 |
| 26-Jan-99 | 63.12 | 2289.00 | 414.21 | 1874.79 |
| 27-Jan-99 | 64.84 | 2115.00 | 414.77 | 1700.23 |
| 28-Jan-99 | 67.55 | 2136.00 | 415.39 | 1720.61 |
| 29-Jan-99 | 67.59 | 2363.00 | 416.07 | 1946.93 |
| 30-Jan-99 | 65.53 | 2349.00 | 416.81 | 1932.19 |
| 31-Jan-99 | 62.41 | 2346.00 | 417.61 | 1928.39 |
| 1-Feb-99 | 64.22 | 2417.00 | 421.43 | 1995.57 |
| 2-Feb-99 | 65.82 | 2205.00 | 422.35 | 1782.65 |
| 3-Feb-99 | 68.86 | 2497.00 | 423.33 | 2073.67 |
| 4-Feb-99 | 70.24 | 2457.00 | 424.36 | 2032.64 |
| 5-Feb-99 | 69.29 | 2375.00 | 425.46 | 1949.54 |
| 6-Feb-99 | 67.93 | 2386.00 | 426.60 | 1959.40 |
| 7-Feb-99 | 68.27 | 2337.00 | 427.81 | 1909.19 |
| 8-Feb-99 | 69.68 | 2334.00 | 429.06 | 1904.94 |
| 9-Feb-99 | 70.25 | 2405.00 | 430.37 | 1974.63 |
| 10-Feb-99 | 68.12 | 2324.00 | 431.73 | 1892.27 |
| 11-Feb-99 | 71.26 | 2389.00 | 433.14 | 1955.86 |
| 12-Feb-99 | 72.40 | 2349.00 | 434.60 | 1914.40 |
| 13-Feb-99 | 70.83 | 2401.00 | 436.11 | 1964.89 |
| 14-Feb-99 | 70.71 | 2405.00 | 437.67 | 1967.33 |
| 15-Feb-99 | 69.28 | 2515.00 | 439.28 | 2075.72 |
| 16-Feb-99 | 69.57 | 2457.00 | 440.93 | 2016.07 |
| 17-Feb-99 | 69.38 | 2464.00 | 442.63 | 2021.37 |
| 18-Feb-99 | 68.96 | 2458.00 | 444.37 | 2013.63 |
| 19-Feb-99 | 70.05 | 2317.00 | 446.16 | 1870.84 |
| 20-Feb-99 | 68.63 | 2297.00 | 447.99 | 1849.01 |
| 21-Feb-99 | 70.23 | 2351.00 | 449.87 | 1901.13 |
| 22-Feb-99 | 68.07 | 2267.00 | 451.78 | 1815.22 |
| 23-Feb-99 | 70.56 | 2485.00 | 453.74 | 2031.26 |
| 24-Feb-99 | 73.26 | 2492.00 | 455.73 | 2036.27 |
| 25-Feb-99 | 73.90 | 2495.00 | 457.76 | 2037.24 |
| 26-Feb-99 | 76.40 | 2548.00 | 459.84 | 2088.16 |
| 27-Feb-99 | 73.24 | 2517.00 | 461.94 | 2055.06 |
| 28-Feb-99 | 69.88 | 2528.00 | 464.09 | 2063.91 |
| 1-Mar-99 | 69.53 | 2124.00 | 470.71 | 1653.29 |
| 2-Mar-99 | 69.26 | 2208.00 | 472.92 | 1735.08 |
| 3-Mar-99 | 69.63 | 2001.00 | 475.17 | 1525.83 |
| 4-Mar-99 | 69.31 | 2161.00 | 477.45 | 1683.55 |
| 5-Mar-99 | 72.01 | 2094.00 | 479.77 | 1614.23 |
| 6-Mar-99 | 75.24 | 2172.00 | 482.11 | 1689.89 |
| 7-Mar-99 | 74.93 | 2105.00 | 484.49 | 1620.51 |
| 8-Mar-99 | 75.58 | 2187.00 | 486.89 | 1700.11 |
| 9-Mar-99 | 77.97 | 2211.00 | 489.32 | 1721.68 |
| 10-Mar-99 | 78.48 | 2149.00 | 491.78 | 1657.22 |
| 11-Mar-99 | 80.06 | 2198.00 | 494.27 | 1703.73 |
| 12-Mar-99 | 79.52 | 2226.00 | 496.78 | 1729.22 |

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|---|---|---|---|---|
| 13-Mar-99 | 75.16 | 2174.00 | 499.32 | 1674.68 |
| 14-Mar-99 | 70.66 | 2140.00 | 501.87 | 1638.13 |
| 15-Mar-99 | 70.59 | 2259.00 | 504.45 | 1754.55 |
| 16-Mar-99 | 73.05 | 2141.00 | 507.05 | 1633.95 |
| 17-Mar-99 | 78.47 | 2306.00 | 509.67 | 1796.33 |
| 18-Mar-99 | 79.96 | 2213.00 | 512.30 | 1700.70 |
| 19-Mar-99 | 75.17 | 1923.00 | 514.95 | 1408.05 |
| 20-Mar-99 | 71.89 | 1983.00 | 517.61 | 1465.39 |
| 21-Mar-99 | 71.55 | 1935.00 | 520.29 | 1414.71 |
| 22-Mar-99 | 73.41 | 2068.00 | 522.97 | 1545.03 |
| 23-Mar-99 | 75.63 | 1978.00 | 525.67 | 1452.33 |
| 24-Mar-99 | 78.05 | 1935.00 | 528.38 | 1406.62 |
| 25-Mar-99 | 80.58 | 1936.00 | 531.09 | 1404.91 |
| 26-Mar-99 | 79.38 | 1960.00 | 533.81 | 1426.19 |
| 27-Mar-99 | 79.08 | 2020.00 | 536.53 | 1483.47 |
| 28-Mar-99 | 77.12 | 2070.00 | 539.26 | 1530.74 |
| 29-Mar-99 | 78.29 | 2053.00 | 541.99 | 1511.01 |
| 30-Mar-99 | 79.51 | 2039.00 | 544.72 | 1494.28 |
| 31-Mar-99 | 79.95 | 1932.00 | 547.45 | 1384.55 |
| 1-Apr-99 | 81.06 | 2007.00 | 548.52 | 1458.48 |
| 2-Apr-99 | 81.62 | 1980.00 | 551.24 | 1428.76 |
| 3-Apr-99 | 80.93 | 2050.00 | 553.96 | 1496.04 |
| 4-Apr-99 | 80.02 | 2123.00 | 556.68 | 1566.32 |
| 5-Apr-99 | 81.19 | 2109.00 | 559.38 | 1549.62 |
| 6-Apr-99 | 81.30 | 2227.00 | 562.08 | 1664.92 |
| 7-Apr-99 | 81.39 | 2119.00 | 564.77 | 1554.23 |
| 8-Apr-99 | 78.52 | 2234.00 | 567.44 | 1666.56 |
| 9-Apr-99 | 73.06 | 1870.00 | 570.11 | 1299.89 |
| 10-Apr-99 | 79.13 | 2231.00 | 572.76 | 1658.24 |
| 11-Apr-99 | 81.37 | 2239.00 | 575.39 | 1663.61 |
| 12-Apr-99 | 81.60 | 2100.00 | 578.01 | 1521.99 |
| 13-Apr-99 | 82.17 | 2060.00 | 580.60 | 1479.40 |
| 14-Apr-99 | 82.31 | 2063.00 | 583.18 | 1479.82 |
| 15-Apr-99 | 82.63 | 2065.00 | 585.74 | 1479.26 |
| 16-Apr-99 | 82.35 | 2061.00 | 588.27 | 1472.73 |
| 17-Apr-99 | 80.75 | 2088.00 | 590.77 | 1497.23 |
| 18-Apr-99 | 79.37 | 2147.00 | 593.25 | 1553.75 |
| 19-Apr-99 | 81.40 | 2161.00 | 595.71 | 1565.29 |
| 20-Apr-99 | 82.54 | 2114.00 | 598.14 | 1515.86 |
| 21-Apr-99 | 82.52 | 2129.00 | 600.54 | 1528.46 |
| 22-Apr-99 | 82.07 | 2184.00 | 602.92 | 1581.08 |
| 23-Apr-99 | 82.59 | 1971.00 | 605.26 | 1365.74 |
| 24-Apr-99 | 83.33 | 1978.00 | 607.58 | 1370.42 |
