PUBLIC SERVICE COMMISSION
of the STATE of MISSOURI

Evaluation of Kansas City Power & Light Company's System Performance and Employee Safety and Training Programs

Kansas City Power & Light Company
Case No. ES-99-581

Operations Division...Electric Department...Engineering Section

Jefferson City, Missouri
February 26, 2001

** Denotes Highly Confidential Information **

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I. EXECUTIVE SUMMARY

This report is the result of a Missouri Public Service Commission (Commission) Order in Case No. EC-99-553 where the Commission ordered its Staff to:

> ". . . investigate and report to the Commission as to whether or not the performance of Kansas City Power & Light Company's system has declined over the past decade . . ."

and

> ". . . . whether Kansas City Power & Light Company has provided adequate and appropriate training to its employees . . ."

1. KCPL Production

When evaluating the operation of any electric utility's base-load generating units, Staff determined that acceptable performance levels would be demonstrated by:

1. High net capacity factor (greater than 65%);
2. High availabilities (greater than 80%);
3. Low forced outage rates;
4. Low production costs.

When evaluating KCPL total base-load generation (nuclear and coal-fired units) and fossil base-load generation (coal-fired units), the overall system performance of base-load generation meets all of the above criteria for acceptable operation.

System wide, excluding peaking capacity, KCPL's total base-load units have average net capacity factor of **64.9%**, over the past 10 years, 1990 through 1999. In addition, average total base-load unit availability is **82.7%** in the same period and equivalent availability is **80.0%** . Also with the exception of the past two years, 1999 through 2000, when Hawthorn 5 was out of service (net capacity factor of 0%, availability of 0%, and forced outage rate of 100%), forced outages were an average of **6.5%** from 1990 through 1998. Thus, KCPL's total base-load generation performed acceptably.

EVALUATION OF KANSAS CITY POWER & LIGHT COMPANY'S SYSTEM PERFORMANCE AND EMPLOYEES SAFETY AND TRAINING PROGRAMS

II. INTRODUCTION

A. The Purpose of This Report

The purpose of this report is to present to the Missouri Public Service Commission (Commission) the results of the Staff's informal investigation of the performance of Kansas City Power & Light Company's (KCPL) generation, transmission and distribution system, and of its safety and training programs for employees.

B. Background

1. The GST Complaint Case

On May 11, 1999, GS Technology Company, Inc., doing business as GST Steel Company (GST), filed a Petition for an Investigation as to the Adequacy of Service Povided by the Kansas City Power & Light Company (KCPL) and Request for Relief. This petition was categorized by the Missouri Public Service Commission as a complaint case and assigned Case No. EC-99-553. GST, KCPL's largest single-point retail customer, alleged that it had experienced significantly higher electricity prices (as set out in the terms of its special contract with KCPL) as a result of increasingly unreliable service from KCPL. In addition, GST claimed to have experienced repeated service disruptions due to recurring KCPL equipment failures on the transmission and distribution system serving GST. GST also alleged that since 1998 it had experienced less reliable electric service from KCPL due to imprudent management decisions from KCPL personnel. GST asserted this imprudence was demonstrated by KCPL's decreased attention to, and decreased expenditures on, the operation and maintenance of KCPL's coal-fired generating plants by its management. GST alleged that KCPL's incompetence led to the explosion of the boiler at the Hawthorn 5 generating station.

2. The Hawthorn 5 Boiler Explosion

In the early morning hours of February 17, 1999, a natural gas explosion destroyed the eleven-story boiler at the Hawthorn 5 generating station, resulting in the loss of the 479 MW base-load generating unit. The unit has been out of service since that date, but is scheduled to come back on line during the summer of 2001. The Commission opened Case No. ES-99-581 for the purpose of receiving information from KCPL concerning the explosion.

Although KCPL's insurance company is still in the process of investigating the explosion of the boiler at Hawthorn 5, the Staff of the Commission filed its Final Report of the incident on January 25, 2001. Because KCPL had greater resources to devote to investigating the explosion, the Staff Final Report, detailing the causes of the explosion, was based, to a significant degree, on the investigation of the explosion and report developed by KCPL, which was given to the Commission Staff on October 2, 2000.

3. Commission Findings to Date

As a result of the testimony presented in the GST complaint case and the explosion of the Hawthorn 5 boiler, the Commission, in its Report and Order in Case No. EC-99-553, expressed concern over the evidence showing that some of KCPL's base-load generating units were experiencing increased forced outage rates and slightly decreasing unit availability. The Commission also determined that KCPL's reduction in operation and maintenance expenditures merited some further analysis. Nevertheless, in Case No. ER-99-553, the Commission decided that, for the period from 1994 to 1998, the performance of KCPL's system, with the notable exception of Hawthorn 5, had been operated and maintained at an adequate level. However, the Commission has made no findings with respect to the Hawthorn 5 boiler explosion.

When evaluating KCPL's coal-fired generation, average net capacity factor increases to **60.3%** in the years 1990 through 1998, from **52.2%** for the prior 10 years (1980 to 1989). Average availability increased from **79.0%** to **83.5%** and forced outage rates decreased from **11.1%** to **7.40%** in the same period. Net generation steadily increased and operating heat rates decreased while maintenance costs gradually decreased. Thus, the performance of KCPL's base-load generation is not only acceptable but shows improvement in the past 10 years.

2. KCPL Transmission

In the absence of any serious transmission outages over the past ten years, there was no evidence to indicate that the performance of KCPL's transmission system in not acceptable.

3. KCPL Distribution

In the absence of any widespread or prolonged distribution outages (except in the case of severe weather) over the past ten years, there was no evidence to indicate that the performance of KCPL's distribution system is not acceptable.

4. KCPL Employee Training

After reviewing extensive training materials prepared by KCPL, including, but not limited to, Occupational Safety and Health Act (OSHA) safety courses, KCPL safety policies and procedures, employee training courses, materials, tests, etc. the Staff did not find any deficiencies in the training procedures that KCPL has developed for its employees, that is used on a regular basis.

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4. Commission Order in Case No. EC-99-553

In its Report and Order in Case No. EC-99-553, issued July 13, 2000, the Commission ordered:

> " . . . 7. That the Staff of the Missouri Public Service Commission, in its investigation of the explosion that occurred at the Hawthorn Station Unit No. 5 on February 17, 1999 in Case No. EC-99-581, shall investigate and report to the Commission as to whether or not the safety procedures prescribed by the management were adequate and appropriate, whether or not Kansas City Power & Light employees followed those safety procedures, and whether Kansas City Power & Light Company has provided adequate and appropriate training to its employees. Likewise, the Staff of the Commission shall investigate and report to the Commission as to whether or not the performance of Kansas City Power & Light Company's system has declined over the past decade and, if so, why."

This report is the result of the above section of the Commission's Report and Order.

C. Scope of Report

This report is primarily a qualitative analysis of the performance of the Kansas City Power & Light Company's base-load generating units. All of KCPL's base-load units were evaluated. The parameters examined for each of the units studied included net capacity factor, operating heat rates, unit availability and forced outage rates. No attempt was made to benchmark the performance of the KCPL generating units to similar units of other utilities because of the difference in unit design, fuels utilized, and the difference in operating environments of similar units. Instead, what is evaluated is the consistency of performance of KCPL's base-load units through the past decade, and the operating and maintenance costs associated with that performance. In addition, Staff examined operation and maintenance costs associated with KCPL's transmission and distribution systems, and also extensive information concerning the many employee training programs at KCPL.

D. Discovery

The Staff conducted extensive discovery and reviewed thousands of documents in this investigation of the performance of KCPL's electrical system and the training of its employees. In addition to examining information about KCPL that is publicly available, such as the Federal Energy Regulatory Commission (FERC) Form 1, Staff conducted on-site visits to all of KCPL's operating coal-fired generating units, and interviewed plant managers and training personnel. Staff sent out 60 data requests to KCPL concerning monthly plant generation operating parameters, work orders for plant repairs and maintenance requiring scheduled or unscheduled outages, and detailed plant operation and maintenance expenses. Staff also examined training material developed and used by KCPL to meet OSHA requirements and to educate employees on job responsibilities, enhance technical expertise and maintain a safe work environment. In addition, Staff utilized information provided by KCPL in other Commission cases or in compliance with Commission rules.

III. EVALUATION OF KANSAS CITY POWER & LIGHT COMPANY'S SYSTEM PERFORMANCE

A. General Description of the KCPL System

KCPL is a medium-size electric utility serving more than 435,000 customers in Northeastern Kansas and Northwestern Missouri, with a 4,700 square mile service territory. About 95% of KCPL's retail revenues are from the Kansas City metropolitan area. Approximately two-thirds of KCPL's retail sales are to Missouri customers, the remainder are to Kansas customers. KCPL owns or partially owns and operates one nuclear generating unit, seven fossil fuel generating units (base-load units) and several gas/oil peaking units. The base-load units, along with their accredited capacities, primary fuels and vintages are listed below.

Generating Unit	Accredited Capacity (MW)	Fuel	Vintage
Wolf Creek	1,170	Nuclear	1985
Iatan	670	Coal	1980
La Cygne 1	688	Coal	1973
La Cygne 2	674	Coal	1977
Hawthorn 5	479	Coal	1969
Montrose 1	All three Montrose	Coal	1958
Montrose 2	Units have combined	Coal	1960
Montrose 3	capacity of 510 MW	Coal	1964

KCPL also owns and operates 1,700 miles of transmission line in its service territory.

B. Evaluation Parameters

The following operating parameters were evaluated for each of the seven base-load generating units:

1. Net generation;
2. Operating heat rate;
3. Net capacity factor;
4. Availability and equivalent availability;
5. Forced outage rate and equivalent forced outage rate.

In addition, the following production cost parameters were also evaluated for each base-load unit:

1. Total operation and maintenance expenses;
2. Fuel costs;
3. Non-fuel operation and maintenance expenses.

Net generation is the amount of energy produced by a generating unit that is for use by its customer. It is determined by the following equation:

Net Generation (MWh) = Gross Generation (MWh)-Station Use (MWh)

By itself, net generation is not a very good indication of unit performance because net generation can fluctuate with load. However, because the generating units evaluated are base-load units, they would be expected to run at near maximum capacity most of the time. Therefore, no significant fluctuations in net generation would be expected unless the unit were not operating.

Operating heat rate is defined as the amount of energy used in Btu to produce a KWh of power. An increasing heat rate could be an indication of decreasing unit efficiency because more fuel would be used to produce a KWh of energy. Increases in heat rate would not be unusual as a generating unit ages. The operating heat rate is given in Btu/KWh.

Net capacity factor is defined as the amount of net energy produced by a generating unit divided by the maximum amount of energy that the unit could produce over the same time period, usually a year. It is given by the following equation:

$$\text{Net Capacity Factor (\%)} = \frac{\text{Total Net Generation (MWh)}}{\text{Net Accredited Capacity (MW)} \times 8{,}740 \text{ hours}} \times 100\%$$

Base-load generating units would be expected to run at relatively high net capacity factors (greater than 65%).

Availability is the amount of time that a generating unit is available to run divided by the maximum the unit could be running. It is given by the equation:

$$\text{Availability (\%)} = \frac{\text{Period Hours (h)} - \text{Outage Hours (h)}}{\text{Total Period Hours(h)}} \times 100\%$$

Base-load generating units should have high availability (greater than 80%).

Equivalent availability is very similar to availability, however, equivalent availability also takes into account unit de-rating. Equivalent availability is given by the equation:

$$\text{Equivalent Availability} = \frac{\text{Period Hours (h)} \times \text{Net Accredited Capacity (MW)} - \text{Outage MWh} - \text{Derate MWh}}{\text{Period Hours (h)} \times \text{Net Accredited Capacity (MW)}} \times 100\%$$

Forced outage rate is defined as the amount of time, either scheduled or unscheduled, that a generating unit is not in service. It is given by the equation:

$$\text{Forced Outage Rate} = \frac{\text{Forced Outage Hours (h)}}{\text{Forced Outage Hours (h)} + \text{In Service Hours (h)}} \times 100\%$$

Equivalent forced outage rate is similar to the forced outage rate, but equivalent forced outage rate includes unit derating. It is given by the equation:

$$\text{Equivalent Forced Outage Rate} = \frac{\text{Forced Outage Hours(h)} \times \text{Net Accredited Capacity (MW)} + \text{Forced Derate MWh}}{\text{Forced Outage Hours (h)} + \text{In Service Hours (h)}} \times 100\%$$

Operation and maintenance (O&M) costs per KWh (total fuel and non-fuel) were examined to determine if there were any significant changes over time. Generally, there is a trade-off between operation and maintenance costs, and fuel costs. Typically, units that burn lower cost fuels have higher O&M costs because lower cost fuels generally produce less energy. Thus, generating units that burn low-cost, low-energy fuel, have high costs of operation and high costs of maintenance, because they must burn more fuel to produce energy.

For each of the seven base-load generating units, the above calculation parameters are presented for, at a minimum, the ten-year period from 1990 through 1999. In many instances, the operating parameters for these units were available for their entire operational history. In those instances, the operation of the generating unit in the past ten to fifteen years is compared to its entire operational history.

For base-load units that are partially owned by KCPL, all parameters are calculated based on KCPL's share of net generation.

C. Generation

1. Wolf Creek

Wolf Creek is a single unit nuclear power generating plant with an accredited capacity of 1,170 MW. It is operated by Wolf Creek Operating Corporation, a company that is jointly owned by three utilities. KCPL owns 47% of Wolf Creek, Western Resources owns 47%, and Kansas Electric Power Cooperative owns the remaining 6%. Wolf Creek began commercial operation in 1985.

Over its history, there has been a significant variation in the net generation from Wolf Creek from a low of **2,753,525 MWh**, (KCPL share) in 1991 to a high of **4,888,272 MWh** in 1998, a **77.5%** increase over 1991. However, these fluctuations are due, to a great extent, to the refueling (maintenance outages schedule approximately every **18 months**. In 1991, Wolf Creek was offline for **103** days, whereas no refueling maintenance outages were scheduled in 1998. The fluctuations in net generation from 1980 through October 2000, are given in Appendix C, Wolf Creek Performance Data.

The **18 month** refueling/maintenance outages also explain the fluctuations in net capacity factor, availability and equivalent availability, and forced outage rates and equivalent forced outage rates throughout Wolf Creek's operating history. However, over the past decade, Wolf Creek has had an average net capacity factor of **84.0%** and an average availability of **85.4%**. These numbers, coupled with a low average production cost of only **$15.58/MWh** indicate that Wolf Creek is a very low cost, reliable generating unit for KCPL. Appendix C also contains net capacity factors, availabilities and equivalent availabilities, forced outage rates and equivalent forced outage rates for Wolf Creek's entire operational history. Production operation and maintenance costs for the period from 1989 through October, 2000 are also presented in Appendix C.

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2. Iatan

Iatan is a base-load, coal-fired generating unit located in Weston, Missouri. KCPL owns 70% of Iatan with the former St. Joseph Light & Power Company (now a division of UtiliCorp United, Inc.) owning 18%, and Empire District Electric Company owning 12%. Although only partially owned by KCPL, Iatan is entirely operated by KCPL. Iatan began its commercial operation in 1980.

Iatan has a Babcock and Wilcox radiant reheat boiler and General Electric turbine/generator. Iatan's design is very similar to that of La Cygne 2. However, Iatan has larger motors, pumps, and precipitators, thus allowing control operators to easily follow load, ramp up, and run the boiler in an over-pressurized state. Iatan burns low sulfur Western coal, primarily from the Powder River Basin.

Although it is KCPL's lowest cost coal unit, historically Iatan had taken much of the burden of load following because of its ability to ramp and ramp down. In recent years, Montrose has picked up much of the load following responsibility because of the installation of its new Bailey Distributed Control System (DCS). This allows Iatan to run at full capacity most of the time. Iatan is still used to follow load if there are problems on any of the Montrose units.

KCPL is planning to install a DCS at Iatan in the next year. Installation of the DCS will eliminate the problem of trying to find obsolete parts, allow the unit to follow load more effectively, and help Iatan control operators maximize the efficiency of the boiler.

Except for the year 1993, when KCPL did a **general overhaul of the generator**, annual net generation from Iatan has been relatively stable, varying from a low of **2,740,000 MWh** to a high of **3,320,000 MWh**, a variation of over a little more than **20.0%** over its operational history. After 1993, annual net generation has consistently exceeded **3,000,000 MWh**, whereas prior to that time, the Iatan unit never reached that value.

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Operating heat rate has also remained relatively uniform, about **10,000 Btu/KWh** over its entire operation.

From 1990 to 1993, Iatan's average net capacity factor was **66.5%**, but after the **generator overhaul**, it increased to approximately **78.0%**. During the same periods, availability increased from **84.5%** to **92.4%**, equivalent availability increased from **81.0%** to **90.8%**, forced outage rates decreased from **6.0%** to **4.8%**, and equivalent forced outage rates decreased from **10.2%** to **5.6%**. Average total production expenses were less than **$12.00/MWh**.

Based on the information provided by KCPL, Iatan is a very reliable, efficient source of base-load generation. Iatan Performance Data are presented in Appendix D.

The Predictive Maintenance Program, which is a program instituted to determine potential equipment failures before they occur, began in 1997 at the Iatan Generating Station with one mechanic dedicated to the program. In July of 1999, an engineer was assigned 85% of the time and in July, 2000, two operators, one fuel yard and one plant side were added brining the total full-time equivalent (FTE) personnel assigned to the program to 3.85.

Iatan's Predictive Maintenance Program includes almost all of its equipment. The vibration portion of the program primarily focuses on the most critical, larger rotating equipment, including induced draft, force draft and primary air fans, air compressors and condensate pumps. Some testing includes the bearings in the conveyor belt system. The lubrication portion of the program includes all rotating equipment, the conveyor system, the dumper equipment, and the stacker reclaimer in the fuel yard.

Although costs/savings have not been calculated, the Predictive Maintenance Program has shown benefits in replacing contaminated oil, correcting high vibrations, and replacing conveyor bearings prior to failure.

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3. La Cygne 1

La Cygne 1 is a base-load, coal-fired generating unit, owned 50% by KCPL and 50% by Western Resources, Inc. It is a Babcock and Wilcox, Cyclone-Fired Universal Pressure Boiler. It is equipped with a wet scrubber that is used for both sulfur and particulate control. It began its commercial operation in 1973. It is operated by KCPL.

When La Cygne 1 was constructed, the prevailing fuel used was Eastern Bituminous coal, because the availability of the more economical Western coal was limited. Because Eastern coal is more expensive than the local Missouri/Kansas coal, La Cygne 1 was built with a cyclone boiler to burn the lower Btu coal and avoid the additional cost of transporting Eastern coal into La Cygne. Missouri/Kansas coal was mined 2 miles away from the La Cygne station.

Today, La Cygne 1 burns a blend of 85% Powder River Basin (PRB) Western coal and 15% local coal from Missouri/Kansas. The conversion to a blend of Western coal and local Missouri/Kansas coal has improved the performance of La Cygne 1. The total operating cost has decreased with the former blend of Eastern Bituminous coal and local Missouri/Kansas coal.

La Cygne 1 is a unique generating unit in comparison to other coal-fired units of its size. It is the only 700 MW+ cyclone fired boiler with a wet scrubber and no precipitator. The purpose of the cyclone boiler design for La Cygne 1 was to trade operations expenses with maintenance expenses for a net savings. Although burning local Missouri/Kansas coal results in higher maintenance costs, these costs were more than offset by the savings in transportation and burning of Eastern coal. However, cyclone boilers tend to have more forced outages, and thus higher forced outage rates, due to the higher pressures and temperatures at which they operate.

Historically, La Cygne 1 has seen a significant increase in net generation in the past decade with a concomitant decrease in operating heat rates. From 1990 through 1999, average

annual net generation increased more than **55.0%** to **1,646,572 MWh** from an average of **1,056,255 MWh** over the previous fifteen years, while average operating heat rates decreased from **12,680 Btu/KWh** to **11,878 Btu/KWh**. Even though the net capacity factors, on an annual basis, were somewhat low and forced outage rates were somewhat high for La Cygne 1 because of its unique design, there have still been improvements in these performance parameters historically. Average net capacity factor has increased to almost **50.0%** over the past decade from **32.5%** previously (again using the 15 years prior to 1990) and annual average forced outage rates decrease from **28.6%** to **17.9%** over the same periods. Most significantly, total production O & M costs have decreased to an average of less than **$20/KWh** for the period from 1993 to 1999.

Net generation, operating heat rates, availabilities and equivalent availabilities, forced outages and equivalent forced outages, and production O & M costs are presented for La Cygne 1 in Appendix E, La Cygne 1 Performance Data.

4. La Cygne 2

La Cygne 2 is the earlier design version of Iatan. It is a base-load, coal-fired generating unit with a Babcock and Wilcox Radiant Reheat Boiler and a General Electric Turbine/Generator. Like La Cygne 1, KCPL owns 50% of the plant and Western Resources owns the other 50%. It is operated by KCPL. La Cygne 2 was put into commercial service in 1977.

Over its entire operational history, unlike La Cygne 1, La Cygne 2 has been a reliable and efficient generating plant of KCPL. Over the past decade, average annual net generation was **2,035,058 MWh**, compared to an annual average of **1,683,806 MWh** for the thirteen years prior to 1990, an increase of almost **21.0%**, with an increase in average annual net capacity factor from **62.3%** to **69.9%**, while operating heat rate remained relatively constant, with only a 7.5% difference between the highest and lowest operating heat rate values. Over its entire operation, unit availability averaged almost **85.0%** annually and forced outage rates averaged only **6.7%**. Since 1997, forced

outage rates have been above the **6.7%** average in each of those years. However, throughout its history, La Cygne 2 has been a very low-cost unit, with total production operation and maintenance costs below **$16.00/MWh** for each year of its operation. La Cygne 2 Performance Data are summarized in Appendix F.

In 1994, a Predictive Maintenance Program was instituted at the La Cygne station. The Predictive Maintenance Program Department uses the following technologies for testing critical operating systems:

Technology	Critical Operating System
Thermography	Switchyard, Motors, Pumps, High Pressure Steam
Oil Analysis, Lubrication	All equipment requiring lubrication
Vibration	All rotating equipment
Laser Alignment	All rotating equipment
Sonic Detection	Low speed (< 600 rpm) equipment boiler (leakage)
Thermo-Expansion	Boiler Feed Pump, Turbine

The Predictive Maintenance Program Department currently has three journeyman mechanics, one journeyman electrician, and five plant equipment operators. KCPL has documented over $9 million in cost savings since the implementation of the program.

5. Hawthorn 5

Prior to the explosion on February 17, 1999, Hawthorn 5 was a coal-fired, generating unit with an accredited capacity of 479 MW. It had a Combustion Engineering radiant reheat boiler and a General Electric Turbine Generator. Located in Jackson County, Missouri, it began its commercial operation in 1969.

Hawthorn 5 had been a low-cost, relatively reliable base-load unit for KCPL. Over its history, average annual net generation increased from **1,733,727 MWh** in the early 1970's through the 1980's (1973-1989) to an average of **2,138,990 MWh** from 1990

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through 1998, an increase of **23.3%**. During the same periods, average annual net capacity factor increased from **42.4%** to **52.4%**, and average availability increased from **74.3%** to over **80%**. Hawthorn 5's operating heat rate remained between **10,000** and **11,000 Btu/KWh**. Forced outage rates decreased from **16.4%** to **8.9%**.

Although KCPL has admitted that Hawthorn 5's operating statistics are slightly below average when compared to generating units of comparable size and age, Hawthorn 5's production costs are low, just under **$18/MWh** for the nine years prior to the explosion. Hawthorn 5 Performance Data are presented in Appendix G.

6. Montrose

The three Montrose generating units have a combined accredited capacity of 510 Mw. All three units have Combustion Engineering radiant reheat boilers. Units 1 and 2 have General Electric Turbine/Generators; Unit 3 has a Westinghouse Turbine/Generator. The Montrose units are located in Henry County, Missouri. Montrose 1 became operational in 1958, Montrose 2 in 1960 and Montrose 3 in 1964.

KCPL reports net generation and operating heat rate data for Montrose units on a combined basis. Combined net generation and operating heat rate data are presented in Appendix H, Montrose Performance Data. Annual net capacity factors, availabilities, equivalent availabilities, forced outage rates and equivalent forced outage rates were available for each of the Montrose units and are discussed below.

The Montrose units are the last base-load units dispatched in the KCPL generating system and thus, can be used for load following. As a result of their use as load following units, their net capacity factors could be expected to be somewhat lower than the other base-load units. However, as base-load units, their availabilities should still be high and their forced outage rates low. The average annual net capacity factors, availabilities, and forced outage rates for each of the Montrose units for the period from 1990 through 1999 is given below:

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	Montrose 1	Montrose 2	Montrose 3
Net Capacity Factor	**61.1%**	**59.1%**	**57.0%**
Availability	**91.0%**	**90.4%**	**86.9%**
Forced Outage Rates	**3.4%**	**4.4%**	**4.3%**

The Predictive Maintenance program at the Montrose generating station began in September, 1992, with two dedicated employees doing vibration analysis, a supervisor and full-time mechanic. The following items are included in the Predictive Maintenance program:

1. Air supply fans and motors;
2. Ash water pumps and motors;
3. Bearing cooling water pumps and motors;
4. Boiler feed water pumps and motors;
5. Boiler circulating water pumps and motors;
6. Coal mills and motors;
7. Condensate pumps and motors;
8. Flame scanner blowers and motors;
9. Forced draft fan blowers and motors;
10. Igniter blowers and motors;
11. Induced draft fans and motors;
12. LP heater drip pumps and motors;
13. SO_3 blower and motor;
14. Turbine cooling water pumps and motors;
15. Conveyor motors and gearboxes;
16. Baghouse fans and motors.

