BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

IN THE MATTER OF THE APPLICATION OF PACIFICORP FOR APPROVAL OF ITS PROPOSED ELECTRIC RATE SCHEDULES AND ELECTRIC SERVICE REGULATION	Docket No. 01-035-01 Exhibit No. DPU 6.0

Prefiled Direct Testimony of

Artie Powell

For the Division of Public Utilities

Department of Commerce

State of Utah

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PREFILED DIRECT TESTIMONY OF
ARTIE POWELL
DIVISION OF PUBLIC UTILITIES
DOCKET NUMBER 01-035-01
EXHIBIT NUMBER DPU 6.0

INTRODUCTION

Q: Please state your name and business address.

A: My name is William A. Powell Jr., but most people know me as Artie. 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. I have published several papers in professional journals including, "A Decision Support System for In-sample Simultaneous Equations System Forecasting Using Artificial Neural Networks," published in *Decision Support Systems* (1994), and "Detecting Abnormal Returns Using the Market model with Pretested Data," published in the *Journal of Financial Research* (1996). 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. Since 1996, I have been employed with the Division 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. A Vita detailing more of my experience is attached as Exhibit No. DPU 6.10.

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 11.0 percent which is the currently allowed ROE. My recommendation is based on estimation results from standard Discounted Cash Flow Models (DCF). In addition, my recommendation is supported by 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 hypothetical capital structure proposed by PacifiCorp – 49.2 percent debt, 47.6 percent equity, and 3.2 percent preferred – is consistent with Standard & Poor's risk criteria and thus seems reasonable. Using an 11.0 percent ROE and the updated cost of debt and preferred stock, 6.99 percent and 6.182 percent respectively, the weighted cost of capital for PacifiCorp would be 8.87 percent.

GENERAL ECONOMIC CONDITIONS

Q: Your recommendation of eleven percent is the currently authorized return on equity and is the same as the Division's recommendation from the previous rate case (Docket No. 99-035-10). What factors did you consider in formulating your recommendation?

A: I considered three primary or general factors in formulating my recommendation. Firstly, I consider several general macroeconomic indicators to understand the state of the economy and in particular the electric industry. Secondly, I used specific information from electric utilities comparable to PacifiCorp to formulate an estimate of the cost of equity capital for PacifiCorp. Finally, I consider the estimated return in light of what has taken place in California with the high costs of purchased power in the West.

Q: What macroeconomic factors do you consider in formulating your recommendation?

A: The primary factors I have in mind are interest rates and stock prices, both of which play a role in determining estimates of the ROE. Interest rates, in general, indicate or reflect the opportunity cost of various investments available to investors. Where the opportunity cost is the value of the next best alternative – what an investor might forgo by choosing one investment over another. Lower interest rates would , everything else being equal, indicate a lower required return. That is, as interest rates decline, the required return to induce an investor to purchase a particular stock will decline. Thus, lower interest rates, in general, may mean a lower cost of equity capital for the utility.

INTEREST RATES

Q: Are interest rates higher or lower than they were, say, a year ago?

A: In general, interest rates are lower today than they were a year ago. Since the beginning of the year, the Federal Reserve has *lowered* its target for the Federal Funds rate five times. The Federal Funds rate, is the rate banks charge each other for loaning funds and is one of the principle monetary policy tools used by the Federal Reserve. Given current and expected future economic conditions, the Federal Reserve will either purchase or sell government securities in order to maintain the Federal Funds rate within a given range. By lowering the target on the Federal Funds rate, the Federal Reserve has followed a policy of buying securities. This in effect, injects money into the economy and should lower the Federal Funds rate and interest rates in general.

Approximately a year ago (March 2, 2000), the Federal Funds rate was 5.75 percent; recently (May 22, 2001), the Federal Funds rate was as low as 4.01 percent. Other interest rates have also declined over the past year. The discount rate (the rate the Federal Reserve charges banks to borrow funds) has declined from 5.25 percent to 3.5 percent. The prime rate has declined from 8.75 percent to 7 percent. The yield on U.S. treasuries has also declined. The yield on a 30-year Treasury Bill has declined from 6.13 percent to 5.76 percent.

Table 1: General Interest rates

Interest Rate	Year Ago (3/2/00)	5 Months Ago (11/30/00)	Recent (5/22/01)
Discount Rate	5.25	6.00	3.50
Federal Funds Rate	5.75	6.50	4.01
30 Year Treasury	6.13	5.64	5.76
10-Year Treasury	6.39	5.50	5.38
Prime Rate	8.75	9.50	7.00

Sources: Value Line Selection and Opinion. March 9, 2001. Wall Street Journal, March 23, 2001. Yahoo! Finance, March 23, 2001

Q: Interest rates do appear to be lower today than they where a year ago. How do interest rates over the last twelve months compare to a similar period prior to the last PacifiCorp rate case?

