BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

IN THE MATTER OF THE APPLICATION OF QUESTAR GAS COMPANY FOR APPROVAL OF AN INCREASE IN RATES AND CHARGES	DPU EXHIBIT 6 DOCKET NUMBER 02-057-02

PREFILED DIRECT TESTIMONY OF

WILLIAM A. POWELL

DIVISION OF PUBLIC UTILITIES

August 30, 2002

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PREFILED DIRECT TESTIMONY OF
ARTIE POWELL
DIVISION OF PUBLIC UTILITIES
DOCKET NUMBER 02-057-02

INTRODUCTION

Q: Please state your name and business address.

A: My name is Artie Powell. My business office is at 160 E. 300 S., Salt Lake City, Utah, 84114.

Q: By whom are you employed and what is your official title?

A: I'm employed by the Utah State Department of Commerce, Division of Public Utilities. My official title is *Utility Economist*.

Q: Please summarize your education and other experience relevant to the current proceedings.

A: I earned a Doctorate degree in economics from Texas A&M University with emphasis in econometrics and public finance. Since 1987, I have taught undergraduate and graduate courses in economics, econometrics, and statistics. And I currently teach as an adjunct professor for Weber State University. For the past six years I have been employed with the Division of Public Utilities as an economist, and have attended several conferences on various aspects of regulation and restructuring in the electric industry. In the summer of 1996, I completed the NARUC Annual Regulatory Studies Program held at Michigan State University. Further details of my education and experience can be found in DPU Exhibit Number DPU 6.17.

SCOPE OF TESTIMONY

Q: For whom are you testifying?

A: I am testifying on behalf of the Division of Public Utilities (Division or DPU).

Q: What is the scope of your testimony?

A: My testimony will cover aspects dealing with the cost of equity capital and capital structure.

Summary of Testimony

Q: Please summarize your testimony and major conclusions or recommendations.

A: I am recommending a return on equity (ROE) of 10.50%, which is 50 basis points lower than the currently allowed ROE. My recommendation is based on estimation results from standard Discounted

Cash Flow Models (DCF) and is supported by both results from the Capital Asset Pricing Model (CAPM) and by Standard & Poor's risk criteria for a utility to maintain an "A" bond rating.

The capital structure proposed by Questar – 47.39% debt and 52.61% equity – is consistent with Standard & Poor's risk criteria. The Division has made no changes in the cost of debt (7.92%) filed by Questar. Given a ROE of 10.5% the weighted cost of capital for Questar would be 9.28%.

MODELS AND ESTIMATES

BASIC DCF MODEL

Q: What models do you use to estimate the return on equity for Questar?

A: My recommendation is based primarily on the results from the constant growth Discounted Cash Flow (DCF) model and a Market or Terminal Value Model. I also use the Capital Asset Pricing (CAPM) model and interest coverage calculation as checks on the reasonableness of these results.

Q: Could you please describe these models and how they are used to arrive at estimates of the ROE?

A: The Discounted Cash Flow (DCF) model is based on the theory that the current price of a stock embodies all future income generated by the stock discounted at an appropriate rate. The appropriate discount rate is that rate that will make investors just indifferent to acquiring the stock as opposed to any other investment of comparable risk. In other words, the discount rate is the investors required return and is thus the cost of equity capital to the utility. Algebraically, assuming the stock is held indefinitely, and that dividends grow at a constant rate, the discount rate can be written as,

$$k = \frac{D_1}{P_0} + g \qquad (1)$$

Equation 1 is the so-called Constant DCF model, where k, D_1, P_0, and g are respectively the required return, dividend, stock price, and dividend growth rate. A common approach in estimating a utility's ROE is to apply the above model to a set of comparable utilities and then use the average or median value of the sample as an estimate of the utility's ROE. While this model has been well documented in previous rate cases before this Commission, for convenience and reference I have included a derivation in DPU Exhibit 6.1.

MARKET OR TERMINAL VALUE MODEL

Q: You also use the Terminal value model to estimate the ROE for Questar. Can you explain how this model works?