In 1997, motor testing was included by adding a full-time electrician to the program. Infra-red (IR) thermography and oil analysis were added in 1998. An additional electrician was added to the program at that time.

Although Montrose does not maintain any cost/benefit analysis of this program, vibration analysis, oil analysis, motor testing and IR thermography are fundamental pieces of the station maintenance program and provide early detection of operational and maintenance problems with critical equipment.

D. Transmission

With respect to the transmission system, only operation and maintenance expenses were evaluated. The reason that only these expenses were examined is because the overall adequacy and reliability of KCPL's transmission system had not been questioned in the GST complaint case. GST had alleged problems with KCPL's transmission serving GST. However, KCPL addressed GST's concerns during the duration of the case and spent approximately $1 million in upgrades and repairs on the wires system serving GST.

Historically, from the period from 1990 through 1999, transmission operation expense increased over **100%**, from **$3,906,048** or **$0.28/MWh** to **$8,914,879** or **$0.50/MWh**. During the same period, transmission maintenance expense decreased from **$3,906,048** or **$0.24/Mwh** to **$1,149,878** or **$0.08/Mwh**.

It is important to note, however, that there is a trade-off between operation and maintenance expenses. Addition of new facilities usually requires an increase in operation expenditures, but usually with smaller expenditures on maintenance because new facilities typically require less maintenance than older facilities. Older facilities typically have increased maintenance costs with perhaps very little change in operating costs.

Transmission Operation and Maintenance Expense data are given in Appendix I.

E. Distribution

Like transmission, only distribution operation and maintenance expenses were examined to determine if there were any significant changes in these expenses in the last ten years, from

1990 through 1999. Although decreases were found in both operations and maintenance expenses over this period, significant changes were not found. This information, coupled with the lack of any widespread or localized customer outages (except of course, in instances of severe storm damage), suggests that KCPL's distribution system is performing adequately. Distribution Operation and Maintenance data are presented in Appendix J.

IV. EVALUATION OF KANSAS CITY POWER & LIGHT COMPANY'S EMPLOYEE TRAINING

A. OSHA

KCPL has developed 24 safety-training courses for its employees to comply with OSHA standards. These courses, along with the OSHA standard that they are in compliance with, and a brief description of the course content are listed in Appendix K. OSHA Training.

The OSHA training courses fall into two broad categories, safety training that is applicable to all employees regardless of their specific job responsibilities, and safety training that is job specific. In the first category, most all of KCPL employees are trained in the areas of emergency and safety procedures (fire, tornado, etc.), fire protection., first aid, and personal protection (hearing loss, respiratory, protection from infections, etc.). Employees generally receive this training annually. Total training hours vary from about 8 to 18 hours annually.

Many of the OSHA training courses given to KCPL employees are dependent upon the nature of the work that the employee performs, such as welding, working with aerial lift trucks, or working with energized conductors. Training of this nature can last anywhere from a day or two to several months. This safety training is offered on an as needed basis.

B. Production

KCPL provided extensive information, courses, syllabus, tests, etc., concerning the training that employees working in the production area receive from the Company. Entry-level employees working at a generating station can receive up to six weeks or 240 hours of

training as a plant equipment attendant. Plant equipment operators, the next level up from a plant equipment attendant receive an additional 16 weeks or 640 hours of training, and control area operators receive anywhere from 600-800 hours training beyond that of plant equipment operator training. Thus, a control operator for a KCPL generating station can receive up to 1680 or 42 weeks of formal training to perform his/her job. Specific topics for plant equipment attendant, plant equipment operator and control operator are presented in Appendix L. Production Training.

In general, production plant employees receive training on the following general topics:

1. Safety and tag out procedures;
2. Electrical equipment;
3. Water cycling equipment;
4. Turbine;
5. Generator;
6. Air-gas-fuel systems.

The training material becomes more advanced on these broad topics as the employee advances.

In addition to these plant positions, there are other positions such as maintenance and repair, fuel operation, etc., however since they are supporting positions, their training is not presented in this report.

C. Transmission

Upon Staff request, KCPL provided information concerning the training of personnel in its Transmission Planning Group and training of its transmission system operators. The list of training topics provided in Appendix K.

Engineers in the Transmission Planning Group receive extensive training via computer simulation of the transmission system including:

1. Contingency analysis;
2. Transmission constraints;
3. Interconnected networks;
4. Reliability for transmission planning purposes;

Transmission system operators receive training and certification to a large extent, from the regional reliability councils in which they operate, Southwest Power Pool (SPP), and Mid-Continent Area Power Pool (MAPP), in addition to overall North American Electric Reliability Council (NERC) training. Their expertise is kept current by attending meetings of the regional reliability councils.

D. Distribution

Although requested, Staff did not receive any information about additional training for distribution employees other than OSHA training documents.

V. SUMMARY AND CONCLUSIONS

A. System Performance

1. Production

When evaluating the operation of an electric utility's base-load generating units, acceptable performance levels would be demonstrated by:

1. High net capacity factor (greater than 65%);
2. High availabilities (greater than 80%);
3. Low forecast outage rates;
4. Low production costs.

Because base-load generating units are almost universally first in the economic dispatch order, because of low production costs, they are expected to run most of the time (high availabilities, low forced outage) at capacities having high capacity factors.

When evaluating KCPL total base-load generation (nuclear and coal-fired units) and fossil base-load generation (coal-fired units, the overall system performance of base-load generation meets all of the above criteria for acceptable operation.

System wide, excluding peaking capacity, KCPL's total base-load units have average net capacity factor of**64.9%**, over the past 10 years, even when some of the units have that have load following responsibility are included in the system average. In addition, average total base-load unit availability is **82.7%** in the same period and equivalent availability is **80.0%** . Also with the exception of the past two years when Hawthorn 5 has been out of service (net capacity factor of 0%, availability of 0%, and forced outage rate of 100%), forced outages averaged **6.5%** from 1990 through 1998. Thus, KCPL's total base-load generation performed acceptably. Total Base-load Generation Performance Data are presented in Appendix A.

The same results hold true when only the fossil base-load generation is evaluated. (Wolf Creek performance data are removed from the total base-load performance data. Wolf Creek is the lowest incremental cost, most efficient base-load unit and the first in the economic dispatch order for KCPL). When evaluating KCPL's coal-fired generation, average net capacity factor increases to **60.3%** in the years 1990 through 1998, from **52.2%** for the prior 10 years (1980 to 1989). Average availability increased from **79.0%** to **83.5%** and forced outage rates decreased from **11.1%** to **7.40%** in the same period. Again, net generation steadily increases and operating heat rates decrease and maintenance costs gradually decrease. Thus, the performance of KCPL's base-load generation is not only acceptable but shows improvement in the past 10 years. Total Fossil Base-load Performance Data are presented in Appendix B.

2. KCPL Transmission

In the absence of any serious transmission outages over the past ten years, there is no evidence at this time to indicate that the performance of KCPL's transmission system in not acceptable.

3. KCPL Distribution

In the absence of any widespread or prolonged distribution outages (except in the case of severe weather) over the past ten years, there is no evidence at this time to indicate that the performance of KCPL's distribution system in not acceptable.

B. KCPL Employee Training

After reviewing extensive safety and training materials prepared by KCPL, including, but not limited to, OSHA safety courses, KCPL safety policies and procedures, employees training courses, materials tests, etc., the Staff could not pinpoint any deficiencies in the safety and training procedures that KCPL has developed and regularly uses for its employees.

Appendix A. Total Base Load Generation Performance Data

This information is deemed highly confidential in its entirety.

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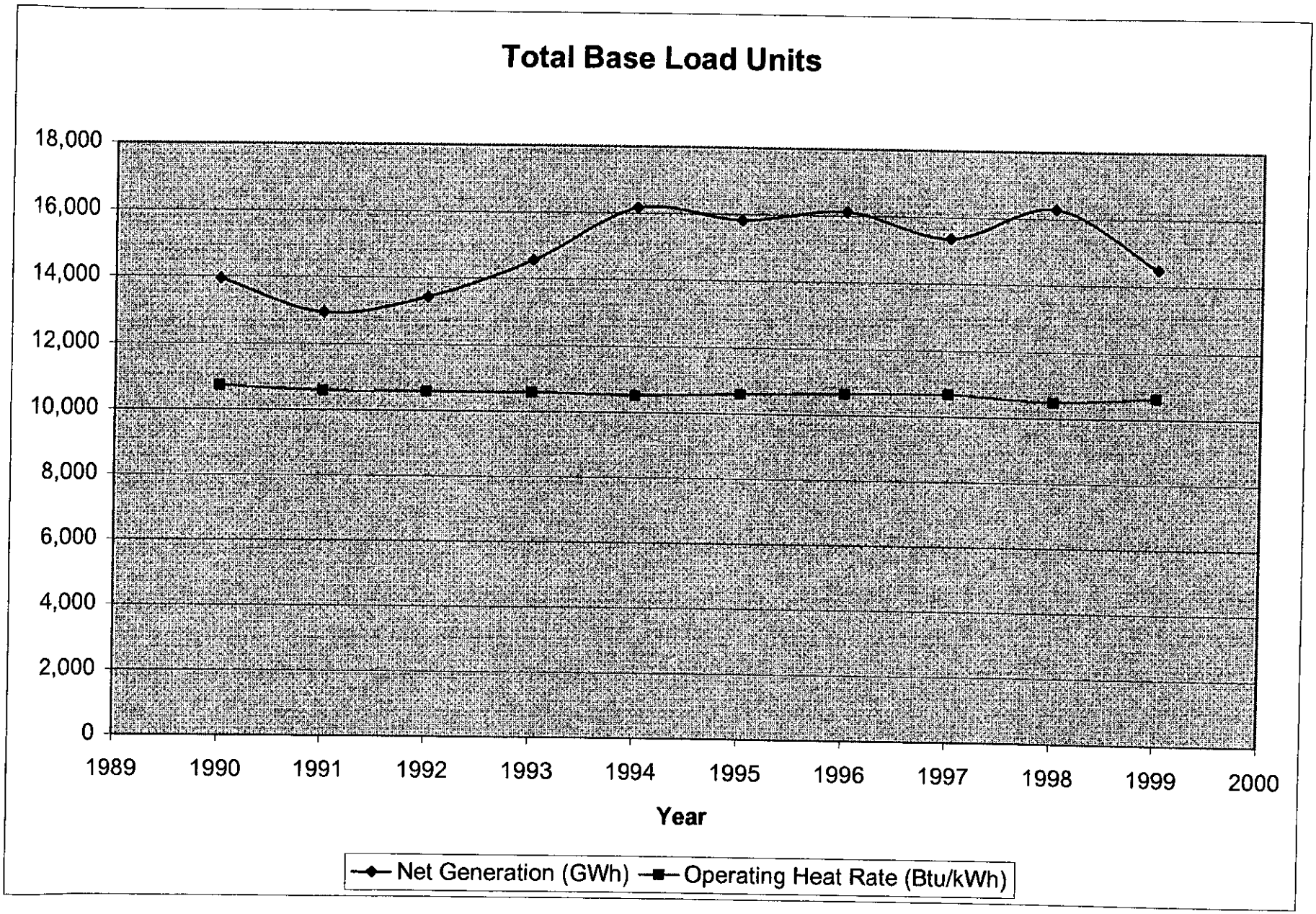
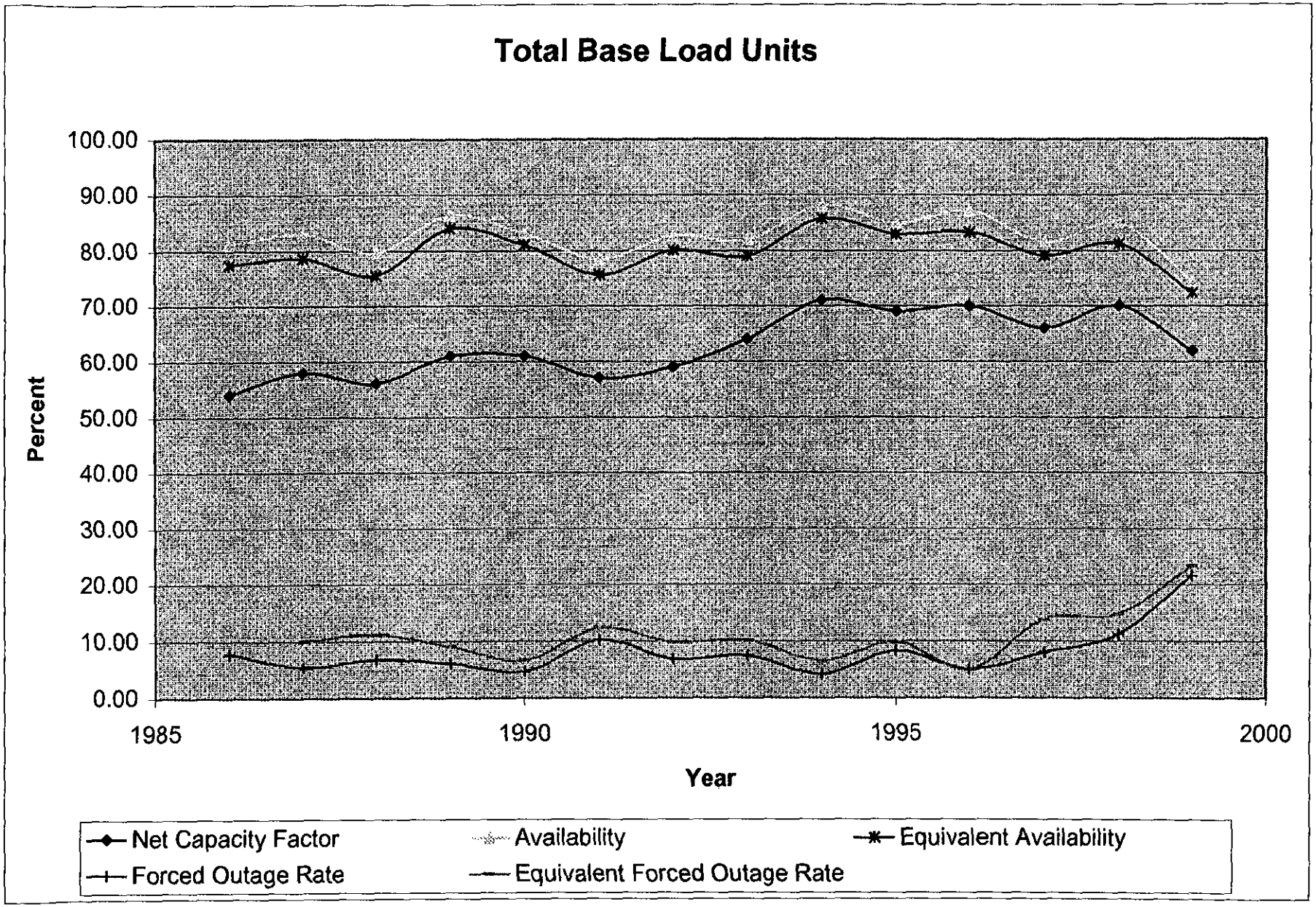
Summary Statistics for All Base Load Units

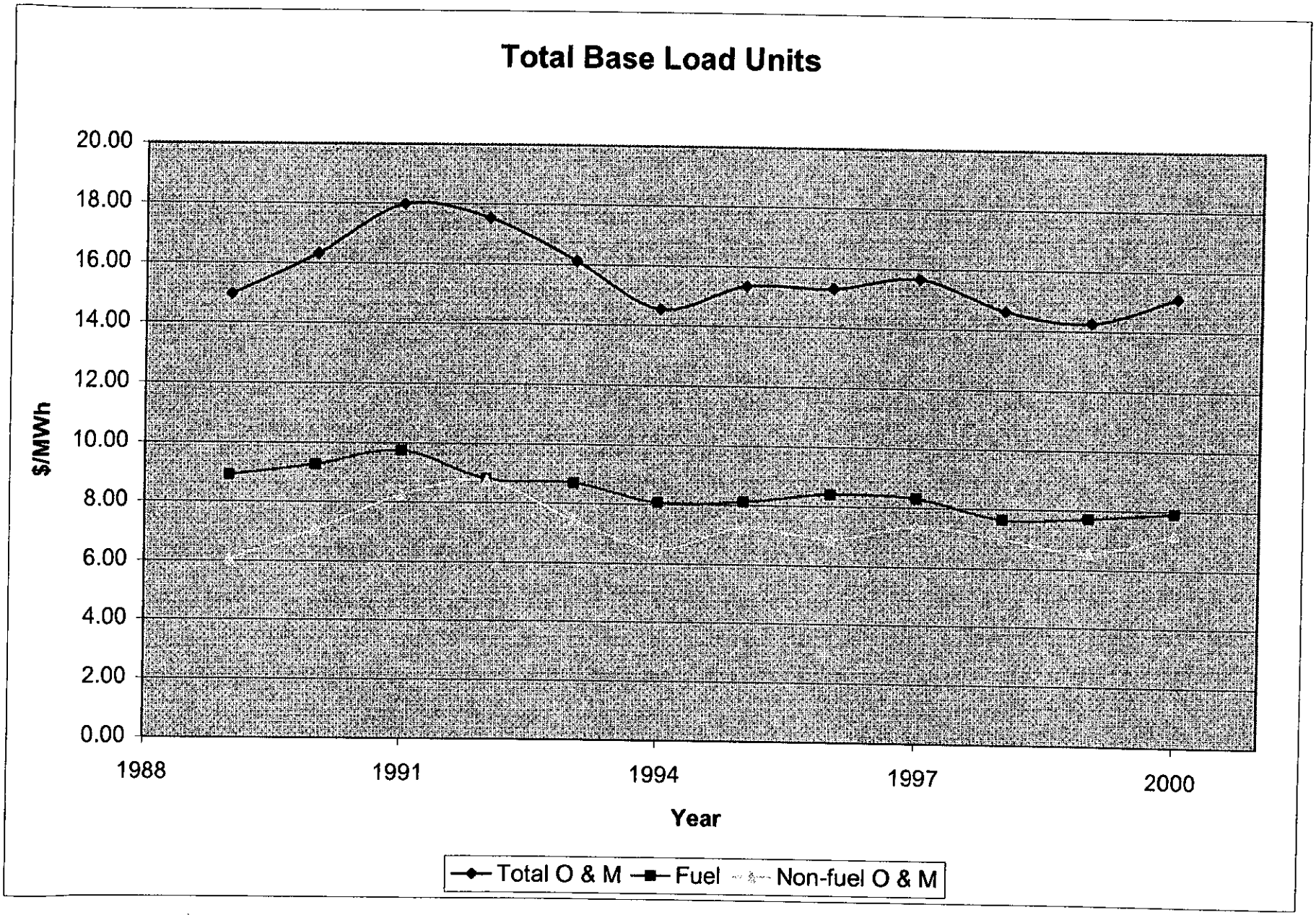
Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	2,686	2,672	2,642	2,631	2,631	2,609	2,598	2,598	2,596	2,584	2,584
Net Generation (MWh)	11,816,863	14,484,776	16,277,396	15,349,492	16,121,584	15,825,284	16,155,603	14,552,651	13,411,223	12,919,716	13,934,030
Operating Heat Rate (Btu/kWh)	NA	10,637	10,493	10,667	10,643	10,597	10,523	10,584	10,584	10,588	10,729
Net Capacity Factor (%)	60.10	61.88	70.00	66.00	70.00	69.00	71.00	64.00	59.00	57.00	61.00
Availability (%)	69.87	74.45	84.85	81.54	87.09	84.87	88.11	81.88	82.62	78.51	83.06
Equivalent Availability (%)	67.01	72.32	81.20	79.16	83.29	82.96	85.68	79.09	80.10	75.70	80.98
Forced Outage Rate (%)	NA	21.57	11.15	8.01	4.95	8.24	4.13	7.42	6.81	10.17	4.63
Equivalent Forced Outage Rate (%)	NA	23.34	14.71	13.76	4.95	9.84	6.50	10.14	9.71	12.30	6.57
Operation and Maintenance Costs											
Fuel Operation ($)	95,689,610	115,219,072	133,369,255	132,576,978	140,005,415	138,034,978	134,854,620	129,567,111	129,915,442	131,689,204	134,957,324
Fuel($)	93,422,473	111,491,563	124,484,662	127,390,083	135,532,749	128,242,933	130,022,798	126,477,786	117,878,909	125,747,060	128,838,871
Fuel Handling($)	3,849,784	4,558,960	5,700,598	6,182,960	6,160,802	6,316,059	6,599,011	5,745,724	5,440,869	5,293,330	5,480,092
Other($)	-1,582,647	-831,451	3,183,995	-996,065	-1,688,136	3,475,986	-1,767,189	-2,656,399	6,595,664	648,814	638,361
Non Fuel Operation($)	42,403,101	49,574,535	52,615,257	55,926,811	53,000,478	49,345,299	50,371,949	51,137,238	47,618,328	44,987,203	39,381,267
Total Operations($)	138,092,711	164,793,607	185,984,512	188,503,789	193,005,894	187,380,277	185,226,569	180,704,349	177,533,771	176,676,407	174,338,591
Maintenance($)	40,226,955	41,594,136	52,058,085	51,884,901	53,478,504	55,450,235	49,460,032	53,765,400	57,434,516	55,394,878	52,690,064
Boiler/ Reactor(%)	24,993,849	24,893,792	27,756,788	35,200,326	34,986,619	27,422,044	29,203,591	29,905,321	29,786,664	30,607,458	29,321,527
Electric Plant ($)	6,312,210	6,403,701	6,047,658	5,105,202	8,184,395	10,611,647	7,679,925	9,199,565	9,239,933	10,761,499	9,660,308
Other ($)	8,920,896	10,296,643	18,253,639	11,579,373	10,307,489	17,416,545	12,576,516	14,660,513	18,407,918	14,025,922	13,708,229
Boiler/ Reactor (%)	62.13	61.88	69.00	87.50	86.97	68.17	72.60	74.34	74.05	76.09	72.89
Electric Plant (%)	15.69	15.92	15.03	12.69	20.35	26.38	19.09	22.87	22.97	26.75	24.01
Other (%)	22.18	25.60	45.38	28.79	25.62	43.30	31.26	36.44	45.76	34.87	34.08
Non-Fuel Operation and Maintenance ($)	82,630,056	91,168,671	104,673,342	107,811,712	106,478,982	104,795,535	99,831,981	104,902,638	105,052,844	100,382,082	92,071,331
Total Operation and Maintenance ($)	178,319,666	206,387,743	238,042,597	240,388,690	246,484,398	242,830,512	234,686,600	234,469,749	234,968,286	232,071,285	227,028,655
Total $/MWh	15.09	14.25	14.62	15.66	15.29	15.34	14.53	16.11	17.52	17.96	16.29
Fuel $/MWh (Fuel Only)	7.91	7.70	7.65	8.30	8.41	8.10	8.05	8.69	8.79	9.73	9.25
Non Fuel $/MWh	7.18	6.55	6.98	7.36	6.88	7.24	6.48	7.42	8.73	8.23	7.05
Number of Employees	NA	1,061	1,125	1,094	1,207	1,347	1,186	1,350	1,440	1,517	1,345
Full Time	NA	845	856	896	919	932	937	1,043	1,061	1,108	1,107
Part Time	NA	0	0	0	0	0	0	0	0	0	0
Contract	NA	216	269	198	288	415	249	307	379	409	238

Production Operation and Maintenance Expenses

	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Steam Production	136,869,981	159,032,467	162,957,776	173,003,875	179,690,357	176,170,006	177,788,929	179,640,561	182,146,886	179,985,252
Operations	111,082,638	126,408,970	131,573,392	140,582,906	139,464,549	141,538,899	138,291,517	136,641,444	142,414,876	141,975,961
Fuel	94,117,743	108,101,781	110,224,094	118,408,138	118,343,618	120,282,642	116,613,788	116,895,176	122,800,217	123,956,279
Non-fuel	16,964,895	18,307,189	21,349,298	22,174,768	21,120,931	21,256,257	21,677,729	19,746,268	19,614,659	18,019,682
Maintenance	25,787,343	32,623,497	31,384,384	32,420,969	40,225,808	34,631,107	39,497,412	42,999,117	39,732,010	38,009,291
Total Steam Generation	9,207,979	10,594,219	10,456,221	11,434,894	10,279,253	11,370,269	10,605,115	8,758,649	9,655,965	9,488,435
Steam Production (/MWh)	14.86	17.27	17.70	18.79	19.51	19.13	19.31	19.51	19.78	19.55
Operations	12.06	13.73	14.29	15.27	15.15	15.37	15.02	14.84	15.47	15.42
Fuel	10.22	11.74	11.97	12.86	12.85	13.06	12.66	12.69	13.34	13.46
Non-fuel	1.84	1.99	2.32	2.41	2.29	2.31	2.35	2.14	2.13	1.96
Maintenance	2.80	3.54	3.41	3.52	4.37	3.76	4.29	4.67	4.31	4.13
Nuclear Production	66,792,327	73,551,919	70,609,104	66,001,257	64,694,344	59,643,260	58,059,346	56,866,559	51,281,557	48,303,086
Operations	52,949,085	57,084,313	53,292,621	48,061,195	49,357,450	44,745,303	43,511,249	42,225,599	35,309,972	33,236,455
Fuel	20,468,232	24,299,804	21,205,542	20,370,914	19,690,315	14,571,978	12,953,323	13,020,266	8,889,987	11,001,045
Non-fuel	32,480,853	32,784,509	32,087,079	27,690,281	29,667,135	30,173,325	30,557,926	29,205,333	26,419,985	22,235,410
Maintenance	13,843,242	16,467,606	17,316,483	17,940,062	15,336,894	14,897,957	14,548,097	14,640,960	15,971,585	15,066,631
Total Nuclear Generation	4,303,564	4,888,272	3,962,235	3,856,274	4,729,216	4,008,623	3,712,783	3,990,611	2,753,525	3,701,019
Nuclear Production	15.52	17.09	16.41	15.34	15.03	13.86	13.49	13.21	11.92	11.22
Operations	12.30	13.26	12.38	11.17	11.47	10.40	10.11	9.81	8.20	7.72
Fuel	4.76	5.65	4.93	4.73	4.58	3.39	3.01	3.03	2.07	2.56
Non-fuel	7.55	7.62	7.46	6.43	6.89	7.01	7.10	6.79	6.14	5.17
Maintenance	3.22	3.83	4.02	4.17	3.56	3.46	3.38	3.40	3.71	3.50
Other Production	18,035,890	12,677,605	4,132,975	1,834,365	2,660,074	1,095,850	1,190,096	759,926	935,534	2,445,245
Operations	17,019,033	11,921,401	3,721,207	739,348	1,509,728	353,378	709,030	348,713	540,489	418,776
Fuel	14,003,084	9,958,158	1,923,092	560,117	1,337,064	251,480	549,773	116,941	409,888	289,034
Non-fuel	3,015,949	1,963,243	1,798,115	179,231	172,664	101,898	159,257	231,772	130,601	129,742
Maintenance	1,016,857	756,204	411,768	1,095,017	1,150,346	742,472	481,066	411,213	395,045	2,026,469
Total Production	221,698,198	245,261,991	237,699,855	240,839,497	247,044,775	236,909,116	237,038,371	237,267,046	234,363,977	230,733,583
Operations	181,050,756	195,414,684	188,587,220	189,383,449	190,331,727	186,637,580	182,511,796	179,215,756	178,265,337	175,631,192
Fuel	128,589,059	142,359,743	133,352,728	139,339,169	139,370,997	135,106,100	130,116,884	130,032,383	132,100,092	135,246,358
Non-fuel	52,461,697	53,054,941	55,234,492	50,044,280	50,960,730	51,531,480	52,394,912	49,183,373	46,165,245	40,384,834
Maintenance	40,647,442	49,847,307	49,112,635	51,456,048	56,713,048	50,271,536	54,526,575	58,051,290	56,098,640	55,102,391
Total Net Generation	14,827,901	16,538,214	15,415,784	16,128,324	15,852,834	16,158,937	14,558,295	13,416,669	12,922,963	13,836,091
Total Production	14.95	16.54	16.03	16.24	16.66	15.98	15.99	16.00	15.81	15.56
Operations	12.21	13.18	12.72	12.77	12.84	12.59	12.31	12.09	12.02	11.84
Fuel	8.67	9.60	8.99	9.40	9.40	9.11	8.78	8.77	8.91	9.12
Non-fuel	3.54	3.58	3.73	3.38	3.44	3.48	3.53	3.32	3.11	2.72
Maintenance	2.74	3.36	3.31	3.47	3.82	3.39	3.68	3.92	3.78	3.72


