Exhibit No.:
Issues: *NYMEX Futures Pricing*
Witness: *Kwang Y. Choe*
Sponsoring Party: *MoPSC Staff*
Type of Exhibit: *Direct Testimony*
Case No.: *ER-2001-672*
Date Testimony Prepared: *December 6, 2001*

MISSOURI PUBLIC SERVICE COMMISSION

UTILITY SERVICES DIVISION

DIRECT TESTIMONY

OF

KWANG Y. CHOE

FILED[3]
DEC 6 2001
Missouri Public
Service Commission

UTILICORP UNITED INC.
d/b/a MISSOURI PUBLIC SERVICE

CASE NO. ER-2001-672

Jefferson City, Missouri
December 2001

DIRECT TESTIMONY

OF

KWANG Y. CHOE

UTILICORP UNITED INC.

d/b/a MISSOURI PUBLIC SERVICE

CASE NO. ER-2001-672

Q. Please state your name and business address.

A. Kwang Y. Choe, P.O. Box 360, Jefferson City, Mo. 65102.

Q. By whom are you employed and in what capacity?

A. I am the Regulatory Economist of the Procurement Analysis Department with the Missouri Public Service Commission (Commission).

Q. How long have you been employed with the Commission?

A. I commenced employment with the Commission Staff (Staff) in January of 2000.

Q. Please describe your educational background and experience.

A. I received a Bachelor of Arts, and Master of Arts degrees in economics. My undergraduate degree is from the University of California, San Diego and my graduate degree is from the University of Missouri, Columbia. I am currently working on a dissertation (I had completed all but the dissertation) for my Doctor of Philosophy degree in economics from the University of Missouri, Columbia. Also, I worked in the department of economics at the University of Missouri, Columbia as a graduate teaching instructor from 1997 to 1999, and as a graduate teaching assistant from 1991 to 1993 and

from 1996 to 1999. I am a member of the International Association for Energy Economics.

Q. What has been the nature of your duties at the Commission?

A. Since early 2000, I have assisted the Commission with monitoring and evaluating the various economic aspects of the natural gas market, both nationally and in Missouri.

Q. Have you previously filed testimony before the Commission?

A. Yes. I previously filed testimony in Case No. ER-2001-299 in the matter of The Empire District Electric Company.

Q. What is the purpose of your testimony in this case?

A. My purpose is to provide the Commission with a general outline of the natural gas futures market, and to explain why the natural gas futures market is not the best tool for predicting actual future natural gas prices, and therefore cannot successfully be used for forecasting in the ratemaking process.

Q. What are natural gas futures?

A. They are financial derivatives for natural gas, which are traded on regulated exchanges such as the New York Mercantile Exchange or the Kansas City Board of Trade. A natural gas futures contract is:

> "a tradable document which entitles the buyer of the contract to claim physical delivery of the commodity, that is, natural gas from the seller at the contract delivery point at a specified date in the future, and entitles the seller to deliver the physical commodity to the buyer under the same conditions."[1]

[1] Fletcher J. Strum, *Trading Natural Gas: A Non Technical Guide*, (PennWell Publishing Company, 1997) p. 35.

A unique characteristic of natural gas futures contracts is that they are standardized contracts, meaning that each natural gas futures contract has the same quality and quantity of natural gas, and is to be delivered and received at the same location (See Schedule 1 for the standard contract specifications for the New York Mercantile Exchange (NYMEX) natural gas futures contract).[2] Natural gas futures prices are based on demand for and supply of the commodity in the future. If natural gas demand and supply were fairly predictable and we were able to buy or sell the commodity at any time in the future at prices we desired, there would likely be no need for a natural gas futures market. Unfortunately, however, we cannot predict without much uncertainty what the future of the natural gas market will bring and, therefore, it is difficult to plan ahead for this market. This is where the natural gas futures market comes in; i.e., to help minimize uncertainty or risk associated with price movements. But the natural gas futures market can in no way accurately predict that there will be a certain price prevailing for the commodity in the future.