| 25-Apr-99 | 83.72 | 2037.00 | 609.87 | 1427.13 |
| 26-Apr-99 | 84.41 | 2000.00 | 612.13 | 1387.87 |
| 27-Apr-99 | 84.37 | 2010.00 | 614.36 | 1395.64 |
| 28-Apr-99 | 84.29 | 2174.00 | 616.55 | 1557.45 |
| 29-Apr-99 | 83.50 | 2122.00 | 618.72 | 1503.28 |
| 30-Apr-99 | 83.21 | 2121.00 | 620.85 | 1500.15 |
| 1-May-99 | 83.48 | 2149.00 | 623.29 | 1525.71 |
| 2-May-99 | 83.77 | 2077.00 | 625.36 | 1451.64 |
| 3-May-99 | 83.96 | 2042.00 | 627.39 | 1414.61 |
| 4-May-99 | 83.47 | 2033.00 | 629.38 | 1403.62 |
| 5-May-99 | 81.67 | 2198.00 | 631.35 | 1566.65 |
| 6-May-99 | 77.69 | 2523.00 | 633.27 | 1889.73 |
| 7-May-99 | 82.06 | 2062.00 | 635.16 | 1426.84 |

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| 8-May-99 | 76.69 | 2068.00 | 637.01 | 1430.99 |
| 9-May-99 | 77.19 | 2266.00 | 638.83 | 1627.17 |
| 10-May-99 | 81.06 | 2204.00 | 640.61 | 1563.39 |
| 11-May-99 | 77.54 | 2222.00 | 642.35 | 1579.65 |
| 12-May-99 | 78.90 | 2060.00 | 644.05 | 1415.95 |
| 13-May-99 | 76.74 | 2034.00 | 645.72 | 1388.28 |
| 14-May-99 | 73.21 | 2004.00 | 647.35 | 1356.65 |
| 15-May-99 | 75.58 | 2186.00 | 648.95 | 1537.05 |
| 16-May-99 | 78.47 | 2259.00 | 650.51 | 1608.49 |
| 17-May-99 | 78.90 | 2118.00 | 652.03 | 1465.97 |
| 18-May-99 | 79.73 | 2269.00 | 653.52 | 1615.48 |
| 19-May-99 | 76.36 | 2224.00 | 654.97 | 1569.03 |
| 20-May-99 | 79.35 | 2212.00 | 656.38 | 1555.62 |
| 21-May-99 | 79.97 | 2194.00 | 657.76 | 1536.24 |
| 22-May-99 | 80.16 | 2217.00 | 659.10 | 1557.90 |
| 23-May-99 | 82.81 | 2252.00 | 660.40 | 1591.60 |
| 24-May-99 | 82.26 | 2219.00 | 661.66 | 1557.34 |
| 25-May-99 | 82.78 | 2345.00 | 662.89 | 1682.11 |
| 26-May-99 | 82.54 | 2315.00 | 664.09 | 1650.91 |
| 27-May-99 | 81.50 | 2089.00 | 665.25 | 1423.75 |
| 28-May-99 | 80.36 | 2112.00 | 666.37 | 1445.63 |
| 29-May-99 | 79.70 | 2265.00 | 667.45 | 1597.55 |
| 30-May-99 | 83.79 | 2483.00 | 668.50 | 1814.50 |
| 31-May-99 | 85.46 | 2161.00 | 669.51 | 1491.49 |
| 1-Jun-99 | 85.45 | 1960.00 | 666.34 | 1293.66 |
| 2-Jun-99 | 77.62 | 2186.00 | 667.28 | 1518.72 |
| 3-Jun-99 | 80.87 | 2202.00 | 668.18 | 1533.82 |
| 4-Jun-99 | 82.23 | 2193.00 | 669.05 | 1523.95 |
| 5-Jun-99 | 82.66 | 2240.00 | 669.88 | 1570.12 |
| 6-Jun-99 | 82.08 | 2246.00 | 670.67 | 1575.33 |
| 7-Jun-99 | 83.70 | 2277.00 | 671.43 | 1605.57 |
| 8-Jun-99 | 84.56 | 2303.00 | 672.15 | 1630.85 |
| 9-Jun-99 | 81.78 | 2287.00 | 672.83 | 1614.17 |
| 10-Jun-99 | 81.72 | 2355.00 | 673.48 | 1681.52 |
| 11-Jun-99 | 80.31 | 2204.00 | 674.09 | 1529.91 |
| 12-Jun-99 | 81.90 | 2213.00 | 674.67 | 1538.33 |
| 13-Jun-99 | 82.73 | 2222.00 | 675.20 | 1546.80 |
| 14-Jun-99 | 83.49 | 2264.00 | 675.71 | 1588.29 |
| 15-Jun-99 | 82.79 | 2155.00 | 676.17 | 1478.83 |
| 16-Jun-99 | 82.40 | 2169.00 | 676.60 | 1492.40 |
| 17-Jun-99 | 81.58 | 2191.00 | 676.99 | 1514.01 |
| 18-Jun-99 | 82.06 | 2257.00 | 677.35 | 1579.65 |
| 19-Jun-99 | 82.04 | 2351.00 | 677.67 | 1673.33 |
| 20-Jun-99 | 81.90 | 2365.00 | 677.96 | 1687.04 |
| 21-Jun-99 | 82.21 | 2240.00 | 678.21 | 1561.79 |
| 22-Jun-99 | 81.04 | 1997.00 | 678.42 | 1318.58 |
| 23-Jun-99 | 80.69 | 2262.00 | 678.59 | 1583.41 |
| 24-Jun-99 | 79.60 | 2339.00 | 678.73 | 1660.27 |
| 25-Jun-99 | 76.42 | 2358.00 | 678.84 | 1679.16 |
| 26-Jun-99 | 79.38 | 2428.00 | 678.90 | 1749.10 |
| 27-Jun-99 | 79.95 | 2449.00 | 678.93 | 1770.07 |
| 28-Jun-99 | 80.59 | 2400.00 | 678.93 | 1721.07 |
| 29-Jun-99 | 81.60 | 2407.00 | 678.89 | 1728.11 |
| 30-Jun-99 | 79.99 | 2347.00 | 678.81 | 1668.19 |
| 1-Jul-99 | 78.53 | 2030.00 | 677.53 | 1352.47 |
| 2-Jul-99 | 79.77 | 2296.00 | 677.38 | 1618.62 |

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|---|---|---|---|---|
| 3-Jul-99 | 80.74 | 2081.00 | 677.19 | 1403.81 |
| 4-Jul-99 | 81.54 | 2039.00 | 676.97 | 1362.03 |
| 5-Jul-99 | 82.00 | 2028.00 | 676.71 | 1351.29 |
| 6-Jul-99 | 80.55 | 1942.00 | 676.42 | 1265.58 |
| 7-Jul-99 | 80.35 | 2296.00 | 676.09 | 1619.91 |
| 8-Jul-99 | 82.66 | 2377.00 | 675.72 | 1701.28 |
| 9-Jul-99 | 80.95 | 2337.00 | 675.32 | 1661.68 |
| 10-Jul-99 | 79.96 | 2081.00 | 674.88 | 1406.12 |
| 11-Jul-99 | 77.97 | 2316.00 | 674.41 | 1641.59 |
| 12-Jul-99 | 79.57 | 2358.00 | 673.90 | 1684.10 |
| 13-Jul-99 | 79.87 | 2292.00 | 673.35 | 1618.65 |
| 14-Jul-99 | 81.02 | 2289.00 | 672.77 | 1616.23 |
| 15-Jul-99 | 82.59 | 2266.00 | 672.15 | 1593.85 |
| 16-Jul-99 | 82.85 | 2293.00 | 671.49 | 1621.51 |
| 17-Jul-99 | 82.54 | 2327.00 | 670.80 | 1656.20 |
| 18-Jul-99 | 81.02 | 2370.00 | 670.08 | 1699.92 |
| 19-Jul-99 | 80.52 | 2313.00 | 669.32 | 1643.68 |
| 20-Jul-99 | 79.38 | 2369.00 | 668.52 | 1700.48 |
| 21-Jul-99 | 80.39 | 2428.00 | 667.68 | 1760.32 |