Total Base Load Units
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Year
Net Generation (GWh)
Operating Heat Rate (Btu/kWh)


Total Base Load Units
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
1985
1990
1995
2000
Year
Net Capacity Factor
Availability
Equivalent Availability
Forced Outage Rate
Equivalent Forced Outage Rate

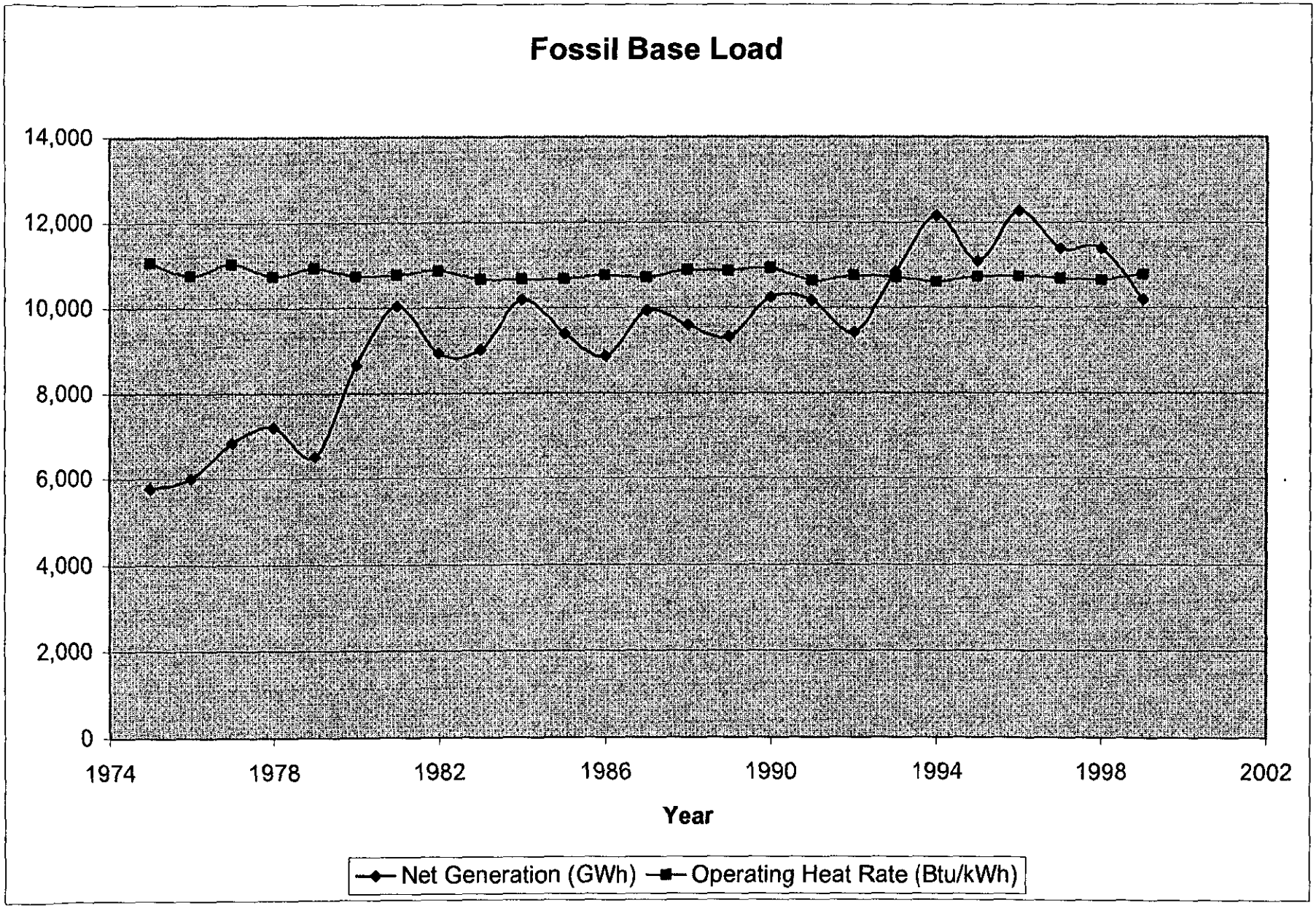

Total Base Load Units
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
$/MWh
1988
1991
1994
1997
2000
Year
Total O & M
Fuel
Non-fuel O & M

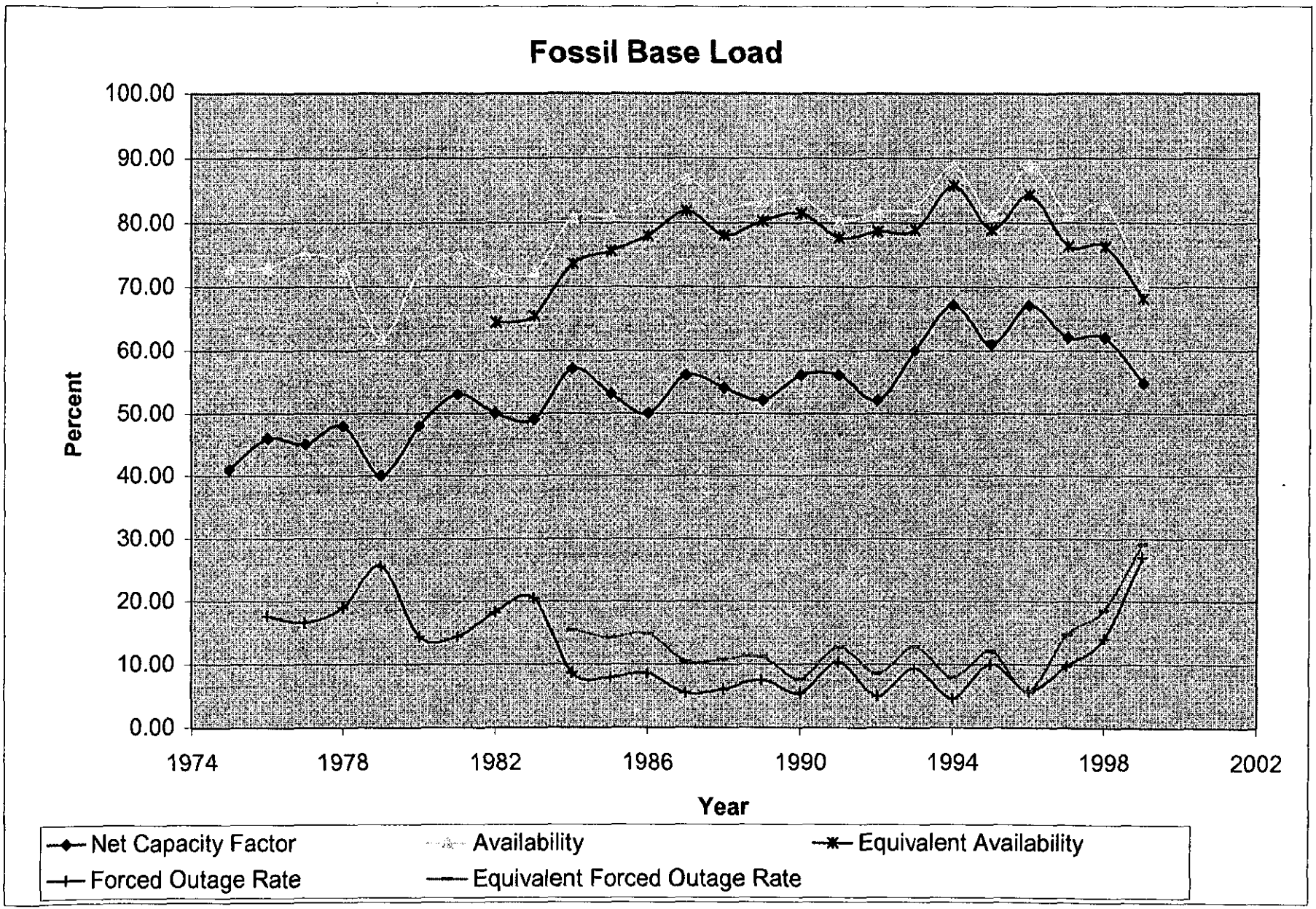
Appendix B. Fossil Fuel Base Load Generation Performance Data

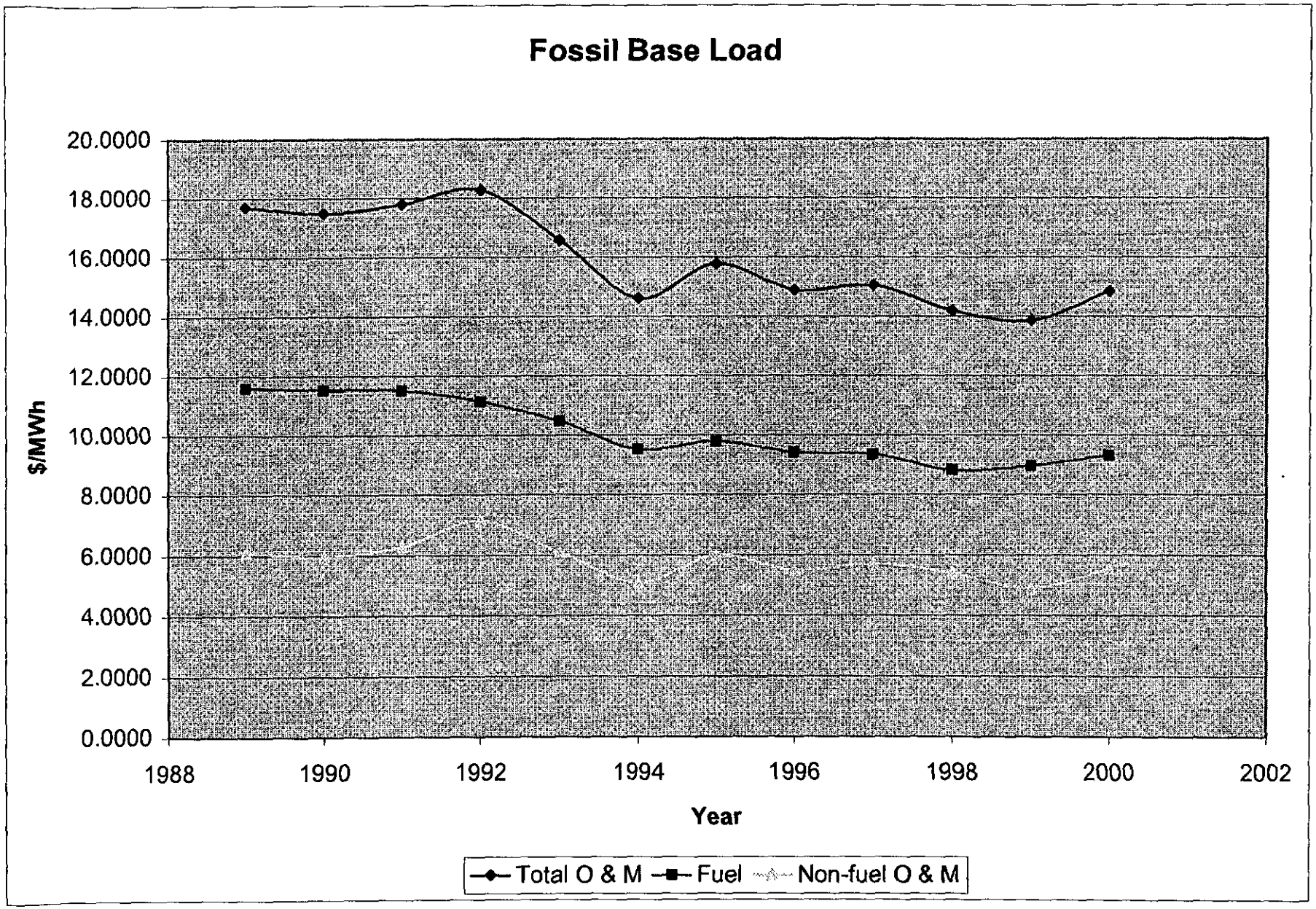
This information is deemed highly confidential in its entirety.

Summary Statistics for Fossil Base Load Units

Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	2,136	2,125	2,094	2,083	2,083	2,061	2,066	2,066	2,064	2,051	2,051
Net Generation (MWh)	8,267,899	10,181,212	11,389,124	11,387,257	12,265,310	11,096,068	12,146,980	10,839,868	9,420,612	10,166,191	10,233,011
Operating Heat Rate (Btu/kWh)	NA	10,785	10,648	10,686	10,742	10,729	10,604	10,710	10,753	10,630	10,927
Net Capacity Factor (%)	52.88	54.69	62.00	62.00	67.00	61.00	67.00	60.00	52.00	56.00	56.00
Availability (%)	65.07	70.55	82.68	81.20	88.94	81.26	88.75	82.38	81.79	80.24	83.77
Equivalent Availability (%)	63.60	68.09	76.29	76.37	84.35	78.92	85.75	78.88	78.63	77.67	81.46
Forced Outage Rate (%)	NA	27.04	14.06	9.73	5.67	10.02	4.58	9.31	4.91	10.30	5.39
Equivalent Forced Outage Rate (%)	NA	29.17	18.56	14.68	5.67	12.01	7.96	12.75	8.55	12.65	7.67
Operation and Maintenance Costs ($)											
Fuel Operation ($)	81,070,082	96,042,840	106,225,451	112,703,811	121,650,126	115,208,663	122,462,642	119,813,785	110,895,179	122,799,217	123,956,279
Fuel($)	76,842,945	91,023,331	100,184,858	106,184,541	115,161,835	108,552,618	115,450,820	113,524,463	104,858,643	116,857,073	117,837,826
Fuel Handling($)	3,849,784	4,558,960	5,700,598	6,182,960	6,160,802	6,316,059	6,599,011	5,745,724	5,440,869	5,293,330	5,480,092
Other($)	377,353	460,549	339,995	336,310	327,489	339,986	412,811	543,598	595,667	648,814	638,361
Non Fuel Operation($)	15,495,952	17,093,681	19,828,359	23,833,376	25,306,166	19,678,164	20,198,624	20,579,321	18,412,995	18,567,219	17,145,856
Total Operations($)	96,566,034	113,136,521	126,053,810	136,537,187	146,956,292	134,886,827	142,661,265	140,393,106	129,308,175	141,366,436	141,102,135
Maintenance($)	26,027,790	27,760,895	35,590,480	34,568,417	35,538,442	40,113,342	34,562,435	39,217,303	42,793,556	39,423,293	37,623,433
Boiler/ Reactor(%)	17,940,528	18,516,011	25,577,918	25,654,206	25,749,853	24,838,043	22,420,998	23,908,427	26,222,135	24,366,392	23,935,391
Electric Plant ($)	3,514,069	3,388,774	4,487,868	4,999,752	4,327,872	8,617,480	4,169,446	5,500,064	7,582,108	7,143,078	7,071,664
Other ($)	4,573,193	5,846,110	5,524,694	3,914,459	5,460,718	6,657,819	7,971,990	9,808,812	8,989,314	7,913,823	6,616,377
Boiler/ Reactor (%)	68.93	71.14	98.27	98.56	98.93	95.43	86.14	91.86	100.75	93.62	91.96
Electric Plant (%)	13.50	13.02	17.24	19.21	16.63	33.11	16.02	21.13	29.13	27.44	27.17
Other (%)	17.57	22.46	21.23	15.04	20.98	25.58	30.63	37.69	34.54	30.41	25.42
Non-Fuel Operation and Maintenance ($)	41,523,742	44,844,576	55,418,839	58,401,793	60,844,608	59,791,506	54,761,058	59,796,624	61,206,552	57,990,512	54,769,289
Total Operation and Maintenance ($)	122,593,824	140,887,416	161,644,290	171,105,604	182,494,735	175,000,169	177,223,700	179,610,409	172,101,731	180,789,729	178,725,568
Total $/MWh	14.83	13.84	14.19	15.03	14.88	15.77	14.59	16.57	18.27	17.78	17.47
Fuel $/MWh (Fuel Only)	9.29	8.94	8.80	9.32	9.39	9.78	9.50	10.47	11.13	11.49	11.52
Non Fuel $/MWh	5.53	4.90	5.40	5.70	5.49	5.99	5.09	6.10	7.14	6.29	5.95
Number of Employees	NA	1,061	1,125	1,094	1,207	1,347	1,186	1,350	1,440	1,517	1,345
Full Time	NA	845	856	896	919	932	937	1,043	1,061	1,108	1,107
Part Time	NA	0	0	0	0	0	0	0	0	0	0
Contract	NA	216	269	198	288	415	249	307	379	409	238


Fossil Base Load
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1974
1978
1982
1986
1990
1994
1998
2002
Year
Net Generation (GWh)
Operating Heat Rate (Btu/kWh)


Fossil Base Load
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
1974
1978
1982
1986
1990
1994
1998
2002
Year
Net Capacity Factor
Availability
Equivalent Availability
Forced Outage Rate
Equivalent Forced Outage Rate

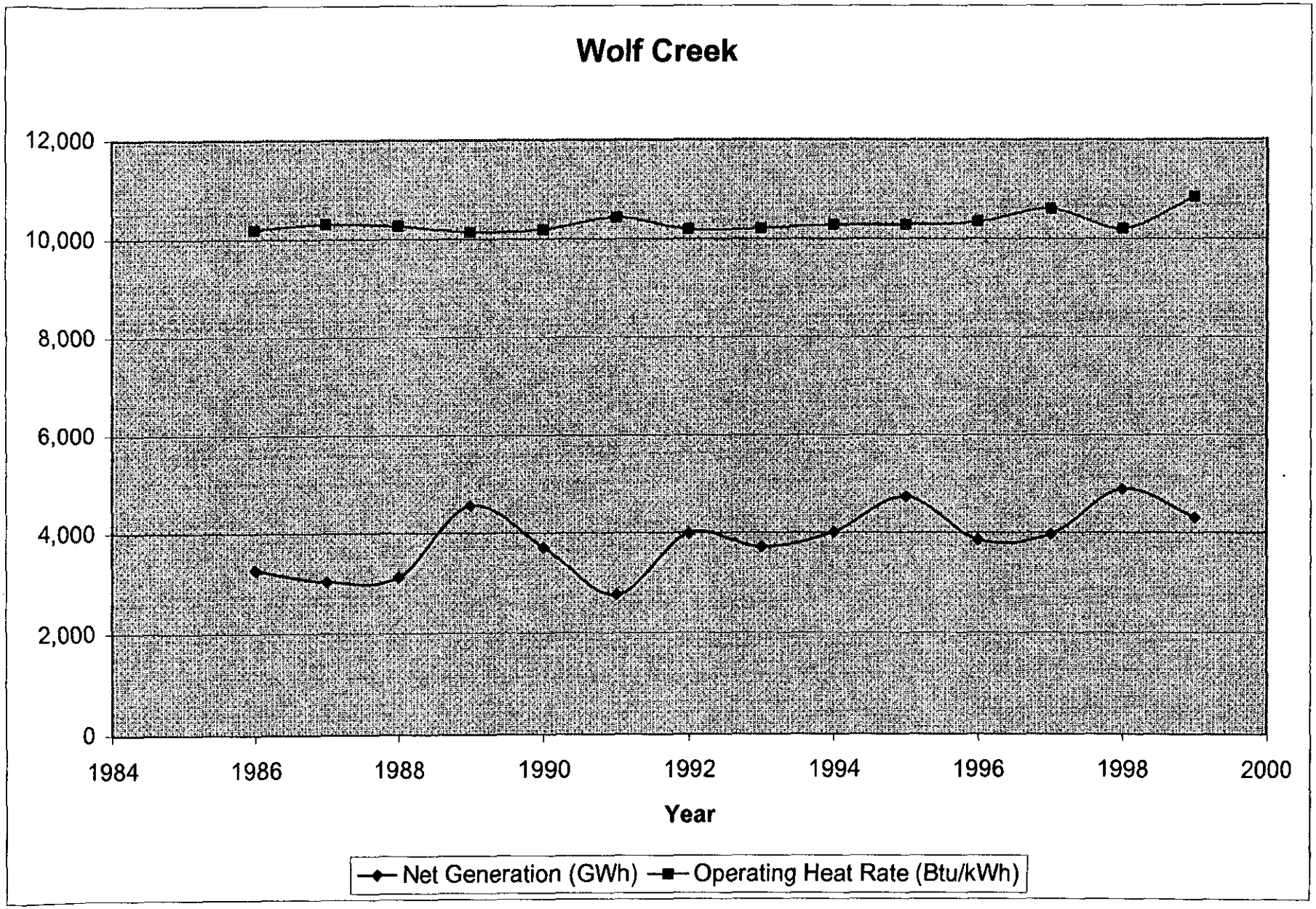

Fossil Base Load
20.0000
18.0000
16.0000
14.0000
12.0000
10.0000
8.0000
6.0000
4.0000
2.0000
0.0000
$/MWh
1988
1990
1992
1994
1996
1998
2000
2002
Year
Total O & M
Fuel
Non-fuel O & M