A: The Terminal Value model (TVM) is similar in principle to the DCF model: the current price is equal to the value of the discounted steam of income generated by the stock. However, unlike the basic DCF model where the stock is held indefinitely, in the TVM it is assumed that the stock is held for a finite number of years (say four) and then sold. Thus the stream of income includes the price paid for the stock, the dividends to be paid while the stock is held, and the price at which the stock is sold. The price paid, the current price, enters the model as a negative cash flow, while the dividends and future price are positive cash flows. The discount rate is the internal rate of return that equates the future price plus the dividend stream to the present price of the stock. Suppose, for example, that the current price of a stock and its dividend are $24 and $1.23 respectively. If the investor expects the price to grow to say $29.19 and the dividend to grow to $1.35 over the next four years, then the discount rate that equates the dividend stream and future price to the current price is 10.08%.

CAPITAL ASSET PRICING MODEL

Q: You indicated that you also use the Capital Asset Pricing Model. Please discuss the model and how you employ it to arrive at a recommendation of the ROE.

A: The Capital Asset Pricing Model (CAPM) is based on the elegant but simple theory that investors expect a rate of return commensurate with the risk of the investment – the greater the risk, the greater the required (expected) rate of return. In its basic or most common form, the investors required return (and thus the cost of equity for the utility) is equal to a risk-free return plus a risk premium, where the premium is adjusted by a factor of proportionality. This factor of proportionality, beta (∃), measures the risk of the security proportional to that of the market. That is,

$$k = R_F + \beta(R_M - R_F) \qquad (2)$$

where k is the required return, R_F is the risk-free return or rate, R_M is the market rate, and ∃ is the security's relative risk measure.

Despite this apparent simplicity, there are some practical problems in implementing the CAPM. In particular, the CAPM is a (expectational) forward-looking model, while available inputs are based on historical data. For this reason, I use the CAPM primarily as a check on the reasonableness of the DCF estimates. If the CAPM results are significantly different from the DCF results, further analysis may be warranted.

MODEL INPUTS

Q: What inputs do you use in these models to arrive at estimates of Questar's ROE?

A: The three basic inputs are dividends, prices, and growth rates. The dividends are the most recently declared quarterly dividends reported by Value Line.[1] Before placing these dividends in the model, they are annualized and grossed up by the growth rate. That is, the dividend D_1 is calculated as

$$D_1 = 4*(1+g)*D_q \quad (3)$$

where D_q is the last declared quarterly dividend and g is the growth rate. Thus, D_1 is the annual dividend to be paid in the next period.

The price P_0 that I use in the models is a three month average of the daily closing price.

There are three growth rates used in the DCF model: two earnings growth rates, one each from Value Line and Zacks, and a dividend growth rate from Value Line. These inputs are illustrated in DPU Exhibit 6.2.

In the TVM I use Value Line's current and forecasted price earnings ratio, and forecasted earnings per share. The beta used in the CAPM is also from Value Line.

UTILITY SAMPLE

Q: What set of risk-comparable utilities are you using in your models?

A: I am using the set of utilities proposed by the Company's witness Dr. Williamson. There are nine utilities in the set: seven gas distribution companies and two gas diversified companies. Of the seven distribution companies, six are identical to those used in the previous rates case (Docket No. 99-057-20).

The criteria used to screen the utilities is, as stated by Dr. Williamson, similar to the criteria used in past rate proceedings. However, I have two concerns with regard to the final selection. First, Dr. Williamson's set of firms includes Questar Corporation. Including the parent company in the set of utilities is unusual. The intent, I believe, which is consistent with Hope and Bluefield, is to compile a set of utilities that have a comparable risk profile to Questar Gas so that the resulting cost of capital estimates are for utilities of comparable risk. As a diversified gas company, Questar Corporation is very likely to have greater risk than Questar Gas, and thus a greater cost of capital. Furthermore, as a diversified company, it is not clear that Questar Corporation meets the income screen set out by Dr.

[1] Value Line Investment Survey for Windows, July 2002.

Williamson. The same objections apply to the second diversified company, National Fuel Gas. Second, along with the choice of the two diversified companies, the choice of the seventh distribution company, Peoples Energy, which was not included in the set of risk comparable utilities in the previous rate case, is disconcerting. If the companies had been chosen at random, you would expect that some ROE estimates would be above the average and others would below. However, all three of these companies have ROE estimates that are greater than the average estimate, thus, in some sense, inflating the final Recommendation.

