BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

IN THE MATTER OF PACIFICORP'S APPLICATION FOR APPROVAL OF ITS PROPOSED ELECTRIC SERVICE SCHEDULES AND REGULATIONS	DOCKET NO. 04-035-42 DPU EXHIBIT 2.0

PREFILED DIRECT TESTIMONY

ARTIE POWELL

UTAH DIVISION OF PUBLIC UTILITIES

December 3, 2004

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7 **INTRODUCTION**

8 **Q:** **Please state your name, business address and title.**

9 A: My name is Artie Powell; my business address is 160 E. 300 S. Salt Lake City,

10 Utah 84114; I am a Technical Consultant and Acting Manger of the Energy Section

11 of the Division of Public Utilities.

12 **Q:** **On whose behalf are you testifying?**

13 A: The Division of Public Utilities ("Division").

14 **Q:** **Please summarize your educational and professional experience.**

15 A: I earned a doctorate degree in economics, with an emphasis in econometrics and

16 microeconomic theory, from Texas A&M University. Since 1985 I have taught a

17 variety of undergraduate and graduate courses in economics, econometrics, and

18 statistics and currently teach as an adjunct professor in the department of

19 economics at Weber State University. Since 1996 I have worked at the Division of

20 Public Utilities. While at the Division I have participated in a variety of energy and

21 regulatory matters including electric deregulation and stranded costs, avoided cost

22 pricing for qualifying facilities, company acquisition of new generation resources,

23 special contracts for large industrial electrical customers, as well as acting as the

1   Division's cost of capital witness.

2   **S C O P E   A N D   S U M M A R Y**

3   **Q:**   **What is the purpose of your testimony?**

4   A: As acting manager for the energy section in the Division, I will be acting as the

5   general policy witness for the Division. I am also the Division's return on equity

6   (ROE) witness.

7   **Q:**   **Please summarize your testimony and recommendations concerning an**
8   **appropriate rate of return on equity capital for the record.**

9   A: On behalf of the Division, I am recommending a ROE of 10%. My

10   recommendation is based on the result from three forms of the discounted cash

11   flow (DCF) model, with a 50 basis point adjustment. Combined with the capital

12   structure reported by the Company's witness Mr. Williams for FY05, and given the

13   Division's adjustment in the cost of long-term debt, the weighted cost of capital is

14   8.06%.

15   My DCF analysis ranges from approximately 8.6% to 10.5% with a midpoint of

16   9.5%. The lower end of the range is found when dividend and earnings growth are

17   weighted according to the Commission's order in Docket No. 02-057-02. The

18   upper end of the estimate range is found when the growth rate in GDP is used as a

19   proxy in the DCF model for the growth in dividends. While I do not necessarily

20   agree with the Company's witness with the use of GDP growth in the DCF model,

1   a 20-year average is within an acceptable range, albeit on the high end,[1] of the

2   historical earnings growth rates for the group of representative firms adopted by Dr.

3   Hadaway and myself.

4   In the past, the Division has typically recommended the midpoint of its DCF

5   analysis as an appropriate ROE for the Company. In this case I am recommending

6   a rate 50 basis points above the midpoint to match more closely the midpoint of the

7   Capital Asset Pricing Model's (CAPM) results. A 10% ROE is approximately

8   equal to the estimates from the DCF model using GDP growth as the proxy growth

9   rate. While the 10% recommendation is still below the actual midpoint of the

10   CAPM, further adjustments are not justifiable since the GDP growth rate defines,

11   in my opinion, an upper bound on the expected growth rate.

12   **Q: Would you please summarize the Division's position in this case with regards**
13   **to PacifiCorp's requested revenue requirement?**

14   A: The Division is not making a recommendation at this time. Division witness Mr.

15   Barrow introduced the Division's witnesses and filed a top-sheet (DPU Exhibit 1.1)

16   indicating the Division's current adjustments. The Division's top-sheet does not

17   report or calculate an overall revenue requirement because the net impact of several

18   adjustments is not known at this time. The Division plans on filing supplemental

19   testimony to its direct testimony as soon as possible that will finalize our position.

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[1] Only three firms in the representative sample have historical earnings per share growth rates greater than the 20-year average growth rate in GDP. Of these three firms, statistical analysis indicates that one firm's earnings growth is an outlier.

1 **Q: Will you explain a little about these adjustments and why the Division has not**
2 **finalized its position?**

3 A: As indicated on the Division's top-sheet, Ms. Coon has, on a Utah basis, made a

4 $33 million adjustment to PacifiCorp's requested net power costs. This adjustment

5 includes the affect of a reduction in the load forecast proposed by PacifiCorp for

6 FY06. However, reducing the load forecast will impact other factors that determine

7 PacifiCorp's revenue requirement. For example, changing the load forecast will

8 change the allocation factors, which in turn will change several of the Division's

9 other adjustments as reported on its top-sheet. Changing the load forecast will also

10 impact the Company's projected revenues.

11 At this time, the Division does not clearly understand how changing the allocation

12 factors for a given reduction in the load forecast will impact PacifiCorp's revenue

13 requirement. However, the Division (roughly) estimates that the reduction in the

14 load forecast as proposed by Ms. Coon will increase PacifiCorp's revenue

15 requirement by $37,000,000. Since it is impossible at this time to determine the net

16 impact these changes will have, the Division respectfully requests to be allowed to

17 file supplementary testimony as soon as reasonably possible.

18 **E S T I M A T I O N   O F   P A C I F I C O R P ' S   R O E**

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

20 A: The primary model that I use to estimate the cost of equity capital or return on

21 equity (ROE) is the Discounted Cash Flow (DCF) model. Specifically, I use two

22 versions: a Constant Growth model and a Non-Constant Growth model. I also

1   employ the Capital Asset Pricing (CAPM) model as a check for reasonableness on

2   the numbers or estimates coming from the DCF models.

