Oregon

Theodore R. Kulongoski, Governor

August 14th, 2006

OREGON PUBLIC UTILITY COMMISSION
ATTENTION: FILING CENTER
PO BOX 2148
SALEM OR 97308-2148

RE: **Docket No. UE 180/ UE 181/ UE 184** - In the Matter of PORTLAND
GENERAL ELECTRIC COMPANY Request for a General Rate Revision
(UE 180), 2007 Resource Valuation Mechanism (UE 181) and Request for a
General Revision relating to the Port Westward Plant (UE 184).

Enclosed for electronic filing in the above-captioned docket is the Public Utility
Commission Staff's Opening Testimony.

/s/ Kay Barnes
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Filing on Behalf of Public Utility Commission Staff
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c: UE 180/UE 181/ UE 184 Service List - parties

PUBLIC UTILITY COMMISSION
OF OREGON

UE 180/UE 181/UE 184

STAFF DIRECT TESTIMONY OF

Thomas D. Morgan
Bryan Conway

In the Matter of
PORTLAND GENERAL ELECTRIC COMPANY
Request for a General Rate Revision (UE 180),
2007 Resource Valuation Mechanism (UE 181),
And
Request for a General Revision relating to the
Port Westward Plant (UE 184).

August 14, 2006

PUBLIC UTILITY COMMISSION
OF
OREGON

STAFF EXHIBIT 1000

Direct Testimony

August 14, 2006

1   **Introduction**

2   **Q.   PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

3   A.   My name is Thomas D. Morgan and my business address is 550 Capitol Street

4   NE, Salem, Oregon 97301-2551.[1]

5   **Q.   BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

6   A.   I am employed as a Financial Economist by the Public Utility Commission of

7   Oregon ("Commission") in the Finance/Policy Analysis Division. I have been

8   employed by the Commission since August 2001 (excluding July through

9   December 2005.)

10   **Q.   HAVE YOU PREPARED ANY EXHIBITS?**

11   A.   Yes. My Witness Qualifications Statement is included as Staff/1001.   The

12   results of my analyses are included as Staff/1002. I have also prepared an

13   Appendix marked as Staff/1003, which includes 443 pages of additional

14   testimony and supporting reports.

15   **Q.   WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

16   A.   The purpose of my testimony is to develop the cost of capital estimates for the

17   rate-regulated property operated by Portland General Electric (PGE or

18   Company.) In addition, I provide Staff's recommended capital structure for the

19   Company.

20   **Q.   WHAT IS YOUR RECOMMENDED RETURN ON EQUITY?**

21   A.   I recommend that the Commission adopt a 9.30 percent return on equity.

22   **Q.   HOW DID YOU DEVELOP YOUR RECOMMENDED RETURN ON EQUITY?**

23   A.   My recommendation is based upon review of single and multi-stage discounted

24   cash flow ("DCF") model results and sensitivity analyses. The use of DCF

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[1] My telephone number is (503) 378-4629 and my e-mail address is thomas.d.morgan@state.or.us.

1   models is consistent with Commission's most recent return on equity decisions

2   in Dockets UE 115[2] and UE 116.[3] I detail the underlying theory of the DCF

3   model beginning at Staff/1003, Morgan/44.

4 **Q. DOES YOUR DCF ANALYSIS ALSO PRODUCE A RANGE OF**

5   **COST OF EQUITY ESTIMATES?**

6 A. Yes. The following table illustrates the range of results produced by the DCF

7   models:

8

Table 1 – Cost of Equity Summary Results

	Range of Results
Single-stage DCF	8.7 percent to 9.6 percent
2-stage 150-year DCF	7.9 percent to 9.6 percent
3-Stage 40-year DCF	8.5 percent to 9.6 percent

9

10   Consistent with the Commission's internal operating guidelines, this

11 range provides the Commission with information related to the upper and lower

12 ends of a reasonable cost of equity estimate.

13 **Q. PLEASE SUMMARIZE YOUR COST OF EQUITY RECOMMENDATION?**

14 A. I recommend a cost of equity of 9.30 percent. The range of my cost of equity

15 estimates is 9.0 to 9.50 percent. The range produced by the models is wider

16 than my recommended range. This is due to the sensitivity analyses that

17 include assumptions of growth rates that are higher than my range of

18 recommended rates.

19 **Q. WHAT IS STAFF'S RECOMMENDED OVERALL ROR FOR THE**

20   **COMPANY?**

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[2] Order 01-777, August, 2001. http://apps.puc.state.or.us/orders/2001ords/01-777.pdf
[3] Order 01-787, September, 2001. http://apps.puc.state.or.us/orders/2001ords/01-787.pdf

1   A.   Staff Witness Conway's testimony regarding recommendations for the

2   embedded costs of long-term debt and preferred stock will be filed at a later

3   date. In his testimony, he will summarize Staff's recommended overall ROR.

4   **Q.   WHY DID YOU APPLY THE DCF MODELS TO A SAMPLE OF COMPANIES**

5   **RATHER THAN TO COMPANY ITSELF?**

6   A.   I applied the DCF models to a representative sample of companies because,

7   although the Company is now publicly-traded, the short time that it has been

8   traded precludes consistent market data to perform the same multi-stage DCF

9   modeling. However, I could provide the results of a single-stage model using

10   the company's current stock price, coupled with its own stated long-term growth

11   goals. I explain the derivation of the single-stage DCF model further in my

12   testimony.

13   PGE published an Investor Fact Sheet in May 2006[4] in which it

14   indicated an annual dividend of $0.90 per share. Coupled with the current

15   share price, as of August 8, 2006, of $25.13 (reported on CNN.com[5]) the

16   dividend yield is 3.58 percent. PGE has indicated that its earnings growth

17   target is between four and five percent. Adding this range of growth to the

18   dividend yield results in an expected return on equity of 7.58 percent to 8.58

19   percent.

20   The high-end of the results of this analysis are consistent with the low-

21   end of my recommended range, which was based on my analysis using a

22   sample of comparable companies.

23   **Q.   WHAT SAMPLE OF COMPANIES DID YOU ADOPT TO DETERMINE THE**

24   **COST OF EQUITY?**

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4 http://files.shareholder.com/downloads/POR/28476830x0x40727/42EBD67C-4652-4E6B-8713-A6A961E4BBF4/factsheet.pdf
5 http://money.cnn.com/quote/quote.html?symb=POR

1   A.   My sample selection includes fourteen companies.[6] I limited my selection to

2   companies covered by Value Line. I considered the overall contribution to

3   earnings (profitability) and the underlying asset base of the companies in

4   addition to revenues. Because revenues are only one financial metric,

5   consideration of additional financial metrics - profitability and the asset base -

6   provide a representative sample.

7   Therefore, my primary selection process was to exclude companies

8   that have a large amount of revenues, assets, or earnings focused on

9   unregulated operations. In addition, I selected companies that were rated BBB

10   or better by Standard & Poor's. Because the financial metrics used to select

11   companies are not static, the final selection process required final judgment

12   pertaining to the anticipated future state of the companies' business.

13   My sample selection is significantly different than the Company's.

14   PGE uses three different samples of companies in the electric utility industry.[7]

15   Although I did not create analyses using the samples selected by PGE, it is

16   likely that the results of a DCF analysis would be largely independent of the

17   sample used in the models. Instead, the main driver of the differences in DCF

18   results are related to the input assumptions related to growth rates, which will

19   be discussed later in my testimony.

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[6] The company name and ticker symbol (in parenthesis) of my sample companies are as follows:
Alliant Energy (LNT); American Electric Power (AEP); Consolidated Edison, Inc. (ED); Empire District
Electric Co. (EDE); Energy East Corporation (EAS); IDACORP, Inc. (IDA); MGE Energy (MGEE);
NSTAR (NST); OGE Energy (OGE); Progress Energy (PGN); Southern Co. (SO); Wisconsin Energy
(WES); WPS Resources (WPS); Xcel Energy, Inc. (XEL).
[7] First, the Company uses a "Combined Sample" of Companies from the S&P Utility Index and
Moody's Utility Index. The Company filters the companies into a 17-company sample. Second, the
Company uses a "PGE Comparable" sample that is comprised of nine companies. PGE's final
sample is based on the 14-company cohort group of companies relied on in the 2005, UE 170
(PacifiCorp) rate case.

1 **Q.   IS THE APPROPRIATE COST OF EQUITY LINKED TO THE CAPITAL**

2 **STRUCTURE?**

3 A.   Yes.   The cost of equity is inextricably linked to the capital structure. For

4   example, if PGE employs less debt and more equity in its capital structure than

5   the sample companies used in the DCF models, all else being equal, PGE is a

6   less risky investment than suggested by the model. Accordingly, PGE would

7   require a lower return than that indicated by models analyzing companies with

8   a capital structure with more debt and less equity. Over the past few years,

9   while the industry has reduced its overall levels of debt, PGE has increased its

10   levels of equity even more than the industry sample. All else equal, this would

11   have the impact of reducing the riskiness of the firms, and therefore, their costs

12   of equity, with PGE having less risk than the overall industry sample.

13   My recommended return on equity is based upon the average capital

14   level of equity of the sample of comparable companies used in the DCF

15   models. If we were to assume a higher level of equity in the capital structure

16   than the comparable companies, as the Company does, the DCF results are

17   inaccurate. The results would be inaccurate because the DCF models return

18   on equity is based upon the capital structure of the sample selection and does

19   not take into account that a more equity-rich capital structure would lower risk

20   and, therefore, reduce the investors required rate of return.

21   The Company's proposed cost of equity is not reasonable based on its

22   proposed capital structure. The Company has not shown how it adjusted its

23   sample cost of equity to reflect the high level of equity it has maintained.

24   Assuming a capital structure that is different than the Company's actual capital

25   structure does not impact the ability of the Company to manage its capital

26   structure. Rather, it simply recognizes that the DCF results related to return on

1   equity are a reflection of the capital structure of the sample selection or

2   comparable companies.

3   **Q.   HAS THE COMMISSION RECOGNIZED THIS COST OF EQUITY AND**

4   **CAPITAL STRUCTURE RELATIONSHIP IN THE PAST?**

5   A.   Yes. In Order No. 01-777 at 36, the Commission stated:

6

7   "It is well understood by finance practitioners and theoreticians

8   that the cost of equity drops as the percentage of common

9   equity in the capital structure increases. Because the average

10   amount of common equity in the capital structure of the

11   comparable group of electric companies was 45.14 percent

12   compared to 52.16 percent for PGE, it necessarily follows that

13   PGE has a lower cost of equity. PGE's capital structure is

14   therefore less risky, and its cost of common equity should be

15   adjusted accordingly."

16   **Q.   IS THE APPROPRIATE LONG-TERM GROWTH RATE AN IMPORTANT**

17   **ISSUE IN THIS DOCKET?**

18   A.   Yes, the disparity between the cost of equity estimates provided by Company

19   and staff is largely due to differences in the long-term growth rates used in the

20   DCF models. My long-term growth rates (I recommend 4.0 to 5.0 percent) are

21   based upon analysis and review of growth rates in the regulated utility industry,

22   financial analysts' estimates of future growth, and sustainable growth rates

23   estimates.

24   In contrast, the Company's long-term growth rates are based on a

25   forecast of GDP growth and on a 40-year average calculation of historical GDP

26   growth. The forecast average is 5.01 percent and the historic average is 6.76

27   percent. PGE's forecast average is at the high-end of the 4.0 to 5.0 percent

1   growth estimate I recommend. PGE's historic GDP growth calculation is

2   almost two hundred basis points higher than the forecasted data. For reasons

3   discussed in more detail below, PGE's historic calculation reflects a rate that

4   should not be used as a proxy for future growth in the regulated utility industry.

5   Accordingly, the Commission should reject the results of PGE's DCF model

6   that rely on historic GDP growth calculation, because these results are

7   predicated on the use of an unreasonable long-term growth rate.

8   **Q. WHAT ARE THE METHODS YOU USED TO ESTIMATE LONG-TERM**

9   **GROWTH?**

10   A.   My growth rate analysis is supported by using separate supporting methods

11   and available market expectations. Specifically, I considered the following:

12   1. Market Consensus Growth Rates (Financial Analysts' Forecasts);

13   2. Sustainable Growth; and,

14   3. Historical Utility Growth Rates.

15   **Q. WHAT INPUTS ARE REQUIRED FOR A SINGLE-STAGE DCF MODEL?**

16   A.   The single-stage DCF model, which is also know as a perpetuity model,

17   requires a dividend growth estimate, current stock price, and an initial dividend.

18   **Q. HOW ARE YOUR MULTI-STAGE DCF MODELS DIFFERENT THAN THE**

19   **SINGLE-STAGE DCF MODEL?**

20   A.   A multi-stage DCF model also requires a current stock price and initial dividend

21   but separates dividend growth into two or more stages. While a single-stage

22   model assumes that growth is steady and stable, the multi-stage models allow

23   the growth rate to change over a period of time before making the final (also

24   called "terminal" or "horizon") constant growth rate assumption.

25   **Q. WHAT MULTI-STAGE DCF MODELS DID YOU EMPLOY?**

1   A.   I used a two-stage DCF model that uses the current dividend yields and Value

2   Line's Investment Survey ("Value Line") estimates of growth for the next few

3   years and applied long-term growth forecasts for the remainder of 150 years.

4   I also utilized the three-stage DCF model that the Commission has

5   relied on in the last two contested cases in which parties litigated the return on

6   equity, UE 115 and UE 116. This model has three-stages over a 40-year

7   period. In the first stage, estimates from Value Line are used. The second

8   stage uses implicit growth rates from two primary input assumptions. The third

9   stage is the "reversionary" stage where an explicit estimation of the stock price

10   is produced at year 40.

11   **Q.   WHAT DID YOU USE FOR THE CURRENT STOCK PRICE IN YOUR DCF**

12   **MODELS?**

13   A.   I used the current stock price (P_o) from Microsoft Network Money as of August

14   8, 2006.[8] The most current spot prices are the correct prices to use for P_o

15   because, based upon the efficient market hypothesis, current spot prices

16   include all current and past information.

17   **Q.   WHAT DID YOU USE FOR THE INITIAL DIVIDEND, D_1, IN YOUR DCF**

18   **MODELS?**

19   A.   I used the estimates of D_1 (the expected dividend per share over the next

20   twelve months) from the July 21, 2006, Value Line Summary and Index.

21   **Q.   DO YOU AND THE COMPANY AGREE ON THE GROWTH RATES TO BE**

22   **USED OVER THE NEXT FEW YEARS?**

23   A.   Yes, we generally agree on the growth rates that should be applied in the near

24   term. We disagree, however, regarding the perpetual, long-term growth rate to

25   be used in the DCF models.

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[8] http://moneycentral.msn.com/investor/home.asp: Supplied by Standard & Poor's ComStock, Inc.

1   **Q.**   **WHAT IS THE APPROPRIATE PERPETUAL, LONG-TERM GROWTH RATE**

2   **TO BE USED IN THE DCF MODELS?**

3   A.   I conclude that the appropriate growth rate ranges from 4.0 to no more than 5.0

4   percent. My perpetual growth rate analysis is supported by separate methods

5   and available market expectations.

6

7   **Market Consensus (Analyst) Growth Rates**

8   **Q.**   **EXPLAIN HOW YOU USED THE MARKET CONCENSUS (ANALYST)**

9   **GROWTH RATE METHOD.**

10   A.   I began by reviewing the actual growth rates achieved by the comparable

11   companies. Then, I considered current forecasts of growth, including changes

12   in dividend payout ratios. In order to estimate reasonable future growth rates, I

13   reviewed estimates from the following five major financial analysis services:

14   Kiplinger's; Firstcall; Zack's; Reuters; and Value Line. Using the analysts'

15   minimum and maximum estimates of 3.8 to 5.3 percent, I created a sensitivity

16   analysis in the single and two-stage DCF models. In Staff/1002, Morgan/16, I

17   provide a table illustrating analysts' future growth estimates. In the three-stage

18   model, I also provide a sensitivity analysis with implicit growth rates that range

19   up to five percent.

20   **Q.**   **HOW DID YOU ESTIMATE DIVIDEND GROWTH?**

21   A.   Consistent with Staff's past approach to the DCF method, I viewed past

22   dividend growth as one potential indicator of the marginal investor's

23   expectations of future growth. I analyzed the historical dividend growth of the

24   comparable companies by looking at both the arithmetic and geometric

25   averages.[9]

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[9] A discussion of geometric and arithmetic averages can be found at Staff/1003, Morgan/27.

1   In addition, I considered the historic growth rate in both earnings per

2   share and book value. Over time, a convergence among these two measures

3   is expected.   For a more detailed explanation of the convergence issue, please

4   see Staff/1003, Morgan/51.

5 **Q.   IS IT APPROPRIATE TO CONSIDER ANALYSTS' FORECASTS OF**

6 **GROWTH WITHIN THE DCF MODEL?**

7 A.   Yes. While the Company and I both incorporate analysts' forecasts, they are

8   not generally supportable assumptions for perpetual growth. Because analyst

9   estimates are explicitly designed to cover a more limited amount of time, I do

10   not rely on them exclusively. Also, analysts may expect higher than

11   sustainable growth rates at times, such as during a recession or major industry

12   restructuring. Thus, such estimates should not necessarily be used for the

13   indefinite future. Nonetheless, in the broad prospective they provide relevant

14   information to consider in conducting a DCF analysis.

15 **Q.   HAS THIS ISSUE BEEN DISCUSSED IN SCHOLARLY ARTICLES?**

16 A.   Yes. A recent publication, entitled "Prophets and Profits," written by McKinsey

17   & Company concluded that analysts tend to provide inflated (as much as 20

18   percent higher for five year forecasts) growth estimates. A copy of the

19   publication can be found at Staff/1003, Morgan/319. Another article from the

20   Journal of Finance, entitled "The Level & Persistence of Growth Rates,"

21   indicates that, while analyst forecasts are not appropriate for perpetual use,

22   they are useful when combined with historic results and reasonable future

23   expectations. The article also explains that actual growth results have

24   generally been lower, on average, than expected from analyst long-term

25   forecasts. A copy of this article can be found at Staff/1003, Morgan/323.

1   Q.   **WHAT DO YOU CONCLUDE THE MARKET EXPECTS FOR GROWTH**

2   **RATES?**

3   A.   I conclude that all the actual growth rates and analysts' forecasts for the next

4   five years provide significant support for a growth rate of less than five percent.

5   These growth rates are in line with the Company's own analysts' estimates. In

6   fact, to the extent the Company's DCF models do not rely on historic long-term

7   average GDP growth, the DCF results generated by the Company are largely

8   consistent with my results. It is only where the Company relies on long-term

9   average GDP growth that our results diverge.

10

11   **Sustainable Growth**

12 Q.   **PLEASE DESCRIBE THE SUSTAINABLE GROWTH METHOD.**

13 A.   The sustainable growth method is a minor variation of the "retention growth"

14   method. The retention growth is calculated by taking the product of the

15   percentage of retained earnings and the rate of return on book equity. The

16   percentage of earnings retained (b), multiplied by the rate of return on equity

17   (ROE), creates a long-horizon future growth estimate (g) [g = b x ROE]. PGE

18   uses a similar method to calculate its long-term growth estimates.

19   The retention growth rate provides a useful check on the supportability

20   of growth rates because it requires an explicit expectation regarding the

21   sustainability of both ROEs and reinvestment rates (or, as the complementary

22   factor, dividend payouts).   The combination of retention rates and ROEs

23   necessary to produce a particular growth rate can be determined.

24   The sustainable growth rate can be estimated by the "b x ROE" formula

25   described above. A variation on the model, designed with the assumption of

1   on-going debt issuances to maintain a "balanced" capital structure while

2   reinvesting a portion of the earnings ("plowback) is described below:

3

4

The Sustainable Growth Rate

• The sustainable growth rate tells us how much the firm can grow by using internally generated funds and issuing debt to maintain a constant debt ratio.

$$\text{Sustainable Growth Rate} = \frac{ROE \times b}{1 - ROE \times b}$$

$$= \frac{.2517 \times .6037}{1 - .2517 \times .6037} = .1792$$

$$= 17.92\%$$

12   Using this formula and assuming: (1) the highest estimate that is

13   expected as a long-run ROE for electric utilities of 11.0 to 12.0 percent, and (2)

14   a reasonable long-run expectation of dividend reinvestment of 30 to 40 percent,

15   results in a growth estimate of 3.3 to 5.0 percent. As a sensitivity analysis, we

16   might assume a 10 percent ROE and a 30 percent retention, which would result

17   in a growth indication of just less than 3.10 percent. The following table

18   presents a summary of the calculations described above:

19
20

SUSTAINABLE GROWTH RATE

ROE	Dividend Payout, "d"	Retention Rate "b" = (1-"d")	ROE x "b"	[1- ROE x "b"]	Expected Growth
10.00%	70%	30%	3.00%	97.00%	3.09%
10.50%	70%	30%	3.15%	96.85%	3.25%
11.00%	65%	40%	4.40%	95.60%	4.60%
12.00%	60%	40%	4.80%	95.20%	5.04%

21

1   **Q. DO YOU HAVE ANYTHING ELSE TO ADD?**

2   A.   Yes. The expectations of Value Line for "earned" ROEs are readily available

3   and are closer to the credible long-run estimates for the earnings that might be

4   expected to accrue to the companies within the industry. Using Value Line's

5   estimate of future "earned" ROEs at about 11 percent, along with a 40 percent

6   retention rate, provides a growth rate estimate of 4.4 percent. This forecasted

7   growth rate is more reasonable than the Company's because it is based upon

8   the future expectations for the specific industry. It takes into account the

9   expected level of earnings retention as well as expected long-run returns on

10   equity for the overall industry. The ROE that is forecast by Value Line includes

11   the contribution to earnings from activities other than the returns generated

12   from rate-regulated assets.