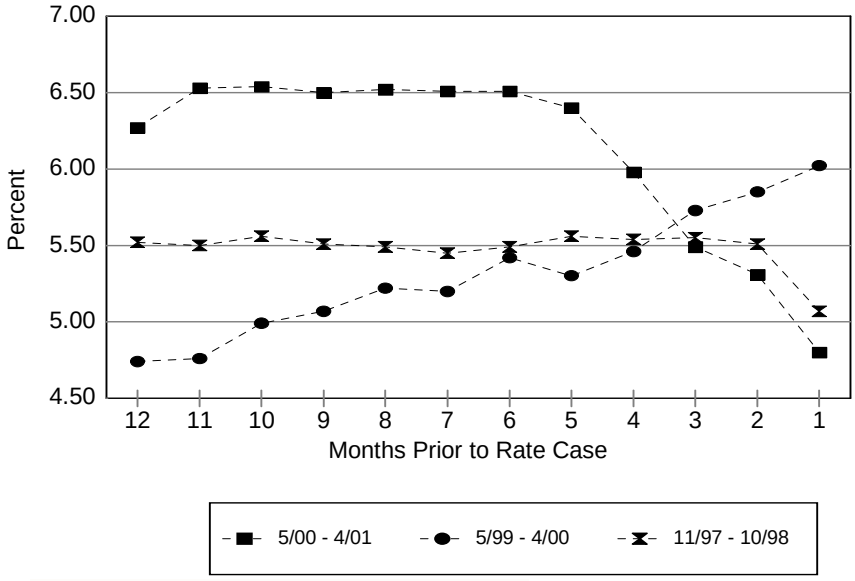
A: The picture is somewhat mixed, but, in general, in the past twelve months interest rates have trended downward. Whereas in the twelve months prior to the last rate case (Docket No. 99-035-

10), interest rates where trending upward.

The Federal Funds rate in the past twelve months has declined from a high of approximately 6.5 percent down to a low of 4.8 percent in April. In the twelve months prior to the last rate case (May, 1999 through April, 2000) the rate went from 4.74 percent to just over 6 percent.

For the twelve months prior to the 1997 rate case (Docket No. 97-035-01) the Federal Funds rate was relatively stable at about 5.5 percent until just prior to the rate case when it fell to just over 5 percent. A similar pattern can be seen in Moody's average corporate bond yield.

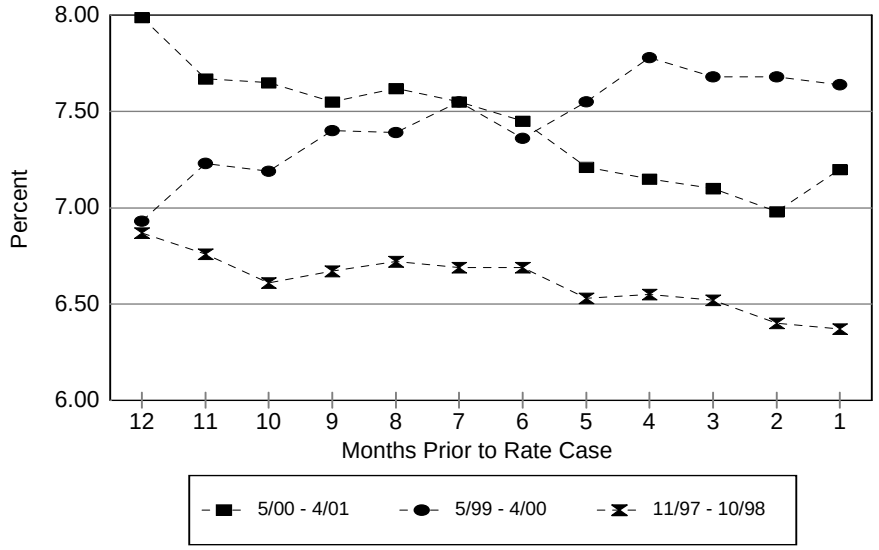
Figure 1: Federal Funds Rate



Source: Federal Reserve Bank of St. Louis, website

In the past twelve months Moody's bond yield has declined from approximately 8 percent to about 7.2 percent. The bond yield also declined prior to the 1997 rate case. Prior to the last rate case, the yield increased from approximately 6.9 percent to 7.6 percent.

Figure 2: Moody's Corporate Bond Yield, Aaa



Source: Federal Reserve Bank of St. Louis, website.

Q: Do all interest rates follow a similar pattern?

A: Not necessarily. While I would say that most interest rates are positively correlated with, or will move in the same direction as, the Federal Funds rate, they will not move in strict tandem with one another. However, in general, it appears that interest rates have been trending downward over the past twelve months where as they where trending upward prior to the last rate case.

Q: What about stock prices, have they been trending upward or downward?

A: Some stocks have been trending downward while others have been trending upward. Over the last fourteen months, for example, the S&P 500, one broad measure or index of stock market activity, has declined by approximately 13 percent.[1] Over the same period, however, the DOW Jones Utility Average, an index of fifteen utilities, has increased by approximately 40 percent.

[1] Simple percentage change in closing levels for January 3, 2000 and May 29, 2001.

Over the period prior to the last rate case, the gap between these two indices was widening, making it relatively harder for utilities to borrow money. With the gap now narrowing, and everything else being the same, utilities should find it easier or less costly to borrow or raise capital.

PAST AND CURRENT RECOMMENDATIONS

Q: How have these factors affected your recommendation?