3   **B ASIC D CF M ODEL**

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

6   A: The Discounted Cash Flow (DCF) model is based on the theory that the current

7   price of a stock embodies all future income generated by the stock discounted at an

8   appropriate rate.   The appropriate discount rate is that rate which will make

9   investors just indifferent to acquiring the stock as opposed to any other investment

10   of comparable risk.   In other words, the discount rate is the investor's required

11   return or opportunity cost and is thus the cost of equity capital to the utility.

12   Algebraically, assuming the stock is held indefinitely, and that dividends grow at a

13   constant rate, the discount rate can be written as,

14
$$k = \frac{D}{P} + g \tag{1}$$

15   Equation 1 is the so called Constant DCF model, where k, D, P, and g are

16   respectively the required return on equity (ROE), dividend, stock price, and

17   dividend growth rate. (See DPU Exhibit 2.1) In addition to the constant growth

18   rate assumption, the DCF theory assumes that prices, earnings, and dividends grow

19   at the same rate. Among other things, this implies that the price earnings ratio will

20   be constant over time. To arrive at an estimate for the ROE, requires information

21   on the dividend, price, and growth rate. If, for example, the dividend yield (D/P) is

1   6.5 percent and the growth rate is 3.5 percent, then the estimated ROE would be

2   10.0 percent.

3   Other forms of the DCF model can be specified by relaxing one or more of the

4   assumptions in the basic DCF model. In particular, it is common to relax the

5   assumption that dividends grow at a constant rate. While the discount rate or

6   required rate of return in this model is somewhat more complicated to derive, the

7   concept is the same as that in the Constant Growth model. Namely, the investors'

8   required return is that (discount) rate which equates the future income from holding

9   the stock to its current price.

10   For example, the Company's witness Dr. Hadaway uses what he refers to as a two-

11   stage growth model. In the near-term, the next five years, Dr. Hadaway uses an

12   implied growth rate for dividends derived from Value Line data. Specifically, the

13   near-term growth rate is the average annual difference in the 2005 dividend and the

14   forecasted 2008 divided as reported by Value Line. That is, the near-term growth

15   for each company is given by, $g = (d_{2008} - d_{2005})/3$ where d_{2008} and d_{2005} are the

16   dividend for 2008 and 2005 respectively. For the long-term, years 6 through 150,

17   Dr. Hadaway uses a weighted average GDP growth rate for the past forty years.

18   The estimated ROE is that rate which equates the dividend stream over the 150

19   years to the current price of the stock.

20   Dr. Hadway's two-stage model is similar to the market model he employed in past

21   rate cases before this Commission. In the market model, instead of assuming that

1   the stock is held over the 150 years, it is assumed that the stock is sold at the end of

2   a relatively short period of time. Again, the discount rate or estimated ROE is the

3   internal rate of return that equates the future price plus the dividend stream over the

4   time the stock is held to the current price of the stock. Suppose, for example, that

5   the current price of a stock and its dividend are $36.00 and $1.00 respectively. If

6   the investor expects the price to grow to say $47.40 and the dividend to grow to

7          $1.25 over the next four years, then the discount rate that equates the dividend

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

9   I employ all three versions of the DCF model: the constant growth, two-stage, and

10   market models in arriving at the Division's recommended ROE.

11   **G D P   A S   A   P R O X Y   F O R   G R O W T H**

12   **Q:**   **You indicated that PacifiCorp's witness, Dr. Hadaway, uses a forty year**
13   **weighted average GDP growth rate as a proxy for the dividend growth rate in**
14   **the two-stage model. Does Dr. Hadaway use GDP growth in other models?**

15   A: Yes, Dr. Hadaway uses the GDP growth rate in the constant growth DCF model as

16   well.

17   **Q:**   **Would you explain what you mean by weighted average?**

18   A: According to the explanation in Dr. Hadaway's direct testimony, he calculated the

19   average growth rate for GDP as the "average of GDP growth for the last 10 year,

20   20 year, 30 year, and 40 year growth periods."[2]   I replicated what I believe Dr.

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[2] Direct Testimony of Samuel C. Hadaway, Docket No. 04-035-42, August 2004, Exhibit UP&L_ (SCH-3), p. 5.

1   Hadaway is doing using GDP data for the years 1964 through 2003 obtained from

2   the St. Louis Federal Reserve Bank's web site. By my calculations this method

3   yields an "average" growth of 6.4%.[3] In essence, Dr. Hadaway's methodology

4   yields a arbitrarily weighted average of the data for the past forty years, with

5   greater weight being given to the more recent years: the last ten years (1994 to

6   2003) receives a weight of 0.52; the next earlier ten years (1984 to 1993) a weight

7   of 0.27; the next earlier ten years (1974 to 1983) a weight of 0.15; and the next

8   earlier ten years (1964-1973) a weight of 0.06. (See DPU Exhibit 2.2)

9   **Q: Has Dr. Hadway used GDP growth in previous rate cases before this**
10 **Commission?**

11 A: Yes.   In the last PacifiCorp general rate case (Docket No. 03-2035-02), Dr.

12 Hadaway proposed using GDP growth as a proxy for dividend growth. However,

13 that rate case was stipulated among the parties and, therefore, the merits of using

14 GDP growth in the DCF model have not been debated before this Commission.

15 Furthermore, in that rate case, Dr. Hadaway used a simple 20-year average to

16 derive the average GDP growth. Likewise, in a recent Washington state rate case

17 (Docket No. UE-032065) Dr. Hadaway used a simple twenty year average. Dr.

18 Hadaway does not explain the reason for changing methodologies in the current

19 rate case before the Commission.   If Dr. Hadaway had used a simple 20-year

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[3] Dr. Hadaway reports an average growth of 6.6%. The difference is, at least in part, due to the differences in ending and starting dates; Dr. Hadaway uses the years 1962 to 2001. Dr. Hadaway does not explain why he omits 2002 and 2003 from his analysis, although both years' data would have been available to him prior to his filing date of August 2004.

1   average as he has in the past, the average GDP growth would have been 5.85% as

2   opposed to the 6.6% reported in his direct testimony.   This change in

3   methodologies substantially increases the Company's ROE estimates.

