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BEFORE THE PUBLIC SERVICE COMMISSION

STATE OF MISSOURI

PREPARED DIRECT TESTIMONY OF

STAN M. KAPLAN

ON BEHALF OF

THE EMPIRE DISTRICT ELECTRIC COMPANY

Jefferson City, Missouri

NP

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Qualifications

Q. Please state your name, business address and business affiliation.

A. My name is Stan M. Kaplan. I am a Managing Consultant with PA Consulting Group, a provider of energy and transportation consulting services. My business address is 1776 I Street, NW, Suite 600, Washington, D.C. 20006.

Q. Please summarize your educational and professional experience.

A. I received an A.B. in History from Rutgers University in 1974 and an M.A. in Public Affairs from the Lyndon B. Johnson School of Public Affairs, University of Texas at Austin, in 1977. Since receiving my graduate degree, I have worked in and studied the energy and utility markets for 22 years. In addition to the information in my resume, I will describe here my work for a regulatory agency and an electric utility that is particularly relevant to my testimony.

Q. Please proceed.

A. In July 1985, I joined the Public Utility Commission of Texas ("PUCT") as a coal supply and transportation analyst. I later became Manager of Fuel Analysis for the PUCT. In this position, I was responsible for directing the PUCT staff's studies of the prudence of utility fuel and transportation contracts, including gas and coal supply and transportation agreements. These studies involved detailed reviews of the process by which utilities arrived at their fuel supply and transportation contracts and their administration of the agreements. When these

studies determined that, by acts of commission or omission, utilities had imprudently incurred excessive fuel costs, disallowances were recommended to the PUCT. These reviews also often made recommendations to the utility for improving the management of its fuel and transportation procurement, and to the PUCT on areas where further investigation or oversight was needed.

Q. What other work did you do for the PUCT?

A. In addition to prudence reviews, I directed a variety of other fuel-related work at the PUCT. This included natural gas, coal, oil and nuclear fuel price forecasts, evaluations of fuel stockpile levels, and evaluations of the fuel supply for proposed power plants.

Q. By whom were you subsequently employed?

A. In October of 1987, I became Manager of Fuels Planning and Supply for Austin Energy, the municipal generating utility operated by the City of Austin, Texas. In that position, I was responsible for Austin Energy's involvement in natural gas, coal, rail, oil, and nuclear fuel procurement for wholly and jointly owned power plants. I was also responsible for contract administration, price forecasting and planning.

In June 1993, I left Austin Energy to join a predecessor firm to PA Consulting. At PA Consulting I direct or otherwise participate in consulting assignments involving natural gas and coal supply and transportation, and power market issues. This work frequently involves assisting electric utilities with planning for

natural gas and coal procurement and transportation; negotiating gas and coal supply and transportation contracts; and support to utilities involved in fuel contract prudence reviews, contract arbitration and litigation.

Q. Have you previously filed testimony in regulatory proceedings?

A. Yes. During my tenure with PUCT, I filed testimony on numerous occasions in dockets involving most of the major generating utilities serving Texas. I also filed testimony as a witness for Austin Energy during rate proceedings, and have filed verified statements as an expert witness before the federal Surface Transportation Board and its predecessor, the Interstate Commerce Commission.

Q. Have you previously filed testimony before the Missouri Public Service Commission?

A. Yes. I filed testimony related to the natural gas markets and outlook on behalf of The Empire District Electric Co. ("Empire") in Empire's Case No. ER-01-269.

Q. Have you attached your resume?

A. Yes, as Schedule SMK-1.

Purpose and Key Conclusions; Organization

Q. What is the purpose of your testimony?

A. My understanding is that Empire is requesting in this proceeding interim rate relief based, in part, on the difference between its actual natural gas costs in 2000

and its expected costs in 2001. This relief is substantially predicated on the expectation that the price of gas to Empire during the period March – September 2001 will be higher than during the corresponding period in 2000. I have been retained by Empire to testify on the current outlook for natural gas prices during 2001.

Q. Please summarize your conclusion.

A. My conclusion is that Empire is likely to confront much higher natural gas prices during 2001 than in 2000. This conclusion is based on a review of the factors that have caused the run-up in gas prices over the past year, current market signals (as represented by the futures market), the forecasts of other market analysts, and a review of Empire's 2000 gas costs and projection for 2001.

Q. How is the remainder of your testimony organized?

A. The remainder of my testimony is divided into the following sections:

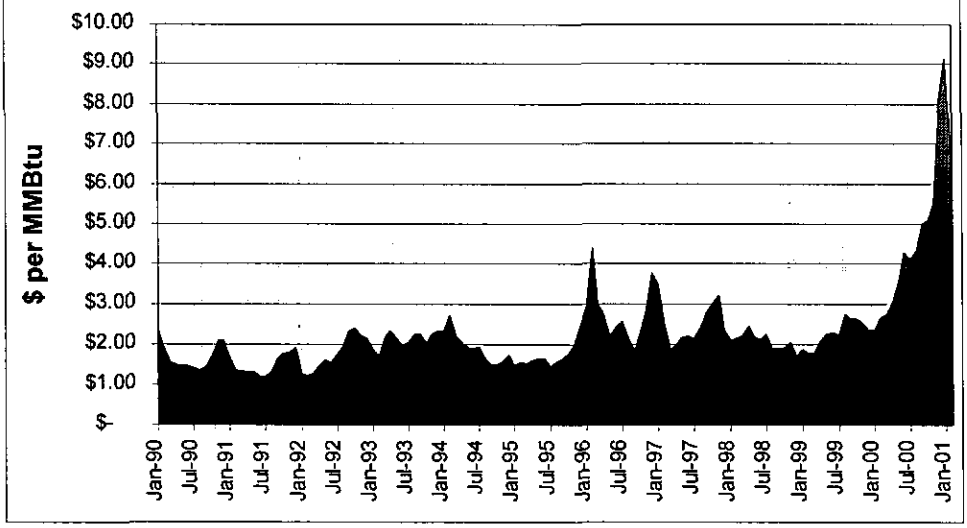
- Factors Behind the Run-Up in Natural Gas Prices.
- Futures Market Prices
- Expectations Concerning Gas Prices in 2001
- Gas Price Prospects for Empire in 2001
- Conclusion

Factors Behind the Run-up in Natural Gas Prices

Q. What has happened to the market price for natural gas during 2000?

A. During 2000, gas prices have risen to what are, by historical standards, extraordinary levels. Figure 1 and Schedule SMK-2 show the trend in natural gas spot prices at the Henry Hub trading point since 1990. As the figure illustrates, natural prices surged beginning in mid-2000. Although prices have eased somewhat since the December 2000 peaks, prices are still far above the roughly $2.00 to $3.00 per MMBtu range that had been typical since the mid-1990s. For example, the *Wall Street Journal* of February 15, 2001, reported a Henry Hub cash price of $5.65 per MMBtu. This was 2.1 times higher than the year-earlier price of only $2.63 per MMBtu.