A: As I explained previously, prior to the last rate case interest rates and stock prices where trending upward. Accordingly, the Division's recommendation increased in the last rate case from the 1997 rate case. Of course this change was reflected or supported by the model analysis completed by Division witnesses. The average estimates of the cost of equity capital increased from 8.58 percent to 10.76 percent for the constant growth DCF model. In the 1997 case, the Division's recommendation was 10 percent and was 11 percent in the last rate case. A similar change in estimates and recommendation can be seen in the Committee's filing as well. (See Exhibit DPU 6.1 for more details).

Q: Even though interest rates are declining, and are lower today than they were for the previous rate case, your recommendation is the same as in the previous rate case. Do you have an explanation for this?

A: On average, my estimates from the DCF analysis are lower in this case than in the previous case, which is consistent with the current trend in interest rates and stock prices. However, other factors persuaded me to leave the recommendation at 11 percent. In particular, one estimate of the cost of equity capital appears to be unusually low. Accordingly, I have assigned less weight to this estimate in formulating my final recommendation.

ESTIMATION OF PACIFICORP'S ROE

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

A: The primary model that I use to estimate the cost of equity capital or return on equity (ROE) is the Discounted Cash Flow (DCF) model. Specifically, I use two versions: a Constant Growth model and a Non-Constant Growth model. I also employ the Capital Asset Pricing (CAPM) model as a check for reasonableness on the numbers or estimates coming from the DCF models.

BASIC DCF MODEL

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 investor's required return or opportunity cost 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,

$$k = \frac{D}{P} + g \qquad (1)$$

Equation 1 is the so called Constant DCF model, where k, D, P, and g are respectively the required return on equity (ROE), dividend, stock price, and dividend growth rate. (See exhibit DPU 6.2 for a more detailed explanation). In addition, to the constant growth rate assumption, the DCF theory assumes that prices, earnings, and dividends grow at the same rate. Among other things, this implies that the price earnings ratio will be constant over time. To arrive at an estimate for the ROE, requires information on the dividend, price, and growth rate. If, for example, the dividend yield (D/P) is 6.5 percent and the growth rate is 3.5 percent, then the estimated ROE would be 10.0 percent.

Of course, by relaxing one or more of the assumptions, other forms of the DCF model can be specified. In particular, it is common to relax the assumption that dividends grow at a constant rate. While the discount rate or required rate of return in this model is somewhat more complicated to derive, the concept is the same as that in the Constant Growth model. Namely, the investors required return is that rate that equates the future income from holding the stock to its current price.

For example, both myself and Company witness Dr. Hadaway use the so called Terminal Value DCF model to estimate the ROE for PacifiCorp.[2] In this version of the DCF model, it is assumed that the stock is held for a finite number of years (say four) and then sold. 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 $36.00 and $1.00 respectively. If the investor expects the price to grow to say $47.40 and the dividend to grow to $1.25 over the next four years, then the discount rate that

[2] Dr Hadaway refers to his model as a "Market Price" model.

equates the dividend stream and future price to the current price is approximately 10.0 percent.

MUCH ADO ABOUT NOTHING

Q: Is there any reason to prefer the Constant Growth DCF model to a Non-Constant Growth DCF model (or vice versa)?

A: In theory, given perfect information about the various inputs, there are certain reasons to prefer a non-constant growth model to a constant growth version. As Roger Morin points out in his book, *Regulatory Finance*, "A Non-Constant Growth DCF model is appropriate whenever the growth rate is expected to change, *and the only way* to produce a change . . . is by introducing an *intermediate growth* rate."[3] (Emphasis added). However, in the absence of perfect information about the various inputs, in particular the growth rate, there is little justification for preferring one model over the other.

Furthermore, as is demonstrated in DPU Exhibit 6.2, anyone with a modicum of algebraic skills can derive the basic DCF model from a statement of the current price as a function of future income streams. On the other hand, the Non-Constant Growth model, for the most part, has no closed form solution. That is, the Non-Constant Growth model can not be easily solved for the discount rate with out the use of a computer. With today's computers this is not, in-and-of itself a problem, however, it does make the Non-Constant Growth model conceptually more difficult.

Finally, let me just mention that any Non-Constant Growth model implies an effective constant dividend growth rate. That is, each of the Non-Constant Growth models has a Constant Growth counterpart. This is because each non-constant growth model implies an effective growth rate, where the effective growth rate is simply the difference between the ROE estimate and the dividend yield. That is,

$$\textit{Effective Growth Rate} = \textit{ROE Estimate} - \textit{Dividend Yield} \qquad (2)$$

Thus, by construction, effective growth rates from Non-Constant Growth DCF models can be utilized in a Constant Growth model to arrive at the same results.[4] In light of this equivalency,

[3] Roger A. Morin, *Regulatory Finance: Utilities' Cost of Capital*, Public Utilities Reports, Inc. Arlington, Virginia, 1994, p. 123.

[4] The obvious corollary would be, if one were inclined, to start with a constant growth figure, divided it up in an appropriate manner to arrive at an infinite number of equivalent Non-Constant Growth models.

the principle of parsimony, commonly referred to as Ockham's Razor,[5] provides a sound argument in favor of the Constant Growth Model: less complexity is preferred when two or more models provide or yield similar results. Greater emphasis, therefore, should be placed on the inputs used in either model as opposed to spending time arguing over which model is more appropriate in any given circumstance.