13

14   **Historic Utility Growth Rates**

15   **Q. IS THERE HISTORIC INFORMATION AVAILABLE REGARDING THE**

16   **ACTUAL GROWTH RATES OF THE COMPARABLE COMPANIES?**

17   A.   Yes. Over the past fifteen years, the comparable electric companies have

18   achieved a median growth in book value, earnings per share, and dividends of

19   less than 3.0 percent.

20   **Q. SHOULD THE COMMISSION GIVE ANY WEIGHT TO THE HISTORIC**

21   **GROWTH IN THIS CASE?**

22   A.   Yes. Because there is no evidence that this historic period was the result of

23   unfair earnings performance, it could provide guidance judging future growth

24   expectations. The historic dividend growth reflects the comparable companies'

25   economic performance and dividend policies. If historic dividend growth is

1   relatively stable, one would assume that the historic dividend growth would

2   continue all else being equal.

3   The comparable companies' historic growth, coupled with Value Line's

4   forecasts of 4.17 percent average growth in earnings over the next five-year

5   period, supports an expected long-term growth rate somewhere in the range of

6   3.0 to 4.5 percent. A factor that would tend to place greater reliance on the

7   higher-end of the range, however, relates to changes in the dividend retentions.

8   As more earnings are withheld and reinvested in a company, the growth rate

9   would increase, all else equal.

10   Q.   IF THE DCF MODELS USE DIVIDEND GROWTH, WHY WOULD ONE

11   CONSIDER GROWTH IN BOOK VALUE OR GROWTH IN EARNINGS?

12   A.   Over the long run, there can be no growth in dividends per share without

13   growth in earnings per share unless companies have higher payout ratios.

14   Both earnings and dividend expectations have a significant influence on the

15   market prices. By considering earnings growth rates in the DCF analysis, a link

16   is provided between investors' market appreciation expectations and the

17   growth rate component of the DCF models. Over the long run, a convergence

18   among these measures of growth is to be expected.

19   Q.   DO YOU HAVE ADDITIONAL INFORMATION ON THE HISTORIC GROWTH

20   RATES FROM THE COHORT SAMPLE YOU HAVE SELECTED?

21   A.   Yes, based upon Value Line's most current data, the following tables detail

22   historic growth in cash flow, earnings per share, dividends, and book value.

23   The last table provides Value Line's forecasts for these same financial metrics.

24   From this data, the growth rates over the past five and ten year periods

25   have averaged less than four percent.

HISTORIC 10-YEAR GROWTH RATES

Company	BV	Dividends	Earnings
Alliant Energy	1.00%	-3.50%	-3.50%
Amer. Elec. Power	-1.00%	-2.50%	0.00%
Consol. Edison	2.50%	1.50%	0.00%
Empire Dist. Elec.	2.00%	0.00%	-1.00%
Energy East Corp.	4.50%	-0.50%	3.00%
IDACORP, Inc.	3.00%	-0.50%	1.50%
MGE Energy	2.50%	1.00%	1.50%
NSTAR	3.00%	2.50%	4.50%
OGE Energy	2.00%	0.00%	2.00%
Progress Energy	6.50%	3.00%	4.50%
Southern Co.	1.00%	2.00%	2.50%
Wisconsin Energy	2.50%	-5.00%	2.00%
WPS Resources	4.00%	2.00%	3.00%
Xcel Energy Inc.	-1.00%	-3.50%	-4.00%
Average	2.32%	-0.25%	1.14%
Median	2.50%	0.00%	1.75%
MAX	6.50%	3.00%	4.50%
75th %	3.00%	1.88%	2.88%

HISTORIC 5-YEAR GROWTH RATES

Company	BV	Dividends	Earnings
Alliant Energy	-1.50%	-7.50%	-3.00%
Amer. Elec. Power	-4.00%	-5.50%	-2.00%
Consol. Edison	2.00%	1.00%	-2.00%
Empire Dist. Elec.	2.00%	0.00%	-3.50%
Energy East Corp.	5.50%	5.50%	-0.50%
IDACORP, Inc.	4.00%	-0.50%	-3.00%
MGE Energy	5.00%	1.00%	4.00%
NSTAR	1.50%	2.50%	5.00%
OGE Energy	1.00%	0.00%	-2.50%
Progress Energy	8.50%	3.00%	5.50%
Southern Co.	-1.50%	1.00%	2.50%
Wisconsin Energy	3.50%	-12.00%	9.50%
WPS Resources	6.50%	2.00%	9.50%
Xcel Energy Inc.	-5.00%	-9.00%	-9.50%
Average	1.96%	-1.32%	0.71%
Median	2.00%	0.50%	-1.25%
MAX	8.50%	5.50%	9.50%
75th %	4.75%	1.75%	4.75%

FORECAST (EX-ANTE) 5-YEAR GROWTH RATES

The following table provides Value Line's current growth rate forecasts. A

reasonable earnings growth rate estimate for the group is approximately 4.5

percent.

Company	BV	Dividends	Earnings
Alliant Energy	4.50%	-2.50%	6.50%
Amer. Elec. Power	4.50%	N/A	2.00%
Consol. Edison	2.50%	1.00%	1.50%
Empire Dist. Elec.	1.50%	N/A	5.00%
Energy East Corp.	3.00%	5.00%	4.50%
IDACORP, Inc.	3.00%	-4.50%	4.50%
MGE Energy	4.00%	1.00%	6.00%
NSTAR	5.50%	3.00%	2.50%
OGE Energy	5.00%	3.00%	5.50%
Progress Energy	2.50%	1.50%	N/A
Southern Co.	5.50%	3.50%	4.00%
Wisconsin Energy	5.50%	4.50%	4.00%
WPS Resources	7.50%	2.00%	5.00%
Xcel Energy Inc.	3.00%	2.50%	7.50%
Average	4.11%	1.67%	4.50%
Median	4.25%	2.25%	4.50%
MAX	7.50%	5.00%	7.50%
75th %	5.38%	3.13%	5.50%

Q.　PLEASE SUMMARIZE THE COMPANY'S RECOMMENDATIONS.

A.　At UE 180/PGE/1100, Hager-Valach/3, the Company recommends:

- A capital structure of 43.75 percent long-term debt, 0.29 percent

  preferred stock, and 55.96 percent common equity.

- A cost of preferred stock of 8.43 percent.

- A cost of equity of 10.75 percent.

- A rate of return of 8.97 percent.

Q.　PLEASE SUMMARIZE THE COMPANY'S COST OF EQUITY RANGE.

A.　In PGE's electronic workpapers, titled "DCF_Elec.xls", the company provides

the following table indicating the results of its analysis:

combined	PGE comparables	UE170 rebut	
9.25%	8.46%	8.43%	BRVS
9.27%	8.99%	9.31%	GDP Trend
10.77%	10.50%	10.81%	GDP Hist

The first row reflects the name associated with the sample of companies that PGE uses in its DCF. The last column represents the method PGE used in estimating long-term growth. Omitting the historic GDP growth rate calculations (the bottom row,) the range of ROE estimates is 8.43 percent to 9.31 percent.

Q. **SHOULD THE COMMISSION GIVE THE COMPANY'S 10.75 PERCENT RECOMMENDED RETURN ON EQUITY ANY WEIGHT?**

A. No. The high-end of the Company's analysis presumes a growth rate that is greater than the company or the electric industry has experienced on average. The high growth rate estimate is based on historic growth in nominal GDP and disregards analyst estimates, sustainable growth rate calculations, and historic growth rates. In addition, the Company's own presentations to the financial community indicate that its long-term goal is to generate four to five percent growth in earnings per share. *See* Staff/1003 Morgan/440.

Q. **WHICH DCF MODELS ARE USED BY THE COMPANY?**

A. The Company uses only one version of the DCF model; a two-stage growth model. The Company applies this model to three samples of integrated electric companies.

Q. **WOULD YOU PLEASE DESCRIBE THE TWO-STAGE DCF MODEL USED BY THE COMPANY?**

A. Yes. The Company uses a two-stage DCF model with three different growth rate assumptions. All three growth rate formulations appear to rely on the closing share price from December 2005.

1   **Q.**   **WERE YOU ABLE TO DETERMINE HOW THE COMPANY PERFORMED ITS**

2   **ANALYSIS?**

3   A.   Not entirely. The Company did not include clear descriptions of its process, nor

4   its assumptions, in its testimony or workpapers. However, after reviewing the

5   workpapers, I discovered that the DCF model appears to employ the expected

6   dividend over the ensuing 12 months and forecast an additional three years of

7   growth based on the forecasts provided by Value Line. The Company appears

8   to have mislabeled some of its headings within its electronic workpapers. For

9   example, the first year of two models ("BR+VS" and "GDP Historical") is labeled

10   "2005" and another model (GDP Trend) is labeled "D1" with the second year

11   labeled "2005". The second-stage extends 247 years, using explicit forecasts

12   of perpetual growth.

13   **Q.**   **HOW DOES THE COMPANY ESTIMATE PERPETUAL GROWTH?**

14   A.   The Company estimates long-term growth three different ways. First, it

15   calculates a "sustainable growth" rate using a retention forecast and forecast of

16   ROE. In addition, it calculates an additional "vs" term. The Company also uses

17   an historic calculation of GDP growth, and a forecast of GDP growth, as two

18   alternative proxies for second-stage growth.

19   **Q.**   **PLEASE DESCRIBE THE FIRST TECHNIQUE.**

20   A.   The first technique is in many ways similar to the sustainable growth formula on

21   which I relied. As I discussed previously, the sustainable growth rate relies

22   upon the ability of retained earnings to grow the future earnings of the

23   company. This earnings growth depends upon normalized ex-ante earnings

24   (*e.g.* forward-looking expectations). The "r" variable represents the long-run

25   anticipated ROE and is applied by multiplying it with the ratio of the long run

26   forecast of retained earnings. The Company's model assumes that Value

1   Line's forecasted ROE and forecasted retention ratio is appropriate. Because

2   the final indication of growth appears reasonable, this method of estimating

3   growth could be supported. However, the ROE that should be used in the

4   calculation should be considered the "steady-state" ROE that could be earned

5   into perpetuity. The ROE at any single point in time is not necessarily the

6   correct figure to use.

7 **Q. PLEASE DESCRIBE THE OTHER TECHNIQUES.**

8 A. The Company also uses two calculations of GDP growth, historic and

9   forecasted, seeming to imply that long run nominal GDP growth is a useful

10   estimate of perpetual or terminal growth in any DCF model. I discuss GDP

11   growth rates starting at Staff/1003, Morgan/18.

12   To calculate its forecast of GDP growth, which the Company identifies

13   as "Average of 20-year growth rate for GDP, the Company relies on published

14   forecasts of GDP growth. [10] The calculation is the average of two sources.

15   The calculation is based on a geometric, or compounded, rate of growth over

16   the respective periods. One estimate is a 25-year forecast from Global Insight

17   (5.49 percent), and the other estimate is a 50-year forecast from the Social

18   Security Administration (4.53 percent.) The average of the 25-year and 50-

19   year estimates is 5.01 percent.

20   To determine historic GDP growth, the Company calculates average

21   historic GDP growth over the time period from 1963 through 2003. It calculates

22   the year-over-year growth over each period and takes the arithmetic, or simple

23   average, of four different periods: the entire 40-year period (7.497 percent), the

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[10] The Company identifies two independent sources of forecast data that are readily available. While I do not support the use of GDP growth as a proxy for long-term utility growth, considering these readily available projections of GDP growth rates produce results similar to the highest analyst forecast for the industry, overall, and is consistent with the high-end of my growth rate recommendations.

1   past 30-year period (7.583 percent), the past 20-year period (6.286 percent)

2   and the past 10-year period (5.663 percent). The Company then takes the

3   average of these four periods (6.757 percent) as the perpetual growth rate for

4   its sample of companies.

5   The Company did not explain why this approach should be relied upon,

6   and only provided a spreadsheet that provides some data relative to GDP for

7   the period from 1963 through 2003.[11] The table and the calculation method,

8   however, are problematic. The results imply that the annual average of the

9   nominal growth rates for four overlapping periods provides a reasonable

10 forecast for the future. The Company did not discuss why it uses an average of

11 annual growth rates rather than using a consistent compounding calculation, as

12 PGE used for the forecast data.

13   The following table identifies the four periods that are calculated and

14 the overall average of each period. Notably, this method gives a large amount

15 of weight to high inflationary periods (1970-1985).

16
PGE's Historic GDP Growth Calculations

10-year nominal average	5.663%
20-year nominal average	6.286%
30-year nominal average	7.583%
40-year nominal average	7.497%
Four-period Simple Average	**6.757%**

17

18   The following table corrects the calculations to reflect the results of

19 compounding, resulting in a four-period average of 6.40 percent, about 35

20 basis points lower than the Company's figures.

---

[11] The Company identifies the source as: www.bea.doc.gov: Nominal GDP (seasonally adjusted, annual).

1

Compounded Historic GDP Growth Calculations

10-year nominal average	5.154%
20-year nominal average	5.839%
30-year nominal average	7.159%
40-year nominal average	7.466%
Four-period Geometric Average	**6.404%**

2

3 **Q. ARE THERE OTHER METHODS FOR CALCULATING LONG-TERM GDP**

4 **GROWTH?**

5 A. Yes. The impact of inflation can be removed from the historic data. Since

6 inflation rates have been declining over the historic period, it is reasonable to

7 remove inflation and simply consider real growth rates rather than nominal

8 growth rates. Then, forward-looking forecasts for inflation can be directly

9 applied to the historic results to reflect a reasonable forward-looking estimate of

10 nominal GDP growth.

11 In my recently-published testimony from PacifiCorp's rate-case, I

12 provided geometric-average calculations based on historic GDP growth using

13 data that included 2004. *See* UE 179 Staff/1000 Morgan/19. The following

14 table removes the impact of inflation and provides an average rate of real

15 growth of 2.65 percent. If we assume that inflation is 2.5 percent, the long-run

16 expectation of nominal growth is still 5.15 percent. This is more in-line with the

17 forecast GDP data on which the Company relies.

18

1

Staff's Historic GDP Growth Calculations

Period	GDP Growth	Inflation	Real Growth
10-year nominal average	5.20%	2.50%	2.70%
20-year nominal average	5.60%	3.00%	2.60%
30-year nominal average	7.10%	4.60%	2.50%
40-year nominal average	7.50%	4.70%	2.80%
Four-period Geometric Average	6.35%	3.70%	2.65%

2   The calculation of historic GDP growth, when used for forecasting,

3   should explicitly consider future inflation, and is better than a calculation of

4   historic nominal growth.

5   **Q.   DO YOU AGREE WITH THE COMPANY'S ASSUMPTION THAT GDP**

6   **GROWTH IS THE CORRECT LONG-TERM PROXY FOR UTILITY-SPECIFIC**

7   **COMPANIES?**

8   A.   No. There is no support that correlates the growth in public utilities with growth

9   in "average" or "normal" companies, which would be the implication if GDP

10   were the proper proxy for growth rate in the DCF model. Rather, public utilities

11   are less risky than the average company due to regulation. In addition, they

12   also pay out a higher portion of their earnings in dividends, which tempers their

13   growth rate potential downward from that of the overall economy. The

14   economy-wide growth rate is an inappropriate proxy in earnings per share

15   growth rates. Some sectors are expected to grow faster than the economy,

16   such as those that do not pay dividends, while others sectors, such as

17   regulated utilities that pay out large portions of their earnings as dividends are

18   expected to grow a slower rate.

19   **Q.   WHAT IS THE TARGET GROWTH RATE FOR PORTLAND GENERAL**

20   **ELECTRIC?**

1   A.   Based on information provided to potential investors, PGE estimates a long-

2   term goal for earnings growth of four to five percent. *See* Staff/1003

3   Morgan/440.

4   **Q.   DO YOU RECOMMEND THAT THE COMMISSION ADOPT THE**

5   **COMPANY'S DCF RESULTS?**

6   A.   No. However, putting aside the company's DCF results that rely on the historic

7   GDP growth estimate, the results of the remaining DCF models appear to be

8   within a reasonable range and are consistent with the results of my analysis**.**

9   **Q.   WHAT OTHER MODELS DOES THE COMPANY PROPOSE?**

10   A.   The Company's witness, Mr. Hager, employs a risk positioning model.

11   **Q.   PLEASE DESCRIBE MR. HAGER'S RISK-PREMIUM MODEL.**

12   A.   Mr. Hager's risk premium model is utility debt + risk premium. The model

13   appears to be unique to Mr. Hager and to my knowledge has not been

14   subjected to peer-review. His model purports to relate Authorized Equity Rates

15   of Return from 1984-2005 to some average interest rate for bonds as reported

16   by Moody's Investors Service, as well as Treasury rates. Over the period

17   included in the model, the allowed returns ranged from a high of 17.38 percent

18   to a low of 9.5 percent.

19   **Q.   DO YOU BELIEVE THAT THIS IS AN APPROPRIATE APPROACH?**

20   A.   No, I do not. First, the ROE is only one component involved in establishing an

21   overall revenue requirement. Requesting the Commission to base its ROE

22   decision on ROEs of other jurisdictions is equivalent to taking one cost element

23   in isolation out of another states' rates and putting it into Oregon rates. Mr.

24   Hager's model likely omits important variables, such as capital structure,

25   whether there are any rate base disallowances, inflation rates. Additionally,

26   risk premium models typically require the use of future expected returns.

1   Authorized ROEs for a company are not the same as the actual returns

2   required by investors. If the Authorized ROE is higher (or lower) than the

3   required return at any given time, then the price of the company shares will

4   increase (decrease) until the required return is in equilibrium. Using authorized

5   returns as a surrogate for expected returns is not necessarily the best proxy.

6   Another concern is that in published risk-premium literature, the analyses

7   generally use a simple difference and do not rely on regression analysis.

8   Finally, there is a lot of evidence that risk premiums may be time-varying, so

9   developing an average over a specific certain period may not be appropriate.

10   Other than the issues pertaining to the model's development, the

11   Company's reasoning is circular. An author of a text focusing on the utility

12   industry has stated: "It would be hopelessly circular to set a fair return based

13   on the past actions of other regulators, much like observing a series of

14   duplicate images in multiple mirrors." For example, if all regulators adopted this

15   practice then no Commission would be free to update ROE and their decisions

16   would always be based upon outdated information.

17   Finally, it is notable that this model includes data spanning a period

18   when interest rates were the highest in history. If the model were applied using

19   current and forecast data, it would likely indicate a lagging effect and

20   demonstrate that the average ROE is lower than indicated in Mr. Hager's

21   regression analysis.

22 **Q. HAS THE COMMISSION DISCUSSED THE USE OF THESE MODELS IN**

23 **THE PAST?**

24 A. Yes, the Commission rejected similar models in the past. In UE 116, the

25   Commission stated that:

26

1   Capital market conditions, not regulatory decisions, determine

2   a utility's cost of equity. While we agree that regulatory

3   agencies generally make every effort to capture those market

4   conditions, a review of past decisions cannot replace an

5   independent analysis of current market conditions and how

6   they affect the particular utility. Moreover, ROE

7   determinations are made not just in the traditional rate cases,

8   but also in a range of other proceedings, such as industry

9   restructuring plans, merger approval cases, or performance-

10 based regulatory plans. Thus, the ROE awards may have

11 been based, in part, on other unknown parameters relevant in

12 that particular docket.

13 The Commission correctly rejected the generic analysis of determining

14 ROE based upon other state commission rulings and they should again reject

15 the Company's request to establish circular ROE decisions that do not consider

16 current market conditions.

17 **Q. DO YOU HAVE ANY FURTHER COMMENTS REGARDING THIS RISK-**

18 **POSITIONING MODEL?**

19 Yes. First, the model suggests that interest rates experienced in the early

20 1980's are going to re-occur in the future. The interest rates during the early

21 1980's were extremely high. This is clearly problematic considering that

22 interest rates are, and are expected to remain, at much lower levels then much

23 of the period analyzed by this model. Since there is evidence that the risk

24 premium varies with interest rates, using a period that contains wide variations

25 in interest rates may weaken the results of the analysis. Further, because

26 common stocks are considered very long term investments, longer periods are

27 preferable when estimating historic return data.

1   Second, because there are no other independent variables in PGE

2   witness Hager's model, it assumes that the "average" cost of debt in a wide-

3   range of companies is the other relevant variable that affects allowed rates of

4   return. As mentioned above, the model does not consider other issues that

5   may be directly relevant such as leverage, overall rate base, performance-

6   based regulation or other regulatory approaches. The Company should

7   consider the requirements of the Modern Portfolio Theory, which identifies non-

8   diversifiable risk as the pertinent risk for which equity investors are

9   compensated.