Q. What are some of the factors that affect natural gas prices?

A. There are several factors that affect natural gas prices, including weather, oil prices, drilling rig counts, electric generation from natural gas-fired combustion turbines, national storage levels for natural gas, the level of economic activity, and psychological factors that influence market speculation as to where the natural gas market will be heading.

Q. Does the current natural gas market resemble that of last year?

A. No. On the contrary, the current market has slackened considerably compared to last year. This suggests that there will be enough gas available for the next

[2] Ibid.

year, meaning that next year's price will be much lower than last year's.[3] This year's market condition compared to last year's is shown in Table 1 below.

Table 1: Storage and Prices for 2000 and 2001

Month	Storage		Futures Prices		Spot Prices	
	2000	2001	2000	2001	2000	2001
January	1,775	1,241	2.344	9.978	2.25	9.98
February	1,194	859	2.610	6.293	2.49	6.29
March	1,031	627	2.603	4.998	2.47	5.03
April	1,059	850	2.900	5.384	2.79	5.34
May	1,274	1,281	3.089	4.891	2.94	4.82
June	1,567	1,717	4.406	3.738	4.19	3.66
July	1,920	2,203	4.369	3.182	4.20	3.05
August	2,144	2,495	3.820	3.167	3.69	3.10
September	2,480	2,914	4.618	2.295	4.50	2.24
October	2,712	3,090	5.310	1.830	5.19	1.75
November	2,502	N/A	4.541	3.202	4.43	3.05
December	1,729	N/A	6.016	2.316	5.90	2.24

(Note) 1. Storage (unit: billion cubic feet) quantities are measured at the end of the last week of each month up to a maximum 3,294 billion cubic feet. [Source: *Btu Weekly*, *Gas Daily*, various issues.]

2. Futures prices (unit: $ per mmbtu's) are the monthly closing prices on the New York Mercantile Exchange. [Source: *Wall Street Journal*, various issues.]

3. Spot prices (unit: $ per mmbtu's) are the first of the month index prices for Williams Pipeline Company. [Source: *Inside FERC's Gas Market Report*, various issues.]

Q. What does Table 1 above suggest regarding the current natural gas market condition compared to the last year's?

A. It suggests that the current market condition has eased dramatically compared to the last year's, with an ample storage build-up heading into this heating season and the market prices substantially lower than the last year's.

[3] Energy Information Administration, "U.S. Natural Gas Markets: Recent Trends and Prospects for the Future," May 2001; and "Winter Fuels Outlook: 2001/2002."

Q. What is an index price?

A. An index price is typically an average of fixed prices at which buyers and sellers agree, during the last week of a month, to purchase and sell gas for the following month.

Q. Do you believe there is any significant correlation between prices in the futures market one year before the closing of a contract and actual prices at the time of closing a year later?

A. There is no systematic correlation between the two prices (See Schedule 2).[4]

Q. Why does staff believe there is no systematic correlation between futures market prices and spot prices?

A. While the futures market predicts a fairly stable price trend going forward, the data indicate that actual spot prices since May 2000 have fluctuated substantially (See Schedule 2). This indicates that there is no systematic correlation between futures market prices and spot prices.

Q. Earlier in your testimony, you indicated that the natural gas futures market is not an accurate predictor of actual future natural gas prices. Please explain.

A. The idea that the natural gas futures market can correctly predict the actual future natural gas prices is predicated upon the assumption that the natural gas futures market is efficient. The efficient market theory suggests that the natural gas futures price today contains all available relevant information regarding the actual future natural gas

[4] Based on the New York Mercantile Exchange (NYMEX) Natural Gas Futures Prices (Monthly) with one-year maturity and the prices at the time of closing a year later, *Wall Street Journal,* June 1998 – October 2001.