DCF MODEL INPUTS

Q: Speaking of inputs, I assume you mean the stock price, dividends, earnings, and a growth rate. Can you explain what inputs you use in your analysis?

A: Yes, the stock price, dividends, and growth rates are the main inputs to be selected for use in the DCF models. Most of the information I use comes from Value Line reports dated January, February, March, or April 2001.[6] Additional information on earnings growth was gathered from Zacks' web site.[7]

The dividend is the annualized[8] last declared quarterly dividend reported by Value Line. For most of the utilities in the set of comparable firms, the dividend is that declared in the first or second quarter of this year.

The price I use is a "three" month average: the average daily closing price for February 1, 2001 through April 18, 2001.

I use two growth rates in my analysis: one for dividends and one for earnings. The dividend growth rate is derived from Value Line information using the following formula,

$$g_{DPS} = \left[\frac{DPS_n}{DPS_0} \right]^{(1/n)} - 1 \qquad (3)$$

Where DPS_n is the projected annual dividend per share, and DPS_0 is the annualized quarterly dividend discussed above. Except for one case, n is equal to four. In the case of Puget Energy, n

[5] According to the medieval philosopher, William of Ockham (c. 1285-1349), "nothing should be assumed that cannot be clearly established by experience or reason or that is not demanded by religious faith." Various formulations of this principle, such as, "Plurality is not to be assumed without necessity," or "What can be done with fewer assumptions is done in vain with more," have come to be known as Ockham's Razor. See, Dorothy Rose Blumberg, *Whose What?*, Holt, Rinehart and Winston, New York, 1969, pp. 118-119.

[6] *Value Line Investment Survey*® for Windows®, April 2001 (Data as March, 2001), © Value Line Publishing, Inc.

[7] Zacks Broker Research Report Service, http://my.zacks.com

[8] The annualized dividend is four times the quarterly dividend.

is equal to three.[9]

The earnings growth rate I use is a weighted average of a growth rate derived from Value Line information and one taken from Zacks' web site. The Value Line earnings growth rate is derived in a similar fashion as the dividend growth rate. However, instead of using the last declared earnings per share, the initial earnings per share (EPS_0) is an annual average earnings per share for the three years, 1998 through 2000.[10] The projected earnings corresponds to the same time frame given for dividends.

Zacks' earnings growth rate is an average 5-year growth estimate. The average is derived from the 120 day consensus of from one to nine individual estimates. Value Line's growth rate, on the other hand, is based on one analyst's opinion. For this reason, I weight the two earnings growth rates by the fraction of the total number of estimates.

For example, suppose there are n estimates[11] underlying Zacks' 120 day consensus. Thus, including the estimate from Value Line, there are a total of (n+1) estimates and the weighted average would be,

$$g_e = \frac{1}{n+1} * (n * g_z + g_{vl}) \quad (4)$$

where g_z is Zacks' average growth, and g_{vl} is Value Line's estimated growth.

In addition to these three inputs, I also use an average price earnings (P/E)ratio. Value Line reports both a current and a projected P/E. I use the simple average of these two as an input in the non-constant growth DCF model.

Q: You stated that you use a three month average price. Does not the DCF theory imply the use of a spot price. Why did you choose a three month average?

A: I agree, the DCF theory does imply the use of a current price. An investor must decide whether

[9] For the reports I use here, Value Line projects a dividend per share, depending on the date of the report, for either the years 2003-2005 or 2004-2006. I use the middle year of these projections as an end point. Thus, except for Puget Energy, the time period is over four years. Using the annualized dividend, the time period over which the dividend is supposed to grow is either from 2000 to 2004 or from 2001 to 2005. In the case of Puget Energy, the last declared dividend is for the first quarter of 2001 while the projected dividend is for 2003-2005, a period of just three years.

[10] This is similar to the methodology Value Line uses in projecting earnings growth. Since earnings are growing, using the most recent quarterly earnings would lower the overall growth rate and thus lower the estimates of ROE.

[11] The individual estimates are not reported by Zacks, only the number of estimates upon which the 120 day consensus is based are reported.

to purchase a stock based on the current price. However, our objective is not necessarily to mimic an individual investors decision, but to estimate a fair rate of return for the utility.

Before beginning my analysis I looked at three different prices. Of these three, two where, from a statistical point of view, essentially the same. The third price, the average I actually use in my analysis, is substantially different from the others. The three prices are, (1) a Value Line spot price,[12] (2) a "current" spot price taken from YAHOO! Finance,[13] and (3) an average daily closing price for the period February 1 to April 18 as previously described. The following table summarizes the average price in each case.

Table 2: Price Comparison

	1 VL's Spot Price	2 Current Spot Price	3 Current 3-Month Avg
n	15	15	15
Mean	36.32	37.07	35.79

Pair-wise Student-t tests indicate that there is no difference between the first two prices. But the third price, the current three-month average, is statistically speaking less than the other two. These tests and their results are reported in an attached exhibit DPU 6.3.

Q: Some may argue that a three month average price based on the three months prior to the date of the Value Line report is more appropriate. Do you agree with this argument?