4 **Q:**   **In the rate cases you sited, Utah Docket No. 03-2035-02 and Washington**

5   **Docket No. UE-032065, where Dr. Hadaway used GDP growth, did he offer a**

6   **justification for using a twenty year average?**

7 A: No, not directly.   However, in Utah Docket No. 01-035-01, Dr. Hadaway, in

8   reference to his risk premium analysis, which used a similar twenty year horizon,

9   argued

10   Since the analyst's basic task is to gauge investors' required
11   returns on long-term investments, some argue that the estimated
12   equity spread should be based on the longest possible time
13   period. Others argue that market relationships between debt and
14   equity from several decades ago are irrelevant and that only
15   recent debt-equity observations should be given any weight in
16   estimating investor requirements.

17   My risk premium recommendation is based on an intermediate
18   position that avoids some of the problems and concerns that have
19   been expressed about both very long and very short periods of
20   analysis with the risk premium model.[4]

21   Similar arguments against a shorter or longer period other than twenty years for

22   GDP growth could be made here, namely, the outcome (i.e. the average GDP

23   growth) may be unduly influenced respectively by either recent or ancient

24   economic events. For example, if the past five years were used, the average GDP

25   growth would be approximately 4.7%, which reflects the relatively slow growth in

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[4] "Direct Testimony of Samuel C. Hadaway," Docket No. 01-035-01, pp. 16-17.

1   2001 and 2002. Furthermore, in the last PacifiCorp general rate case, Dr. Hadaway

2   argued, "The 20-year historical GDP growth rate is a reasonable estimate of long-

3   term expectations".[5]

4 **Q: Do you have any other evidence to support the use of 20 years as opposed to**

5   **some longer period?**

6 A: A graph of annual growth rates appears to indicate a difference in the volatility in

7   GDP growth – the volatility appears to be greater in the years before 1984 relative

8   to the years after 1984. (See Figure 1) The results from a simple F-test support

9   this hypothesis. The hypothesis is that the variance in the growth rates in the years

10   prior to 1984 is greater than the variance in the years after 1984; the F-statistic for

11   the hypothesis is the ratio of the variances, which yields a value of 4.03 and has a

12   p-value of 0.001.   (See Table 1)

13 **Table 1: Comparison of GDP Growth**

$$H_o : \sigma^2_{pre1984} \le \sigma^2_{post1984} \quad H_a : \sigma^2_{pre1984} > \sigma^2_{post1984}$$

	n	**Variance**	**F-stat**	**P-value**
1948 to 1983	36	0.0013	4.0278	0.0011
1984 to 2003	20	0.0003		

14

15   This small of a p-value indicates that there is little support for the hypothesis.[6]

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[5] "Direct Testimony of Samuel C. Hadaway," Docket No. 03-2035-02, p. 28.

[6] Technically, given the (null) hypothesis is true, the p-value is the probability of finding (in this case) a value of the F-statistic that is more extreme than the one found with the sample at hand. From a practical point of

1   Therefore it is reasonable to conclude that the volatility in the growth rate of GDP

2   is greater in the years prior to 1984 relative to the years after 1984.

3   **Figure 1: Annual GDP Growth**
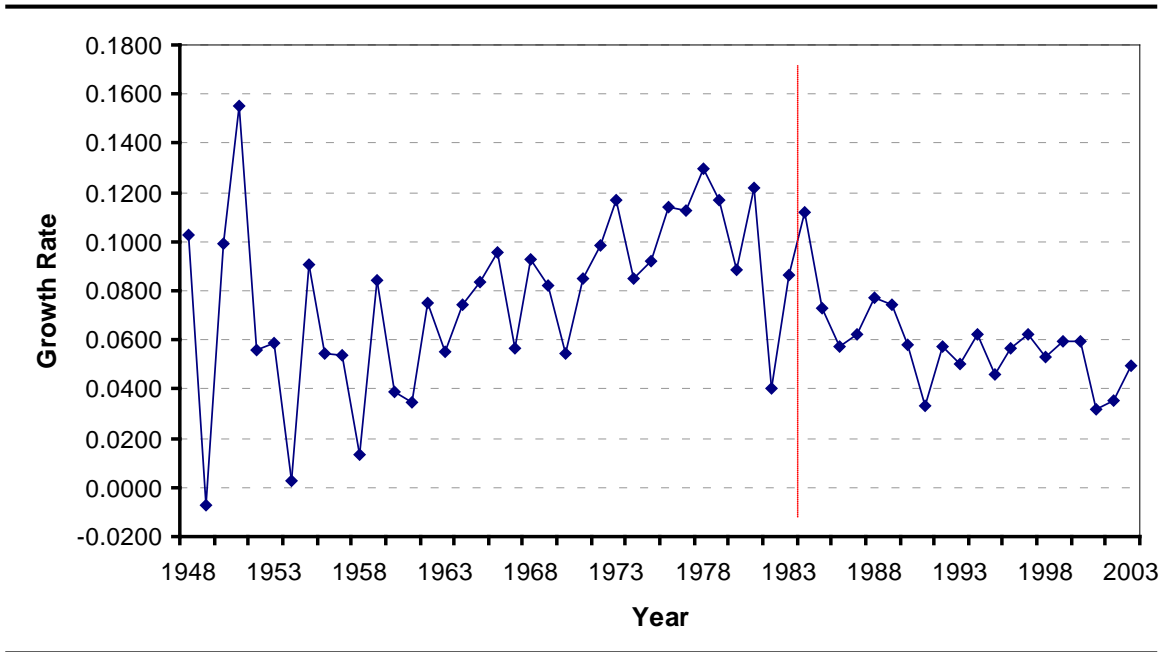
4

5

6   **Q: What impact does changing the GDP growth rate have on Dr. Hadaway's**
7   **ROE estimates?**

8   A: Changing the GDP growth rate from 6.6% to 5.85% in Dr. Hadaway's constant

9   growth DCF model reduces his average ROE estimate from 11.2%, which is the

10   high end of Dr. Hadaway's DCF estimates, to 10.5%. Using the 20-year average in

11   Dr. Hadaway's two-stage model lowers his average ROE estimate from 10.7% to

view, p-values less than 1% indicate little or no support for the hypothesis; p-values greater than 10% indicate little or no evidence against the hypothesis. P-values between 1% ad 10% invite more scrutiny.