prices and as such, helps to draw a correct forecast of the actual price tomorrow.[5] However, to put it more correctly, even if the futures market is efficient, that is not to say that the market correctly forecasts the actual future price. All it says is that the futures market contains all relevant and available information regarding the actual future prices, and therefore the futures prices are the best ex ante forecasting one can do. That may not necessarily be a correct forecast. In particular, past research has shown that the longer the maturity of the contract, the harder it is to see the convergence of the futures prices and the actual prices.[6] If you look at the price comparisons between the futures prices and the actual prices for the same period during July 1995 through November 2001, there are significant discrepancies between these two prices during the early winter of 1996 and 1997, and during the winter season just past – winter of 2000-2001 and there also is no clear co-movement between these two prices for the past seven months (See schedules 3 and 4).[7] After understating the actual prices for much of 2000 and part of 2001, the futures prices came to overstate the actual prices during the recent months by over-correction.[8] This leads to another characteristic of the futures market: namely, its inherent volatility. Therefore, it is very difficult to predict the future movement of the market.[9]

[5] W. David Walls, "An Econometric Analysis of the Market for Natural Gas Futures," The Energy Journal, 16(1), 1995, pp. 71-83.
[6] William G. Tomek, "Commodity Futures Prices as Forecasts," Review of Agricultural Economics, 19(1), 1997, pp. 23-44.
[7] Based on the New York Mercantile Exchange (NYMEX) Natural Gas Futures Prices, *Wall Street Journal and Inside FERC's Gas Market Report,* July 1995 – November 2001 and Williams Pipeline (WNG) First of Month Index Prices.
[8] I compare what the futures market prices predict for the future prices in one year to the actual future prices a year later.
[9] Victor Chwee, "Chaos in Natural Gas Futures?." The Energy Journal, 19(2), 1998, pp. 149-164.

Q. Can the natural gas futures market be successfully used in the determination of the rates that customers pay for electricity use?

A. No. Because of the inherent risk in the market and the historical volatility of natural gas prices, it is extremely difficult to develop a method that will provide enough assurance to be able to use the futures market prices in the ratemaking process. There is no "safety net" to consumers if the futures market prices overstate natural gas prices, and ultimately, fuel expenses. Using the futures market prices to determine natural gas prices for fuel expense places substantial risk on the customers, in that any over statement will be a windfall to the Company in higher fuel costs.

Q. Are you responsible for developing the natural gas prices in this case?

A. No. Staff witness V. William Harris identified in his direct testimony the approach that Staff is using with regard to natural gas prices.

Q. What is your conclusion?

A. The efficient market theory does not apply to the natural gas futures market when the market faces a great deal of uncertainty. Table 1 above illustrates how the market could change from one extreme to the other in a year. Furthermore, due to the inherent volatility of the natural gas futures market, it is highly risky to rely solely on what the natural gas futures market predicts to determine actual future natural gas prices.

Q. Does this conclude your direct testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of the Application of the Tariff Filing of Missouri Public Service (MPS) A Division of UtiliCorp United Inc., to Implement a General Rate Increase for Retail Electric Service Provided to Customers in the Missouri Service Area of MPS	))))))	Case No. ER-2001-672

AFFIDAVIT OF KWANG Y. CHOE

STATE OF MISSOURI	)	
	)	ss.
COUNTY OF COLE	)	

Kwang Y. Choe, being of lawful age, on his oath states: that he has participated in the preparation of the foregoing Direct Testimony in question and answer form, consisting of 17 pages to be presented in the above case; that the answers in the foregoing Direct Testimony were given by his; that he has knowledge of the matters set forth in such answers; and that such matters are true and correct to the best of his knowledge and belief.

Kwang Y. Choe

Subscribed and sworn to before me this 5th day of December 2001.