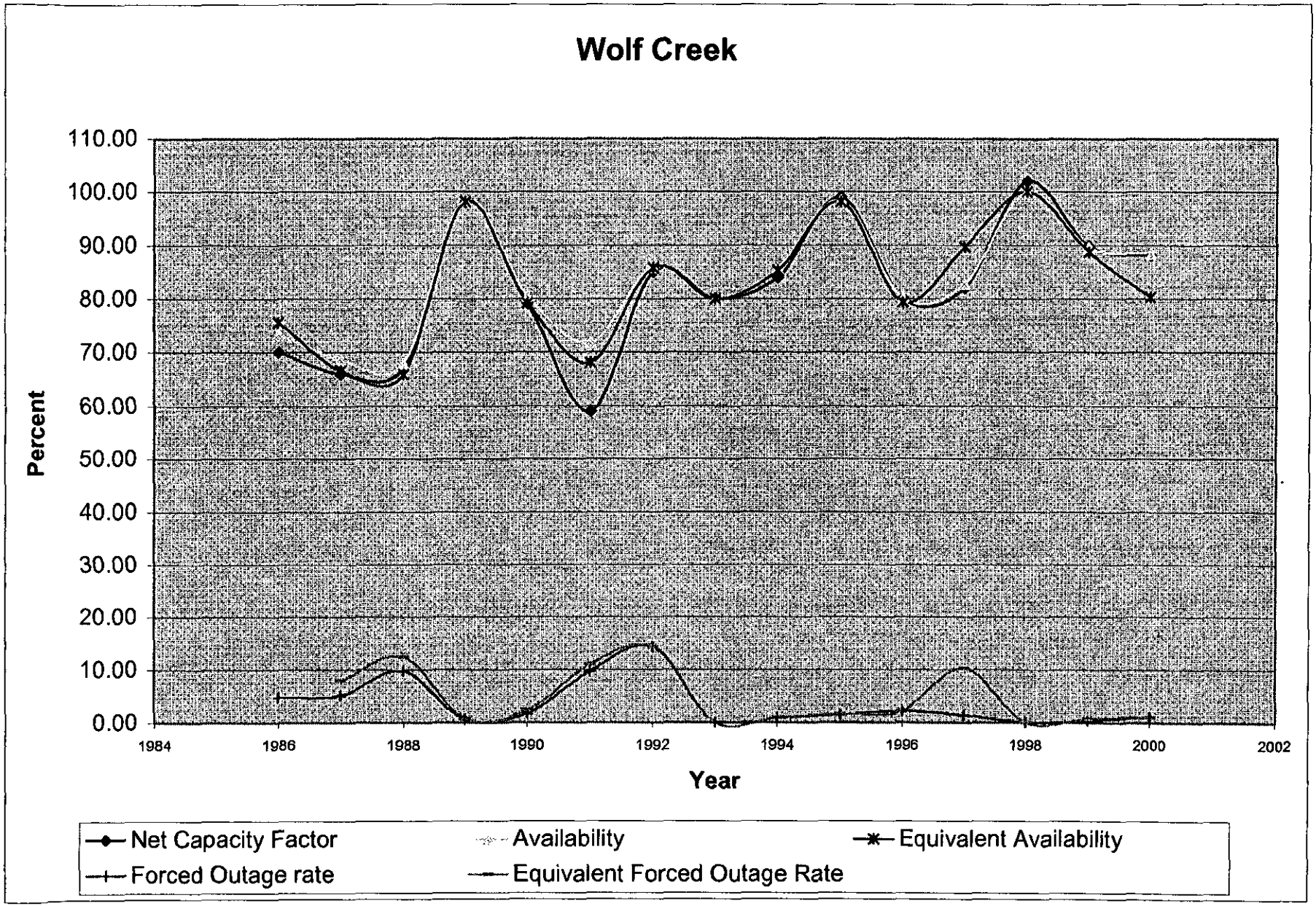
Appendix C. Wolf Creek Performance Data

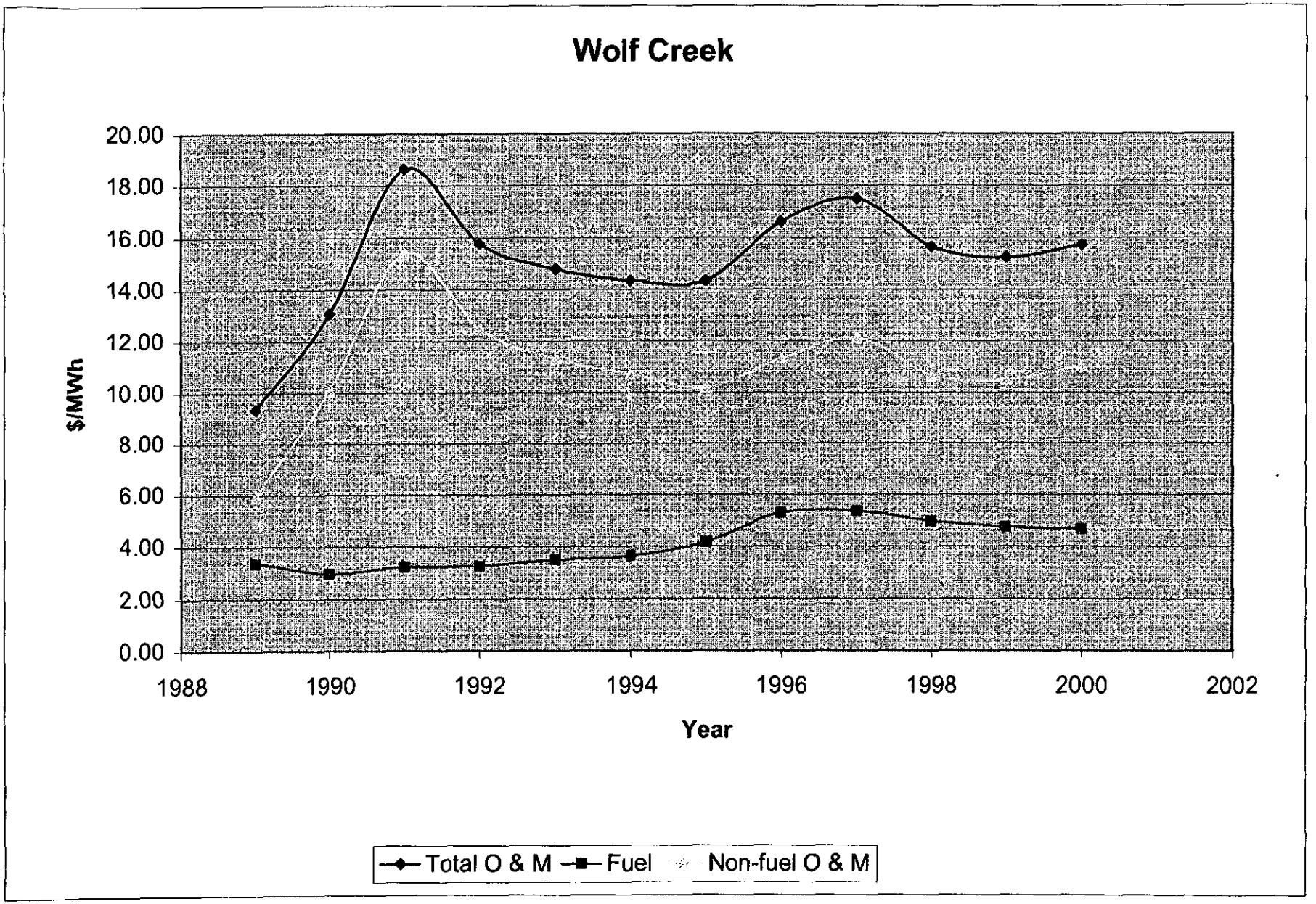
This information is deemed highly confidential in its entirety.

Summary Statistics for Wolf Creek

Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	550	547	548	548	548	548	532	532	532	533	533
Net Generation (MWh)	3,548,964	4,303,564	4,888,272	3,962,235	3,856,274	4,729,216	4,008,623	3,712,783	3,990,611	2,753,525	3,701,019
Operating Heat Rate (Btu/kWh)	NA	10,851	10,208	10,602	10,344	10,288	10,281	10,214	10,186	10,438	10,188
Net Capacity Factor (%)	88.15	89.81	102.00	82.00	80.00	99.00	84.00	80.00	85.00	59.00	79.00
Availability (%)	88.50	89.58	100.00	82.82	80.08	98.46	85.64	79.92	85.83	71.80	80.32
Equivalent Availability (%)	80.26	88.74	100.00	89.75	79.26	98.14	85.32	79.92	85.83	68.07	79.13
Forced Outage Rate (%)	1.12	0.32	0.00	1.43	2.22	1.54	0.87	0.00	14.17	9.63	1.71
Equivalent Forced Outage Rate (%)	1.17	0.72	0.00	10.25	2.22	1.68	0.98	0.00	14.17	10.92	2.31
Operation and Maintenance Costs											
Fuel Operation ($)	14,619,528	19,176,232	27,143,804	19,873,167	18,355,289	22,826,315	12,391,978	9,753,326	19,020,263	8,889,987	11,001,045
Fuel($)	16,579,528	20,468,232	24,299,804	21,205,542	20,370,914	19,690,315	14,571,978	12,953,323	13,020,266	8,889,987	11,001,045
Fuel Handling($)	0	0	0	0	0	0	0	0	0	0	0
Other($)	-1,960,000	-1,292,000	2,844,000	-1,332,375	-2,015,625	3,136,000	-2,180,000	-3,199,997	5,999,997	0	0
Non Fuel Operation($)	26,907,149	32,480,854	32,786,898	32,093,435	27,694,312	29,667,135	30,173,325	30,557,918	29,205,333	26,419,984	22,235,410
Total Operations($)	41,526,677	51,657,086	59,930,702	51,966,602	46,049,601	52,493,450	42,565,303	40,311,244	48,225,596	35,309,971	33,236,455
Maintenance($)	14,199,165	13,843,241	16,467,605	17,316,484	17,940,062	15,336,893	14,897,597	14,548,096	14,640,959	15,971,585	15,066,631
Boiler/ Reactor(%)	7,053,321	6,377,781	2,178,870	9,546,120	9,236,767	2,584,001	6,782,593	5,996,894	3,564,529	6,241,066	5,386,136
Electric Plant ($)	2,798,141	3,014,927	1,559,790	105,450	3,856,523	1,994,167	3,510,479	3,699,501	1,657,826	3,618,420	2,588,644
Other ($)	4,347,703	4,450,533	12,728,945	7,664,914	4,846,772	10,758,726	4,604,526	4,851,702	9,418,605	6,112,099	7,091,852
Boiler/ Reactor (%)	49.67	46.07	13.23	55.13	51.49	16.85	45.53	41.22	24.35	39.08	35.75
Electric Plant (%)	19.71	21.78	9.47	0.61	21.50	13.00	23.56	25.43	11.32	22.66	17.18
Other (%)	30.62	32.15	77.30	44.26	27.02	70.15	30.91	33.35	64.33	38.27	47.07
Non-Fuel Operation and Maintenance ($)	41,106,314	46,324,095	49,254,503	49,409,919	45,634,374	45,004,028	45,070,922	45,106,014	43,846,292	42,391,569	37,302,042
Total Operation and Maintenance ($)	55,725,842	65,500,327	76,398,307	69,283,086	63,989,663	67,830,343	57,462,900	54,859,340	62,866,555	51,281,556	48,303,087
Total $/MWh	15.70	15.22	15.63	17.49	16.59	14.34	14.33	14.78	15.75	18.62	13.05
Fuel $/MWh (Fuel Only)	4.67	4.76	4.97	5.35	5.28	4.16	3.64	3.49	3.26	3.23	2.97
Non Fuel $/MWh	11.03	10.46	10.66	12.13	11.31	10.18	10.70	11.29	12.49	15.40	10.08
Number of Employees	NA	1,090	1,100	1,070	1,108	1,217	1,337	1,417	1,417	1,438	1,401
Full Time	NA	983	985	997	1,026	1,107	1,213	1,263	1,263	1,279	1,252
Part Time	NA	13	12	9	7	8	9	7	7	6	7
Contract	NA	94	103	64	75	102	115	147	147	153	142


Wolf Creek
12,000
10,000
8,000
6,000
4,000
2,000
0
1984
1986
1988
1990
1992
1994
1996
1998
2000
Year
Net Generation (GWh)
Operating Heat Rate (Btu/kWh)


Wolf Creek
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Year
Net Capacity Factor
Availability
Equivalent Availability
Forced Outage rate
Equivalent Forced Outage Rate


Wolf Creek
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
$/MWh
1988
1990
1992
1994
1996
1998
2000
2002
Year
Total O & M
Fuel
Non-fuel O & M

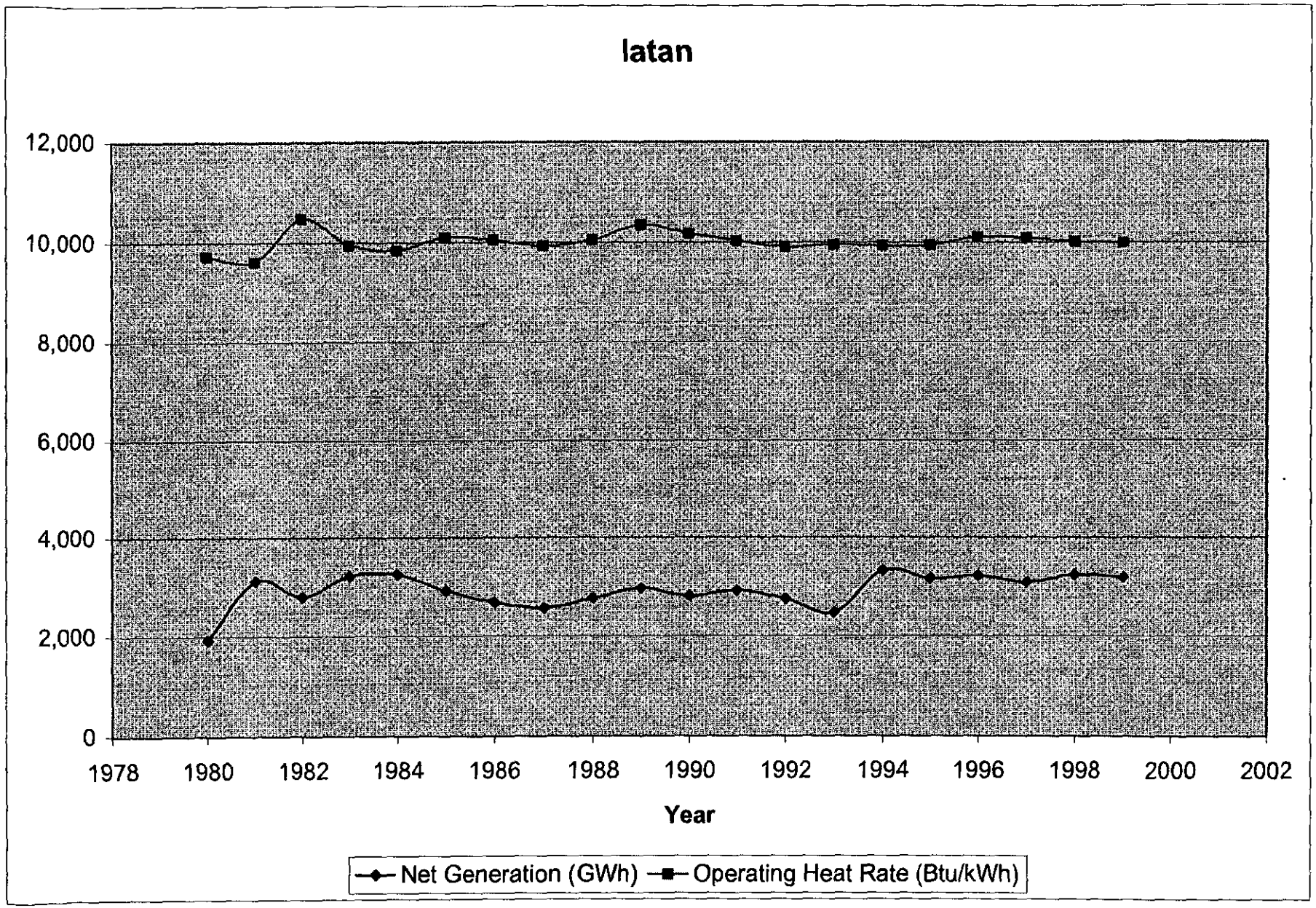
Summary Statistics for Iatan

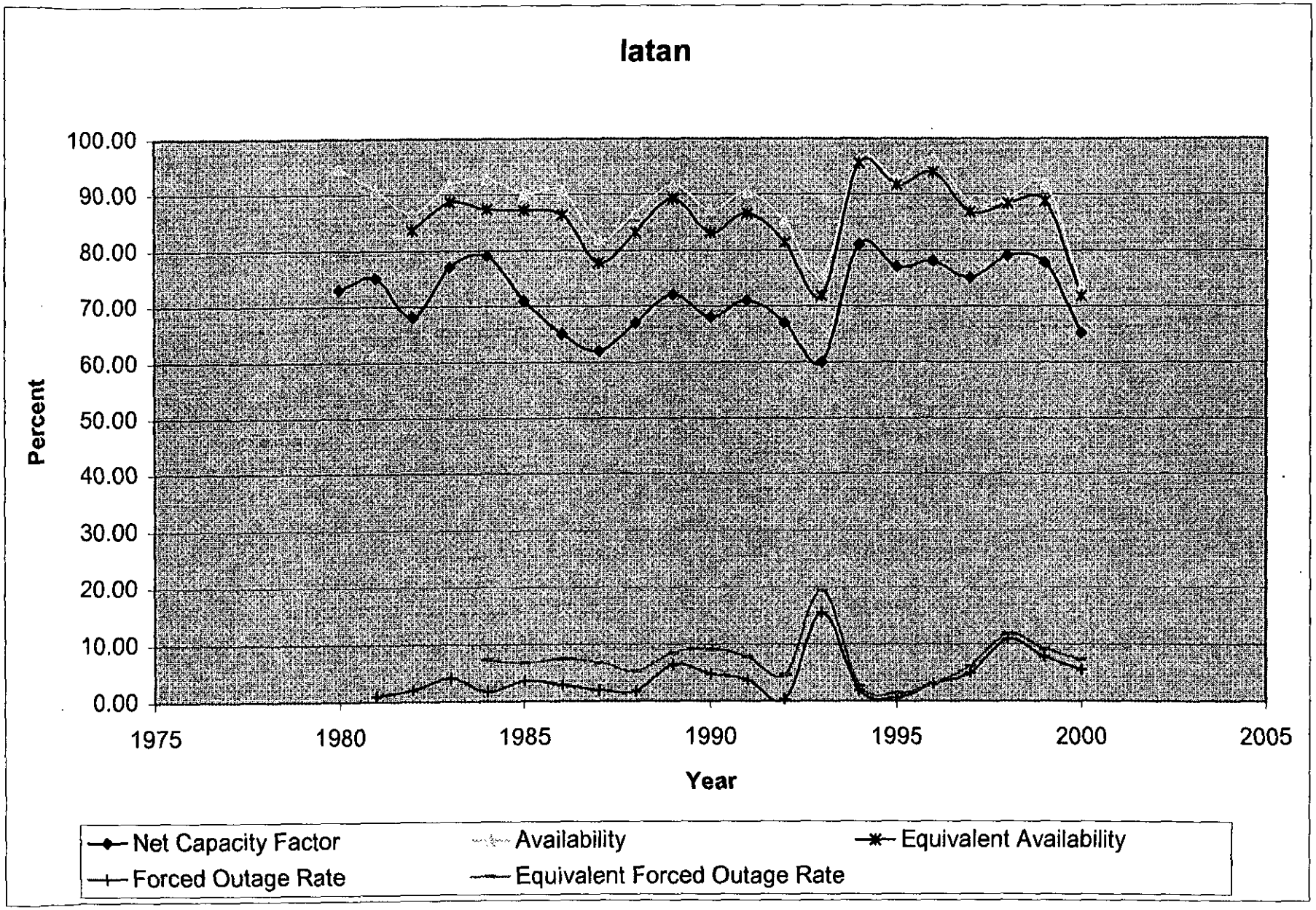
Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	469	469	469	469	469	469	469	469	469	469	469
Net Generation (MWh)	2,238,237	3,192,096	3,235,379	3,085,004	3,213,023	3,161,721	3,318,426	2,463,138	2,743,021	2,920,152	2,802,212
Operating Heat Rate (Btu/kWh)	NA	9,997	10,015	10,083	10,107	9,948	9,931	9,958	9,912	10,028	10,177
Net Capacity Factor (%)	65.20	77.70	79.00	75.00	78.00	77.00	81.00	60.00	67.00	71.00	68.00
Availability (%)	73.43	91.76	89.17	88.22	96.45	92.67	96.26	75.41	85.17	90.37	87.18
Equivalent Availability (%)	71.77	88.72	88.30	86.82	93.82	91.63	95.49	71.85	81.41	86.58	83.16
Forced Outage Rate (%)	5.46	7.69	10.83	4.88	2.96	0.48	1.91	15.43	0.30	3.68	4.71
Equivalent Forced Outage Rate (%)	7.32	9.11	11.70	6.11	2.96	1.22	2.69	19.41	4.56	7.69	9.10
Operation and Maintenance Costs											
Fuel Operation ($)	18,813,105	26,808,986	27,797,490	27,416,655	27,938,291	26,704,862	28,868,200	23,563,083	25,387,814	27,743,986	25,577,335
Fuel($)	17,900,013	25,619,621	26,655,402	26,219,849	26,698,134	25,514,920	27,564,876	22,438,726	24,282,866	26,812,958	24,641,019
Fuel Handling($)	913,092	1,189,365	1,142,088	1,196,806	1,240,157	1,189,942	1,303,324	1,114,357	1,104,948	931,028	936,316
Other($)	0	0	0	0	0	0	0	0	0	0	0
Non Fuel Operation($)	2,874,603	3,394,740	3,737,801	4,175,180	4,171,640	3,397,777	3,857,567	3,917,091	3,383,877	3,134,287	2,898,594
Total Operations($)	21,687,708	30,203,726	31,535,291	31,591,835	32,109,931	30,102,639	32,725,767	27,470,174	28,771,691	30,878,273	28,475,929
Maintenance($)	9,221,260	5,390,198	4,627,638	4,581,512	4,615,061	5,199,656	4,486,009	7,093,167	6,515,459	5,512,687	5,123,067
Boiler/ Reactor(%)	6,152,050	3,970,091	3,376,607	3,488,152	3,426,941	3,481,810	2,410,249	3,584,920	3,412,248	3,396,723	3,322,330
Electric Plant ($)	1,993,214	562,781	595,845	551,262	392,349	694,511	830,082	2,047,922	1,911,018	710,858	676,770
Other ($)	1,075,996	857,326	655,186	542,098	795,771	1,023,335	1,245,678	1,460,326	1,192,193	1,405,105	1,123,967
Boiler/ Reactor (%)	66.72	73.65	72.97	76.14	74.26	66.96	53.73	50.54	52.37	61.62	64.85
Electric Plant (%)	21.62	10.44	12.88	12.03	8.50	13.36	18.50	28.87	29.33	12.89	13.21
Other (%)	11.67	15.91	14.16	11.83	17.24	19.68	27.77	20.59	18.30	25.49	21.94
Non-Fuel Operation and Maintenance ($)	12,095,863	8,784,938	8,365,439	8,756,692	8,786,700	8,597,433	8,343,576	11,010,258	9,899,336	8,646,973	8,021,661
Total Operation and Maintenance ($)	30,908,968	35,593,924	36,162,929	36,173,347	36,724,992	35,302,295	37,211,776	34,563,342	35,287,150	36,390,960	33,598,996
Total $/MWh	13.81	11.15	11.18	11.73	11.43	11.17	11.21	14.03	12.86	12.46	11.99
Fuel $/MWh (Fuel Only)	8.00	8.03	8.24	8.50	8.31	8.07	8.31	9.11	8.85	9.18	8.79
Non Fuel $/MWh	5.81	3.12	2.94	3.23	3.12	3.10	2.91	4.92	4.01	3.28	3.20
Number of Employees	NA	123	114	129	129	145	126	167	161	158	162
Full Time	NA	110	107	114	116	115	114	128	129	133	137
Part Time	NA	0	0	0	0	0	0	0	0	0	0
Contract	NA	13	7	15	13	30	12	39	32	25	25

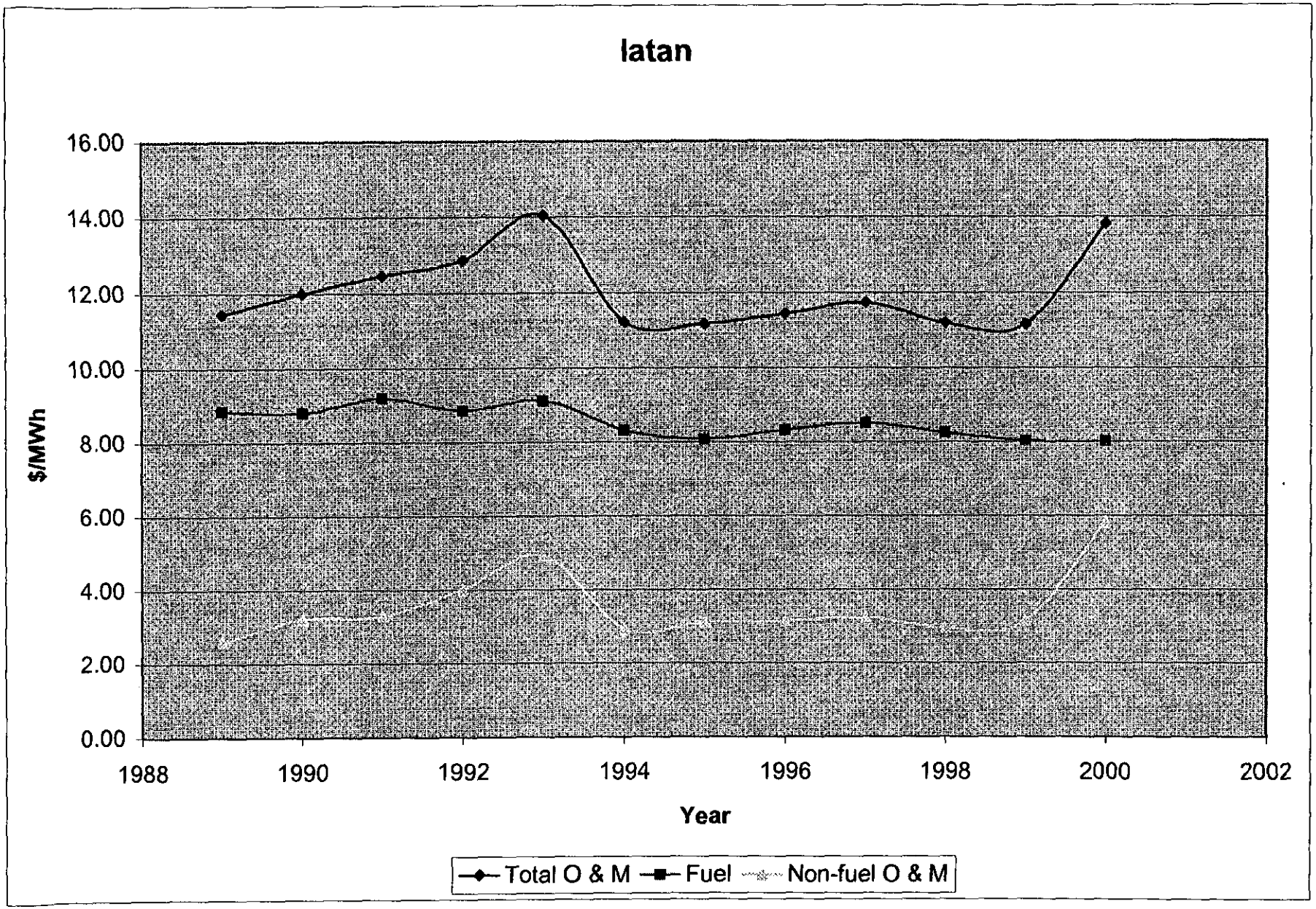
Appendix D. Iatan Performance Data

This information is deemed highly confidential in its entirety.