Although I have left these three companies in the set of utilities I work with, their inclusion is debatable.

Q: What would be the effect of excluding Questar Corporation and National Fuel Gas from the set of comparable utilities?

A: The final recommendation would be about 30 basis points lower. If Questar Corporation were removed, then the average estimate would be 10.5%, which is slightly lower than the average estimate of 10.54% when Questar Corp. is included. If National Fuel were also removed, the average estimate would only be 10.18%.

Q: What implications does including these two diversified utilities in the set of comparable firms have for your recommendation of 10.5%?

A: Given the greater risk of these two companies, 10.5% is a relatively high estimate of the cost of capital for Questar Gas. If I had eliminated these two companies from the set of comparables, and only used the remaining seven distribution utilities, then my recommendation would have been **10.2%**.

Q: You indicated that six of the distribution companies were the same as those used in the last rate case. Which of the companies was not used in the last rate case?

A: Peoples Energy was no included in the set of comparable companies in the last case. The remaining six companies are, AGL Resources, Atmos Energy, Energen, New Jersey Resources, Northwest Natural Gas, and Piedmont Natural gas. These six companies form a common set of risk comparable utilities between the previous rate case (Docket 99-057-20) and the present one.

I use this common or smaller set of utilities for comparison purposes between the rate cases. For example, if we were to use the common set of utilities then, based on current information, the average ROE estimate would be 9.81%. The lower average estimate for the common set of utilities reinforces the previous conclusion that 10.5% is a relatively high estimate of the cost of capital for Questar Gas.

ROE ESTIMATES AND RECOMMENDATION

Q: Please summarize the results of your analysis and how you arrived at your recommendation?

A: There are two estimates from the DCF model, 7.2% and 12.1%, and one estimate from the TVM, 12.3%. The average of these three estimates is 10.5%, which is my recommendation.

MODEL RESULTS

Q: Why are there two estimates from the DCF model?

A: I have two estimates because I use both a growth rate for dividends and for earnings.

Q: Why the two growth rates, why not just use one or the other?

A: Recall, the DCF model has the form,

$$k = \frac{D_1}{P_0} + g \qquad (4)$$

where g is the dividend growth rate. The ROE, "k", in the DCF model is derived assuming an infinite horizon. Thus the growth rate we are looking for is one that is sustainable over a very long period. However, available estimates for dividend and earnings growth rates are for relatively short horizons. For example, Value Line estimates growth rates for both dividends and earnings for the next three to five years. Historically dividends tend to change very little while earnings can change considerably over horizons of this length. It's not surprising therefore that dividend growth forecasts are, relative to earnings growth forecasts, quite small. If we were to utilize a longer horizon, dividends might be expected to grow at a faster rate but, since dividends are paid out of earnings, dividends cannot grow faster than earnings. Thus, it seems reasonable to treat estimates of dividend growth as a lower bound and to treat earnings growth estimates as an upper bound of what an investor could typically expect as a sustainable growth rate to use in the DCF model.

In other words, if we were to rely solely on an estimate of dividend growth in the DCF model, then the resulting ROE estimate would be the lower bound of appropriate values. Likewise, if we were to rely solely on earnings growth rates, we would be estimating the upper bound of appropriate values.

Q: What are the estimates from your DCF and TVM analysis?

A: In each run of the DCF model, I use the quarterly dividend reported by Value Line and the average closing price for the three-month period May 1, 2002 to July 22, 2002.

When these inputs are combined with Value Line's forecasted dividend growth rate, the average ROE for our utility sample is **7.2%**.

The second DCF estimate is found using an earnings growth rate, which is the weighted average of Value Line and Zacks growth rate forecasts. The weighting is done according to the number of analysts used to prepare each forecast. Value Line growth rate forecasts are prepared by one analyst, while the growth rates from Zacks are the average of several analysts' opinions. For example, if Zacks

uses m different analysts to come up with and estimated growth rate g_z, then, given Value Lines' growth rate g_v, the weighted average growth rate would be

$$g_w = \left(\frac{1}{m+1}\right) * g_v + \left(\frac{m}{m+1}\right) * g_z \quad (5)$$

Using the weighted average earnings growth in the DCF model yields and average ROE of **12.11%.**

There are two estimates of ROE from the TVM, one using the current P/E ratio and one using a forecasted P/E ratio. Both estimates are the average ROE estimate from each run of the model. The midpoint of these two estimates is **12.3%**. The simple average of these three values is approximately **10.5%**, which is my recommendation. All the estimation results are summarized in DPU Exhibit 6.3; details are contained in DPU Exhibits 6.4 – 6.9.