Figure 1
Henry Hub Spot Price, 1990 - Feb. 2001



Q. What factors have contributed to the high gas prices in 2000?

A. The increase in gas prices is due to a confluence of several factors. Some of the most important of these include:

- Reduced effort to find and bring into service new supplies of natural gas, due to the relatively low prices prior to 2000. In the absence of a strong economic incentive to bring new supplies on line, gas exploration and development ("E&D") activity declined. Between 1997 and 1999, the rotary drilling rig count, a standard measure of E&D activity, dropped from 1317 to 870 units in operation.[1]

- However, even as E&D activity stagnated, the nation's appetite for natural gas grew. Gas demand increased from 18.7 trillion cubic feet ("Tcf") in 1990 to an estimated 22.7 Tcf in 2000. A driver of this growth was the industrial and electric power segments, which experienced a combined demand increase of 24% between 1990 and 1999.[2]

- The upshot has been a supply/demand imbalance. Between 1998 and 1999 gas consumption increased from 21.3 Tcf to 21.7Tcf, but domestic production was essentially unchanged at 18.7 Tcf. For 2000, consumption increased by about

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[1] Baker-Hughes rig count data from the web site http://www.bakerhughes.com/investor/rig/rig_na.htm

[2] EIA, *Historical Natural Gas Annual*, Table 3 and *Natural Gas Monthly,* January 2001, Table 3.

1.0 TCF, but domestic production grew by only half as much (0.5 Tcf). This suggests that there is currently limited slack in production capacity, and helps explain the run-up in gas prices. [3]

- The growth in industrial and electric power demand has changed an important dynamic of the natural gas industry. To meet peak winter demand, gas must be stored in the summer and shoulder months (late Spring and early Fall) when heating demand is minimal. However, industrial and power consumers often operate year round or peak in the summer. This increased competition for "off-season" gas has added to price pressures.

Compounding this situation, in recent years storage operators have been putting progressively less gas into storage in preparation for the winter peak. While this moderates (but does not eliminate) the new off-peak competition for gas supplies, the practice of minimizing gas storage adds a new element of risk into the market.[4]

Q. Did the factors described above contribute to the price spike in 2000?

A. Yes. The price spike in 2000 is the result of the convergence of these factors. Demand continued to grow in 2000, up 4.1% compared to 1999. Even in face of

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[3] EIA, *Natural Gas Monthly*, January 2001, Table 2.

substantial price increases, industrial and power demand, which often has the option of switching to fuel oil, increased by 1.6%, following a 1.4% increase in 1999[5] As discussed above, growth in electric and industrial demand creates competition with storage operators for the off-season gas supplies, creating price pressures in what had once been a low price period.

Q. Was there any other factor that contributed to the price rise?

A. Yes. Another important factor was the weather. After three years of unusually mild winters, temperatures in the early winter of 2000 "returned to normal or colder-than-normal levels."[6] The cold weather increased space heating demand for gas, and added to the tension in an already jumpy market.

Q. Please summarize.

A. The factors described above, along with market expectations of further increases in demand, triggered the takeoff in gas prices. Low storage levels exacerbated the situation. As shown below in Table 1, gas storage inventories in 2000 have badly lagged 1999 (which in turn were lower than in 1998). Buyers were rattled by low

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[4] Several factors appearing to have been driving operators to minimize storage inventories, including an effort to reduce working capital and to better tailor inventory with likely demand. The increased demand for off-season gas is also likely a factor.

[5] EIA, *Natural Gas Monthly*, January 2001, Table 3.

[6] EIA, *Natural Gas Monthly*, December 2000, page 1.

storage inventories, which they saw as creating the potential for shortages during the winter.

Table 1
Working Gas in Storage (BCF)

			Difference	
Month	**1999**	**2000**	**BCF**	**Percent**
January	2073	1725	-348	-17%
June	2149	1706	-443	-21%
September	2923	2473	-450	-15%
December (E)	2523	1759	-764	-30%

Source: EIA, *Natural Gas Monthly*, January 2001, Table 9. December is estimated.

Low storage and high gas prices created a "feedback" loop that exacerbated the price run-up. High prices during 2000 encouraged storage operators to delay buying gas for their facilities (in the hope that prices would retreat). The resulting low storage levels added to the momentum for higher prices, which further delayed storage injections, putting even more pressure on prices.

Q. Was there any other factor that contributed to the price spike?

A. Yes. A final factor has been the increase in oil prices. When gas supply is tight and prices are high, the price linkage between gas and residual oil strengthens because more boiler operators will begin to switch between the fuels. In recent months, tight gas supplies coincided with a tight, high-priced residual oil market. For example, in early February 2001, the spot price for low sulfur residual oil was

$27.00 per barrel, equivalent to $4.29 per MMBtu.[7] This high price for the competing fuel reinforced high gas prices.

The combined result of these factors has been the surge in prices that has driven the cost of gas above $5.00 per MMBtu.

Q. How does the increase in gas prices effect the outlook for gas supply?

A. The recent surge in prices does not mean that the nation is running out of gas. E&D activity, which matched the decline in prices, is now tracking the increase. Down the road this will lead to additional production in the US and Canada. Moreover, new supplies are coming on-line or are "in the pipeline" (such as the off-shore Sable Island gas production, and increased imports of liquefied natural gas). As more supply comes on-line, prices will eventually moderate.

Q. Given the fundamental factors you have described above, what is the outlook for gas prices in 2001?

A. It is reasonable to expect gas prices to average above $4.00 per MMBtu during 2001. Just as long-term factors, operating over a period of years, created the 2000 price run-up, it will take a period of years for market developments to drive prices consistently back under $4.00 per MMBtu. It will take time for the increase in

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[7] *Natural Gas Week*, February 5, 2001, page 11.

drilling activity to translate into new discoveries, and then to develop those discoveries into productive sources of gas.

Q. How long it will take for gas supply and demand to come into balance?

A. This is uncertain. A key variable is the weather. Mild winters will accelerate the balancing process by putting less pressure on gas storage. However, cold winters could deplete storage, in which case storage operators attempting to refill their facilities will compete intensely with industrial and power consumers for off-season gas, driving up the price of gas.

In summary, it appears likely that gas prices will be high through 2001, and will probably average more than $4.00 per MMBtu during the year.

Q. How have actual 2001 market gas prices to date compared to Empire's budget forecast for 2001?

A. Actual Henry Hub prices in 2001 have so far greatly exceeded Empire's forecast. Empire forecast a price of $5.21 per MMBtu for January 2001; the actual Henry Hub average monthly price was $9.13 per MMBtu, or 75% higher. In early February the Henry Hub actual price was $6.14 per MMBtu, compared to an Empire forecast of only $5.005 per MMBtu.

Futures Market Prices

Q. Is there an indicator of the market's view of the outlook for natural gas prices?

A. Yes. The outlook of the broad-based market is reflected in the prices available in the gas futures market.

Q. What are gas futures?

A. A futures contract is "a supply contract between a buyer and seller, whereby the buyer is obligated to take delivery and the seller is obligated to provide delivery of a fixed amount of a commodity at a predetermined price [and time] at a specified location. Futures contracts are traded exclusively on regulated exchanges and are settled daily based on their current value in the marketplace."[8] Other characteristics of futures contracts are standardization (the quantity per contract, quality, delivery point and form of the contract are the same for all contracts) and transparent pricing immediately available to all participants in the market.

In practice, the physical sale and delivery of the asset rarely occurs. Rather, the futures contract is used as a "hedge." That is, by entering into "paper" commitments to buy or sell futures contracts at a known price, a party can limit its financial risks on physical transactions.