A: No, I do not. This argument is based on a concept of timing – the prior three months are consistent with other information reported by Value Line. While there is some validity to this argument, the Division, and I believe the Commission as well, has relied on the most current available information in determining the cost of capital. We use the most current values for both the cost of debt and preferred stock. The current three month average price that I adopt here is consistent with this practice.

[12] Value Line's spot price is the closing price for the Wednesday prior to the reporting date.

[13] The closing price for April 16, 2001.

For this reason, and given the test results, I believe that the price I use, price 3 or the current three month average, is more indicative of what an average investor may be faced with and yields a more fair rate return than would either of the other two prices.

Q: In deriving growth rates, you treat dividends and earnings differently. To obtain a growth rate for dividends you annualize the last reported quarterly dividend. While in deriving one earnings growth rate you use the reported annual earnings per share. Why?

A: The current dividend, I believe, better reflects investor expectations about future dividends – for investors the current dividend is a better indicator of dividends in the near future than are past dividends.

Furthermore, for most firms Value Line reports an average growth rate for both dividends and earnings. However, for five of the fifteen utilities in the comparable list, Value Line does not report a growth rate for dividends or reports a negative growth rate. A negative growth rate may be due to either an announced or expected decrease in a utility's dividend over the forecasting period. To avoid the complication of negative growth rates, I use the last reported quarterly dividend.

COMPARABLE UTILITY SAMPLE

Q: PacifiCorp filed using a sample of sixteen utilities for comparison. However, you have mentioned a couple of times that your results are based on a sample of fifteen utilities. How does your sample differ from PacifiCorp's sample?

A: Since PacifiCorp filed their initial testimony in this case, CP&L Energy, one of PacifiCorp's original sixteen firms, purchased Florida Progress. The merged company now does business as Progress Energy. As a result, current Value Line information is not available for CP&L. Therefore, I have eliminated CP&L from my sample. The remaining fifteen firms are those used by PacifiCorp. (See attached exhibit DPU 6.3)

Q: Are there other problems or issues concerning the remaining fifteen firms or are you satisfied that they constitute an adequate sample to estimate PacifiCorp's return on equity?

A: There are a couple of issues, but for several reasons I am satisfied with the remaining fifteen utilities.

Q: If you would, please elaborate on your concerns.

A: Of the fifteen remaining utilities, six are in the process of merging with another utility. For example, at the time of this filing, DTE Energy (which is in our sample) and MCN Energy are in

the process of revising their merger agreement. For one thing, the walk away date has been extended from April fifteenth to the end of the year. However, it does not appear that the merger announcements have unduly affected the DCF estimates.

Q: What do you mean that these announcements have not "unduly affected the DCF estimates?"

A: For each model and its corresponding set of inputs, I analysis the results looking for outliers – estimates that are, relative to the group, unusually small or large. The criteria I use is that used in constructing a Box Plot. Namely, an outlier is defined as a value that is either below a "lower fence" or above an "upper fence." In no case did I find evidence of any extreme outliers – none of the individual firm's estimates lie outside the fences.[14]

Q: Are there any remaining concerns you would like to express?

A: PacifiCorp uses what appears to be a logical set of criteria to screen and arrive at its sample of utilities. This set of criteria are similar to those used in previous rate cases. Namely, all electric utilities, (1) with a single-A or higher bond rating, (2) that have electric revenues at least 75 percent of total revenues, and (3) for which complete and reliable data are available. While these criteria seem reasonable, preliminary results indicate a lack of correlation with the estimated ROEs coming from the DCF models.

The correlation coefficient is a number between minus one and positive one. A positive coefficient indicates the two variables tend to move together in the same direction – if one increases (decreases) the other will also increase (decrease). A negative correlation coefficient indicates that the two variables tend to move in opposite directions. The magnitude of the coefficient is an indication of the strength of the linear relationship between the two variables. For example, a coefficient of one indicates that the two variables are perfectly positively correlated – if one variable increases by ten percent the other will increase by ten percent also.

For purposes of analysis I assigned numbers to the letter bond ratings indicated by Moody's for a large set of electric utilities. The correlation between the coded bond rating and the estimated ROE is quite small, -0.17. Similarly, the correlation between the percent of income and the estimated ROEs is only -0.23. Both of these values are statistically insignificant. That is, from a statistical point of view, these values can not be distinguished from zero – the observed

[14] There are two cases of what may be classified as mild outliers – two estimates lie above the inner fence indicating that they are unusually, but mildly, large. Both cases occurred in the non-constant DCF model and involved the utility DQE. Removing these estimates from the final analysis would cause the average ROE estimates to be slightly lower than reported in this testimony. For an explanation of Box Plots and there use, see, among others, Harvey Brightman and Howard Schneider, *Statistics Business Problem Solving*, South-Western Publishing, Cincinnati, Ohio.

correlation is not strong enough to conclude that these variables necessarily move in opposite directions. (See attached exhibit DPU 6.4 for more details).

Q: What conclusions can be drawn from these results?

A: Primarily, I think the results suggests that the set of criteria are somewhat arbitrary and that the Commission should be open to arguments favoring, or evidence supporting, alternative samples.

CAPITAL ASSET PRICING MODEL

Q: Before we get into the actual DCF estimates, would you please explain how you use the Capital Asset Pricing Model.