STATISTICAL ISSUES

Q: Your recommendation is based on the sample average from each of the model runs. Is there a particular reason why you use the sample mean as opposed to the sample median?

A: Yes there is. While both the sample mean and median are valid measures of central tendency, the sample mean generally has a smaller sampling error than does the sample median.

Both the mean and the median are locational parameters – they determine where the center of the distribution of values will be located. In large samples, both the sample mean and median are approximately normally distributed. In addition to being large, if the sample is drawn from a population that is itself normally distributed, it can be demonstrated that the sample mean is "more reliable" than the median as a measure of central tendency.[2] That is, the mean will have a smaller sampling variation than will the median. This result is quite general, even in small samples, as long as there are no unusually large or small values in the sample, and thus the sample mean is in general the better measure of central tendency.

If, however, there are unusual values – values that are determined to be outliers – in the sample, then the sample median will likely have the smaller sampling error. Thus, if the sample contains outliers, the sample median will be the better measure of central tendency. (See DPU Exhibit 6.10).

In the present case, none of the ROE estimates from individual model runs can be classified as outliers. Therefore, I use the sample mean to summarize or represent each model run.

[2] See, Freund, *Mathematical Statistics*, pp.322-325.

IN SUPPORT OF OUR RECOMMENDATION

Q: Your recommendation is 50 basis points less than your recommendation of 11% in the previous rate case. Do you believe this to be a fair rate of return for Questar? And if so, why?

A: Yes, I believe 10.5% is a fair return. I base this conclusion on four factors: a calculation of Questar Gas's ability to cover its pretax obligations (Times interest earned ratio, TIER), the results from the Capital Asset Pricing model (CAPM), a comparison of interest rates, and a comparison of model result from this case and the previous rate case.

TIMES INTERESTS EARNED RATIO

Q: Would you please explain the TIER and you concerns?

A: Standard & Poor's has revised the principle financial targets it uses to establish bond ratings for investor-owned utilities. For convenience these financial targets are listed along with the criteria themselves in DPU Exhibit 6.13.

According to Standard & Poor's revised criteria, "The new financial targets . . . pertain to risk adjusted ratios that distinguish between higher risk and lower risk activities." The risk adjustment follow a ten-point scale with "1" being associated with the lowest risk activities and "10" highest risk.

One of these criteria is the Times Interest Earned Ratio (TIER). The TIER measures the ability of the firm to meet its fixed obligations and is an important determinate of creditworthiness. The TIER is equal to the ratio of the utilities profit before taxes plus its interest charges all divided by the interest charges:

$$TIER = \frac{\mathrm{Pr}ofit\ Before\ Taxes + Interst\ Ch\mathrm{arg}es}{Interest\ Ch\mathrm{arg}es} = \frac{W_d + (W_p + W_e) * t}{W_d} \quad (6)$$

where W_p, W_e, and W_d are the weighted costs of preferred, equity and debt, and t is a tax gross up factor: 1/(1-tax rate). For comparison purposes I calculate the TIER for ROEs between 10.5% and 12.6% in .5% increments.

Table 1: Times Interest Earned Ratio

K_e	Tier	
10.50%	3.37	Division's Recommendation
11.00%	3.49	
11.50%	3.60	
12.00%	3.71	
12.50%	3.83	
12.60%	3.85	Questar's Recommendation

Notes: The tax rate is 38.0%. Capital structure and cost of debt are those proposed by Questar.

Using the capital structure (47.39% debt and 52.61% equity) and cost of debt (7.92%) proposed by Questar, the calculations indicate a TIER range of approximately 3.40 to 3.90. Standard & Poor's ranks Questar Gas as a business profile of 2. For a utility with this ranking, the recommended TIER range for an A bond rating is 2.3 to 2.9. With a 10.5% ROE, the TIER calculation is 3.37, which is substantially greater than that recommended by Standard & Poor's.