10   **Q.   ARE THERE ANY OTHER CONCERNS THAT STAFF WOULD LIKE TO**

11   **ADDRESS REGARDING THE COMPANY'S RISK-POSITIONING**

12   **REGRESSION ANALYSIS?**

13   A.   Yes. Mr. Conway will discuss the econometric analysis in his testimony,

14   Staff/1200.

15   **Q.   ARE THERE MACROECONOMIC FACTORS, OTHER THAN CHANGES IN**

16   **INTEREST RATES,[12] THAT WERE OMITTED IN THE COMPANY'S ANALYSIS?**

17   A.   Yes. The Company failed to discuss the implications of the tax cut program

18   enacted in 2003. The tax changes lowered dividend taxes, which is especially

19   relevant for public utilities, which generally pay a large amount of dividends.

20   With this reduction, the equity investor would be expected to bid up the price,

21   all else being equal. This change would be expected to significantly contribute

22   to the price of shares in high-dividend paying companies; thereby, reducing the

23   required rate of return.

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[12] Expected changes in interest rates are included in my analysis. For more information on interest rates, please refer to Staff/1003, Morgan/3.

1   The 2005 Financial Review, "Annual Report of the U.S. Shareholder-

2   owned Electric Utility Industry, Edison Electric Institute"[13] supports the

3   assertion that the dividend tax-reduction has the effect of increasing access to

4   capital, as well as lowering the required returns:

5

6   "The electric utility industry, known for its history of paying a

7   strong dividend, continues to benefit from The Jobs and

8   Growth Tax Relief Reconciliation Act of 2003. The Act reduced

9   individual tax rates on dividends to 15% for most tax brackets

10   and to 5% for the lowest two brackets. These tax rate

11   reductions provide an advantage for dividend paying stocks

12   over bonds, as bond interest is still taxed as ordinary income.

13   In May 2006, Congress extended the tax break an additional

14   two years, through the end of 2010. The reduction of individual

15   tax rates on dividends has clearly supported utility share

16   values by improving the net after-tax return to shareholders.

17   From the dividend paying company's perspective, a

18   higher stock price reduces the number of shares required to

19   raise a targeted amount of equity capital, therefore reducing

20   the aggregate dividend payment required to service the newly

21   issued shares—an especially attractive benefit for this capital-

22   intensive industry."

23

24   **Sensitivity Analysis**

25 **Q. WHAT IS THE RANGE OF COST OF EQUITY RESULTS THAT CAN BE**

26 **INDICATED BY THE 40-YEAR DCF MODEL PREVIOUSLY ADOPTED BY**

27 **THIS COMMISSION?[14]**

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[13] http://www.eei.org/industry_issues/finance_and_accounting/finance/research_and_analysis/financial_review/FinancialReview.pdf, page 21
[14] Orders 01-777 and 01-787.

1   A.   The following table provides a range of results, indicating the cost of equity that

2   could be generated in the 3-stage, 40-year DCF.

3   **SENSITIVITY ANALYSIS, EXPECTED COST OF EQUITY**

Growth Rate	3.50%	4.00%	4.50%	5.00%	5.50%
Cost of Equity	7.27%	8.06%	8.83%	9.60%	10.35%

4   **Q.   WHAT IS THE PERCENTAGE OF EQUITY YOU PROPOSE FOR THE**

5   **CAPITAL STRUCTURE?**

6   A.   I propose a capital structure that includes 48.50 percent equity and 51.50

7   percent debt. This is consistent with the amount of equity included in the

8   sample of companies from which I derived my cost of equity recommendation.

9   Consistent with Staff/1100, Conway/2-3, I have not included a component for

10   preferred equity in the capital structure.

11 **Q.   DOES THIS CONCLUDE YOUR TESTIMONY?**

12 A.   Yes.

PUBLIC UTILITY COMMISSION
OF
OREGON

STAFF EXHIBIT 1001

Witness Qualification Statement

August 14, 2006

WITNESS QUALIFICATIONS STATEMENT

NAME: Thomas D. Morgan

EMPLOYER: Public Utility Commission of Oregon

TITLE: Senior Financial Economist, Economic & Policy Analysis

ADDRESS: 550 Capitol St NE Suite 215, Salem, Oregon 97301-2551.

EDUCATION: Bachelor of Science in Business Administration, Finance; 1993, University of Oregon, Eugene, Oregon *summa cum laude.* I am enrolled in Master of Science in Finance program through the University of Leicester (UK).

RELEVANT WORK
EXPERIENCE: Since August 2001, I have been employed by the Public Utility Commission of Oregon as a financial analyst in the Economic Research & Financial/Policy Analysis Division. Current responsibilities include conducting research and providing technical support for cost of equity issues for electric, telecommunications, and gas utilities.

                        From October 1997 to August 2001, I worked for the Oregon Department of Revenue as a Senior Appraiser Analyst in the Utility Program, Valuation Section of the Property Tax Division. Duties included appraising a variety of public utility and transportation properties. The valuation process included developing cost of capital studies for use in the discounting of cash flows in the Income Capitalization Approach to value. Duties included valuation of the property owned by gas, electric, telecommunication and airline companies.

                        I am a certified general property appraiser and have been involved in the valuation of commercial properties since 1993.

PUBLIC UTILITY COMMISSION
OF
OREGON

STAFF EXHIBIT 1002

Exhibits in Support
of Direct Testimony

August 14, 2006

Single-Stage DCF Model Results   UE 180   Schedule 1 - Single Stage Model

COMPANY	TICKER	[A] Next 12-months Dividend	[B] Current Price	[C] Dividend Yield	[D] Growth Rate	[E] Selected Companies
Alliant Energy	LNT	1.18	$36.35	3.25%	4.40%	7.65%
Amer. Elec. Power	AEP	1.54	$36.63	4.20%	3.51%	7.72%
Consol. Edison	ED	2.31	$46.06	5.02%	3.41%	8.43%
Empire Dist. Elec.	EDE	1.28	$22.18	5.77%	3.38%	9.15%
Energy East Corp.	EAS	1.21	$24.91	4.86%	4.27%	9.12%
IDACORP, Inc.	IDA	1.2	$36.82	3.26%	4.79%	8.05%
MGE Energy	MGEE	1.38	$31.98	4.32%	6.00%	10.32%
NSTAR	NST	1.24	$31.83	3.90%	4.50%	8.40%
OGE Energy	OGE	1.35	$35.79	3.77%	3.50%	7.27%
Progress Energy	PGN	2.46	$43.88	5.61%	3.49%	9.10%
Southern Co.	SO	1.56	$33.55	4.65%	4.70%	9.35%
Wisconsin Energy	WEC	0.94	$41.67	2.26%	6.80%	9.06%
WPS Resources	WPS	2.3	$51.37	4.48%	4.80%	9.28%
Xcel Energy Inc.	XEL	0.89	$20.57	4.33%	4.86%	9.18%
AVERAGE		$1.49	$35.26	4.26%	4.46%	8.72%
MEDIAN		$1.32	$36.07	4.32%	4.45%	9.08%

[A]	Value Line Summary and Index, July 21, 2006
[B]	Most current stock quotes provided by MSN Money, www.moneycentral.msn.com
[C]	Dividend rate divided by market price [C] / [B]
[D]	Growth Rates from average of Kiplinger's; Firstcall; Zack's; Reuters; Value Line
[E]	Dividend Yield + Growth [C] + [D]

Single-Stage DCF Model, Sensitivity Analysis   UE 180   Schedule 1A - Sensitivity Analysis

COMPANY	TICKER	Next 12-months Dividend	Current price	Div Yield	Minimum Analyst Estimate	COE Results	Maximum Analyst Estimate	COE Results
Alliant Energy	LNT	$1.18	$36.35	3.25%	2.50%	5.75%	6.50%	9.75%
Amer. Elec. Power	AEP	$1.54	$36.63	4.20%	2.00%	6.20%	6.00%	10.20%
Consol. Edison	ED	$2.31	$46.06	5.02%	1.50%	6.52%	4.00%	9.02%
Empire Dist. Elec.	EDE	$1.28	$22.18	5.77%	2.50%	8.27%	5.00%	10.77%
Energy East Corp.	EAS	$1.21	$24.91	4.86%	4.00%	8.86%	4.50%	9.36%
IDACORP, Inc.	IDA	$1.20	$36.82	3.26%	4.50%	7.76%	5.00%	8.26%
MGE Energy	MGEE	$1.38	$31.98	4.32%	6.00%	10.32%	6.00%	10.32%
NSTAR	NST	$1.24	$31.83	3.90%	2.50%	6.40%	5.00%	8.90%
OGE Energy	OGE	$1.35	$35.79	3.77%	3.00%	6.77%	5.50%	9.27%
Progress Energy	PGN	$2.46	$43.88	5.61%	2.87%	8.48%	4.00%	9.61%
Southern Co.	SO	$1.56	$33.55	4.65%	4.00%	8.65%	5.00%	9.65%
Wisconsin Energy	WEC	$0.94	$41.67	2.26%	4.00%	6.26%	8.00%	10.26%
WPS Resources	WPS	$2.30	$51.37	4.48%	4.50%	8.98%	5.00%	9.48%
Xcel Energy Inc.	XEL	$0.89	$20.57	4.33%	4.00%	8.33%	5.00%	9.33%
AVERAGE		$1.49	$35.26	4.26%	3.42%	7.68%	5.32%	9.58%
MEDIAN		$1.32	$36.07	4.32%	3.50%	8.02%	5.00%	9.54%

150-Year Horizon DCF   UE 180   Schedule 2 - Sensitivity Range Analysis - Low   ===> to year 150

HADAWAY COMPANIES	(ticker)	IRR	[1] Current Price [A]	[2] Dividend EOY 1 [B]	[3] Dividend EOY 2 [B]	[4] Dividend EOY 3 [B]	[5] Dividend EOY 4 [B]	LT Growth Dividend EOY 5 [C]	Dividend EOY 6	Dividend EOY 7	Dividend EOY 8	Dividend EOY 9	Dividend EOY 10
Alliant Energy	LNT	6.31%	($36.35)	$1.21	$1.31	$1.41	$1.51	$1.55	$1.59	$1.63	$1.67	$1.71	$1.75
Amer. Elec. Power	AEP	6.74%	($36.63)	$1.56	$1.66	$1.76	$1.86	$1.90	$1.94	$1.98	$2.02	$2.06	$2.10
Consol. Edison	ED	6.43%	($46.06)	$2.31	$2.33	$2.35	$2.37	$2.41	$2.44	$2.48	$2.52	$2.56	$2.59
Empire Dist. Elec.	EDE	7.90%	($22.18)	$1.22	$1.28	$1.28	$1.28	$1.31	$1.34	$1.38	$1.41	$1.45	$1.48
Energy East Corp.	EAS	8.92%	($24.91)	$1.20	$1.27	$1.33	$1.38	$1.44	$1.49	$1.55	$1.61	$1.68	$1.75
IDACORP, Inc.	IDA	7.32%	($36.82)	$1.20	$1.20	$1.20	$1.20	$1.25	$1.31	$1.37	$1.43	$1.50	$1.56
MGE Energy	MGEE	9.78%	($31.98)	$1.39	$1.40	$1.42	$1.43	$1.52	$1.61	$1.71	$1.81	$1.92	$2.03
NSTAR	NST	6.75%	($31.83)	$1.24	$1.31	$1.39	$1.47	$1.51	$1.54	$1.58	$1.62	$1.66	$1.70
OGE Energy	OGE	6.77%	($35.79)	$1.35	$1.39	$1.44	$1.48	$1.53	$1.57	$1.62	$1.67	$1.72	$1.77
Progress Energy	PGN	8.34%	($43.88)	$2.48	$2.53	$2.57	$2.61	$2.68	$2.76	$2.84	$2.92	$3.00	$3.09
Southern Co.	SO	8.88%	($33.55)	$1.59	$1.67	$1.76	$1.85	$1.92	$2.00	$2.08	$2.16	$2.25	$2.34
Wisconsin Energy	WEC	6.21%	($41.67)	$0.95	$0.99	$1.04	$1.08	$1.13	$1.17	$1.22	$1.27	$1.32	$1.37
WPS Resources	WPS	8.65%	($51.37)	$2.31	$2.35	$2.39	$2.43	$2.53	$2.65	$2.77	$2.89	$3.02	$3.16
Xcel Energy Inc.	XEL	8.64%	($20.57)	$0.91	$0.97	$1.02	$1.08	$1.12	$1.17	$1.21	$1.26	$1.31	$1.36
AGGREGATE		7.85%	($493.59)	$20.98	$21.66	$22.35	$23.03	$23.80	$24.59	$25.41	$26.26	$27.15	$28.07

LT Growth 3.31%

Average	7.69%
Stdev	1.18%
Min	6.21%
Max	9.78%
Median	7.61%
25 percentile	6.74%
75 percentile	8.65%

Sources:

[A] Most current stock quotes provided by MSN Money, www.moneycentral.msn.com
[B] Value Line Data (See Schedule 3)
[C] Long-term growth is the input variable, based on consensus analyst growth expectations.

Schedule 2A - Sensitivity Range Analysis - High

150-Year Horizon DCF — UE 180

COHORT COMPANY DATA

SELECTED FINANCIAL DATA

HADAWAY COMPANIES

	(ticker)	IRR	[1] Current Price	[2] Dividend EOY 1	[3] Dividend EOY 2	[4] Dividend EOY 3	[5] Dividend EOY 4	LT Growth Dividend EOY 5	Dividend EOY 6	Dividend EOY 7	Dividend EOY 8	Dividend EOY 9	Dividend EOY 10 ===> to year 150
			[A]	[B]	[B]	[B]	[B]	[C]					
Alliant Energy	LNT	9.91%	($36.35)	$1.21	$1.31	$1.41	$1.51	$1.61	$1.72	$1.83	$1.95	$2.07	$2.21
Amer. Elec. Power	AEP	10.26%	($36.63)	$1.56	$1.66	$1.76	$1.86	$1.97	$2.09	$2.22	$2.35	$2.49	$2.64
Consol. Edison	ED	8.61%	($46.06)	$2.31	$2.33	$2.35	$2.37	$2.47	$2.57	$2.67	$2.78	$2.89	$3.00
Empire Dist. Elec.	EDE	10.05%	($22.18)	$1.28	$1.28	$1.28	$1.28	$1.34	$1.41	$1.48	$1.56	$1.63	$1.72
Energy East Corp.	EAS	9.35%	($24.91)	$1.22	$1.27	$1.33	$1.38	$1.44	$1.51	$1.57	$1.65	$1.72	$1.80
IDACORP, Inc.	IDA	7.78%	($36.82)	$1.20	$1.20	$1.20	$1.20	$1.26	$1.32	$1.39	$1.46	$1.53	$1.61
MGE Energy	MGEE	9.78%	($31.98)	$1.39	$1.40	$1.42	$1.43	$1.52	$1.61	$1.71	$1.81	$1.92	$2.03
NSTAR	NST	8.97%	($31.83)	$1.24	$1.31	$1.39	$1.47	$1.54	$1.62	$1.70	$1.79	$1.88	$1.97
OGE Energy	OGE	9.02%	($35.79)	$1.35	$1.39	$1.44	$1.48	$1.56	$1.65	$1.74	$1.84	$1.94	$2.04
Progress Energy	PGN	9.31%	($43.88)	$2.48	$2.53	$2.57	$2.61	$2.71	$2.82	$2.93	$3.05	$3.17	$3.30
Southern Co.	SO	9.75%	($33.55)	$1.59	$1.67	$1.76	$1.85	$1.94	$2.04	$2.14	$2.25	$2.36	$2.48
Wisconsin Energy	WEC	9.92%	($41.67)	$0.95	$0.99	$1.04	$1.08	$1.17	$1.26	$1.36	$1.47	$1.59	$1.72
WPS Resources	WPS	9.09%	($51.37)	$2.31	$2.35	$2.39	$2.43	$2.55	$2.67	$2.81	$2.95	$3.09	$3.25
Xcel Energy Inc.	XEL	11.72%	($20.57)	$0.91	$0.97	$1.02	$1.08	$1.16	$1.25	$1.34	$1.44	$1.55	$1.66
AGGREGATE		9.59%	(493.59)	20.98	21.66	22.35	23.03	24.25	25.53	26.89	28.32	29.83	31.42

Average	9.54%
Stdev	0.88%
Min	7.78%
Max	11.72%
Median	9.55%
25 percentile	9.04%
75 percentile	9.92%

[A] Most current stock quotes provided by MSN Money, www.moneycentral.msn.com
[B] Value Line Data (See Schedule 3)
[C] Long-term growth is the input variable, based on consensus analyst growth expectations.

150-Year Horizon DCF   UE 180

COHORT COMPANY DATA

Schedule 2B - Analyst Growth Estimates Consensus

LT Growth ===> to year 150
Based on Analysts' Estimates (See Schedule 8)

SELECTED FINANCIAL DATA

GAS COMPANIES	(ticker)	IRR	[1] Current Price [A]	[2] Dividend EOY 1 [B]	[3] Dividend EOY 2 [B]	[4] Dividend EOY 3 [B]	[5] Dividend EOY 4 [B]	Dividend EOY 5 [B]	Dividend EOY 6 [C]	Dividend EOY 7	Dividend EOY 8	Dividend EOY 9	Dividend EOY 10
Alliant Energy	LNT	8.01%	($36.35)	$1.21	$1.31	$1.41	$1.51	$1.58	$1.65	$1.72	$1.80	$1.88	$1.96
Amer. Elec. Power	AEP	8.07%	($36.63)	$1.56	$1.66	$1.76	$1.86	$1.93	$2.00	$2.07	$2.14	$2.21	$2.29
Consol. Edison	ED	8.10%	($46.06)	$2.31	$2.33	$2.35	$2.37	$2.45	$2.54	$2.62	$2.71	$2.81	$2.90
Empire Dist. Elec.	EDE	8.65%	($22.18)	$1.28	$1.28	$1.28	$1.28	$1.32	$1.37	$1.41	$1.46	$1.51	$1.56
Energy East Corp.	EAS	9.15%	($24.91)	$1.22	$1.27	$1.33	$1.38	$1.44	$1.50	$1.56	$1.63	$1.70	$1.77
IDACORP, Inc.	IDA	7.59%	($36.82)	$1.20	$1.20	$1.20	$1.20	$1.26	$1.32	$1.38	$1.45	$1.52	$1.59
MGE Energy	MGEE	9.78%	($31.98)	$1.39	$1.40	$1.42	$1.43	$1.52	$1.61	$1.71	$1.81	$1.92	$2.03
NSTAR	NST	8.52%	($31.83)	$1.24	$1.31	$1.39	$1.47	$1.54	$1.61	$1.68	$1.75	$1.83	$1.91
OGE Energy	OGE	7.22%	($35.79)	$1.35	$1.39	$1.44	$1.48	$1.53	$1.59	$1.64	$1.70	$1.76	$1.82
Progress Energy	PGN	8.87%	($43.88)	$2.48	$2.53	$2.57	$2.61	$2.70	$2.79	$2.89	$2.99	$3.09	$3.20
Southern Co.	SO	9.49%	($33.55)	$1.59	$1.67	$1.76	$1.85	$1.93	$2.03	$2.12	$2.22	$2.32	$2.43
Wisconsin Energy	WEC	8.81%	($41.67)	$0.95	$0.99	$1.04	$1.08	$1.16	$1.23	$1.32	$1.41	$1.50	$1.61
WPS Resources	WPS	8.92%	($51.37)	$2.31	$2.35	$2.39	$2.43	$2.54	$2.66	$2.79	$2.93	$3.07	$3.21
Xcel Energy Inc.	XEL	9.39%	($20.57)	$0.91	$0.97	$1.02	$1.08	$1.13	$1.19	$1.24	$1.30	$1.37	$1.43
AGGREGATE		8.65%	($493.59)	$20.98	$21.66	$22.35	$23.03	$24.03	$25.07	$26.16	$27.30	$28.49	$29.73

Average	8.61%
Stdev	0.71%
Min	7.22%
Max	9.78%
Median	8.73%
25 percentile	8.07%
75 percentile	9.09%

[A] Most current stock quotes provided by MSN Money, www.moneycentral.msn.com
[B] Value Line Data (See Schedule 3)
[C] Long-term growth is the input variable, based on consensus analyst growth expectations.