Q. Are these contracts traded on a public exchange?

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[8] From the NYMEX on-line glossary, at http://www.nymex.com/.

A. Yes. In the case of natural gas, monthly futures contracts are traded on the New York Mercantile Exchange ("NYMEX") for gas delivered at the Henry Hub at Erath, Louisiana. The Henry Hub is an interchange point where seven interstate pipelines, two intrastate pipelines, and a gathering system connect. Accordingly, it is location where buyers and sellers have great flexibility for moving and trading gas, and is therefore suitable as a pricing point for gas.[9]

Natural gas futures can currently be purchased as far as 36 months ahead. Gas futures are widely traded, with annual trading volumes in excess of 16 million contracts (each contract represents a volume of 10,000 MMBtus of gas).

Q. Where can futures prices be found?

A. Prices are available in real-time through various financial reporting services. The end-of-day closing price is available in major news publications, such as the *Wall Street Journal*.

Q. Is the series of futures prices for each month of 2001 (often referred to as the futures "strip") a price forecast?

A. The futures strip is more than a forecast; it is a set of "forward prices" at which transactions can, and are, made. Gas futures represent the aggregated opinion of market participants (including gas producers, gas buyers, and speculators)

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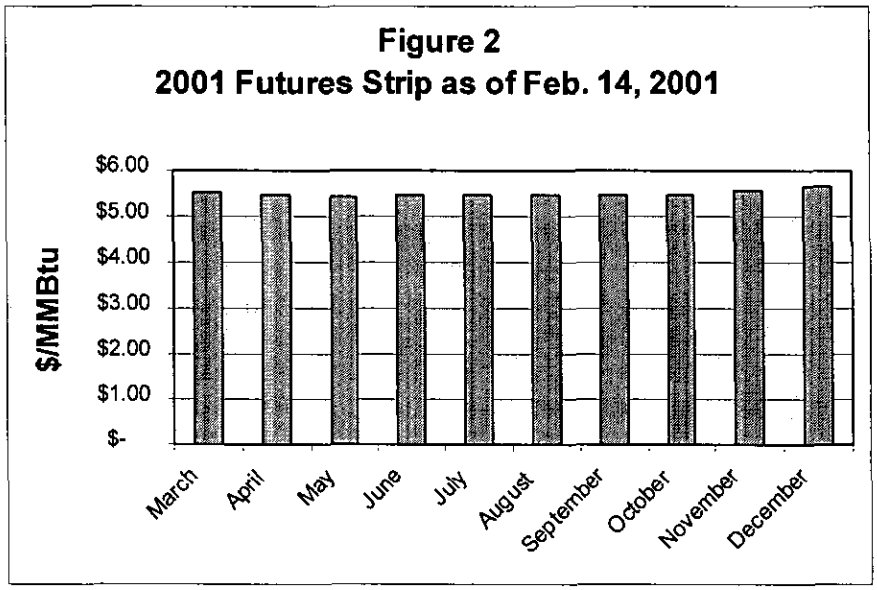
[9] Capozza, Frank C., *Energy Futures Trading in the 90's*, 2nd Edition, page 2-7.

concerning the likely trajectory of prices. In a sense it consolidates all opinion and information in the market concerning the direction of prices.

Q. What is the 2001 futures strip as of February 14, 2001.

A. Figure 2 and Schedule SMK-3 present the futures strip as of that date. As shown, the prices are consistently above $5.00 per MMBtu.

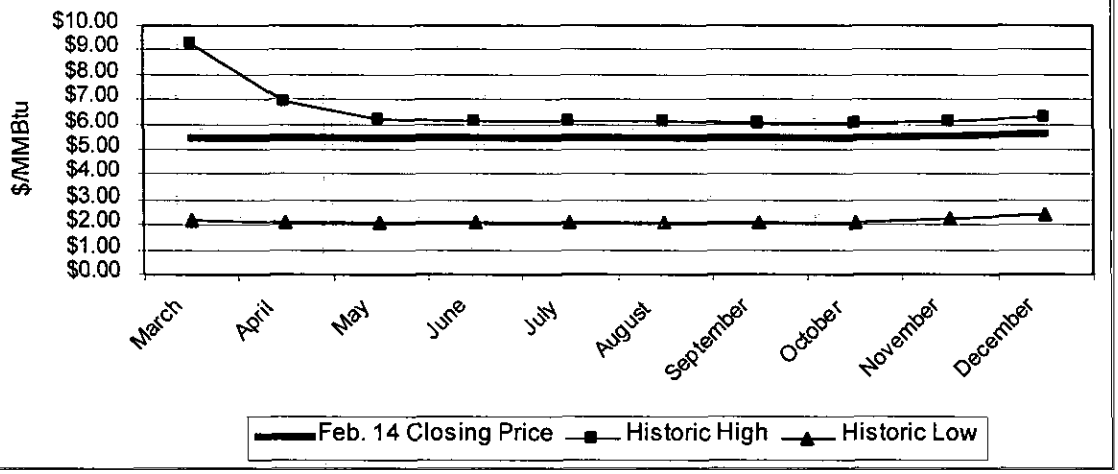
Figure 2
2001 Futures Strip as of Feb. 14, 2001



Q. How would you describe the futures prices?

A. The futures prices have been volatile and difficult to predict. Figure 3 and Schedule SMK-3 draw a band around the current 2001 strip, defined by the historic high and low price for each month. The band defines a range of several dollars around the current strip.

Figure 3
Price History for the 2001 Strip



Q. In your view, what does the 2001 futures strip suggest for the actual spot prices for gas that Empire (and other buyers) will encounter in 2001?

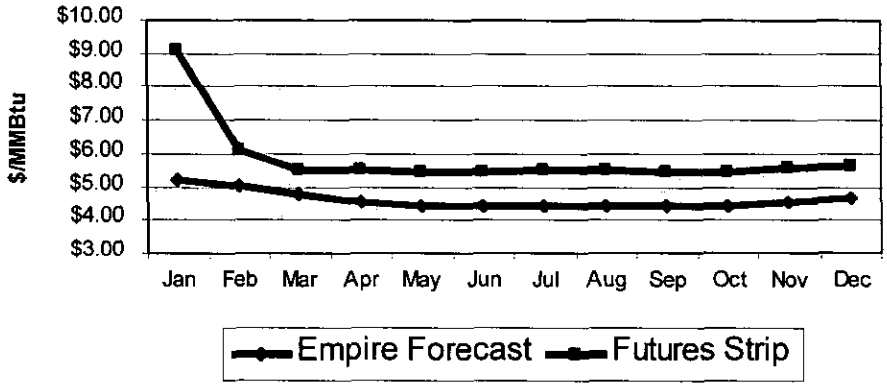
A. The futures prices suggest that spot prices during 2001 will be volatile, but generally high. The volatility in the market is indicated, as noted above, by the dramatic changes in the futures prices over time. However, since mid-2000 these price swings have not brought futures contract prices near the $4.00 per MMBtu mark. As discussed above, the fundamental factors shaping the market point toward high prices, and the futures contracts continue to reflect the fundamentals. The price swings we are seeing are within a high range, not outside of that range.