Increasing the ROE to Questar's recommended level, 12.6%, would only increase the TIER by 0.48 times, but would increase the revenue requirement by approximately $10 million, which would be a substantial burden on ratepayers. Thus, I believe 10.50% balances investor and ratepayer interests and is thus a reasonable rate of return on equity.

CAPITAL ASSET PRICE MODEL

The Capital Asset Pricing model (CAPM) also supports a 10.5% ROE. The CAPM is based on the elegant but simple theory that investors expect a rate of return commensurate with the risk of the investment – the greater the risk, the greater the required (expected) rate of return. In its basic or most common form, the investors required return (and thus the cost of equity for the utility) is equal to a risk-free return plus a risk premium, where the premium is adjusted by a factor of proportionality. This factor of proportionality, beta (∃), measures the risk of the security proportional to that of the market. That is,

$$k = R_F + \beta * (R_M - R_F) \quad (7)$$

where k is the required return, R_F is the risk-free return or rate, R_M is the market rate, and ∃ is the security's relative risk measure.

Despite this apparent simplicity, there are some practical problems in implementing the CAPM. In particular, the CAPM is a (expectational) forward-looking model, while available inputs are based on

historical data. For this reason, I use the CAPM primarily as a check on the reasonableness of the DCF estimates. If the CAPM results are significantly different from the DCF results, further analysis may be warranted.

The risk free rate, 5.4%, is a recent yield (7/2/02) on 30-year government securities.[3] The betas for the sample of comparable utilities range from a low of 0.55 to high of 0.75 with an average of 0.63. For the market premium, I use the long run average and endpoints of a standard confidence interval of U.S. stock returns. The long run average is 8%, while the endpoints are 3% and 13% respectively.[4]

Table 2: CAPM Results

	Market Premium		
	3.0%	8.00%	13.0%
Mean	7.30%	10.47%	13.63%

With a market premium of 8%, the mean ROE estimate is approximately 10.5%,[5] which is exactly my recommendation.

COMPARISON OF INTEREST RATES

Interest rates are substantially less than they were when the Commission set the current authorized ROE of 11%. For example, compared to months just prior to the Commission's order the rate on 20-year government securities has averaged 57 basis points less in recent months. Other interests rates show a similar relationship. (See DPU Exhibit 6.15) Given lower interest rates, ceteris paribus, we would expect the cost of capital to be lower which supports reducing the current authorized ROE of 11%.

[3] See, *Value Line Selection and Opinion*, July 12, 2002.

[4] John H. Cochrane, "Where is the Market Going? Uncertain Facts and Novel Theories," NBER Working Paper Series, Working Paper 6207, National Bureau of Economic Research, October, 1997.

[5] Further details can be found in DPU Exhibit 6.14.

RATE CASE COMPARISON

ROE estimates for the current case are also substantially lower than in the previous case (Docket 99-057-20).

Table 3: Comparison of Average ROE Estimates Between Cases

	DCF W/Dividend Growth	DCF W/Earnings Growth	TVM	Average
Previous Case[6]	8.33%	12.51%	14.07%	11.6%
Current Case	7.21%	12.11%	12.30%	10.5%
Current Case Common Sample	6.70%	11.56%	11.18%	9.8%

For example, if we look at the DCF estimates with dividend and earnings growth, the current estimates are approximately 13% and 3% less than in the previous case respectively. Likewise, the estimates from the Terminal Value Model (TVM) are approximately 13% less. If we restrict the comparison to those six utilities that are common[7] between the two cases, the difference is even larger.

While earnings growth rates are slightly higher in the present case, prices are also higher. Dividends between the two rate cases remained constant: the quarterly dividend averages .30 in both the previous and current case. The combination of these factors with similar growth rates between the cases, accounts for the lower DCF estimates in the current case. Similarly, the lower TVM estimates are reflective of higher current prices, flat earnings growth rates and, lower dividend earnings growth rates.

[6] For comparison purposes, average estimates from the previous rate case are reported here. The Division's recommendation of 11% in the previous case, however, was based on the median ROE estimates.

[7] Six utilities in our comparable set in the present case constituted the set of comparable firms in the previous rate case, namely, AGL Resources, Atmos Energy, Energen Corp., New Jersey Resources, Northwest Natural gas, and Piedmont Natural Gas.