1   10.1%. (See DPU Exhibit 2.3)

2   **Q:**   **In response to a previous question regarding the use of GDP as a proxy for**
3   **dividend growth, you seemed to hesitate. Do you think that the growth in**
4   **GDP is an appropriate proxy for dividend growth in the DCF models?**

5   A: In general, no, GDP growth is probably not a good proxy for utility dividend

6   growth. In this case, however, the 20-year average GDP growth rate is within a

7   reasonable range of possible growth rates, and appears to form an upper bound on

8   what an investor may expect as a growth rate.

9   GDP is a broad measure of economic activity and likely does not represent the

10   performance of any single industry or firm. In some sense, GDP represents an

11   average – some industries in the economy will grow at a faster rate than GDP,

12   others will grow at a slower rate. This is recognized, at least implicitly, in the

13   reference sited by Dr. Hadaway in support of using GDP growth in the first place.

14   In a the Washington rate case, Dr. Hadaway quotes from a text book as follows,

15   Expected growth rates vary from company to company, but
16   dividend growth on average is expected to continue in the
17   foreseeable future at about the same rate as that of the nominal
18   gross domestic product (real GDP plus inflation). On this basis,
19   one might expect the dividend of an *average,* or "*normal*,"
20   company to grow at a rate of 6 to 8 percent a year. (Brigham,
21   Gapenski, and Ehrhardt, Financial Management, 9th Ed., page
22   335).[7] (Emphasis added by the Division)

23   Since growth rates vary from firm to firm, the crux of the problem is in identifying

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[7] Rebuttal Testimony of Samuel C. Hadaway, Washington Rate Case, Docket No. UE-032065, p. 20.

1   an "average" or "normal" company. Since the average doesn't really exist – the

2   average is a mathematical construct that summarizes the information in the sample

3   with respect to a specific characteristic – I think what the authors have in mind is,

4   given a broad or diverse portfolio of firms, dividends will on average grow at about

5   the same rate as the economy. What this quote does not say, however, is that any

6   one industry or firm will grow at the same rate as GDP and, therefore, is not, in my

7   opinion, a justification in using the growth in GDP as a proxy in the DCF model to

8   determine an individual firms return.

9   Again, GDP is a broad measure of total economic activity. In some sense, it

10   represents the average activity of all firms in the economy.[8]   In general, however,

11   the average of a group does not represent any one member of the group.   In logic,

12   arguing that the general behavior exhibited by a group is necessarily how

13   individual members of the group behave is known as the fallacy of composition.

14   The fallacy of composition in this case would be akin to me claiming to be six feet

15   tall because the average height of the adult males in the room is six feet; it may be a

16   nice idea but, unfortunately, it is not true.

17   **Q: Are you suggesting that the Commission should disregard Dr. Hadaway's**

18   **analysis that utilizes the growth in GDP?**

---

[8] There are several ways of calculating or measuring GDP. The most common way is the expenditures approach.   From an expenditures point of view, GDP is a measure of economic activity for all sectors of the economy including households or consumers, government, net international trade as well as firms. However, since consumer spending or consumption is approximately 2/3 of GDP and is likely strongly correlated with business performance, GDP can be used as a proxy for general business performance. If the economy is doing well, then on average, business is doing well.

1   Not entirely; it may be that the growth in GDP may serve as an upper bound on

2   growth and, therefore, an upper bound on the appropriate ROE for PacifiCorp.

3   In Figure 2, I compare the twenty year average GDP growth to the average

4   historical earnings per share growth for each of the seventeen utilities in Dr.

5   Hadaway's representative sample. The earnings per share for each utility were

6   obtained from Value Line. Figure 2, which is a simple box-plot for the historical

7   earnings per share for the seventeen companies, depicts several statistics including

8   the first, second and third quartiles (Q1, Q2, and Q3 respectively);[9] the inter-

9   quartile range (IQR);[10] and the upper and lower fences.[11]

10   As indicated in the box-plot, historical earnings growth ranges from a low of   -

11   0.9% for Excel Energy to a high of 13.1% for Sempra Energy, with a median

12   growth rate of about 3.4%. The average earnings growth rate is about 3.9%. The

13   upper fence, which is used to identify outliers or unusual values, is 7.95%, thus, the

14   box-plot indicates that Sempra's growth is unusually large.

15

[9] The quartiles divide the data into four equal sets. Thus, approximately 25% of the data is less than the first quartile; 25% is between the first and second quartile; and so forth.

[10] The IQR is the difference between the third and first quartiles and is a range that contains approximately 50% of the sample data.

[11] The upper and lower fences are *Q3 + 1.5*IQR and Q1 - 1.5*IQR* respectively. The fences are used to identify unusual data values in the sample. Generally speaking, values above the upper fence or below the lower fence are, based on the sample, unusual values or outliers. See for example, David C. Hoaglin, Fredrick Mosteller, and John W. Tukey, "Boxplots and Batch Data," in *Understanding Robust and Exploratory Data Analysis,* [John Wiley & Sons, 1977] pp. 58-65. Tukey's original work on box plots can be found in *Exploratory Data Analysis,* Addison Wesley, 1977.