The major change in the pricing of futures contracts since the beginning of 2001 has been a retreat from the very highest peaks (about $9.00 per MMBtu) as the weather has moderated. There has been no indication as yet that prices will go far below $5.00 per MMBtu.

Q. How does the Empire forecast of gas prices for 2001 compare to the futures strip in early February 2001?

A. As shown in Figure 4 and Schedule SMK-4, the Empire projection, as used in Case No. ER-01-269, for 2001 is well below the current futures strip. The monthly variance is typically about $1.00 per MMBtu, or about 22%.

Figure 4
Comparison of Futures Strip and EDE 2001 Forecast



Q. Please comment on the fact that the Empire forecast is below the futures strip.

A. This is not surprising. The Empire forecast is simply the 2001 futures strip as it stood on October 11, 2000. At that time the fundamentals did not look as bad as later developed. As the U.S. Department of Energy notes, "Concern about the adequacy of winter supplies loomed throughout most of the summer and fall as storage levels remained significantly depressed. Last December, *the most severe assumptions about low storage levels became real*, when the spot price closed for

the day at over $10.00 per cubic feet on several occasions." The current futures strip reflects these more recent, and more negative, market fundamentals.[10]

Expectations Concerning Gas Prices in 2001

Q. Can you characterize recent forecasts and expectations concerning the outlook for gas prices in 2001?

A. I am unaware of any formal poll of market participants. However, I do regularly read the trade literature and speak to people involved in the purchase, sale and transportation of natural gas. I believe it is fair to state that the prevailing opinion is that gas prices will be unusually high through 2001. For example, a recent article in *Natural Gas Week*, titled "Concerns over Storage Ease, But High Gas Prices to Persist", stated that while "Some concerns about the ability of gas storage capacity holders to meet late-winter demand have been eased in recent weeks as temperatures moderated and some gas consumers turned to alternative fuels. *But the stage is still set for demand-driven high prices throughout 2001.*" [emphasis added] The article noted that "Most industry observers believe that domestic gas production has been slightly increased in the past few months" but that in counterpoint, as many as 30,000 MW of new gas-fired generating capacity may come on line in 2001.

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[10] EIA, *Short-Term Energy Outlook*, February 2001, p. 3. Emphasis added.

The February 5, 2001 *Natural Gas Week* wrote that "Several weeks of mild temperatures and a mass exodus of industrial and utility customers from natural gas as their fuel of choice have brought current supply/demand fundamentals closer to balance, *but the gas market remains drum tight* with a price floor just below the $6/MMBtu level."[11] [Emphasis added]

A recent article in *Gas Daily* described a 20 cent dip in the price of the March futures contract to $5.80 per MMBtu – a price that would have seemed astronomical, if not altogether beyond belief a year ago – as a "price collapse." That a price just slightly below $6.00 per MMBtu could be viewed as being in any sense a low price illustrates the fundamental shift in the gas market toward an expectation for prices to be far above historic levels.

Q. Please describe recent government forecasts of the outlook for gas prices.

A. The Energy Information Administration ("EIA"), a unit of the federal Department of Energy ("DOE") regularly publishes a *Short Term Energy Outlook* ("STEO"). The STEO published in February 2000, concluded that:

> … heating demand was eased by milder than normal weather during the latter part of January in much of the nation's gas consuming regions. This in turn led to spot prices plunging to less than $6.00 per thousand cubic feet.
>
> Nevertheless, spot prices and wellhead prices still remain quite high by historical standards. We are projecting that winter (October 2000-March 2001) natural gas

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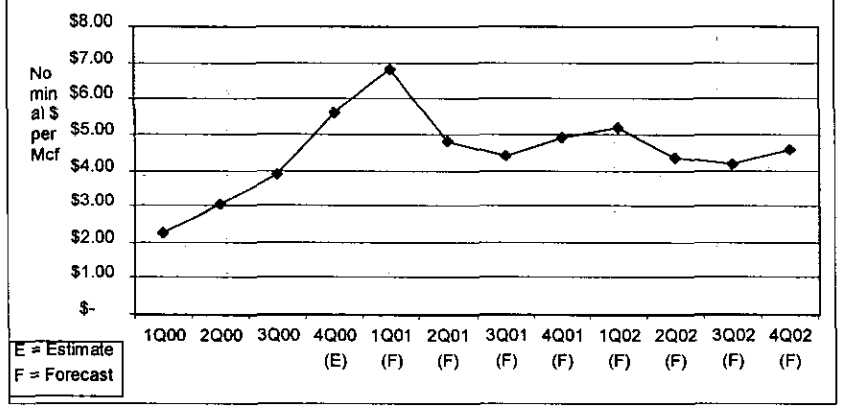
[11] *Natural Gas Week*, February 5, 2001, p. 1.

prices at the wellhead will average about $6.14 per thousand cubic feet, more than two and one half times the price of the previous winter season...This spring and summer, monthly average wellhead prices should drop from the winter peak [of about $10.00 per Mcf] by about $4.00 per thousand cubic feet as the weather-related demand recedes. Still, for the year 2001, assuming normal weather and our projection of continued low underground storage levels, wellhead prices are not expected to dip much below $4.00 per thousand cubic feet ...*Increases in production and imports of natural gas needed to keep pace with the rapidly growing demand for natural gas will be accompanied, for the time being, by relatively expensive supplies for gas due to rising production costs and capacity constraints on the pipelines.*[12] [Emphasis added]

As shown in Figure 5 and Schedule SMK-5, EIA is projecting wellhead prices in excess of $4.00 per thousand cubic feet (Mcf) throughout 2001 *and* 2002, and an average wellhead prices of $4.95 in 2001. Wellhead prices run below prices at the Henry Hub due to transportation costs, so the EIA wellhead forecast actually understates the spot prices that gas buyers would face in 2001 at Henry Hub.

Figure 5
Historical and Projected Price of Spot Wellhead Gas



[12] EIA, *Short Term Energy Outlook*, January 2001, p. 4.

Q. Please summarize your conclusions concerning forecasts and expectations for natural gas prices in 2001.

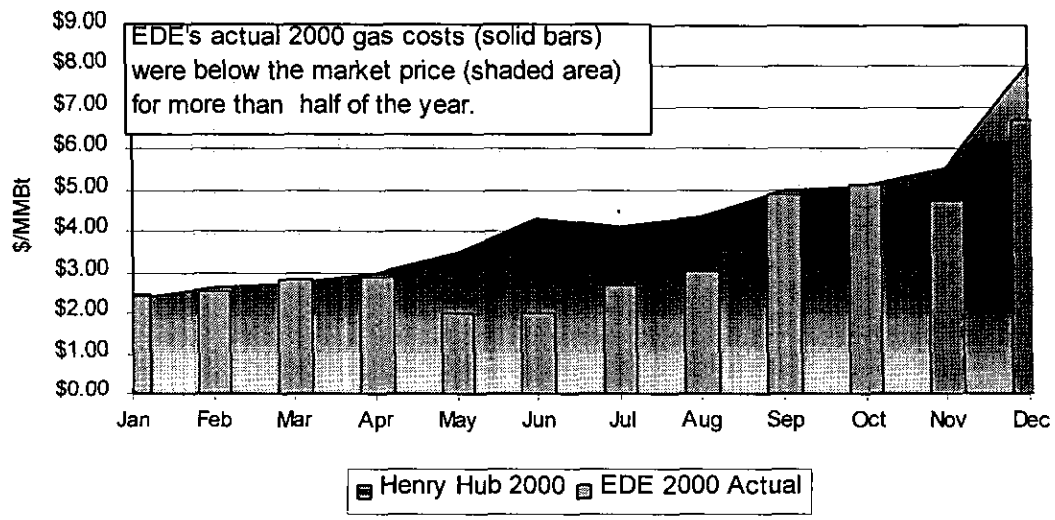
A. In summary, I believe that prevailing opinion in the market, and the most recent EIA published forecast, support the conclusion that gas prices will generally run well above $4.00 per MMBtu in 2001.