Value Line Data

COHORT ELECTRIC COMPANIES
VALUE LINE'S EARNINGS PER SHARE PROJECTIONS   UE 180   Schedule 3

	2006	2007	2008	2009	2010
Alliant Energy	$2.30	$2.35	$2.38	$2.42	$2.45
Amer. Elec. Power	$2.70	$2.80	$2.95	$3.10	$3.25
Consol. Edison	$3.00	$3.05	$3.10	$3.15	$3.20
Empire Dist. Elec.	$1.05	$1.45	$1.47	$1.48	$1.50
Energy East Corp.	$1.60	$1.65	$1.77	$1.88	$2.00
IDACORP, Inc.	$1.85	$1.90	$1.93	$1.97	$2.00
MGE Energy	$1.80	$2.00	$2.15	$2.30	$2.45
NSTAR	$1.90	$2.05	$2.20	$2.35	$2.50
OGE Energy	$2.15	$2.10	$2.20	$2.20	$2.25
Progress Energy	$3.20	$3.30	$3.33	$3.37	$3.40
Southern Co.	$2.15	$2.25	$2.42	$2.58	$2.75
Wisconsin Energy	$2.55	$2.65	$2.85	$3.05	$3.25
WPS Resources	$3.75	$3.85	$3.92	$3.98	$4.05
Xcel Energy Inc.	$1.30	$1.40	$1.52	$1.63	$1.75
AVERAGE	**$2.24**	**$2.34**	**$2.44**	**$2.53**	**$2.63**

Note: Data are from the most current Value Line report(s)

RETAINED EARNINGS

	2006	2007	2008	2009	2010
Alliant Energy	$1.15	$1.10	$1.03	$0.97	$0.90
Amer. Elec. Power	$1.22	$1.20	$1.25	$1.30	$1.35
Consol. Edison	$0.70	$0.73	$0.76	$0.79	$0.82
Empire Dist. Elec.	($0.23)	$0.17	$0.19	$0.20	$0.22
Energy East Corp.	$0.42	$0.41	$0.47	$0.54	$0.60
IDACORP, Inc.	$0.65	$0.70	$0.73	$0.77	$0.80
MGE Energy	$0.42	$0.61	$0.74	$0.88	$1.01
NSTAR	$0.69	$0.79	$0.86	$0.93	$1.00
OGE Energy	$0.82	$0.74	$0.74	$0.75	$0.75
Progress Energy	$0.76	$0.80	$0.79	$0.79	$0.78
Southern Co.	$0.61	$0.63	$0.71	$0.79	$0.87
Wisconsin Energy	$1.63	$1.69	$1.84	$2.00	$2.15
WPS Resources	$1.47	$1.53	$1.56	$1.58	$1.61
Xcel Energy Inc.	$0.42	$0.47	$0.53	$0.59	$0.65
AVERAGE	**$0.77**	**$0.83**	**$0.87**	**$0.92**	**$0.97**

Value Line's Dividends Per Share

COMPANY	2006	2007	2008	2009	2010
Alliant Energy	$1.15	$1.25	$1.35	$1.45	$1.55
Amer. Elec. Power	$1.48	$1.60	$1.70	$1.80	$1.90
Consol. Edison	$2.30	$2.32	$2.34	$2.36	$2.38
Empire Dist. Elec.	$1.28	$1.28	$1.28	$1.28	$1.28
Energy East Corp.	$1.18	$1.24	$1.29	$1.35	$1.40
IDACORP, Inc.	$1.20	$1.20	$1.20	$1.20	$1.20
MGE Energy	$1.38	$1.39	$1.41	$1.42	$1.44
NSTAR	$1.21	$1.26	$1.34	$1.42	$1.50
OGE Energy	$1.33	$1.36	$1.41	$1.45	$1.50
Progress Energy	$2.44	$2.50	$2.54	$2.58	$2.62
Southern Co.	$1.54	$1.62	$1.71	$1.79	$1.88
Wisconsin Energy	$0.92	$0.96	$1.01	$1.05	$1.10
WPS Resources	$2.28	$2.32	$2.36	$2.40	$2.44
Xcel Energy Inc.	$0.88	$0.93	$0.99	$1.04	$1.10
AVERAGE	**$1.47**	**$1.52**	**$1.57**	**$1.61**	**$1.66**

Retention Rate
(Earnings less Dividends divided by Earnings)

	2006	2007	2008	2009	2010
Alliant Energy	50.0%	46.8%	$0.43	$0.40	36.7%
Amer. Elec. Power	45.2%	42.9%	$0.42	$0.42	41.5%
Consol. Edison	23.3%	23.9%	$0.25	$0.25	25.6%
Empire Dist. Elec.	-21.9%	11.7%	$0.13	$0.14	14.7%
Energy East Corp.	26.3%	24.8%	$0.27	$0.28	30.0%
IDACORP, Inc.	35.1%	36.8%	$0.38	$0.39	40.0%
MGE Energy	23.3%	30.5%	$0.35	$0.38	41.2%
NSTAR	36.3%	38.5%	$0.39	$0.40	40.0%
OGE Energy	38.1%	35.2%	$0.35	$0.34	33.3%
Progress Energy	23.8%	24.2%	$0.24	$0.23	22.9%
Southern Co.	28.4%	28.0%	$0.29	$0.31	31.6%
Wisconsin Energy	63.9%	63.8%	$0.65	$0.65	66.2%
WPS Resources	39.2%	39.7%	$0.40	$0.40	39.8%
Xcel Energy Inc.	32.3%	33.6%	$0.35	$0.36	37.1%
AVERAGE	**31.7%**	**34.3%**	**34.9%**	**35.4%**	**35.8%**

VALUE LINE'S BOOK VALUE PER SHARE PROJECTIONS

	2005	2006	2007	2008	2009	2010
Alliant Energy	$22.13	$20.85	$22.10	$23.52	$24.93	$26.35
Amer. Elec. Power	$21.32	$23.08	$24.30	$26.03	$27.77	$29.50
Consol. Edison	$29.09	$29.80	$30.85	$32.00	$33.15	$34.30
Empire Dist. Elec.	$14.76	$15.08	$15.55	$15.95	$16.35	$16.75
Energy East Corp.	$17.89	$19.45	$19.25	$19.92	$20.58	$21.25
IDACORP, Inc.	$23.88	$24.04	$24.95	$26.05	$27.15	$28.25
MGE Energy	$16.59	$16.82	$17.10	$17.75	$18.40	$19.05
NSTAR	$13.52	$14.37	$15.05	$16.28	$17.52	$18.75
OGE Energy	$14.28	$15.19	$16.10	$17.23	$18.37	$19.50
Progress Energy	$30.90	$31.90	$32.80	$34.08	$35.37	$36.65
Southern Co.	$13.86	$14.41	$15.05	$16.23	$17.42	$18.60
Wisconsin Energy	$21.31	$22.91	$24.20	$26.22	$28.23	$30.25
WPS Resources	$29.30	$32.47	$35.15	$37.38	$39.62	$41.85
Xcel Energy Inc.	$12.99	$13.37	$13.95	$14.55	$15.15	$15.75
AVERAGE	**$20.13**	**$20.98**	**$21.89**	**$23.09**	**$24.29**	**$25.49**

SELECTED COMPANIES 40-YEAR MULTISTAGE DCF METHOD

UE 180

Schedule 4 - 40-year 3-stage DCF Model
Page 1

RESULTING IRR 9.29%

	Long-run Retention Rate	ROE	GROWTH
	40.00%	12.00%	4.80%

Based on the Recent Price reported in Value Line

Year	[1] Year End Book	[2] Retention Rate	[3] Dividend	[4] Earnings Per Share	[5] Retained Earnings Per Share	[6] Total Increment to Book	[7] Market Price	[8] Mkt to Book	[9] Expect. Ret. on Equity	[10] Cash Fl. from Stock Trans.	[11] Cash Fl. from Div.	[12] Total Cash Flow	
	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	
2005	$20.13						$33.79	1.73		($33.79)		($33.79)	
2006	$20.98	34.28%	$1.47	$2.24			$36.38	1.73	10.88%		$1.47	$1.47	First
2007	$21.89	35.27%	$1.52	$2.34			$37.95	1.73	10.93%		$1.52	$1.52	Stage
2008	$23.09	35.79%	$1.57	$2.44			$40.03	1.73	10.84%		$1.57	$1.57	
2009	$24.29	36.27%	$1.61	$2.53			$42.11	1.73	10.70%		$1.61	$1.61	
2010	$25.49	36.71%	$1.66	$2.63			$44.19	1.73	10.56%		$1.66	$1.66	
2011	$26.74	40.00%	$1.88	$3.13	$1.25	$1.25	$46.36	1.73	12.00%		$1.88	$1.88	
2012	$28.05	40.00%	$1.97	$3.29	$1.32	$1.32	$48.64	1.73	12.00%		$1.97	$1.97	
2013	$29.43	40.00%	$2.07	$3.45	$1.38	$1.38	$51.04	1.73	12.00%		$2.07	$2.07	
2014	$30.88	40.00%	$2.17	$3.62	$1.45	$1.45	$53.55	1.73	12.00%		$2.17	$2.17	
2015	$32.40	40.00%	$2.28	$3.80	$1.52	$1.52	$56.18	1.73	12.00%		$2.28	$2.28	
2016	$33.99	40.00%	$2.39	$3.98	$1.59	$1.59	$58.94	1.73	12.00%		$2.39	$2.39	
2017	$35.67	40.00%	$2.51	$4.18	$1.67	$1.67	$61.84	1.73	12.00%		$2.51	$2.51	
2018	$37.42	40.00%	$2.63	$4.39	$1.75	$1.75	$64.88	1.73	12.00%		$2.63	$2.63	
2019	$39.26	40.00%	$2.76	$4.60	$1.84	$1.84	$68.07	1.73	12.00%		$2.76	$2.76	
2020	$41.19	40.00%	$2.90	$4.83	$1.93	$1.93	$71.42	1.73	12.00%		$2.90	$2.90	
2021	$43.22	40.00%	$3.04	$5.06	$2.03	$2.03	$74.93	1.73	12.00%		$3.04	$3.04	
2022	$45.34	40.00%	$3.19	$5.31	$2.13	$2.13	$78.62	1.73	12.00%		$3.19	$3.19	Second Stage
2023	$47.57	40.00%	$3.34	$5.57	$2.23	$2.23	$82.49	1.73	12.00%		$3.34	$3.34	
2024	$49.91	40.00%	$3.51	$5.85	$2.34	$2.34	$86.54	1.73	12.00%		$3.51	$3.51	
2025	$52.37	40.00%	$3.68	$6.14	$2.45	$2.45	$90.80	1.73	12.00%		$3.68	$3.68	
2026	$54.94	40.00%	$3.86	$6.44	$2.58	$2.58	$95.26	1.73	12.00%		$3.86	$3.86	
2027	$57.64	40.00%	$4.05	$6.76	$2.70	$2.70	$99.95	1.73	12.00%		$4.05	$4.05	
2028	$60.48	40.00%	$4.25	$7.09	$2.83	$2.83	$104.87	1.73	12.00%		$4.25	$4.25	
2029	$63.45	40.00%	$4.46	$7.44	$2.97	$2.97	$110.02	1.73	12.00%		$4.46	$4.46	
2030	$66.57	40.00%	$4.68	$7.80	$3.12	$3.12	$115.43	1.73	12.00%		$4.68	$4.68	
2031	$69.85	40.00%	$4.91	$8.19	$3.27	$3.27	$121.11	1.73	12.00%		$4.91	$4.91	
2032	$73.28	40.00%	$5.15	$8.59	$3.44	$3.44	$127.07	1.73	12.00%		$5.15	$5.15	
2033	$76.89	40.00%	$5.41	$9.01	$3.60	$3.60	$133.32	1.73	12.00%		$5.41	$5.41	
2034	$80.67	40.00%	$5.67	$9.45	$3.78	$3.78	$139.87	1.73	12.00%		$5.67	$5.67	
2035	$84.64	40.00%	$5.95	$9.92	$3.97	$3.97	$146.75	1.73	12.00%		$5.95	$5.95	
2036	$88.80	40.00%	$6.24	$10.41	$4.16	$4.16	$153.97	1.73	12.00%		$6.24	$6.24	
2037	$93.16	40.00%	$6.55	$10.92	$4.37	$4.37	$161.54	1.73	12.00%		$6.55	$6.55	
2038	$97.75	40.00%	$6.87	$11.45	$4.58	$4.58	$169.49	1.73	12.00%		$6.87	$6.87	
2039	$102.55	40.00%	$7.21	$12.02	$4.81	$4.81	$177.82	1.73	12.00%		$7.21	$7.21	
2040	$107.60	40.00%	$7.57	$12.61	$5.04	$5.04	$186.57	1.73	12.00%		$7.57	$7.57	
2041	$112.89	40.00%	$7.94	$13.23	$5.29	$5.29	$195.74	1.73	12.00%		$7.94	$7.94	
2042	$118.44	40.00%	$8.33	$13.88	$5.55	$5.55	$205.37	1.73	12.00%		$8.33	$8.33	
2043	$124.27	40.00%	$8.74	$14.56	$5.82	$5.82	$215.47	1.73	12.00%		$8.74	$8.74	
2044	$130.38	40.00%	$9.17	$15.28	$6.11	$6.11	$226.06	1.73	12.00%		$9.17	$9.17	
2045	$136.79	40.00%	$9.62	$16.03	$6.41	$6.41	$237.18	1.73	12.00%	$237.18	$9.62	$246.80	3rd Stage

Internal Rate of Return 9.29%

Source:

[A] First Stage is average from Value Line. Second stage is prior years' book value plus value from Col. [6]
[B] First Stage is (Col. [4]-Col.[3])/Col.[4]). First year of second stage computed by 1-dividends/earnings; subsequent years use the same retention rate.
[C] First Stage is from Value Line. First year of second stage is Col. [4] x (1-Col. [2]) Subsequent years of second stage is Col. [4] x (1-Col. [2])
[D] First Stage is from Value line. Second stage is from Value line. Second stage is average of current and prior year's value from Col. [1] x Col. [9]
[E] Col. [4] - Col. [3]
[F] Col. [4] - Col. [3]
[G] Col. [1] x Col. [10]
[H] Staff/1002 Morgan/10 (Schedule 7)
[I] First stage is Col. [4]/Ave. of Current and prior year's Col. [1]. Second stage is input.
[J] Input is "negative" Col. [7] for year of purchase, "positive" Col. [7] for year of sale.
[K] Col. [3]
[L] Col. [10] + Col. [11]

Schedule 4 - 40-year 3-stage DCF Model Sensitivity Analysis
Page 2

SELECTED COMPANIES 40-YEAR MULTISTAGE DCF METHOD

SENSITIVITY ANALYSES, EXPECTED INTERNAL RATE OF RETURN

Terminal Retention Rate	Terminal ROE								
	10.00%	10.50%	11.00%	11.50%	12.00%	12.50%	13.00%	13.50%	14.00%
30.00%	7.72%	8.01%	8.30%	8.58%	8.86%	9.14%	9.42%	9.69%	9.97%
35.00%	7.88%	8.18%	8.48%	8.78%	9.07%	9.36%	9.65%	9.94%	10.22%
40.00%	8.05%	8.36%	8.67%	8.98%	9.29%	9.59%	9.89%	10.19%	10.49%
45.00%	8.23%	8.55%	8.87%	9.19%	9.51%	9.83%	10.14%	10.46%	10.77%
50.00%	8.40%	8.74%	9.07%	9.41%	9.74%	10.07%	10.40%	10.72%	11.05%

SENSITIVITY ANALYSES, EXPECTED ORGANIC GROWTH RATE

Terminal Retention Rate	Terminal ROE								
	10.00%	10.50%	11.00%	11.50%	12.00%	12.50%	13.00%	13.50%	14.00%
30.00%	3.00%	3.15%	3.30%	3.45%	3.60%	3.75%	3.90%	4.05%	4.20%
35.00%	3.50%	3.68%	3.85%	4.03%	4.20%	4.38%	4.55%	4.73%	4.90%
40.00%	4.00%	4.20%	4.40%	4.60%	4.80%	5.00%	5.20%	5.40%	5.60%
45.00%	4.50%	4.73%	4.95%	5.18%	5.40%	5.63%	5.85%	6.08%	6.30%
50.00%	5.00%	5.25%	5.50%	5.75%	6.00%	6.25%	6.50%	6.75%	7.00%

Terminal ROE	COE
9.50%	7.74%
10.00%	8.05%
10.50%	8.36%
11.00%	8.67%
11.50%	8.98%
12.00%	9.29%

Terminal Retention Rate	IRR
25.00%	8.66%
30.00%	8.86%
35.00%	9.07%
40.00%	9.29%
45.00%	9.51%

M/B Ratio	IRR
1.250	8.96%
1.375	9.05%
1.500	9.14%
1.625	9.22%
1.750	9.30%

Stock Prices Used in DCF Models

Data from: 8/8/2006

Schedule 5

UE 180

Stock Quotes Provided by MSN Money

Click here to visit MSN Money

Company			Last	Previous Close	High	Low	Volume	Change	% Change	52 Wk High	52 Wk Low	Market Cap	EPS	P/E Ratio	# Shares Out
Alliant Energy Corporation	Chart	News	36.35	36.3	36.49	36.33	123,300	0.05	0.14%	36.98	25.79	4,280,506,755	0.79	43.7	117,758,100
American Electric Power Company,	Chart	News	36.63	36.52	36.72	36.55	432,400	0.11	0.30%	40.8	32.27	14,431,308,334	2.02	14.3	393,975,100
Consolidated Edison, Inc.	Chart	News	46.06	46.01	46.23	45.96	500,900	0.05	0.11%	49.29	41.17	11,352,251,934	2.97	15.3	246,466,600
The Empire District Electric Company	Chart	News	22.18	21.8	22.24	21.97	48,500	0.38	1.74%	24.16	19.25	580,826,559	0.99	22.1	26,186,950
Energy East Corporation	Chart	News	24.91	24.89	24.99	24.86	208,000	0.02	0.08%	26.69	22.18	3,679,244,342	1.67	14.9	147,701,500
Green Mountain Power Corp	Chart	News	33.59	33.48	33.68	33.45	8,800	0.11	0.33%	34	26.62	176,480,517	2.23	15.3	5,253,960
IDACORP, Inc.	Chart	News	36.82	36.82	36.99	36.27	331,500	unch	0.00%	37.49	27.46	1,575,631,251	1.56	23.6	42,792,810
MGE Energy, Inc.	Chart	News	31.98	31.02	31.98	31.2	18,251	0.96	3.09%	38.12	29.2	654,134,901	1.73	17.9	20,454,500
NSTAR	Chart	News	31.83	31.83	31.95	31.55	257,700	unch	0.00%	32.05	24.9	3,399,711,364	1.92	16.5	106,808,400
OGE Energy Corp.	Chart	News	35.79	35.57	35.96	35.64	194,800	0.22	0.62%	39.15	24.41	3,255,894,048	3.13	15.7	90,972,170
Progress Energy, Inc.	Chart	News	43.88	43.63	43.99	43.7	344,700	0.25	0.57%	45.5	40.19	11,100,337,034	2.62	16.2	252,970,300
The Southern Company	Chart	News	33.55	33.47	33.81	33.5	539,100	0.08	0.24%	36.47	30.48	24,903,698,089	2.06	16.2	742,286,100
Wisconsin Energy Corporation	Chart	News	41.67	41.55	41.72	41.51	73,500	0.12	0.29%	43	36.49	4,874,510,549	2.75	15.3	116,978,900
WPS Resources Corp	Chart	News	51.37	51	51.43	50.92	76,800	0.37	0.73%	59.65	47.39	2,215,478,636	4.05	12.2	43,127,870
Xcel Energy Inc.	Chart	News	20.57	20.41	20.6	20.46	234,400	0.16	0.78%	20.64	17.8	8,350,749,294	1.34	15.6	405,967,400

COMPARATIVE ELECTRIC COMPANIES
Percentage of Common Equity in the Capital Structure
Excluding Short-term Debt