| 22-Jul-99 | 81.43 | 2391.00 | 666.81 | 1724.19 |
| 23-Jul-99 | 81.63 | 2427.00 | 665.91 | 1761.09 |
| 24-Jul-99 | 82.43 | 2392.00 | 664.97 | 1727.03 |
| 25-Jul-99 | 83.57 | 2331.00 | 663.99 | 1667.01 |
| 26-Jul-99 | 82.51 | 2387.00 | 662.97 | 1724.03 |
| 27-Jul-99 | 81.72 | 2428.00 | 661.92 | 1766.08 |
| 28-Jul-99 | 81.33 | 2311.00 | 660.84 | 1650.16 |
| 29-Jul-99 | 82.19 | 2300.00 | 659.72 | 1640.28 |
| 30-Jul-99 | 81.39 | 2142.00 | 658.56 | 1483.44 |
| 31-Jul-99 | 84.69 | 1911.00 | 657.37 | 1253.63 |
| 1-Aug-99 | 83.25 | 2178.00 | 654.73 | 1523.27 |
| 2-Aug-99 | 81.12 | 2313.00 | 653.47 | 1659.53 |
| 3-Aug-99 | 80.93 | 2347.00 | 652.16 | 1694.84 |
| 4-Aug-99 | 81.82 | 2277.00 | 650.83 | 1626.17 |
| 5-Aug-99 | 82.34 | 2408.00 | 649.46 | 1758.54 |
| 6-Aug-99 | 81.20 | 2443.00 | 648.05 | 1794.95 |
| 7-Aug-99 | 81.35 | 2551.00 | 646.61 | 1904.39 |
| 8-Aug-99 | 81.15 | 2531.00 | 645.14 | 1885.86 |
| 9-Aug-99 | 80.90 | 2580.00 | 643.63 | 1936.37 |
| 10-Aug-99 | 81.57 | 2539.00 | 642.09 | 1896.91 |
| 11-Aug-99 | 81.94 | 2539.00 | 640.51 | 1898.49 |
| 12-Aug-99 | 81.06 | 2535.00 | 638.91 | 1896.09 |
| 13-Aug-99 | 80.00 | 2431.00 | 637.27 | 1793.73 |
| 14-Aug-99 | 78.91 | 2496.00 | 635.60 | 1860.40 |
| 15-Aug-99 | 78.40 | 2485.00 | 633.90 | 1851.10 |
| 16-Aug-99 | 80.57 | 2568.00 | 632.18 | 1935.82 |
| 17-Aug-99 | 81.27 | 2551.00 | 630.42 | 1920.58 |
| 18-Aug-99 | 81.01 | 2440.00 | 628.63 | 1811.37 |
| 19-Aug-99 | 81.08 | 2516.00 | 626.82 | 1889.18 |
| 20-Aug-99 | 81.68 | 2432.00 | 624.99 | 1807.01 |
| 21-Aug-99 | 81.57 | 2903.00 | 623.12 | 2279.88 |
| 22-Aug-99 | 81.88 | 2430.00 | 621.23 | 1808.77 |
| 23-Aug-99 | 82.58 | 2159.00 | 619.32 | 1539.68 |
| 24-Aug-99 | 82.48 | 2374.00 | 617.38 | 1756.62 |
| 25-Aug-99 | 80.69 | 2389.00 | 615.42 | 1773.58 |
| 26-Aug-99 | 80.97 | 2485.00 | 613.43 | 1871.57 |
| 27-Aug-99 | 79.57 | 2489.00 | 611.43 | 1877.57 |

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|---|---|---|---|---|
| 28-Aug-99 | 79.88 | 2517.00 | 609.40 | 1907.60 |
| 29-Aug-99 | 80.12 | 2474.00 | 607.35 | 1866.65 |
| 30-Aug-99 | 79.90 | 2261.00 | 605.29 | 1655.71 |
| 31-Aug-99 | 80.42 | 2404.00 | 603.20 | 1800.80 |
| 1-Sep-99 | 80.94 | 2497.00 | 608.50 | 1888.50 |
| 2-Sep-99 | 81.01 | 2489.00 | 606.38 | 1882.62 |
| 3-Sep-99 | 80.96 | 2490.00 | 604.24 | 1885.76 |
| 4-Sep-99 | 81.45 | 2399.00 | 602.08 | 1796.92 |
| 5-Sep-99 | 82.31 | 2454.00 | 599.90 | 1854.10 |
| 6-Sep-99 | 81.72 | 2474.00 | 597.71 | 1876.29 |
| 7-Sep-99 | 80.73 | 2412.00 | 595.51 | 1816.49 |
| 8-Sep-99 | 81.21 | 2476.00 | 593.29 | 1882.71 |
| 9-Sep-99 | 80.68 | 2517.00 | 591.06 | 1925.94 |
| 10-Sep-99 | 79.96 | 2519.00 | 588.82 | 1930.18 |
| 11-Sep-99 | 78.68 | 2617.00 | 586.56 | 2030.44 |
| 12-Sep-99 | 78.51 | 2561.00 | 584.29 | 1976.71 |
| 13-Sep-99 | 80.27 | 2476.00 | 582.01 | 1893.99 |
| 14-Sep-99 | 79.66 | 2460.00 | 579.73 | 1880.27 |
| 15-Sep-99 | 81.24 | 2495.00 | 577.43 | 1917.57 |
| 16-Sep-99 | 81.38 | 2496.00 | 575.12 | 1920.88 |
| 17-Sep-99 | 82.06 | 2457.00 | 572.81 | 1884.19 |
| 18-Sep-99 | 80.01 | 2483.00 | 570.49 | 1912.51 |
| 19-Sep-99 | 80.82 | 2464.00 | 568.16 | 1895.84 |
| 20-Sep-99 | 80.29 | 2341.00 | 565.82 | 1775.18 |
| 21-Sep-99 | 78.93 | 2481.00 | 563.48 | 1917.52 |
| 22-Sep-99 | 77.52 | 2804.00 | 561.14 | 2242.86 |
| 23-Sep-99 | 78.39 | 2412.00 | 558.79 | 1853.21 |
| 24-Sep-99 | 79.97 | 2445.00 | 556.44 | 1888.56 |
| 25-Sep-99 | 80.56 | 2475.00 | 554.08 | 1920.92 |
| 26-Sep-99 | 79.79 | 2501.00 | 551.72 | 1949.28 |
| 27-Sep-99 | 80.49 | 2321.00 | 549.37 | 1771.63 |
| 28-Sep-99 | 79.97 | 2296.00 | 547.01 | 1748.99 |
| 29-Sep-99 | 81.49 | 2844.00 | 544.65 | 2299.35 |
| 30-Sep-99 | 80.88 | 2533.00 | 542.29 | 1990.71 |
| 1-Oct-99 | 78.48 | 2481.00 | 540.78 | 1940.22 |
| 2-Oct-99 | 79.60 | 2634.00 | 538.43 | 2095.57 |
| 3-Oct-99 | 80.62 | 2576.00 | 536.07 | 2039.93 |
| 4-Oct-99 | 80.56 | 2461.00 | 533.72 | 1927.28 |
| 5-Oct-99 | 79.28 | 2390.00 | 531.38 | 1858.62 |
| 6-Oct-99 | 77.69 | 2196.00 | 529.04 | 1666.96 |
| 7-Oct-99 | 80.32 | 2143.00 | 526.70 | 1616.30 |
| 8-Oct-99 | 81.27 | 2285.00 | 524.37 | 1760.63 |
| 9-Oct-99 | 81.07 | 2263.00 | 522.05 | 1740.95 |
| 10-Oct-99 | 79.29 | 2142.00 | 519.73 | 1622.27 |
| 11-Oct-99 | 79.27 | 2064.00 | 517.42 | 1546.58 |
| 12-Oct-99 | 81.04 | 2291.00 | 515.12 | 1775.88 |
| 13-Oct-99 | 80.23 | 2265.00 | 512.83 | 1752.17 |
| 14-Oct-99 | 77.59 | 2299.00 | 510.55 | 1788.45 |
| 15-Oct-99 | 79.19 | 2333.00 | 508.28 | 1824.72 |
| 16-Oct-99 | 79.09 | 2255.00 | 506.02 | 1748.98 |
| 17-Oct-99 | 78.50 | 2287.00 | 503.78 | 1783.22 |
| 18-Oct-99 | 76.05 | 2308.00 | 501.54 | 1806.46 |