REMOVE FROM HC
DATE 8/14/01


latan
12,000
10,000
8,000
6,000
4,000
2,000
0
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Year
Net Generation (GWh)
Operating Heat Rate (Btu/kWh)


Iatan
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
1975
1980
1985
1990
1995
2000
2005
Year
Net Capacity Factor
Availability
Equivalent Availability
Forced Outage Rate
Equivalent Forced Outage Rate

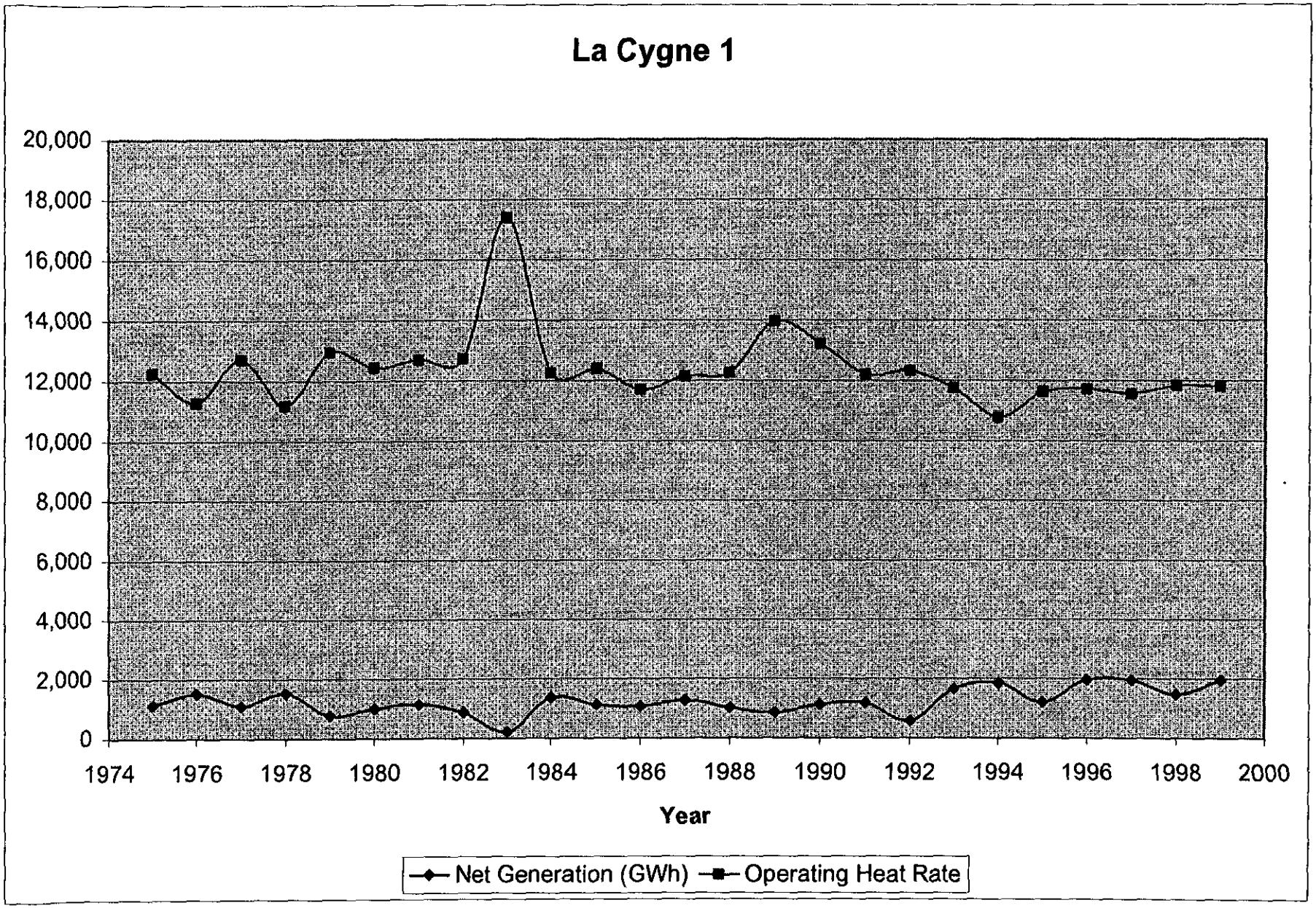

Iatan
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
$/MWh
1988
1990
1992
1994
1996
1998
2000
2002
Year
Total O & M
Fuel
Non-fuel O & M

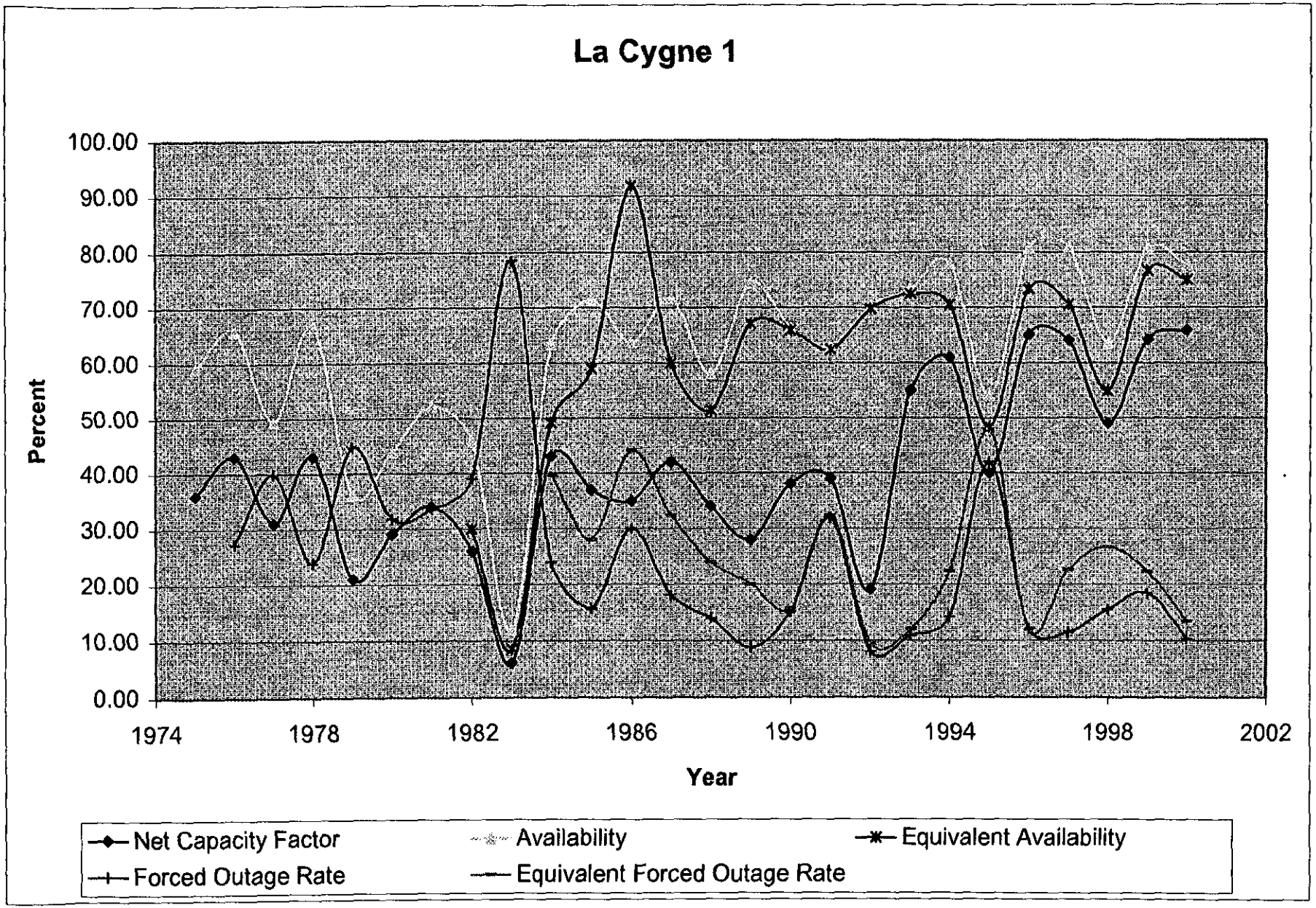
Appendix E. La Cygne 1 Performance Data

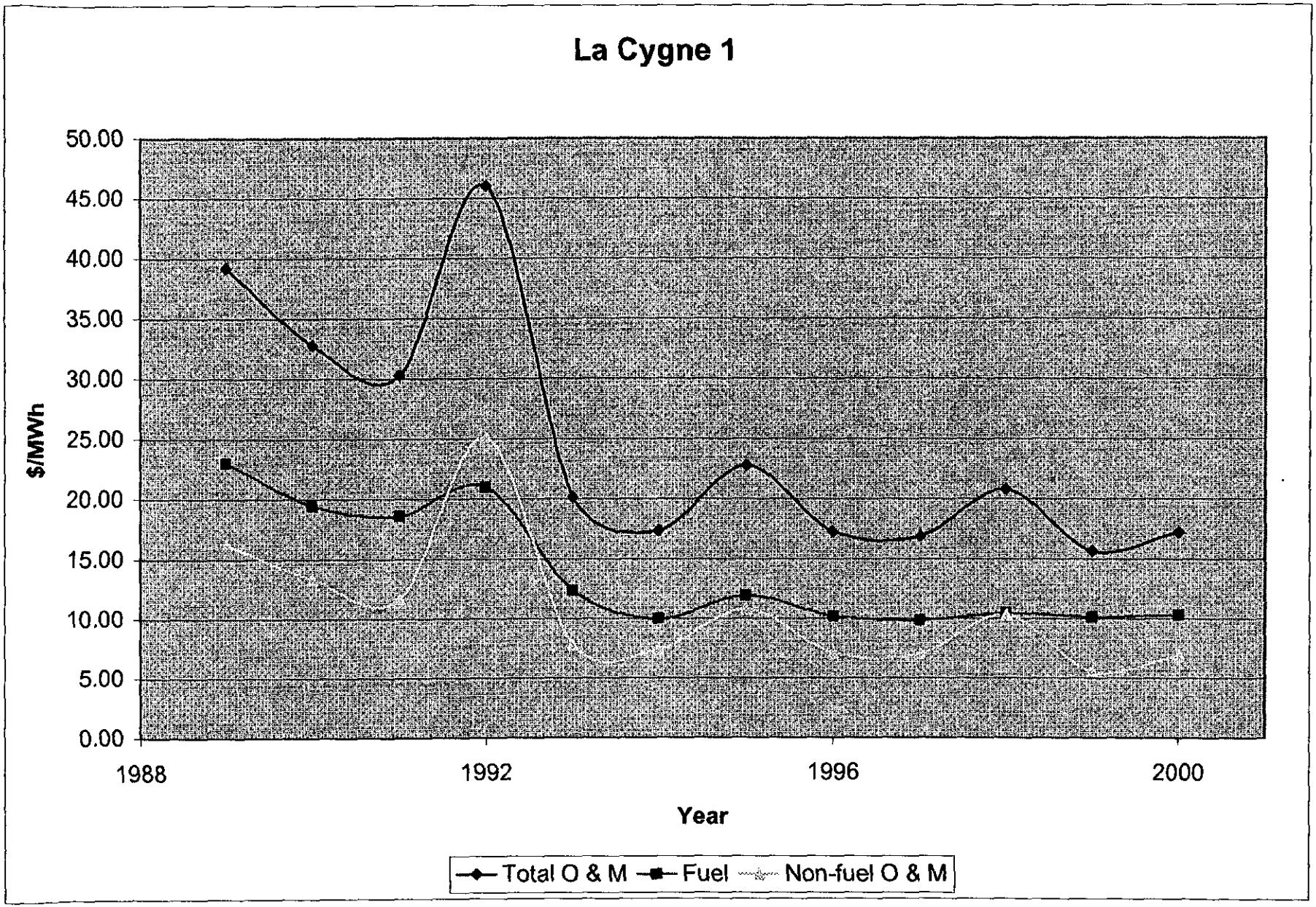
This information is deemed highly confidential in its entirety.

Summary Statistics for La Cygne 1

Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	344	344	343	341	341	341	343	343	343	343	343
Net Generation (MWh)	1,658,589	1,935,006	1,463,881	1,930,428	1,946,484	1,208,514	1,836,156	1,636,180	562,078	1,171,269	1,129,154
Operating Heat Rate (Btu/kWh)	NA	11,799	11,827	11,560	11,711	11,616	10,789	11,735	12,316	12,208	13,216
Net Capacity Factor (%)	65.88	64.21	49.00	64.00	65.00	40.00	61.00	55.00	19.00	39.00	38.00
Availability (%)	77.72	80.60	63.53	80.90	80.60	53.96	78.00	73.39	70.22	62.84	66.34
Equivalent Availability (%)	75.03	76.69	55.01	70.54	73.33	48.34	70.48	72.42	69.72	62.35	65.94
Forced Outage Rate (%)	10.33	18.42	15.46	11.36	11.94	41.94	14.09	10.76	8.00	31.85	15.07
Equivalent Forced Outage Rate (%)	13.46	22.38	26.72	22.57	11.94	47.98	22.35	11.96	9.37	32.39	15.60
Operation and Maintenance Costs											
Fuel Operation ($)	18,330,104	20,977,778	16,646,106	20,461,087	21,270,528	15,762,491	19,707,212	21,676,629	13,175,186	23,658,022	23,895,417
Fuel($)	17,116,730	19,555,063	15,244,961	19,004,942	19,869,094	14,397,887	18,273,558	20,175,478	11,769,291	21,789,241	21,984,993
Fuel Handling($)	836,021	962,166	1,061,150	1,119,835	1,073,945	1,024,618	1,020,843	957,553	810,228	1,219,967	1,272,063
Other($)	377,353	460,549	339,995	336,310	327,489	339,986	412,811	543,598	595,667	648,814	638,361
Non Fuel Operation($)	3,237,707	3,471,165	3,865,928	4,351,735	4,418,688	3,469,548	3,406,752	3,191,113	2,858,449	3,412,626	3,200,950
Total Operations($)	21,567,811	24,448,943	20,512,034	24,812,822	25,689,216	19,232,039	23,113,964	24,867,742	16,033,635	27,070,649	27,096,367
Maintenance($)	7,022,135	5,751,606	9,842,502	7,770,791	7,942,645	8,207,752	8,703,574	8,051,381	9,836,629	8,360,571	9,910,362
Boiler/ Reactor(%)	5,721,651	4,549,346	7,269,750	6,197,317	6,457,450	5,923,068	6,119,439	4,662,950	5,980,908	5,649,577	6,540,503
Electric Plant ($)	548,399	149,233	1,605,244	745,180	400,799	715,103	810,112	1,081,007	2,133,860	1,050,334	1,966,568
Other ($)	752,085	1,053,027	967,508	828,294	1,084,395	1,569,581	1,774,024	2,307,424	1,721,862	1,660,660	1,403,291
Boiler/ Reactor (%)	81.48	79.10	73.86	79.75	81.30	72.16	70.31	57.91	60.80	67.57	66.00
Electric Plant (%)	7.81	2.59	16.31	9.59	5.05	8.71	9.31	13.43	21.69	12.56	19.84
Other (%)	10.71	18.31	9.83	10.66	13.65	19.12	20.38	28.66	17.50	19.86	14.16
Non-Fuel Operation and Maintenance ($)	10,259,842	9,222,771	13,708,430	12,122,526	12,361,333	11,677,300	12,110,326	11,242,495	12,695,079	11,773,197	13,111,312
Total Operation and Maintenance ($)	28,589,946	30,200,549	30,354,536	32,583,613	33,631,861	27,439,791	31,817,538	32,919,123	25,870,265	35,431,220	37,006,729
Total $/MWh	17.24	15.61	20.74	16.88	17.28	22.71	17.33	20.12	46.03	30.25	32.77
Fuel $/MWh (Fuel Only)	10.32	10.11	10.41	9.84	10.21	11.91	9.95	12.33	20.94	18.60	19.47
Non Fuel $/MWh	6.92	5.50	10.32	7.03	7.07	10.79	7.38	7.79	25.09	11.65	13.30
Number of Employees*	NA	325	365	344	390	426	385	413	462	510	423
Full Time*	NA	248	254	264	273	280	284	315	322	339	336
Part Time*	NA	0	0	0	0	0	0	0	0	0	0
Contract*	NA	77	111	80	117	146	101	98	140	171	87


La Cygne 1
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
Year
Net Generation (GWh)
Operating Heat Rate


La Cygne 1
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
1974
1978
1982
1986
1990
1994
1998
2002
Year
Net Capacity Factor
Availability
Equivalent Availability
Forced Outage Rate
Equivalent Forced Outage Rate

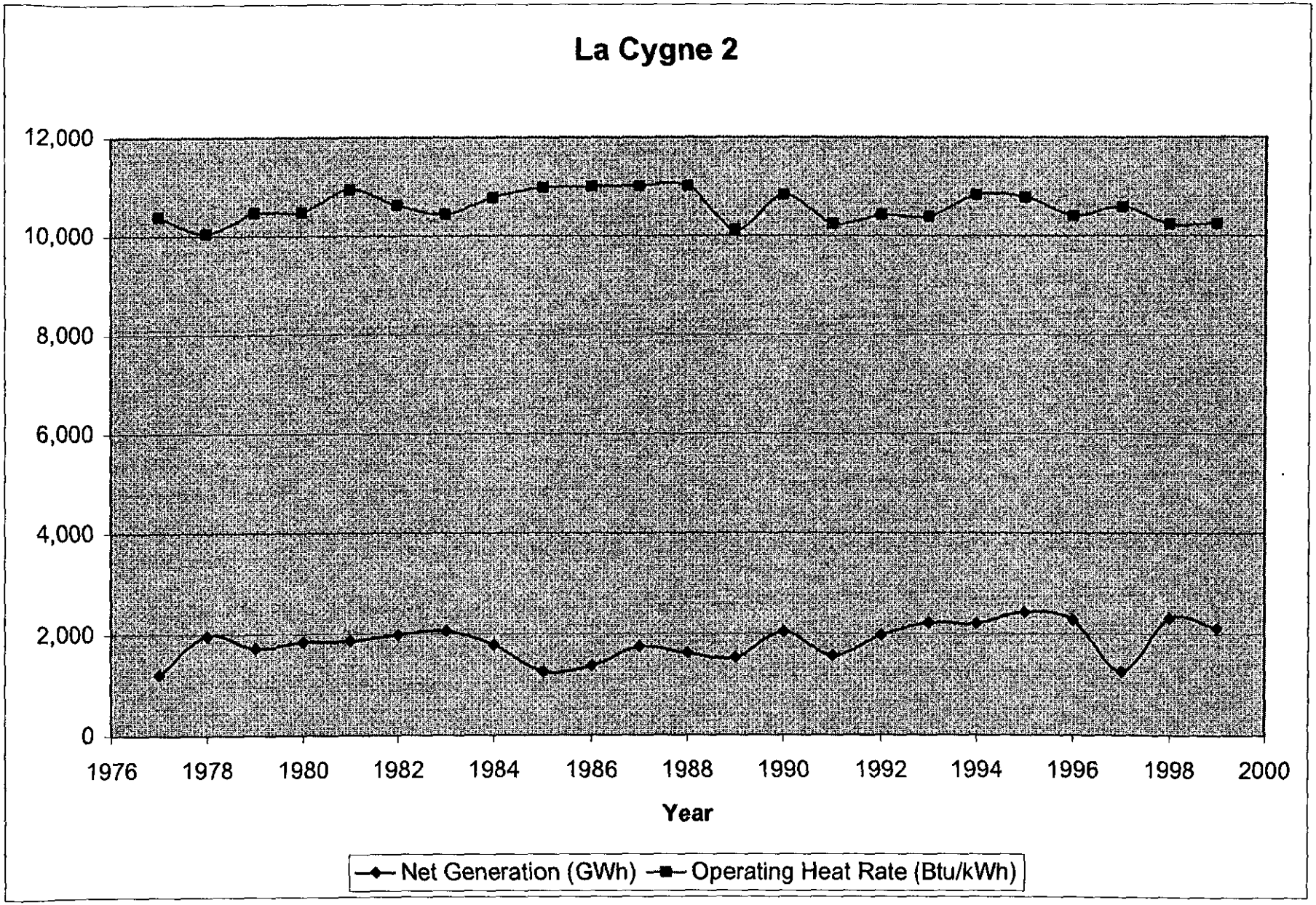

La Cygne 1
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
$/MWh
1988
1992
1996
2000
Year
Total O & M
Fuel
Non-fuel O & M

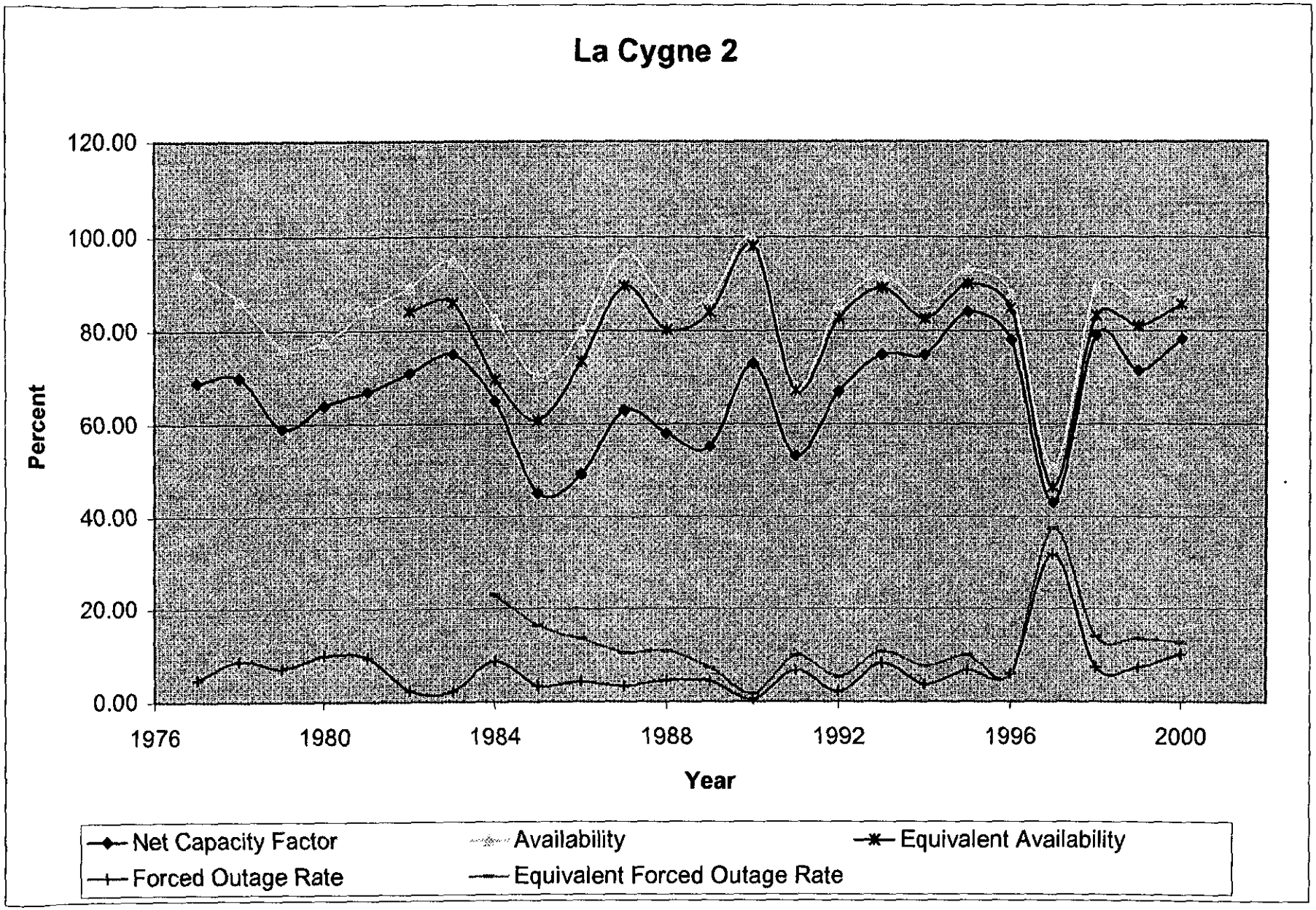
Appendix F. La Cygne 2 Performance Data

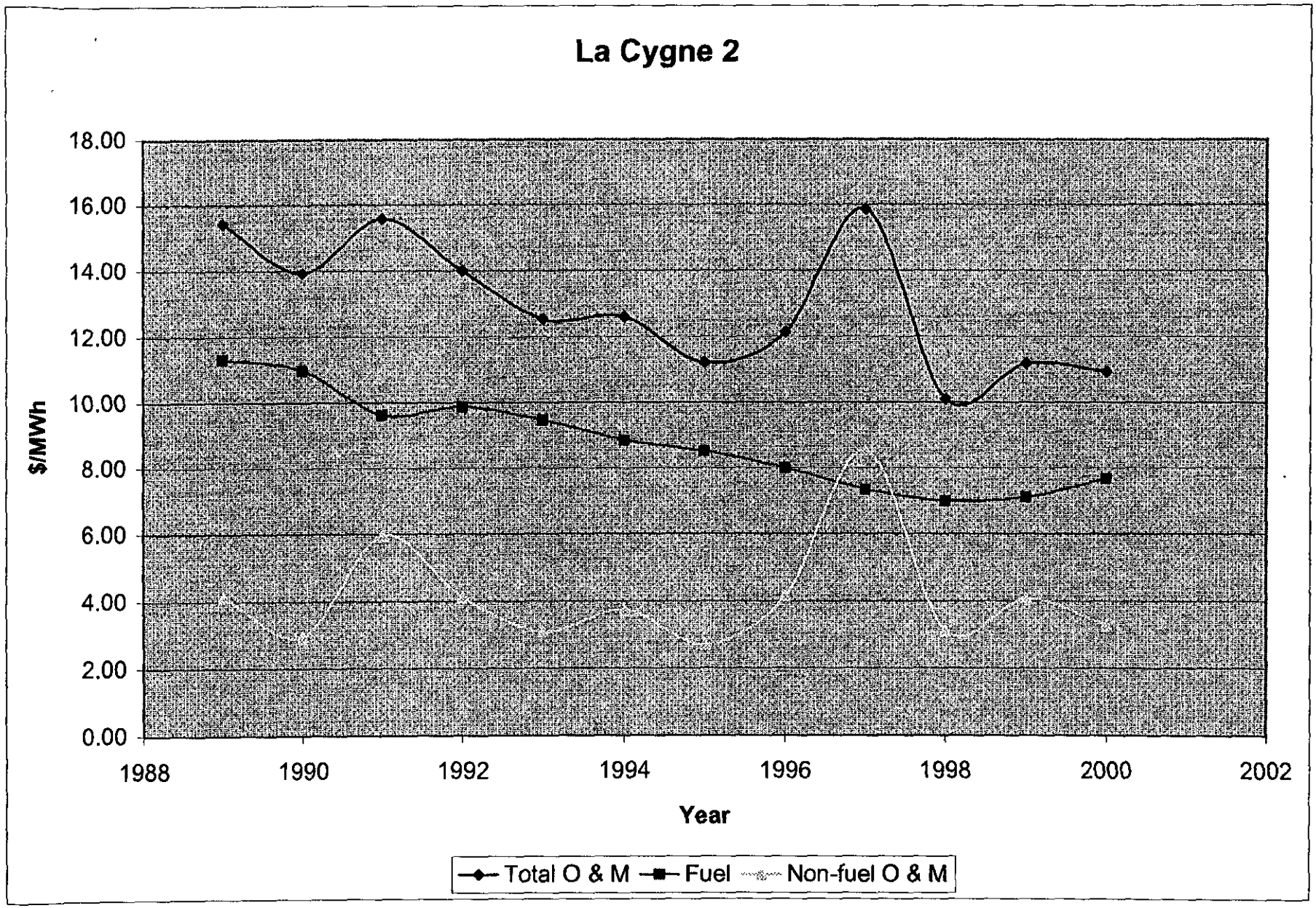
This information is deemed highly confidential in its entirety.