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 beta (β). And beta measures the risk of the security proportional to that of the market. That is,

$$k = R_F + \beta * (R_M - R_F) \quad (5)$$

where k is the required return, R_F is the risk-free return or rate, R_M is the market rate, and β 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.

Q: How do the results from the CAPM compare to your recommendation of 11 percent?

A: My recommendation of 11.0 percent is actually in the upper range of the CAPM results.

Remember the CAPM adds a risk premium to a risk free rate where the premium is determined by the relative risk of the stock to the market's risk. The betas and the risk free rate I use come from *Value Line Survey* as of April, 2001. The risk free rate, 5.45 percent, is the midpoint of a 13-week range for 30-year Treasury bond yields. The betas for the sample of comparable utilities range from a low of 0.45 to high of 0.60 with an average of 0.53.

The market return I use is actually drawn from a study of U.S. stock returns.[15] In this study by John Cochrane, the average market return over a long period is 8 percent. Of course, returns will fluctuate or vary around this average over a given period of time. As indication of how much the returns are likely to vary over time, I use the 95 percent confidence interval, 3 percent to 13 percent, reported by Cochrane. The confidence interval indicates that over time we should expect that 95 percent of all observed returns will be within the stated range. Using these three values (3, 8, and 13) for the market rate of return, establishes a range of reasonable estimates for the cost of equity capital.

Q: Do you believe that these estimates of the market return are correct?

A: Certainly if the study were updated, these values would change. For example, the average would be different, it may be lower or higher than the 8 percent reported in Cochrane's 1997 study. However, given the long period over which Cochrane's performs his study, I don't believe the average or confidence interval would change by much. Therefore, I am comfortable with these values.

Q: What is the range of estimates from your CAPM?

A: Given the risk free rate, betas, and market returns discussed above, the average ROE estimates for the CAPM range from 7.05 percent to 12.38 percent with a midpoint of 9.72 percent. Further details can be found in exhibit DPU 6.5.

Table 3: CAPM Results

	Market Premium		
	3%	8%	13%
Mean	7.05	9.72	12.38
Median	7.10	9.85	12.60

DCF ESTIMATION RESULTS

Q: What are the results of your DCF analysis?

A: As I stated above, I am recommending an ROE of 11.0 percent which is the currently authorized return on equity. This recommendation is the approximate midpoint of estimation results from

[15] 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.

the Constant and Non-Constant Growth DCF models.

CONSTANT GROWTH DCF MODEL ESTIMATES

The Constant Growth DCF model that I use has the form discussed above, namely,

$$k = \frac{D_1}{P_0} + g \quad (6)$$

where k is the ROE, D_1 is a measure of the next period's dividend , P_0 is the three month average discussed previously, and g is a growth rate. The dividend, D_1 is found by annualizing the last declared quarterly divided (D_0) and adjusting the result for one period's growth:

$$D_1 = 4 * D_0 * (1 + g) \quad (7)$$

The last declared quarterly dividend is that reported by Value Line. Finally, for g I use both the dividend and average earnings growth rates discussed previously.

The mean ROE estimates for this model range from a low of 7.18 percent to a high of 12.03 percent with a midpoint of 9.61 percent. Further details can be found in exhibit DPU 6.6.

NON-CONSTANT GROWTH DCF MODEL

The Non-Constant Growth model I use is the same as one used by Dr. Hadaway. I refer to this model as a terminal value approach because it assumes that the stock is bought in the current period, held for a finite number of periods, and then sold at some value at the end of the holding period.[16] The ROE estimate in this model is the discount rate (internal rate of return) that equates the terminal price of the stock (at the end of the holding period) plus the dividend stream over the holding period to the current price.

The current price I use is again the three month average. The initial dividend is the annualized quarterly dividend. And the terminal price is found by multiplying the P/E by the forecasted earnings per share (EPS). The forecasted EPS is taken from the Value Line reports and the P/E ratio is an average of the current and forecasted values reported by Value Line.

To determine the intermediate years dividend income, the initial dividend is allowed to grow at both the dividend and earnings growth rates. The mean estimates for this model range from 10.89 percent to 11.42 percent with a midpoint of 11.16 percent. Further details can be

[16] Dr. Hadaway refers to this model as the Market Price Model.

found in exhibit DPU 6.7.

ANALYSIS SUMMARY AND RECOMMENDATION

SUMMARY OF DCF ESTIMATES

Q: Would you please summarize your results and explain how you arrived at your recommendation.

A: In summary, there are four mean estimates of the return on equity: two from the constant growth model and two from the non-constant growth model. For each model both a dividend and earnings growth rate are employed. Overall the estimates range from a low of 7.18 percent to a high of 12.03 percent. The overall average of these four estimates is 10.38 percent.

While all four of the estimates are within the range established by the CAPM, 7.05 percent to 12.03 percent, one is on the lower end of the range. This low estimate comes from the constant grow model utilizing the dividend growth rate. This is not surprising since the average dividend growth rate is 2.21 percent compared to an average earnings growth of 6.73 percent. If we drop this low estimate, the average of the remaining three estimates is 11.45 percent. My recommendation of 11.0 percent is the approximate midpoint of the range 10.38 percent to 11.45 percent.