| 19-Oct-99 | 78.54 | 2324.00 | 499.32 | 1824.68 |
| 20-Oct-99 | 77.87 | 2302.00 | 497.11 | 1804.89 |
| 21-Oct-99 | 77.91 | 2290.00 | 494.92 | 1795.08 |
| 22-Oct-99 | 78.70 | 2303.00 | 492.74 | 1810.26 |

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|---|---|---|---|---|
| 23-Oct-99 | 79.63 | 2363.00 | 490.58 | 1872.42 |
| 24-Oct-99 | 79.60 | 2408.00 | 488.44 | 1919.56 |
| 25-Oct-99 | 78.36 | 2332.00 | 486.31 | 1845.69 |
| 26-Oct-99 | 78.05 | 2469.00 | 484.20 | 1984.80 |
| 27-Oct-99 | 78.81 | 2503.00 | 482.11 | 2020.89 |
| 28-Oct-99 | 79.23 | 2461.00 | 480.03 | 1980.97 |
| 29-Oct-99 | 78.74 | 2365.00 | 477.98 | 1887.02 |
| 30-Oct-99 | 78.48 | 2451.00 | 475.95 | 1975.05 |
| 31-Oct-99 | 79.32 | 2587.00 | 473.94 | 2113.06 |
| 1-Nov-99 | 79.48 | 2583.00 | 472.47 | 2110.53 |
| 2-Nov-99 | 76.62 | 2437.00 | 470.50 | 1966.50 |
| 3-Nov-99 | 77.20 | 2422.00 | 468.56 | 1953.44 |
| 4-Nov-99 | 77.01 | 2457.00 | 466.64 | 1990.36 |
| 5-Nov-99 | 76.45 | 2283.00 | 464.75 | 1818.25 |
| 6-Nov-99 | 75.40 | 2271.00 | 462.88 | 1808.12 |
| 7-Nov-99 | 74.27 | 2275.00 | 461.03 | 1813.97 |
| 8-Nov-99 | 74.75 | 2368.00 | 459.22 | 1908.78 |
| 9-Nov-99 | 73.91 | 2490.00 | 457.43 | 2032.57 |
| 10-Nov-99 | 73.92 | 2549.00 | 455.66 | 2093.34 |
| 11-Nov-99 | 71.68 | 2583.00 | 453.93 | 2129.07 |
| 12-Nov-99 | 71.60 | 2399.00 | 452.22 | 1946.78 |
| 13-Nov-99 | 71.89 | 2432.00 | 450.55 | 1981.45 |
| 14-Nov-99 | 70.46 | 2419.00 | 448.91 | 1970.09 |
| 15-Nov-99 | 71.76 | 2271.00 | 447.29 | 1823.71 |
| 16-Nov-99 | 71.51 | 2281.00 | 445.71 | 1835.29 |
| 17-Nov-99 | 71.49 | 2377.00 | 444.16 | 1932.84 |
| 18-Nov-99 | 70.71 | 2390.00 | 442.65 | 1947.35 |
| 19-Nov-99 | 71.14 | 2406.00 | 441.16 | 1964.84 |
| 20-Nov-99 | 70.78 | 2450.00 | 439.72 | 2010.28 |
| 21-Nov-99 | 68.97 | 2471.00 | 438.30 | 2032.70 |
| 22-Nov-99 | 68.77 | 2518.00 | 436.93 | 2081.07 |
| 23-Nov-99 | 68.81 | 2485.00 | 435.59 | 2049.41 |
| 24-Nov-99 | 67.82 | 2267.00 | 434.29 | 1832.71 |
| 25-Nov-99 | 68.07 | 2379.00 | 433.02 | 1945.98 |
| 26-Nov-99 | 68.60 | 2139.00 | 431.79 | 1707.21 |
| 27-Nov-99 | 68.88 | 2238.00 | 430.61 | 1807.39 |
| 28-Nov-99 | 68.04 | 2358.00 | 429.46 | 1928.54 |
| 29-Nov-99 | 67.69 | 2344.00 | 428.35 | 1915.65 |
| 30-Nov-99 | 68.34 | 2311.00 | 427.29 | 1883.71 |
| 1-Dec-99 | 68.25 | 2280.00 | 417.05 | 1862.95 |
| 2-Dec-99 | 68.06 | 2304.00 | 416.07 | 1887.93 |
| 3-Dec-99 | 67.91 | 2357.00 | 415.13 | 1941.87 |
| 4-Dec-99 | 66.13 | 2453.00 | 414.24 | 2038.76 |
| 5-Dec-99 | 68.21 | 2356.00 | 413.38 | 1942.62 |
| 6-Dec-99 | 67.18 | 2406.00 | 412.58 | 1993.42 |
| 7-Dec-99 | 66.85 | 2293.00 | 411.82 | 1881.18 |
| 8-Dec-99 | 68.30 | 2538.00 | 411.11 | 2126.89 |
| 9-Dec-99 | 70.96 | 2396.00 | 410.44 | 1985.56 |
| 10-Dec-99 | 71.13 | 2320.00 | 409.82 | 1910.18 |
| 11-Dec-99 | 71.46 | 2357.00 | 409.25 | 1947.75 |
| 12-Dec-99 | 71.01 | 2358.00 | 408.73 | 1949.27 |
| 13-Dec-99 | 70.68 | 2375.00 | 408.26 | 1966.74 |
| 14-Dec-99 | 68.72 | 2406.00 | 407.84 | 1998.16 |
| 15-Dec-99 | 65.24 | 2203.00 | 407.47 | 1795.53 |
| 16-Dec-99 | 65.54 | 2205.00 | 407.14 | 1797.86 |
| 17-Dec-99 | 67.32 | 2212.00 | 406.87 | 1805.13 |

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|---|---|---|---|---|
| 18-Dec-99 | 67.72 | 2422.00 | 406.64 | 2015.36 |
| 19-Dec-99 | 67.85 | 2426.00 | 406.46 | 2019.54 |
| 20-Dec-99 | 66.92 | 2454.00 | 406.33 | 2047.67 |
| 21-Dec-99 | 65.37 | 2469.00 | 406.24 | 2062.76 |
| 22-Dec-99 | 65.58 | 2469.00 | 406.21 | 2062.79 |
| 23-Dec-99 | 65.06 | 2497.00 | 406.21 | 2090.79 |
| 24-Dec-99 | 65.95 | 2417.00 | 406.26 | 2010.74 |
| 25-Dec-99 | 65.94 | 2394.00 | 406.36 | 1987.64 |
| 26-Dec-99 | 65.21 | 2506.00 | 406.50 | 2099.50 |
| 27-Dec-99 | 65.29 | 2522.00 | 406.69 | 2115.31 |
| 28-Dec-99 | 65.44 | 2480.00 | 406.91 | 2073.09 |
| 29-Dec-99 | 65.15 | 2484.00 | 407.18 | 2076.82 |
| 30-Dec-99 | 64.18 | 2440.00 | 407.50 | 2032.50 |
| 31-Dec-99 | 63.39 | 2375.00 | 407.85 | 1967.15 |

Table A9: Weather and Load Information of the Year 1998

| Date | THI (Avg) | PL (MW) | Lw (MW) | NWL (MW) |
|---|---|---|---|---|
| 1-Jan-98 | 63.85 | 1600.00 | 402.90 | 1197.10 |
| 2-Jan-98 | 60.67 | 1605.00 | 402.00 | 1203.00 |
| 3-Jan-98 | 61.31 | 1680.00 | 401.15 | 1278.85 |
| 4-Jan-98 | 55.91 | 1680.00 | 400.36 | 1279.64 |
| 5-Jan-98 | 57.97 | 1708.00 | 399.62 | 1308.38 |
| 6-Jan-98 | 56.71 | 1700.00 | 398.94 | 1301.06 |
| 7-Jan-98 | 55.84 | 1705.00 | 398.30 | 1306.70 |
| 8-Jan-98 | 56.88 | 1685.00 | 397.73 | 1287.27 |
| 9-Jan-98 | 58.21 | 1763.00 | 397.20 | 1365.80 |
| 10-Jan-98 | 55.62 | 1794.00 | 396.73 | 1397.27 |