Summary Statistics for La Cygne 2

Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	337	336	334	331	331	331	335	335	333	320	320
Net Generation (MWh)	1,930,103	2,107,578	2,309,828	1,253,698	2,269,818	2,428,079	2,202,881	2,208,984	1,969,535	1,565,265	2,034,915
Operating Heat Rate (Btu/kWh)	NA	10,245	10,227	10,579	10,409	10,771	10,818	10,392	10,416	10,244	10,815
Net Capacity Factor (%)	78.24	71.60	79.00	43.00	78.00	84.00	75.00	75.00	67.00	53.00	73.00
Availability (%)	88.20	86.75	89.63	50.60	87.96	93.22	86.27	91.69	85.59	68.20	99.53
Equivalent Availability (%)	85.76	81.01	83.19	46.30	84.84	90.09	82.64	89.24	82.77	67.23	98.12
Forced Outage Rate (%)	10.27	7.41	7.34	31.85	5.97	6.78	3.69	8.31	2.14	6.75	0.47
Equivalent Forced Outage Rate (%)	12.76	13.54	13.93	37.41	5.97	9.89	7.72	10.75	5.34	9.84	1.72
Operation and Maintenance Costs											
Fuel Operation ($)	15,591,034	15,869,371	17,119,576	10,193,354	19,213,319	21,688,119	20,700,561	21,909,879	20,316,276	15,668,309	23,246,231
Fuel($)	14,784,616	14,973,519	16,149,780	9,208,681	18,133,068	20,673,031	19,496,740	20,897,805	19,448,262	15,049,571	22,357,457
Fuel Handling($)	806,418	895,852	969,796	984,673	1,080,251	1,015,088	1,203,821	1,012,074	868,014	618,738	888,774
Other($)	0	0	0	0	0	0	0	0	0	0	0
Non Fuel Operation($)	2,282,815	2,210,118	2,658,671	3,244,783	3,194,243	2,114,502	1,939,074	1,880,871	1,912,298	2,122,055	1,794,093
Total Operations($)	17,873,849	18,079,489	19,778,247	13,438,137	22,407,562	23,802,621	22,639,634	23,790,750	22,228,574	17,790,364	25,040,324
Maintenance($)	3,214,854	5,471,596	3,531,845	6,456,400	5,120,918	3,420,066	5,072,404	3,868,244	5,323,800	6,588,819	3,289,259
Boiler/ Reactor(%)	2,412,090	4,113,588	2,435,810	3,422,463	4,183,980	2,305,763	3,563,079	2,477,940	3,754,690	4,511,415	2,410,620
Electric Plant ($)	190,819	342,085	135,689	2,447,009	320,090	313,638	560,786	349,200	488,811	1,000,110	242,392
Other ($)	611,945	1,015,923	960,346	586,928	616,847	800,666	948,539	1,041,103	1,080,300	1,077,294	636,247
Boiler/ Reactor (%)	75.03	75.18	68.97	53.01	81.70	67.42	70.24	64.06	70.53	68.47	73.29
Electric Plant (%)	5.94	6.25	3.84	37.90	6.25	9.17	11.06	9.03	9.18	15.18	7.37
Other (%)	19.03	18.57	27.19	9.09	12.05	23.41	18.70	26.91	20.29	16.35	19.34
Non-Fuel Operation and Maintenance ($)	5,497,669	7,681,714	6,190,516	9,701,183	8,315,161	5,534,568	7,011,478	5,749,115	7,236,098	8,710,874	5,083,352
Total Operation and Maintenance ($)	21,088,703	23,551,085	23,310,092	19,894,537	27,528,480	27,222,686	27,712,039	27,658,993	27,552,374	24,379,183	28,329,583
Total $/MWh	10.93	11.17	10.09	15.87	12.13	11.21	12.58	12.52	13.99	15.58	13.92
Fuel $/MWh (Fuel Only)	7.66	7.10	6.99	7.35	7.99	8.51	8.85	9.46	9.87	9.61	10.99
Non Fuel $/MWh	3.27	4.07	3.10	8.52	4.14	2.70	3.73	3.06	4.11	5.96	2.93
Number of Employees*	NA	325	365	344	390	426	385	413	462	510	423
Full Time*	NA	248	254	264	273	280	284	315	322	339	336
Part Time*	NA	0	0	0	0	0	0	0	0	0	0
Contract*	NA	77	111	80	117	146	101	98	140	171	87


La Cygne 2
12,000
10,000
8,000
6,000
4,000
2,000
0
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
Year
Net Generation (GWh)
Operating Heat Rate (Btu/kWh)


La Cygne 2
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Percent
1976
1980
1984
1988
1992
1996
2000
Year
Net Capacity Factor
Availability
Equivalent Availability
Forced Outage Rate
Equivalent Forced Outage Rate

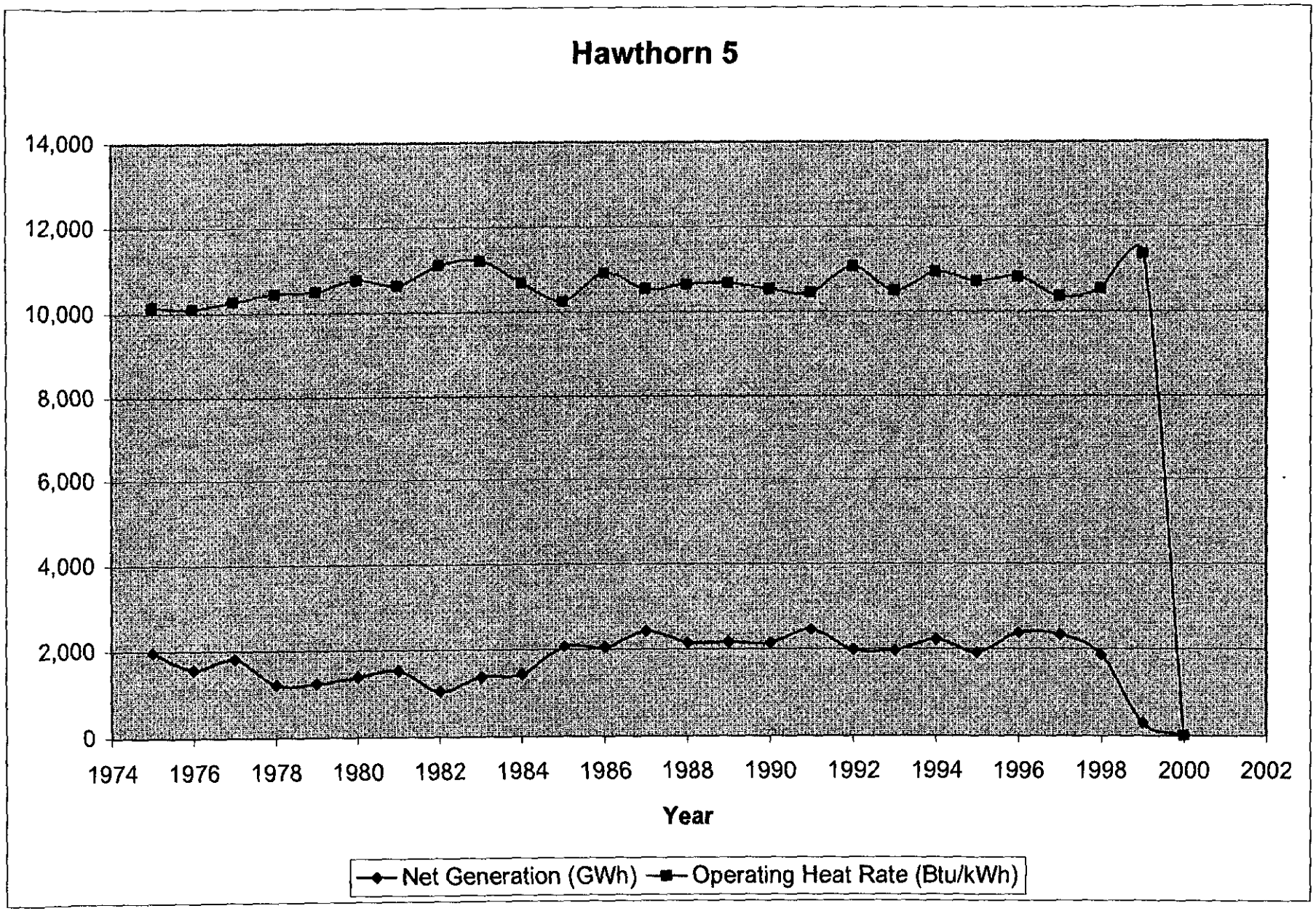

La Cygne 2
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
$/MWh
1988
1990
1992
1994
1996
1998
2000
2002
Year
Total O & M
Fuel
Non-fuel O & M

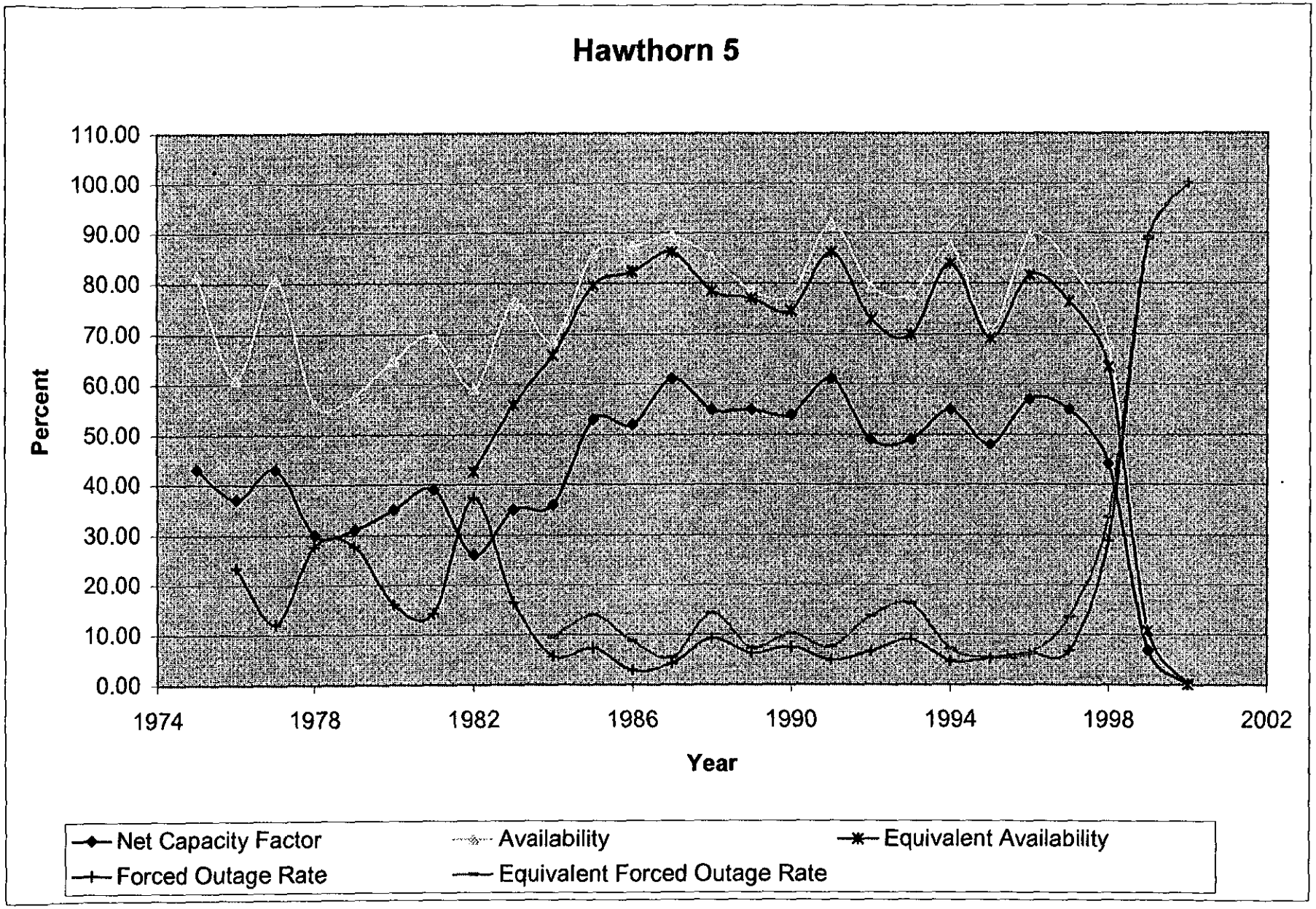
Appendix G. Hawthorn 5 Performance Data

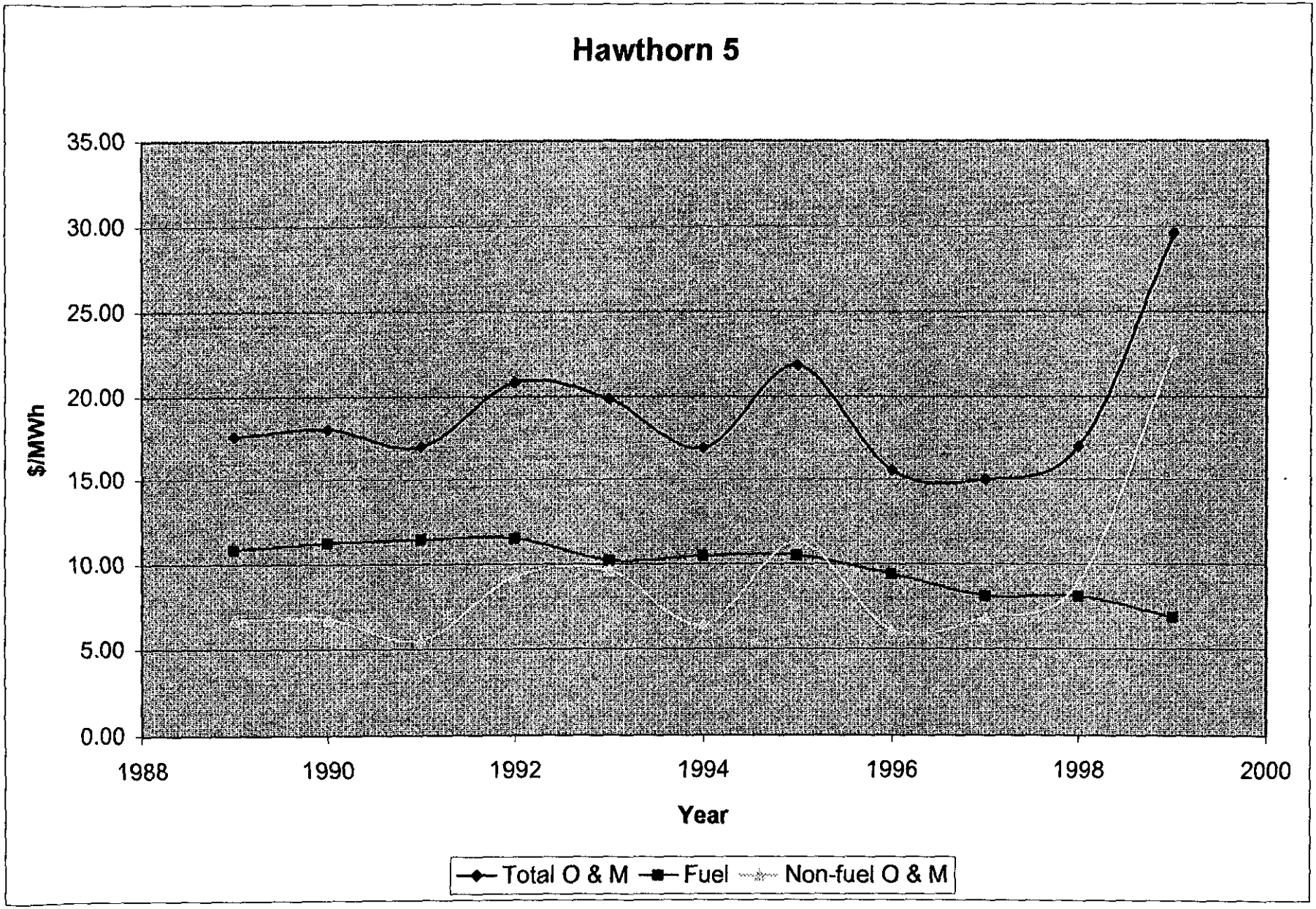
This information is deemed highly confidential in its entirety.

Summary Statistics for Hawthorn 5

Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	476	479	479	479	479	457	457	457	457	457	457
Net Generation (MWh)	0	287,246	1,861,708	2,325,666	2,375,094	1,917,632	2,221,236	1,973,775	1,981,491	2,448,830	2,145,482
Operating Heat Rate (Btu/kWh)	0	11,354	10,544	10,361	10,820	10,704	10,930	10,489	11,059	10,450	10,537
Net Capacity Factor (%)	0.00	6.85	44.00	55.00	57.00	48.00	55.00	49.00	49.00	61.00	54.00
Availability (%)	0.00	11.33	67.92	83.66	89.29	70.77	87.25	77.84	79.29	91.76	77.89
Equivalent Availability (%)	0.00	10.79	63.32	76.34	81.55	69.12	83.89	69.82	72.87	86.21	74.56
Forced Outage Rate (%)	100.00	88.67	28.85	6.76	6.24	5.19	4.66	9.06	6.66	4.85	7.56
Equivalent Forced Outage Rate (%)	100.00	89.07	33.52	13.59	6.24	5.36	7.10	16.18	13.76	7.44	10.22
Operation and Maintenance Costs											
Fuel Operation ($)	303,438	2,340,931	16,470,798	20,381,824	23,887,710	21,314,593	24,712,907	21,447,423	24,080,841	29,259,926	25,375,535
Fuel($)	-83,192	1,979,851	15,072,540	18,961,729	22,369,571	20,110,066	23,234,217	20,168,467	22,872,349	28,052,495	24,161,630
Fuel Handling($)	386,630	361,080	1,398,258	1,420,095	1,518,139	1,204,527	1,478,690	1,278,956	1,208,492	1,207,431	1,213,905
Other($)	0	0	0	0	0	0	0	0	0	0	0
Non Fuel Operation($)	2,369,719	2,777,982	4,799,623	5,499,560	5,955,222	5,449,519	5,517,207	5,772,791	4,973,138	4,650,732	4,431,462
Total Operations($)	2,673,157	5,118,913	21,270,421	25,881,384	29,842,931	26,764,112	30,230,114	27,220,214	29,053,979	33,910,658	29,806,997
Maintenance($)	2,423,660	3,375,939	10,324,652	8,963,465	7,017,659	15,017,443	7,251,319	11,932,907	12,168,947	7,682,418	8,921,555
Boiler/ Reactor(%)	895,925	1,293,841	7,727,974	6,959,254	4,752,405	8,493,370	4,070,479	7,954,462	7,110,674	4,829,027	6,204,747
Electric Plant ($)	284,057	1,203,531	1,415,531	758,436	914,560	4,343,008	1,173,926	1,339,302	1,982,756	717,863	959,038
Other ($)	1,243,678	878,567	1,181,147	1,245,775	1,350,694	2,181,066	2,006,913	2,639,124	3,075,518	2,135,528	1,757,769
Boiler/ Reactor (%)	36.97	38.33	74.85	77.64	67.72	56.56	56.13	66.66	58.43	62.86	69.55
Electric Plant (%)	11.72	35.65	13.71	8.46	13.03	28.92	16.19	11.22	16.29	9.34	10.75
Other (%)	51.31	26.02	11.44	13.90	19.25	14.52	27.68	22.12	25.27	27.80	19.70
Non-Fuel Operation and Maintenance ($)	4,793,379	6,153,921	15,124,275	14,463,025	12,972,881	20,466,963	12,768,526	17,705,698	17,142,085	12,333,149	13,353,017
Total Operation and Maintenance ($)	5,096,817	8,494,852	31,595,073	34,844,849	36,860,590	41,781,556	37,481,433	39,153,121	41,222,926	41,593,076	38,728,552
Total $/MWh	NA	29.57	16.97	14.98	15.52	21.79	16.87	19.84	20.80	16.98	18.05
Fuel $/MWh (Fuel Only)	NA	6.89	8.10	8.15	9.42	10.49	10.46	10.22	11.54	11.46	11.26
Non Fuel $/MWh	NA	22.68	8.87	6.83	6.10	11.30	6.41	9.62	9.26	5.53	6.79
Number of Employees	NA	153	140	133	132	181	133	175	169	151	165
Full Time	NA	110	107	114	116	115	114	128	129	133	137
Part Time	NA	0	0	0	0	0	0	0	0	0	0
Contract	NA	43	33	19	16	66	19	47	40	18	28


Hawthorn 5
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Year
Net Generation (GWh)
Operating Heat Rate (Btu/kWh)


Hawthorn 5
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
1974
1978
1982
1986
1990
1994
1998
2002
Year
Net Capacity Factor
Availability
Equivalent Availability
Forced Outage Rate
Equivalent Forced Outage Rate

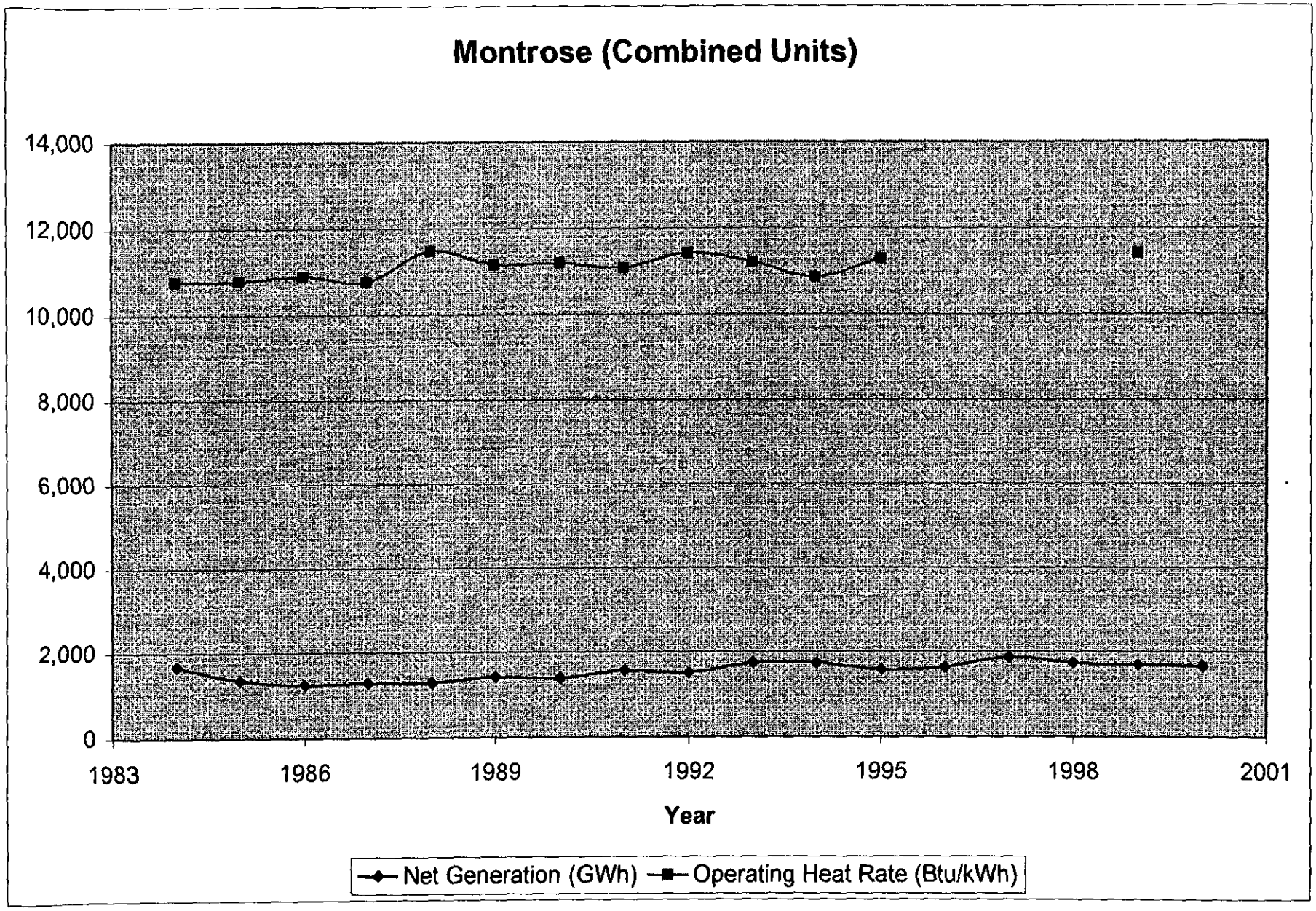

Hawthorn 5
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
$/MWh
1988
1990
1992
1994
1996
1998
2000
Year
Total O & M
Fuel
Non-fuel O & M