Docket UE 180

Schedule 6 - Capital Structure Analysis

COMPANIES	Ticker	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006 Est.	2007	'09-'11	Ave. '96-'06	Ave. '96-'10	Ave. '99-'10
Alliant Energy	LNT			49.2%	57.4%	50.2%	42.7%	39.2%	50.0%	50.2%	53.1%	57.5%	55.5%	50.5%	49.9%	50.5%	50.6%
Amer. Elec. Power	AEP					44.4%	44.6%	43.1%	38.7%	43.1%	44.9%	41.5%	40.0%	40.5%	42.9%	42.3%	42.3%
Consol. Edison	ED	55.7%	56.8%	58.4%	53.1%	49.1%	49.6%	48.1%	48.0%	51.0%	49.0%	50.0%	50.0%	50.5%	51.7%	51.5%	49.8%
Empire Dist. Elec.	EDE	45.8%	48.9%	45.2%	40.4%	42.4%	42.8%	44.5%	48.0%	48.7%	49.0%	49.0%	48.0%	48.5%	45.9%	46.2%	46.1%
Energy East Corp.	EAS	51.9%	52.8%	53.5%	53.0%	41.8%	38.4%	39.2%	38.5%	40.6%	43.8%	43.5%	43.0%	45.0%	45.2%	45.0%	42.7%
IDACORP, Inc.	IDA	45.1%	46.8%	44.2%	44.8%	45.9%	47.9%	47.9%	46.4%	50.7%	50.0%	50.5%	50.0%	50.5%	47.3%	47.7%	48.5%
MGE Energy	MGEE	58.1%	58.2%	53.3%	55.5%	52.2%	57.8%	54.2%	56.5%	62.6%	60.7%	60.5%	60.5%	61.0%	57.2%	57.8%	58.2%
NSTAR	NST	44.5%	46.5%	50.1%	47.2%	39.4%	39.5%	37.8%	40.2%	40.2%	38.6%	39.0%	42.0%	51.5%	42.1%	42.8%	41.5%
OGE Energy	OGE	52.3%	52.5%	52.7%	47.2%	39.2%	40.5%	39.6%	45.6%	47.4%	50.5%	48.5%	50.0%	54.0%	46.9%	47.7%	46.3%
Progress Energy	PGN	50.2%	53.2%	52.4%	52.5%	47.6%	38.5%	40.4%	43.4%	44.3%	43.3%	46.0%	48.5%	51.0%	46.5%	47.0%	45.6%
Southern Co.	SO	49.7%	43.5%	42.9%	37.8%	50.6%	42.2%	43.4%	43.6%	44.1%	44.3%	44.5%	44.5%	46.0%	44.2%	44.4%	44.1%
Wisconsin Energy	WEC	57.4%	54.4%	51.7%	45.9%	40.5%	37.2%	39.6%	39.6%	43.3%	46.7%	44.0%	47.0%	48.5%	45.5%	45.8%	43.2%
WPS Resources	WPS	56.7%	57.4%	53.8%	43.9%	41.6%	46.3%	45.8%	52.1%	54.4%	58.7%	57.0%	54.5%	52.0%	51.6%	51.9%	50.6%
Xcel Energy Inc.	XEL						32.8%	39.5%	43.8%	44.1%	47.3%	46.0%	49.5%	52.5%	42.3%	44.4%	44.4%
Average		51.6%	51.9%	50.6%	48.2%	45.0%	43.0%	43.0%	45.3%	47.5%	48.6%	48.4%	48.8%	50.1%	47.1%	47.5%	46.7%
Standard Deviation		5.0%	4.9%	4.5%	6.1%	4.6%	6.2%	4.7%	5.3%	6.1%	6.0%	6.3%	5.5%	4.7%	4.3%	4.2%	4.5%
25th Percentile		47.8%	47.9%	48.2%	44.6%	41.6%	38.8%	39.5%	41.0%	43.5%	44.5%	44.1%	45.1%	48.5%	44.5%	44.6%	43.4%
Median		51.9%	52.8%	52.1%	47.2%	44.4%	42.5%	41.8%	44.7%	45.9%	48.2%	47.3%	49.0%	50.5%	46.2%	46.6%	45.8%
75th Percentile		56.2%	55.6%	53.4%	53.0%	49.1%	45.9%	45.5%	48.0%	50.6%	50.4%	50.4%	50.0%	51.9%	49.3%	49.8%	49.5%
Minimum		44.5%	43.5%	42.9%	37.8%	39.2%	32.8%	37.8%	38.5%	40.2%	38.6%	39.0%	40.0%	40.5%	42.1%	42.3%	41.5%
Maximum		58.1%	58.2%	58.4%	57.4%	52.2%	57.8%	54.2%	56.5%	62.6%	60.7%	60.5%	60.5%	61.0%	57.2%	57.8%	58.2%

Source: *Value Line*

Most current through: **Aug-06**

Schedule 7

	Line	Symbol	DivYld	Wt'ed M/B M/B	EOY 2005 M/B
Alliant Energy	1	LNT	3.25%	1.68	1.74
Amer. Elec. Power	2	AEP	4.20%	1.54	1.59
Consol. Edison	3	ED	5.02%	1.51	1.55
Empire Dist. Elec.	4	EDE	5.77%	1.44	1.47
Energy East Corp.	5	EAS	4.86%	1.29	1.28
IDACORP, Inc.	6	IDA	3.26%	1.50	1.53
MGE Energy	7	MGEE	4.32%	1.88	1.90
NSTAR	8	NST	3.90%	2.15	2.22
OGE Energy	9	OGE	3.77%	2.27	2.36
Progress Energy	10	PGN	5.61%	1.35	1.38
Southern Co.	11	SO	4.65%	2.27	2.33
Wisconsin Energy	12	WEC	2.26%	1.76	1.82
WPS Resources	13	WPS	4.48%	1.50	1.58
Xcel Energy Inc.	14	XEL	4.33%	1.50	1.54
			DivYld	M/B	M/B
Average			4.3%	1.69	1.73

Schedule 7

OUTSTANDING SHARES (millions)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	'09-'11
Alliant Energy									77.63	78.98	79.01	89.68	92.30	110.96	115.74	117.04	118.10	119.10	122.10
Amer. Elec. Power											322.02	322.24	338.84	395.02	395.86	393.72	394.00	396.00	400.00
Consol. Edison	228.23	228.33	233.93	234.37	234.91	234.96	234.99	235.49	232.83	213.81	212.03	212.15	213.93	225.84	242.51	245.29	255.00	257.00	263.00
Empire Dist. Elec.	12.67	12.99	13.29	13.57	13.94	15.22	16.44	16.78	17.11	17.37	17.60	19.76	22.57	24.98	25.70	26.08	30.15	31.20	33.00
Energy East Corp.	124.86	126.80	138.88	141.19	143.01	143.01	139.34	135.02	125.89	109.34	117.66	116.72	144.97	146.26	147.12	147.70	148.00	148.25	149.00
IDACORP, Inc.	33.98	33.98	36.19	37.09	37.61	37.61	37.61	37.61	37.61	37.61	37.61	37.63	38.02	38.34	42.22	42.66	43.90	45.20	46.10
MGE Energy	16.02	16.05	16.05	16.08	16.08	16.08	16.08	16.08	16.08	16.16	16.62	17.07	17.57	18.34	20.39	20.45	20.50	20.50	20.50
NSTAR	78.00	84.09	89.53	90.26	91.07	96.01	97.02	97.03	94.37	116.12	106.07	106.07	106.07	106.07	106.55	106.81	106.81	106.81	106.81
OGE Energy	80.60	80.60	80.66	80.69	80.71	80.75	80.76	80.77	80.80	77.86	77.92	77.99	78.50	87.40	90.00	90.60	91.20	91.80	93.50
Progress Energy												218.73	232.43	246.00	247.00	252.00	254.00	256.00	261.00
Southern Co.					657.00	670.00	677.00	685.00	698.63	666.00	682.00	699.00	716.90	734.80	741.80	741.60	750.00	755.00	780.00
Wisconsin Energy	101.04	101.04	103.09	105.32	108.94	110.82	111.68	112.87	115.61	118.90	118.65	115.42	116.03	118.43	116.99	116.98	117.00	117.00	117.00
WPS Resources	22.89	22.89	23.85	23.90	23.90	23.90	23.90	23.90	26.55	26.85	26.85	31.18	32.01	36.91	37.26	40.16	43.30	43.80	45.30
Xcel Energy Inc.												345.02	398.71	398.96	400.46	403.39	406.00	427.00	435.00

Schedule 7

BOOK VALUE PER SHARE

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	'09-'11
Alliant Energy									20.69	27.29	25.79	21.39	19.89	21.37	22.13	20.85	22.10	13.30	26.35
Amer. Elec. Power											25.01	25.54	20.85	19.93	21.32	23.08	24.30	25.60	29.50
Consol. Edison	19.73	20.18	20.89	21.63	22.62	23.51	24.37	25.18	25.88	25.31	25.81	26.71	27.68	28.44	29.09	29.80	30.85	31.70	34.30
Empire Dist. Elec.	11.75	12.08	12.29	12.37	12.47	12.69	12.96	13.06	13.43	13.48	13.65	13.58	14.59	15.17	14.76	15.08	15.55	15.95	16.75
Energy East Corp.	10.93	11.08	11.42	11.44	11.64	12.19	12.70	13.36	13.61	12.84	14.59	15.26	16.97	17.59	17.89	19.45	19.25	19.65	21.25
IDACORP, Inc.	17.40	17.06	17.28	17.86	17.91	18.15	18.47	18.93	19.42	20.02	21.82	23.15	23.01	22.54	23.88	24.04	24.95	25.90	28.25
MGE Energy	10.62	10.98	11.24	11.51	11.78	12.01	11.14	11.25	11.34	11.49	12.05	12.67	12.94	14.34	16.59	16.82	17.10	17.55	19.05
NSTAR	8.61	8.96	9.39	9.71	10.06	10.31	10.54	10.98	11.14	13.29	12.65	11.90	12.25	12.84	13.52	14.37	15.05	15.90	18.75
OGE Energy	10.96	11.30	11.18	11.24	11.41	11.61	11.91	12.19	12.91	13.09	13.66	13.34	12.53	13.75	14.28	15.19	16.10	16.95	19.50
Progress Energy												27.45	28.73	30.26	30.90	31.90	32.80	33.75	36.65
Southern Co.					12.46	13.09	13.61	14.08	14.02	13.82	15.67	11.42	12.15	13.13	13.86	14.41	15.05	15.80	18.60
Wisconsin Energy	13.70	14.35	14.97	15.67	16.01	16.89	17.42	16.51	16.46	16.89	17.00	17.81	18.44	19.92	21.31	22.91	24.20	25.60	30.25
WPS Resources	16.26	16.13	17.33	18.18	18.69	19.39	19.56	20.00	19.48	19.97	20.21	22.96	24.45	27.18	29.30	32.47	35.15	36.85	41.85
Xcel Energy Inc.												17.95	11.70	12.95	12.99	13.37	13.95	14.35	15.75

Schedule 7

DIVIDENDS DECLARED PER SHARE

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	'09-'11
Alliant Energy									2.00	2.00	2.00	2.00	2.00	1.00	1.02	1.05	1.15	1.25	1.55
Amer. Elec. Power											2.40	2.40	2.40	1.65	1.40	1.42	1.48	1.60	1.90
Consol. Edison	1.82	1.86	1.90	1.94	2.00	2.04	2.08	2.10	2.12	2.14	2.18	2.20	2.22	2.24	2.26	2.28	2.30	2.32	2.38
Empire Dist. Elec.	1.18	1.22	1.26	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
Energy East Corp.	1.03	1.05	1.07	1.09	1.00	0.70	0.70	0.70	0.78	0.84	0.88	0.92	0.96	1.00	1.06	1.12	1.18	1.24	1.40
IDACORP, Inc.	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.70	1.20	1.20	1.20	1.20	1.20
MGE Energy	1.15	1.17	1.19	1.19	1.25	1.26	1.28	1.29	1.30	1.31	1.32	1.33	1.34	1.35	1.36	1.37	1.38	1.39	1.44
NSTAR	0.77	0.80	0.83	0.86	0.89	0.92	0.94	0.94	0.95	0.98	1.01	1.04	1.07	1.09	1.13	0.87	1.21	1.26	1.50
OGE Energy	1.26	1.30	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.36	1.50
Progress Energy												2.14	2.18	2.26	2.32	2.38	2.44	2.50	2.62
Southern Co.							1.26	1.30	1.34	1.34	1.34	1.34	1.36	1.39	1.42	1.48	1.54	1.62	1.88
Wisconsin Energy	1.16	1.23	1.29	1.34	1.40	1.46	1.51	1.54	1.56	1.56	1.37	0.80	0.80	0.80	0.83	0.88	0.92	0.96	1.10
WPS Resources	1.64	1.68	1.72	1.76	1.80	1.84	1.88	1.92	1.96	2.00	2.04	2.08	2.12	2.16	2.20	2.24	2.28	2.32	2.44
Xcel Energy Inc.												1.50	1.13	0.75	0.81	0.85	0.88	0.93	1.10

Schedule 7

EARNINGS PER SHARE

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	'09-11
Alliant Energy									1.26	2.19	2.47	2.42	1.18	1.57	1.85	2.21	2.30	2.35	2.45
Amer. Elec. Power											1.04	3.27	2.86	2.53	2.61	2.64	2.70	2.80	3.25
Consol. Edison	2.34	2.32	2.46	2.66	2.98	2.93	2.93	2.95	3.04	3.13	2.74	3.21	3.13	2.83	2.32	2.99	3.00	3.05	3.20
Empire Dist. Elec.	1.28	1.43	1.26	1.16	1.32	1.18	1.23	1.29	1.53	1.13	1.35	0.59	1.19	1.29	0.86	0.92	1.05	1.45	1.50
Energy East Corp.	1.24	1.18	1.20	1.04	1.19	1.25	1.26	1.26	1.51	1.91	2.07	2.00	1.50	1.43	1.62	1.74	1.60	1.65	2.00
IDACORP, Inc.	1.91	1.56	1.55	1.97	1.80	2.10	2.21	2.32	2.37	2.43	3.50	3.35	1.63	0.96	1.90	1.75	1.85	1.90	2.00
MGE Energy	1.36	1.52	1.45	1.51	1.53	1.49	0.82	1.40	1.38	1.48	1.67	1.62	1.69	1.71	1.77	1.57	1.80	2.00	2.45
NSTAR	0.80	0.98	1.05	1.14	1.21	1.04	1.31	1.36	1.38	1.39	1.60	1.64	1.69	1.74	1.76	1.83	1.90	2.05	2.50
OGE Energy	1.69	1.64	1.21	1.39	1.51	1.52	1.62	1.61	2.04	1.94	1.89	1.29	1.43	1.73	1.78	1.83	2.15	2.10	2.25
Progress Energy												3.43	3.84	3.41	3.10	2.94	3.20	3.30	3.40
Southern Co.					1.52	1.66	1.68	1.58	1.73	1.83	2.01	1.61	1.85	1.97	2.06	2.13	2.15	2.25	2.75
Wisconsin Energy	1.85	1.87	1.67	1.81	1.67	2.13	1.97	0.54	1.65	1.88	1.08	1.84	2.32	2.26	1.85	2.56	2.55	2.65	3.25
WPS Resources	2.00	2.23	2.35	2.47	2.21	2.32	2.00	2.13	1.76	2.24	2.43	2.74	2.74	2.76	4.07	4.09	3.75	3.85	4.05
Xcel Energy Inc.												2.27	0.42	1.23	1.27	1.20	1.30	1.40	1.75

Schedule 7

VALUE LINE'S REPORTED RETURN ON EQUITY (ROE)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	'09-'11
Alliant Energy	11.7%		6.0%	8.0%	9.6%	9.8%	5.8%	6.7%	8.2%	13.1%	10.5%	10.0%	9.5%
Amer. Elec. Power	9.2%	11.7%	11.8%	12.9%	10.7%	12.8%	13.7%	12.4%	12.2%	11.3%	11.0%	11.0%	11.0%
Consol. Edison	10.1%	9.8%	11.3%	8.8%	9.8%	12.0%	11.3%	9.8%	7.8%	9.7%	9.5%	9.5%	9.5%
Empire Dist. Elec.	11.9%	9.7%	11.3%	15.8%	13.8%	3.9%	7.8%	7.8%	5.8%	6.0%	6.0%	9.0%	9.5%
Energy East Corp.	7.4%	12.2%	12.2%	12.1%	16.0%	13.1%	8.0%	8.1%	9.0%	8.9%	8.5%	8.5%	
IDACORP, Inc.	12.3%	12.4%	12.2%	12.8%	13.7%	14.4%	7.0%	4.2%	7.2%	6.2%	7.5%	7.0%	7.0%
MGE Energy	13.6%	12.3%	12.6%	9.1%	13.0%	12.6%	12.8%	11.6%	10.0%	9.3%	10.5%	11.5%	12.0%
NSTAR		13.2%	15.8%	14.8%	13.8%	13.7%	13.8%	13.7%	13.1%	12.8%	12.5%	13.0%	13.5%
OGE Energy						9.7%	11.4%	11.8%	12.3%	12.1%	11.5%	12.5%	12.0%
Progress Energy						11.5%	12.1%	10.9%	9.9%	9.0%	9.5%	9.5%	9.0%
Southern Co.	12.2%	11.2%	12.2%	13.6%	12.3%	14.0%	15.1%	14.8%	14.9%	14.9%	14.0%	14.0%	14.5%
Wisconsin Energy	11.2%	3.3%	9.9%	10.9%	6.5%	10.6%	12.6%	11.4%	8.8%	11.3%	10.5%	10.5%	11.0%
WPS Resources						10.8%	11.7%	9.1%	14.0%	11.8%	10.5%	10.5%	9.5%
Xcel Energy Inc.	10.1%	10.6%	9.0%	11.1%	11.9%	12.6%	3.7%	9.8%	10.0%	9.2%	10.0%	9.5%	10.5%

Analyst Earnings Growth Expectations
UE 180

Schedule 8

Electric Companies		Kiplinger's		Firstcall		Zack's	Reuters	Value Line	Average	Median	Minimum	Maximum
		Last 5 years	Next 5 years	Last 5 years	Next 5 years	Next 5 years	Next 5 years	Next 5 years				
Alliant Energy	LNT	N/A	5.00%	2.80%	2.50%	4.00%	4.00%	6.50%	4.40%	4.00%	2.50%	6.50%
Amer. Elec. Power	AEP	N/A	3.00%	-6.40%	3.00%	6.00%	3.57%	2.00%	3.51%	3.00%	2.00%	6.00%
Consol. Edison	ED	-3.00%	4.00%	-3.00%	4.00%	3.90%	3.67%	1.50%	3.41%	3.90%	1.50%	4.00%
Empire Dist. Elec.	EDE	-1.00%	3.00%	2.60%	3.00%	N/A	2.50%	5.00%	3.38%	3.00%	2.50%	5.00%
Energy East Corp.	EAS	-3.00%	4.00%	-3.10%	4.00%	4.50%	4.33%	4.50%	4.27%	4.33%	4.00%	4.50%
IDACORP, Inc.	IDA	-17.00%	5.00%	-7.40%	5.00%	4.70%	4.75%	4.50%	4.79%	4.75%	4.50%	5.00%
MGE Energy	MGEE	0.00%	N/A	N/A	N/A	N/A	N/A	6.00%	6.00%	6.00%	6.00%	6.00%
NSTAR	NST	N/A	5.00%	2.30%	5.00%	5.00%	5.00%	2.50%	4.50%	5.00%	2.50%	5.00%
OGE Energy	OGE	10.00%	3.00%	7.40%	3.00%	3.00%	3.00%	5.50%	3.50%	3.00%	3.00%	5.50%
Progress Energy	PGN	0.00%	4.00%	-2.90%	3.50%	3.60%	2.87%	N/A	3.49%	3.55%	2.87%	4.00%
Southern Co.	SO	2.00%	5.00%	6.40%	5.00%	4.80%	4.70%	4.00%	4.70%	4.80%	4.00%	5.00%
Wisconsin Energy	WEC	13.00%	8.00%	6.10%	8.00%	7.00%	7.00%	4.00%	6.80%	7.00%	4.00%	8.00%
WPS Resources	WPS	10.00%	5.00%	12.10%	5.00%	4.50%	4.50%	5.00%	4.80%	5.00%	4.50%	5.00%
Xcel Energy Inc.	XEL	N/A	4.00%	-14.30%	4.00%	4.50%	4.29%	7.50%	4.86%	4.29%	4.00%	7.50%
AVERAGE		1.10%	4.46%	0.20%	4.23%	4.63%	4.17%	4.50%	4.46%	4.40%	3.42%	5.50%
MEDIAN		0.00%	4.00%	2.30%	4.00%	4.50%	4.29%	4.50%	4.45%	4.31%	3.50%	5.00%
MIN		-17.00%	3.00%	-14.30%	2.50%	3.00%	2.50%	1.50%	3.38%	3.00%	1.50%	4.00%
MAX		13.00%	8.00%	12.10%	8.00%	7.00%	7.00%	7.50%	6.80%	7.00%	6.00%	8.00%

PUBLIC UTILITY COMMISSION
OF
OREGON

STAFF EXHIBIT 1100

Direct Testimony

August 14, 2006

1   Q.   **PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND**

2   **OCCUPATION.**

3   A.   My name is Bryan Conway. My business address is 550 Capitol Street

4   NE, Suite 215, Salem, Oregon 97301-2551. I am employed by the Public

5   Utility Commission of Oregon (OPUC) as the Program Manager of the

6   Economic and Policy Analysis Section in the Economic Research and

7   Financial Analysis Division.

8   Q.   **PLEASE DESCRIBE YOUR EDUCATION AND EXPERIENCE.**

9   A.   My Witness Qualifications Statement is found on Exhibit Staff/1101,

10   Conway/1.

11   Q.   **HAVE YOU PREPARED AN EXHIBIT?**

12   A.   Yes, I have prepared Staff Exhibit 1101 consisting of one page and Staff

13   Exhibit 1102 consisting of 22 pages.

14   Q.   **WHAT IS THE PURPOSE OF THIS TESTIMONY?**

15   A.   The purpose of my testimony is to review the costs of preferred stock and

16   discuss problems with PGE's "risk positioning model."

17

18   **<u>Summary Recommendation</u>**

19   Q.   **WHAT IS YOUR SUMMARY RECOMMENDATION?**

20   A.   I recommend the Commission reject the Company's proposed cost of

21   preferred stock and adopt Staff's recommendation to remove all costs

22   associated with PGE's preferred stock. I recommend the Commission

23   reject PGE's risk positioning model.