1   **Figure 2: Box Plot of Historical Earnings Growth**

Earnings Growth
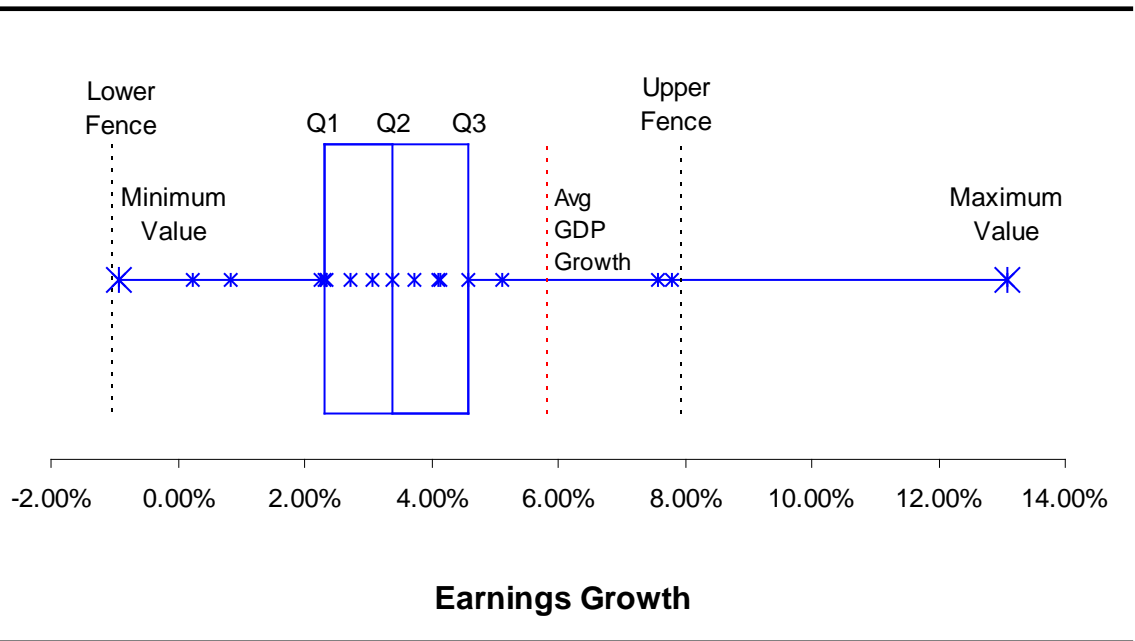
2

3   The average GDP growth – either the twenty-year average of 5.85% or Dr.

4   Hadaway's weighted forty-year average – is within the upper fence. However,

5   given the discussion above with regards to Dr. Hadaway's forty-year average, the

6   twenty-year average appears to be a more reasonable estimate of earnings growth,

7   albeit a high estimate. (Of the seventeen companies in Dr. Hadaway's

8   representative group, only three firms, Sempra, Vectren, and Northeast have

9   historical grow rates greater than 5.85%).

10   Although the versions of the DCF model I (and the Company) utilize yield different

11   results, the driving factor behind these results is the growth rate. Indeed, I have

12   argued elsewhere that the difference in the models is "Much Ado About

1   Nothing":[12] the ROE from a non-constant growth DCF model – for example, the

2   two-stage model – can be used to compute for each company an implied growth

3   rate, which can in turn be used in the constant growth model to arrive at the same

4   ROE as from the non-constant growth model. Thus, the focus should be on the

5   growth rate and in this case, the growth in GDP appears to be on the high end and,

6   therefore, indicates an upper bound on the appropriate ROE. Again, changing from

7   Dr. Hadaway's weighted 40-year average to a 20-year average reduces

8   substantially Dr. Hadaway's upper estimates. The lower bound will be determined

9   by what other grow rates are considered and used in the models.

10 **D I V I S I O N ' S   I N P U T S**

11 **Q: Do you use the 20-year average GDP growth in your analysis?**

12 A: Yes, I report the average ROE estimate for the three DCF models using the 20-year

13   average growth in GDP as a proxy for dividend growth.

14 **Q: What other inputs do you use?**

15 A: Looking back at Equation 1, it can be seen that a price and dividend for each firm is

16   required. The price I use is a 3-month average of the midpoint of the daily high

17   and low price as reported by Yahoo! Finance. The dividend is the last declared

18   dividend as reported by Value Line. The prices and dividends are used in all three

19   DCF models.

20   Additional inputs include price earnings ratios reported by Value Line; dividend

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[12] "Prefiled Direct Testimony of Artie Powell," Docket No. 01-035-01.

1   growth rates obtained from Value Line data; and earnings per share growth rates

2   from Value Line and Zacks.

3 **Q:**   **What utilities do you as a representative sample?**

4 A: I am using the same group of seventeen firms that the Company's witness, Dr.

5   Hadaway, utilizes.

6   I reviewed the selection criteria used by Dr. Hadaway in choosing the sample and

7   found them to be consistent with criteria used in previous rate cases. In response to

8   data requests, the Company provided information on each company's bond rating,

9   and proportion of income from regulatory activities. My review indicates that the

10   firms in Dr. Hadway's sample are consistent with the selection criteria.   The

11   sample of firms, therefore, appears to be a reasonable set of firms from which to

12   estimate the cost of equity capital for PacifiCorp.

13 **D ISCOUNTED C ASH F LOW A NALYSIS**

14 **Q:**   **You indicated that you use three DCF models in arriving at a ROE**
15   **recommendation. Can you describe the results from the constant growth**
16   **model?**

17 A: My constant growth DCF estimates are contained in DPU Exhibit 2.4. The average

18   estimates range from 8.82% to 10.52%. The higher estimate (10.5%) is from the

19   model using the 20-year average GDP growth and is similar to Dr. Hadaway's

20   result of 10.5% as modified and reported herein. The lower estimate (8.82%) is

21   from the model using a 25/75 weight of dividends and earnings. This later

22   weighting scheme is the weighting scheme used by the Commission in setting

1   QUESTAR's ROE in Docket No. 02-057-02.

2   An enhanced earnings growth rate can be used by averaging the earnings growth

3   rates from Value Line and Zacks with GDP growth.   If this new earnings growth

4   rate is used in combination with dividends, the average ROE estimate increases to

5   9.19%. Thus, I conclude that the constant Growth DCF estimates range from about

6   9.2% to 10.5%.

7   **Q: You use the two-stage DCF model described by Dr. Hadaway in direct**
8   **testimony. Can you describe your results from this model?**

9   A: My results from the two-stage DCF model are reported in DPU Exhibit 2.5. The

10   estimates for this model range from 8.55% (25/75 weighting of dividends and

11   earnings) to 10.03% (GDP growth). If the earnings/GDP growth rate is combined

12   with dividends, the lower end increases to 8.89%. Thus the estimates from this

13   model range from approximately 9% to 10%.