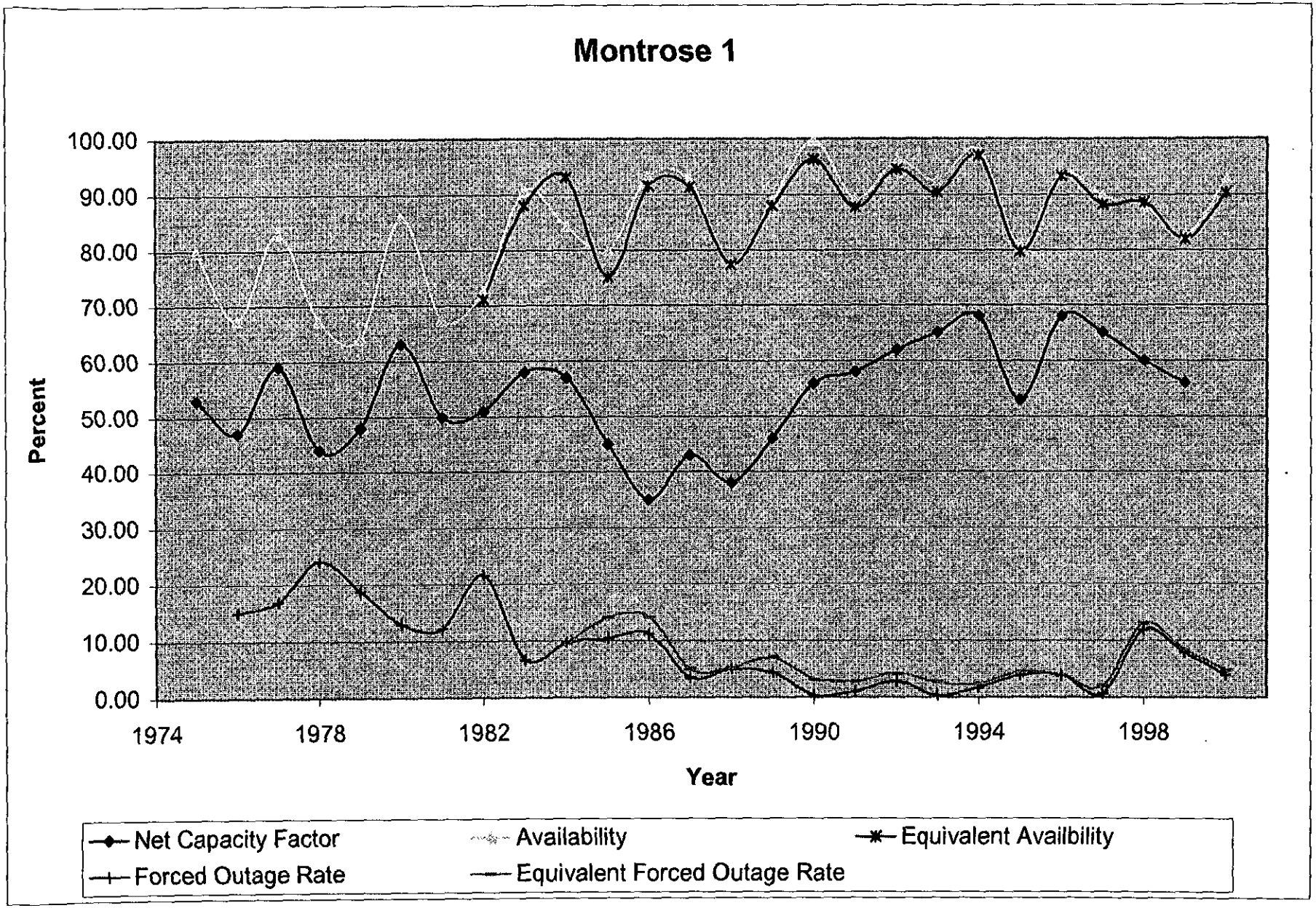
Appendix H. Montrose Performance Data

This information is deemed highly confidential in its entirety.

Summary Statistics for Montrose (Combined Units)

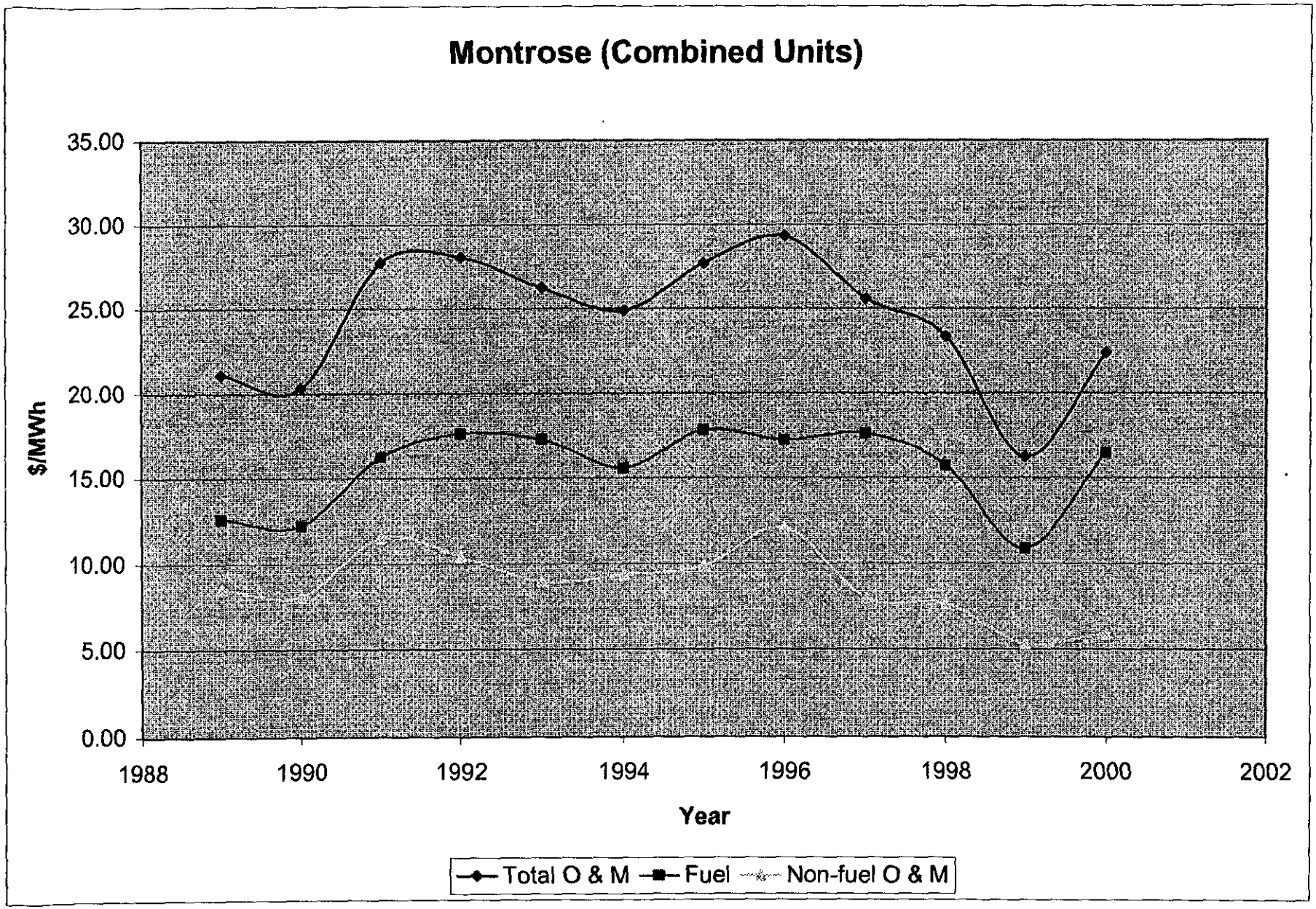
Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics	0	0	0	0	0	0	0	0	0	0	0
Accredited Capacity (MW)	510	497	469	463	463	463	462	462	462	462	462
Net Generation (MWh)	1,646,210	1,686,053	1,723,423	1,861,425	1,630,475	1,563,307	1,728,570	1,729,038	1,502,724	1,550,449	1,376,672
Operating Heat Rate (Btu/KWh)	NA	NA	NA	NA	NA	11,285	10,874	11,220	11,428	1,086	11,203
Net Capacity Factor (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Availability (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Equivalent Availability (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Forced Outage Rate (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Equivalent Forced Outage Rate (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Operation and Maintenance											
Fuel Operation ($)	28,032,401	30,045,774	28,191,481	34,250,891	29,340,278	29,738,598	28,473,763	31,226,771	27,935,062	26,468,973	25,861,762
Fuel ($)	27,124,778	28,895,277	27,062,175	32,789,340	28,091,968	27,856,714	26,881,429	29,843,987	26,485,875	25,152,808	24,692,727
Fuel Handling ($)	907,623	1,150,497	1,129,306	1,461,551	1,248,310	1,881,884	1,592,334	1,382,784	1,449,187	1,316,165	1,169,035
Other ($)											
Non Fuel Operation ($)	4,731,108	5,239,676	4,766,336	6,562,118	7,566,373	5,246,818	5,478,023	5,817,454	5,285,234	5,247,519	4,820,758
Total Operation ($)	32,763,509	35,285,450	32,957,817	40,813,009	36,906,651	34,985,416	33,951,786	37,044,226	33,220,296	31,716,492	30,682,520
Maintenance ($)	4,145,881	7,761,556	7,263,843	6,796,249	10,842,160	8,268,425	9,049,129	8,271,604	8,948,720	11,278,799	10,379,189
Boiler/ Reactor ($)	2,758,812	4,589,145	4,767,777	5,587,020	6,929,076	4,634,032	6,257,752	5,228,136	5,963,616	5,979,650	5,457,190
Electric Plant ($)	497,580	1,131,144	735,559	497,865	2,300,073	2,551,220	794,541	682,633	1,065,663	3,663,913	3,226,896
Other ($)	889,489	2,041,267	1,760,507	711,364	1,613,011	1,083,173	1,996,836	2,360,835	1,919,441	1,635,236	1,695,104
Boiler/ Reactor (%)	66.54	59.13	65.64	82.21	63.91	56.04	69.15	63.21	66.64	53.02	52.58
Electric Plant (%)	12.00	14.57	10.13	7.33	21.21	30.85	8.78	8.25	11.91	32.48	31.09
Other (%)	21.45	26.30	24.24	10.47	14.88	13.10	22.07	28.54	21.45	14.50	16.33
Non fuel Operation and Maintenance ($)	8,876,989	13,001,232	12,030,179	13,358,367	18,408,533	13,515,243	14,527,152	14,089,058	14,233,954	16,526,318	15,199,947
Total Operation and Maintenance ($)	36,909,390	43,047,006	40,221,660	47,609,258	47,748,811	43,253,841	43,000,915	45,315,830	42,169,016	42,995,291	41,061,709
Total $/kWh	22.42	16.19	23.34	25.58	29.28	27.67	24.88	26.21	28.06	27.73	20.32
Fuel $/kWh (Fuel Only)	16.48	10.87	15.70	17.61	17.23	17.82	15.55	17.26	17.62	16.22	12.22
Non Fuel $/kWh	5.94	5.32	7.64	7.96	12.06	9.85	9.32	8.95	10.44	11.51	8.10
Number of Employees	NA	135	141	144	166	169	157	182	186	188	172
Full Time	NA	129	134	140	141	142	141	157	159	164	161
Part Time	NA	0	0	0	0	0	0	0	0	0	0
Contract	NA	6	7	4	25	27	16	25	27	24	11


Montrose (Combined Units)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1983
1986
1989
1992
1995
1998
2001
Year
Net Generation (GWh)
Operating Heat Rate (Btu/kWh)


Montrose 1
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
1974
1978
1982
1986
1990
1994
1998
Year
Net Capacity Factor
Availability
Equivalent Availbility
Forced Outage Rate
Equivalent Forced Outage Rate

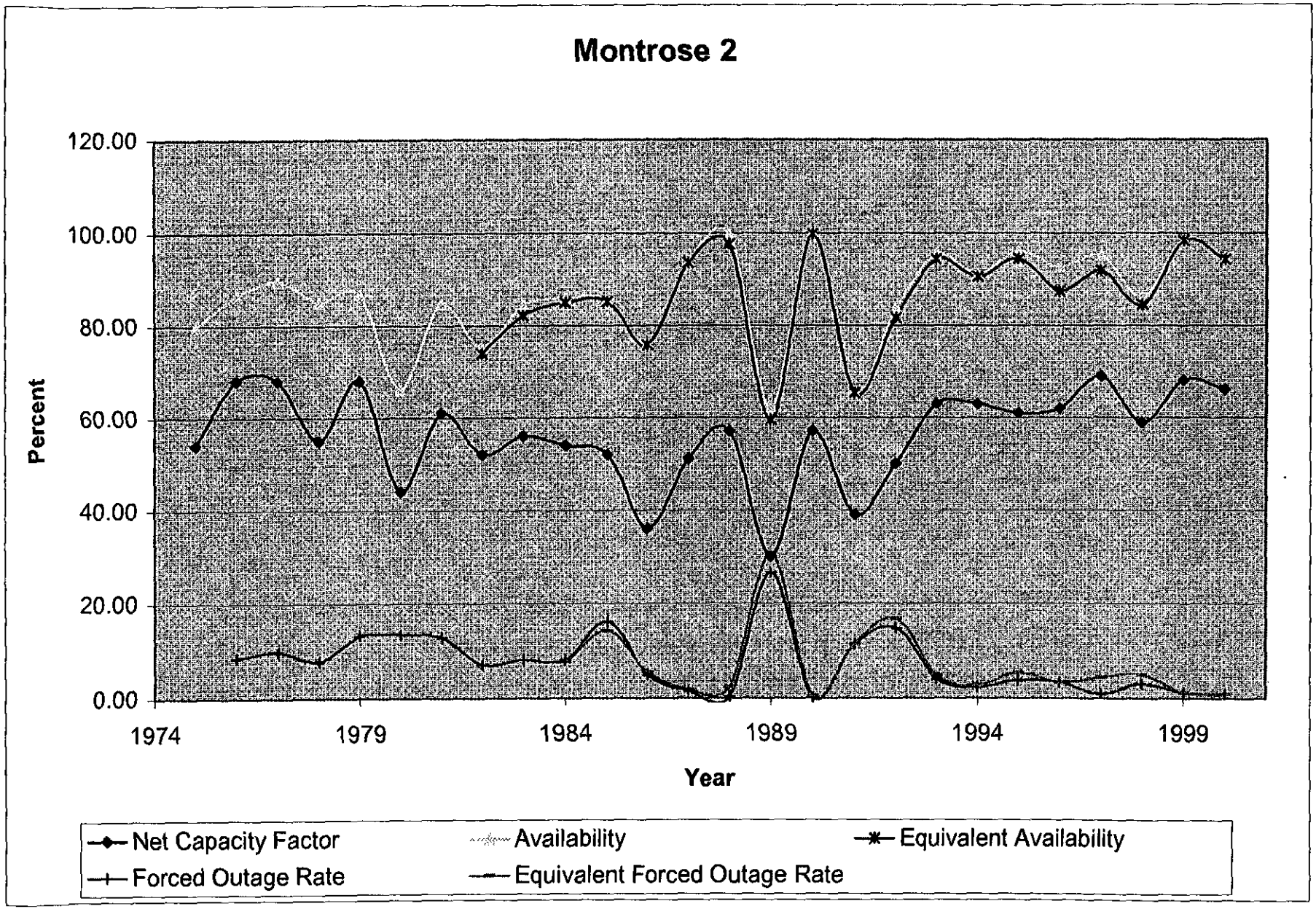
Summary Statistics for Montrose 1

Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	170	163	155	150	150	150	150	150	150	150	150
Net Generation (MWh)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Operating Heat Rate (Btu/KWh)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Net Capacity Factor (%)	NA	55.99	60.00	65.00	68.00	53.00	68.00	65.00	62.00	58.00	56.00
Availability (%)	92.74	82.56	87.75	89.77	93.67	80.54	98.05	92.49	95.82	89.29	99.59
Equivalent Availability (%)	90.25	81.90	88.66	88.19	93.37	79.68	96.96	90.36	94.54	87.73	96.26
Forced Outage Rate (%)	3.89	7.78	11.83	0.54	3.80	3.78	1.63	0.26	2.78	0.98	0.30
Equivalent Forced Outage Rate (%)	4.84	8.29	12.92	1.92	3.80	4.50	2.35	2.61	4.19	2.79	3.18
Operation and Maintenance Costs											
Fuel Operation ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Handling ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non Fuel Operation ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Operation ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maintenance ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boiler/ Reactor ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electric Plant ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boiler/ Reactor (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electric Plant (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non fuel Operation and Maintenance ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total $/kWh	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel $/kWh (Fuel Only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non Fuel $/kWh	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Number of Employees	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Full Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Part Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Contract	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA


Montrose (Combined Units)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
$/MWh
1988
1990
1992
1994
1996
1998
2000
2002
Year
Total O & M
Fuel
Non-fuel O & M

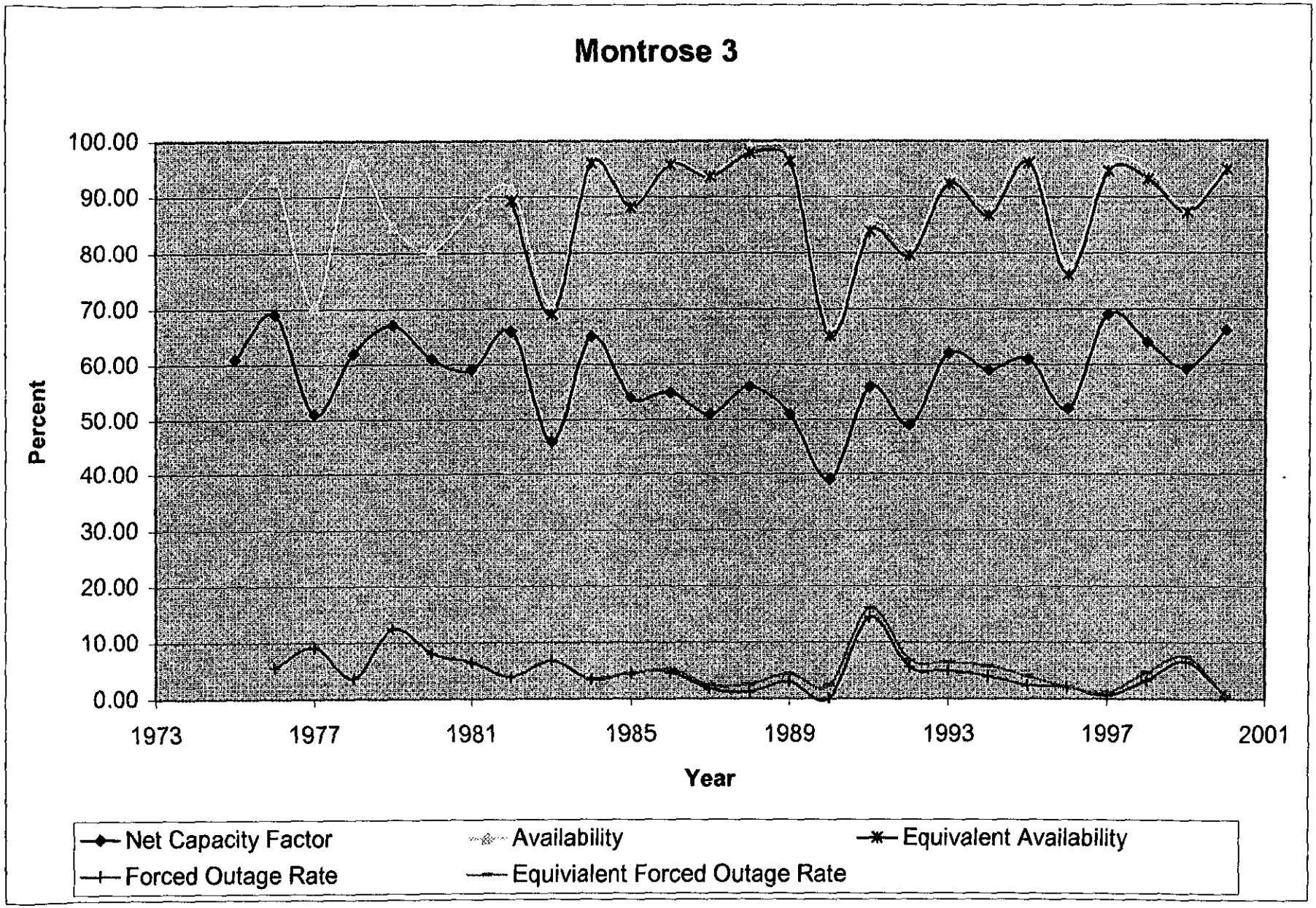
Summary Statistics for Montrose 2

Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	164	163	153	152	152	152	152	152	152	152	152
Net Generation (MWh)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Operating Heat Rate (Btu/KWh)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Net Capacity Factor (%)	66.20	68.16	59.00	69.00	62.00	61.00	63.00	63.00	50.00	39.00	67.00
Availability (%)	94.59	98.53	86.28	95.12	92.69	96.05	91.09	95.47	83.69	65.46	99.98
Equivalent Availability (%)	94.30	98.42	84.54	91.87	87.53	94.51	90.59	94.38	81.75	65.38	99.74
Forced Outage Rate (%)	0.79	1.14	3.02	0.94	3.29	3.67	2.30	3.95	14.62	11.27	0.02
Equivalent Forced Outage Rate (%)	0.93	1.14	4.99	4.29	3.29	5.29	2.71	4.73	16.75	11.39	0.28
Operation and Maintenance Costs											
Fuel Operation ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Handling ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non Fuel Operation ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Operation ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maintenance ($)											
Boiler/ Reactor ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electric Plant ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boiler/Reactor (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electric Plant (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-fuel Operation and Maintenance ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Operation and Maintenance ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total $/kWh	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel $/kWh (Fuel Only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non Fuel $/kWh	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Number of Employees	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Full Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Part Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Contract	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA


Montrose 2
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Percent
1974
1979
1984
1989
1994
1999
Year
Net Capacity Factor
Availability
Equivalent Availability
Forced Outage Rate
Equivalent Forced Outage Rate