1

Embedded Cost of Preferred Stock

3 **Q. WHAT IS PGE'S RECOMMENDED COST OF PREFERRED STOCK?**

4 A. In Exhibit PGE/1100, Hager-Valach/3, PGE's proposed embedded cost of

5 preferred stock is 8.43%.

6 **Q. HOW DID PGE ARRIVE AT THE 8.43% FIGURE?**

7 A. PGE first determined the cost of money for its preferred stock issuance.

8 The cost of money for each preferred stock series was then multiplied by

9 the principal amount outstanding for each issue to yield the annualized

10 cost. Because the preferred stock has a sinking fund requirement, PGE

11 used the average month-end balance for its preferred stock. The effective

12 interest rate represents the internal rate of return of the cash flows

13 associated with the preferred stock over the test period.

14 **Q. WHAT IS STAFF'S RECOMMENDED COST OF PREFERRED STOCK?**

15 A. I recommend the Commission remove the costs of PGE's preferred stock

16 due to the mandatory sinking fund payment due June 2007.

17 **Q. PLEASE EXPLAIN HOW YOU ACCOUNTED FOR THE MANDATORY**

18 **SINKING FUND PAYMENT DUE JUNE 2007.**

19 A. As of June 2007, PGE will no longer have any preferred stock in its capital

20 structure. In order to set rates that best represent the costs of preferred

21 stock going forward, I used the preferred stock balance at July 1, 2007,

22 which is the midpoint of the test year.

23 **Q. WHY IS THIS ADJUSTMENT APPROPRIATE?**

1   A.   Accounting for the June 2007 payment helps ensure that the cost of

2   preferred stock is most reflective of rates on a going forward basis.

3   Because the preferred stock has a mandatory redemption, it is known and

4   measurable change and should be considered when establishing rates

5   going forward.

6

7   **PGE's Risk Positioning Model**

8   **Q.**   **PLEASE DESCRIBE PGE'S RISK POSITIONING MODEL (RPM).**

9   A.   PGE uses regression analysis as one of its methods of estimating its

10   required return on equity. Specifically, PGE regresses differences

11   between historic cost of equity decisions from regulatory agencies across

12   the United States, and a lagged treasury or corporate bond rate against

13   the same lagged treasury or corporate bond rate. (See PGE's Cost of

14   Capital Work Papers pages 132 and 133 attached as Staff/1102,

15   Conway/1-2.) Staff Witness Thomas D. Morgan also discusses the model

16   at Staff/1000, Morgan/23-26.

17   **Q.**   **WHAT IS THE PURPOSE OF YOUR TESTIMONY ON PGE'S RPM?**

18   A.   My testimony focuses on econometric issues surrounding PGE's

19   application of its RPM. More specifically, I address problems with PGE's

20   regression analysis.

21   **Q.**   **WHAT IS THE DIFFERENCE BETWEEN MR. MORGAN'S TESTIMONY**

22   **ON PGE'S RPM AND YOUR TESTIMONY ON PGE'S RPM?**

1   A.   Mr. Morgan's testimony focuses on the theoretical pitfalls of using an RPM

2   that is based on historic authorized costs of equity from around the nation.

3   My testimony addresses errors PGE made in its application of its RPM.

4   Q.   **WHAT CONCERNS DID YOU IDENTIFY WITH PGE'S APPLICATION**

5   **OF ITS RPM?**

6   A.   I have two major concerns with PGE's RPM. First, PGE's RPM appears

7   to be misspecified. By misspecified, I mean PGE's model appears to lack

8   relevant explanatory variables. Second, the RPM's statistically significant

9   results are likely fallacious due to the circular logic used by PGE when it

10   set up its regression analysis. I also have three additional concerns of

11   lesser magnitude. First, PGE did not perform basic statistical tests to

12   check for problems present in either cross-sectional or time series

13   analysis. Second, the analysis PGE relied upon to determine the lag it

14   would assume for Treasury rates was not reproducible and likely not

15   correctly done. Third, the data relied upon by PGE's contains errors and

16   is not consistent with PGE's testimony.

17   Q.   **PLEASE DISCUSS YOUR FIRST MAJOR CONCERN THAT PGE'S**

18   **RPM IS MISSPECIFIED.**

19   A.   PGE testifies that there are numerous risks or factors that need to be

20   considered by this Commission in determining PGE's specific required

21   return on equity. For example, PGE discusses Ballot Measure 9, SB 408,

22   a "new wholesale power environment," hydro risks, etc. (See generally,

23   PGE/1100, Hager-Valach/18 through Hager-Valach/21.) PGE further

1   states that "[c]onceptually, the required return to induce an investor to

2   purchase any security investment is: k=r+pi+i+b+f+l." (See PGE/1100,

3   Hager-Valach/21, lines 11-12.)

4   However, PGE's model to predict or forecast the correct authorized

5   return using its RPM looks at only the nominal interest rate (r+pi). By

6   excluding relevant variables such as expected growth rates, inflation, or

7   other non-diversifiable risks, PGE's RPM model likely is misspecified.

8   **Q.   WHAT IS THE IMPACT OF A MISSPECIFIED MODEL?**

9   A.   The impact depends on the nature of the misspecification. In PGE's case,

10   its RPM appears to omit relevant variables.

11 **Q.   WHAT IS THE IMPACT OF OMITTING RELEVANT VARIABLES FROM**

12 **A REGRESSION EQUATION?**

13 A.   Generally, this is known as omitted variable bias. The following excerpt

14   from A Guide to Econometrics (Peter Kennedy, 2nd Edition, pg. 69) states,

15   (i) Omission of a relevant independent variable

16
17   (a) In general, the OLS estimates of the coefficients of the remaining
18   variables are biased. If by luck….the observations on the omitted
19   variables(s) are uncorrelated in the sample with the observations on the
20   other independent variables (i.e., if the omitted variable is orthogonal to
21   the included variables), the slope coefficients will be unbiased; the
22   intercept estimate will retain its bias unless the mean of the observations
23   on the omitted variable is zero.

24
25   (b) The estimator of the variance-covariance matrix of B^{ols} is biased
26   upward, causing inferences concerning these parameters to be
27   inaccurate. This is the case even if the omitted variable is orthogonal to
28   the others.

29 **Q.   PGE STATES THAT ITS RPM "ASSUMES THAT NON-STIPULATED**

30 **ROE DECISIONS BY REGULATORY BODIES, ON AVERAGE SINCE**

1   **1983, PROVIDE UNBIASED ESTIMATES OF THE COST OF EQUITY**

2   **FOR ELECTRIC UTILITIES." ARE YOU ARGUING THAT THE**

3   **VARIOUS COMMISSION DECISIONS WERE BIASED?**

4   A.   No. My arguments do not depend on the accuracy of the various

5   regulatory decisions. I conclude that the coefficient PGE relies upon to

6   estimate its implied RROE from the risk-positioning model is likely biased

7   independent of the accuracy of the regulatory decisions. Should the

8   decisions or a subset of the regulatory decisions prove to be biased, that

9   would also likely add another source of error to PGE's analysis.

10   Q.   **PLEASE DISCUSS YOUR SECOND MAJOR CONCERN THAT THE**

11   **STATISTICAL RESULTS OF PGE'S RPM ARE FALLACIOUS.**

12   A.   PGE's model subtracts either a Treasury rate or a corporate rate from the

13   Commission authorized decision and then regresses that difference on the

14   same Treasury or corporate rate. Mathematically this can be expressed

15   as the following: $(AROE_{i,t} - T_{i,t-1}) = \alpha + \beta * T_{i,t-1} + \varepsilon$. Because the term

16   $T_{i,t-1}$ is on both sides of the equation, the results are a "finding" that the

17   interest rate that was subtracted from the authorized cost of equity helps

18   explain the difference between the authorized cost of equity and that same

19   interest rate. This circular reasoning results in statistical tests that appear

20   to show a high degree of statistical significance.

21   Q.   **CAN YOU PROVIDE AN EXAMPLE OF HOW THIS CIRCULAR LOGIC**

22   **CAN PRODUCE STATISTICALLY SIGNIFICANT RESULTS?**

1   A.   Yes. To illustrate the problem I have been discussing, I replicated PGE's

2   regression analysis substituting samples of 50 randomly generated

3   numbers as replacements for authorized ROEs and interest rates (either

4   Treasuries or cost of debt). I conducted this exercise ten times refreshing

5   the random variables for each regression run. The results of my analysis

6   show that when running PGE's regression using fictitious and randomly

7   generated regulatory decisions and interest rates, I obtain highly

8   significant results in all ten trial runs. The *t*-statistic and R-squared results

9   are shown in Table 1. The full results of this analysis are attached as

10   Staff/1102, Conway/3-14.

11   Table 1:

Trial	Multiple R-Squared	T-statistic
1	75%	-7.97
2	82%	-10.05
3	74%	-7.53
4	64%	-5.83
5	69%	-6.68
6	67%	-6.23
7	74%	-7.53
8	69%	-6.58
9	76%	-8.18
10	68%	-6.45

12

13 **Q.   PLEASE EXPLAIN IN LAYMAN'S TERMS WHAT YOU MEAN BY**

14   **"HIGHLY SIGNIFICANT RESULTS."**

1   A.   The R-squared and *t*-statistic are commonly reported statistics. The R-

2   squared gives the analyst an idea of how much of the variation in the

3   dependent variable is being explained by the independent variable(s).

4   The *t*-statistic roughly represents how confident the analyst can be that the

5   coefficient on the independent variable is not zero. I refer to these results

6   as highly significant since it is fairly standard to accept a t-statistic of 2 (in

7   absolute value) as significant.

8   Q.   **WHAT DO YOU CONCLUDE ABOUT PGE'S RPM BASED ON YOUR**

9   **TEN TRIALS USING RANDOMLY GENERATED NUMBERS?**

10   A.   The statistical results from PGE's RPM should not be relied upon since

11   they are most likely the result of how PGE set up its regression analysis

12   and do not represent sound econometric analysis.

13   Q.   **DO ALL OF PGE'S DIFFERENT RISK-POSITIONING MODELS**

14   **SUFFER FROM THE SAME CIRCULAR LOGIC?**

15   A.   Yes. I discovered the flawed logic while reviewing PGE's SAS program

16   included with its work papers. PGE's testimony provides an inaccurate

17   description of its RPM but PGE corrected its testimony in response to Staff

18   Data Requests Nos. 83 and 88. PGE's responses are attached as

19   Staff/1102, Conway/15-16.

20   Q.   **PLEASE EXPLAIN YOUR CONCERN REGARDING PGE NOT**

21   **PERFORMING ANY BASIC STATISTICAL TESTS ON ITS RPM.**

22   A.   Putting aside the issue regarding how PGE set up its RPM, it is troubling

23   that no basic statistical tests were run by PGE to check for common

1   problems. PGE's responses to Staff's data requests state that PGE did

2   not run statistical tests to check for problems common in cross-sectional

3   analysis. Additionally, PGE's responses to Staff's data requests regarding

4   statistical tests to check for problems common to time series analysis

5   state that the statistical tests common to time series were not run because

6   "…the data used was a pooled cross-sectional sample and not just a time

7   series." (See PGE's responses to Staff data requests 85 and 206

8   attached as Exhibit Staff/1102, Pages 17-18.)

9 **Q.   WHAT IS THE DIFFERENCE BETWEEN CROSS-SECTIONAL DATA**

10   **AND TIME SERIES DATA?**

11 A. Cross-sectional data is data that spans across several entities or items in

12   the same time period such as price of gasoline from multiple gas stations

13   in Salem on July 27, 2006. Time series refers to data that is viewed

14   across time for the same entity or item (e.g., the price of gasoline at the

15   State Street ARCO from June 1, 2006, through July 1, 2006.)

16 **Q.   CAN A DATA SET BE BOTH CROSS-SECTIONAL AND TIME SERIES?**

17 A. Yes. This is commonly referred to as "panel data."

18 **Q.   DOES IT MAKE SENSE TO APPLY EITHER CROSS-SECTIONAL OR**

19   **TIME SERIES TESTS TO PANEL DATA?**

20 A. Yes. The fact that you have pooled data does not negate issues

21   surrounding either cross-sectional or time series data sets. The following

22   quote from "Econometric Models & Economic Forecasts" by Robert S.

23   Pindyck & Daniel L. Rubinfeld pg. 223-224 makes this clear.

1   "The process of combining cross-section and time-series data is called
2   *pooling*. Cross-section parameters may shift over time, in which case
3   pooling is not the appropriate procedure. Alternatively, there may be
4   time-series-related explanatory variables such as expectations, prices,
5   and interest rates which could be included in a pooled model. In either
6   case, the necessity of combining time series and cross-section
7   variables adds a new dimension of difficulty to the problem of model
8   specification, because the disturbance term is likely to consist of time-
9   series-related disturbances, cross-section disturbances, and a
10 combination of both."

11

12 **Q.   PLEASE DISCUSS YOUR CONCERNS REGARDING PGE'S CHOICE**

13 **OF USING A ONE-MONTH AND AN EIGHT-MONTH LAG IN ITS RPM.**

14 A.   PGE was unable to produce any analysis to justify the use of a lag or any

15 analysis specific to its choice of a 1- or 8-month lag. (See PGE's

16 response to Staff data request 91 attached as Staff/1102, Conway/19.)

17 Because PGE's analysis cannot be replicated, it should not be given any

18 weight.

19 **Q.   WAS PGE ABLE TO EXPLAIN IN GENERAL TERMS HOW THEY**

20 **CONDUCTED THE ANALYSIS TO DETERMINE THE OPTIMAL LAG?**

21 A.   Yes. In response to Staff Data Request 202, PGE explained that they use

22 R-squared, *t*-tests, and F-tests to determine the optimal lag. (*See* PGE's

23 response to Staff's data request 202 attached as Staff/1102, Conway/20.)

24 **Q.   DOES THIS RESPONSE ALLEVIATE ANY OF YOUR CONCERNS**

25 **ABOUT PGE BEING UNABLE TO REPRODUCE THE ANALYSIS USED**

26 **TO DETERMINE THE OPTIMAL LAG?**

1   A.   No, however it does raise some additional concerns. PGE reliance on

2   both the *t*-test and the F-test for its RPM seems to indicate a

3   misunderstanding of statistical analysis.

4   **Q.   PLEASE EXPLAIN.**

5   A.   There are two issues.

6   The first is a technical point. For a univariate regression such as PGE's

7   RPM, the F-test and the T-test provide identical results. The tests are

8   purely duplicative because the t-test is run to test the hypothesis that an

9   individual coefficient is equal to zero. The F-test is run to test the

10   hypothesis that all of the coefficients are zero. In the case of the RPM,

11   there is only one coefficient (on the interest rate); therefore the tests are

12   functionally identical.

13   The second is a methodological concern. T-tests and F-tests are

14   meant to report on how confident the researcher can be that the

15   coefficient or a group of coefficients are not equal to zero. However, a

16   model should not merely be developed from the results of these tests. A

17   model should be developed from a sound, defensible theory that

18   describes a causal relationship between several variables.

19   **Q.   DO YOU HAVE CONCERNS ABOUT PGE'S USE OF R-SQUARED FOR**

20   **DETERMINING THE APPROPRIATE LAG?**

21   A.   Yes, while it may be intuitively compelling to use the R-squared to assist in

22   model selection, it is not generally the best tool. The R-squared is

23   backward looking and helps one to understand how much of the "history"

1   or variation of the dependent variable the model can explain. A more

2   pertinent question for this model is how well the model can predict a future

3   authorized return on equity given current interest rates.

4   **Q.**   **DID PGE CONDUCT ANY TESTS OF THE RPM'S PREDICTIVE**

5   **POWER?**

6   A.   No. See PGE's response to Staff Data Requests Nos. 209 and 210

7   attached as Staff/1102, Conway/21-22.

8   **Q.**   **DO YOU HAVE ANY SUPPORT FOR YOUR ASSERTION THAT PGE**

9   **MAY NOT HAVE PERFORMED APPROPRIATE SPECIFICATION**

10   **TESTS?**

11   A.   Yes. From A Guide to Econometrics (Peter Kennedy, 2nd Edition, pg. 76):

12   "Using techniques that adopt specifications on the basis of searches
13   for high R^2 or high t values, is called data-mining, fishing, grubbing or
14   number-crunching. This methodology is described eloquently by Coase:
15   'if you torture the data long enough, Nature will confess.' In reference to
16   this unjustified (but unfortunately typical) means of specifying relations,
17   Leamer (1983a) is moved to comment: '[t]here are two things you are
18   better off not watching in the making: sausages and econometric
19   estimates.'

20
21   Peach and Webb (1983) fabricated 50 macroeconomic models at
22   random and discovered that the majority of these models exhibited very
23   high R^2 and t statistics. This casts considerable doubt on the practice of
24   using a high R^2 or high t values to defend a specification, and suggests
25   that practitioners should utilize some of the more relevant specification
26   testing methods exposited in this chapter."

27
28   **Q.**   **PLEASE EXPLAIN THE CONCERNS YOU HAVE WITH THE**

29   **UNDERLYING DATA PGE RELIED UPON FOR ITS RPM.**

30   A.   PGE states that it used the cost of equity decisions it could find for the

31   period January 1983 through the time it published its testimony. PGE then

1   excluded stipulated results. I conducted a cursory review of PGE's data

2   set based on my experience at the Oregon Commission. From this

3   review, I noted that PGE had not excluded PacifiCorp's stipulated cost of

4   equity from UE 170 and PGE had excluded this Commission's decision on

5   PGE's own cost of equity from Docket No. UE 115. Given the

6   inaccuracies present in the data found while focusing solely on recent

7   history in Oregon, it draws into question the accuracy of the entire data set

8   and the results of the RPM.

9 Q.   **WHAT DO YOU CONCLUDE REGARDING PGE'S APPLICATION OF**

10   **ITS RPM MODEL?**

11 A.   Even if there was support from a theoretical perspective for such a model,

12   I conclude that PGE's application of its RPM is likely flawed from a

13   statistical perspective and that the results are based on inaccurate data. I

14   conclude that, even if the Commission determines a model similar to

15   PGE's is theoretically feasible, PGE's specific RPM should be rejected.

16 Q.   **DOES THIS CONCLUDE YOUR TESTIMONY?**

17 A.   Yes.

PUBLIC UTILITY COMMISSION
OF
OREGON

STAFF EXHIBIT 1101

Witness Qualification Statement

August 14, 2006

WITNESS QUALIFICATION STATEMENT

NAME: Bryan A. Conway

EMPLOYER: Public Utility Commission of Oregon

TITLE: Program Manager, Economic & Policy Analysis Section

ADDRESS: 550 Capitol Street NE Suite 215, Salem, Oregon 97301-2551.

EDUCATION: B.S.   University of Oregon, Eugene, Oregon
                            Major: Economics; 1991

                     M.S.   Oregon State University, Corvallis, Oregon
                            Major: Economics; 1994

                     In addition, I have completed all of the required and elective
                     coursework for a Ph.D. in economics from Oregon State University.
                     My fields of study were Industrial Organization and Applied
                     Econometrics.

EXPERIENCE: Starting in October 1998, I have been employed by the Public Utility
                     Commission of Oregon. I am currently the Program Manager of the
                     Economic & Policy Analysis Section. My responsibilities include
                     leading research and providing technical support on a wide range of
                     policy issues for electric, telecommunications, and gas utilities. I
                     have testified before the Commission on policy and technical issues
                     in UG 132, UE 115, UE 116, UE 170, UE 179 and have been the
                     Summary Staff Witness in UP 158, UP 168, UP 165/170, UX 27, UX
                     28, UM 967, UM 1041, UM 1045, UM 1121, UM 1206, and UM
                     1209.

                     From December 1994 to October 1998, I worked for the Oregon
                     Employment Department as a Research Analyst in their Research
                     Section. Duties included leading research projects on various policy
                     issues involving labor economics and information systems.

OTHER EXPERIENCE: I am currently a faculty member of the University of Phoenix
                     teaching economics.

                     From January 1998 through September 2000, I was a part time
                     instructor at Linn-Benton Community College teaching principles of
                     economics.

                     From July 1992 through June 1994, I was a graduate teaching
                     assistant at Oregon State University teaching introductory principles
                     of economics.