| 11-Jan-98 | 56.44 | 1799.00 | 396.32 | 1402.68 |
| 12-Jan-98 | 58.71 | 1609.00 | 395.97 | 1213.03 |
| 13-Jan-98 | 64.42 | 1641.00 | 395.67 | 1245.33 |
| 14-Jan-98 | 63.87 | 1763.00 | 395.43 | 1367.57 |
| 15-Jan-98 | 61.98 | 1737.00 | 395.25 | 1341.75 |
| 16-Jan-98 | 65.75 | 1667.00 | 395.12 | 1271.88 |
| 17-Jan-98 | 66.26 | 1668.00 | 395.06 | 1272.94 |
| 18-Jan-98 | 65.36 | 1774.00 | 395.05 | 1378.95 |
| 19-Jan-98 | 63.23 | 1693.00 | 395.11 | 1297.89 |
| 20-Jan-98 | 62.89 | 1738.00 | 395.22 | 1342.78 |
| 21-Jan-98 | 57.71 | 1753.00 | 395.40 | 1357.60 |
| 22-Jan-98 | 60.45 | 1795.00 | 395.64 | 1399.36 |
| 23-Jan-98 | 60.45 | 1798.00 | 395.94 | 1402.06 |
| 24-Jan-98 | 61.72 | 1788.00 | 396.31 | 1391.69 |
| 25-Jan-98 | 64.21 | 1717.00 | 396.74 | 1320.26 |
| 26-Jan-98 | 65.69 | 1879.00 | 397.23 | 1481.77 |
| 27-Jan-98 | 65.47 | 1868.00 | 397.79 | 1470.21 |
| 28-Jan-98 | 65.82 | 1886.00 | 398.41 | 1487.59 |
| 29-Jan-98 | 65.19 | 1852.00 | 399.09 | 1452.91 |
| 30-Jan-98 | 66.20 | 1747.00 | 399.83 | 1347.17 |
| 31-Jan-98 | 65.35 | 1789.00 | 400.63 | 1388.37 |
| 1-Feb-98 | 66.40 | 1900.00 | 404.45 | 1495.55 |
| 2-Feb-98 | 66.38 | 1869.00 | 405.37 | 1463.63 |
| 3-Feb-98 | 67.39 | 1991.00 | 406.35 | 1584.65 |
| 4-Feb-98 | 67.05 | 2097.00 | 407.38 | 1689.62 |
| 5-Feb-98 | 63.40 | 2124.00 | 408.48 | 1715.52 |

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|---|---|---|---|---|
| 6-Feb-98 | 62.70 | 2034.00 | 409.62 | 1624.38 |
| 7-Feb-98 | 61.70 | 2059.00 | 410.83 | 1648.17 |
| 8-Feb-98 | 62.95 | 2105.00 | 412.08 | 1692.92 |
| 9-Feb-98 | 63.19 | 2004.00 | 413.39 | 1590.61 |
| 10-Feb-98 | 64.43 | 2006.00 | 414.75 | 1591.25 |
| 11-Feb-98 | 65.43 | 1848.00 | 416.16 | 1431.84 |
| 12-Feb-98 | 65.86 | 1847.00 | 417.62 | 1429.38 |
| 13-Feb-98 | 66.46 | 1812.00 | 419.13 | 1392.87 |
| 14-Feb-98 | 67.07 | 1817.00 | 420.69 | 1396.31 |
| 15-Feb-98 | 69.29 | 1775.00 | 422.30 | 1352.70 |
| 16-Feb-98 | 72.45 | 1754.00 | 423.95 | 1330.05 |
| 17-Feb-98 | 73.63 | 1731.00 | 425.65 | 1305.35 |
| 18-Feb-98 | 72.02 | 1796.00 | 427.39 | 1368.61 |
| 19-Feb-98 | 72.27 | 1789.00 | 429.18 | 1359.82 |
| 20-Feb-98 | 70.15 | 1720.00 | 431.01 | 1288.99 |
| 21-Feb-98 | 68.54 | 1875.00 | 432.89 | 1442.11 |
| 22-Feb-98 | 68.30 | 1906.00 | 434.80 | 1471.20 |
| 23-Feb-98 | 70.83 | 1911.00 | 436.76 | 1474.24 |
| 24-Feb-98 | 72.53 | 1851.00 | 438.75 | 1412.25 |
| 25-Feb-98 | 72.74 | 1814.00 | 440.78 | 1373.22 |
| 26-Feb-98 | 73.42 | 1903.00 | 442.86 | 1460.14 |
| 27-Feb-98 | 71.07 | 1878.00 | 444.96 | 1433.04 |
| 28-Feb-98 | 69.20 | 1887.00 | 447.11 | 1439.89 |
| 1-Mar-98 | 68.11 | 1895.00 | 453.73 | 1441.27 |
| 2-Mar-98 | 66.37 | 1888.00 | 455.94 | 1432.06 |
| 3-Mar-98 | 67.28 | 1827.00 | 458.19 | 1368.81 |
| 4-Mar-98 | 69.07 | 1881.00 | 460.47 | 1420.53 |
| 5-Mar-98 | 71.33 | 1951.00 | 462.79 | 1488.21 |
| 6-Mar-98 | 72.88 | 1778.00 | 465.13 | 1312.87 |
| 7-Mar-98 | 70.87 | 1718.00 | 467.51 | 1250.49 |
| 8-Mar-98 | 65.89 | 1926.00 | 469.91 | 1456.09 |
| 9-Mar-98 | 67.37 | 1897.00 | 472.34 | 1424.66 |
| 10-Mar-98 | 69.66 | 2081.00 | 474.80 | 1606.20 |
| 11-Mar-98 | 75.52 | 1927.00 | 477.29 | 1449.71 |
| 12-Mar-98 | 73.86 | 1803.00 | 479.80 | 1323.20 |
| 13-Mar-98 | 73.14 | 1882.00 | 482.34 | 1399.66 |
| 14-Mar-98 | 74.11 | 1876.00 | 484.89 | 1391.11 |
| 15-Mar-98 | 69.96 | 1851.00 | 487.47 | 1363.53 |
| 16-Mar-98 | 69.83 | 1822.00 | 490.07 | 1331.93 |
| 17-Mar-98 | 71.13 | 1883.00 | 492.69 | 1390.31 |
| 18-Mar-98 | 72.97 | 1792.00 | 495.32 | 1296.68 |
| 19-Mar-98 | 73.45 | 1670.00 | 497.97 | 1172.03 |
| 20-Mar-98 | 74.21 | 1747.00 | 500.63 | 1246.37 |
| 21-Mar-98 | 76.23 | 1822.00 | 503.31 | 1318.69 |
| 22-Mar-98 | 79.61 | 1841.00 | 505.99 | 1335.01 |
| 23-Mar-98 | 72.91 | 1754.00 | 508.69 | 1245.31 |
| 24-Mar-98 | 68.74 | 1754.00 | 511.40 | 1242.60 |
| 25-Mar-98 | 73.31 | 1772.00 | 514.11 | 1257.89 |
| 26-Mar-98 | 71.11 | 1808.00 | 516.83 | 1291.17 |
| 27-Mar-98 | 71.94 | 1783.00 | 519.55 | 1263.45 |
| 28-Mar-98 | 72.88 | 1759.00 | 522.28 | 1236.72 |
| 29-Mar-98 | 74.38 | 1768.00 | 525.01 | 1242.99 |
| 30-Mar-98 | 69.54 | 1814.00 | 527.74 | 1286.26 |
| 31-Mar-98 | 69.56 | 1819.00 | 530.47 | 1288.53 |
| 1-Apr-98 | 72.23 | 1852.00 | 531.54 | 1320.46 |
| 2-Apr-98 | 73.55 | 1881.00 | 534.26 | 1346.74 |

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| 3-Apr-98 | 74.63 | 1875.00 | 536.98 | 1338.02 |
| 4-Apr-98 | 76.86 | 1873.00 | 539.70 | 1333.30 |
| 5-Apr-98 | 77.63 | 1916.00 | 542.40 | 1373.60 |
| 6-Apr-98 | 75.55 | 1916.00 | 545.10 | 1370.90 |
| 7-Apr-98 | 75.54 | 1917.00 | 547.79 | 1369.21 |
| 8-Apr-98 | 76.10 | 1994.00 | 550.46 | 1443.54 |