Gas Price Prospects for Empire in 2001

Q. What gas prices did Empire incur in 2000?

A. As shown in Figure 6 and Schedule SMK-6, during 2000 the average cost of gas to Empire was $3.10 per MMBtu. As also shown, the actual gas prices incurred by Empire in 2000 were *better* than the market price (cash cost at Henry Hub) for nine months out of the year.

Figure 6
Comparison of EDE Actual 2000 Prices and the 2000 Market Price



Q. Do you believe that Empire will experience during 2001gas prices similar to what it incurred in 2000?

A. No, the probability is that Empire will experience much higher prices in 2001.

Q. Please explain.

A. There are two reasons for this.

First, as discussed above, the likelihood is that the spot price of gas will run well above $4.00 per MMBtu during 2001. This is far above the market prices available to Empire during most of 2000, and far above the actual prices paid by Empire during most of 2000.

Second, in 2000 Empire was able to buy gas at prices below market levels due to two well-conceived contracts. In 1998, Empire entered into a contract with **** ********** **** for the purchase of gas during 2000 at a price of $2.014 per MMBtu. This proved to be far below the market price. In August 2000, Empire purchased gas from **** ********** **** for delivery during the period November 2000 through February 2001 at a price of $4.52 per MMBtu. This also proved to be below the market price (see Schedule SMK-6).

NP

My understanding is that Empire was unable to secure below-market contracts for the balance of 2001. Accordingly, unless market prices collapse – which appears to be a remote possibility – Empire will face gas prices in 2001 well above the prices actually incurred in 2000, and also well above the prices assumed in the rate relief calculations for the period March – September 2001.

Q. Have you illustrated your conclusions?

A. Yes. The probability that Empire will face much higher gas costs in 2001 is illustrated in Figures 7 and 8, and Schedule SMK-7. Figure 7 superimposes over Empire's actual 2000 gas costs and 2001 forecast the current futures strip. As shown, for the period March – September (i.e., the interim rate relief period) the futures strip exceeds the 2001 forecast and Empire's actual 2000 prices in every month.

Figure 7
Comparison of EDE Actual 2000 Prices, and 2001 Forecast, and the Futures Strip: March - September

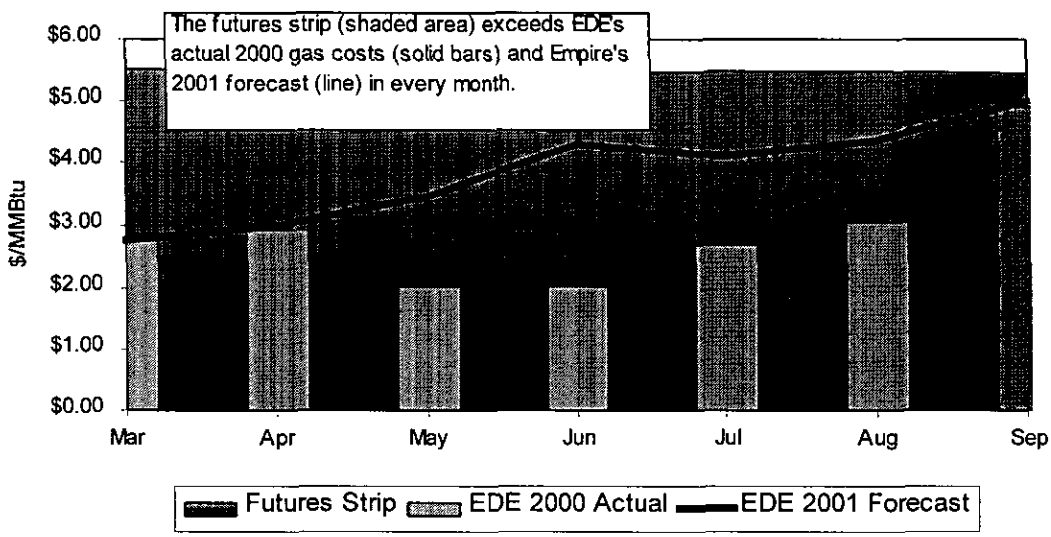
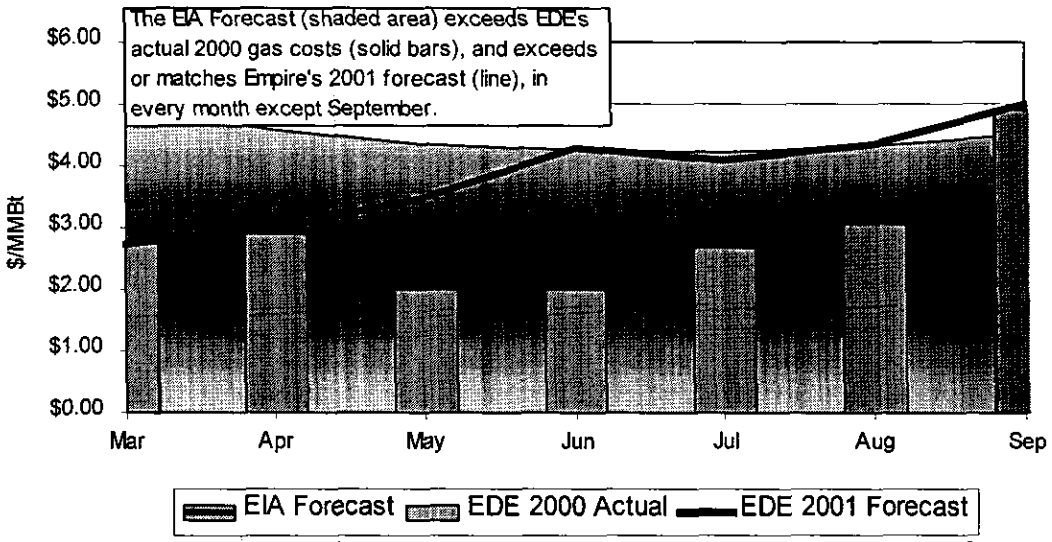


Figure 8 superimposes over Empire's 2001 forecast and actual 2000 gas prices the most recent EIA outlook for 2001.[14] As the figure shows, the EIA forecast exceeds Empire's actual 2000 gas costs in every month except September. Similarly, the EIA forecast essentially exceeds or matches the Empire 2001 forecast in all months of the rate relief period other than September.

Figure 8
Comparison of EDE Actual 2000 Prices, and 2001 Forecast, and the EIA Forecast: March - September



[14] The EIA forecast reports prices as the spot price at the wellhead in dollars per thousand cubic feet (Mcf). Empire buys gas in MMBtus, and its prices are pegged to the Henry Hub cash price (as are the gas futures contracts). To make the EIA forecast comparable to the other values, the EIA prices have been converted to MMBtus and had a cost to Henry Hub adder applied. For the detailed calculations and sources, see Schedule SMK-7.