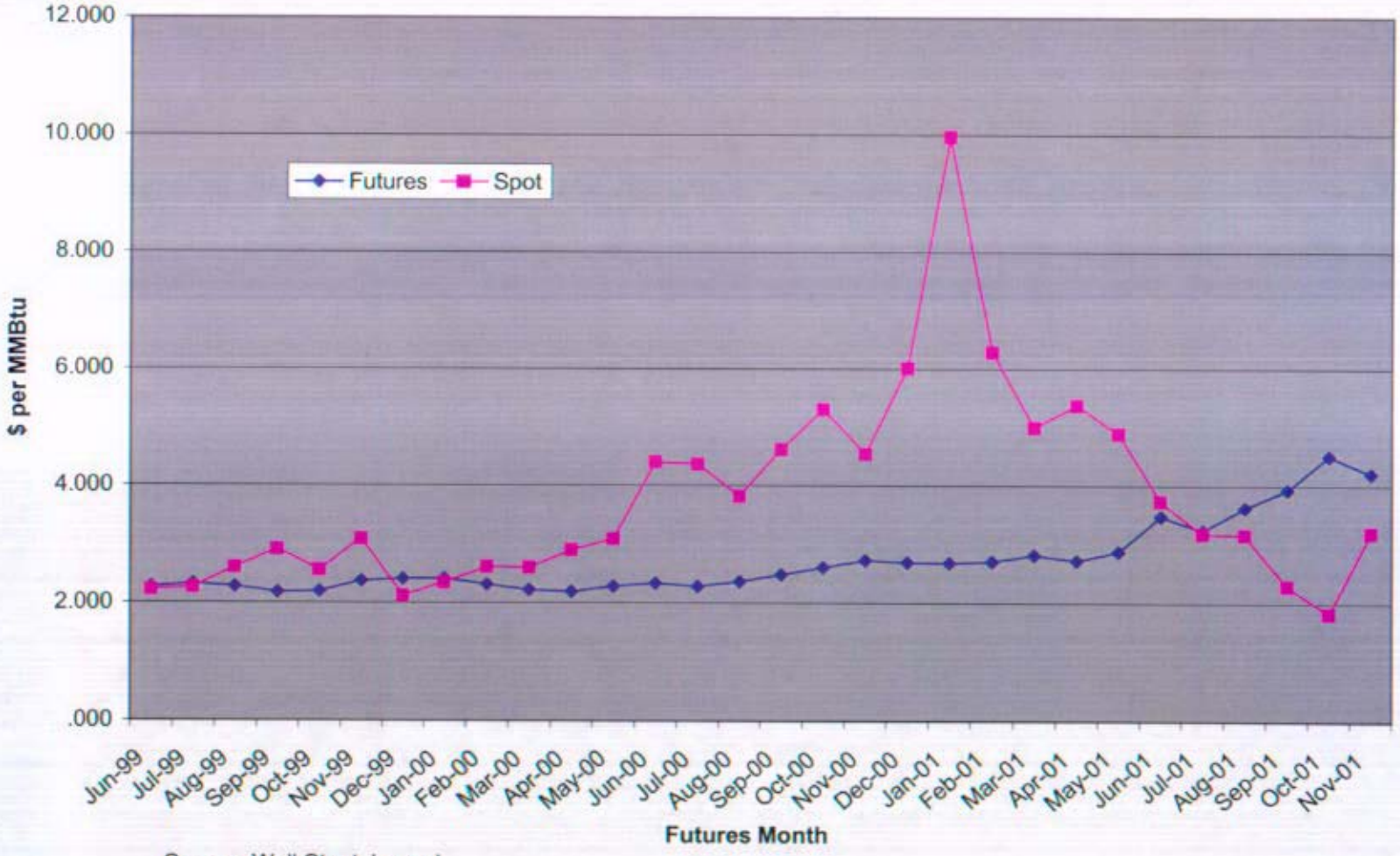
TONI M. CHARLTON
NOTARY PUBLIC STATE OF MISSOURI
COUNTY OF COLE
My Commission Expires December 28, 2004

The New York Mercantile Exchange Natural Gas Futures Contract Specifications

Delivery Location:	Sabine Pipeline Hub at Henry, Louisiana
Contract Size:	One (1) contract equals 10,000 MMBtu
Minimum Price Fluctuation:	$0.001 per MMBtu
Maximum Daily Price Fluctuation:	$1.00 per MMBtu for all months
Trading Months:	Thirty-six (36) consecutive months commencing with the next calendar month, plus a long-dated contract, initially listed 36 months out
Last Trading Day:	Three (3) business days prior to the first calendar day of the delivery month