| 9-Apr-98 | 76.77 | 1863.00 | 553.13 | 1309.87 |
| 10-Apr-98 | 79.20 | 1892.00 | 555.78 | 1336.22 |
| 11-Apr-98 | 81.82 | 1914.00 | 558.41 | 1355.59 |
| 12-Apr-98 | 82.84 | 1921.00 | 561.03 | 1359.97 |
| 13-Apr-98 | 82.03 | 1872.00 | 563.62 | 1308.38 |
| 14-Apr-98 | 82.24 | 1844.00 | 566.20 | 1277.80 |
| 15-Apr-98 | 81.64 | 1911.00 | 568.76 | 1342.24 |
| 16-Apr-98 | 78.41 | 1858.00 | 571.29 | 1286.71 |
| 17-Apr-98 | 75.12 | 1818.00 | 573.79 | 1244.21 |
| 18-Apr-98 | 78.31 | 1809.00 | 576.27 | 1232.73 |
| 19-Apr-98 | 77.39 | 1887.00 | 578.73 | 1308.27 |
| 20-Apr-98 | 75.63 | 1949.00 | 581.16 | 1367.84 |
| 21-Apr-98 | 76.79 | 1722.00 | 583.56 | 1138.44 |
| 22-Apr-98 | 75.94 | 1710.00 | 585.94 | 1124.06 |
| 23-Apr-98 | 71.85 | 1688.00 | 588.28 | 1099.72 |
| 24-Apr-98 | 74.63 | 1780.00 | 590.60 | 1189.40 |
| 25-Apr-98 | 79.00 | 1646.00 | 592.89 | 1053.11 |
| 26-Apr-98 | 79.32 | 1745.00 | 595.15 | 1149.85 |
| 27-Apr-98 | 79.95 | 1781.00 | 597.38 | 1183.62 |
| 28-Apr-98 | 79.58 | 1781.00 | 599.57 | 1181.43 |
| 29-Apr-98 | 80.16 | 1777.00 | 601.74 | 1175.26 |
| 30-Apr-98 | 82.29 | 1747.00 | 603.87 | 1143.13 |
| 1-May-98 | 81.17 | 1875.00 | 606.31 | 1268.69 |
| 2-May-98 | 75.05 | 1858.00 | 608.38 | 1249.62 |
| 3-May-98 | 75.20 | 1825.00 | 610.41 | 1214.59 |
| 4-May-98 | 79.89 | 1782.00 | 612.40 | 1169.60 |
| 5-May-98 | 73.53 | 1907.00 | 614.37 | 1292.63 |
| 6-May-98 | 78.36 | 1862.00 | 616.29 | 1245.71 |
| 7-May-98 | 80.60 | 1780.00 | 618.18 | 1161.82 |
| 8-May-98 | 81.37 | 1791.00 | 620.03 | 1170.97 |
| 9-May-98 | 83.29 | 1792.00 | 621.85 | 1170.15 |
| 10-May-98 | 80.06 | 2199.00 | 623.63 | 1575.37 |
| 11-May-98 | 78.48 | 1861.00 | 625.37 | 1235.63 |
| 12-May-98 | 80.38 | 1822.00 | 627.07 | 1194.93 |
| 13-May-98 | 81.96 | 1818.00 | 628.74 | 1189.26 |
| 14-May-98 | 82.50 | 1806.00 | 630.37 | 1175.63 |
| 15-May-98 | 82.63 | 1696.00 | 631.97 | 1064.03 |
| 16-May-98 | 79.15 | 1704.00 | 633.53 | 1070.47 |
| 17-May-98 | 81.32 | 1592.00 | 635.05 | 956.95 |
| 18-May-98 | 82.74 | 1710.00 | 636.54 | 1073.46 |
| 19-May-98 | 83.02 | 1755.00 | 637.99 | 1117.01 |
| 20-May-98 | 83.08 | 1678.00 | 639.40 | 1038.60 |
| 21-May-98 | 86.30 | 1760.00 | 640.78 | 1119.22 |
| 22-May-98 | 85.33 | 1701.00 | 642.12 | 1058.88 |
| 23-May-98 | 85.06 | 1694.00 | 643.42 | 1050.58 |
| 24-May-98 | 81.72 | 1749.00 | 644.68 | 1104.32 |
| 25-May-98 | 80.43 | 1771.00 | 645.91 | 1125.09 |
| 26-May-98 | 76.38 | 1701.00 | 647.11 | 1053.89 |
| 27-May-98 | 75.89 | 1725.00 | 648.27 | 1076.73 |
| 28-May-98 | 76.30 | 1731.00 | 649.39 | 1081.61 |

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| 29-May-98 | 83.07 | 1754.00 | 650.47 | 1103.53 |
| 30-May-98 | 83.31 | 1772.00 | 651.52 | 1120.48 |
| 31-May-98 | 85.49 | 1717.00 | 652.53 | 1064.47 |
| 1-Jun-98 | 86.20 | 1638.00 | 649.36 | 988.64 |
| 2-Jun-98 | 85.73 | 1591.00 | 650.30 | 940.70 |
| 3-Jun-98 | 79.54 | 1718.00 | 651.20 | 1066.80 |
| 4-Jun-98 | 85.17 | 1870.00 | 652.07 | 1217.93 |
| 5-Jun-98 | 85.77 | 1632.00 | 652.90 | 979.10 |
| 6-Jun-98 | 85.86 | 1673.00 | 653.69 | 1019.31 |
| 7-Jun-98 | 85.37 | 1722.00 | 654.45 | 1067.55 |
| 8-Jun-98 | 86.29 | 1737.00 | 655.17 | 1081.83 |
| 9-Jun-98 | 85.69 | 1592.00 | 655.85 | 936.15 |
| 10-Jun-98 | 83.03 | 1813.00 | 656.50 | 1156.50 |
| 11-Jun-98 | 83.93 | 1858.00 | 657.11 | 1200.89 |
| 12-Jun-98 | 84.19 | 1850.00 | 657.69 | 1192.31 |
| 13-Jun-98 | 84.12 | 1843.00 | 658.22 | 1184.78 |
| 14-Jun-98 | 83.66 | 1855.00 | 658.73 | 1196.27 |
| 15-Jun-98 | 84.28 | 1942.00 | 659.19 | 1282.81 |
| 16-Jun-98 | 83.55 | 1967.00 | 659.62 | 1307.38 |
| 17-Jun-98 | 84.06 | 1943.00 | 660.01 | 1282.99 |
| 18-Jun-98 | 84.42 | 1794.00 | 660.37 | 1133.63 |
| 19-Jun-98 | 84.82 | 2080.00 | 660.69 | 1419.31 |
| 20-Jun-98 | 84.08 | 1993.00 | 660.98 | 1332.02 |
| 21-Jun-98 | 82.60 | 1740.00 | 661.23 | 1078.77 |
| 22-Jun-98 | 83.57 | 1917.00 | 661.44 | 1255.56 |
| 23-Jun-98 | 83.07 | 1942.00 | 661.61 | 1280.39 |
| 24-Jun-98 | 83.15 | 1933.00 | 661.75 | 1271.25 |
| 25-Jun-98 | 81.82 | 1908.00 | 661.86 | 1246.14 |
| 26-Jun-98 | 82.77 | 1899.00 | 661.92 | 1237.08 |
| 27-Jun-98 | 83.15 | 2098.00 | 661.95 | 1436.05 |
| 28-Jun-98 | 82.71 | 2018.00 | 661.95 | 1356.05 |
| 29-Jun-98 | 83.06 | 2033.00 | 661.91 | 1371.09 |
| 30-Jun-98 | 83.46 | 2101.00 | 661.83 | 1439.17 |
| 1-Jul-98 | 83.33 | 1946.00 | 660.55 | 1285.45 |
| 2-Jul-98 | 82.94 | 1961.00 | 660.40 | 1300.60 |
| 3-Jul-98 | 82.56 | 1988.00 | 660.21 | 1327.79 |
| 4-Jul-98 | 81.69 | 2203.00 | 659.99 | 1543.01 |
| 5-Jul-98 | 81.21 | 2158.00 | 659.73 | 1498.27 |
| 6-Jul-98 | 81.29 | 2178.00 | 659.44 | 1518.56 |
| 7-Jul-98 | 81.87 | 2167.00 | 659.11 | 1507.89 |