14   **Q: Can you describe your results from the Market Model?**

15   A: My market model DCF estimates are contained in DPU Exhibit 2.6. The market

16   model is different from the constant growth and two-stage models in that it uses the

17   implied growth in dividends and price. The Market model assumes that the stock is

18   bought in the current year, held till 2008 and sold at a future price in 2008. The

19   income stream is the dividends received in each of the three years from 2005

20   through 2008, plus the price at which the stock is then sold. The estimated ROE is

21   that discount rate that equates the income stream to the current price. The average

1   ROE estimate for the group of seventeen firms is 7.55%.

2   **C H E C K S   O N   D C F   E S T I M A T E S**

3   **Q: You also use the Capital Asset Pricing model as a check on the DCF results.**
4   **Can you explain your results from the CAPM?**

5   A: The Capital Asset Pricing Model (CAPM) is based on the elegant but simple theory

6   that investors expect a rate of return commensurate with the risk of the investment

7   – the greater the risk, the greater the required (expected) rate of return. In its basic

8   or most common form, the investors required return (and thus the cost of equity for

9   the utility) is equal to a risk-free return plus a risk premium, where the premium is

10   adjusted by a factor of proportionality, beta (β). Beta measures the risk of the

11   security proportional to that of the market. That is,

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

13   where k is the required return, R_F is the risk-free return or rate, R_M is the market

14   rate, and β is the security's relative risk measure.

15   Despite this apparent simplicity, there are some practical problems in

16   implementing the CAPM. In particular, the CAPM is a (expectational) forward-

17   looking model, while available inputs are based on historical data. For this reason,

18   I use the CAPM primarily as a check on the reasonableness of the DCF estimates.

19   If the CAPM results are significantly different from the DCF results, further

20   analysis may be warranted.

1 **Q:** **How do the results from the CAPM compare to your recommendation of 10**
2 **percent?**

3 A: My recommendation of 10.0 percent is below the midpoint of the CAPM estimated

4 range. Remember, the CAPM adds a risk premium to a risk free rate where the

5 premium is determined by the relative risk of the stock to the market's risk. The

6 betas and the risk free rate I use come from *Value Line Survey* as of October 2004.

7 The risk free rate, 5.045 percent, is the midpoint of a 13-week range for 30-year

8 Treasury bond yields. The betas for the sample of comparable utilities range from

9 a low of 0.60 to a high of 1.05 with an average of 0.75.

10 The market return I use is actually drawn from a study of U.S. stock returns.[13] In

11 this study by John Cochrane, the average market return over a long period is 8

12 percent. Of course, returns will fluctuate or vary around this average over a given

13 period of time. As indication of how much the returns are likely to vary over time,

14 I use the 95 percent confidence interval, 3 percent to 13 percent, reported by

15 Cochrane. The confidence interval indicates that over time we should expect that

16 95 percent of all observed returns will be within the stated range. Using these three

17 values (3, 8, and 13) for the market rate of return, establishes a range of reasonable

18 estimates for the cost of equity capital.

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

---

[13] 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.

1 A: Certainly if the study were updated, these values would change. For example, the

2 average would be different; it may be lower or higher than the 8 percent reported in

3 Cochrane's 1997 study. However, given the long period over which Cochrane's

4 performs his study, I don't believe the average or confidence interval would change

5 by much. Therefore, I am comfortable with these values.

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

7 A: Given the risk free rate, betas, and market returns discussed above, the average

8 ROE estimates for the CAPM range from 7.30 percent to 14.80 percent with a

9 midpoint of 11.05 percent. Further details can be found in DPU Exhibit 2.7.

10 **Q: How do the DCF results compare to the CAPM results?**

11 A: The DCF results range from 7.55% to 10.52%. The lower end is from the market

12 model and appears to be unusually low: the Market model result is approximately

13 one-quarter of a percent (.25%) above the lower bound of the results from the

14 Capital Asset Pricing Model (CAPM).   Therefore, I have discounted the results

15 from the market model in setting my recommendation. (If the range of ROE results

16 from the CAPM is indicative of the returns over a long period of time, we would

17 expect most of the results to be closer to the midpoint of the range).

18 Excluding the results from the Market Model, the DCF results range from 8.55% to

19 10.52%. The midpoint of this range is 9.54%.   Typically, the Division's preferred

20 position is to recommend the midpoint of the range. However, the midpoint in this

21 case is still approximately 152 basis points below the midpoint of the CAPM

1   results.   (See Table 2)   Therefore, some adjustment to the Division's usual

2   recommendation may be warranted.

3   To investigate the possibility of further adjustments to the midpoint, I reviewed the

4   Division's testimony in the two previous PacifiCorp rates cases. In the previous

5   rate case (Docket No. 03-2035-02), which was settled, the range for the CAPM was

6   from 7.37% to 14.22%, with a midpoint of 10.79%, which is similar to the CAPM's

7   range and midpoint in this case.[14]   The settled ROE for Docket No. 03-2035-02

8   was 10.7%.

9   In Docket No. 01-035-01, the CAPM range was 7.05% to 12.38%, with a midpoint

10   of 9.72%. The Division's DCF estimates ranged from a low of 7.18% to a high of

11   12.03%.   The average ROE estimate was 10.38%; excluding the low estimate

12   (7.18%), the overall average was 11.45%. The midpoint between the two overall

13   averages was approximately 11% [= (10.38% + 11.45%)/2], which was the

14   Division's recommendation.

15   Thus, in the two previous rate cases, the Division's recommendation, although

16   based on DCF results, was either at or above the midpoint indicated by the CAPM.

17   An additional factor to consider is that, the cap imposed by MSP in this case has

18   the effect of decreasing the effective ROE. However, in light of the DCF results in

19   this case and the previous discussion on using GDP growth in the DCF model,

20   raising the recommendation to 11% (the current midpoint of the CAPM range)

---

[14] The Division did not file testimony in this case, but the worksheets are available from the Division.