Conclusion

Q. Please summarize your conclusions?

A. As discussed above, the run-up in natural gas prices in 2000 and early 2001 is due to fundamental market factors that developed over a period of years. It will take years for the market to adjust, by adding additional supply sources and perhaps by a slow-down in demand growth, and for prices to return to the levels typical of the 1990s.

During a large part of 2000 and January and February of 2001, Empire has been insulated from much of the price run-up by well-conceived, below market contracts. However, the last of these contracts expire in February, after which Empire can expect to pay market prices. Market prices, whether indicated by the Empire forecast for 2001, the most recent EIA forecast, or the 2001 futures strip, are likely to substantially exceed Empire's 2000 prices. As shown above, the Empire forecast for 2001, which is used in the interim rate relief calculations, is conservative (low) compared to the futures strip or the most recent EIA projection.

Q. Does this conclude your direct testimony at this time?

A. Yes.

AFFIDAVIT

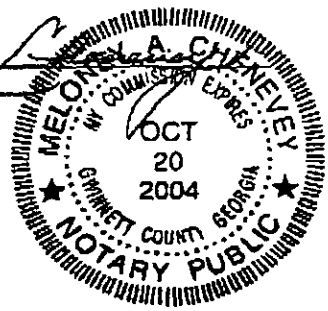
State of Georgia)
DeKalb County) ss
)

On the 16th day of February, 2001, before me appeared Stan M. Kaplan, to me personally known, who, being by me first duly sworn, states that he is a Managing Consultant employed by PA Consulting and acknowledged that he has read the above and foregoing document and believes that the statements therein are true and correct to the best of his information, knowledge and belief.

Stan M. Kaplan

Subscribed and sworn to before me this 16th day of February, 2001.

My commission expires:



Resume
Stan M. Kaplan

Education

University of Texas at Austin, Johnson School of Public Affairs — MA, Public Policy, 1977

Rutgers University — BA, History, 1974

Current Position: Managing Consultant, PA Consulting Group

Mr. Kaplan has worked for PA Consulting and its predecessor, Fieldston Company, since 1993. Consulting specialties and projects include:

- Fuel strategy and procurement assistance: coal and natural gas supply and transportation.
- Assistance to clients transitioning from coal to gas-fired generation, including: risk analyses of alternative plant sites; assessment of supply and transportation options; recommendations concerning the use of firm vs. interruptible transportation; recommendations for fuel oil backup.
- Litigation support, including: coal and rail contract litigation and settlement; prudence of utility management of nuclear power projects; prudence of fuel management; litigation related to IPP power prices and construction costs; and other fuel and power-related disputes.
- Valuation of existing and prospective fossil and nuclear power projects.
- Analysis of fossil and nuclear plant stranded costs.
- Benchmarking of costs and performance for fossil-fired and nuclear generating stations.
- Forecasts of fuel and electricity prices; generator dispatch analyses.
- Forecasts of SO2 and NOx allowance prices.
- Integration of existing and prospective environmental regulations with client generation strategy.
- Application of quantitative approaches to resolving client issues, including optimization models; probabilistic (Monte Carlo) analyses; and financial modeling.

Prior Professional Experience

- **Austin Energy (Electric Utility), City of Austin (1987–1993). Manager, Fuels Planning & Supply.**
  - Managed the planning and procurement of gas, oil, coal, and nuclear fuel for a municipal electric utility with a 2400 Mw generation base.
  - Responsibilities included fuel purchases and contract administration; fuel strategy and planning; price forecasting; determination of fuel inventory targets; fuel accounting; and testimony for rate cases.
  - Part of utility teams for Clean Air Act Amendment compliance; rate case strategy; National Energy Plan comments.

- Primary City negotiator for short and long term gas, coal, and nuclear fuel supply and transportation contracts. Managed the City's interest in gas-producing properties.

- Responsible for a variety of fuels planning projects, including a study of gas storage options; fuel price forecasts; fuel choice for new generation; and development of a model used to determine the optimum monthly mix of purchases from the utility's various gas-supply contracts.

- Directed research efforts and made presentations which convinced the management and co-owners of the South Texas Nuclear Project to adopt a market-oriented approach to nuclear fuel purchases. Responsible for planning and building a spur pipeline which ended a 40-year monopoly on gas transportation to the utility's gas-fired plants.

- Managed a staff of eight FTEs; developed from scratch the utility's fuel accounting function. Presentations on numerous occasions to City Council, senior City management, and the management committees for jointly-owned power projects.

- **Public Utility Commission of Texas (1985–1987). Manager, Fuels Analysis.**

  - Managed review of the prudence of electricity utility fuel contracts and of utility strategies for buying gas, oil, coal, and nuclear fuel.

  - Responsible for the fuel aspects of Commission policy studies, e.g., study of central economic dispatch for Texas (ERCOT); calculation of utility avoided costs; assessment of the electricity supply and demand balance in Texas.

  - Evaluation of the need for proposed power plants.

  - Testified on numerous occasions on utility fuel issues.

- **Fieldston Company, Inc. (1984–1985). Consultant.**

  - Evaluated for US DOE the financial and operational performance of the major coal-hauling railroads, with the aim of determining whether changes were needed in the Staggers (rail deregulation) Act.

  - Assisted a utility in litigating a coal supply contract, including preparation of testimony and development of a financial model of the source coal mine.

  - Performed cost studies of rail movements of coal for a northeastern utility to find opportunities for rate reductions.

  - Editor for the first *Fieldston Coal Transportation Manual*, a comprehensive guide to rail, barge, and international coal transportation. Also wrote articles for the *Coal Transportation Report*, a biweekly newsletter

- **Other Energy and Environmental Positions (1978–1984).** Energy Ventures Analysis, Inc. and Jensen Associates — consulting studies of air regulations; natural gas, petroleum, and coal supply and demand; and performed economic evaluations of draft effluent guideline regulations for the US EPA; California Energy Commission and EMAY Corp. — studies of solar energy economics.

- **Other Positions (1977–1977).** Congressional Budget Office – summer intern (1976) and Center for Defense Information – Junior Fellow (1977); for both organizations worked on studies of weapons procurement policy.

Testimony

Expert testimony on numerous occasions as a staff witness before the Public Utility Commission of Texas and for the City of Austin; deposed on several occasions as an expert or fact witness.

With James Heller, Joint Rebuttal Verified Statement, Docket No. 42051, Wisconsin Power & Light Co. v. Union Pacific Railroad Co., September 28, 2000.

Reply Verified Statement, Surface Transportation Board, Ex. Parte 627, Market Dominance Determinations -- Product and Geographic Competition, June 29, 1998.

Verified Statement and Reply Verified Statement, Surface Transportation Board, Docket 41989, PEPCO v. CSX Transportation, 1997.

Verified Statement, Surface Transportation Board, Finance Docket 33388, CSX Transportation, Inc., Norfolk Southern Railway Co. -- Control -- Conrail Inc., July 11, 1997.

Rebuttal Verified Statement, Interstate Commerce Commission, Docket 41191, West Texas Utilities v. Burlington Northern Railroad Co., July 20, 1995.