Table 4: Average ROE Estimate Summary

	Model Form	
Growth Factor	Constant Growth	Non-Constant Growth
Dividends	7.18%	10.89%
Earnings	12.03%	11.42%

Overall average	Average Excluding Low Estimate
10.38%	11.45%

OTHER CONSIDERATIONS

Q: If I understand you correctly, your recommendation gives less weight to the dividend related results from the constant growth model. Is that correct?

A: Yes, that is what I intended.

Q: Can you explain why you feel it necessary to assign less weight to the results from this one model?

A: For the sample of comparable firms, the average growth in dividends is just over 2 percent. Some utilities have recently cut or are holding dividends constant over the near future. However, this low growth rate does not, in my opinion, reflect long run investor expectations. Furthermore, the average estimate of the cost of equity capital from this model (7.18 percent) is only about 17 basis points above PacifiCorp's current cost of debt, and is 63 basis points less than Moody's Average Public Utility Bond Yield for April. Based on these factors, I have discounted this estimate accordingly.

Q: By assigning less weight to this one estimate, your resulting recommendation is on the high end of the range of your estimates. Other than the explanation you have given, is there any justification for your discounting this estimate?

A: Although modest, there is some statistical support for my discounting the low value.

In the past, Division witnesses have used a simple average of both a dividend and earnings growth rates as an input into the constant growth DCF model. In the present case, I have reported results separately for these two grow rates. I did so because, given the recent history of California, I expected that the earnings for Western utilities would be affected differently than the earnings for non-Western utilities.

Numerous articles have pointed out the difficulty that PG&E and Southern California Edison have had in meeting their financial obligations due to high purchasing power costs. Since these purchasing cost will be very similar for all utilities in the Western region, Western utilities may face greater risks than non-Western utilities. If so, investors in Western utilities should require a greater average return than investors in non-Western utilities. I anticipated that, if it exists, this higher risk would be reflected as a difference in the ROE estimates of Western utilities versus non-Western utilities – given higher risk, the ROE estimates for Western utilities should be greater than the estimates for non-Western utilities. The results of my statistical analysis, however, only weakly support this hypothesis.

Q: Given the California situation, your hypothesis is that Western Utilities are inherently riskier than non-Western utilities?

A: That is the hypothesis I investigated.

Q: What evidence did you find to support this hypothesis?

A: I first looked at the resulting estimates from the constant growth model based on the earnings growth rate. Recall, that the overall average estimate for this model is 12.03 percent. If the results are separated into Western and non-Western utilities, the average ROE estimates are 12.69 percent and 11.87 percent respectively. Thus, it appears that investors in Western utilities do require a higher average ROE. However, given the small sample sizes involved – three Western and 12 non-Western utilities – no meaningful statistical results are available.

Table 5: Western Versus Non-Western

Constant Growth DCF Model,
Average Earnings Growth Rate
Sample of 15 Utilities

	Western Utilities	Non-Western Utilities
Mean	12.69%	11.87%

To further investigate the stated hypothesis, I collected data for fifty-six utilities. The sample consisted of those firms for which Value Line reported both a spot price and dividends. The growth rate is the earnings growth rate reported by Zacks. I used this information to calculate ROE estimates similar to those reported above.

For the Western utilities the average ROE estimate is 13.62 percent and for non-Western utilities the average is 11.56 percent. Although it appears that the Western utilities do indeed have a higher average ROE estimate, a standard Student-t test of the hypothesis indicates that there is statistically no difference between these means. In other words, statistically, investors in Western utilities do not require a greater return than investors in non-Western utilities

Regression analysis, however, does provide some statistical evidence that investors in Western utilities in this larger sample do require a greater return than investors in non-Western utilities. For the expanded sample of fifty-six utilities, I regressed all the ROEs against a Western indicator or dummy variable and the percent of income from electric operations. The

indicator variable is simply a variable that is one for a Western utility and zero for all non-Western utilities. The estimated coefficient for the indicator variable is positive, which supports the hypothesis of a higher return for investors in Western utilities. Furthermore, the coefficient is statistically significant indicating that the coefficient value is different from zero and that the greater return required by investors is possibly due to the high purchasing cost in the West. (See attached exhibit DPU 6.4 for details).

TIMES INTEREST EARNED RATIO

Q: Have you used any other factors to ensure that your recommendation is reasonable?

A: Yes I have. Standard & Poor's has revised the principle financial targets it uses to establish bond ratings for investor-owned utilities. For convenience these criteria are listed along with the criteria themselves in Exhibit DPU 6.9. 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:

$$TIER = \frac{Profit\ Before\ Taxes + InterstCharges}{Interest\ Charges}$$

$$= \frac{(W_p + W_e) * t + W_d}{W_d}$$

where W_p, W_e, and W_d are the weighted costs of preferred, equity and debt, respectively. And t is a tax gross up factor equal to 1/(1-tax rate). For comparison purposes I calculated the TIER for ROEs between 10 percent and 13 percent in 0.50 percent increments.