Source: http://www.nymex.com

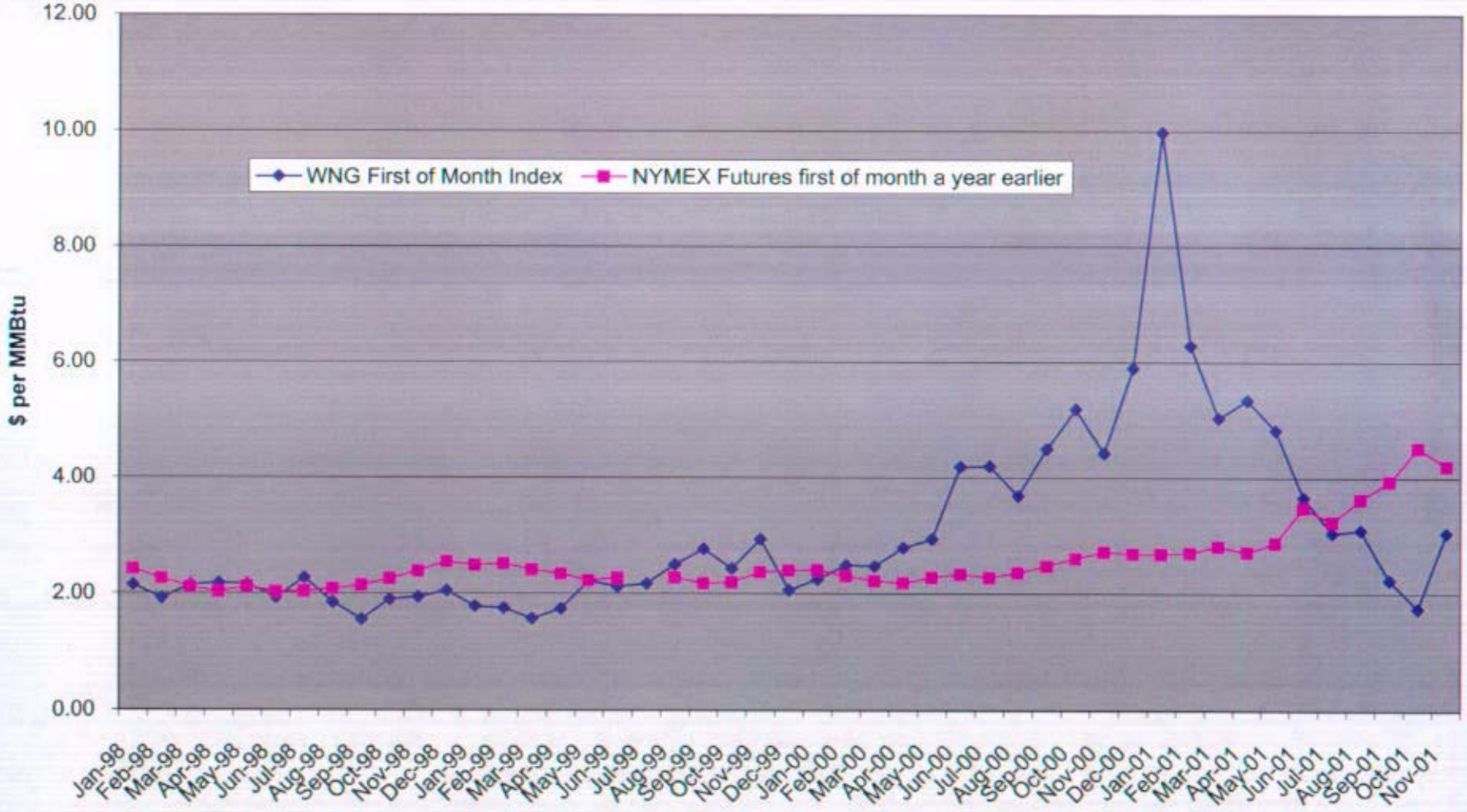
Futures vs. Spot
(Schedule2)