Publications and Papers

Strategic Analysis of Railroad Rate, Cost, and Service Prospects: Conflict or Cooperation?, report prepared for EPRI, November 1999 (co-author Trygve Gaalaas).

Utility Responses to Railroad Market Power, report prepared for **EPRI**, October 1997.

"The Next Wave of Renegotiating Coal and Transportation Contracts," **Natural Resources & Environment**, Winter 1997.

Coal Supply and Transportation Markets During Clean Air Act Phase One: Change, Risk and Opportunity, report prepared for **EPRI**, January 1996 (co-author Jamie Heller).

"Long-Term Natural Gas Contracts and Electric Utilities: Balance of Benefits and Traps," **Natural Gas**, December 1993.

"Fuels, Natural Resources, and Technology: A Broader Context for Fuel Price Forecasting," presented at the **International Association for Energy Economics 15th North American Conference**, October 13, 1993.

"The New Keys to Gas Deliverability: Storage, Imports, and Resource Development," presented to the **SPE Gas Technology Symposium**, June 30, 1993.

"The Long View: Technology, Society and the Price of Fuel," presented to the **American Power Conference**, April 14, 1993.

"Storage and Imports Rearranging the Price Picture," **Natural Gas**, February 1993.

"Utility Planning for Natural Gas Storage," paper and presentation to the **New Gas Storage Strategies** conference, Houston, Texas, September 2–3, 1992.

"Fear and Loathing in the Gas Market," **Compliance Strategies Review**, September 28, 1992.

"The Short-Term Approach to Fuel Supply Strategy and Contracts," conference paper and presentation, **Power-Gen'91**, Tampa, Florida, December 4-5, 1991.

Rail Transportation of Coal to Texas, Working Paper 85-5, **Public Utility Commission of Texas**, October 1985.

Editor, ***Fieldston Coal Transportation Manual***, 1984–85 edition, Fieldston Company, 1984.

"Fuel Grade Coke Could Gain Status as Product," **Oil and Gas Journal**, October 10, 1983.

"Petroleum Coke as a Supplemental Industrial Fuel," paper and presentation, **Fifth Symposium on Industrial Coal Utilization**, June 6–7, 1983.

Schedule SMK-2

CASH MARKET HUB TRADING
($/MMBtu)
Henry Hub, La.

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Average Annual	Average Annual Gas Price Expressed as
1990	$ 2.39	$ 1.90	$ 1.55	$ 1.49	$ 1.47	$ 1.47	$ 1.41	$ 1.36	$ 1.44	$ 1.69	$ 2.10	$ 2.11	$ 1.70	$9.86
1991	$ 1.67	$ 1.36	$ 1.34	$ 1.33	$ 1.31	$ 1.20	$ 1.19	$ 1.31	$ 1.63	$ 1.77	$ 1.81	$ 1.92	$ 1.47	$8.53
1992	$ 1.28	$ 1.21	$ 1.28	$ 1.47	$ 1.59	$ 1.56	$ 1.75	$ 1.97	$ 2.33	$ 2.42	$ 2.24	$ 2.16	$ 1.80	$10.44
1993	$ 1.88	$ 1.69	$ 2.18	$ 2.35	$ 2.17	$ 1.97	$ 2.06	$ 2.26	$ 2.27	$ 2.02	$ 2.26	$ 2.34	$ 2.11	$12.24
1994	$ 2.34	$ 2.71	$ 2.21	$ 2.04	$ 1.92	$ 1.90	$ 1.96	$ 1.66	$ 1.49	$ 1.51	$ 1.58	$ 1.72	$ 1.86	$10.79
1995	$ 1.48	$ 1.54	$ 1.52	$ 1.59	$ 1.64	$ 1.65	$ 1.44	$ 1.56	$ 1.63	$ 1.76	$ 1.98	$ 2.45	$ 1.80	$10.44
1996	$ 2.92	$ 4.41	$ 3.00	$ 2.71	$ 2.21	$ 2.43	$ 2.57	$ 2.12	$ 1.84	$ 2.27	$ 2.82	$ 3.78	$ 2.76	$16.01
1997	$ 3.47	$ 2.55	$ 1.88	$ 2.00	$ 2.19	$ 2.21	$ 2.17	$ 2.40	$ 2.80	$ 3.03	$ 3.23	$ 2.37	$ 2.57	$14.91
1998	$ 2.10	$ 2.17	$ 2.23	$ 2.45	$ 2.18	$ 2.14	$ 2.25	$ 1.90	$ 1.91	$ 1.93	$ 2.06	$ 1.69	$ 2.08	$12.06
1999	$ 1.87	$ 1.78	$ 1.78	$ 2.07	$ 2.27	$ 2.30	$ 2.23	$ 2.74	$ 2.63	$ 2.63	$ 2.54	$ 2.35	$ 2.25	$13.05
2000	$ 2.37	$ 2.66	$ 2.75	$ 2.99	$ 3.47	$ 4.30	$ 4.10	$ 4.35	$ 5.01	$ 5.21	$ 5.52	$ 8.08	$ 4.34	$25.17
2001	$ 9.13	$ 6.14											$ 7.64	$44.28

Notes: oil-equivalent price is calculated for crude oil with 5.8 MMBtus per barrel; February 2001 price is for first week of the month..

Source: Natural Gas Week, February 5, 2001 and January 1, 1996.

Schedule SMK-3
Futures Strip for 20001 as of February 14, 2001

	Feb. 14 Closing Price	Historic High	Historic Low
March	$5.51	$9.25	$2.21
April	$5.48	$6.94	$2.12
May	$5.45	$6.22	$2.12
June	$5.46	$6.14	$2.10
July	$5.48	$6.14	$2.10
August	$5.50	$6.10	$2.10
September	$5.47	$6.04	$2.14
October	$5.48	$6.05	$2.13
November	$5.56	$6.14	$2.28
December	$5.66	$6.27	$2.42

Source: Wall Street Journal, February 15, 2001

Schedule SMK-4

Comparison of Futures Strip and Empire Forecast
($/MMBtu)

	Empire Forecast	Futures Strip		Difference, Forecast vs. Strip $/MMBtu	Percent
Jan	$ 5.21	$ 9.13	***Henry Hub Actual***	$ 3.92	75%
Feb	$ 5.01	$ 6.14	as of 2/5/01	$ 1.14	23%
Mar	$ 4.77	$ 5.51		$ 0.74	16%
Apr	$ 4.54	$ 5.48		$ 0.95	21%
May	$ 4.46	$ 5.45		$ 1.00	22%
Jun	$ 4.43	$ 5.46		$ 1.03	23%
Jul	$ 4.43	$ 5.48		$ 1.06	24%
Aug	$ 4.43	$ 5.50		$ 1.07	24%
Sep	$ 4.42	$ 5.47		$ 1.05	24%
Oct	$ 4.42	$ 5.48		$ 1.06	24%
Nov	$ 4.56	$ 5.56		$ 1.01	22%
Dec	$ 4.65	$ 5.66		$ 1.01	22%
Average	$ 4.61	$ 5.86			

Sources: Forecast provided by Empire; Futures Strip and Hub Prices from Schedules SMK-2 and SMK-3.