1   appears unjustifiable. However, given the effect of the MSP cap and the difference

2   between the DCF and CAPM results, some adjustment away from the midpoint of

3   the DCF results may be warranted.

4   **Table 2: ROE Estimate Summary**

	Model Type		
Growth Rate	**Constant Growth**	**Two-Stage**	**Market Model**
Dividend and Price Growth	NA	NA	7.55%
GDP Growth	10.52	10.03	NA
25/75 Weighting Dividends and Earnings	8.82	8.55	NA
25/75 Weighting Dividends and Earnings (Including GDP)	9.19	8.89	NA
CAPM	Lower Bound	Mean	Upper Bound
	7.30	11.05	14.80

5

6   As was pointed out previously, the highest estimates in this case are associated with

7   using the 20-year GDP growth rate. (See Table 2) The estimates based on GDP

8   growth define, in the Division's opinion, an upper bound on an appropriate ROE,

9   which in this case appears to be in the range of 10% to 10.5%. According to the

10   Division's calculations, an authorized return of 10% would, under the MSP cap,

11   yield an effective return of approximately 9.5%, which is equal to the midpoint of

12   the DCF results. Therefore, the Division recommends the Commission authorize a

1   return of 10%.

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

4   A: Yes I have. In the past I have used Standard & Poor's revised principle financial

5   targets for investor-owned utilities as a check on the ROE and capital structure.

6   One of these criteria is the Times Interest Earned Ratio (TIER).   The TIER

7   measures the ability of the firm to meet its fixed obligations and is an important

8   determinate of creditworthiness.   The TIER is equal to the ratio of the utilities

9   profit before taxes plus its interest charges all divided by the interest charges:

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

10

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

11   where W_p, W_e, and W_d are the weighted costs of preferred, equity, and debt

12   respectively. And t is a tax gross up factor equal to 1/(1-tax rate).

13   According to Standard & Poor's criteria, "The new financial targets . . . pertain to

14   risk adjusted ratios that distinguish between higher risk and lower risk activities."

15   The risk adjustment follows a ten-point scale with "1" being associated with the

16   lowest risk activities and "10" highest risk. A recent rating by Standard & Poor's

17   gives PacifiCorp a business profile of 2. For an "A" rated utility with a business

18   profile of 2, Standard & Poor's TIER criterion is between 2.3 and 2.9. Assuming

1   the Division's capital structure and cost of long-term debt, a ROE of 10.0 percent

2   would give PacifiCorp a TIER of approximately 3.2, slightly better than the criteria

3   set out by Standard & Poor's.

4   **C A P I T A L   S T R U C T U R E**

5   **Q:**   **Your TIER analysis depends on assuming an adjustment to the capital**
6   **structure proposed by the Company. Can you explain the adjustment?**

7   A: As explained in Mr. Croxford's testimony on behalf of the Division, PacifiCorp

8   proposes increasing the amount of equity in its capital structure from 45.95% in

9   FY05to 49.5% in FY06. For purposes of its filing, PacifiCorp uses the average of

10   these two values, 47.8%, to calculate its revenue requirement.   However,

11   PacifiCorp gives no clear justification for this change or increase in equity. The

12   impact of the increase, according to Mr. Croxford (and Mr. Barrow), is to increase

13   the revenue requirement by approximately $6 million. The Division has taken the

14   position that without a clear justification for the increase in equity capital,

15   ratepayers should not bear the cost.

16   Similar to the TIER, Standard & Poor's has a total debt ratio for utilities.   For an A

17   rated utility with a business profile of 2, Standard & Poor's total debt ratio criteria

18   ranges from 51% to 56.5%. PacifiCorp's reported debt ratio for FY05 is 52.78%.

19   The debt ratio as proposed by PaCifiCorp in this case is 51%. Both debt ratios are,

20   therefore, within the criteria set out by Standard and Poor's. However, in the last

21   PacifiCorp rate case (Docket No. 03-2035-02), PacifiCorp used its actual capital

22   structure for the basis of its revenue requirement. In that case, the debt ratio was

1   45.14%, which is similar to the debt ratio for FY05. Therefore, the Division

2   recommends that the Commission adopt the capital structure for FY05 as reported

3   by the Company.

4   **Q: What is the capital structure for fiscal year 2005?**

5   A: As indicated in Mr. William's testimony on behalf of the Company, the capital

6   structure consists of 45.95% common equity, 52.78% long-term debt, and 1.27%

7   preferred equity.

8   As explained in Mr. Croxford's testimony, the Division is making an adjustment to

9   the cost of long-term debt. The Division's adjustment lowers the cost from 6.54%

10   (reported in Mr. William's testimony) to 6.405%. Given this adjustment, the FY05

11   capital structure, and a ROE of 10%, the weighted cost of capital is 8.06%. (See

12   Table 3)

13 **Table 3: Capital Structure**

	Proportion	Cost	Weighted Cost
Common Equity	45.95%	10.000%	4.60%
Preferred Equity	1.27%	6.635%	0.08%
Long Term Debt	52.78%	6.405%	3.38%
Total	100.00%		8.06%

14

15 **G E N E R A L   E C O N O M I C   C O N D I T I O N S**

16 **Q: On November 10th of this year, the Federal Open Market Committee**

1   **announced its intention to raise its target for the federal funds rate by 25 basis**

2   **points to 2 percent. Have you taken interest rates and other economic factors**

3   **in setting your recommendation?**

4   A: Yes, I have. The November 10th announcement by the Open Market Committee

5   (FOMC) marks the fourth time in the last 7 months that it has raised its federal

6   funds target rate by 25 basis points.   The FOMC raised the target rate in June,

7   August, and September. The effects of the FOMC actions can be seen in the prime

8   rate. In the months leading up to the Company's August filing in this rate case, the

9   prime rate was relatively stable at approximately 4%. Starting in June, the prime

10   rate began to rise to approximately 4.8% in October. This pattern contrasts with

11   the last rate case (Docket No. 03-2035-02) when the prime rate generally declined

12   in the months surrounding the Company's filing date. (See Figure 3) (In both time

13   periods, the prime rate has fluctuated by a relatively small amount between 4% and

14   5%).