| 8-Jul-98 | 81.75 | 2172.00 | 658.74 | 1513.26 |
| 9-Jul-98 | 82.02 | 2106.00 | 658.34 | 1447.66 |
| 10-Jul-98 | 82.59 | 2163.00 | 657.90 | 1505.10 |
| 11-Jul-98 | 81.34 | 1758.00 | 657.43 | 1100.57 |
| 12-Jul-98 | 80.40 | 2040.00 | 656.92 | 1383.08 |
| 13-Jul-98 | 81.65 | 2037.00 | 656.37 | 1380.63 |
| 14-Jul-98 | 79.50 | 2095.00 | 655.79 | 1439.21 |
| 15-Jul-98 | 79.83 | 2147.00 | 655.17 | 1491.83 |
| 16-Jul-98 | 81.72 | 2067.00 | 654.51 | 1412.49 |
| 17-Jul-98 | 79.96 | 2088.00 | 653.82 | 1434.18 |
| 18-Jul-98 | 80.41 | 2032.00 | 653.10 | 1378.90 |
| 19-Jul-98 | 81.74 | 2090.00 | 652.34 | 1437.66 |
| 20-Jul-98 | 82.97 | 2165.00 | 651.54 | 1513.46 |
| 21-Jul-98 | 80.20 | 2064.00 | 650.70 | 1413.30 |
| 22-Jul-98 | 81.78 | 2126.00 | 649.83 | 1476.17 |
| 23-Jul-98 | 79.78 | 2174.00 | 648.93 | 1525.07 |

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| 24-Jul-98 | 82.05 | 2101.00 | 647.99 | 1453.01 |
| 25-Jul-98 | 83.63 | 2114.00 | 647.01 | 1466.99 |
| 26-Jul-98 | 83.72 | 2126.00 | 645.99 | 1480.01 |
| 27-Jul-98 | 83.38 | 2138.00 | 644.94 | 1493.06 |
| 28-Jul-98 | 82.47 | 2141.00 | 643.86 | 1497.14 |
| 29-Jul-98 | 82.32 | 2164.00 | 642.74 | 1521.26 |
| 30-Jul-98 | 83.23 | 2073.00 | 641.58 | 1431.42 |
| 31-Jul-98 | 83.69 | 2040.00 | 640.39 | 1399.61 |
| 1-Aug-98 | 83.62 | 2016.00 | 637.75 | 1378.25 |
| 2-Aug-98 | 82.71 | 2084.00 | 636.49 | 1447.51 |
| 3-Aug-98 | 81.29 | 2151.00 | 635.18 | 1515.82 |
| 4-Aug-98 | 81.52 | 2161.00 | 633.85 | 1527.15 |
| 5-Aug-98 | 82.67 | 1997.00 | 632.48 | 1364.52 |
| 6-Aug-98 | 82.43 | 1869.00 | 631.07 | 1237.93 |
| 7-Aug-98 | 83.10 | 1891.00 | 629.63 | 1261.37 |
| 8-Aug-98 | 83.13 | 1888.00 | 628.16 | 1259.84 |
| 9-Aug-98 | 83.37 | 1866.00 | 626.65 | 1239.35 |
| 10-Aug-98 | 82.24 | 1857.00 | 625.11 | 1231.89 |
| 11-Aug-98 | 81.40 | 1951.00 | 623.53 | 1327.47 |
| 12-Aug-98 | 82.15 | 1770.00 | 621.93 | 1148.07 |
| 13-Aug-98 | 80.03 | 1933.00 | 620.29 | 1312.71 |
| 14-Aug-98 | 80.46 | 1971.00 | 618.62 | 1352.38 |
| 15-Aug-98 | 81.15 | 1983.00 | 616.92 | 1366.08 |
| 16-Aug-98 | 82.72 | 1939.00 | 615.20 | 1323.80 |
| 17-Aug-98 | 79.48 | 1995.00 | 613.44 | 1381.56 |
| 18-Aug-98 | 80.33 | 1958.00 | 611.65 | 1346.35 |
| 19-Aug-98 | 82.25 | 1927.00 | 609.84 | 1317.16 |
| 20-Aug-98 | 82.33 | 1944.00 | 608.01 | 1335.99 |
| 21-Aug-98 | 83.63 | 1857.00 | 606.14 | 1250.86 |
| 22-Aug-98 | 82.17 | 1858.00 | 604.25 | 1253.75 |
| 23-Aug-98 | 82.28 | 1995.00 | 602.34 | 1392.66 |
| 24-Aug-98 | 82.46 | 1849.00 | 600.40 | 1248.60 |
| 25-Aug-98 | 81.19 | 2080.00 | 598.44 | 1481.56 |
| 26-Aug-98 | 80.58 | 2089.00 | 596.45 | 1492.55 |
| 27-Aug-98 | 80.47 | 2116.00 | 594.45 | 1521.55 |
| 28-Aug-98 | 82.43 | 1940.00 | 592.42 | 1347.58 |
| 29-Aug-98 | 82.23 | 2136.00 | 590.37 | 1545.63 |
| 30-Aug-98 | 81.61 | 2030.00 | 588.31 | 1441.69 |
| 31-Aug-98 | 81.52 | 2004.00 | 586.22 | 1417.78 |
| 1-Sep-98 | 82.49 | 2004.00 | 591.52 | 1412.48 |
| 2-Sep-98 | 81.96 | 2018.00 | 589.40 | 1428.60 |
| 3-Sep-98 | 82.39 | 1979.00 | 587.26 | 1391.74 |
| 4-Sep-98 | 81.29 | 1950.00 | 585.10 | 1364.90 |
| 5-Sep-98 | 81.60 | 1807.00 | 582.92 | 1224.08 |
| 6-Sep-98 | 80.35 | 1807.00 | 580.73 | 1226.27 |
| 7-Sep-98 | 80.79 | 1898.00 | 578.53 | 1319.47 |
| 8-Sep-98 | 79.64 | 1916.00 | 576.31 | 1339.69 |
| 9-Sep-98 | 78.91 | 1894.00 | 574.08 | 1319.92 |
| 10-Sep-98 | 79.75 | 1902.00 | 571.84 | 1330.16 |
| 11-Sep-98 | 79.79 | 1871.00 | 569.58 | 1301.42 |
| 12-Sep-98 | 79.90 | 1899.00 | 567.31 | 1331.69 |
| 13-Sep-98 | 80.31 | 1919.00 | 565.03 | 1353.97 |
| 14-Sep-98 | 80.27 | 1827.00 | 562.75 | 1264.25 |
| 15-Sep-98 | 81.84 | 1911.00 | 560.45 | 1350.55 |
| 16-Sep-98 | 81.71 | 1941.00 | 558.14 | 1382.86 |
| 17-Sep-98 | 81.02 | 2013.00 | 555.83 | 1457.17 |

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| 18-Sep-98 | 82.69 | 1968.00 | 553.51 | 1414.49 |
| 19-Sep-98 | 83.11 | 2031.00 | 551.18 | 1479.82 |
| 20-Sep-98 | 79.70 | 2165.00 | 548.84 | 1616.16 |
| 21-Sep-98 | 78.82 | 2128.00 | 546.50 | 1581.50 |
| 22-Sep-98 | 82.13 | 2109.00 | 544.16 | 1564.84 |
| 23-Sep-98 | 83.02 | 2121.00 | 541.81 | 1579.19 |
| 24-Sep-98 | 82.67 | 1994.00 | 539.46 | 1454.54 |
| 25-Sep-98 | 83.72 | 1894.00 | 537.10 | 1356.90 |
| 26-Sep-98 | 84.64 | 2083.00 | 534.74 | 1548.26 |
| 27-Sep-98 | 82.92 | 2076.00 | 532.39 | 1543.61 |
| 28-Sep-98 | 80.33 | 2079.00 | 530.03 | 1548.97 |
| 29-Sep-98 | 81.87 | 2097.00 | 527.67 | 1569.33 |
| 30-Sep-98 | 80.07 | 2089.00 | 525.31 | 1563.69 |
| 1-Oct-98 | 80.06 | 1951.00 | 523.80 | 1427.20 |
| 2-Oct-98 | 80.27 | 2042.00 | 521.45 | 1520.55 |
| 3-Oct-98 | 79.89 | 2037.00 | 519.09 | 1517.91 |