Schedule SMK-5

Historical and Forecasted Wellhead Spot Prices
($/MCF)

1Q00	$ 2.26
2Q00	$ 3.06
3Q00	$ 3.87
4Q00 (E)	$ 5.61
1Q01 (F)	$ 6.61
2Q01 (F)	$ 4.23
3Q01 (F)	$ 4.11
4Q01 (F)	$ 4.86
1Q02 (F)	$ 4.92
2Q02 (F)	$ 4.28
3Q02 (F)	$ 4.12
4Q02 (F)	$ 4.77

Average Annual Prices	
2000 (E)	$3.73
2001 (F)	$4.95
2002 (F)	$4.52

Note: E = estimate; F = Forecast

Source: EIA, Short-Term Energy Outlook, February 2001, Table 4

Schedule SMK-6
Historical and Projected Empire Gas Costs

Volumes for 2000 in MMBTUs

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total March - Sept
** **	72,117	-	-	-	500,000	800,000	900,000	1,130,000	112,000	59,000	-	-	3,573,117	3,442,000
** * *	203,800	140,400	665,800	545,000	-	-	400,000	350,000	464,000	-	115,000	335,200	3,219,200	2,424,800
Total	275,917	140,400	665,800	545,000	500,000	800,000	1,300,000	1,480,000	576,000	59,000	115,000	335,200	6,792,317	5,866,800

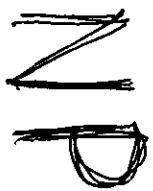
Commodity Cost in 2000 (Commodity only no Transportation)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
** **	$193,037	$-	$-	$-	$1,007,000	$1,611,200	$1,812,600	$2,884,300	$550,185	$303,780	$-	$-	$8,362,102	7,865,285
** **	$486,822	$356,998	$1,879,988	$1,588,050	$-	$-	$1,676,000	$1,627,250	$2,270,990	$-	$544,250	$2,247,950	$12,678,298	9,042,278
Total	$679,859	$356,998	$1,879,988	$1,588,050	$1,007,000	$1,611,200	$3,488,600	$4,511,550	$2,821,175	$303,780	$544,250	$2,247,950	$21,040,400	16,907,563

Commodity Cost in $ per MMBtu

** **	$2.68	$-	$-	$-	$2.01	$2.01	$2.01	$2.55	$4.91	$5.15	$-	$-	$2.34	$2.29
** **	$2.39	$2.54	$2.82	$2.91	$-	$-	$4.19	$4.65	$4.89	$-	$4.73	$6.71	$3.94	$3.73
Total	$2.46	$2.54	$2.82	$2.91	$2.01	$2.01	$2.68	$3.05	$4.90	$5.15	$4.73	$6.71	$3.10	$2.88

EDE 2001 Forecast	$5.21	$5.01	$4.77	$4.54	$4.46	$4.43	$4.43	$4.43	$4.42	$4.42	$4.56	$4.65
Henry Hub 2000	$2.37	$2.66	$2.75	$2.99	$3.47	$4.30	$4.10	$4.35	$5.01	$5.11	$5.52	$8.08



Schedule SMK-7

Comparison of Empire 2000 Forecast to Actual 2000 Prices, EIA Forecast for 2001 and Futures Strip for 2001

Conversion of EIA Historical and Projected Wellhead Spot Prices to Henry Hub Equivalent							Other Prices Used in Figures 7 and 8		
EIA Data $ per MCF		Conversion to $/MMBtu	Henry Hub	Difference, Hub and EIA Wellhead		EIA Wellhead as a	Futures Strip	Empire Forecast for 2001	Actual Empire 2000 Prices
Month	Spot Price	1.11	$ per MMBtu	$	%	Henry Hub Equivalent	$ per MMBtu	$ per MMBtu	$ per MMBtu
Jan-99	$ 1.75	$1.577	$1.87	$ 0.29	19%	$1.84			
Feb-99	$ 1.66	$1.495	$1.78	$ 0.28	19%	$1.75			
Mar-99	$ 1.64	$1.477	$1.78	$ 0.30	20%	$1.73			
Apr-99	$ 1.93	$1.739	$2.07	$ 0.33	19%	$2.03			
May-99	$ 2.14	$1.928	$2.27	$ 0.34	18%	$2.26			
Jun-99	$ 2.16	$1.946	$2.30	$ 0.35	18%	$2.28			
Jul-99	$ 2.12	$1.910	$2.23	$ 0.32	17%	$2.23			
Aug-99	$ 2.62	$2.360	$2.74	$ 0.38	16%	$2.76			
Sep-99	$ 2.50	$2.252	$2.63	$ 0.38	17%	$2.64			
Oct-99	$ 2.53	$2.279	$2.63	$ 0.35	15%	$2.67			
Nov-99	$ 2.41	$2.171	$2.54	$ 0.37	17%	$2.54			
Dec-99	$ 2.21	$1.991	$2.35	$ 0.36	18%	$2.33			
Jan-00	$ 2.26	$2.036	$2.37	$ 0.33	16%	$2.38			
Feb-00	$ 2.50	$2.252	$2.66	$ 0.41	18%	$2.64			
Mar-00	$ 2.62	$2.360	$2.75	$ 0.39	17%	$2.76			
Apr-00	$ 2.87	$2.586	$2.99	$ 0.40	16%	$3.03			
May-00	$ 3.26	$2.937	$3.47	$ 0.53	18%	$3.44			
Jun-00	$ 4.16	$3.748	$4.30	$ 0.55	15%	$4.38			
Jul-00	$ 3.97	$3.577	$4.10	$ 0.52	15%	$4.18			
Aug-00	$ 4.13	$3.721	$4.35	$ 0.63	17%	$4.35			
Sep-00	$ 4.82	$4.342	$5.01	$ 0.67	15%	$5.08			
Oct-00	$ 4.95	$4.459	$5.11	$ 0.65	15%	$5.22			
Nov-00	$ 5.25	$4.730	$5.52	$ 0.79	17%	$5.53			
Dec-00	$ 8.12	$7.315	$8.08	$ 0.76	10%	$8.56			
Jan-01	$ 8.72	$7.856	$9.13	$ 1.27	16%	$9.19			
Feb-01	$ 5.69	$5.127	$6.14	$ 1.01	20%	$6.00			
Mar-01	$ 4.67	$4.208			17% Average	$4.92	$5.51	$4.77	$2.82
Apr-01	$ 4.34	$3.912				$4.58	$5.48	$4.54	$2.91
May-01	$ 4.13	$3.722				$4.35	$5.45	$4.46	$2.01
Jun-01	$ 4.04	$3.638				$4.26	$5.46	$4.43	$2.01
Jul-01	$ 4.00	$3.602				$4.21	$5.48	$4.43	$2.68
Aug-01	$ 4.11	$3.704				$4.33	$5.50	$4.43	$3.05
Sep-01	$ 4.29	$3.860				$4.52	$5.47	$4.42	$4.90
Oct-01	$ 4.61	$4.157				$4.86			
Nov-01	$ 4.92	$4.435				$5.19			
Dec-01	$ 5.30	$4.772				$5.58			

Sources: EIA wellhead forecast is the monthly detail from the February 2001 Short-Term Energy Outlook; MCF to MMBtu conversion factor is from the EIA Annual Energy Review; the futures strip and Empire forecast series are from Schedules SMK-4 and -6.