15   Inflation in the months surrounding the Company's filing in the 2003 docket was

16   relatively stable, fluctuating from approximately 1.5% to 3%. In the months

17   leading up to the Company's filing in the present case, inflation has been

18   increasing, hence, the FOMC actions. (See Figure 4) In a recent newsletter

19   published by the St. Louis Federal Reserve, James B. Bullard compared inflation

20   and the federal funds rate for 1994 and 2004. His analysis indicates, "the federal

21   funds target is somewhat lower today relative to inflation than it was at the

1   beginning of 1994."[15] Mr. Bullard speculates that the FOMC may have to raise the

2   federal funds rate in the future to head-off inflation.

3   **Figure 3: Prime Interest Rate in the Months Surrounding Company's Filing**
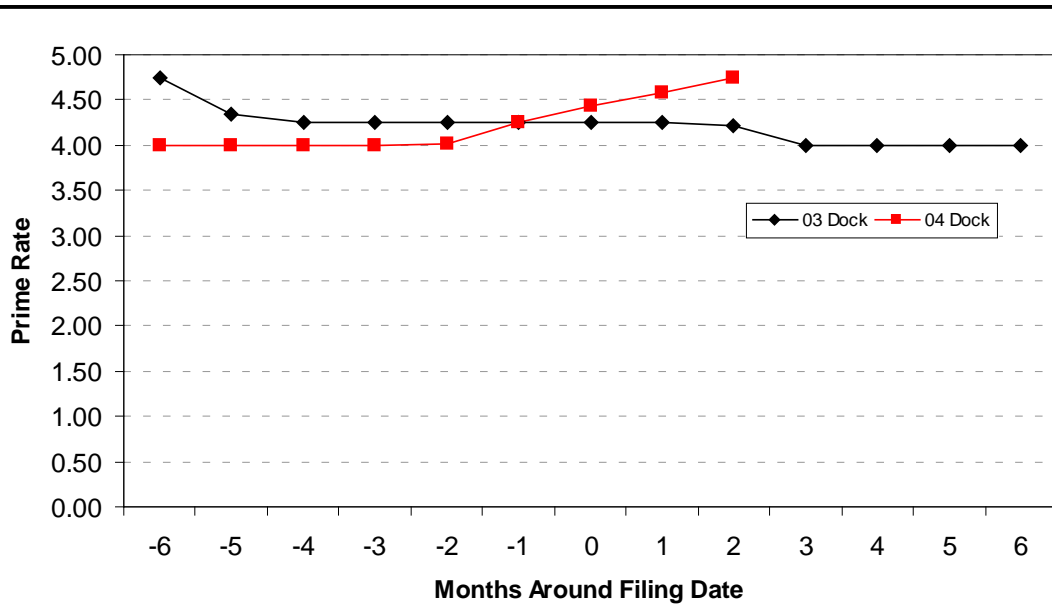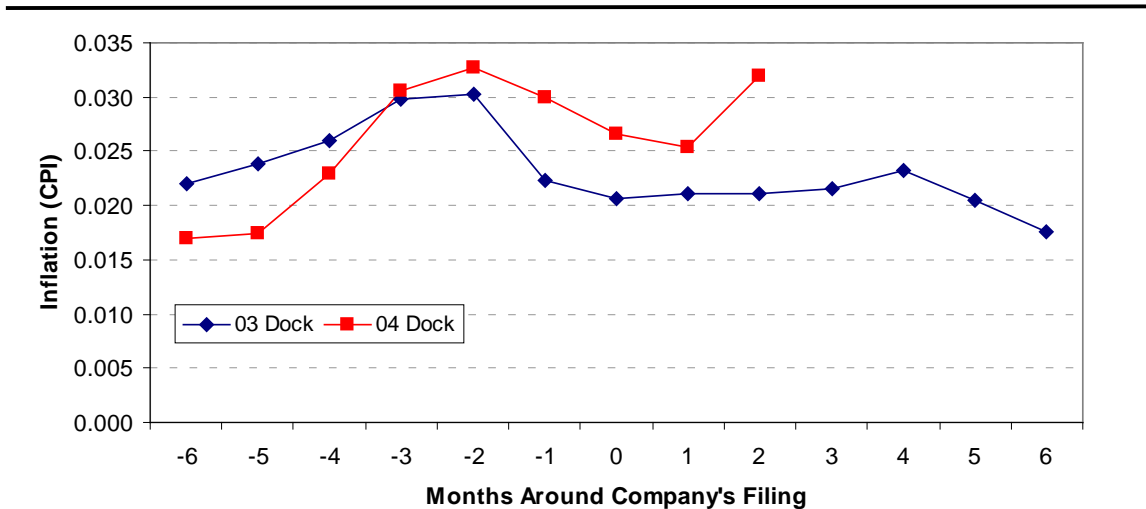

Source: St. Louis Federal Reserve

4

5   **Q: If the FOMC raises its target for the federal funds rate and interest rates**
6   **continue to rise, will this not raise the cost of capital for the Company?**

7   A: Yes, generally speaking the cost of capital will, albeit not in lock-step, rise with

8   interest rates.

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[15] James Bullard, "1994," *National Economic Trends*, The Federal Reserve Bank of St. Louis, July 1994.

1 **Figure 4: inflation in Months Around Company's Filing**

Source: St. Louis Federal Reserve

2

3   However, all of the information about the FOMC current actions and its intentions

4   in the future is in the public domain. According to the efficient market hypothesis

5   (EMH), investors will use all available information in formulating their

6   expectations including information about interest rates, inflation and, the general

7   state of the economy. Among other things, the EMH implies that the present value

8   of all future income streams from the stock are equal to the current price an

9   investor is willing to pay.   In other words, the current price of a stock already

10   reflects investor expectations about the future.   Therefore, a further adjustment to

11   the Division's recommended ROE is unwarranted.

12 **Q: Does this conclude your testimony?**

13 A: Yes, it does.