Table 4: Comparison of Average Input Values Between Rate Cases

	VL Dividend Growth	VL Earnings Growth	Price
Previous Case	3.33%	7.33%	25.23
Current Case	2.78%	8.06%	27.77
Current Case Common Sample	2.33%	7.75%	27.55

COMMENTS ON QUESTAR'S ROE ESTIMATES

Q: Dr. Williamson recommends a return on equity of 12.6%. This recommendation is largely based on the results from his DCF analysis – it is the average of the median values from three DCF model runs. Do you agree with Dr. Williamson's use of the median?

A: No I do not. There are no outliers in the estimates from Dr. Williamson's analysis and, therefore, I believe he should have used the sample mean as the better estimate.

Q: What impact would using the sample mean have on Dr. Williamson's results?

A: If Dr. Williamson had used the sample means, the resulting recommendation would have been approximately 12.2%, 40 basis points less than the recommended 12.6%.

However, this is not the only problem I see in Dr. Williamson's recommendation. First, Dr. Williamson uses the DCF model with both earnings growth rates from IBES and Value Line. Like Zacks, IBES growth rates are based on several analysts' research, while Value Line growth rates are from one analyst. These growth rates should have been weighted as I explained above. If Dr. Williamson had done so then, using the sample means, the resulting recommendation would have been approximately 11.7%.

Finally, Dr. Williamson ignores the DCF results using Value Lines' dividend growth. If these estimates had been used as I have done, then the resulting recommendation would have been approximately 10.2%, a value 240 basis points less than the recommended 12.6%.

Q: Does Dr. Williamson give a reason for ignoring the dividend growth based DCF results?

A: Yes he does. On page 14 of his direct testimony, Dr. Williamson states, "Value Line dividend growth forecasts cannot be relied on as measures of investor-anticipated growth for use in the DCF model. They lead to cost-of-equity estimates of 6% to 7%."

Q: Do you agree with this assessment?

A: No I do not. While the estimates based on dividend growth are substantially less than those based on earnings growth, relying solely on earnings growth overstates the ROE. As I explained above, earnings growth represents the upper bound and dividend growth the lower bound of what might be expected as a sustainable growth rate to use in the DCF model. Averaging the DCF estimates using both dividend and earnings growth, produces an estimate of ROE that is approximately in the middle of the two extremes.

CAPITAL STRUCTURE

Q: What capital structure are you proposing in this case?

A: I am proposing to use Questar's actual capital structure, namely, 47.39% long-term debt and 52.61% equity. This is the same capital structure proposed by Questar Gas.

Q: You have recommended a ROE of 10.5%. Are you making any recommendations for the cost of long-term debt or preferred stock?

A: No, I am not. DPU witnesses have reviewed Questar's financial records and concluded that the reported cost of debt of 7.92% is reasonable.

Q: Based on your analysis, what would you propose as the overall or weighted cost of capital?

A: Given the proposed capital structure and respective costs, the weighted cost of capital for Questar would be **9.28%**.

Table 5: Weighted Cost of Capital

	Percent of Capital	Cost	Weighted Cost
Long Term Debt	47.39%	7.92%	3.75%
Common Equity	52.61%	10.50%	5.52%
Preferred	0.00%	0.00%	0.00%
Total	1		9.28%

Q: How does your proposed capital structure compare to the average capital structure of the set of comparable utilities?

A: The average capital structure for the nine utilities is 50.3% long-term debt and 49.3% common equity. The average capital structure changes very little if the two diversified utilities are eliminated from the list. Therefore, Questar Gas's debt and equity ratios are respectively lower and higher than the average ratios for the set of comparable utilities.

Table 6: Capital Structure

	Long-Term Debt	Common Equity
Average For All Comparable Utiltities	50.32%	49.25%
Average Excluding Questar and National	50.54%	48.90%
Questar Gas	47.39%	52.61%

The higher equity ratio and lower debt ratio implies that Questar has lower financial risk on average than the set of comparable utilities. Given the relatively lower risk position of Questar Gas is consistent with my earlier conclusion. Specifically, my recommendation of 10.5% is on the high end of appropriate values for Questar's authorized ROE.

Q: Does that conclude your Testimony?

A: Yes it does.