Table 6: Times Interest Earned Ratio

ROE	Tier
10.00%	3.32
10.50%	3.44
11.00%	3.55
11.50%	3.66
12.00%	3.77
12.50%	3.88
13.00%	3.99

Notes:
k_e is the cost of equity (ROE). Tax Rate = 38%. Capital structure and cost of debt and preferred are those recommended by the Division.

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. Given PacifiCorp's commitment to its core business, we can reasonably assume that, for purposes of Standard & Poor's criteria, PacifiCorp is a low to moderate risk utility. That is, they have a business position on Standard & Poor's scale of 3 to 5. In fact, Standard & Poor's ranks PacifiCorp as having a Business Profile of 4. For a utility with a ranking of 4, the TIER range is 3.3 to 4. This roughly corresponds to an ROE range of 10.0 percent to 13.0 percent. With a ROE of 11.0 percent, PacifiCorp would have a TIER of 3.55 which meets Standard&Poor's criteria to maintain an "A" bond rating.

COMMENTS ON DR. HADAWAY'S RESULTS

Q: The difference between your recommendation and that of the PacifiCorp does not appear to be very large. There is only 50 basis points separating the two. In your opinion, is the difference significant?

A: In some respects the difference may seem insignificant. For example, from my TIER ratio analysis above it can be determined that the TIER ratio for PacifiCorp only increases by about 3 percent (3.55 to 3.66) by moving from an ROE of 11 percent to 11.5 percent.

From the ratepayer's point of view, however, the 50 basis points is very significant.

Fifty basis points in the allowed rate of return would increase PacifiCorp's revenue requirement by approximately $10 million.

Q: I see, from the rate payers point of view the difference in recommendations is quite substantial. What do you think accounts for the difference in your recommendation and PacifiCorp's?

A: The major difference I believe is due to the growth rates used in the DCF analysis. My recommendation is based on a weighting of results utilizing both a dividend and an earnings growth rate. Dr. Hadaway's recommendation is based on results that only utilize earnings growth rates.

Q: Why did you choose to use a combination of earnings and dividend growth rates in your analysis?

A: As is well known, the DCF models are based on sound theory, however, their application is less than exact. What I mean by this is, the basic DCF model is a infinitely forward-looking model. The model is based on the theory that the current price of the stock is the discounted present value of all future income (the dividend stream) derived from holding the stock. On average, over an infinite horizon, dividends per share can not exceed earnings per share. Earnings growth, therefore, acts as an upper limit on the growth of dividends.

In addition to the constant growth assumption, the constant growth model assumes that dividends, earnings, and prices will grow at the same rate. Historical evidence, however, shows that this assumption is highly unlikely. Recently, dividends have grown at much slower rates than earnings. Current, estimates of dividend growth rates would appear to represent a lower bound on long-run dividend growth rates.

Combining the two, both dividend and earnings growth rates, I believe is a suitably compromise between the two extremes and better reflects investor's long-run growth rate expectations.

Q: Do you believe that Dr. Hadaway's DCF analysis is flawed given he only uses earnings growth rates?

A: No, I do not believe that his analysis is flawed in any fundamental way. If one only looks at the results based on earnings growth, our results are similar. In fact, on average my results based on earnings are slightly higher than Dr. Hadaway's. With that said, however, I do believe that Dr. Hadaway's recommendation represents an upper bound on the reasonable range of ROE estimates for PacifiCorp and should be weighted by the Commission accordingly.

CAPITAL STRUCTURE AND THE WEIGHTED COST OF CAPITAL

Q: Let's shift gears for a moment. You indicated in the summary of your testimony that you would testify on the proposed capital structure. Are you comfortable with the proposed (hypothetical) capital structure?

A: Yes I am comfortable with the capital structure as proposed by PacifiCorp. Therefore, I am not recommending any changes to the hypothetical mix of capital sources.

Q: Are there specific reasons or factors that lead you to this conclusion?

A: Yes, the debt ratio proposed by PacifiCorp, 49.2 percent falls within the suggested range by Standard & Poor's for a moderately risky utility to maintain an "A" bond rating. I'm defining moderate to mean a utility with a business profile of 3, 4, or 5 on Standard and Poor's scale. (See, attached exhibit DPU 6.8). For utilities of this risk range, Standard & Poor's suggests a debt ratio range from 41.5 percent to 53.0 percent. Thus, it would appear that the capital structure as proposed by PacifiCorp is reasonable.

Q: You have recommended a ROE of 11.0 percent. Are you making any recommendations for the cost of long-term debt or preferred stock?

A: Yes, I am. DPU witness Ron Burrup has thoroughly reviewed PacifiCorp's financial records and has updated the costs of debt and preferred equity. The updated costs are detailed in Exhibits DPU 1.0 and 1.8. The new costs for debt and preferred are 6.991 percent and 6.182 percent respectively.

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

A: Given the costs of debt and preferred, and the hypothetical capital structure, the weighted cost of capital for PacifiCorp would be 8.87 percent.

Table 7: Weighted Cost of Capital

Division's ROE Recommendation
Updated Costs of Debt and Preferred

Source	Percent	Cost	Weighted Cost
Preferred	3.20%	6.18%	0.20%
Debt	49.20%	6.99%	3.44%
Equity	47.60%	11.00%	5.24%
Total	100.00%		8.87%

Q: Does that conclude your testimony?

A: Yes it does.