| 4-Oct-98 | 80.61 | 2029.00 | 516.74 | 1512.26 |
| 5-Oct-98 | 82.31 | 1987.00 | 514.40 | 1472.60 |
| 6-Oct-98 | 82.55 | 2000.00 | 512.06 | 1487.94 |
| 7-Oct-98 | 82.12 | 2210.00 | 509.72 | 1700.28 |
| 8-Oct-98 | 82.39 | 2227.00 | 507.39 | 1719.61 |
| 9-Oct-98 | 83.64 | 2147.00 | 505.07 | 1641.93 |
| 10-Oct-98 | 83.17 | 2153.00 | 502.75 | 1650.25 |
| 11-Oct-98 | 82.63 | 2204.00 | 500.44 | 1703.56 |
| 12-Oct-98 | 83.52 | 2202.00 | 498.14 | 1703.86 |
| 13-Oct-98 | 81.60 | 2174.00 | 495.85 | 1678.15 |
| 14-Oct-98 | 81.32 | 2224.00 | 493.57 | 1730.43 |
| 15-Oct-98 | 79.69 | 2261.00 | 491.30 | 1769.70 |
| 16-Oct-98 | 79.71 | 2010.00 | 489.04 | 1520.96 |
| 17-Oct-98 | 81.47 | 2059.00 | 486.80 | 1572.20 |
| 18-Oct-98 | 82.32 | 2100.00 | 484.56 | 1615.44 |
| 19-Oct-98 | 82.63 | 2112.00 | 482.34 | 1629.66 |
| 20-Oct-98 | 80.06 | 2099.00 | 480.13 | 1618.87 |
| 21-Oct-98 | 80.50 | 2219.00 | 477.94 | 1741.06 |
| 22-Oct-98 | 79.25 | 2248.00 | 475.76 | 1772.24 |
| 23-Oct-98 | 79.42 | 2222.00 | 473.60 | 1748.40 |
| 24-Oct-98 | 78.58 | 2188.00 | 471.46 | 1716.54 |
| 25-Oct-98 | 79.57 | 2199.00 | 469.33 | 1729.67 |
| 26-Oct-98 | 79.88 | 2241.00 | 467.22 | 1773.78 |
| 27-Oct-98 | 79.72 | 2265.00 | 465.13 | 1799.87 |
| 28-Oct-98 | 76.58 | 2245.00 | 463.05 | 1781.95 |
| 29-Oct-98 | 77.94 | 2237.00 | 461.00 | 1776.00 |
| 30-Oct-98 | 75.42 | 2186.00 | 458.97 | 1727.03 |
| 31-Oct-98 | 76.44 | 2287.00 | 456.96 | 1830.04 |
| 1-Nov-98 | 75.97 | 2331.00 | 455.49 | 1875.51 |
| 2-Nov-98 | 77.05 | 2100.00 | 453.52 | 1646.48 |
| 3-Nov-98 | 75.58 | 2101.00 | 451.58 | 1649.42 |
| 4-Nov-98 | 75.19 | 2079.00 | 449.66 | 1629.34 |
| 5-Nov-98 | 74.85 | 2055.00 | 447.77 | 1607.23 |
| 6-Nov-98 | 74.89- | 2029.00 | 445.90 | 1583.10 |
| 7-Nov-98 | 74.43 | 2070.00 | 444.05 | 1625.95 |
| 8-Nov-98 | 74.45 | 2065.00 | 442.24 | 1622.76 |
| 9-Nov-98 | 74.44 | 2307.00 | 440.45 | 1866.55 |
| 10-Nov-98 | 74.75 | 2259.00 | 438.68 | 1820.32 |
| 11-Nov-98 | 75.15 | 2327.00 | 436.95 | 1890.05 |
| 12-Nov-98 | 74.44 | 2323.00 | 435.24 | 1887.76 |

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| 13-Nov-98 | 73.01 | 2136.00 | 433.57 | 1702.43 |
| 14-Nov-98 | 73.94 | 2148.00 | 431.93 | 1716.07 |
| 15-Nov-98 | 73.31 | 2150.00 | 430.31 | 1719.69 |
| 16-Nov-98 | 75.97 | 2165.00 | 428.73 | 1736.27 |
| 17-Nov-98 | 77.16 | 2211.00 | 427.18 | 1783.82 |
| 18-Nov-98 | 77.80 | 2312.00 | 425.67 | 1886.33 |
| 19-Nov-98 | 77.10 | 2282.00 | 424.18 | 1857.82 |
| 20-Nov-98 | 77.44 | 2126.00 | 422.74 | 1703.26 |
| 21-Nov-98 | 78.92 | 1942.00 | 421.32 | 1520.68 |
| 22-Nov-98 | 71.94 | 1751.00 | 419.95 | 1331.05 |
| 23-Nov-98 | 73.17 | 2032.00 | 418.61 | 1613.39 |
| 24-Nov-98 | 72.08 | 2056.00 | 417.31 | 1638.69 |
| 25-Nov-98 | 72.07 | 2078.00 | 416.04 | 1661.96 |
| 26-Nov-98 | 67.82 | 2256.00 | 414.81 | 1841.19 |
| 27-Nov-98 | 69.12 | 2175.00 | 413.63 | 1761.37 |
| 28-Nov-98 | 70.54 | 2176.00 | 412.48 | 1763.52 |
| 29-Nov-98 | 71.24 | 2174.00 | 411.37 | 1762.63 |
| 30-Nov-98 | 71.16 | 2133.00 | 410.31 | 1722.69 |
| 1-Dec-98 | 70.95 | 2213.00 | 400.07 | 1812.93 |
| 2-Dec-98 | 69.30 | 2218.00 | 399.09 | 1818.91 |
| 3-Dec-98 | 69.37 | 2279.00 | 398.15 | 1880.85 |
| 4-Dec-98 | 69.57 | 2111.00 | 397.26 | 1713.74 |
| 5-Dec-98 | 68.86 | 2100.00 | 396.40 | 1703.60 |
| 6-Dec-98 | 69.38 | 2230.00 | 395.60 | 1834.40 |
| 7-Dec-98 | 69.74 | 2239.00 | 394.84 | 1844.16 |
| 8-Dec-98 | 70.04 | 2243.00 | 394.13 | 1848.87 |
| 9-Dec-98 | 69.14 | 2232.00 | 393.46 | 1838.54 |
| 10-Dec-98 | 68.86 | 2238.00 | 392.84 | 1845.16 |
| 11-Dec-98 | 68.34 | 2164.00 | 392.27 | 1771.73 |
| 12-Dec-98 | 67.37 | 2234.00 | 391.75 | 1842.25 |
| 13-Dec-98 | 68.78 | 2259.00 | 391.28 | 1867.72 |
| 14-Dec-98 | 67.52 | 2247.00 | 390.86 | 1856.14 |
| 15-Dec-98 | 66.44 | 2233.00 | 390.49 | 1842.51 |
| 16-Dec-98 | 66.63 | 2156.00 | 390.16 | 1765.84 |
| 17-Dec-98 | 65.74 | 2121.00 | 389.89 | 1731.11 |
| 18-Dec-98 | 65.39 | 2174.00 | 389.66 | 1784.34 |
| 19-Dec-98 | 65.11 | 2265.00 | 389.48 | 1875.52 |
| 20-Dec-98 | 65.76 | 2220.00 | 389.35 | 1830.65 |
| 21-Dec-98 | 64.26 | 2215.00 | 389.26 | 1825.74 |
| 22-Dec-98 | 63.56 | 2011.00 | 389.23 | 1621.77 |
| 23-Dec-98 | 63.00 | 2008.00 | 389.23 | 1618.77 |
| 24-Dec-98 | 62.87 | 2075.00 | 389.28 | 1685.72 |
| 25-Dec-98 | 63.12 | 2033.00 | 389.38 | 1643.62 |
| 26-Dec-98 | 65.90 | 2107.00 | 389.52 | 1717.48 |
| 27-Dec-98 | 66.11 | 2144.00 | 389.71 | 1754.29 |
| 28-Dec-98 | 65.24 | 2127.00 | 389.93 | 1737.07 |
| 29-Dec-98 | 63.72 | 2063.00 | 390.20 | 1672.80 |
| 30-Dec-98 | 62.23 | 2059.00 | 390.52 | 1668.48 |
| 31-Dec-98 | 61.53 | 2037.00 | 390.87 | 1646.13 |