Source: Wall Steet Journal

Schedule 2

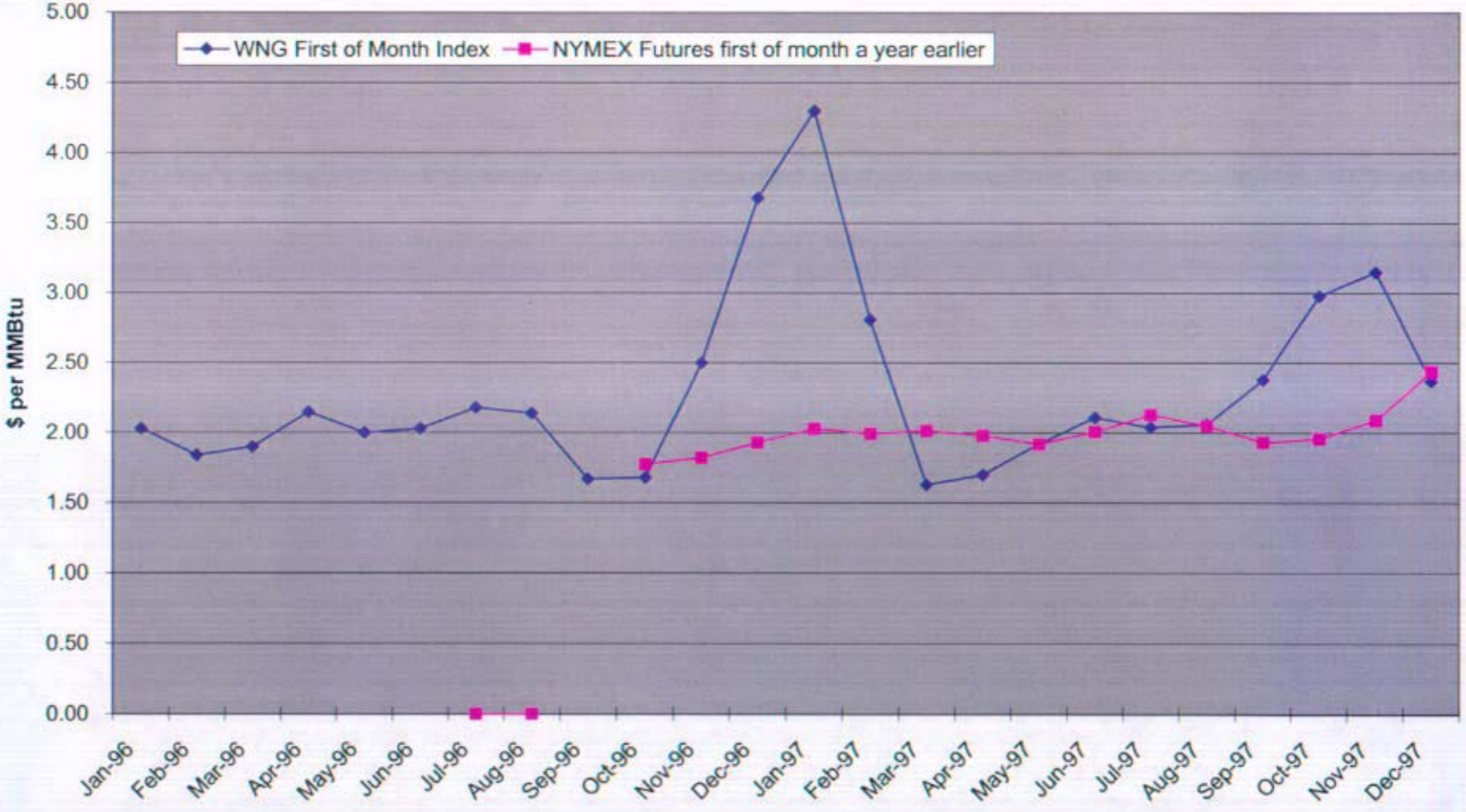
Williams Pipeline(WNG) First of Month Index vs NYMEX Futures Prediction A Year Earlier
(Schedule 3)



Source: Wall Street Journal and Inside FERC's Gas Market Report

Schedule 3

Williams Pipeline(WNG) First of Month Index vs NYMEX Futures Prediction A Year Earlier
(Schedule 4)



Source: Wall Street Journal and Inside FERC's Gas Market Report

Schedule 4