PUBLIC UTILITY COMMISSION
OF
OREGON

STAFF EXHIBIT 1102

Exhibits in Support
of Direct Testimony

August 14, 2006

```
libname in '/sas913library/ad_hoc/rates/revreq/data';


options nocenter;
data ferc;
   set in.authroe2007;

proc sort;  by y m name;
run;
*;
*;
* BRING IN THE TREASURY BOND DATA FROM 1982 ON;
*;
data gov;
   set in.govbonds2;
   yr71=lag1(yr7);
   yr78=lag8(yr7);
   yr51=lag1(yr5);
   yr58=lag8(yr5);
   yr101=lag1(yr10);
   yr108=lag8(yr10);
run;

 *;
proc print data=gov;
   title '1982 - 2005 bond data';
run;
*;
*;
proc sort data=gov; by y m; run;
proc sort data=ferc; by y m; run;
*;
data riskprem;
   merge gov ferc;
   by y m;
   riskprm = allowedroe-debtcost;
   rptr71= allowedroe-yr71;
   rptr78= allowedroe-yr78;
   rptr51=allowedroe-yr51;
   rptr58=allowedroe-yr58;
   rptr101=allowedroe-yr101;
   rptr108=allowedroe-yr108;


run;
*;
*;
data riskprem; set riskprem;
  *;
  *THE NEXT FEW LINES CONTROL FOR DATE PERIOD OF INTEREST;
  *;
   keep yr7 y m yr71 name allowedroe debtcost yr5 yr10 yr51 yr58
        rptr71 riskprm stip yr78 rptr78 yr101 yr108 rptr51 rptr58
        rptr101 rptr108;
  IF (y<2006 AND y> 1983);
  run;
  *;
```

```
data final;
   set riskprem;
   if allowedroe = . then delete;
   if stip = 'y' then delete;
if stip='t' then delete;
run;
*;
*;
* DATA SET WITH STIPULATIONS REMOVED;
*;
proc print data = final;
 var y m name debtcost stip riskprm rptr71 rptr78;
 title 'final data';
 run;
*;
*;
* POOLED CROSS-SECTIONAL TIME-SERIES DATA;
*;
*;
 proc reg data = final;
  model rptr71    =    yr71 / mse ;
  model rptr78    =    yr78 / mse ;
  model rptr51=yr51 /mse;
  model rptr58=yr58 /mse;
  model rptr101=yr101 /mse;
  model rptr108=yr108 /mse;
 run;
*;
proc reg data = final;
   model riskprm = debtcost / mse ;
run;
*;

*data check; *set gov;
*proc print; *var y m yr7;
*run;
```

Trial	Multiple R-squared	T-statistic
1	75%	-7.97
2	82%	-10.05
3	74%	-7.53
4	64%	-5.83
5	69%	-6.68
6	67%	-6.23
7	74%	-7.53
8	69%	-6.58
9	76%	-8.18
10	68%	-6.45

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.488239	0.950777	-0.4625383
0.321728	0.326804	-0.0050763
0.639608	0.459635	0.1799739
0.16007	0.217499	-0.0574293
0.048973	0.27777	-0.2287972
0.415606	0.985018	-0.5694122
0.523022	0.198798	0.3242241
0.511975	0.84907	-0.337095
0.864474	0.808074	0.0564002
0.147937	0.802427	-0.6544896
0.888907	0.666536	0.222371
0.360861	0.835015	-0.4741546
0.8978	0.294428	0.6033719
0.598177	0.899422	-0.3012442
0.695488	0.286945	0.4085431
0.504547	0.797406	-0.2928596
0.20618	0.71987	-0.5136903
0.435911	0.200317	0.2355946
0.572201	0.067387	0.5048143
0.352798	0.418824	-0.0660258
0.354253	0.510144	-0.1558908
0.296872	0.38833	-0.0914585
0.905759	0.973462	-0.0677023
0.665366	0.308508	0.3568577
0.766804	0.3807	0.3861038
0.631965	0.65183	-0.0198651
0.958413	0.110226	0.8481875
0.638502	0.841605	-0.2031029
0.818373	0.125313	0.6930599
0.491875	0.626743	-0.1348677
0.67533	0.389224	0.2861054
0.722422	0.860004	-0.1375822
0.556564	0.974102	-0.4175382
0.557155	0.513432	0.043723
0.957479	0.224893	0.7325856
0.403638	0.733973	-0.3303353
0.799321	0.085371	0.7139495
0.27192	0.145528	0.126392
0.049312	0.363633	-0.3143206
0.586018	0.33671	0.2493079
0.073419	0.213539	-0.1401206
0.129532	0.192288	-0.0627564
0.924511	0.829301	0.09521
0.49365	0.686513	-0.1928625
0.710934	0.397866	0.3130677
0.232298	0.105469	0.1268295
0.791283	0.124789	0.6664944
0.933892	0.051812	0.8820803
0.896905	0.100399	0.7965056
0.000307	0.118831	-0.1185234

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.268652	0.181593	0.0870593
0.65569	0.012052	0.6436388
0.928305	0.469135	0.4591705
0.97496	0.469247	0.5057138
0.610175	0.56283	0.047345
0.025252	0.37588	-0.3506286
0.862617	0.063213	0.7994039
0.199784	0.858228	-0.6584437
0.364486	0.496203	-0.1317176
0.396878	0.650508	-0.2536296
0.368827	0.322782	0.0460445
0.438562	0.256641	0.1819212
0.94842	0.443452	0.5049681
0.907264	0.258178	0.6490862
0.390308	0.782127	-0.3918186
0.153892	0.74864	-0.5947482
0.409298	0.853637	-0.4443381
0.509436	0.642375	-0.1329386
0.523366	0.299824	0.2235417
0.883852	0.365553	0.518299
0.233608	0.836283	-0.6026749
0.80812	0.092144	0.7159765
0.329794	0.713943	-0.3841492
0.51972	0.207761	0.3119584
0.377183	0.782098	-0.4049149
0.513047	0.743833	-0.2307861
0.869247	0.343589	0.5256574
0.049047	0.170152	-0.1211054
0.255065	0.682663	-0.4275985
0.073549	0.234748	-0.1611989
0.59356	0.006291	0.5872688
0.023873	0.312995	-0.2891221
0.389986	0.453294	-0.0633073
0.425637	0.86991	-0.444273
0.364986	0.769167	-0.4041809
0.188706	0.350047	-0.1613408
0.159628	0.316578	-0.1569503
0.749091	0.963782	-0.2146915
0.314279	0.732864	-0.4185849
0.207814	0.320485	-0.1126711
0.158959	0.081225	0.0777337
0.756731	0.466371	0.2903596
0.110971	0.851223	-0.7402522
0.074229	0.503123	-0.4288939
0.217834	0.088342	0.129492
0.249397	0.778619	-0.529222
0.407828	0.890717	-0.4828891
0.140253	0.971187	-0.8309342
0.699107	0.78253	-0.0834227
0.893189	0.465524	0.4276647

AROE = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.147880404
R Square	0.021868614
Adjusted R Square	0.001490877
Standard Error	0.282461744
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.085621842	0.085621842	1.073162026	0.305423233
Residual	48	3.82966256	0.079784637		
Total	49	3.915284403			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.513865658	0.082160936	6.25437934	1.02357E-07	0.348670028	0.679061288	0.348670028	0.679061288
Random2 (Debt or Treasury)	-0.149388802	0.144206685	-1.035935339	0.305423233	-0.43933577	0.140558167	-0.43933577	0.140558167

MRP = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.754727533
R Square	0.569613648
Adjusted R Square	0.560647266
Standard Error	0.282461744
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	5.068534479	5.068534479	63.5277002	2.44079E-10
Residual	48	3.82966256	0.079784637		
Total	49	8.89819704			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.513865658	0.082160936	6.25437934	1.02357E-07	0.348670028	0.679061288	0.348670028	0.679061288
Random2 (Debt or Treasury)	-1.149388802	0.144206685	-7.970426601	2.44079E-10	-1.43933577	-0.859441833	-1.43933577	-0.859441833

Trial 1

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.304631	0.686816	-0.3821851
0.672928	0.651406	0.0215214
0.543551	0.451831	0.0917206
0.901254	0.054789	0.8464655
0.843322	0.177488	0.6658342
0.492032	0.944308	-0.4522758
0.10823	0.953952	-0.8457213
0.391446	0.382588	0.0088581
0.698809	0.363555	0.3332537
0.260641	0.970722	-0.7100811
0.117233	0.068119	0.0491133
0.596309	0.116726	0.4795829
0.56669	0.494422	0.0722678
0.705245	0.097443	0.6078026
0.76318	0.31089	0.4522905
0.906596	0.032104	0.874492
0.715209	0.621529	0.09368
0.960026	0.220524	0.7395025
0.840441	0.933428	-0.0929871
0.782972	0.528594	0.2543777
0.751305	0.206452	0.5448523
0.358506	0.317662	0.040844
0.641738	0.924239	-0.2825012
0.888873	0.638731	0.2501423
0.863586	0.563493	0.3000923
0.856689	0.018659	0.8380302
0.310782	0.174965	0.1358164
0.834234	0.037934	0.7962994
0.37738	0.747277	-0.3698967
0.363789	0.257751	0.1060378
0.960991	0.768751	0.1922405
0.344997	0.476746	-0.1317491
0.912309	0.291986	0.6203224
0.404302	0.943975	-0.5396732
0.713461	0.058161	0.6553007
0.321125	0.136261	0.184864
0.825181	0.636425	0.1887553
0.467009	0.253028	0.2139806
0.553704	0.031456	0.5222479
0.670695	0.335482	0.335213
0.633115	0.850809	-0.2176945
0.717714	0.663968	0.0537461
0.419182	0.545333	-0.1261512
0.863966	0.710833	0.1531331
0.627606	0.435844	0.1917616
0.940885	0.395064	0.545821
0.045534	0.787792	-0.7422574
0.756328	0.195677	0.5606514
0.858181	0.413424	0.4427572
0.396517	0.429338	-0.0328209

AROE = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.216746498
R Square	0.046979044
Adjusted R Square	0.027124441
Standard Error	0.242799567
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.139488621	0.139488621	2.366153768	0.130558901
Residual	48	2.829678228	0.05895163		
Total	49	2.969166848			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.69760386	0.062687311	11.12831051	6.8192E-15	0.571562576	0.823645143	0.571562576	0.823645143
Random2 (Debt or Treasury)	-0.180815301	0.117547581	-1.538230727	0.130558901	-0.417160549	0.055529947	-0.417160549	0.055529947

MRP = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.823200356
R Square	0.677658825
Adjusted R Square	0.670943384
Standard Error	0.242799567
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	5.948841091	5.948841091	100.9105451	2.18318E-13
Residual	48	2.829678228	0.05895163		
Total	49	8.778519318			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.69760386	0.062687311	11.12831051	6.8192E-15	0.571562576	0.823645143	0.571562576	0.823645143
Random2 (Debt or Treasury)	-1.180815301	0.117547581	-10.04542409	2.18318E-13	-1.417160549	-0.944470053	-1.417160549	-0.944470053

Trial 2

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.680529	0.236271	0.4442578
0.427388	0.179527	0.2478613
0.772865	0.690592	0.0822732
0.040466	0.84585	-0.8053841
0.69037	0.060897	0.6294724
0.63814	0.028558	0.6095818
0.608726	0.814413	-0.2056874
0.496606	0.753449	-0.2568424
0.566113	0.590267	-0.0241536
0.325909	0.817617	-0.491708
0.604135	0.361863	0.2422719
0.882021	0.649497	0.2325238
0.036934	0.342143	-0.305209
0.700853	0.23211	0.4687435
0.498066	0.889822	-0.3917562
0.012237	0.336089	-0.3238521
0.077645	0.503703	-0.426058
0.184082	0.38092	-0.1968376
0.334854	0.814145	-0.4792914
0.685296	0.69929	-0.0139939
0.222453	0.566466	-0.344013
0.920333	0.626588	0.2937454
0.215773	0.415049	-0.1992756
0.49858	0.641378	-0.142798
0.49037	0.648507	-0.1581366
0.769765	0.588262	0.1815028
0.379888	0.95659	-0.5767017
0.864511	0.694538	0.1699729
0.175276	0.440347	-0.2650714
0.014034	0.846773	-0.8327385
0.467823	0.072552	0.395271
0.410477	0.061753	0.3487231
0.750827	0.749734	0.0010934
0.874813	0.962739	-0.087926
0.239846	0.517664	-0.2778184
0.519783	0.464374	0.0554089
0.698247	0.448865	0.2493825
0.980525	0.342148	0.6383775
0.244088	0.07912	0.1649675
0.552827	0.968422	-0.4155951
0.365132	0.802598	-0.437466
0.310545	0.239257	0.0712883
0.173787	0.020846	0.152941
0.358157	0.121988	0.2361693
0.093092	0.467015	-0.3739225
0.545831	0.012192	0.5336391
0.34954	0.693226	-0.3436855
0.453219	0.918057	-0.4648382
0.047959	0.953785	-0.9058262
0.681924	0.240438	0.4414858

AROE = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.022372178
R Square	0.000500514
Adjusted R Square	-0.020322392
Standard Error	0.268220212
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.001729252	0.001729252	0.02403672	0.877441634
Residual	48	3.453219934	0.071942082		
Total	49	3.454949186			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.448253842	0.077058892	5.817029434	4.76591E-07	0.293316558	0.603191125	0.293316558	0.603191125
Random2 (Debt or Treasury)	0.020162955	0.130051862	0.155037802	0.877441634	-0.241323834	0.281649743	-0.241323834	0.281649743

MRP = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.736089834
R Square	0.541828244
Adjusted R Square	0.532282999
Standard Error	0.268220212
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	4.083735127	4.083735127	56.76420554	1.12134E-09
Residual	48	3.453219934	0.071942082		
Total	49	7.536955061			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.448253842	0.077058892	5.817029434	4.76591E-07	0.293316558	0.603191125	0.293316558	0.603191125
Random2 (Debt or Treasury)	-0.979837045	0.130051862	-7.534202382	1.12134E-09	-1.241323834	-0.718350257	-1.241323834	-0.718350257

Trial 3

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.015242	0.223315	-0.2080728
0.97478	0.531115	0.4436642
0.893518	0.303124	0.590394
0.984506	0.583476	0.4010302
0.991083	0.908222	0.0828611
0.605972	0.346406	0.2595657
0.750866	0.518077	0.2327894
0.242709	0.452398	-0.2096896
0.630916	0.679711	-0.0487959
0.071453	0.3254	-0.2539465
0.966985	0.907012	0.0599724
0.441537	0.326253	0.1152843
0.956983	0.588846	0.3681366
0.633195	0.621923	0.0112717
0.373472	0.00248	0.3709919
0.024424	0.75968	-0.7352251
0.918805	0.10693	0.8116749
0.476495	0.481151	-0.0046557
0.204983	0.504443	-0.2994601
0.161412	0.647407	-0.4859952
0.9243	0.420318	0.5039825
0.149096	0.911782	-0.7626857
0.388813	0.583975	-0.1951626
0.916499	0.620009	0.2964901
0.255693	0.993586	-0.7378934
0.911014	0.96266	-0.0516466
0.363265	0.136242	0.2270237
0.286696	0.148536	0.1381593
0.729308	0.821374	-0.0920659
0.040838	0.481812	-0.4409735
0.462925	0.504218	-0.0412931
0.055469	0.96239	-0.9069214
0.441778	0.268419	0.1733588
0.767884	0.339047	0.4288373
0.991352	0.098053	0.8932986
0.765636	0.713264	0.0523722
0.655657	0.985579	-0.3299224
0.621067	0.710529	-0.0894619
0.586018	0.328354	0.2576648
0.161997	0.806177	-0.6441801
0.428554	0.93893	-0.5103753
0.275055	0.578517	-0.3034614
0.792286	0.554567	0.2377189
0.879394	0.579302	0.3000911
0.158644	0.803665	-0.6450212
0.896606	0.73804	0.1585664
0.320045	0.828691	-0.5086463
0.907487	0.768355	0.1391328
0.718344	0.581892	0.1364516
0.457847	0.954846	-0.4969995

$$AROE = constant + B*(Debt\ or\ Treasury) + e$$

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.051636548
R Square	0.002666333
Adjusted R Square	-0.02357929
Standard Error	0.299274991
Observations	40

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.009099099	0.009099099	0.101591535	0.751673419
Residual	38	3.403489768	0.08956552		
Total	39	3.412588867			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.490155014	0.102296093	4.791532106	2.54073E-05	0.283067402	0.697242626	0.283067402	0.697242626
Random2 (Debt or Treasury)	-0.053360037	0.167412301	-0.318734269	0.751673419	-0.39226852	0.285548445	-0.39226852	0.285548445

$$MRP = constant + B*(Debt\ or\ Treasury) + e$$

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.643908324
R Square	0.41461793
Adjusted R Square	0.40242247
Standard Error	0.321460677
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3.513222132	3.513222132	33.99772845	4.54205E-07
Residual	48	4.9601744	0.103336967		
Total	49	8.473396532			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.55808046	0.110042451	5.071501521	6.31643E-06	0.336825286	0.779335633	0.336825286	0.779335633
Random2 (Debt or Treasury)	-1.009513297	0.173135886	-5.830757108	4.54205E-07	-1.357626321	-0.661400274	-1.357626321	-0.661400274

Trial 4

SUMMARY OUTPUT

AROE = constant + B*(Debt or Treasury) + e

Regression Statistics

Multiple R	0.037180817
R Square	0.001382413
Adjusted R Square	-0.01942212
Standard Error	0.290712812
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.005615756	0.005615756	0.066447689	0.797682926
Residual	48	4.056669074	0.084513939		
Total	49	4.06228483			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.441226166	0.08200641	5.380386308	2.18231E-06	0.276341231	0.606111102	0.276341231	0.606111102
Random2 (Debt or Treasury)	0.03716978	0.144194949	0.257774492	0.797682926	-0.252753591	0.327093151	-0.252753591	0.327093151

SUMMARY OUTPUT

MRP = constant + B*(Debt or Treasury) + e

Regression Statistics

Multiple R	0.693947806
R Square	0.481563558
Adjusted R Square	0.470762799
Standard Error	0.290712812
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3.768145592	3.768145592	44.5808408	2.29885E-08
Residual	48	4.056669074	0.084513939		
Total	49	7.824814666			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.441226166	0.08200641	5.380386308	2.18231E-06	0.276341231	0.606111102	0.276341231	0.606111102
Random2 (Debt or Treasury)	-0.96283022	0.144194949	-6.677281189	2.29885E-08	-1.252753591	-0.672906849	-1.252753591	-0.672906849

Random1 (Debt or Treasury) (AROE)	Random2 (Debt or Treasury) (MRP)	Difference
0.036654	0.491436	-0.4527818
0.530548	0.24248	0.2880685
0.787231	0.399259	0.387972
0.254468	0.46416	-0.2096917
0.04298	0.450359	-0.407379
0.145611	0.876986	-0.7313745
0.187841	0.65629	-0.4684493
0.793965	0.490155	0.3038098
0.930159	0.56782	0.3623392
0.622571	0.666637	-0.0440659
0.524597	0.137579	0.3870175
0.021203	0.355438	-0.3342345
0.130677	0.681654	-0.5509777
0.717008	0.526375	0.1906331
0.288361	0.192803	0.0955571
0.331855	0.828722	-0.4968667
0.315062	0.860519	-0.5654566
0.333039	0.909039	-0.5760004
0.834642	0.014205	0.8204367
0.914563	0.17584	0.7387229
0.72667	0.866767	-0.1400976
0.225009	0.11605	0.108959
0.73996	0.015698	0.724262
0.819949	0.484393	0.3355563
0.191767	0.228531	-0.0367637
0.006508	0.731287	-0.724779
0.154128	0.588102	-0.4339746
0.316319	0.46808	-0.151761
0.584124	0.199186	0.3849384
0.19028	0.184684	0.0055955
0.029968	0.01053	0.0194378
0.578785	0.947757	-0.3689716
0.840751	0.894502	-0.053751
0.749192	0.456285	0.2929076
0.381326	0.073182	0.3081436
0.577274	0.468691	0.1085825
0.188673	0.714258	-0.525585
0.909382	0.830622	0.0787604
0.562275	0.374326	0.1879486
0.493903	0.389069	0.1048342
0.180904	0.335992	-0.1550882
0.617531	0.757167	-0.1396359
0.962235	0.984705	-0.0224706
0.248751	0.155976	0.0927758
0.150312	0.87302	-0.7227084
0.699997	0.049981	0.6500162
0.404635	0.608416	-0.2037807
0.363342	0.546743	-0.1834009
0.563421	0.854654	-0.2912328
0.773437	0.387826	0.3856108

Trial 5

AROE = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.085811763
R Square	0.007363659
Adjusted R Square	-0.013316265
Standard Error	0.312054959
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.034674236	0.034674236	0.356077654	0.553496938
Residual	48	4.674158278	0.097378297		
Total	49	4.708832513			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.441421728	0.092366268	4.779036063	1.70363E-05	0.255706901	0.627136554	0.255706901	0.627136554
Random2 (Debt or Treasury)	0.087353982	0.146389641	0.596722426	0.553496938	-0.206982113	0.381690077	-0.206982113	0.381690077

MRP = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.668904213
R Square	0.447432847
Adjusted R Square	0.435921031
Standard Error	0.312054959
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3.784828562	3.784828562	38.86726982	1.09845E-07
Residual	48	4.674158278	0.097378297		
Total	49	8.458986839			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.441421728	0.092366268	4.779036063	1.70363E-05	0.255706901	0.627136554	0.255706901	0.627136554
Random2 (Debt or Treasury)	-0.912646018	0.146389641	-6.234362022	1.09845E-07	-1.206982113	-0.618309923	-1.206982113	-0.618309923