Summary Statistics for Montrose 3

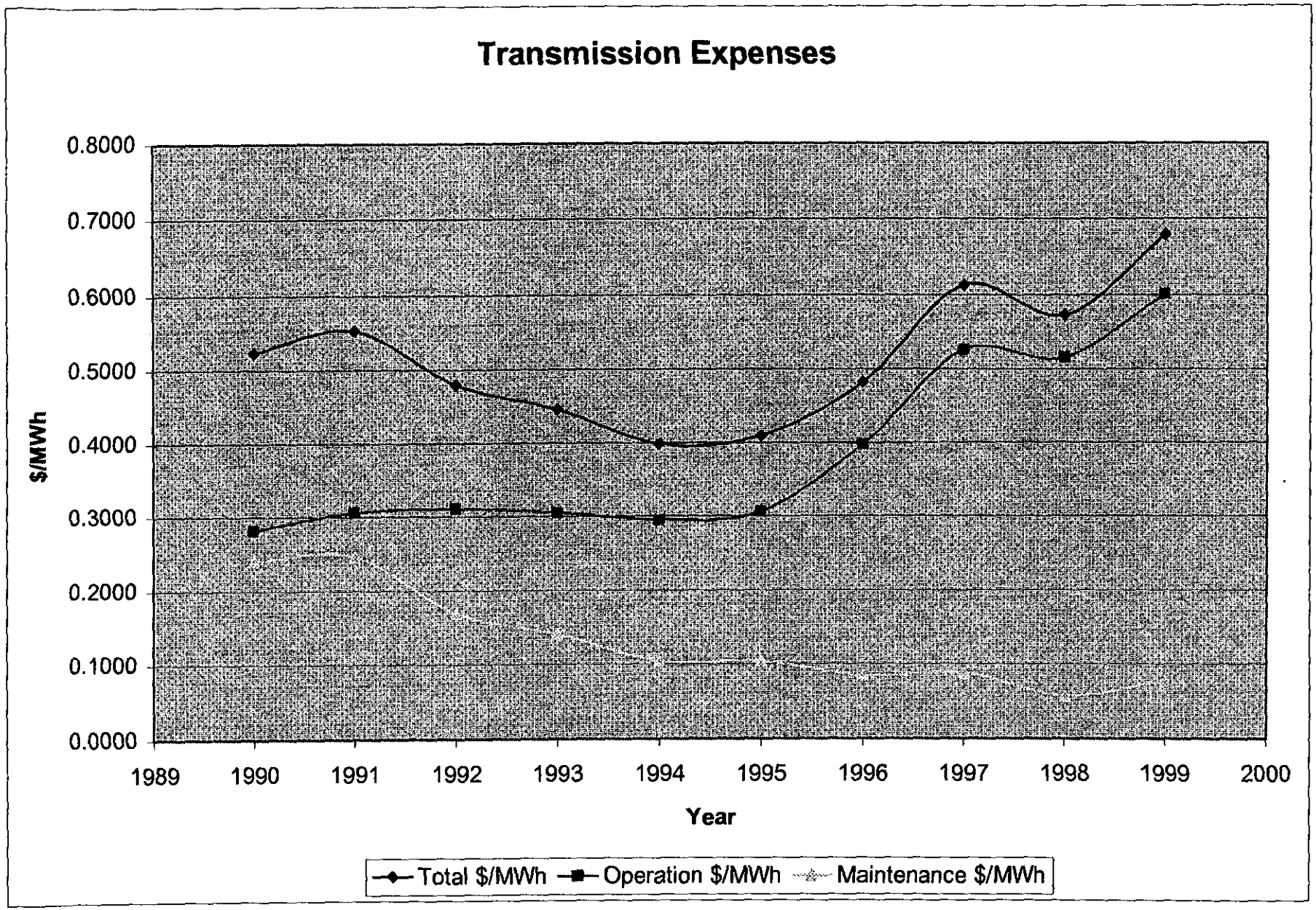
Year	10/2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operating Statistics											
Accredited Capacity (MW)	176	171	161	161	161	161	160	160	160	160	160
Net Generation (MWh)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Operating Heat Rate (Btu/KWh)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Net Capacity Factor (%)	66.08	59.18	64.00	69.00	52.00	61.00	59.00	62.00	49.00	56.00	39.00
Availability (%)	95.53	88.07	94.52	96.34	77.74	97.77	88.40	93.80	80.89	85.54	66.43
Equivalent Availability (%)	94.79	87.20	93.15	94.59	76.00	96.13	86.71	92.25	79.50	83.90	65.10
Forced Outage Rate (%)	0.46	6.44	3.12	0.57	1.98	2.36	3.93	4.92	5.51	14.39	0.03
Equivalent Forced Outage Rate ($)	0.50	7.37	4.54	1.11	1.98	3.88	5.74	6.41	6.79	16.11	2.26
Operation and Maintenance											
Fuel Operation ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Handling ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-fuel Operation ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Operation ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maintenance ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boiler/Reactor ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electric Plant ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boiler/Reactor (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electric Plant (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-fuel Operation and Maintenance ($)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total $/kWh	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel $/kWh (Fuel Only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-fuel $/kWh	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Number of Employees	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Full Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Part Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Contract	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA


Montrose 3
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
1973
1977
1981
1985
1989
1993
1997
2001
Year
Net Capacity Factor
Availability
Equivalent Availability
Forced Outage Rate
Equivialent Forced Outage Rate

Appendix I. Transmission Operation and Maintenance Data

Transmission Operation and Maintenance Expenses

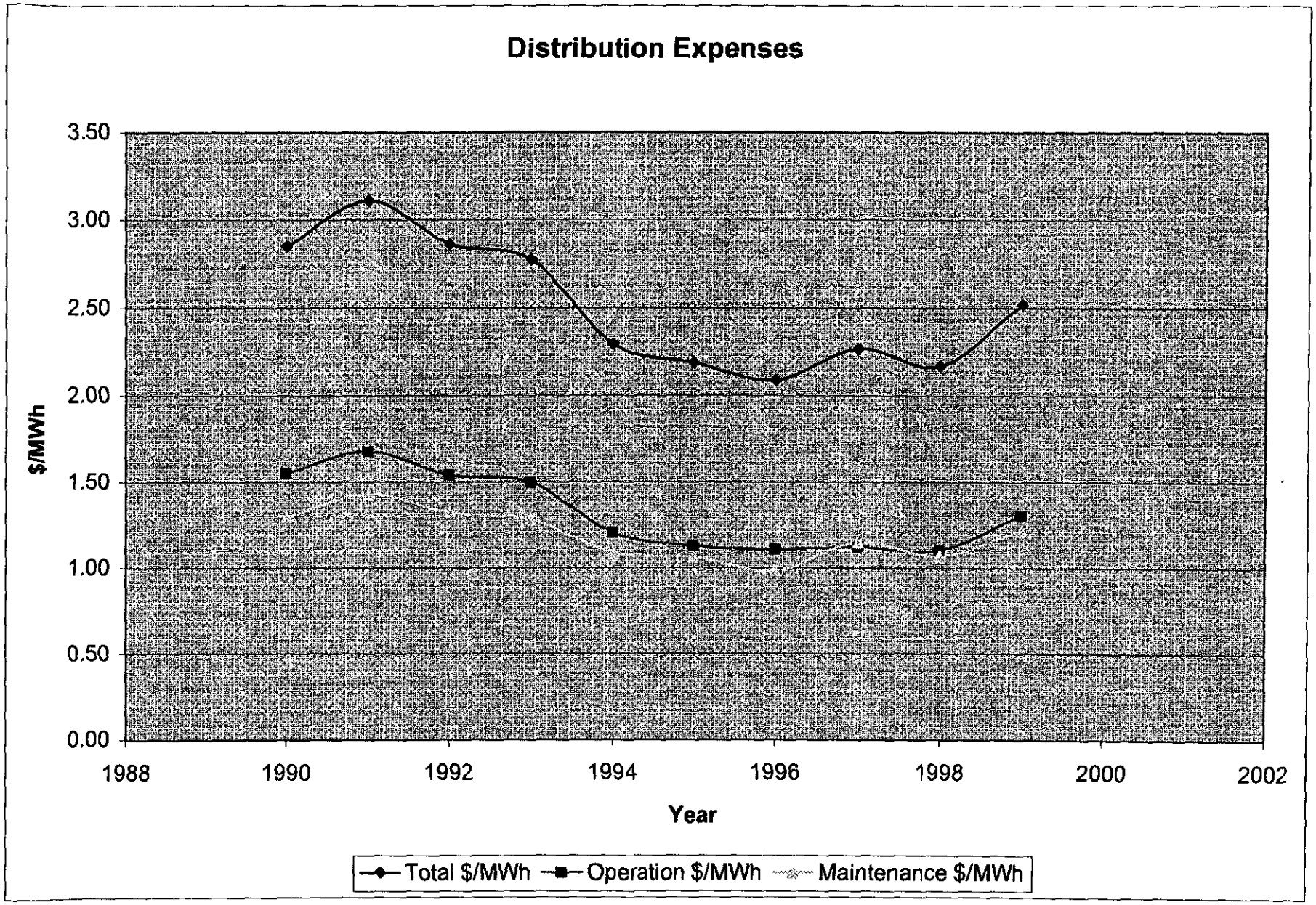
	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operation										
Supervision and Engineering	1,908,217	1,858,694	959,633	1,311,728	911,191	839,993	817,960	730,377	746,322	751,139
Load Dispatching	551,295	523,527	517,389	431,996	540,916	548,184	623,672	607,279	616,070	566,546
Station Expenses	385,361	292,546	336,182	137,077	105,854	143,262	182,148	151,662	182,509	162,428
Overhead Lines	117,302	89,413	86,411	117,754	177,045	309,643	151,171	68,757	99,604	171,806
Underground Lines	11,099	9,160	9,352	9,828	9,805	25,196	18,187	28,385	13,964	203
Transmission by Others	1,673,266	1,946,145	2,058,246	743,916	327,395	346,290	237,446	277,361	205,830	190,045
Miscellaneous	1,565,146	1,351,100	1,579,115	1,096,398	270,296	96,321	-27,413	-83,991	99,736	98,237
Rents	2,703,211	2,458,214	2,554,383	2,561,787	2,504,705	2,461,437	2,441,132	2,390,618	1,983,696	1,965,644
Total	8,914,897	8,528,799	8,100,711	6,410,484	4,847,207	4,770,326	4,444,303	4,170,448	3,947,731	3,906,048
Maintenance										
Supervision and Engineering	246	663	0	0	51,139	68,760	102,150	95,668	68,467	100,047
Structures	14,755	9,536	14,953	36,444	5,990	785	3,845	1,601	16,081	8,654
Station Equipment	250,586	290,442	471,183	448,377	597,449	777,751	848,095	803,347	1,902,402	1,500,145
Overhead Lines	930,948	565,412	834,543	869,610	921,599	788,433	1,037,665	1,250,196	1,108,457	1,717,445
Underground Lines	-46,657	73,106	26,460	6,537	67,216	34,091	51,402	106,939	92,231	6,402
Miscellaneous	0	0	0	0	0	0	0	0	0	0
Total	1,149,878	939,161	1,347,139	1,360,968	1,643,393	1,669,820	2,043,157	2,257,771	3,187,638	3,332,693
Total O & M	10,064,775	9,467,960	9,447,850	7,771,452	6,490,600	6,440,146	6,487,460	6,428,219	7,135,369	7,238,741
Net Generation	14,827,901	16,538,214	15,415,784	16,128,324	15,852,834	16,158,937	14,558,295	13,416,669	12,922,963	13,836,091
Year	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
$/MWh Total	0.68	0.57	0.61	0.48	0.41	0.40	0.45	0.48	0.55	0.52
$/MWh Operation	0.60	0.52	0.53	0.40	0.31	0.30	0.31	0.31	0.31	0.28
$/MWh Maintenance	0.08	0.06	0.09	0.08	0.10	0.10	0.14	0.17	0.25	0.24


Transmission Expenses
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
$/MWh
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Year
Total $/MWh
Operation $/MWh
Maintenance $/MWh

Appendix J. Distribution Operation and Maintenance Data

Distribution Operation and Maintenance Expenses

	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Operation										
Supervision and Engineering	2,585,561	3,948,782	3,127,920	4,107,731	3,552,835	5,662,210	5,880,009	4,937,597	4,442,010	4,309,817
Load Dispatching	990,869	1,042,277	983,399	1,049,808	832,260	933,231	1,100,542	1,126,299	1,149,066	988,785
Station Expenses	298,624	293,416	358,399	469,043	646,675	627,222	661,663	730,596	942,585	1,054,685
Overhead Lines	1,944,403	2,291,552	2,090,248	1,705,309	3,022,651	3,538,475	3,795,813	4,184,431	4,319,077	4,936,778
Underground Lines	2,571,197	2,242,552	2,149,161	1,881,875	1,341,132	1,528,877	1,955,130	2,030,413	2,142,744	2,250,904
Street Lighting & Signals	116,750	124,817	131,531	181,358	483,257	810,187	897,519	907,651	977,342	1,050,287
Meter	752,742	835,674	1,204,734	1,456,576	1,528,098	1,628,483	1,824,418	1,844,928	1,699,512	1,737,422
Customer Installation	339,103	451,671	327,217	409,696	183,536	273,866	281,255	262,626	270,477	316,670
Miscellaneous	8,859,023	6,265,815	6,109,941	5,718,838	5,664,427	3,844,572	4,869,696	4,349,285	5,758,113	4,804,169
Rents	912,383	722,012	793,320	825,278	578,554	603,330	503,702	269,536	2,516	3,829
Total	19,370,655	18,218,568	17,275,870	17,805,512	17,853,425	19,450,473	21,769,547	20,643,362	21,703,442	21,453,346
Maintenance										
Supervision and Engineering	73	1,457	0	14,691	612,765	1,209,265	2,126,820	2,508,375	2,807,802	2,753,830
Structures	262,986	238,459	348,590	398,587	124,685	195,688	187,284	155,643	193,440	100,432
Station Equipment	880,926	967,416	1,059,911	1,456,539	1,416,272	1,676,406	1,858,655	1,984,390	1,285,459	1,257,085
Overhead Lines	13,279,218	12,967,081	12,207,745	10,722,605	10,701,697	9,878,447	9,895,400	9,325,848	9,917,181	9,113,613
Underground Lines	1,479,355	1,517,997	1,738,542	1,534,018	1,189,730	1,247,422	1,020,988	886,770	1,088,342	1,718,285
Line Transformers	644,027	614,985	540,224	316,347	1,226,107	1,596,271	1,617,420	1,318,237	1,234,332	1,468,706
Street Lighting & Signals	525,103	528,406	1,045,489	786,747	823,134	1,137,656	1,488,530	1,109,986	1,468,836	1,021,387
Meter	600,864	535,630	488,727	379,253	507,750	592,880	377,714	444,422	473,521	475,107
Miscellaneous	354,349	254,334	263,630	248,656	222,878	36,660	28,643	21,518	11,859	16,935
Total	18,026,901	17,625,765	17,682,858	15,857,443	16,825,018	17,570,695	18,601,432	17,755,189	18,480,772	17,925,360
Total O & M	37,397,556	35,844,333	34,958,728	33,662,955	34,678,443	37,021,168	40,370,979	38,398,551	40,184,214	39,378,706
Net Generation	14,827,901	16,538,214	15,415,764	16,128,324	15,852,834	16,158,937	14,558,295	13,416,669	12,922,963	13,836,091
Year	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
$/MWh Total	2.52	2.17	2.27	2.09	2.19	2.29	2.77	2.86	3.11	2.85
$/MWh Operation	1.31	1.10	1.12	1.10	1.13	1.20	1.50	1.54	1.68	1.55
$/MWh Maintenance	1.22	1.07	1.15	0.98	1.06	1.09	1.28	1.32	1.43	1.30


Distribution Expenses
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
$/MWh
1988
1990
1992
1994
1996
1998
2000
2002
Year
Total $/MWh
Operation $/MWh
Maintenance $/MWh

Appendix K. OSHA Training

OSHA TRAINING

1. Emergency Procedures
   - Compliance with OSHA 1910.38: Egress-Emergency Plans and Fire Protection Plans
   - Provides and trains all employees how to deal with emergency situations
   - Reduces the possibility of serious injury to employees by means of evaluation
   - Emergency drills are practiced semi-annually

2. Aerial Lift Trucks
   - Compliance with OSHA 1910.67(c)(2)(ii)
   - Provides special operating instructions and information pertaining to the specific vehicle being used

3. Ventilation-Airborne Particulate for Grinding and Painting
   - Compliance with OSHA 1910.94: Ventilation
   - Reduces employee exposure to particulates from abrasive blasting, grinding and spray painting and finishing operations
   - Instructs employees on ventilation systems and use of personal protection equipment (PPE)

4. Hearing Conservation
   - Compliance with OSHA 1910.95: Occupational Noise Exposure
   - Provides employees information on effects of noise on hearing
   - Teaches selection, fitting, use and care of hearing protection
   - Provides audiometric testing, explanation of hearing test procedures and results

5. Hydrogen
   - Compliance with OSHA 1910.103: Hydrogen
   - Provides training about the dangers of working with hydrogen
   - Provides training to employees on how to operate systems dealing with hydrogen

6. Flammable and Combustible Liquids
   - Compliance with OSHA 1910.106: Flammable and Combustible Liquids
   - Provides employees knowledge on hazards associated with the use of various flammable and combustible materials in the workplace

7. Propane Training
   - Compliance with OSHA 1910.110(11)(vii): Petroleum Gases
   - Procedures for transferring fuel from storage tank to vehicles
   - Identification of personal protection equipment needed

8. Anhydrous Ammonia
   - Compliance with OSHA 1910.111: Storage and Handling of Anhydrous Ammonia
   - Provides information to employees regarding the hazards of anhydrous ammonia
   - Provides employees with the skills to handle anhydrous ammonia safely

9. Personal Protective Equipment (PPE)
   - Compliance with OSHA 1910.132, 133, 135, 136, 137: Personal Protective Equipment
   - Provides employees information on identification of the need for PPE, selection, limits, proper use and care
   - PPE hazard assessments are conducted to determine training needs

10. Respiratory Protection
    - Compliance with OSHA 1910.134: Respiratory Protection
    - Prevents or eliminates occupational conditions that create occupational diseases caused by breathing contaminated air

11. Accident Prevention Signs and Tags
    - Compliance with OSHA 1910.145: Accident Prevention Signs and Tags
    - Informs employees of workplace hazards
    - Yellow tag, white tag, and green tag procedures

12. Confined Space Procedure
    - Compliance with OSHA 1910.146: Permit Required Confined Spaces
    - Educates workers on the hazards associated with confined spaces and what constitutes a confined space
    - How to properly use the confined space procedure as set out in KCPL safety rules and procedures book

13. Hold Procedure (Lock-Out, Tag-Out)
    - Compliance with OSHA 1910.147: Control of Hazardous Energy (Lock-Out/Tag-Out)
    - Instructs employees on the proper procedures for using the hold procedure
    - Program is covered in depth as workers progress into different work groups

14. Standard First Aid and CPR
    - Compliance with OSHA 1910.151 and 1910.269: Medical Service and First Aid
    - Provides emergency treatment for employees injured on the job in the absence of a clinic or hospital until professional assistance is available
    - Reduces potential for medical complications as a result of work-related illness or injury
    - Provides employees with the knowledge and skill necessary in an emergency to call for help, to help keep someone alive, to reduce pain and minimize the consequences of injury or sudden illness until professional medical help arrives

15. Fire Protection Program
    - Compliance with OSHA 1910.38: Egress – Emergency Plans and Fire Prevention Plans and 1910.157 Portable Fire Extinguishers
    - Familiarizes employees with emergency procedures and alarms for emergencies
    - Provides understanding of different fire protection systems and fire brigade structure
    - Provides hands-on training of fire fighting activities

16. Powered Industrial Trucks (forklifts)
    - Compliance with OSHA 1910.178: Powered Industrial Trucks
    - Instructs workers on the safe use of forklifts to prevent accidents, injuries and fatalities in the workplace
    - How to do daily inspections of forklifts
    - Refueling procedures

17. Overhead and Gantry Cranes and Rigging
    - Compliance with OSHA 1910.179 and 1910.184: Overhead and Gantry Cranes and Slings
    - Provides designating employees training to perform safely and competently while operating gantry and overhead cranes and rigging procedures

18. Welding, Cutting and [redacted]zing
    - Compliance with OSHA 1910: 252, 253, 254, 255 Welding, Cutting and Brazing
    - Provides skills to work safely with various welding applications

19. Clearance of Lines and Equipment
    - Compliance with OSHA 1910.269 Electric Power Generation, Transmission and Distribution
    - Provides instruction to employees who perform any service or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy that could cause injury

20. Asbestos
    - Compliance with OSHA 1910.1001 and 1926.1101: Asbestos
    - Provides general awareness training on asbestos and its hazards
    - Provides specific training for employees working with or supervisory employees overseeing asbestos removal or management in place

21. Lead and Lead Paint
    - Compliance with OSHA 1910.1025 and 1926.62: Lead
    - Makes employees aware of the hazards of lead and lead paint
    - Provides job specific training on handling lead and lead paint
    - Specific training for lead paint removal
    - Specific training for handling and pouring lead in cable splicing

22. Blood Borne Pathogens (Infections Control Plan)
    - Compliance with OSHA 1910.1030: Blood-borne Pathogens
    - Reduces potential employee contact with contaminated body fluids

23. Hazard Communication
    - Compliance with OSHA 1910.1200: Hazard Communication
    - Provides employees with information relative to the potential chemical exposures in the workplace

24. Excavation, Trenching and Shoring
    - Compliance with OSHA 1910.651 and 1926.652
    - Provides overview of excavation and shoring
    - Teaches worksite hazard analysis
    - Soil failure/definitions
    - OSHA acronyms

Appendix L. Production Training

Control Operator Training (616-800 Hours)

Electrical and Switchyard

- Protective Relaying
- Electrical Systems
- Transformers
- 69 KV Switchgear
- 480 Volt Power Centers
- Motor Control Centers
- Normal Power, Backup Power, Throwover Switch
- 120 Volt Continuous AC
- DC Power System
- Switchyard

Water Cycle and Auxiliary Equipment

- Circulating Water
- Fire Protection
- Bearing Cooling Water
- Makeup Water (Water Treatment and Storage)
- Condensate Pumps
- Deaerator and Hotwell Level Control
- Feedwater Heaters
- Attemperating Sprays
- Honeywell System
- Information and Readings
- Fuel Handling System
- Auxilliary Cooling Water Operation and Controls
- Water Analysis

Turbine and Auxiliaries

- Turbine Oil System
- Thrust and Main Journal Bearings
- Turning Gear Operation
- Turbine Electro-Hydraulic System and Controls
- Steam Seal System
- Condenser Exhausters and Vacuum Breakers
- Efficient Operation of the Condenser
- Front Standard
- Middle Standard
- Steam Control Valves
- Turbine Auxiliary Valve Location and Operation
- Exhaust Hood Spray Operation
- Turbine Extractions and Drains
- Turbine Controls
- Turbine Supervisory Instruments
- Turbine and Loading
- Normal Starting and Operation
- Modes of Operation
- Turbine Protective System
- Turbine Operation in Emergency

Air-Gas-Fuel Systems

- Boiler Theory of Operation
- Air Preheater System
- Air Heaters
- Air Heater Drive Controls and Backup Operation
- Gas Recirculation Fan
- Induced Draft, Forced Draft, Primary Air Fans
- Ignitor Fuel Oil Pumps
- Ductwork
- Furnace Purge Requirements
- Fuel Oil Lighters
- Coal Feeders
- Pulverizers
- Sootblower System Operation
- Bottom Ash System
- Econimizer Ash System
- Bailey System Controls and Operations
- Boiler Trips and Runbacks
- Thermal Probes
- Auxilliary Boiler Operation and Controls
- Boiler Vents and Drains

Generator and Exciter

- Generator Theory of Operation
- Hydrogen Gas System
- Stator Cooling Water System
- Excitation
- Seal Oil System

Safety

- Safety and Hold Procedure
- Information Tag
- Safety Equipment
- Personal Safety
- Emergency Procedures

Pl[redacted] Equipment Operator Training: (640 H[redacted])

Safety

Personal Safety
Emergency Procedures
Hold Procedures
Tagging Procedure
Safety Equipment and First Aid Kits
Safety Showers and Eyewash stations
Station Fire Procedure
Disaster Plan
Portable Fire Extinguishers
Fire Water Supply
Deluge System
Cardox System
Halon System
Foam Fighting Equipment
Turbine Bearing Fire Protection
Chemicals
Gaseous and Liquefied Compressed Gases

Major Systems

Water Treatment
Steam and Water Cycle
Extraction Steam System
Heater Drip System
Boiler Furnace and Auxiliaries
Boiler Fuel Systems
Air Quality Control
Chemical Feed System
Feed Water System
Steam Turbine-Generator-Tandem
    Compound Reheat Turbine
Extraction Steam System
Heater Drip System
Heater Vents and Drain System
Steam Turbine-Generator-Lubrication System
Generator and Alterrex System
Electrical System
Condenser Exhausters
Circulating Water System
Compressed Air System
Nitrogen Gs System
Auxiliary Steam System
Auxiliary Cooling Water System
Building Heat, Air Conditioning and Ventilation Systems

Plan[redacted]quipment Attendant Training: (240 [redacted]urs)

Fans
- Induced Draft
- Forced Draft
- Primary Air

Pulverizers

Ash Removal
- Bottom Ash Handling System
- Fly Ash Hopper Systems
- Precipitators
- Fly Ash Silo
- Pulverizer Pyrite Removal System
- Inspection of Ash Handling Equipment

Intake
- Pumps
- Screens
- Control Systems
- Lubrication
- Sump Pumps
- Service Water

Freeze Protection

Electrical System
- 480 Volt Power Center
- 480 Volt Power Center Breakers
- 480 Volt Motor Control Center
- 480 Volt Motor Control Center Breakers
- Power Panels and Lighting Panels

Fire Protection
- Fire Procedure
- Portable Fire Extinguishers
- Fire Water System

Safety and Hold Procedure
- Personal Safety
- Safety Manual
- Hold Procedures
- Information Tag Procedure
- Safety Equipment and First Aid Kits
- Safety Showers
- Emergency Procedures

Auxiliary Systems

Water Treatment

Appendix M. Transmission Training

TRANSMISSION SERVICE TRAINING

Transmission Planning Group (132 Hours)

Reliability Assessment
- Base Case Development
- Contingency Analysis
- Probabilistic Assessment
- Load Point Index Calculations
- Single and Multiple Load Level Assessment
- Security Constrained Corrective Actions
- Transfer Limit Analysis
- Substation Reliability Assessment
- Reinforcement Selection

Managing and Utilizing System Transmission
- Transfer Limit Analysis
- Available Transfer Capability (ATC) Calculations
- Parametric Contingency Analysis
- Transaction Impact Analysis on Transfer Limits
- Impact of Interregional Transactions on Control Areas
- Sensitivity Analysis for Limiting Constraints
- Generation Dispatch Sensitivity Analysis on Transfer
- Identification of "Must-Run" Units
- NERC Flow gate Concepts

Power Flow and Steady-State Analysis Training
- Power Flow
- Fault Analysis
- Steady State Analysis

Dynamics of Interconnected Power Systems
- Dynamic Phenomena of Interconnected Power Systems
- Power System Operation and Dynamics
- Frequency Deviations
- Voltage Deviations and Voltage Collapse
- Power System Oscillations

Dynamic Simulation
- Dynamics
- Initial System Setup

Transmission System Operators

Dynamics of Interconnected Power Systems
- Dynamic Phenomena of Interconnected Power Systems
- Power System Operation and Dynamics
- Frequency Deviations
- Voltage Deviations and Voltage Collapse
- Power System Operations

MAPP System Operator Short Course

MAPP System Operating Meetings

SPP System Operator Short Course

NERC System Operator Certification

SPP Operator Certification

American Power Dispatchers Association (APDA) Meetings

Industry Workshops
- North American Electric Reliability Council (NERC)
- Electric Power Research Institute (EPRI)
- Southwest Power Pool (SPP)
- Mid-Continent Area Power Pool (MAPP)