Trial 6

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.692166	0.330007	0.3621585
0.819143	0.723744	0.095399
0.672249	0.676565	-0.004316
0.949577	0.25756	0.6920172
0.247493	0.643593	-0.3961001
0.158921	0.40321	-0.2442886
0.059117	0.741342	-0.6822247
0.915643	0.930381	-0.0147382
0.921242	0.928543	-0.0073011
0.818207	0.898454	-0.0802474
0.732975	0.961264	-0.2282884
0.660423	0.139453	0.5209694
0.64359	0.676143	-0.0325524
0.331645	0.960066	-0.6284203
0.720721	0.717844	0.0028771
0.52536	0.61863	-0.09327
0.527478	0.607232	-0.0797539
0.086965	0.809448	-0.7224832
0.840533	0.886297	-0.0457636
0.440212	0.051496	0.3887164
0.101584	0.825373	-0.7237894
0.178586	0.201908	-0.023322
0.060401	0.43339	-0.3729882
0.743005	0.087362	0.6556427
0.093809	0.414744	-0.3209349
0.219737	0.258213	-0.0384765
0.672746	0.764585	-0.091839
0.308145	0.813107	-0.5049622
0.865696	0.869824	-0.0041282
0.060541	0.002152	0.0583887
0.433179	0.730711	-0.2975316
0.105146	0.147389	-0.0422427
0.537439	0.873791	-0.3363524
0.678499	0.242759	0.4357398
0.011148	0.243295	-0.2321471
0.716057	0.433199	0.2828579
0.147312	0.884734	-0.7374221
0.919228	0.813265	0.1059628
0.933902	0.125305	0.8085966
0.234474	0.952148	-0.7176743
0.189853	0.597286	-0.407433
0.330836	0.330839	3.46E-06
0.332732	0.782715	-0.4499822
0.314122	0.155167	0.1589551
0.963213	0.011546	0.9516671
0.111786	0.298874	-0.1870885
0.403338	0.845357	-0.4420193
0.810738	0.430364	0.3803738
0.915926	0.354711	0.5612148
0.335195	0.828877	-0.4936823

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.262206	0.612448	-0.3502419
0.343254	0.946174	-0.6029203
0.438758	0.308793	0.1299651
0.359774	0.495649	-0.1358746
0.852106	0.997513	-0.1454066
0.301794	0.968396	-0.6666023
0.642184	0.851657	-0.2094732
0.442877	0.789542	-0.3466657
0.212385	0.266897	-0.0545124
0.271741	0.37999	-0.1082488
0.232402	0.672759	-0.4403567
0.528084	0.789195	-0.2611114
0.097076	0.030663	0.0664127
0.700939	0.380401	0.3205387
0.905262	0.761381	0.1438814
0.733151	0.262473	0.470678
0.811382	0.108179	0.7032024
0.011575	0.411332	-0.3997577
0.880724	0.235548	0.6451766
0.805885	0.491024	0.3148808
0.566773	0.497107	0.0696659
0.482572	0.92887	-0.4462982
0.002747	0.203352	-0.2006054
0.54852	0.57591	-0.0273897
0.058736	0.508624	-0.4498885
0.748477	0.799027	-0.0505496
0.151758	0.917031	-0.7652732
0.398193	0.189963	0.2082298
0.479204	0.336358	0.142846
0.214361	0.177731	0.0366306
0.885383	0.24954	0.6358436
0.434697	0.043534	0.3911638
0.220486	0.098178	0.1223081
0.631939	0.08344	0.5484987
0.554941	0.105354	0.4495862
0.665774	0.074817	0.5909567
0.663063	0.302937	0.3601255
0.329405	0.438037	-0.1086325
0.65243	0.16692	0.4855102
0.848703	0.752942	0.0957616
0.044285	0.14735	-0.1030653
0.654937	0.823557	-0.1686192
0.098974	0.69988	-0.6009052
0.808723	0.353395	0.4553281
0.831891	0.106587	0.725304
0.108531	0.798948	-0.6904169
0.67485	0.184282	0.4905676
0.184034	0.809788	-0.6257544
0.960309	0.499049	0.4612599
0.800605	0.380416	0.420189

AROE = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.033974961
R Square	0.001154298
Adjusted R Square	-0.019654988
Standard Error	0.284048945
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.004475557	0.004475557	0.055470331	0.814806056
Residual	48	3.872822539	0.080683803		
Total	49	3.877298096			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.505644414	0.074822644	6.757906238	1.72898E-08	0.355203408	0.656085421	0.355203408	0.656085421
Random2 (Debt or Treasury)	-0.032301969	0.137150887	-0.235521403	0.814806056	-0.308062306	0.243458367	-0.308062306	0.243458367

MRP = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.735756472
R Square	0.541337587
Adjusted R Square	0.53178212
Standard Error	0.284048945
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	4.570909553	4.570909553	56.65213325	1.151E-09
Residual	48	3.872822539	0.080683803		
Total	49	8.443732092			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.505644414	0.074822644	6.757906238	1.72898E-08	0.355203408	0.656085421	0.355203408	0.656085421
Random2 (Debt or Treasury)	-1.032301969	0.137150887	-7.52676114	1.151E-09	-1.308062306	-0.756541633	-1.308062306	-0.756541633

Trial 7

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.934167	0.602778	0.3313888
0.730977	0.740657	-0.00968
0.440076	0.074865	0.3652114
0.154216	0.460088	-0.3058722
0.512069	0.45836	0.0537092
0.262725	0.327822	-0.065097
0.421336	0.553237	-0.1319008
0.24482	0.387691	-0.1428708
0.663796	0.559617	0.1041793
0.08404	0.050367	0.0336734
0.33447	0.537857	-0.2033863
0.586254	0.958846	-0.3725924
0.867121	0.32981	0.5373112
0.750883	0.878091	-0.1272085
0.453586	0.418757	0.0348288
0.781043	0.655513	0.1255304
0.850394	0.7378	0.1125946
0.894903	0.337568	0.5573342
0.266973	0.846059	-0.5790867
0.822239	0.923329	-0.1010898
0.493115	0.791	-0.2978854
0.067615	0.98284	-0.9152247
0.120335	0.696766	-0.5764306
0.37275	0.315001	0.057749
0.660595	0.099523	0.5610718
0.23575	0.914431	-0.6786817
0.357654	0.008844	0.3488096
0.062224	0.083142	-0.0209181
0.846937	0.423093	0.4238438
0.602393	0.401567	0.2008285
0.132428	0.081773	0.0506553
0.443883	0.286137	0.1577454
0.815899	0.771866	0.0440329
0.921798	0.417927	0.5038712
0.457168	0.933459	-0.4762905
0.287397	0.45807	-0.1706733
0.742219	0.264547	0.4776723
0.202104	0.570458	-0.3683537
0.016674	0.181276	-0.1646028
0.321401	0.74842	-0.4270188
0.538639	0.945498	-0.4068588
0.122058	0.988567	-0.8665096
0.543488	0.699523	-0.1560356
0.70138	0.707304	-0.0059236
0.822946	0.494066	0.3288795
0.303733	0.158156	0.1455769
0.946716	0.159377	0.787339
0.75358	0.252485	0.5010948
0.563629	0.637753	-0.0741235
0.45895	0.497968	-0.039018

AROE = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.091232086
R Square	0.008323294
Adjusted R Square	-0.012336638
Standard Error	0.276629572
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.030829292	0.030829292	0.402871309	0.528624043
Residual	48	3.67314816	0.07652392		
Total	49	3.703977452			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.454045369	0.081507039	5.570627712	1.12727E-06	0.290164487	0.617926251	0.290164487	0.617926251
Random2 (Debt or Treasury)	0.087922589	0.138521536	0.634721442	0.528624043	-0.190593622	0.3664388	-0.190593622	0.3664388

MRP = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.688891307
R Square	0.474571233
Adjusted R Square	0.4636248
Standard Error	0.276629572
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3.317615171	3.317615171	43.35396266	3.19217E-08
Residual	48	3.67314816	0.07652392		
Total	49	6.990763331			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.454045369	0.081507039	5.570627712	1.12727E-06	0.290164487	0.617926251	0.290164487	0.617926251
Random2 (Debt or Treasury)	-0.912077411	0.138521536	-6.58437261	3.19217E-08	-1.190593622	-0.6335612	-1.190593622	-0.6335612

Trial 8

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.401018	0.051815	0.3492032
0.692148	0.152351	0.5397974
0.269829	0.66683	-0.3970007
0.879141	0.948292	-0.0691511
0.352713	0.899248	-0.5465349
0.09303	0.298622	-0.2055917
0.903232	0.221176	0.6820557
0.106828	0.851248	-0.7444203
0.016426	0.186128	-0.169702
0.112767	0.153782	-0.0410156
0.733809	0.125265	0.6085438
0.69069	0.467545	0.2231449
0.911823	0.037344	0.8744793
0.902881	0.574828	0.3280535
0.372153	0.651637	-0.2794838
0.671946	0.327229	0.3447162
0.535132	0.634286	-0.0991543
0.250317	0.281564	-0.0312475
0.001162	0.576348	-0.5751864
0.499867	0.917832	-0.417965
0.097789	0.585936	-0.4881477
0.247647	0.957864	-0.7102168
0.411783	0.380699	0.0310838
0.320662	0.423985	-0.1033228
0.652786	0.676104	-0.023318
0.714648	0.841895	-0.1272467
0.715174	0.869499	-0.1543254
0.283304	0.936104	-0.6528002
0.173451	0.058979	0.1144719
0.29488	0.523934	-0.2290546
0.346689	0.160475	0.1862132
0.020816	0.818688	-0.7978717
0.314133	0.136067	0.1780658
0.130108	0.48654	-0.3564317
0.593571	0.543737	0.0498335
0.331212	0.503972	-0.1727599
0.831491	0.001535	0.8299558
0.453993	0.2523	0.2016928
0.428057	0.726114	-0.2980574
0.543005	0.874539	-0.3315335
0.547551	0.689735	-0.1421833
0.748291	0.438746	0.3095445
0.255098	0.785502	-0.530404
0.690205	0.62574	0.0644656
0.706398	0.141408	0.5649901
0.204501	0.005137	0.1993641
0.771236	0.201535	0.5697015
0.77892	0.758379	0.0205405
0.580088	0.911158	-0.3310705
0.659813	0.327524	0.3322884

$AROE = constant + B*(Debt\ or\ Treasury) + e$

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.048232044
R Square	0.00232633
Adjusted R Square	-0.018458538
Standard Error	0.26902966
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.008100734	0.008100734	0.111924214	0.73942149
Residual	48	3.474093994	0.072376958		
Total	49	3.482194728			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.485927476	0.073511596	6.610215249	2.9136E-08	0.338122508	0.633732444	0.338122508	0.633732444
Random2 (Debt or Treasury)	-0.042654326	0.12749732	-0.334550765	0.73942149	-0.299004865	0.213696213	-0.299004865	0.213696213

$MRP = constant + B*(Debt\ or\ Treasury) + e$

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.762995937
R Square	0.582162801
Adjusted R Square	0.573457859
Standard Error	0.26902966
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	4.840373934	4.840373934	66.87727772	1.18761E-10
Residual	48	3.474093994	0.072376958		
Total	49	8.314467928			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.485927476	0.073511596	6.610215249	2.9136E-08	0.338122508	0.633732444	0.338122508	0.633732444
Random2 (Debt or Treasury)	-1.042654326	0.12749732	-8.17785288	1.18761E-10	-1.299004865	-0.786303787	-1.299004865	-0.786303787

Trial 9

AROE = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.024490256
R Square	0.000599773
Adjusted R Square	-0.020221065
Standard Error	0.307939822
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.002731619	0.002731619	0.028806365	0.865940209
Residual	48	4.551692825	0.094826934		
Total	49	4.554424445			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.524451357	0.093660876	5.599470999	1.01949E-06	0.336133548	0.712769166	0.336133548	0.712769166
Random2 (Debt or Treasury)	-0.027033012	0.159275951	-0.169724379	0.865940209	-0.347278769	0.293212746	-0.347278769	0.293212746

MRP = constant + B*(Debt or Treasury) + e

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.681290608
R Square	0.464156893
Adjusted R Square	0.452993494
Standard Error	0.307939822
Observations	50

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3.942757812	3.942757812	41.57845932	5.16539E-08
Residual	48	4.551692825	0.094826934		
Total	49	8.494450637			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.524451357	0.093660876	5.599470999	1.01949E-06	0.336133548	0.712769166	0.336133548	0.712769166
Random2 (Debt or Treasury)	-1.027033012	0.159275951	-6.448136112	5.16539E-08	-1.347278769	-0.706787254	-1.347278769	-0.706787254

Random1 (AROE)	Random2 (Debt or Treasury)	Difference (MRP)
0.756127	0.934327	-0.1782
0.113782	0.949347	-0.8355657
0.789453	0.785504	0.0039492
0.584636	0.495334	0.089302
0.658984	0.69599	-0.0370063
0.203765	0.65625	-0.4524853
0.590139	0.316895	0.2732435
0.007921	0.55605	-0.5481295
0.978829	0.168912	0.8099169
0.602909	0.284876	0.3180326
0.783677	0.308071	0.4756058
0.336037	0.329555	0.0064822
0.817565	0.124485	0.6930804
0.056338	0.076866	-0.0205274
0.703415	0.219343	0.4840726
0.415617	0.41189	0.0037267
0.792599	0.375654	0.4169446
0.950111	0.286578	0.663533
0.033723	0.784584	-0.7508613
0.852488	0.480055	0.1724331
0.210362	0.762652	-0.5522899
0.180724	0.068107	0.1126165
0.636657	0.820511	-0.1838542
0.512249	0.756199	-0.24395
0.569785	0.962615	-0.3928297
0.946301	0.540437	0.4058639
0.915361	0.674209	0.2411515
0.88638	0.46678	0.4195996
0.38193	0.893913	-0.5119834
0.659568	0.76083	-0.1012623
0.140124	0.684305	-0.5441815
0.938588	0.792168	0.1464199
0.633677	0.42517	0.2085064
0.179877	0.614274	-0.4343974
0.98953	0.875384	0.1141462
0.667483	0.446996	0.2204869
0.067628	0.308359	-0.2407309
0.322329	0.066143	0.2561863
0.554893	0.362935	0.1919578
0.931339	0.992383	-0.0610437
0.534577	0.456505	0.0780723
0.384988	0.397164	-0.012176
0.571122	0.48757	0.0835522
0.1146	0.881107	-0.7665077
0.116765	0.667596	-0.550831
0.086352	0.736188	-0.6498364
0.314051	0.112919	0.2011312
0.033239	0.612511	-0.5792721
0.706532	0.104771	0.6017609

Trial 10

April 12, 2006

TO: Vikie Bailey-Goggins
            Oregon Public Utility Commission

FROM: Patrick G. Hager
            Manager, Regulatory Affairs

PORTLAND GENERAL ELECTRIC
UE 180
PGE Response to OPUC Data Request
Dated March 28, 2006
Question No. 083

Request:

Regarding PGE/1100, Hager-Valach/31, lines 10-14, is it correct that PGE regressed the "authorized ROE in each of the 486 decisions against the yield on the appropriate long-term corporate bond for each company?" If yes, please identify which of the "model" commands in the "POOLED CROSS-SECTIONAL TIME-SERIES DATA" section of PGE/1100, Work Papers/133 corresponds to the regression described in PGE/1100, Hager-Valach/31, lines 10-14. Please also indicate which variable from the "model" commands is the "authorized ROE."

Response:

No. The quote should read "regressed the *difference* between the authorized ROE and its most recent FMB yield to maturity against each individual utility's corporate bond yield to maturity (*debtcost*) in each of the 486 decisions."

The dependent variable in the equation is *riskprm*.

April 12, 2006

TO: Vikie Bailey-Goggins
Oregon Public Utility Commission

FROM: Patrick G. Hager
Manager, Regulatory Affairs

PORTLAND GENERAL ELECTRIC
UE 180
PGE Response to OPUC Data Request
Dated March 28, 2006
Question No. 088

Request:

Regarding PGE/1100, Hager-Valach/33, lines 6-12, is it correct that PGE regressed the "authorized ROE in each of the 486 decisions against the seven-year Treasury bond, lagged one month prior to the dates of the decisions?" If yes, please identify which of the "model" commands in the "POOLED CROSS-SECTIONAL TIME-SERIES DATA" section of PGE/1100, Work Papers/133 corresponds to the regression described in PGE/1100, Hager-Valach/33, lines 6-12. Please also indicate which variable from the "model" commands is the "authorized ROE."

Response:

No. The quote should read "regressed the *difference* between the authorized ROE and the seven year treasury bond, lagged one month (*RPTR71 or RPTR78*) against each of the lagged seven year treasury bond (*YR71 or YR78*) in each of the 486 decisions."

April 12, 2006

TO: Vikie Bailey-Goggins
           Oregon Public Utility Commission

FROM: Patrick G. Hager
           Manager, Regulatory Affairs

PORTLAND GENERAL ELECTRIC
UE 180
PGE Response to OPUC Data Request
Dated March 28, 2006
Question No. 085

<u>Request:</u>

Regarding PGE/1100, Hager-Valach/31, lines 10-14, did PGE run any tests to determine the level of integration between the "486 decisions" and the yield on the corporate bonds or the difference between the authorized ROE and the yield on corporate bonds and the yield on the corporate bonds? If yes, please identify each test and provide the results. If no, why not?

<u>Response:</u>

PGE did not perform these tests since the data used was a pooled cross-sectional sample and not just a time series. While one could theoretically test for autocorrelation across each of the companies, the data are not sufficient in number or in sequence to allow for such a test. Decisions on authorized ROE for a utility do not occur monthly or even yearly. Sometimes, there are several years between decisions.

April 27, 2006

TO: Vikie Bailey-Goggins
        Oregon Public Utility Commission

FROM: Patrick G. Hager
        Manager, Regulatory Affairs

**PORTLAND GENERAL ELECTRIC
UE 180
PGE Response to OPUC Data Request
Dated April 13, 2006
Question No. 206**

Request:

Regarding PGE's response to OPUC Staff Data Request 85 where PGE states "PGE did not perform these tests since the data used was a pooled cross-sectional sample and not just a time series." Were any tests run to determine if the cross-section parameters remained constant over time? If no, why not. If yes, please identify the statistical test run and provide the results.

Response:

PGE originally tested the data set over different time periods but did not apply sophisticated tests for heteroskedasticity.

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April 12, 2006

TO: Vikie Bailey-Goggins
        Oregon Public Utility Commission

FROM: Patrick G. Hager
        Manager, Regulatory Affairs

**PORTLAND GENERAL ELECTRIC
UE 180
PGE Response to OPUC Data Request
Dated March 28, 2006
Question No. 091**

Request:

Regarding the regression analysis described at PGE/1100, Hager-Valach/33, lines 6-12, did PGE run any tests to determine the optimal lag? If yes, please identify the tests and provide the results. If no, why not?

Response:

Previously we tested lags ranging from none to 10 months. The one month lag and eight month lag performed the best. This analysis was performed eight years ago (1998) and those results are no longer available.

April 27, 2006

TO: Vikie Bailey-Goggins
            Oregon Public Utility Commission

FROM: Patrick G. Hager
            Manager, Regulatory Affairs

**PORTLAND GENERAL ELECTRIC
UE 180
PGE Response to OPUC Data Request
Dated April 13, 2006
Question No. 202**

Request:

**Regarding PGE's response to OPUC Staff Data Request 91, PGE states that "[t]he one
month lag and eight month lag performed best." What test was conducted to determine
which lag "performed" best? Please list the tests and describe how the best performing
lags were chosen.**

Response:

PGE tested the models by running separate regressions testing each of the potential lags. PGE
then reviewed the results of each model, using the adjusted R-squared, t-tests, and F- values as
well as appropriated coefficient signs, among others. Based on our judgment, we chose the 1- and
8-month lag models.

April 27, 2006

TO: Vikie Bailey-Goggins
    Oregon Public Utility Commission

FROM: Patrick G. Hager
    Manager, Regulatory Affairs

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**PORTLAND GENERAL ELECTRIC
UE 180
PGE Response to OPUC Data Request
Dated April 13, 2006
Question No. 209**

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Request:

Regarding the regression analysis described at PGE/1100, Hager-Valach/31, lines 10-14, did PGE run any tests to determine forecasting accuracy? If yes, please identify the tests and provide the results. If no, why not?

Response:

PGE did not use a forecasting model. In developing the analysis all available data were used.

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April 27, 2006

TO: Vikie Bailey-Goggins
Oregon Public Utility Commission

FROM: Patrick G. Hager
Manager, Regulatory Affairs

**PORTLAND GENERAL ELECTRIC
UE 180
PGE Response to OPUC Data Request
Dated April 13, 2006
Question No. 210**

Request:

Regarding the regression analysis described at PGE/1100, Hager-Valach/33, lines 6-12, did PGE run any tests to determine forecasting accuracy? If yes, please identify the tests and provide the results. If not, why not?

Response:

PGE did not use a forecasting model. In developing the analysis all available data were used.

CERTIFICATE OF SERVICE

UE 180/UE 181/UE 184

I certify that I have this day served the foregoing document upon all parties of record in this proceeding by delivering a copy in person or by mailing a copy properly addressed with first class postage prepaid, or by electronic mail pursuant to OAR 860-13-0070, to the following parties or attorneys of parties.

Dated at Salem, Oregon, this 14th of August, 2006.

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UE 181
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